20.11.41 NMAC
"AUTHORITY-TO-CONSTRUCT"
AIR QUALITY PERMIT #3291-4AR-R1
SIGNIFICANT MODIFICATION APPLICATION

Albuquerque, New Mexico

PREPARED FOR
ALBUQUERQUE ASPHALT, INC.

DECEMBER 2017

Prepared by

Montrose Air Quality Services, Inc.

CLASS 1 TECHNICAL SERVICES

MONTROSE ENVIRONMENTAL

Introduction

With this 20.11.41.2 permit modification, Albuquerque Asphalt, Inc. (AAI) will revise Permit #3291-4AR-R1 for their 400 tph hot mix asphalt (HMA) plant and 300 tph recycled asphalt and concrete plant (RAP/Concrete).

AAI has retained Class One Technical Services (CTS) to assist with the significant modification application. The plant will be identified as AAI Broadway HMA and will be located at 5028 Broadway Blvd SE. The HMA facility at the Broadway site will consist of a HMA plant, and a recycle asphalt pavement (RAP)/concrete crushing plant. Co-located on the site will be AAI's KMA plant permitted under Permit #1955 and AAI's Complete Concrete and Excavation Permit #1838-4AR.

For the facility's site, the operating time for the HMA plant will be 24 hours per day, 7 days per week, or 8760 hours per year. For the permit modification, AAI will take permit conditions on daily HMA operating throughput. The HMA plant will reduce the permitted daily throughput to the following;

Month	Tons Per Day
January	2800
February	2800
March	2800
April	3600
May	3600
June	4000
July	4000
August	4000
September	3600
October	3600
November	2400
December	2400

Additionally, permit modification changes will include:

- For this permit modification, the HMA plant will operate on line power, so no HMA plant generators are included for the modification of Permit #3291-4AR-R1.
- AAI will crush both RAP and concrete with the RAP/Concrete crushing plant.
- AAI is requesting options on a particular RAP/Concrete crushing plant for four (4) potential plant options. The plants are rated by the manufacturer at 200 tph or greater, but AAI is requesting a permit limit of 200 tph based on manufacture rating for crushing RAP or concrete. This will allow them to operate their crushing operation with the most

flexibility. The dispersion modeling analysis for this flexibility will require modeling the worst-case scenario, since each plant has a different number of emission sources and engine/generator for each plant is different. The table below presents the number of emission sources for each plant layout. For this modeling analysis, the Lippmann plant layout was used.

Potential Crusher Plant	# of Emission Points
Presently Permitted	15
Terex	13
KPI	13
Lippmann	15
Kleemann	13

- There are five (5) potential engines to power the crusher plant. The worst-case emission rates were used in the modeling analysis. The model parameters follow the engine with the highest emission rates, which is the engine that is presently permitted in Permit #3291-4AR-R1.

Parameter	Permitted #3292 Lb/Hr	Terex Plant Engine Lb/Hr	KPI Plant Engine Lb/Hr	Lippmann Engine Lb/Hr	Kleemann Engine Lb/Hr
Horsepower	817	300	440	415	497
NOx	13.71	3.95	0.17	3.17	0.32
CO	0.49	0.71	0.00	2.20	0.16
SO2	0.28	0.11	0.16	0.14	0.22
PM	0.85	0.13	0.00	0.18	0.016

Emission rates highlighted in yellow are worst-case engine emission rates that will be used in modeling

Parameter	Permitted #3292	Terex Plant Engine	KPI Plant Engine	Lippmann Engine	Kleemann Engine
Horsepower	817	300	440	415	415
Stack Height	15 feet	15 feet	15 feet	15 feet	15 feet
Stack Exit Diameter	0.667 feet	0.333 feet	0.5 feet	0.5 feet	0.5 feet
Stack Exhaust Temp.	892° F	815° F	851.5° F	894.7° F	800° F
Stack Exhaust Flowrate	4626 ACFM	1835.3 ACFM	1524.6 ACFM	2520.1 ACFM	2356.2 ACFM
Stack Exhaust Velocity	220.9 ft/sec	350.6 ft/sec	129.4 ft/sec	213.9 ft/sec	200.0 ft/sec

Parameters highlighted in yellow were used in modeling. Along with emission rates (except for CO) the presently permitted emission rates is the worst-case model scenario for this application.

- The maximum hourly throughput for the RAP/Concrete Crusher Plant will decrease from 300 tph to 200 tph and the annual throughput will increase from 315,000 tons per year to

748,800 tons per year. The present and requested generator limits will remain at an annual operating hours of 3744. For the RAP/Concrete crushing plant, it will be limited to the hours listed in Table 1.

- The co-located AAI's KMA plant permitted under Permit #1955 will limit winter hours of operation to 6 AM to 6 PM daily while operating at the site.

The facility will produce hot mix asphalt used for road and highway projects. The HMA plant will consist of a feed bin, scalping screen, pug mill, lime silo with auger, drum dryer/mixer, asphalt cement oil heater, and multiple conveyors. The HMA plant will be powered by commercial line power, so generators/engines powering the HMA plant will be removed from with this permit modification. At this time the equipment has been purchased, but is in the process of being constructed.

TABLE 1: RAP/Concrete Plant Hours of Operation

	Winter	Spring	Summer	Fall
12:00 AM	0	0	0	0
1:00 AM	0	0	0	0
2:00 AM	0	0	0	0
3:00 AM	0	0	0	0
4:00 AM	0	0	0	0
5:00 AM	0	0	0	0
6:00 AM	0	0	0	0
7:00 AM	0	1	1	1
8:00 AM	1	1	1	1
9:00 AM	1	1	1	1
10:00 AM	1	1	1	1
11:00 AM	1	1	1	1
12:00 PM	1	1	1	1
1:00 PM	1	1	1	1
2:00 PM	1	1	1	1
3:00 PM	1	1	1	1
4:00 PM	1	1	1	1
5:00 PM	0	0	1	0
6:00 PM	0	0	1	0
7:00 PM	0	0	0	0
8:00 PM	0	0	0	0
9:00 PM	0	0	0	0
10:00 PM	0	0	0	0
11:00 PM	0	0	0	0

For Albuquerque Asphalt's KMA operating under Permit #1955, while operating at AAI Broadway HMA site will limit hours of operation during winter hours, December through February. Table 2 presents the hours of operation for the KMA plant.

TABLE 2: Modeled KMA Plant Hours of Operation

	Winter	Spring	Summer	Fall
12:00 AM	0	1	1	1
1:00 AM	0	1	1	1
2:00 AM	0	1	1	1
3:00 AM	0	1	1	1
4:00 AM	0	1	1	1
5:00 AM	0	1	1	1
6:00 AM	1	1	1	1
7:00 AM	1	1	1	1
8:00 AM	1	1	1	1
9:00 AM	1	1	1	1
10:00 AM	1	1	1	1
11:00 AM	1	1	1	1
12:00 PM	1	1	1	1
1:00 PM	1	1	1	1
2:00 PM	1	1	1	1
3:00 PM	1	1	1	1
4:00 PM	1	1	1	1
5:00 PM	1	1	1	1
6:00 PM	0	1	1	1
7:00 PM	0	1	1	1
8:00 PM	0	1	1	1
9:00 PM	0	1	1	1
10:00 PM	0	1	1	1
11:00 PM	0	1	1	1

The co-located Complete Concrete and Excavation permitted under Permit #1838-4AR will limit annual production to 265,000 cubic yards per year. Presently, Permit #1838-4AR limits production to 100 cubic yards per hour, 1000 cubic yards per day, and 365 days per year or 365,000 cubic yards per year. Operating hours are limited to 14 hours per day from 3 AM to 5 PM, 7 days per week and 52 weeks per year. Because of the limit on hourly and daily production this limits operating at maximum (100 cubic yards per hour) to 10 hours per day.

Particulate emissions for this facility will be controlled primarily by limiting annual production. The facility will also utilize baghouses on the lime silo and drum dryer to reduce the amount of particulate emitted from the plant. Furthermore, the use of moisture (water sprays) in material handling procedures and paving/millings/surfactants/watering on roadways will be utilized as controls for particulate emissions.

No startup/shutdown emission rates are expected to be greater than what is proposed for normal operations of the plant. All controls will be operating and functioning correctly prior to the start of production.

If you have any questions regarding this relocation application please call Paul Wade of Class One Technical Services at (505) 830-9680 x6 or Dan Fisher of AAI at (505) 831-7311.

The contents of this application packet include:

20.11.41 NMAC Permit Fee Review
20.11.41 NMAC Permit Modification Application Forms
Attachment A: Figure A-1: HMA Plant Process Flow
Figure A-2: RAP/Concrete Plant Process Flow
Figure A-3: Facility Site Plot Plan
Attachment B: Emission Calculations
Attachment C: Emission Calculations Support Documents
Attachment D: Figure E-1: 7.5 Minute USGS Topographic Map
Attachment E: Facility Description
Attachment F: Dispersion Modeling Summary and Report
Attachment G: Public Notice Documents

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Review Fee Instructions

All source registration, authority-to-construct, and operating permit applications for stationary or portable sources shall be charged an application review fee according to the fee schedule in 20.11.2 NMAC. These filing fees are required for both new construction, reconstruction, and permit modifications applications. Qualified small businesses as defined in 20.11.2 NMAC may be eligible to pay one-half of the application review fees and 100% of all applicable federal program review fees.

Please fill out the permit application review fee checklist and submit with a check or money order payable to the "City of Albuquerque Fund 242" and either:

1. be delivered in person to the Albuquerque Environmental Health Department, 3rd floor, Suite 3023 or Suite 3027, Albuquerque-Bernalillo County Government Center, south building, One Civic Plaza NW, Albuquerque, NM or,
2. mailed to Attn: Air Quality Program, Albuquerque Environmental Health Department, P.O. Box 1293, Albuquerque, NM 87103.

The department will provide a receipt of payment to the applicant. The person delivering or filing a submittal shall attach a copy of the receipt of payment to the submittal as proof of payment Application review fees shall not be refunded without the written approval of the manager. If a refund is requested, a reasonable professional service fee to cover the costs of staff time involved in processing such requests shall be assessed. Please refer to 20.11.2 NMAC (effective January 10, 2011) for more detail concerning the "Fees" regulation as this checklist does not relieve the applicant from any applicable requirement of the regulation.

City of Albuquerque

Environmental Health Department
Air Quality Program
Permit Application Review Fee Checklist

Please completely fill out the information in each section. Incompleteness of this checklist may result in the Albuquerque Environmental Health Department not accepting the application review fees. If you should have any questions concerning this checklist, please call 768-1972.

I. COMPANY INFORMATION:

Company Name	Albuquerque Asphalt, Inc.	
Company Address	202 94th St SW, Albuquerque, NM 87121	
Facility Name	Broadway HMA Plant	
Facility Address	5028 Broadway Blvd SE	
Contact Person	Dan Fisher	
Contact Person Phone Number	(505) 228-4485	
Are these application review fees for an existing permitted source located within the City of Albuquerque or Bernalillo County?	**<u>Yes</u>**	**No**
If yes, what is the permit number associated with this modification?	**Permit #3291-4AR-R1**	
Is this application review fee for a Qualified Small Business as defined in 20.11.2 NMAC? (See Definition of Qualified Small Business on Page 4)	**Yes**	**<u>No</u>**

II. STATIONARY SOURCE APPLICATION REVIEW FEES:

If the application is for a new stationary source facility, please check all that apply. If this application is for a modification to an existing permit please see Section III.

Check All That Apply	Stationary Sources	Review Fee	Program Element
	Stationary Source Review Fees (Not Based on Proposed Allowable Emission Rate)		
	Source Registration required by 20.11.40 NMAC	$ 549.00	2401
	A Stationary Source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$ 1,097.00	2301
	Not Applicable	*See Sections Below*	
	Stationary Source Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)		
	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$ 823.00	2302
	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$ 1,646.00	2303
	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$ 3,291.00	2304
	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$ 4,937.00	2305
	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$ 6,582.00	2306
	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$8,228.00	2307
	Not Applicable	*See Section Above*	
	Federal Program Review Fees (In addition to the Stationary Source Application Review Fees above)		
	40 CFR 60 - "New Source Performance Standards" (NSPS)	$ 1,097.00	2308
	40 CFR 61 - "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$ 1,097.00	2309
	40 CFR 63 - (NESHAPs) Promulgated Standards	$ 1,097.00	2310
	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$ 10,971.00	2311
	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$ 5,485.00	2312
	20.11.60 NMAC, Non-Attainment Area Permit	$ 5,485.00	2313
	Not Applicable	*Not Applicable*	

III. MODIFICATION TO EXISTING PERMIT APPLICATION REVIEW FEES:

If the permit application is for a modification to an existing permit, please check all that apply. If this application is for a new stationary source facility, please see Section II.

Check All That Apply	Modifications	Review Fee	Program Element
Modification Application Review Fees (Not Based on Proposed Allowable Emission Rate)			
	Proposed modification to an existing stationary source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$ 1,097.00	2321
	Not Applicable	*See Sections Below*	
Modification Application Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)			
	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$ 823.00	2322
	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$ 1,646.00	2323
	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$ 3,291.00	2324
X	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$ 4,937.00	2325
	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$ 6,582.00	2326
	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$ 8,228.00	2327
	Not Applicable	*See Section Above*	
Major Modifications Review Fees (In addition to the Modification Application Review Fees above)			
	20.11.60 NMAC, Permitting in Non-Attainment Areas	$ 5,485.00	2333
	20.11.61 NMAC, Prevention of Significant Deterioration	$ 5,485.00	2334
	Not Applicable	*Not Applicable*	
Federal Program Review Fees (This section applies only if a Federal Program Review is triggered by the proposed modification) (These fees are in addition to the Modification and Major Modification Application Review Fees above)			
	40 CFR 60 - “New Source Performance Standards” (NSPS)	$ 1,097.00	2328
	40 CFR 61 - “Emission Standards for Hazardous Air Pollutants (NESHAPs)	$ 1,097.00	2329
	40 CFR 63 - (NESHAPs) Promulgated Standards	$ 1,097.00	2330
	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$ 10,971.00	2331
	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$ 5,485.00	2332
	20.11.60 NMAC, Non-Attainment Area Permit	$ 5,485.00	2333
	Not Applicable	*Not Applicable*	

IV. ADMINISTRATIVE AND TECHNICAL REVISION APPLICATION REVIEW FEES:

If the permit application is for an administrative or technical revision of an existing permit issued pursuant to 20.11.41 NMAC, please check one that applies.

Check One	Revision Type	Review Fee	Program Element
	Administrative Revisions	$ 250.00	2340
	Technical Revisions	$ 500.00	2341
	Not Applicable	*See Sections II, III or V*	

V. PORTABLE STATIONARY SOURCE RELOCATION FEES:

If the permit application is for a portable stationary source relocation of an existing permit, please check one that applies.

Check One	Portable Stationary Source Relocation Type	Review Fee	Program Element
	No New Air Dispersion Modeling Required	$ 500.00	2501
	New Air Dispersion Modeling Required	$ 750.00	2502
	Not Applicable	*See Sections II, III or V*	

VI. Please submit a check or money order in the amount shown for the total application review fee.

Section Totals	Review Fee Amount
Section II Total	$
Section III Total	$4,937.00
Section IV Total	$
Section V Total	$
Total Application Review Fee	**$4,937.00**

I, the undersigned, a responsible official of the applicant company, certify that to the best of my knowledge, the information stated on this checklist, give a true and complete representation of the permit application review fees which are being submitted. I also understand that an incorrect submittal of permit application reviews may cause an incompleteness determination of the submitted permit application and that the balance of the appropriate permit application review fees shall be paid in full prior to further processing of the application.

Signed this 4TH **day of** DECEMBER **20**17

DAN FISHER
Print Name

VICE PRESIDENT OF ENGINEERING.
Print Title

[signature]
Signature

Definition of Qualified Small Business as defined in 20.11.2 NMAC:
"Qualified small business" means a business that meets all of the following requirements:

(1) a business that has 100 or fewer employees;
(2) a small business concern as defined by the federal Small Business Act;
(3) a source that emits less than 50 tons per year of any individual regulated air pollutant, or less than 75 tons per year of all regulated air pollutants combined; and
(4) a source that is not a major source or major stationary source.

Note: Beginning January 1, 2011, and every January 1 thereafter, an increase based on the consumer price index shall be added to the application review fees. The application review fees established in Subsection A through D of 20.11.2.18 NMAC shall be adjusted by an amount equal to the increase in the consumer price index for the immediately-preceding year. Application review fee adjustments equal to or greater than fifty cents ($0.50) shall be rounded up to the next highest whole dollar. Application review fee adjustments totaling less than fifty cents ($0.50) shall be rounded down to the next lowest whole dollar. The department shall post the application review fees on the city of Albuquerque environmental health department air quality program website.

Albuquerque Environmental Health Department - Air Quality Program
Please mail this application to **P.O. Box 1293, Albuquerque, NM 87103**
or hand deliver between 8:00am - 5:00pm Monday - Friday to:
3rd Floor, Suite 3023 - One Civic Plaza NW, Albuquerque, New Mexico 87103
(505) 768 – 1972 aqd@cabq.gov (505) 768 - 1977 (Fax)

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

Clearly handwrite or type **Corporate Information** **Submittal Date: 12/04/2017**

1. Company Name Albuquerque Asphalt Inc.
2. Street Address 202 94th St SW Zip 87121
3. Company City Albuquerque 4. Company State NM 5. Company Phone (505) 831-7311 6. Company Fax (505) 831-0811
7. Company Mailing Address: P.O. BOX 66450 Zip 87193
8. Company Contact and Title Dan Fisher - Vice President of Engineering 9. Phone (505) 831-7311
10. E-mail Dan@alb-asphalt.com

Stationary Source (Facility) Information: [Provide a plot plan (legal description/drawing of facility property) with overlay sketch of facility processes; Location of emission points; Pollutant type and distances to property boundaries]

1. Facility Name AAI Broadway HMA 2. Street Address 5028 Broadway Blvd SE

3. City Albuquerque 4. State NM 5. Facility Phone (505) 831-7311 6. Facility Fax (505) 831-0811

7. Facility Mailing Address (Local) P.O. BOX 66450 Zip 87193

8. Latitude - Longitude or UTM Coordinates of Facility 349,700E; 3,874,950 NAD 83, Zone 13

9. Facility Contact and Title Dan Fisher - Vice President of Engineering 10. Phone (505) 831-7311 11.E-mail Dan@alb-asphalt.com

General Operation Information (if any further information request does not pertain to your facility, write N/A on the line or in the box)

1. Facility Type (description of your facility operations) Hot Mix Asphalt Plant
2. Standard Industrial Classification (SIC 4 digit #) 2951
3. North American Industry Classification System (NAICS Code #) 324121
4. Is facility currently operating in Bernalillo County. NO If yes, date of original construction____/____/______
   If no, planned startup is 03/31/2018
5. Is facility permanent YES If no, give dates for requested temporary operation - from ____/____/______ through ____/____/______
6. Is facility process equipment new YES If no, give actual or estimated manufacture or installation dates in the Process Equipment Table.
7. Is application for a modification, expansion, or reconstruction (altering process, or adding, or replacing process equipment, etc.) to an existing facility which will result in a change in emissions YES. If yes, give the manufacture date of modified, added, or replacement equipment in the Process Equipment Table modification date column , or the operation changes to existing process/equipment which cause an emission increase.
8. Is facility operation (circle one) [Continuous **Intermittent** Batch]

9. Estimated % of production Jan-Mar 21% Apr-Jun 28% Jul-Sep 30% Oct-Dec 21%

10. Current or requested operating times of facility 24 hrs/day 7 days/wk 4 wks/mo 12 mos/yr

11. Business hrs_______ am/pm to ________ am/pm

12. Will there be special or seasonal operating times other than shown above YES If yes, explain: The hourly throughput for the HMA plant will be 400 tons per hour, with a daily throughput of 4000 tons per day (equivalent to operating 10 hours at maximum hourly throughput) for the months of June through August; a daily throughput of 2800 tons per day (equivalent to operating 7 hours at maximum hourly throughput) for the months of January, February and March; a daily throughput of 2400 tons per day (equivalent to operating 6 hours at maximum hourly throughput) for the months of November and December; and a daily throughput of 3600 tons per day (equivalent to operating 8 hours at maximum hourly throughput) for the months of April, May, September and October. For the RAP/Concrete Plant the hourly throughput for the RAP/Concrete plant will be limited at 200 tons per hour and the annual throughput will be limited to 748,800 tons per year. Hours of operation for the RAP/Concrete Plant will be from 8 AM to 5 PM in winter months, from 7 AM to 5 PM in spring months, from 7 AM to 7 PM in summer hours, and from 7 AM to 5 PM in fall months.

13. Raw materials processed Aggregate, mineral filler, recycled asphalt material, asphalt cement

14. Saleable item(s) produced Asphalt concrete

15. Permitting Action Being Requested

☐ New Permit X Permit Modification ☐ Technical Permit Revision ☐ Administrative Permit Revision

Current Permit #: 3291 Current Permit #: ___________ Current Permit #: ___________

PROCESS EQUIPMENT TABLE

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator, etc.) Match the Process Equipment Units listed on this Table to the same numbered line if also listed on Emissions & Stack Table (page 6).

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
1. HMA Cold Aggregate/RAP Storage Piles	NA	NA	NA	NA	TBD	NA	370 ton/hr. 832,500 ton/yr	NA
2. HMA Cold Aggregate Feed Bins(5)	Astec	1014-5	17-098-319740-1-1	2017	TBD	NA	230 ton/hr. 517,500 ton/yr	NA
3. HMA Cold Aggregate Feed Bin Conveyor	Astec	PSS-412-60	17-098-319740-2-1	2017	TBD	NA	230 ton/hr. 517,500 ton/yr	NA
4. HMA Scalping Screen	Telsmith	4x12 SDVK	S0199	2017	TBD	NA	230 ton/hr. 517,500 ton/yr	NA
5. HMA Scalping Screen Conveyor	Astec	PSS-412-60	17-098-319740-2-1	2017	TBD	NA	230 ton/hr. 517,500 ton/yr	NA
6. HMA Pug Mill	Astec	PLM-T400-60	17-098-319740-3-1	2017	TBD	NA	236 ton/hr. 531,000 ton/yr	NA
7. HMA Scale Conveyor	Astec	PSS-462-60	17-098-098-319740-2-1	2017	TBD	NA	236 ton/hr. 531,000 ton/yr	NA
8. HMA Slinger Conveyor	Astec	PLM-T400-60	17-098-319740-3-1	2017	TBD	NA	236 ton/hr. 531,000 ton/yr	NA
9. HMA RAP Bins (2)	Astec	RB-1014-2	17-098-319740-18-1	2017	TBD	NA	140 ton/hr. 315,000 ton/yr	NA
10. HMA RAP Bin Conveyor	Astec	RB-1014-2	17-098-319740-18-1	2017	TBD	NA	140 ton/hr. 315,000 ton/yr	NA
11. HMA RAP Screen	Telsmith	4x8 SDVK	SO200	2017	TBD	NA	140 ton/hr. 315,000 ton/yr	NA
12. HMA RAP Transfer Conveyor	Astec	SS-48-50	17-098-319740-19-1	2017	TBD	NA	140 ton/hr. 315,000 ton/yr	NA
13. HMA RAP Transfer Conveyor	Astec	RIC-3025	17-098-319740-36-1	2017	TBD	NA	140 ton/hr. 315,000 ton/yr	NA
14. HMA Mineral Filler Silo w/ Baghouse and Auger	Astec	DA650C	11-037	2017	TBD	NA	6 ton/hr. 13,500 ton/yr	NA
15. HMA Drum Dryer/Mixer	Astec	PDM-9638	17-098-319740-5-1	2017	TBD	NA	400 ton/hr 900,000 ton/yr	Fuel Oil, Natural Gas, or Propane
15. HMA Drum Dryer/Mixer Baghouse	Astec	PEBH-70-24	17-098-319740	2017	TBD	NA	69,685 ACFM	NA
16. HMA Asphalt Incline Conveyor	Astec	SEB-10036 PC-3684-1	245832-1-1 17-098-319740-24-1	2017	TBD	NA	400 ton/hr 900,000 ton/yr	NA
17. HMA Asphalt Silos (6)	Astec	KGW-200	C17-081 C17-082	2017	TBD	NA	400 ton/hr 900,000 ton/yr	NA

1. Basis for Equipment Size or Process Rate (Manufacturers data, Field Observation/Test, etc.) <u>Throughput for cold aggregate, RAP, and mineral filler processing equipment is based on an asphalt concrete mix ratio of 57.5% aggregate / 35% RAP / 1.5% mineral filler. This ratio will change with different asphalt concrete mixes and is not a requested limit on throughput of cold aggregate, RAP, or mineral filler.</u>

Submit information for each unit as an attachment

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

PROCESS EQUIPMENT TABLE

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator, etc.) Match the Process Equipment Units listed on this Table to the same numbered line if also listed on Emissions & Stack Table (page 6).

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
20. HMA Asphalt Heater	CEI	CHT-350P-SP	C17-083	2017	TBD	NA	2.5 MMBtu/hr 21,900 MMBtu/yr	Low Sulfur Diesel or NG/Propane
21. HMA Asphalt Cement Storage Tanks (2)	CEI	CTA-30DP	C17-085	2017	TBD	NA	5206 gal/hr. 11,713,666 gal/yr	NA
22. Haul Road Traffic	NA	NA	NA	NA	TBD	NA	32 trucks/hr 72,312 trucks/yr	NA
23. HMA Yard	NA	NA	NA	NA	TBD	NA	400 ton/hr 900,000 ton/yr	NA
24. Raw RAP/Concrete Storage Piles	NA	NA	NA	NA	TBD	NA	300 ton/hr. 748,800 ton/yr	NA
25. RAP/Concrete Crusher Plant Feeder	One of four Crusher Plant Terex Lippmann KPI Kleemann	Terex 4242 SR Lippmann 4800 Impact 526 Screen KPI FT4250CC Kleemann MR 110Z/110	Terex 420140CCSR Lippmann TBD KPI TBD Kleemann TBD	Terex 2005 Lippmann TBD KPI 2017 Kleemann TBD	Terex TBD Lippmann TBD KPI TBD Kleemann TBD	Terex TBD Lippmann TBD KPI TBD Kleemann TBD	300 ton/hr. 748,800 ton/yr	NA
26. RAP/Concrete Crusher Plant Primary Crusher							300 ton/hr. 748,800 ton/yr	NA
27. RAP/Concrete Crusher Plant Crusher Conveyor							300 ton/hr. 748,800 ton/yr	NA
28. RAP/Concrete Crusher Plant Screen Conveyor							300 ton/hr. 748,800 ton/yr	NA
29. RAP/Concrete Crusher Plant Transfer Chute							300 ton/hr. 748,800 ton/yr	NA
30. RAP/Concrete Crusher Plant Screen							480 ton/hr. 1,198,080 ton/yr	NA
31. RAP/Concrete Crusher Plant Secondary Crusher							180 ton/hr. 449,280 ton/yr	NA
32. RAP/Concrete Crusher Plant Transfer Conveyor							180 ton/hr. 449,280 ton/yr	NA
33. RAP/Concrete Crusher Plant Transfer Conveyor							180 ton/hr. 449,280 ton/yr	NA
34. RAP/Concrete Crusher Plant Transfer Conveyor							300 ton/hr. 748,800 ton/yr	NA
35. RAP/Concrete Crusher Plant Transfer Conveyor							300 ton/hr. 748,800 ton/yr	NA
36. RAP/Concrete Crusher Plant Stacker Conveyor							300 ton/hr. 748,800 ton/yr	NA
37. RAP/Concrete Crusher Plant Finish Pile							300 ton/hr. 748,800 ton/yr	NA
38. RAP/Concrete Crusher Plant Main Generator	CAT (Present)	3412CDITA	81Z18858	12/14/1995	TBD	TBD	Max Rating 817 hp	Low Sulfur Diesel
	CAT (Terex)	C-9	390863UHRC91	12/12/2004	TBD	TBD		
	CAT (Lippmann)	C-13	TBD	TBD	TBD	TBD		
	CAT (KPI)	C-13	N3F02460	07/13/2017	TBD	TBD		
	Scania (Kleemann)	CV AB	TBD	2016 or 17	TBD	TBD		

1. Basis for Equipment Size or Process Rate (Manufacturers data, Field Observation/Test, etc.) The RAP/Concrete plant throughput is based on 200 tons per hour input to the feeders. The RAP/concrete plant will have two (2) feeders, but the total hourly input to the plant will still be limited to 200 tons per hour. The process throughput to the secondary crusher and downstream conveyors from the crusher is 60 percent of the RAP plant throughput or 180 tons per hour.

TABLE EXEMPTED SOURCES AND EXEMPTED ACTIVITIES

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator, etc.) Match the Process Equipment Units listed on this Table to the same numbered line if also listed on Emissions & Stack Table (page 6).

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
1. NA							HR. YR.	
2.							HR. YR.	
3.							HR. YR.	
4.							HR. YR.	
5.							HR. YR.	
6.							HR. YR.	
7.							HR. YR.	
8.							HR. YR.	
9.							HR. YR.	
10.							HR. YR.	
11.							HR. YR.	
12.							HR. YR.	
13.							HR. YR.	
14.							HR. YR.	
15.							HR. YR.	

1. Basis for Equipment Size or Process Rate (Manufacturers data, Field Observation/Test, etc.)____
   Submit information for each unit as an attachment

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8,760 hrs)

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOC's)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
1. HMA Cold Aggregate/RAP Storage Pile	1. lbs/hr	lbs/hr	lbs/hr	lbs/hr	1.75 lbs/hr	AP-42 Section 13.2.4 "Aggregate Handling" 2% moisture content and 8.5 MPH wind speed
	1a. tons/yr	tons/yr	tons/yr	tons/yr	7.65 tons/yr	
2. HMA Cold Aggregate Feed Bin Loading	2. lbs/hr	lbs/hr	lbs/hr	lbs/hr	1.09 lbs/hr	AP-42 Section 13.2.4 "Aggregate Handling" 2% moisture content and 8.5 MPH wind speed
	2a. tons/yr	tons/yr	tons/yr	tons/yr	4.76 tons/yr	
3. HMA Cold Aggregate Feed Bin Unloading	3. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.69 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	3a. tons/yr	tons/yr	tons/yr	tons/yr	3.02 tons/yr	
4. HMA Scalping Screen	4. lbs/hr	lbs/hr	lbs/hr	lbs/hr	5.75 lbs/hr	AP-42 Table 11.19.2-2 "Screening Uncontrolled"
	4a. tons/yr	tons/yr	tons/yr	tons/yr	25.19 tons/yr	
5. HMA Scalping Screen Unloading to Scalping Screen Conveyor	5. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.69 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	5a. tons/yr	tons/yr	tons/yr	tons/yr	3.02 tons/yr	
6. HMA Pug Mill	6. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.71 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	6a. tons/yr	tons/yr	tons/yr	tons/yr	3.10 tons/yr	
7. HMA Pug Mill Unload to Scale Conveyor	7. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.71 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	7a. tons/yr	tons/yr	tons/yr	tons/yr	3.10 tons/yr	
8. HMA Scale Conveyor to Slinger Conveyor	8. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.71 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	8a. tons/yr	tons/yr	tons/yr	tons/yr	3.10 tons/yr	
9. HMA RAP Bin Loading	9. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.20 lbs/hr	AP-42 Section 13.2.4 "Aggregate Handling" 2% moisture content and 8.5 MPH wind speed plus inherent control of 70% from EPA EIIP Volume II, Chapter 3
	9a. tons/yr	tons/yr	tons/yr	tons/yr	0.87 tons/yr	
10. HMA RAP Bin Unloading to RAP Bin Conveyor	10. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.42 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	10a. tons/yr	tons/yr	tons/yr	tons/yr	1.84 tons/yr	
Totals of Uncontrolled Emissions (1 - 10)	**lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**	**12.7 lbs/hr**	
	tons/yr	**tons/yr**	**tons/yr**	**tons/yr**	**55.6 tons/yr**	

*** If any one (1) of these process units, <u>or</u> combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet. <u>Copy this Table if additional space is needed (begin numbering with 11., 12., etc.)</u>**

*** If all of these process units, individually <u>and</u> in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

<u>If your facility does not require a registration or permit, based on above emissions, complete the remainder of this application to determine if a registration or permit would be required for Toxic or Hazardous air pollutants used at your facility.</u>

UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8,760 hrs)

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOC's)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
11a. HMA RAP Screen	11a. lbs/hr	lbs/hr	lbs/hr	lbs/hr	3.50 lbs/hr	AP-42 Table 11.19.2-2 "Screening Uncontrolled"
	11aa. tons/yr	tons/yr	tons/yr	tons/yr	15.3 tons/yr	
11b. HMA RAP Screen Unloading to RAP Transfer Conveyor	11b. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.42 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	11ba. tons/yr	tons/yr	tons/yr	tons/yr	1.84 tons/yr	
12. HMA RAP Transfer Conveyor to RAP Transfer Conveyor	12. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.42 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	12a. tons/yr	tons/yr	tons/yr	tons/yr	1.84 tons/yr	
13. HMA RAP Transfer Conveyor to Drum Mixer	13. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.42 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	13a. tons/yr	tons/yr	tons/yr	tons/yr	1.84 tons/yr	
14. HMA Mineral Filler Silo Loading	14. lbs/hr	lbs/hr	lbs/hr	lbs/hr	18.0 lbs/hr	AP-42 Section 11.12 "Concrete Batching" Table 11.12-2 "Cement Unloading to Elevated Storage Silo"
	14a. tons/yr	tons/yr	tons/yr	tons/yr	18.9 tons/yr	
15. HMA Drum Mixer/Dryer	15. 52.0 lbs/hr	22.0 lbs/hr	12.8 lbs/hr	23.2 lbs/hr	11200 lbs/hr	AP-42 Section 11.1 "Hot Mix Asphalt Plants" Table 11.1-3, -4, -7, -8
	15a. 227.8 tons/yr	96.4 tons/yr	56.1 tons/yr	101.6 tons/yr	49056 tons/yr	
16. HMA Drum Mixer Unloading to Asphalt Incline Conveyor	16. 0.47 lbs/hr	lbs/hr	4.9 lbs/hr	lbs/hr	0.23 lbs/hr	AP-42 Section 11.1 "Hot Mix Asphalt Plants" Table 11.1-14
	16a. 2.1 tons/yr	tons/yr	21.4 tons/yr	tons/yr	1.03 tons/yr	
17. HMA Asphalt Silo Unloading to Trucks	17. 0.54 lbs/hr	lbs/hr	1.7 lbs/hr	lbs/hr	0.21 lbs/hr	AP-42 Section 11.1 "Hot Mix Asphalt Plants" Table 11.1-14
	17a. 2.4 tons/yr	tons/yr	7.3 tons/yr	tons/yr	0.91 tons/yr	
20. HMA Asphalt Heater	20. 0.20 lbs/hr	0.39 lbs/hr	0.027 lbs/hr	0.14 lbs/hr	0.039 lbs/hr	AP-42 1.3 (9/98) "Diesel" or AP-42 1.5 (7/08) "Natural Gas/Propane"
	20a. 0.90 tons/yr	1.7 tons/yr	0.12 tons/yr	0.61 tons/yr	0.17 tons/yr	
21. HMA Asphalt Cement Storage Tanks	21. lbs/hr	lbs/hr	0.037 lbs/hr	lbs/hr	lbs/hr	TANKS 4.0.9d
	21a. tons/yr	tons/yr	0.16 tons/yr	tons/yr	tons/yr	
22. Haul Road Traffic	22. lbs/hr	lbs/hr	lbs/hr	lbs/hr	30.1 lbs/hr	AP-42 13.2.2 "Unpaved Road" (11/06), AP-42 13.2.1 "Paved Road" (01/11)
	22a. tons/yr	tons/yr	tons/yr	tons/yr	35.3 tons/yr	
Totals of Uncontrolled Emissions (11 - 22)	**53.2 lbs/hr**	**22.4 lbs/hr**	**19.4 lbs/hr**	**23.3 lbs/hr**	**11253 lbs/hr**	
	233.1 tons/yr	**98.1 tons/yr**	**85.0 tons/yr**	**102.2 tons/yr**	**49133 tons/yr**	

*** If any one (1) of these process units, <u>or</u> combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet. <u>Copy this Table if additional space is needed (begin numbering with 11., 12., etc.)</u>**

*** If all of these process units, individually <u>and</u> in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

<u>If your facility does not require a registration or permit, based on above emissions, complete the remainder of this application to determine if a registration or permit would be required for Toxic or Hazardous air pollutants used at your facility.</u>

UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8,760 hrs)

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOC's)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
23. HMA Yard	23. 0.14 lbs/hr	lbs/hr	0.44 lbs/hr	lbs/hr	lbs/hr	AP-42 Section 11.1.2.5
	23a. 0.62 tons/yr	tons/yr	1.9 tons/yr	tons/yr	tons/yr	
24. Raw RAP/Concrete Storage Piles	24. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.94 lbs/hr	AP-42 Section 13.2.4 "Aggregate Handling" 2% moisture content and 8.5 MPH wind speed.
	24a. tons/yr	tons/yr	tons/yr	tons/yr	4.13 tons/yr	
25. RAP/Concrete Crusher Plant Feeder Loading	25. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.94 lbs/hr	AP-42 Section 13.2.4 "Aggregate Handling" 2% moisture content and 8.5 MPH wind speed.
	25a. tons/yr	tons/yr	tons/yr	tons/yr	4.13 tons/yr	
26. RAP/Concrete Crusher Plant Primary Crusher	26. lbs/hr	lbs/hr	lbs/hr	lbs/hr	1.08 lbs/hr	AP-42 Table 11.19.2-2 "Tertiary Crushing Uncontrolled"
	26a. tons/yr	tons/yr	tons/yr	tons/yr	4.73 tons/yr	
27. RAP/Concrete Crusher Plant Crusher to Crusher Conveyor	27. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.60 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	27a. tons/yr	tons/yr	tons/yr	tons/yr	2.63 tons/yr	
28. RAP/Concrete Crusher Plant Crusher Conveyor to Screen Conveyor	28. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.60 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	28a. tons/yr	tons/yr	tons/yr	tons/yr	2.63 tons/yr	
29. RAP/Concrete Crusher Plant Transfer Chute	29. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.36 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	29a. tons/yr	tons/yr	tons/yr	tons/yr	1.58 tons/yr	
30. RAP/Concrete Crusher Plant Screen	30. lbs/hr	lbs/hr	lbs/hr	lbs/hr	8.0 lbs/hr	AP-42 Table 11.19.2-2 "Screening Uncontrolled"
	30a. tons/yr	tons/yr	tons/yr	tons/yr	35.0 tons/yr	
31. RAP/Concrete Crusher Plant Secondary Crusher	31. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.65 lbs/hr	AP-42 Table 11.19.2-2 "Tertiary Crushing Uncontrolled"
	31a. tons/yr	tons/yr	tons/yr	tons/yr	2.84 tons/yr	
32. RAP/Concrete Crusher Plant Screen to Transfer Conveyor (Recycle)	32. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.36 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	32a. tons/yr	tons/yr	tons/yr	tons/yr	1.58 tons/yr	
33. RAP/Concrete Crusher Plant Transfer Conveyor to Transfer Conveyor (Recycle)	33. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.36 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	33a. tons/yr	tons/yr	tons/yr	tons/yr	1.58 tons/yr	
34. RAP/Concrete Crusher Plant Screen to Screen Conveyor	34. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.60 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	34a. tons/yr	tons/yr	tons/yr	tons/yr	2.63 tons/yr	
Totals of Uncontrolled Emissions (23 - 34)	**0.14 lbs/hr**	**lbs/hr**	**0.44 lbs/hr**	**lbs/hr**	**14.5 lbs/hr**	
	0.62 tons/yr	**tons/yr**	**1.9 tons/yr**	**tons/yr**	**63.5 tons/yr**	

*** If any one (1) of these process units, <u>or</u> combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet. <u>Copy this Table if additional space is needed (begin numbering with 11., 12., etc.)</u>**

*** If all of these process units, individually <u>and</u> in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

<u>If your facility does not require a registration or permit, based on above emissions, complete the remainder of this application to determine if a registration or permit would be required for Toxic or Hazardous air pollutants used at your facility.</u>

UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8,760 hrs)

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOC's)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
35. RAP/Concrete Crusher Plant Screen Conveyor to Transfer Conveyor	35. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.60 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	35a. tons/yr	tons/yr	tons/yr	tons/yr	2.63 tons/yr	
36. RAP/Concrete Crusher Plant Transfer Conveyor to Stacker Conveyor	36. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.60 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	36a. tons/yr	tons/yr	tons/yr	tons/yr	2.63 tons/yr	
37. RAP/Concrete Crusher Plant Stacker Conveyor to Finish Pile	37. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.94 lbs/hr	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
	37a. tons/yr	tons/yr	tons/yr	tons/yr	4.13 tons/yr	
38. RAP/Concrete Crusher Plant Main Generator	38. 2.20 lbs/hr	13.7 lbs/hr	0.27 lbs/hr	0.28 lbs/hr	0.85 lbs/hr	Maximum Manufacturer Emission Limits – NOx, CO, VOC, PM SO2 – Mass Balance
	38a. 9.64 tons/yr	60.0 tons/yr	1.18 tons/yr	1.23 tons/yr	3.72 tons/yr	
Totals of Uncontrolled Emissions (35 - 38)	**2.20 lbs/hr**	**13.7 lbs/hr**	**0.27 lbs/hr**	**0.28 lbs/hr**	**3.0 lbs/hr**	
	9.64 tons/yr	**60.0 tons/yr**	**1.18 tons/yr**	**1.23 tons/yr**	**13.1tons/yr**	

*** If any one (1) of these process units, or combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet. Copy this Table if additional space is needed (begin numbering with 11., 12., etc.)**

*** If all of these process units, individually and in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

If your facility does not require a registration or permit, based on above emissions, complete the remainder of this application to determine if a registration or permit would be required for Toxic or Hazardous air pollutants used at your facility.

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Based on current operations with emission controls OR requested operations with emission controls)

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table (pg. 3)

Process Equipment Unit	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOC's)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Control Method	% Efficiency
1. HMA Cold Aggregate/RAP Storage Pile	1. lbs/hr	lbs/hr	lbs/hr	lbs/hr	1.75 lbs/hr	N/A	N/A
	1a. tons/yr	tons/yr	tons/yr	tons/yr	1.96 tons/yr		
2. HMA Cold Aggregate Feed Bin Loading	2. lbs/hr	lbs/hr	lbs/hr	lbs/hr	1.09 lbs/hr	N/A	N/A
	2a. tons/yr	tons/yr	tons/yr	tons/yr	1.22 tons/yr		
3. HMA Cold Aggregate Feed Bin Unloading	3. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.032 lbs/hr	Water spray or Moisture Content	95.33%
	3a. tons/yr	tons/yr	tons/yr	tons/yr	0.036 tons/yr		
4. HMA Scalping Screen	4. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.51 lbs/hr	Water spray or Moisture Content	91.20%
	4a. tons/yr	tons/yr	tons/yr	tons/yr	0.57 tons/yr		
5. HMA Scalping Screen Unloading to Scalping Screen Conveyor	5. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.032 lbs/hr	Water spray or Moisture Content	95.33%
	5a. tons/yr	tons/yr	tons/yr	tons/yr	0.036 tons/yr		
6. HMA Pug Mill	6. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.033 lbs/hr	Water spray or Moisture Content	95.33%
	6a. tons/yr	tons/yr	tons/yr	tons/yr	0.037 tons/yr		
7. HMA Pug Mill Unload to Scale Conveyor	7. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.033 lbs/hr	Water spray or Moisture Content	95.33%
	7a. tons/yr	tons/yr	tons/yr	tons/yr	0.037 tons/yr		
8. HMA Scale Conveyor to Slinger Conveyor	8. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.033 lbs/hr	Water spray or Moisture Content	95.33%
	8a. tons/yr	tons/yr	tons/yr	tons/yr	0.037 tons/yr		
9. HMA RAP Bin Loading	9. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.20 lbs/hr	N/A	N/A
	9a. tons/yr	tons/yr	tons/yr	tons/yr	0.22 tons/yr		
10. HMA RAP Bin Unloading to RAP Bin Conveyor	10. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.020 lbs/hr	Water spray or Moisture Content	95.33%
	10a. tons/yr	tons/yr	tons/yr	tons/yr	0.022 tons/yr		
Totals of Controlled Emissions (1 - 10)	**lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**	**3.72 lbs/hr**		
	tons/yr	**tons/yr**	**tons/yr**	**tons/yr**	**4.18 tons/yr**		

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test,AP-42, etc.)
   Control efficiency based on AP-42 emission factors [1-(controlled/uncontrolled)]
   Submit information for each unit as an attachment

2. Explain and give estimated amounts of any Fugitive Emission associated with facility processes ____________________

____

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Based on current operations with emission controls OR requested operations with emission controls)

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table (pg. 3)

Process Equipment Unit	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOC's)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Control Method	% Efficiency
11a. HMA RAP Screen	11a. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.31 lbs/hr	Water spray or Moisture Content	91.20%
	11aa. tons/yr	tons/yr	tons/yr	tons/yr	0.35 tons/yr		
11b. HMA RAP Screen Unloading to RAP Transfer Conveyor	11b. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.020 lbs/hr	Water spray or Moisture Content	95.33%
	11ba. tons/yr	tons/yr	tons/yr	tons/yr	0.022 tons/yr		
12. HMA RAP Transfer Conveyor to RAP Transfer Conveyor	12. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.020 lbs/hr	Water spray or Moisture Content	95.33%
	12a. tons/yr	tons/yr	tons/yr	tons/yr	0.022 tons/yr		
13. HMA RAP Transfer Conveyor to Drum Mixer	13. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.020 lbs/hr	Water spray or Moisture Content	95.33%
	13a. tons/yr	tons/yr	tons/yr	tons/yr	0.022 tons/yr		
14. HMA Mineral Filler Silo Loading	14. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.18 lbs/hr	Baghouse	99%
	14a. tons/yr	tons/yr	tons/yr	tons/yr	0.049 tons/yr		
15. HMA Drum Mixer/Dryer	15. 52.0 lbs/hr	22.0 lbs/hr	12.8 lbs/hr	23.2 lbs/hr	13.2 lbs/hr	Baghouse	99.88%
	15a. 58.5 tons/yr	24.8 tons/yr	14.4 tons/yr	26.1 tons/yr	14.9 tons/yr		
16. HMA Drum Mixer Unloading to Asphalt Incline Conveyor	16. 0.47 lbs/hr	lbs/hr	4.9 lbs/hr	lbs/hr	0.23 lbs/hr	N/A	N/A
	16a. 0.53 tons/yr	tons/yr	5.5 tons/yr	tons/yr	0.26 tons/yr		
17. HMA Asphalt Silo Unloading to Trucks	17. 0.54 lbs/hr	lbs/hr	1.66 lbs/hr	lbs/hr	0.21 lbs/hr	N/A	N/A
	17a. 0.61 tons/yr	tons/yr	1.87 tons/yr	tons/yr	0.23 tons/yr		
20. HMA Asphalt Heater	20. 0.20 lbs/hr	0.39 lbs/hr	0.027 lbs/hr	0.14 lbs/hr	0.039 lbs/hr	N/A	N/A
	20a. 0.90 tons/yr	1.71 tons/yr	0.12 tons/yr	0.61 tons/yr	0.17 tons/yr		
21. HMA Asphalt Cement Storage Tanks	21. lbs/hr	lbs/hr	0.037 lbs/hr	lbs/hr	lbs/hr	N/A	N/A
	21a. tons/yr	tons/yr	0.16 tons/yr	tons/yr	tons/yr		
22. Haul Road Traffic	22. lbs/hr	lbs/hr	lbs/hr	lbs/hr	5.48 lbs/hr	Unpaved Roads-Surfactants or equivalent, Paved - None	Unpaved - 90% Paved – 0.0%
	22a. tons/yr	tons/yr	tons/yr	tons/yr	6.64 tons/yr		
Totals of Controlled Emissions (11 - 22)	**53.2 lbs/hr**	**22.4 lbs/hr**	**19.4 lbs/hr**	**23.3 lbs/hr**	**19.7 lbs/hr**		
	60.5 tons/yr	**26.5 tons/yr**	**22.0 tons/yr**	**26.7 tons/yr**	**22.6 tons/yr**		

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test,AP-42, etc.)
 Unit 14 – % control efficiency is conservative estimate for silo baghouse filter; Unit 15 – % control efficiency is controlled/uncontrolled emission factors from AP-42 Section 11.1, Unit 22 "Unpaved Roads" – New Mexico Environmental Department – Air Quality Bureau default control efficiency for surfactants or equivalent.
 Submit information for each unit as an attachment

2. Explain and give estimated amounts of any Fugitive Emission associated with facility processes ____________________

____

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Based on current operations with emission controls OR requested operations with emission controls)

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table (pg. 3)

Process Equipment Unit	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOC's)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Control Method	% Efficiency
23. HMA Yard	23. 0.14 lbs/hr	lbs/hr	0.44 lbs/hr	lbs/hr	lbs/hr	N/A	N/A
	23a. 0.16 tons/yr	tons/yr	0.50 tons/yr	tons/yr	tons/yr		
24. Raw RAP/Concrete Storage Piles	24. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.94 lbs/hr	N/A	N/A
	24a. tons/yr	tons/yr	tons/yr	tons/yr	1.77 tons/yr		
25. RAP/Concrete Crusher Plant Feeder Loading	25. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.94 lbs/hr	N/A	N/A
	25a. tons/yr	tons/yr	tons/yr	tons/yr	1.77 tons/yr		
26. RAP/Concrete Crusher Plant Primary Crusher	26. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.24 lbs/hr	Water spray or Moisture Content	88.33%
	26a. tons/yr	tons/yr	tons/yr	tons/yr	0.45 tons/yr		
27. RAP/Concrete Crusher Plant Crusher to Crusher Conveyor	27. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.028 lbs/hr	Water spray or Moisture Content	95.33%
	27a. tons/yr	tons/yr	tons/yr	tons/yr	0.052 tons/yr		
28. RAP/Concrete Crusher Plant Crusher Conveyor to Screen Conveyor	28. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.028 lbs/hr	Water spray or Moisture Content	95.33%
	28a. tons/yr	tons/yr	tons/yr	tons/yr	0.052 tons/yr		
29. RAP/Concrete Crusher Plant Transfer Chute	29. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.017 lbs/hr	Water spray or Moisture Content	95.33%
	29a. tons/yr	tons/yr	tons/yr	tons/yr	0.031 tons/yr		
30. RAP/Concrete Crusher Plant Screen	30. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.70 lbs/hr	Water spray or Moisture Content	91.20%
	30a. tons/yr	tons/yr	tons/yr	tons/yr	1.32 tons/yr		
31. RAP/Concrete Crusher Plant Secondary Crusher	31. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.14 lbs/hr	Water spray or Moisture Content	88.33%
	31a. tons/yr	tons/yr	tons/yr	tons/yr	0.27 tons/yr		
32. RAP/Concrete Crusher Plant Screen to Transfer Conveyor (Recycle)	32. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.017 lbs/hr	Water spray or Moisture Content	95.33%
	32a. tons/yr	tons/yr	tons/yr	tons/yr	0.031 tons/yr		
33. RAP/Concrete Crusher Plant Transfer Conveyor to Transfer Conveyor (Recycle)	33. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.017 lbs/hr	Water spray or Moisture Content	95.33%
	33a. tons/yr	tons/yr	tons/yr	tons/yr	0.031 tons/yr		
34. RAP/Concrete Crusher Plant Screen to Screen Conveyor	34. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.028 lbs/hr	Water spray or Moisture Content	95.33%
	34a. tons/yr	tons/yr	tons/yr	tons/yr	0.052 tons/yr		
Totals of Controlled Emissions (23 - 34)	**0.14 lbs/hr**	**lbs/hr**	**0.44 lbs/hr**	**lbs/hr**	**3.11 lbs/hr**		
	0.16 tons/yr	**tons/yr**	**0.50 tons/yr**	**tons/yr**	**5.82tons/yr**		

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test,AP-42, etc.)
____
Submit information for each unit as an attachment

2. Explain and give estimated amounts of any Fugitive Emission associated with facility processes ____

____

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Based on current operations with emission controls OR requested operations with emission controls)

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table (pg. 3)

Process Equipment Unit	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOC's)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Control Method	% Efficiency
35. RAP/Concrete Crusher Plant Screen Conveyor to Transfer Conveyor	35. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.028 lbs/hr	Water spray or Moisture Content	95.33%
	35a. tons/yr	tons/yr	tons/yr	tons/yr	0.052 tons/yr		
36. RAP/Concrete Crusher Plant Transfer Conveyor to Stacker Conveyor	36. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.028 lbs/hr	Water spray or Moisture Content	95.33%
	36a. tons/yr	tons/yr	tons/yr	tons/yr	0.052 tons/yr		
37. RAP/Concrete Crusher Plant Stacker Conveyor to Finish Pile	37. lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.57 lbs/hr	Water spray or Moisture Content	40%
	37a. tons/yr	tons/yr	tons/yr	tons/yr	1.06 tons/yr		
38. RAP/Concrete Crusher Plant Main Generator	38. 2.20 lbs/hr	13.7 lbs/hr	0.27 lbs/hr	0.28 lbs/hr	0.85 lbs/hr	N/A	N/A
	38a. 4.12 tons/yr	25.7 tons/yr	0.51 tons/yr	0.52 tons/yr	1.59 tons/yr		
Totals of Controlled Emissions (35 - 38)	**2.20 lbs/hr**	**13.7 lbs/hr**	**0.27 lbs/hr**	**0.28 lbs/hr**	**1.5 lbs/hr**		
	4.12 tons/yr	**25.7 tons/yr**	**0.51 tons/yr**	**0.52 tons/yr**	**2.1 tons/yr**		
Totals of Controlled Emissions (1 - 38)	**54.0 lbs/hr**	**26.3 lbs/hr**	**20.0 lbs/hr**	**23.4 lbs/hr**	**26.5 lbs/hr**		
	61.9 tons/yr	**33.9 tons/yr**	**26.9 tons/yr**	**26.9 tons/yr**	**28.5 tons/yr**		

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test,AP-42, etc.)
   Unit 37 – % control efficiency based on increasing the moisture content of the raw material based on the NMED default of 2% to a moisture content of 2.88% during processing through the RAP/Concrete plant.
   Submit information for each unit as an attachment

2. Explain and give estimated amounts of any Fugitive Emission associated with facility processes ____

____

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

**TOXIC EMISSIONS

VOLATILE, HAZARDOUS, & VOLATILE HAZARDOUS AIR POLLUTANT EMISSION TABLE

Product Categories (Coatings, Solvents, Thinners, etc.)	Volatile Organic Compound (VOC), Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service Number (CAS) Of VOC, HAP, Or VHAP From Representative As Purchased Product	VOC, HAP, Or VHAP Concentration Of Representative As Purchased Product (pounds/gallon, or %)	1. How were Concentrations Determined (CPDS, MSDS, etc.)	Total Product Purchases For Category	(-)	Quantity Of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
I. NA	NA	NA	NA	NA	lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
II.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
III.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
IV.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
V.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
VI.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
VII.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
VIII.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
IX.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
X.					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr
TOTAL >>>>>>>					lbs/yr	(-)	lbs/yr	(=)	lbs/yr
					gal/yr		gal/yr		gal/yr

1. Basis for percent (%) determinations (Certified Product Data Sheets, Material Safety Data Sheets, etc.). Submit, as an attachment, information on one (1) product from each Category listed above which best represents the average of all the products purchased in that Category. Copy this Table if additional space is needed (begin numbering with XI., XII., etc.)

****NOTE: A REGISTRATION IS REQUIRED, AT MINIMUM, FOR ANY AMOUNT OF HAP OR VHAP EMISSION.**
A PERMIT MAY BE REQUIRED FOR THESE EMISSIONS, DETERMINED ON A CASE-BY-CASE EVALUATION.

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

MATERIAL AND FUEL STORAGE TABLE

(Tanks, barrels, silos, stockpiles, etc.) Copy this table if additional space is needed (begin numbering with 6., 7., etc.)

Storage Equipment	Product Stored	Capacity (bbls - tons gal - acres,etc)	Above or Below Ground	Construction (welded, riveted) & Color	Install Date	Loading Rate	Offloading Rate	True Vapor Pressure	Control Equipment	Seal Type	% Eff.
T1.	Hot oil Asphalt Cement	30,000 gal.	Above	Welded - Silver	TBD	5000 gal 5,856,833 gal /YR	2603 gal/HR 5,856,833 gal /YR.	0.0050 Psia	NA	NA	NA
T2.	Hot oil Asphalt Cement	30,000 gal.	Above	Welded - Silver	TBD	5000 gal 5,856,833 gal /YR	2603 gal/HR 5,856,833 gal /YR.	0.0050 Psia	NA	NA	NA
T3.	Burner Fuel Oil	10,000 gal.	Above	Welded - White	TBD	3000 gal 405,000 gal/YR	360 gal/HR 405,000 gal/ YR	0.00089 Psia	NA	NA	NA
T4.	Burner Fuel Oil	10,000 gal.	Above	Welded - White	TBD	3000 gal 405,000 gal/YR	360 gal/HR 405,000 gal/ YR	0.00089 Psia	NA	NA	NA
T5.	Diesel Fuel	10,000 gal.	Above	Welded - White	TBD	3000 gal 320,580 gal/ YR	59.5 gal/HR 320,580 gal/ YR	0.00089 Psia	NA	NA	NA
1.	Cold Aggregate /RAP/ Concrete Storage Piles	2.5 Acres	Above	NA	TBD	430 tons/HR 1,266,300 ton/ YR	430 tons/HR 1,266,300 ton/ YR	NA	NA	NA	NA

1. Basis for Loading/Offloading Rate (Manufacturers data, Field Observation/Test, etc.) Submit information for each unit as an attachment
   Delivery truck capacity for asphalt cement and fuel deliveries

2. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test, AP-42, etc.) Submit information for each unit as an attachment
   No controls for storage equipment

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

STACK AND EMISSION MEASUREMENT TABLE

If any equipment from the Process Equipment Table (Page 2) is also listed in this Stack Table, use the same numbered line for the Process Equipment unit on both Tables to show the association between the Process Equipment and its Stack. Copy this table if additional space is needed (begin numbering with 6., 7., etc.).

Process Equipment	Pollutant (CO,NOx,TSP, Toluene,etc)	Control Equipment	Control Efficiency	Stack Height & Diameter in feet	Stack Temp.	Stack Velocity & Exit Direction	Emission Measurement Equipment Type	Range-Sensitivity-Accuracy-
14. Mineral Filler Silo Baghouse	PM	Baghouse	99%	30 ft / 6 in	Ambient	42 fps / Horizontal	NA	NA
15. Drum Mixer Baghouse	CO, NOx, SO2, VOC, PM	Baghouse	99.88%	30 ft / 4.23 ft	200° F	82.5 fps / Vertical	NA	NA
20. HMA Asphalt Heater	CO, NOx, SO2, VOC, PM	NA	NA	14 ft / 12 in	600° F	20.7 fps / Raincap	NA	NA
38. RAP/Concret e Plant Generator	CO, NOx, SO2, VOC, PM	NA	NA	15 ft / 8 in	892° F	220.9 fps / Vertical	NA	NA

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test,AP-42, etc.) Submit information for each unit as an attachment
Unit 14 – % control efficiency is conservative estimate for silo baghouse filter; Unit 15 – % control efficiency is controlled/uncontrolled emission factors from AP-42 Section 11.1

I, the undersigned, a responsible officer of the applicant company, certify that to the best of my knowledge, the information stated on this application, together with associated drawings, specifications, and other data, give a true and complete representation of the existing, modified existing, or planned new stationary source with respect to air pollution sources and control equipment. I also understand that any significant omissions, errors, or misrepresentations in these data will be cause for revocation of part or all of the resulting registration or permit.

Signed this 4TH day of DECEMBER, 20 17

Dan Fisher
Print Name

Vice President of Engineering
Print Title

[signature]
Signature

Attachment A
Facility Process Flow Diagrams and Plot Plan

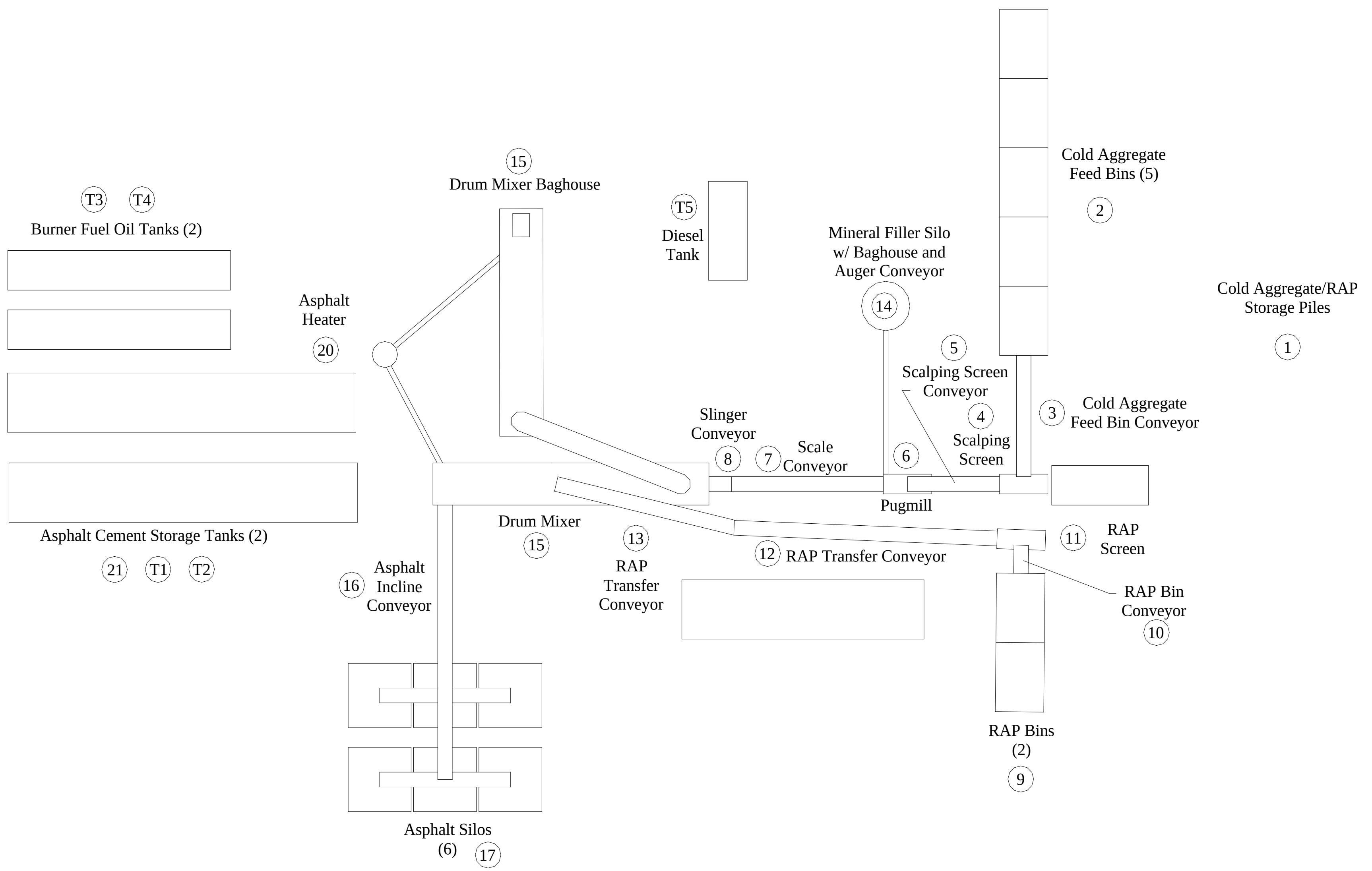

Figure A-1: AAI's HMA Process Flow

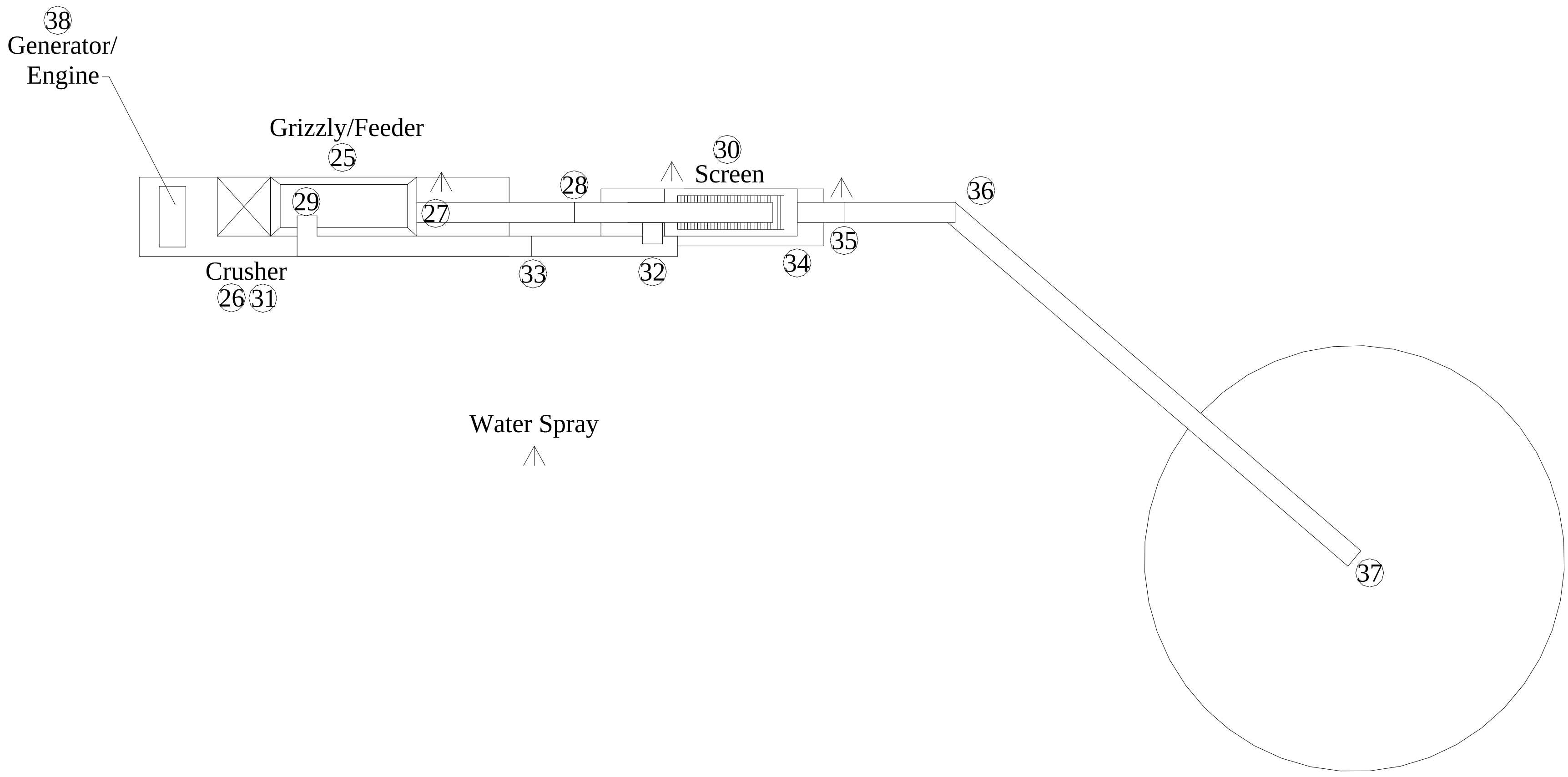

Figure A-2: AAI's Worst-Case RAP/Concrete Plant Process Flow

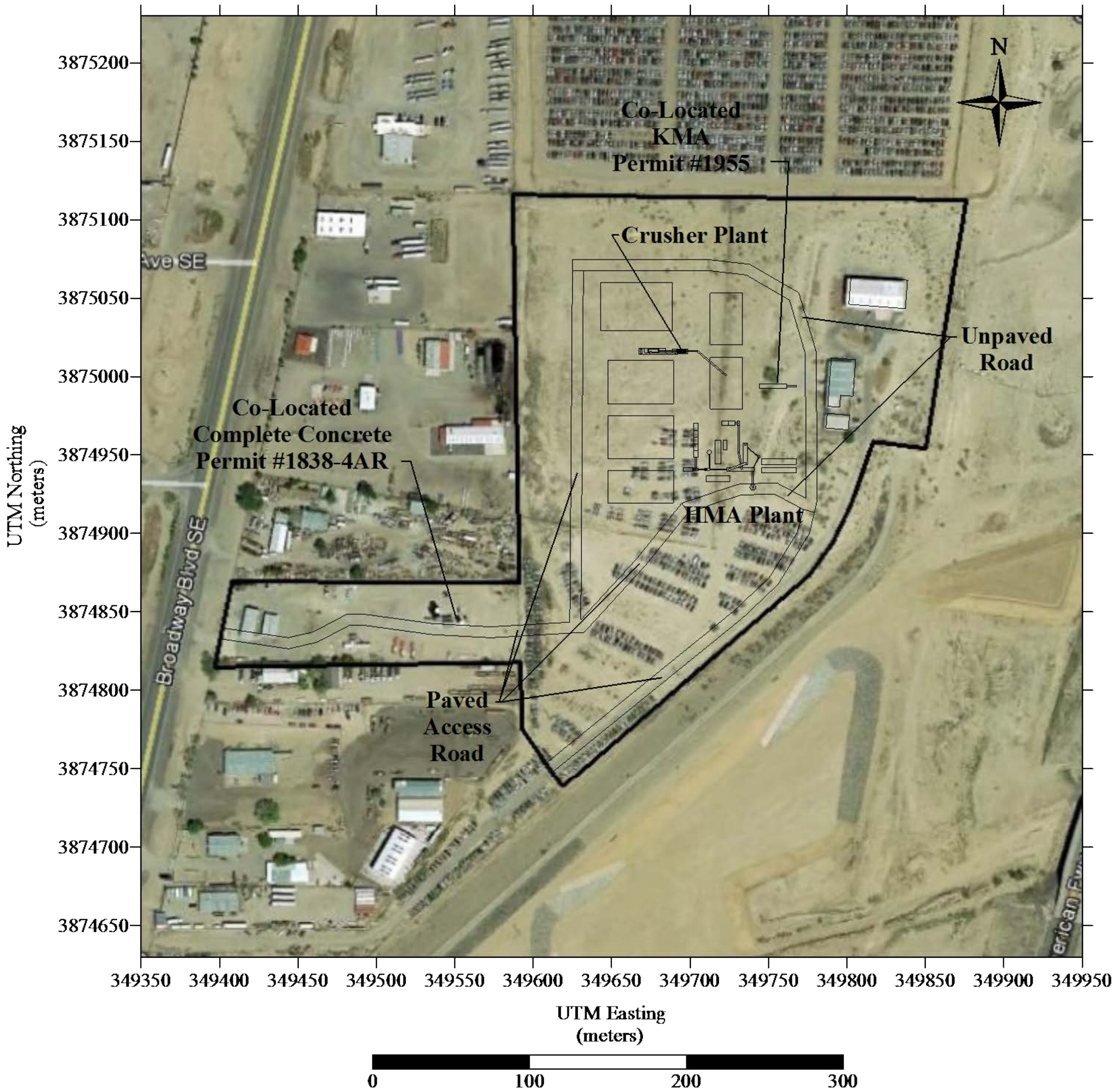

Figure A-3: AAI's Broadway HMA Plant Layout

Attachment B
Emissions Calculations

Pre-Control Particulate Emission Rates

MATERIAL HANDLING ($PM_{2.5}$, PM_{10}, AND TSP)

To estimate material handling pre-control particulate emissions rates for crushing, screening, 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 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 feed bins/stacker conveyor to pile loading), 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 and annual emission rate emission rate are based on the average wind speed for Albuquerque for the years of 1996 through 2006 of 8.5 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 0.995/0.050 from $TSP/PM_{2.5}$ uncontrolled 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 400 tons per hours. Virgin aggregate/ RAP/Mineral filler/Asphalt cement ratios used in estimating material handling particulate emission rates is equal to 57.5/35.0/1.5/6.0. These ratios are estimates and ratios may change with mix requirements, these are not requested permit conditions. Maximum hourly RAP plant production is 200 tons per hour.

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_{TSP} (lbs/ton) = 0.74 x 0.0032 x $(8.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.5/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{TSP} (lbs/ton) = 0.00472 lbs/ton;

E_{PM10} (lbs/ton) = 0.00223 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00034 lbs/ton

AP-42 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
Pug Mill = Uncontrolled Conveyor Transfer Point Emission Factor

Material Handling Emission Factors:

Process Unit	TSP 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	0.00132
Uncontrolled Screen Unloading, Pug Mill Loading and Unloading, Feed Bin Unloading, and Conveyor Transfers	0.00300	0.00110	0.00017
Uncontrolled Aggregate Storage Piles, Aggregate Feeder Loading, Stacker Conveyor Unloading	0.00472	0.00223	0.00034

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

Process Unit	TSP Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Mineral Filler Silo Loading	0.72	0.46	0.036

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 B-1 Pre-Controlled Material Handling Emission Rates

Unit #	Process Unit Description	Process Rate (tph)	TSP Emission Rate (lbs/hr)	TSP 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)
1	Cold Aggregate/RAP Storage Pile	370.0	1.7	7.6	0.8	3.6	0.13	0.55
2	Feed Bin Loading	230.0	1.1	4.8	0.51	2.2	0.08	0.34
3	Feed Bin Unloading	230.0	0.69	3.0	0.25	1.1	0.13	0.17
4	Scalping Screen	230.0	5.8	25	2.0	8.8	0.08	1.3
5	Scalping Screen Unloading	230.0	0.69	3.0	0.25	1.1	0.039	0.17
6	Pug Mill Load	236.0	0.71	3.1	0.26	1.1	0.030	0.18
7	Pug Mill Unloading	236.0	0.71	3.1	0.26	1.1	0.039	0.18
8	Conveyor Transfer to Slinger Conveyor	236.0	0.71	3.1	0.26	1.1	0.040	0.18
9	RAP Bin Loading	140.0	0.20	0.87	0.094	0.41	0.014	0.062
10	RAP Bin Unloading	140.0	0.42	1.8	0.15	0.67	0.040	0.10
11	Rap Screen	140.0	3.5	15	1.2	5.3	0.047	0.81
	RAP Screen Unloading	140.0	0.42	1.8	0.15	0.67	0.024	0.10
12	RAP Transfer Conveyor	140.0	0.42	1.8	0.15	0.67	0.024	0.10
13	RAP Transfer Conveyor	140.0	0.42	1.8	0.15	0.67	0.024	0.10
14	Mineral Filler Silo Loading	25.0	18	19	12	12	0.90	0.95
24	RAP/Concrete Raw Material Pile	200.0	0.94	4.13	0.45	1.96	0.068	0.296
25	RAP/Concrete Feeder	200.0	0.94	4.13	0.45	1.96	0.068	0.296
26	RAP/Concrete Primary Crusher	200.0	1.08	4.73	0.48	2.10	0.073	0.319

Unit #	Process Unit Description	Process Rate (tph)	TSP Emission Rate (lbs/hr)	TSP 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)
27	RAP/Concrete Transfer Point	200.0	0.60	2.63	0.22	0.96	0.033	0.146
28	RAP/Concrete Transfer Point	200.0	0.60	2.63	0.22	0.96	0.033	0.146
29	RAP/Concrete Transfer Point	120.0	0.36	1.58	0.13	0.58	0.020	0.088
30	RAP/Concrete Screen	320.0	8.00	35.0	2.78	12.19	0.422	1.848
31	RAP/Concrete Secondary Crusher	120.0	0.65	2.84	0.29	1.26	0.044	0.191
32	RAP/Concrete Transfer Point	120.0	0.36	1.58	0.13	0.58	0.020	0.088
33	RAP/Concrete Transfer Point	120.0	0.36	1.58	0.13	0.58	0.020	0.088
34	RAP/Concrete Transfer Point	200.0	0.60	2.63	0.22	0.96	0.033	0.146
35	RAP/Concrete Transfer Point	200.0	0.60	2.63	0.22	0.96	0.033	0.146
36	RAP/Concrete Transfer Point	200.0	0.60	2.63	0.22	0.96	0.033	0.146
37	RAP/Concrete Stacker Conveyor to Pile	200.0	0.94	4.13	0.45	1.96	0.068	0.296
		TOTALS	52.1	167.6	24.9	68.5	2.61	9.53

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 from Murray Road will be paved. The haul road around the plant will be unpaved but controlled with surfactants and/or millings and watering. Haul trucks will be used to deliver asphalt cement, mineral filler, RAP, aggregate material, and transport asphalt product. Table B-2 summarizes the emission rate for each haul truck category.

Paved Roads – HMA Plant

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 TSP	0.011			
k PM10	0.0022			
k PM25	0.00054			
sL	0.6	road surface silt loading (g/m2) AP-42 Table 13.2.1-2 "Ubiquitous Baseline < 500 ADT		
P = days with precipitation over 0.01 inches	60			
N = number of days in averaging period	365			
Truck weight	27.5	tons		
Haul Truck VMT Paved In	238.2	meter/one way vehicle	0.14806	miles/vehicle
Haul Truck VMT Paved Asphalt Exit	106.4	meter/one way vehicle	0.06613	miles/vehicle
Haul Truck VMT Paved Aggregate Exit	230.2	meter/one way vehicle	0.14310	miles/vehicle
Haul Truck VMT Paved Out	225.2	meter/one way vehicle	0.13994	miles/vehicle
Max. Mineral Filler Truck/hr	0.2	truck/hr		
Max. Asphalt Cement Truck/hr	1.0	truck/hr		
Max. Asphalt Truck/hr	16.0	truck/hr		
Max Aggregate Truck/hr	9.2	truck/hr		
Max. Total Truck into Site	**26.4**	**truck/hr**		

		Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved In		3.90890	miles/hr	8795	miles/yr
Haul Truck VMT Paved Asphalt Exit		1.12156	miles/hr	2524	miles/yr
Haul Truck VMT Paved Aggregate Exit		1.35082	miles/hr	3039	miles/yr
Haul Truck VMT Paved Out		3.69431	miles/hr	8312	miles/yr
	Total	**10.07559**	**miles/yr**	**22670**	**miles/yr**

		TSP Uncontrolled		
Max. Truck Emissions Paved Road Asphalt	2.0460	lbs/hr	2.2071	tons/yr
		PM10 Uncontrolled		
	0.4092	lbs/hr	0.4414	tons/yr
		PM2.5 Uncontrolled		
	0.1004	lbs/hr	0.1084	tons/yr

Unpaved Roads – HMA Plant

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
TSP = 4.9

s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)
W = mean vehicle weight (27.5 tons)
p = number of days with at least 0.01 in of precip. (NMED Policy = 60 days)

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

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

Trucks per Hour

Total Trucks Entrance = 32.0 trucks per hour average
Mineral Filler = 0.2 truck per hour average
Asphalt Cement = 1.0 truck per hour average
Asphalt = 16.0 truck per hour average
Aggregate= 9.2 truck per hour average

VMT =Vehicle Miles Traveled

Mineral Filler	Unpaved – 0.17335 miles per vehicle
Asphalt Cement	Unpaved – 0.05264 miles per vehicle
Asphalt Truck	Unpaved – 0.05264 miles per vehicle
Aggregate Truck	Unpaved – 0.17335 miles per vehicle

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

TSP = 6.9925 lbs/VMT
PM10 = 1.7821 lbs/VMT
PM2.5 = 0.1782 lbs/VMT

Annual Emission Rate Factor

TSP = 5.8430 lbs/VMT
PM10 = 1.4892 lbs/VMT
PM2.5 = 0.1489 lbs/VMT

Paved Roads – RAP/Concrete Plant

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 TSP	0.011			
k PM10	0.0022			
k PM25	0.00054			
sL	0.6	road surface silt loading (g/m2) AP-42 Table 13.2.1-2 "Ubiquitous Baseline < 500 ADT		
P = days with precipitation over 0.01 inches	60			
N = number of days in averaging period	365			
Truck weight	27.5	tons		
Haul Truck VMT Paved In	238.2	meter/one way vehicle	0.14806	miles/vehicle
Haul Truck VMT Paved Aggregate Exit	230.2	meter/one way vehicle	0.14310	miles/vehicle
Haul Truck VMT Paved Out	225.2	meter/one way vehicle	0.13994	miles/vehicle
Max. RAP Truck/hr	8.0	truck/hr	29952	truck/yr

	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved In	1.18452	miles/hr	4435	miles/yr
Haul Truck VMT Paved Aggregate Exit	1.14476	miles/hr	4286	miles/yr
Haul Truck VMT Paved Out	1.11949	miles/hr	4191	miles/yr
Total	**3.44876**	**miles/yr**	**12912**	**miles/yr**

		TSP Uncontrolled		
Max. Truck Emissions Paved Road RAP/Concrete	0.7003	lbs/hr	1.2571	tons/yr
		PM10 Uncontrolled		
	0.1401	lbs/hr	0.2514	tons/yr
		PM2.5 Uncontrolled		
	0.0344	lbs/hr	0.0617	tons/yr

Unpaved Roads – RAP/Concrete Plant

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
TSP = 4.9

s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)
W = mean vehicle weight (27.5 tons)
p = number of days with at least 0.01 in of precip. (NMED Policy = 60 days)
a = Constant PM2.5 = 0.9
PM10 = 0.9
TSP = 0.7
b = Constant PM2.5 = 0.45
PM10 = 0.45
TSP = 0.45
Trucks per Hour
RAP = 8.0 truck per hour average

VMT =Vehicle Miles Traveled
RAP Unpaved – 0.17335 miles per vehicle

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
TSP = 6.9925 lbs/VMT
PM10 = 1.7821 lbs/VMT
PM2.5 = 0.1782 lbs/VMT

Annual Emission Rate Factor
TSP = 5.8430 lbs/VMT
PM10 = 1.4892 lbs/VMT
PM2.5 = 0.1489 lbs/VMT

Table B-2: Pre-Controlled Haul Road Fugitive Dust Emission Rates

Process Unit Description	Process Rate	TSP Emission Rate (lbs/hr)	TSP 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)
Total Haul Truck Paved HMA	10.08 miles/hr; 22,670 miles/yr	2.05	2.21	0.41	0.44	0.10	0.11
Mineral Filler Unpaved HMA	0.05054 miles/hr; 113.7 miles/yr	0.29	0.27	0.074	0.070	0.0074	0.0070
Asphalt Cement Unpaved HMA	0.10256 miles/hr; 230.8 miles/yr	0.35	0.33	0.090	0.085	0.0090	0.0085
Asphalt Truck Unpaved HMA	0.84226 miles/hr; 1895 miles/yr	5.89	5.54	1.50	1.41	0.15	0.14
Aggregate Truck Unpaved HMA	1.59477 miles/hr; 3588 miles/yr	11.15	10.48	2.84	2.67	0.28	0.27
Truck Unpaved - RAP/Concrete	1.38676 miles/hr; 5192 miles/yr	9.70	15.17	2.47	3.87	0.25	0.39
Truck Paved - RAP/Concrete	3.44876 miles/hr; 12,912 miles/yr	0.70	1.26	0.14	0.25	0.034	0.062
	Total	30.1	35.3	7.5	8.8	0.83	0.98

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 is permitted to combust either fuel oil or natural gas/propane. The worst-case emission factor from either combusting fuel oil or natural gas/propane was used to estimate emission rates. Hourly emission rates are based on maximum hourly asphalt production (400 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. Percent sulfur content of the burner fuel will not exceed 0.5 percent.

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.

<u>AP-42 Section 11.1 Table 11.1-3, 7, 8, and 14 Uncontrolled Emission Factors:</u>

Process Unit	Pollutant	Emission Factor (lbs/ton)
Drum Mixer	NO_X	0.055
	CO	0.13
	VOC	0.032
	TOC	0.044
	TSP	28.0
	PM_{10}	6.5
	$PM_{2.5}$	1.565
Drum Unloading	CO	0.001179981
	TOC	0.012186685
	TSP	0.000585889
	PM_{10}	0.000585889
	$PM_{2.5}$	0.000585889
Silo Loadout	CO	0.001349240
	TOC	0.004158948
	TSP	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 B-3: 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)
15	Asphalt Drum Dryer	NO_X	400	22	96
		CO	400	52	228
		SO_2	400	23	102
		VOC	400	13	56
		TSP	400	11200	49056
		PM_{10}	400	2600	11388
		$PM_{2.5}$	400	626	2742
16	Drum Mixer Unloading	CO	400	0.47	2.1
		TOC	400	4.9	21
		TSP	400	0.23	1.0
		PM_{10}	400	0.23	1.0
		$PM_{2.5}$	400	0.23	1.0
17	Asphalt Silo Unloading	CO	400	0.54	2.4
		TOC	400	1.7	7.3
		TSP	400	0.21	0.91
		PM_{10}	400	0.21	0.91
		$PM_{2.5}$	400	0.21	0.91
21	Asphalt Cement Storage Tanks	TOC	60,000 gallons	0.039	0.17
23	YARD	TOC	400	0.44	1.9
		CO	400	0.14	0.62

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 (Units 15), unloading the drum mixer (Unit 16), asphalt silos (Unit 17), asphalt heater (Units 20) or RAP/Concrete plant generator (Unit 38) with the exception of limiting annual production rates for production equipment or hours of operation for the RAP/Concrete plant generator.

CONTROLLED MATERIAL HANDLING ($PM_{2.5}$, PM_{10}, AND TSP)

No fugitive dust controls or emission reductions are proposed for the aggregate/RAP/Concrete storage piles or loading of the cold aggregate/RAP/Concrete feed bins (Units 1, 2, 9, 24, 25) 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 (Unit 3) will be controlled, as needed, with enclosures and/or water sprays at the exit of the feed bins. Fugitive dust control for unloading the HMA RAP feed bins onto the RAP feed bin conveyor (Unit 10) will be controlled, as needed, with enclosures and/or water sprays at the exit of the RAP feed bins. Fugitive dust control for unloading the RAP/Concrete plant feed bin (Unit 25) will be controlled, as needed, with enclosures and/or water sprays at the exit of the RAP/Concrete feed bin. Fugitive dust control for the HMA RAP transfer conveyor (Unit 13) will be controlled with material moisture content and/or enclosure. Fugitive dust control for the plant transfer conveyors (Units 13, 14, 27, 28, 29, 32 - 36) will be controlled with material moisture content and/or enclosure. Fugitive dust control for loading and unloading the pug mill (Unit 6, 7) 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.

Fugitive dust control for the RAP/Concrete plant crushers (Units 26 and 31) 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 for the scalping screen (Unit 4), HMA RAP screen (Unit 11) and RAP/Concrete plant screen (Unit 30) 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 conveyor transfer from the scalping screen (Unit 4) unloading to the scalping screen conveyor (Unit 5) or RAP screen unloading (Unit 11a) to the RAP transfer conveyor (Unit 12) will be controlled with material moisture content and/or enclosure. It is estimated that this method 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 stacker conveyor transfer to storage pile (Unit 37) 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. This will control fugitive emissions to an efficiency of 60 percent. Additional emission reductions include limiting annual production rates.

Particulate emissions from loading the mineral filler silo (Unit 14) 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 (Unit 15) will be controlled with a baghouse dust collector 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 returned to the drum dryer/mixer via a closed loop system. Additional emission reductions include limiting annual production rates.

No fugitive controls or emission reductions are proposed for unloading the drum dryer/mixer or asphalt silos (Units 16, 17) with the exception of limiting annual production rates. No fugitive controls are proposed for yard emissions (Unit 23) or asphalt storage tanks (Units 21).

To estimate material handling control particulate emissions rates for crushing, screening, 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/RAP/concrete/ 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 and annual emission rate emission rate are based on the average wind speed for Albuquerque for the years of 1996 through 2006 of 8.5 mph, and the NMED default moisture content of 2 percent.

To estimate material handling control particulate emission rates for RAP/Concrete plant stacker conveyor to storage pile (Unit 37), 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 and annual emission rate emission rate are based on the average wind speed for Albuquerque for the years of 1996 through 2006 of 8.5 mph, and the footnote b of AP-42 Table 11.19.2-2 high moisture content of 2.88 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 TSP/$PM_{2.5}$ 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 400 tons per hours. Virgin aggregate/ RAP/Mineral filler/Asphalt cement ratios used in estimating material handling particulate emission rates is equal to 57.5/35.0/1.5/6.0. 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 900,000 tons of asphalt per year. The maximum hourly throughput for the RAP/Concrete plant feeder is 200 tons per hour and 748,800 tons per year.

Aggregate/RAP/Concrete 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_{TSP} (lbs/ton) = 0.74 x 0.0032 x $(8.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.5/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{TSP} (lbs/ton) = 0.00472 lbs/ton;

E_{PM10} (lbs/ton) = 0.00223 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00034 lbs/ton

RAP/Concrete Plant Storage Pile Loading from Stacker Conveyor (Unit 37) Emission Equation:

Maximum Hour Emission Factor

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

E_{TSP} (lbs/ton) = 0.74 x 0.0032 x $(8.5/5)^{1.3}$ / $(2.88/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.5/5)^{1.3}$ / $(2.88/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.5/5)^{1.3}$ / $(2.88/2)^{1.4}$

E_{TSP} (lbs/ton) = 0.00085 lbs/ton;

E_{PM10} (lbs/ton) = 0.00040 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00006 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	TSP 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 Crushing	0.00120	0.00054	0.00010
Controlled Screening	0.00220	0.00074	0.00005
Transfer Conveyor	0.00014	0.00005	0.000013
Controlled Screen Unloading and Pug Mill Loading and Unloading	0.00014	0.00005	0.000013
Aggregate/RAP/Concrete Storage Piles, Feeder Loading Maximum Hourly	0.00472	0.00223	0.00034
RAP Stacker Conveyor to Pile Maximum Hourly	0.00085	0.00040	0.00006

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

Process Unit	TSP Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Mineral Filler Silo Loading	0.0072	0.0046	0.00036

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

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

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 B-4 Controlled Material Handling Emission Rates

Unit #	Process Unit Description	Process Rate (tph)	TSP Emission Rate (lbs/hr)	TSP 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)
1	Cold Aggregate/RAP Storage Pile	370.0	1.75	1.96	0.83	0.93	0.13	0.14
2	Feed Bin Loading	230.0	1.09	1.22	0.51	0.58	0.078	0.087
3	Feed Bin Unloading	230.0	0.032	0.036	0.011	0.012	0.0030	0.0034
4	Scalping Screen	230.0	0.51	0.57	0.17	0.19	0.012	0.013
5	Scalping Screen Unloading	230.0	0.032	0.036	0.011	0.012	0.0030	0.0034
6	Pug Mill Load	236.0	0.033	0.037	0.011	0.012	0.0031	0.0035
7	Pug Mill Unloading	236.0	0.033	0.037	0.011	0.012	0.0031	0.0035
8	Conveyor Transfer to Slinger Conveyor	236.0	0.033	0.037	0.011	0.012	0.0031	0.0035
9	RAP Bin Loading	140.0	0.20	0.22	0.094	0.11	0.014	0.016
10	RAP Bin Unloading	140.0	0.020	0.022	0.0064	0.0072	0.0018	0.0020
11	Rap Screen	140.0	0.31	0.35	0.10	0.12	0.0070	0.0079
	RAP Screen Unloading	140.0	0.020	0.022	0.0064	0.0072	0.0018	0.0020
12	RAP Transfer Conveyor	140.0	0.020	0.022	0.0064	0.0072	0.0018	0.0020
13	RAP Transfer Conveyor	140.0	0.020	0.022	0.0064	0.0072	0.0018	0.0020
14	Mineral Filler Silo Loading	25.0	0.18	0.049	0.12	0.031	0.0090	0.0024
24	RAP/Concrete Raw Material Pile	200.0	0.94	1.77	0.45	0.84	0.068	0.13
25	RAP/Concrete Feeder	200.0	0.94	1.77	0.45	0.84	0.068	0.13
26	RAP/Concrete Primary Crusher	200.0	0.24	0.45	0.11	0.202	0.020	0.037
27	RAP/Concrete Transfer Point	200.0	0.028	0.052	0.0092	0.0172	0.0026	0.0049
28	RAP/Concrete Transfer Point	200.0	0.028	0.052	0.0092	0.0172	0.0026	0.0049
29	RAP/Concrete Transfer Point	120.0	0.017	0.031	0.0055	0.0103	0.0016	0.0029
30	RAP/Concrete Screen	320.0	0.70	1.32	0.24	0.44	0.016	0.030
31	RAP/Concrete Secondary Crusher	120.0	0.14	0.27	0.065	0.12	0.012	0.023
32	RAP/Concrete Transfer Point	120.0	0.017	0.031	0.0055	0.010	0.0016	0.0029

Unit #	Process Unit Description	Process Rate (tph)	TSP Emission Rate (lbs/hr)	TSP 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)
33	RAP/Concrete Transfer Point	120.0	0.017	0.031	0.0055	0.010	0.0016	0.0029
34	RAP/Concrete Transfer Point	200.0	0.028	0.052	0.0092	0.017	0.0026	0.0049
35	RAP/Concrete Transfer Point	200.0	0.028	0.052	0.0092	0.017	0.0026	0.0049
36	RAP/Concrete Transfer Point	200.0	0.028	0.052	0.0092	0.017	0.0026	0.0049
37	RAP/Concrete Stacker Conveyor to Pile	200.0	0.57	1.06	0.27	0.50	0.041	0.076
		TOTALS	**8.00**	**11.63**	**3.55**	**5.11**	**0.52**	**0.75**

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 from Murray Road will be paved. All other haul roads throughout the plant are unpaved that will be controlled with surfactants, millings, and water. Haul road traffic emission rates controlled by surfactants, millings, and/or water have applied a control efficiency of 90%. Table B-5 summarizes the emission rate for each haul truck category.

Paved Roads - HMA Plant

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 TSP	0.011	
k PM10	0.0022	
k PM25	0.00054	
sL	0.6	road surface silt loading (g/m2) AP-42 Table 13.2.1-2 “Ubiquitous Baseline < 500 ADT
P = days with precipitation over 0.01 inches	60	
N = number of days in averaging period	365	
Truck weight	27.5	tons

Haul Truck VMT Paved In	238.2	meter/one way vehicle	0.14806	miles/vehicle
Haul Truck VMT Paved Asphalt Exit	106.4	meter/one way vehicle	0.06613	miles/vehicle
Haul Truck VMT Paved Aggregate Exit	230.2	meter/one way vehicle	0.14310	miles/vehicle
Haul Truck VMT Paved Out	225.2	meter/one way vehicle	0.13994	miles/vehicle

Max. Mineral Filler Truck/hr	0.2	truck/hr
Max. Asphalt Cement Truck/hr	1.0	truck/hr
Max. Asphalt Truck/hr	16.0	truck/hr
Max Aggregate Truck/hr	9.2	truck/hr
Max. Total Truck into Site	**26.4**	**truck/hr**

	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved In	3.90890	miles/hr	8795	miles/yr
Haul Truck VMT Paved Asphalt Exit	1.12156	miles/hr	2524	miles/yr
Haul Truck VMT Paved Aggregate Exit	1.35082	miles/hr	3039	miles/yr
Haul Truck VMT Paved Out	3.69431	miles/hr	8312	miles/yr
Total	**10.07559**	**miles/yr**	**22,670**	**miles/yr**

		TSP Uncontrolled		
Max. Truck Emissions Paved Road HMA	2.0460	lbs/hr	2.2071	tons/yr
		PM10 Uncontrolled		
	0.4092	lbs/hr	0.4414	tons/yr
		PM2.5 Uncontrolled		
	0.1004	lbs/hr	0.1084	tons/yr

Unpaved Roads – HMA Plant

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
TSP = 4.9

s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)
W = mean vehicle weight (27.5 tons)
p = number of days with at least 0.01 in of precip. (NMED Policy = 60 days)
a = Constant PM2.5 = 0.9
PM10 = 0.9
TSP = 0.7
b = Constant PM2.5 = 0.45
PM10 = 0.45
TSP = 0.45

Trucks per Hour
Total Trucks Entrance = 32.0 trucks per hour average
Mineral Filler = 0.2 truck per hour average
Asphalt Cement = 1.0 truck per hour average
Asphalt = 16.0 truck per hour average
Aggregate= 9.2 truck per hour average

VMT =Vehicle Miles Traveled

Mineral Filler	Unpaved – 0.17335 miles per vehicle
Asphalt Cement	Unpaved – 0.05264 miles per vehicle
Asphalt Truck	Unpaved – 0.05264 miles per vehicle
Aggregate Truck	Unpaved – 0.17335 miles per vehicle

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:

<u>Hourly Emission Rate Factor with 90% CE</u>
TSP = 0.69925 lbs/VMT
PM10 = 0.17821 lbs/VMT
PM2.5 = 0.01782 lbs/VMT

<u>Annual Emission Rate Factor with 90% CE</u>
TSP = 0.58430 lbs/VMT
PM10 = 0.14892 lbs/VMT
PM2.5 = 0.01489 lbs/VMT

Paved Roads – RAP/Concrete Plant

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 TSP	0.011			
k PM10	0.0022			
k PM25	0.00054			
sL	0.6	road surface silt loading (g/m2) AP-42 Table 13.2.1-2 "Ubiquitous Baseline < 500 ADT		
P = days with precipitation over 0.01 inches	60			
N = number of days in averaging period	365			
Truck weight	27.5	tons		
Haul Truck VMT Paved In	238.2	meter/one way vehicle	0.14806	miles/vehicle
Haul Truck VMT Paved Aggregate Exit	230.2	meter/one way vehicle	0.14310	miles/vehicle
Haul Truck VMT Paved Out	225.2	meter/one way vehicle	0.13994	miles/vehicle
Max. RAP Truck/hr	8.0	truck/hr		

	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved In	1.18452	miles/hr	4435	miles/yr
Haul Truck VMT Paved Aggregate Exit	1.14476	miles/hr	4286	miles/yr
Haul Truck VMT Paved Out	1.11949	miles/hr	4191	miles/yr
Total	**3.44876**	**miles/yr**	**12912**	**miles/yr**

	TSP Uncontrolled			
Max. Truck Emissions Paved Road	0.7003	lbs/hr	1.2571	tons/yr
	PM10 Uncontrolled			
	0.1401	lbs/hr	0.2514	tons/yr
	PM2.5 Uncontrolled			
	0.0344	lbs/hr	0.0617	tons/yr

Unpaved Roads – RAP/Concrete Plant

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
TSP = 4.9
s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)
W = mean vehicle weight (27.5 tons)
p = number of days with at least 0.01 in of precip. (NMED Policy = 60 days)
a = Constant PM2.5 = 0.9
PM10 = 0.9
TSP = 0.7
b = Constant PM2.5 = 0.45
PM10 = 0.45
TSP = 0.45
Trucks per Hour
RAP = 5.6 truck per hour average

VMT =Vehicle Miles Traveled
RAP Unpaved – 0.17335 miles per vehicle

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 with 90% CE
TSP = 0.69925 lbs/VMT
PM10 = 0.17821 lbs/VMT
PM2.5 = 0.01782 lbs/VMT

Annual Emission Rate Factor with 90% CE
TSP = 0.58430 lbs/VMT
PM10 = 0.14892 lbs/VMT
PM2.5 = 0.01489 lbs/VMT

Table B-5: Controlled Haul Road Fugitive Dust Emission Rates

Process Unit Description	Process Rate	TSP Emission Rate (lbs/hr)	TSP 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)
Total Haul Truck Paved HMA	10.08 miles/hr; 22,670 miles/yr	2.05	2.21	0.41	0.44	0.10	0.11
Mineral Filler Unpaved HMA	0.10256 miles/hr; 230.8 miles/yr	0.029	0.027	0.0074	0.0070	0.00074	0.00070
Asphalt Cement Unpaved HMA	0.84226 miles/hr; 1895 miles/yr	0.035	0.033	0.0090	0.0085	0.00090	0.00085
Asphalt Truck Unpaved HMA	1.59477 miles/hr; 3588 miles/yr	0.59	0.55	0.15	0.14	0.015	0.014
Aggregate Truck Unpaved HMA	1.38676 miles/hr; 5192 miles/yr	1.12	1.05	0.28	0.27	0.028	0.027
Truck Unpaved - RAP/Concrete	3.44876 miles/hr; 12,912 miles/yr	0.97	1.52	0.25	0.39	0.025	0.039
Truck Paved - RAP/Concrete	3.44876 miles/hr; 12,912 miles/yr	0.70	1.26	0.14	0.25	0.034	0.062
	Total	**5.49**	**6.65**	**1.25**	**1.51**	**0.20**	**0.25**

Drum Mix Hot Mix Asphalt Plant

Particulate emissions from the drum dryer/mixer (Unit 15) will be controlled with a baghouse dust collector 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 (Units 16, 17) 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 is permitted to combust either fuel oil or natural gas/propane. The worst-case emission factor from either combusting fuel oil or natural gas/propane was used to estimate emission rates. Hourly emission rates are based on maximum hourly asphalt production (400 tph) and annual emission rates are based on maximum annual asphalt production (900,000 tpy). PM (TSP, 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. Percent sulfur content of the burner fuel will not exceed 0.5 percent.

Emissions of VOCs (TOCs) from the asphalt cement storage tank (Unit 22) 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)
Asphalt Drum	NO_X	0.055
	CO	0.13
	VOC	0.032
	SO_2	0.058
	TSP	0.033
	PM_{10}	0.023
	$PM_{2.5}$	0.023
Drum Unloading	CO	0.001179981
	TOC	0.012186685
	TSP	0.000585889
	PM_{10}	0.000585889
	$PM_{2.5}$	0.000585889
Silo Loadout	CO	0.001349240
	TOC	0.004158948
	TSP	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 B-6: Controlled Hot Mix Plant Emission Rates

Process Unit Number	Process Unit Description	Pollutant	Process Rate	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
15	Asphalt Drum Dryer Baghouse	NO_X	400	22.0	24.8
		CO	400	52.0	58.5
		SO_2	400	23.2	26.1
		VOC	400	12.8	14.4
		TSP	400	13.2	14.9
		PM_{10}	400	9.2	10.4
		$PM_{2.5}$	400	9.2	10.4
16	Drum Mixer Unloading	CO	400	0.47	0.53
		TOC	400	4.9	5.5
		TSP	400	0.23	0.26
		PM_{10}	400	0.23	0.26
		$PM_{2.5}$	400	0.23	0.26
17	Asphalt Silo Unloading	CO	400	0.54	0.61
		TOC	400	1.7	1.9
		TSP	400	0.21	0.23
		PM_{10}	400	0.21	0.23
		$PM_{2.5}$	400	0.21	0.23
21	Asphalt Cement Storage Tanks	TOC	60,000 gallons	0.039	0.17
23	YARD	TOC	400	0.44	0.55
		CO	400	0.14	0.18

Estimates for RAP/Concrete Plant Diesel-Fired Engine (NO_X, CO, SO_2, VOC and PM)

One of five diesel-fired engines, provides power to the RAP/Concrete plant. Nitrogen oxides (NO_X), carbon monoxides (CO), hydrocarbons (VOC), and particulate (PM) emissions were obtained from engine manufacturer emission rates. Sulfur dioxide (SO_2) emissions are estimated based on sulfur content of diesel fuel, not to exceed 0.05% fuel content. 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 3744 hours per year.

<u>Manufacturer Emission Rate Permitted 817 HP Engine:</u>

Pollutant	Emission Factor (lbs/hr)
Nitrogen Oxide	13.71
Hydrocarbons	0.27
Particulate	0.85

<u>Manufacturer Emission Rate Lippmann Plant 415 HP Engine:</u>

Pollutant	Emission Factor (lbs/hr)
Carbon Monoxide	2.20

Sulfur dioxide emission rate was calculated using the fuel consumption rate for this engine of 40 gallons per hour, a fuel density of 7.1 pounds per gallon, a fuel sulfur content of 0.05%, 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

$$\text{Emission Rate (lbs/hr)} = \frac{40\ \text{gallons}}{\text{hr}} \left| \frac{7.0\ \text{lbs}}{\text{gallon}} \right| \frac{0.0005\ \text{lbs Sulfur}}{\text{lbs of fuel}} \left| \frac{2\ \text{lbs Sulfur Dioxide}}{1\ \text{lb Sulfur}} \right.$$

Emission Rate (lbs/hr) = 0.28 lbs/hr

Table B-7: Pre-Controlled Combustion Emission Rates

Process Unit Number	Pollutant	Generator Rating (hp)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
38	NO_X	817	13.71	60.1
	CO	415	2.20	9.64
	SO_2	817	0.28	1.23
	VOC	817	0.27	1.18
	TSP	817	0.85	3.72
	PM_{10}	817	0.85	3.72
	$PM_{2.5}$	817	0.85	3.72

Table B-8: Controlled Combustion Emission Rates

Process Unit Number	Pollutant	Generator Rating (hp)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
38	NO_X	817	13.71	25.67
	CO	415	2.20	4.12
	SO_2	817	0.28	0.52
	VOC	817	0.27	0.51
	TSP	817	0.85	1.59
	PM_{10}	817	0.85	1.59
	$PM_{2.5}$	817	0.85	1.59

Fuel Oil-Fired Asphalt Heater

One TBD distillate diesel fuel or natural gas/propane asphalt heater heats the asphalt oil before it is mixed with the aggregate in the drum dryer/mixer. The unit is rated at 2,500,000 Btu/hr. The estimated hourly diesel fuel usage for the heater is approximately 19.5 gallons per hour (128,000 Btu/gal) and 27.3 gallons per hour for natural gas/propane (91,500 Btu/gal). 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 1.3 "External Combustion Sources" (rev 9/98) or AP-42 Section 1.5 "Liquefied Petroleum Gas Combustion" (7/08), whichever produced the worst-case emission rate. Sulfur content of the diesel fuel is not to exceed 0.05% fuel content. 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 8760 hours per year. The highest resulting pollutant emissions from either the diesel or natural gas/propane were used in the application.

<u>AP-42 Emission Factors: Section 1.3 and 1.5</u>

Diesel Emission Factors

Pollutant	Emission Factor
Nitrogen Oxides	0.02 lbs/gal-hr
Carbon Monoxides	0.005 lbs/gal-hr
Particulate	0.002 lbs/gal-hr
Hydrocarbons	0.00034 lbs/gal-hr
Sulfur Dioxides	0.142S lbs/gal-hr

S = % Fuel Sulfur Content

Natural Gas/ Propane Emission Factors

Pollutant	Emission Factor
Nitrogen Oxides	0.013 lbs/gal-hr
Carbon Monoxides	0.0075 lbs/gal-hr
Particulate	0.0007 lbs/gal-hr
Hydrocarbons	0.001 lbs/gal-hr
Sulfur Dioxides	0.000018 lbs/gal-hr

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

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

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

Table B-9: Pre-Controlled Combustion Emission Rates for TBD Diesel Heater

Process Unit Number	Pollutant	Fuel Usage (gal)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
20	NO_X	19.5	0.391	1.711
	CO	19.5	0.098	0.428
	SO_2	19.5	0.139	0.607
	VOC	19.5	0.0066	0.029
	PM	19.5	0.039	0.171

Table B-10: Controlled Combustion Emission Rates for TBD Diesel Heater

Process Unit Number	Pollutant	Fuel Usage (gal)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
20	NO_X	19.5	0.391	1.711
	CO	19.5	0.098	0.428
	SO_2	19.5	0.139	0.607
	VOC	19.5	0.0066	0.029
	PM	19.5	0.039	0.171

Table B-11: Pre-Controlled Combustion Emission Rates for TBD Natural Gas/ Propane Heater

Process Unit Number	Pollutant	Fuel Usage (gal)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
20	NO_X	27.3	0.36	1.6
	CO	27.3	0.20	0.90
	SO_2	27.3	0.00049	0.0022
	VOC	27.3	0.027	0.12
	PM	27.3	0.019	0.084

Table B-12: Controlled Combustion Emission Rates for Natural Gas/ Propane Heater

Process Unit Number	Pollutant	Fuel Usage (gal)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
20	NO_X	27.3	0.36	1.6
	CO	27.3	0.20	0.90
	SO_2	27.3	0.00049	0.0022
	VOC	27.3	0.027	0.12
	PM	27.3	0.019	0.084

Table B-13 Summary of Uncontrolled NOx, CO, SO2, and PM Emission Rates

Uncontrolled Emission Totals															
		NOx		CO		SO_2		VOC		TSP		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
1	Cold Aggregate/RAP Storage Pile									1.75	7.65	0.83	3.6	0.13	0.55
2	Feed Bin Loading									1.09	4.76	0.51	2.2	0.078	0.34
3	Feed Bin Unloading									0.69	3.02	0.25	1.1	0.039	0.17
4	Scalping Screen									5.75	25.19	2.0	8.8	0.30	1.3
5	Scalping Screen Unloading									0.69	3.02	0.25	1.1	0.039	0.17
6	Pug Mill Load									0.71	3.10	0.26	1.1	0.040	0.18
7	Pug Mill Unload									0.71	3.10	0.26	1.1	0.040	0.18
8	Conveyor Transfer to Slinger Conveyor									0.71	3.10	0.26	1.1	0.040	0.18
9	RAP Bin Loading									0.20	0.87	0.094	0.41	0.014	0.062
10	RAP Bin Unloading									0.42	1.84	0.15	0.67	0.024	0.10
11	RAP Screen									3.50	15.3	1.22	5.3	0.18	0.81
	RAP Screen Unloading									0.42	1.84	0.15	0.67	0.024	0.10
12	RAP Transfer Conveyor									0.42	1.84	0.15	0.67	0.024	0.10
13	RAP Transfer Conveyor									0.42	1.84	0.15	0.67	0.024	0.10
14	Mineral Filler Silo Loading									18.0	18.9	11.5	12.1	0.90	0.95
15	Drum Dryer	22.0	96.4	52.0	227.8	23.2	101.6	12.8	56.1	11200	49056	2600	11388	626	2742
16	Drum Mixer Unloading			0.47	2.1			4.9	21.4	0.23	1.03	0.23	1.0	0.23	1.0
17	Asphalt Silo Unloading			0.54	2.4			1.7	7.3	0.21	0.91	0.21	0.91	0.21	0.91
20	Asphalt Heater	0.39	1.7	0.20	0.90	0.14	0.61	0.027	0.12	0.039	0.17	0.039	0.17	0.039	0.17
21	Asphalt Cement Storage Tank			***	***			0.037	0.16						
22	Haul Road Traffic									30.1	35.3	7.5	8.8	0.83	0.98
23	HMA Yard			0.14	0.62			0.44	1.9						
24	RAP/Concrete Raw Material Pile									0.94	4.13	0.45	1.96	0.068	0.296
25	RAP/Concrete Feeder									0.94	4.13	0.45	1.96	0.068	0.296

Table B-13 Summary of Uncontrolled NOx, CO, SO2, and PM Emission Rates

Uncontrolled Emission Totals															
		NOx		CO		SO_2		VOC		TSP		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
26	RAP/Concrete Primary Crusher									1.08	4.73	0.48	2.10	0.073	0.319
27	RAP/Concrete Transfer Point									0.60	2.63	0.22	0.96	0.033	0.146
28	RAP/Concrete Transfer Point									0.60	2.63	0.22	0.96	0.033	0.146
29	RAP/Concrete Transfer Point									0.36	1.58	0.13	0.58	0.020	0.088
30	RAP/Concrete Screen									8.00	35.0	2.78	12.19	0.422	1.848
31	RAP/Concrete Secondary Crusher									0.65	2.84	0.29	1.26	0.044	0.191
32	RAP/Concrete Transfer Point									0.36	1.58	0.13	0.58	0.020	0.088
33	RAP/Concrete Transfer Point									0.36	1.58	0.13	0.58	0.020	0.088
34	RAP/Concrete Transfer Point									0.60	2.63	0.22	0.96	0.033	0.146
35	RAP/Concrete Transfer Point									0.60	2.63	0.22	0.96	0.033	0.146
36	RAP/Concrete Transfer Point									0.60	2.63	0.22	0.96	0.033	0.146
37	RAP/Concrete Stacker Conveyor to Pile									0.94	4.13	0.45	1.96	0.068	0.296
38	RAP/Concrete Plant Engine/Generator	13.7	60.0	2.20	9.64	0.28	1.23	0.27	1.18	0.85	3.72	0.85	3.72	0.85	3.72
	Total	**36.1**	**158.1**	**55.6**	**243.3**	**23.6**	**103.4**	**20.1**	**88.1**	**11284**	**49265**	**2633**	**11471**	**631.0**	**2758.3**

*** Insignificant

Table B-14 Summary of Controlled NOx, CO, SO2, and PM Emission Rates

Controlled Emission Totals															
Unit #	Description	NOx		CO		SO_2		VOC		TSP		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
1	Cold Aggregate/RAP Storage Pile									1.75	1.96	0.83	0.93	0.13	0.14
2	Feed Bin Loading									1.09	1.22	0.51	0.58	0.078	0.087
3	Feed Bin Unloading									0.032	0.036	0.011	0.012	0.0030	0.0034
4	Scalping Screen									0.51	0.57	0.17	0.19	0.012	0.013
5	Scalping Screen Unloading									0.032	0.036	0.011	0.012	0.0030	0.0034
6	Pug Mill Load									0.033	0.037	0.011	0.012	0.0031	0.0035
7	Pug Mill Unload									0.033	0.037	0.011	0.012	0.0031	0.0035
8	Conveyor Transfer to Slinger Conveyor									0.033	0.037	0.011	0.012	0.0031	0.0035
9	RAP Bin Loading									0.20	0.22	0.094	0.11	0.014	0.016
10	RAP Bin Unloading									0.020	0.022	0.0064	0.0072	0.0018	0.0020
11	RAP Screen									0.31	0.35	0.10	0.12	0.0070	0.0079
	RAP Screen Unloading									0.020	0.022	0.0064	0.0072	0.0018	0.0020
12	RAP Transfer Conveyor									0.020	0.022	0.0064	0.0072	0.0018	0.0020
13	RAP Transfer Conveyor									0.020	0.022	0.0064	0.0072	0.0018	0.0020
14	Mineral Filler Silo Loading									0.18	0.049	0.12	0.031	0.0090	0.0024
15	Drum Dryer	22.0	24.8	52.0	58.5	23.2	26.1	12.8	14.4	13.2	14.9	9.2	10.4	9.2	10.4
16	Drum Mixer Unloading			0.47	0.53			4.87	5.48	0.23	0.26	0.23	0.26	0.23	0.26
17	Asphalt Silo Unloading			0.54	0.61			1.66	1.87	0.21	0.23	0.21	0.23	0.21	0.23
20	Asphalt Heater	0.39	1.7	0.20	0.90	0.14	0.61	0.027	0.12	0.039	0.17	0.039	0.17	0.039	0.17
21	Asphalt Cement Storage Tank			***	***			0.037	0.16						
22	Haul Road Traffic									5.49	6.65	1.25	1.51	0.20	0.25
23	HMA Yard			0.14	0.16			0.44	0.50						
24	RAP/Concrete Raw Material Pile									0.94	1.77	0.45	0.84	0.068	0.13
25	RAP/Concrete Feeder									0.94	1.77	0.45	0.84	0.068	0.13
26	RAP/Concrete Primary Crusher									0.24	0.45	0.11	0.202	0.020	0.037

Table B-14 Summary of Controlled NOx, CO, SO2, and PM Emission Rates

Controlled Emission Totals															
		NOx		CO		SO_2		VOC		TSP		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
27	RAP/Concrete Transfer Point									0.028	0.052	0.0092	0.0172	0.0026	0.0049
28	RAP/Concrete Transfer Point									0.028	0.052	0.0092	0.0172	0.0026	0.0049
29	RAP/Concrete Transfer Point									0.017	0.031	0.0055	0.0103	0.0016	0.0029
30	RAP/Concrete Screen									0.70	1.32	0.24	0.44	0.016	0.030
31	RAP/Concrete Secondary Crusher									0.14	0.27	0.065	0.121	0.012	0.0225
32	RAP/Concrete Transfer Point									0.017	0.031	0.0055	0.010	0.0016	0.0029
33	RAP/Concrete Transfer Point									0.017	0.031	0.0055	0.010	0.0016	0.0029
34	RAP/Concrete Transfer Point									0.028	0.052	0.0092	0.017	0.0026	0.0049
35	RAP/Concrete Transfer Point									0.028	0.052	0.0092	0.017	0.0026	0.0049
36	RAP/Concrete Transfer Point									0.028	0.052	0.0092	0.017	0.0026	0.0049
37	RAP/Concrete Stacker Conveyor to Pile									0.57	1.06	0.27	0.50	0.041	0.076
38	RAP/Concrete Plant Engine/Generator	13.7	25.7	2.20	4.12	0.28	0.52	0.27	0.51	0.85	1.59	0.85	1.59	0.85	1.59
	Total	**36.1**	**52.1**	**55.6**	**64.8**	**23.6**	**27.2**	**20.1**	**23.0**	**28.0**	**35.4**	**15.3**	**19.2**	**11.2**	**13.6**

*** Insignificant

Estimates for State Toxic Air Pollutants (Asphalt Fumes)

The Hot Mix Asphalt Plant (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 (0.12 pounds per ton x 400 tons/hr) from the drum dryer/mixer baghouse stack or 4.8 pounds per hour.

Emissions of asphalt fumes from the asphalt silo unloading (Unit 17), yard (asphalt transported in asphalt trucks-Unit 23), and hot oil asphalt storage tanks (Unit 22) 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.

<u>Drum Loadout</u>

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

<u>Silo Filling</u>

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

<u>Asphalt Storage Tanks</u>

Asphalt Fumes EF = VOC emissions from TANKs * 1.3%

<u>Yard</u>

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 0.075 and 0.035 pounds per hour.

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 0.0066 pounds per hour (400 tph of asphalt production).

Emissions of asphalt fumes from the asphalt cement storage tanks (Unit 22) 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 30,000 gallon tank were estimated at 325.76 pounds per year or 0.037 pounds per hour. Based on 1.3 percent of the VOC emissions (0.037 pounds per hour total from both tanks), the asphalt fumes emission rate is 0.00048 pounds per hour.

Total asphalt fumes from the HMA plant is 4.9 pounds per hour and 5.5 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 (Unit 15), asphalt heater (Unit 20) and RAP/Concrete plant generator/engine (Unit 38) 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 main, standby and RAP plant generators using AP-42 Section 3.3 and Section 1.3. Emissions of HAPs were determined for the asphalt heaters using AP-42 Section 1.3.

The following tables summarize the HAPs emission rates from the drum mixer, RAP/Concrete plant generator/engine, and asphalt heater. Total combined HAPs emissions from MSCI Broadway HMA is 4.23 pounds per hour and 4.73 tons per year.

Table B-15: HAPs Emission Rates from the Drum Dryer/Mixer
EPA HAPS Emissions Drum Mixer Hot Mix Asphalt Plant with Fabric Filter

Average Hourly Production Rate:	400	tons per hour
Yearly Production Rate:	900000	tons per year

Type of Fuel:	Waste Fuel Oil
Emission Factors	AP-42 Section 11.1 Tables 11.1-10, 11.1-12

Non-PAH HAPS	CAS#		Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Acetalehyde	75-07-0		1.3E-03	0.520	0.59
Acrolein	107-02-8		2.6E-05	0.010	0.01
Benzene	71-43-2		3.9E-04	0.156	0.18
Ethylbenzene	100-41-4		2.4E-04	0.096	0.11
Formaldehyde	50-00-0		3.1E-03	1.240	1.40
Hexane	110-54-3		9.2E-04	0.368	0.41
Isooctane	540-84-1		4.0E-05	0.016	0.02
Methyl Ethyl Ketone	78-93-3		2.0E-05	0.008	0.01
Propionaldehyde	123-38-6		1.3E-04	0.052	0.06
Quinone	106-51-4		1.6E-04	0.064	0.07
Methyl chorlform	71-55-6		4.8E-05	0.019	0.02
Toluene	108-88-3		2.9E-03	1.160	1.31
Xylene	1330-20-7		2.0E-04	0.080	0.09
		Total Non-PAH HAPS	9.5E-03	3.790	4.26

PAH HAPS	CAS#		Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
2-Methylnaphthalene	91-57-6		1.7E-04	0.068000	0.076500
Acenaphthene	83-32-9		1.4E-06	0.000560	0.000630
Acenaphthylene	208-96-8		2.2E-05	0.008800	0.009900
Anthracene	120-12-7		3.1E-06	0.001240	0.001395
Benzo(a)anthracene	56-55-3		2.1E-07	0.000084	0.000095
Benzo(a)pyrene	50-32-8		9.8E-09	0.000004	0.000004
Benzo(b)fluoranthene	205-99-2		1.0E-07	0.000040	0.000045
Benzo(b)pyrene	192-97-2		1.1E-07	0.000044	0.000050
Benzo(g,h,I)perylene	191-24-2		4.0E-08	0.000016	0.000018
Benzo(k)fluoranthene	207-08-9		4.1E-08	0.000016	0.000018
Chrysene	218-01-9		1.8E-07	0.000072	0.000081
Fluoranthene	206-44-0		6.1E-07	0.000244	0.000275
Fluorene	86-73-7		1.1E-05	0.004400	0.004950
Indeno(1,2,3-cd)pyrene	193-39-5		7.0E-09	0.000003	0.000003
Naphthalene	91-20-3		6.5E-04	0.260000	0.292500
Perylene	198-55-0		8.8E-09	0.000004	0.000004
Phenanthrene	85-01-8		2.3E-05	0.009200	0.010350
Pyrene	129-00-0		3.0E-06	0.001200	0.001350
		Total PAH HAPS	8.8E-04	0.353927	0.398167

HAPS Metals		Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Arsenic		5.6E-07	0.000224	0.000252
Beryllium		0.0E+00	0.000000	0.000000
Cadmium		4.1E-07	0.000164	0.000185
Chromium		5.5E-06	0.002200	0.002475
Cobalt		2.6E-08	0.000010	0.000012
Hexavalent Chromium		4.5E-07	0.000180	0.000203
Lead		1.5E-05	0.006000	0.006750
Manganese		7.7E-06	0.003080	0.003465
Mercury		2.6E-06	0.001040	0.001170
Nickel		6.3E-05	0.025200	0.028350
Phosphorus		2.8E-05	0.011200	0.012600
Selenium		3.5E-07	0.000140	0.000158
	Total Metals HAPS	1.2E-04	0.049438	0.055618
	Total HAPS		**4.193**	**4.72**

Table B-16: HAPs Emission Rates from the RAP/Concrete Plant Generator

Horsepower Rating:	817	horsepower	
Fuel Usage:	40	gallons/hr	
MMBtu/hr:	5.48	Btu	(based on 128000 Btu/gallon)
Btu x 10^-12/hr:	5.48E-06	Btu x10^-12	(based on 128000 Btu/gallon)
Yearly Operating Hours:	3744	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	0.004203	0.007868
Acrolein	107-02-8		9.25E-05	0.000507	0.000949
Benzene	71-43-2		9.33E-04	0.005113	0.009571
1,3-Butadiene	106-99-0		3.91E-05	0.000214	0.000401
Formaldehyde	50-00-0		1.18E-03	0.006466	0.012105
Propylene	115-07-1		2.58E-03	0.014138	0.026467
Toluene	108-88-3		4.09E-04	0.002241	0.004196
Xylene	1330-20-7		2.85E-04	0.001562	0.002924
		Total Non-PAH HAPS	6.29E-03	0.034445	0.064481

PAH HAPS	CAS#		Emission Factor (lbs/mmBtu)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Acenaphthene	83-32-9		1.42E-06	0.000008	0.000015
Acenaphthylene	208-96-8		5.06E-06	0.000028	0.000052
Anthracene	120-12-7		1.87E-06	0.000010	0.000019
Benzo(a)anthracene	56-55-3		1.68E-06	0.000009	0.000017
Benzo(a)pyrene	50-32-8		1.88E-07	0.000001	0.000002
Benzo(b)fluoranthene	205-99-2		9.91E-08	0.000001	0.000001
Benzo(a)pyrene	192-97-2		1.55E-07	0.000001	0.000002
Benzo(g,h,I)perylene	191-24-2		4.89E-07	0.000003	0.000005
Benzo(k)fluoranthene	207-08-9		1.55E-07	0.000001	0.000002
Dibenz(a,h)anthracene			5.83E-07	0.000003	0.000006
Chrysene	218-01-9		3.53E-07	0.000002	0.000004
Fluoranthene	206-44-0		7.61E-06	0.000042	0.000078
Fluorene	86-73-7		2.92E-05	0.000160	0.000300
Indeno(1,2,3-cd)pyrene	193-39-5		3.75E-07	0.000002	0.000004
Naphthalene	91-20-3		8.48E-05	0.000465	0.000870
Phenanthrene	85-01-8		2.94E-05	0.000161	0.000302
Pyrene	129-00-0		4.78E-06	0.000026	0.000049
		Total PAH HAPS	1.68E-04	0.000922	0.001726

HAPS Metals		**Emission Factor (lbs/Btu^12)**	**Emission Rate (lbs/hr)**	**Emission Rate (ton/yr)**
Arsenic		4	0.000022	0.000041
Beryllium		3	0.000016	0.000031
Cadmium		3	0.000016	0.000031
Chromium		3	0.000016	0.000031
Lead		9	0.000049	0.000092
Manganese		6	0.000033	0.000062
Mercury		3	0.000016	0.000031
Nickel		3	0.000016	0.000031
Selenium		15	0.000082	0.000154
	Total Metals HAPS	49	0.000269	0.000503
	Total HAPS		**0.0356**	**0.0052**

Table B-17: HAPs Emission Rates from the Asphalt Heater

Btu Rating	2.5	MMBtu/hr	(based on 128000 Btu/gallon)
Fuel Usage:	19.5	gallons/hr	
Btu x 10^-12/hr:	2.5E-06	Btu x10^-12	(based on 128000 Btu/gallon)
Yearly Operating Hours:	8760	hours per year	

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

Organic Compounds	CAS#		Emission Factor (lbs/10^3 gal)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Acenaphthene	83-32-9		2.11E-05	0.000000	0.000002
Acenaphthylene	208-96-8		2.53E-07	0.000000	0.000000
Anthracene	120-12-7		1.22E-06	0.000000	0.000000
Benzene	71-43-2		2.14E-04	0.000004	0.000018
Benzo(a)anthracene	56-55-3		4.01E-06	0.000000	0.000000
Benzo(b,k)fluoranthene	205-99-2		1.48E-06	0.000000	0.000000
Benzo(g,h,I)perylene	191-24-2		2.26E-06	0.000000	0.000000
Chrysene	218-01-9		2.38E-06	0.000000	0.000000
Dibenz(a,h)anthracene			1.67E-06	0.000000	0.000000
Ethylbenzene	100-41-4		6.36E-05	0.000001	0.000005
Fluoranthene	206-44-0		4.84E-06	0.000000	0.000000
Fluorene	86-73-7		4.47E-06	0.000000	0.000000
Formaldehyde	50-00-0		6.10E-02	0.001190	0.005210
Indeno(1,2,3-cd)pyrene	193-39-5		2.14E-06	0.000000	0.000000
Naphthalene	91-20-3		1.13E-03	0.000022	0.000097
Phenanthrene	85-01-8		1.05E-05	0.000000	0.000001
Pyrene	129-00-0		4.25E-06	0.000000	0.000000
Toluene	108-88-3		6.20E-03	0.000121	0.000530
Xylene	1330-20-7		1.09E-04	0.000002	0.000009
		Total Organic Compounds	6.88E-02	0.001341	0.005874

HAPS Metals		Emission Factor (lbs/Btu^12)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Arsenic		4	0.000010	0.000044
Beryllium		3	0.000008	0.000033
Cadmium		3	0.000008	0.000033
Chromium		3	0.000008	0.000033
Lead		9	0.000023	0.000099
Manganese		6	0.000015	0.000066
Mercury		3	0.000008	0.000033
Nickel		3	0.000008	0.000033
Selenium		15	0.000038	0.000164
	Total Metals HAPS	49	0.000123	0.000537
	Total HAPS		**0.00280**	**0.00641**

Attachment C
Emission Calculations Supporting Documents

AAI Broadway Site - NSR Asphalt Mixing Plant Emission Summary
400 TPH

Mix Ratios

Aggregate	57.50%	230	tons/hr	517500	tons/yr
RAP	35.00%	140	tons/hr	315000	tons/yr
Mineral Filler	1.50%	6	tons/hr	13500	tons/yr
Asphalt Cement	6.00%	24	tons/hr	54000	tons/yr
Aggregate Total		376	tons/hr	846000	tons/yr
	Total	400	tons/hr	900000	tons/yr

Plant Hourly Average	400.0	tons/hr	
	2250.0	hrs/yr	Based on Annual Production and Hourly Production. Not a requested Permit Condition.
Uncontrolled hrs/yr of operation	8760.0	hrs/yr	
Exhaust Stack Temperature	270.0	deg F	
Exhaust Stack Moisture	21.7	%	
Exhaust Stack Flowrate	32000	ACFM	
Exhaust Stack Flowrate	13975	DSCFM	
NSPS	0.04	gr/dscf	
Annual tons per year	900000	tpy	

Aggregate/RAP Handling Storage Piles

AP-42 Section 13.2.4 "Aggregate Handling"	E(TSP) =	0.00472 lbs/ton	AP-42 13.2.4 (11/06)	E = k x (0.0032) x (U/5)^1.3 / (M/2)^1.4 lbs/ton		
Ver 11/2006	E(PM10) =	0.00223 lbs/ton	Max tph	370.0	tph	
	E(PM2.5) =	0.00034 lbs/ton	k(tsp)	0.74		
			k(pm10)	0.35		
	E(TSP) =	0.00472 lbs/ton	k(pm2.5)	0.053		
	E(PM10) =	0.00223 lbs/ton	U Maximum	8.5	MPH	1996-2006 Albuquerque Ave MPH
	E(PM2.5) =	0.00034 lbs/ton	U Annual	8.5	MPH	1996-2006 Albuquerque Ave MPH
		370.0 tph	M	2	%	NMED Default

	lb/hr	tons/yr	
E(tsp) Uncontrolled	1.74649	7.65	
E(pm10) Uncontrolled	0.82604	3.62	
E(pm2.5) Uncontrolled	0.12509	0.55	
E(tsp) Controlled	1.74649	1.96	Annual Emissions are Controlled by Limiting Annual Production
E(pm10) Controlled	0.82604	0.93	Annual Emissions are Controlled by Limiting Annual Production
E(pm2.5) Controlled	0.12509	0.14	Annual Emissions are Controlled by Limiting Annual Production

Aggregate Feed Bin Loading (Cold)

AP-42 Section 13.2.4 "Aggregate Handling"	E(TSP) =	0.00472 lbs/ton	AP-42 13.2.4 (11/06)	E = k x (0.0032) x (U/5)^1.3 / (M/2)^1.4 lbs/ton		
Ver 11/2006	E(PM10) =	0.00223 lbs/ton	Max tph	230.0	tph	
	E(PM2.5) =	0.00034 lbs/ton	k(tsp)	0.74		
			k(pm10)	0.35		
	E(TSP) =	0.00472 lbs/ton	k(pm2.5)	0.053		
	E(PM10) =	0.00223 lbs/ton	U Maximum	8.5	MPH	1996-2006 Albuquerque Ave MPH
	E(PM2.5) =	0.00034 lbs/ton	U Annual	8.5	MPH	1996-2006 Albuquerque Ave MPH
		230.0 tph	M	2	%	NMED Default

	lb/hr	tons/yr	
E(tsp) Uncontrolled	1.08566	4.76	
E(pm10) Uncontrolled	0.51349	2.25	
E(pm2.5) Uncontrolled	0.07776	0.34	
E(tsp) Controlled	1.08566	1.22	Annual Emissions are Controlled by Limiting Annual Production
E(pm10) Controlled	0.51349	0.58	Annual Emissions are Controlled by Limiting Annual Production
E(pm2.5) Controlled	0.07776	0.09	Annual Emissions are Controlled by Limiting Annual Production

Aggregate Feed Bin Unloading

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		230.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.69000	3.022
E(pm10) Uncontrolled	0.25300	1.108
E(pm2.5) Uncontrolled	0.03910	0.171
E(tsp) Controlled	0.03220	0.036
E(pm10) Controlled	0.01058	0.012
E(pm2.5) Controlled	0.00299	0.003

Scalping Screen

AP-42 Table 11.19.2-2 "Screening Uncontrolled"	E(TSP) =	0.02500	lbs/ton		
Ver 8/2004	E(PM10) =	0.00870	lbs/ton		
	E(PM2.5) =	0.00132	lbs/ton		
				91.20 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Screening Controlled"	E(TSP) =	0.00220	lbs/hr		
Ver 8/2004	E(PM10) =	0.00074	lbs/ton		
	E(PM2.5) =	0.00005	lbs/ton		
Throughput		230.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	5.75000	25.185
E(pm10) Uncontrolled	2.00100	8.764
E(pm2.5) Uncontrolled	0.30360	1.330
E(tsp) Controlled	0.50600	0.569
E(pm10) Controlled	0.17020	0.191
E(pm2.5) Controlled	0.01150	0.013

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Scalping Screen Unloading

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		230.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.69000	3.022
E(pm10) Uncontrolled	0.25300	1.108
E(pm2.5) Uncontrolled	0.03910	0.171
E(tsp) Controlled	0.03220	0.036
E(pm10) Controlled	0.01058	0.012
E(pm2.5) Controlled	0.00299	0.003

Pug Mill

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		236.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.70800	3.101
E(pm10) Uncontrolled	0.25960	1.137
E(pm2.5) Uncontrolled	0.04012	0.176
E(tsp) Controlled	0.03304	0.037
E(pm10) Controlled	0.01086	0.012
E(pm2.5) Controlled	0.00307	0.003

Pug Mill Unloading to Scale Conveyor

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		236.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.70800	3.101
E(pm10) Uncontrolled	0.25960	1.137
E(pm2.5) Uncontrolled	0.04012	0.176
E(tsp) Controlled	0.03304	0.037
E(pm10) Controlled	0.01086	0.012
E(pm2.5) Controlled	0.00307	0.003

Scale Conveyor Transfer to Slinger Conveyor

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		236.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.70800	3.101
E(pm10) Uncontrolled	0.25960	1.137
E(pm2.5) Uncontrolled	0.04012	0.176
E(tsp) Controlled	0.03304	0.037
E(pm10) Controlled	0.01086	0.012
E(pm2.5) Controlled	0.00307	0.003

RAP Feed Bin Loading

AP-42 Section 13.2.4 "Aggregate Handling"	E(TSP) =	0.00142 lbs/ton	AP-42 13.2.4 (11/06)	E = k x (0.0032) x (U/5)^1.3 / (M/2)^1.4 lbs/ton		
Ver 11/2006	E(PM10) =	0.00067 lbs/ton	Max tph	140.0	tph	
	E(PM2.5) =	0.00010 lbs/ton	k(tsp)	0.74		
			k(pm10)	0.35		
	E(TSP) =	0.00142 lbs/ton	k(pm2.5)	0.053		
	E(PM10) =	0.00067 lbs/ton	U Maximum	8.5	MPH	1996-2006 Albuquerque Ave MPH
	E(PM2.5) =	0.00010 lbs/ton	U Annual	8.5	MPH	1996-2006 Albuquerque Ave MPH
		140.0 tph	M	2	%	NMED Default
			RAP Inherent Material Properties	70	% Reduction	"EIIP – Preferred and Alternative Methods for Estimating Air Emissions from Hot-Mix-Asphalt Plants, Final Report, July 1996, Table 3.2-1 Fugitive Dust – Crushed RAP material"EPA

	lb/hr	tons/yr	
E(tsp) Uncontrolled	0.19825	0.87	
E(pm10) Uncontrolled	0.09377	0.41	
E(pm2.5) Uncontrolled	0.01420	0.06	
E(tsp) Controlled	0.19825	0.22	Annual Emissions are Controlled by Limiting Annual Production
E(pm10) Controlled	0.09377	0.11	Annual Emissions are Controlled by Limiting Annual Production
E(pm2.5) Controlled	0.01420	0.02	Annual Emissions are Controlled by Limiting Annual Production

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400 TPH

RAP Feed Bin Unloading

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		140.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.42000	1.840
E(pm10) Uncontrolled	0.15400	0.675
E(pm2.5) Uncontrolled	0.02380	0.104
E(tsp) Controlled	0.01960	0.022
E(pm10) Controlled	0.00644	0.007
E(pm2.5) Controlled	0.00182	0.002

RAP Screen

AP-42 Table 11.19.2-2 "Screening Uncontrolled"	E(TSP) =	0.02500	lbs/ton		
Ver 8/2004	E(PM10) =	0.00870	lbs/ton		
	E(PM2.5) =	0.00132	lbs/ton		
				91.20 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Screening Controlled"	E(TSP) =	0.00220	lbs/hr		
Ver 8/2004	E(PM10) =	0.00074	lbs/ton		
	E(PM2.5) =	0.00005	lbs/ton		
Throughput		140.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	3.50000	15.330
E(pm10) Uncontrolled	1.21800	5.335
E(pm2.5) Uncontrolled	0.18480	0.809
E(tsp) Controlled	0.30800	0.347
E(pm10) Controlled	0.10360	0.117
E(pm2.5) Controlled	0.00700	0.008

RAP Screen Unloading

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		140.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.42000	1.840
E(pm10) Uncontrolled	0.15400	0.675
E(pm2.5) Uncontrolled	0.02380	0.104
E(tsp) Controlled	0.01960	0.022
E(pm10) Controlled	0.00644	0.007
E(pm2.5) Controlled	0.00182	0.002

RAP Transfer Conveyor to Conveyor

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		140.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.42000	1.840
E(pm10) Uncontrolled	0.15400	0.675
E(pm2.5) Uncontrolled	0.02380	0.104
E(tsp) Controlled	0.01960	0.022
E(pm10) Controlled	0.00644	0.007
E(pm2.5) Controlled	0.00182	0.002

RAP Transfer Conveyor to Drum

AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"	E(TSP) =	0.00300	lbs/ton		
Ver 8/2004	E(PM10) =	0.00110	lbs/ton		
	E(PM2.5) =	0.00017	lbs/ton		
				95.33 % Control Efficiency	AP-42 Table 11.19.2-2
AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"	E(TSP) =	0.00014	lbs/hr		
Ver 8/2004	E(PM10) =	0.000046	lbs/ton		
	E(PM2.5) =	0.000013	lbs/ton		
Throughput		140.0	tph		

	lb/hr	tons/yr
E(tsp) Uncontrolled	0.42000	1.840
E(pm10) Uncontrolled	0.15400	0.675
E(pm2.5) Uncontrolled	0.02380	0.104
E(tsp) Controlled	0.01960	0.022
E(pm10) Controlled	0.00644	0.007
E(pm2.5) Controlled	0.00182	0.002

AAI Broadway Site - NSR Asphalt Mixing Plant Emission Summary
400 TPH

Mineral Filler Silo

Uncontrolled emissions based on AP-42 Section 11.12 "Concrete Batching" Table 11.12-2 "Cement Unloading to Elevated Storage Silo"

E(TSP) =	0.72 lbs/ton	Uncontrolled Cement Silo Loading TSP
E(PM10) =	0.46 lbs/ton	Uncontrolled Cement Silo Loading PM10
E(PM2.5) =	0.036 lbs/ton	Uncontrolled Cement Silo Loading PM2.5 (TSP * 0.05025; Table 11.12-3 Uncontrolled)

Max tph Mineral Filler	25 tph Max		6 tph Ave	52560.00 tons/yr uncontrolled
				13500.00 tons/yr controlled
	lb/hr	lb/hr Ave	tons/yr	
E(tsp) uncontrolled cement	18.00000	4.32000	18.922	
E(pm10) uncontrolled cement	11.50000	2.76000	12.089	
E(pm2.5) uncontrolled cement	0.90000	0.21600	0.946	

Baghouse Control Efficiency 99.0 % Engineering Judgement based on lower end of Baghouse Controls

Uncontrolled emissions based on AP-42 Section 11.12 "Concrete Batching" Table 11.12-2 "Cement Unloading to Elevated Storage Silo" and %CE

E(TSP) =	0.0072 lbs/ton	Controlled Cement Silo Loading TSP
E(PM10) =	0.0046 lbs/ton	Controlled Cement Silo Loading PM10
E(PM2.5) =	0.00036 lbs/ton	Controlled Cement Silo Loading PM2.5 (TSP * 0.06; Table 11.12-3 Controlled K factors)

	lb/hr	lb/hr Ave	tons/yr
E(tsp) controlled	0.18000	0.04320	0.049
E(pm10) controlled	0.11500	0.02760	0.031
E(pm2.5) controlled	0.00900	0.00216	0.002

Aspahlt Cement Storage Tank

TANKS 4.0.9d

Tank capacity	60000 gallons	
Tons Per Hour	24 tons	
Tons Per Year	54000 tons	
Density	9.22 lbs/gallon	
Gallons Per Hour	5206.1 gal/hr	
Gallons Per Year	11713665.9 gal/yr	
Tank Temperature	325 degrees f	
Turnovers	195.2277657 per year	
Working Loss TOC	325.76 lbs/yr	
Breathing Loss TOC	0 lbs/yr	
Total TOC	325.76 lbs/yr	
Total TOC	0.037 lbs/hr	
Total TOC	0.163 tpy	
Total Asphalt Fumes	0.00048 lbs/hr	1.3% of VOC
Total Asphalt Fumes	0.00212 tpy	1.3% of VOC

AAI Broadway Site - NSR Asphalt Mixing Plant Emission Summary
400 TPH

Drum Mixer Emissions

Uncontrolled emissions based on AP-42 Section 11.1 "Hot Mix Asphalt Plants" Table 11.1-3, -4, -7, -8, -14

E(TSP) =	28.000 lbs/ton	Uncontrolled Drum Mixer	
E(PM10) =	6.500 lbs/ton	Uncontrolled Drum Mixer	
E(PM2.5) =	1.565 lbs/ton	Uncontrolled Drum Mixer	Table 11.1-4 plus condensable
E(NOx) =	0.055 lbs/ton	Uncontrolled Drum Mixer	
E(CO) =	0.130 lbs/ton	Uncontrolled Drum Mixer	
E(SO2) =	0.058 lbs/ton	Uncontrolled Drum Mixer	
E(VOC) =	0.032 lbs/ton	Uncontrolled Drum Mixer	
E(Asphalt Fumes) =	0.012 lbs/ton	Uncontrolled Drum Mixer	Table 11.1-3 Organic Condensable
E(CO) Silo Filling =	0.001179981 lbs/ton	Uncontrolled Drum Unloading CO	
E(TOC) Silo Filling =	0.012186685 lbs/ton	Uncontrolled Drum Unloading TOC	
E(Asphalt Fumes) Silo Filling =	0.000188603 lbs/ton	Uncontrolled Drum Unloading PM	
E(TSP) Silo Filling =	0.000585889 lbs/ton	Uncontrolled Drum Unloading PM	
E(PM10) Silo Filling =	0.000585889 lbs/ton	Uncontrolled Drum Unloading PM	
E(PM2.5) Silo Filling =	0.000585889 lbs/ton	Uncontrolled Drum Unloading PM	
E(CO) Plant Unloading =	0.001349240 lbs/ton	Uncontrolled Silo Loading CO	
E(TOC) Plant Unloading =	0.004158948 lbs/ton	Uncontrolled Silo Loading TOC	
E(Asphalt Fumes) Plant Unloading =	0.000087048 lbs/ton	Uncontrolled Silo Loading PM Organic	
E(TSP) Plant Unloading =	0.000521937 lbs/ton	Uncontrolled Silo Loading PM	
E(PM10) Plant Unloading =	0.000521937 lbs/ton	Uncontrolled Silo Loading PM	
E(PM2.5) Plant Unloading =	0.000521937 lbs/ton	Uncontrolled Silo Loading PM	
E(CO) Yard =	0.000352000 lbs/ton	Uncontrolled Yard CO	
E(TOC) Yard =	0.001100000 lbs/ton	Uncontrolled Yard TOC	

TSP	11200.00 lbs/hr	49056.00 tons/yr	
PM10	2600.00 lbs/hr	11388.00 tons/yr	
PM2.5	626.00 lbs/hr	2741.88 tons/yr	
NOx	22.00 lbs/hr	96.36 tons/yr	
CO	52.00 lbs/hr	227.76 tons/yr	
SO2	23.20 lbs/hr	101.62 tons/yr	
VOC	12.80 lbs/hr	56.06 tons/yr	
Asphalt Fumes	4.80 lbs/hr	21.02 tons/yr	
CO Silo Filling	0.47 lbs/hr	2.07 tons/yr	
TOC Silo Filling	4.87 lbs/hr	21.35 tons/yr	
Asphalt Fumes Silo Filling	0.08 lbs/hr	0.33 tons/yr	
TSP Silo Filling	0.23 lbs/hr	1.03 tons/yr	
PM10 Silo Filling	0.23 lbs/hr	1.03 tons/yr	
PM2.5 Silo Filling	0.23 lbs/hr	1.03 tons/yr	
CO Plant Unloading	0.54 lbs/hr	2.36 tons/yr	
TOC Plant Unloading	1.66 lbs/hr	7.29 tons/yr	
Asphalt Fumes Plant Unloading	0.03 lbs/hr	0.15 tons/yr	
TSP Plant Unloading	0.21 lbs/hr	0.91 tons/yr	
PM10 Plant Unloading	0.21 lbs/hr	0.91 tons/yr	
PM2.5 Plant Unloading	0.21 lbs/hr	0.91 tons/yr	
CO Yard	0.14 lbs/hr	0.62 tons/yr	
TOC Yard	0.44 lbs/hr	1.93 tons/yr	
Asphalt Fumes Yard	0.01 lbs/hr	0.03 tons/yr	1.5% of TOC

Controlled emissions based on AP-42 Section 11.1 "Hot Mix Asphalt Plants" Table 11.1-3, -7, -8, -14

E(TSP) =	0.033 lbs/ton	Controlled Drum Mixer	99.88 % Control Efficiency	AP-42 Section 11.1
E(PM10) =	0.023 lbs/ton	Controlled Drum Mixer		
E(PM2.5) =	0.023 lbs/ton	Controlled Drum Mixer		
E(NOx) =	0.055 lbs/ton	Controlled Drum Mixer		
E(CO) =	0.130 lbs/ton	Controlled Drum Mixer		
E(SO2) =	0.058 lbs/ton	Controlled Drum Mixer		
E(VOC) =	0.032 lbs/ton	Controlled Drum Mixer		
E(Asphalt Fumes) =	0.012 lbs/ton	Controlled Drum Mixer	Table 11.1-3 Organic Condensable	
E(CO) Silo Filling =	0.001179981 lbs/ton	Controlled Drum Unloading CO		
E(TOC) Silo Filling =	0.012186685 lbs/ton	Controlled Drum Unloading TOC		
E(Asphalt Fumes) Silo Filling =	0.000188603 lbs/ton	Controlled Drum Unloading TOC		
E(TSP) Silo Filling =	0.000585889 lbs/ton	Controlled Drum Unloading PM		
E(PM10) Silo Filling =	0.000585889 lbs/ton	Controlled Drum Unloading PM		
E(PM2.5) Silo Filling =	0.000585889 lbs/ton	Controlled Drum Unloading PM		
E(CO) Plant Unloading =	0.001349240 lbs/ton	Controlled Silo Loading CO		
E(TOC) Plant Unloading =	0.004158948 lbs/ton	Controlled Silo Loading TOC		
E(Asphalt Fumes) Plant Unloading =	0.000087048 lbs/ton	Controlled Silo Loading PM Organic		
E(TSP) Plant Unloading =	0.000521937 lbs/ton	Controlled Silo Unloading PM		
E(PM10) Plant Unloading =	0.000521937 lbs/ton	Controlled Silo Unloading PM		
E(PM2.5) Plant Unloading =	0.000521937 lbs/ton	Controlled Silo Unloading PM		
E(CO) Yard =	0.000352000 lbs/ton	Controlled Yard CO		
E(TOC) Yard =	0.001100000 lbs/ton	Controlled Yard TOC		

TSP	13.20 lbs/hr	14.85 tons/yr	AP-42 11.1
PM10	9.20 lbs/hr	10.35 tons/yr	
PM2.5	9.20 lbs/hr	10.35 tons/yr	
NOx	22.00 lbs/hr	24.75 tons/yr	
CO	52.00 lbs/hr	58.50 tons/yr	
SO2	23.20 lbs/hr	26.10 tons/yr	
VOC	12.80 lbs/hr	14.40 tons/yr	
Asphalt Fumes	4.80 lbs/hr	5.40 tons/yr	
CO Silo Filling	0.47 lbs/hr	0.53 tons/yr	
TOC Silo Filling	4.87 lbs/hr	5.48 tons/yr	
Asphalt Fumes Silo Filling	0.075 lbs/hr	0.08 tons/yr	
TSP Silo Filling	0.23 lbs/hr	0.26 tons/yr	
PM10 Silo Filling	0.23 lbs/hr	0.26 tons/yr	
PM2.5 Silo Filling	0.23 lbs/hr	0.26 tons/yr	
CO Plant Unloading	0.54 lbs/hr	0.61 tons/yr	
TOC Plant Unloading	1.66 lbs/hr	1.87 tons/yr	
Asphalt Fumes Plant Unloading	0.035 lbs/hr	0.04 tons/yr	
TSP Plant Unloading	0.21 lbs/hr	0.23 tons/yr	
PM10 Plant Unloading	0.21 lbs/hr	0.23 tons/yr	
PM2.5 Plant Unloading	0.21 lbs/hr	0.23 tons/yr	
CO Yard	0.14 lbs/hr	0.16 tons/yr	
TOC Yard	0.44 lbs/hr	0.50 tons/yr	
Asphalt Fumes Yard	0.0066 lbs/hr	0.007 tons/yr	1.5% of TOC

AAI Broadway Site - NSR Asphalt Mixing Plant Emission Summary
400 TPH

HMA Haul Road Traffic
AP-42 13.2 Unpaved Road (11/06)
Equation:
E = k(s/12)^a*(W/3)^b*[(365-p)/365]   *Annual emissions only include p factor*

k TSP	4.9		
k PM10	1.5		
k PM25	0.15		
a TSP	0.7		
a PM10	0.9		
a PM25	0.9		
b TSP	0.45		
b PM10	0.45		
b PM25	0.45		
% Silt Content = s	4.8	%	Sand and Gravel (AP-42 13.2.2-1)
p = days with precipitation over 0.01 inches	60		

Vehicle control	90.0 %		Surfactants/millings and water

Mineral Filler Truck VMT Unpaved	278.9 meter/one way vehicle	25 tons/load	6 tons/hr	0.17335 miles/vehicle
Asphalt Cement Truck VMT Unpaved	84.7 meter/one way vehicle	25 tons/load	24 tons/hr	0.05264 miles/vehicle
Asphalt Truck VMT Unpaved	84.7 meter/one way vehicle	25 tons/load	400 tons/hr	0.05264 miles/vehicle
Aggregate Truck VMT Unpaved	278.9 meter/one way vehicle	25 tons/load	230 tons/hr	0.17335 miles/vehicle

Max. Mineral Filler Truck/hr	0.2 truck/hr	540 truck/yr	13500 tons/yr
Max. Asphalt Cement Truck/hr	1.0 truck/hr	2160 truck/yr	54000 tons/yr
Max. Asphalt Truck/hr	16.0 truck/hr	36000 truck/yr	900000 tons/yr
Max Aggregate Truck/hr	9.2 truck/hr	20700 truck/yr	517500 tons/yr
Max. Total Truck into Site	26.4 truck/hr	59400 truck/yr	

Mineral Filler Truck VMT Unpaved	0.04160 miles/hr	93.60632098	93.60632098
Asphalt Cement Truck VMT Unpaved	0.05054 miles/hr	113.7056627	113.7056627
Asphalt Truck VMT Unpaved	0.84226 miles/hr	1895.094379	1895.094379
Aggregate Truck VMT Unpaved	1.59477 miles/hr	3588.242304	3588.242304
	2.529 miles/hr	5690.649	5690.649

Mineral Filler Truck weight	27.5 tons
Asphalt Cement Truck weight	27.5 tons
Asphalt Truck weight	27.5 tons
Aggregate Truck weight	27.5 tons

		TSP Uncontrolled		TSP Control	
Max. Mineral Filler Truck Emissions Unpaved		0.29 lbs/hr	0.27 tons/yr	0.029 lbs/hr	0.027 tons/yr
Max. Asphalt Cement Truck Emissions Unpaved		0.35 lbs/hr	0.33 tons/yr	0.035 lbs/hr	0.033 tons/yr
Max. Asphalt Truck Emissions Unpaved		5.89 lbs/hr	5.54 tons/yr	0.59 lbs/hr	0.55 tons/yr
Max. Aggregate Truck Emissions Unpaved		11.15 lbs/hr	10.48 tons/yr	1.12 lbs/hr	1.05 tons/yr
	HMA total traffic	17.69 lbs/hr	16.63 tons/yr	1.77 lbs/hr	1.66 tons/yr
		PM10 Uncontrolled		PM10 Control	
Max. Mineral Filler Truck Emissions Unpaved		0.074 lbs/hr	0.070 tons/yr	0.0074 lbs/hr	0.0070 tons/yr
Max. Asphalt Cement Truck Emissions Unpaved		0.090 lbs/hr	0.085 tons/yr	0.0090 lbs/hr	0.0085 tons/yr
Max. Asphalt Truck Emissions Unpaved		1.50 lbs/hr	1.41 tons/yr	0.15 lbs/hr	0.14 tons/yr
Max. Aggregate Truck Emissions Unpaved		2.84 lbs/hr	2.67 tons/yr	0.28 lbs/hr	0.27 tons/yr
	HMA total traffic	4.51 lbs/hr	4.24 tons/yr	0.45 lbs/hr	0.42 tons/yr
		PM2.5 Uncontrolled		PM2.5 Control	
Max. Mineral Filler Truck Emissions Unpaved		0.0074 lbs/hr	0.0070 tons/yr	0.00074 lbs/hr	0.00070 tons/yr
Max. Asphalt Cement Truck Emissions Unpaved		0.0090 lbs/hr	0.0085 tons/yr	0.00090 lbs/hr	0.00085 tons/yr
Max. Asphalt Truck Emissions Unpaved		0.15 lbs/hr	0.14 tons/yr	0.015 lbs/hr	0.014 tons/yr
Max. Aggregate Truck Emissions Unpaved		0.28 lbs/hr	0.27 tons/yr	0.028 lbs/hr	0.027 tons/yr
	HMA total traffic	0.45 lbs/hr	0.42 tons/yr	0.045 lbs/hr	0.042 tons/yr

AAI Broadway Site - NSR Asphalt Mixing Plant Emission Summary
400 TPH

AP-42 13.1 Paved Road (01/11)
Equation:
E = k(sL)^0.91*(W)^1.02*[1-P/4N]

Annual emissions only include p factor

k TSP	0.011				
k PM10	0.0022				
k PM25	0.00054				
sL	0.6		road surface silt loading (g/m2)		
P = days with precipitation over 0.01 inches	60				
N = number of days in averaging period	365				
Truck weight		27.5	tons		
Haul Truck VMT Paved In		238.2	meter/one way vehicle	0.14806	miles/vehicle
Haul Truck VMT Paved Asphalt Exit		106.4	meter/one way vehicle	0.06613	miles/vehicle
Haul Truck VMT Paved Aggregate Exit		230.2	meter/one way vehicle	0.14310	miles/vehicle
Haul Truck VMT Paved Out		225.2	meter/one way vehicle	0.13994	miles/vehicle
Max. Mineral Filler Truck/hr		0.2	truck/hr	540	truck/yr
Max. Asphalt Cement Truck/hr		1.0	truck/hr	2160	truck/yr
Max. Asphalt Truck/hr		16.0	truck/hr	36000	truck/yr
Max Aggregate Truck/hr		9.2	truck/hr	20700	truck/yr
Max. Total Truck into Site		26.4	truck/hr	59400	truck/yr

		Hourly Max		Annual VMT
Haul Truck VMT Paved In		3.90890	miles/hr	8795
Haul Truck VMT Paved Asphalt Exit		1.12156	miles/hr	2524
Haul Truck VMT Paved Aggregate Exit		1.35082	miles/hr	3039
Haul Truck VMT Paved Out		3.69431	miles/hr	8312
	Total	10.07559		22670

			TSP Uncontrolled		
Max. Truck Emissions Paved Road In	0.7938	lbs/hr		0.8563	tons/yr
			PM10 Uncontrolled		
	0.1588	lbs/hr		0.1713	tons/yr
			PM2.5 Uncontrolled		
	0.03897	lbs/hr		0.0420	tons/yr
			TSP Uncontrolled		
Max. Truck Emissions Paved Road Asphalt Exit	0.2277	lbs/hr		0.2457	tons/yr
			PM10 Uncontrolled		
	0.0455	lbs/hr		0.0491	tons/yr
			PM2.5 Uncontrolled		
	0.01118	lbs/hr		0.0121	tons/yr
			TSP Uncontrolled		
Max. Truck Emissions Paved Road Aggregate Exit	0.2743	lbs/hr		0.2959	tons/yr
			PM10 Uncontrolled		
	0.0549	lbs/hr		0.0592	tons/yr
			PM2.5 Uncontrolled		
	0.01347	lbs/hr		0.0145	tons/yr
			TSP Uncontrolled		
Max. Truck Emissions Paved Road Out	0.7502	lbs/hr		0.8093	tons/yr
			PM10 Uncontrolled		
	0.1500	lbs/hr		0.1619	tons/yr
			PM2.5 Uncontrolled		
	0.03683	lbs/hr		0.0397	tons/yr
			TSP Uncontrolled		
Total	2.0460	lbs/hr		2.2071	tons/yr
			PM10 Uncontrolled		
	0.4092	lbs/hr		0.4414	tons/yr
			PM2.5 Uncontrolled		
	0.1004	lbs/hr		0.1084	tons/yr

AAI Broadway Site - NSR Asphalt Mixing Plant Emission Summary
400 TPH

RAP/Concrete Plant Haul Road Traffic

AP-42 13.2 Unpaved Road (11/06)
Equation:
E = k(s/12)^a*(W/3)^b*[(365-p)/365] *Annual emissions only include p factor*

k TSP	4.9		
k PM10	1.5		
k PM25	0.15		
a TSP	0.7		
a PM10	0.9		
a PM25	0.9		
b TSP	0.45		
b PM10	0.45		
b PM25	0.45		
% Silt Content = s	4.8	%	Sand and Gravel (AP-42 13.2.2-1)
p = days with precipitation over 0.01 inches	60		

Vehicle control	90.0	%		Surfactants/millings and water					
RAP Truck VMT Unpaved	278.9	meter/one way vehicle	25	tons/load	200	tons/hr	0.17335	miles/vehicle	
Max. RAP Truck/hr	8.0	truck/hr	29952	truck/yr	748800	tons/yr			
RAP Truck VMTUnpaved	1.38676	miles/hr	5192.030603	miles/yr uncontrolled	5192.030603	miles/yr controlled			
RAP Truck weight	27.5	tons							
		TSP Uncontrolled				TSP Control			
Max. RAP Truck Emissions Unpaved	9.70	lbs/hr	15.17	tons/yr	0.97	lbs/hr	1.52	tons/yr	
		PM10 Uncontrolled				PM10 Control			
Max. RAP Truck Emissions Unpaved	2.47	lbs/hr	3.87	tons/yr	0.25	lbs/hr	0.39	tons/yr	
		PM2.5 Uncontrolled				PM2.5 Control			
Max. RAP Truck Emissions Unpaved	0.25	lbs/hr	0.39	tons/yr	0.025	lbs/hr	0.039	tons/yr	

AP-42 13.1 Paved Road (01/11)
Equation:
E = k(sL)^0.91*(W)^1.02*[1-P/4N] *Annual emissions only include p factor*

k TSP	0.011	
k PM10	0.0022	
k PM25	0.00054	
sL	0.6	road surface silt loading (g/m2)
P = days with precipitation over 0.01 inches	60	
N = number of days in averaging period	365	

Truck weight	27.5	tons		
Haul Truck VMT Paved In	238.2	meter/one way vehicle	0.14806	miles/vehicle
Haul Truck VMT Paved Aggregate Exit	230.2	meter/one way vehicle	0.14310	miles/vehicle
Haul Truck VMT Paved Out	225.2	meter/one way vehicle	0.13994	miles/vehicle
Max. RAP Truck/hr	8.0	truck/hr	29952	truck/yr

	Hourly Max		Annual VMT
Haul Truck VMT Paved In	1.18452	miles/hr	4435
Haul Truck VMT Paved Aggregate Exit	1.14476	miles/hr	4286
Haul Truck VMT Paved Out	1.11949	miles/hr	4191
Total	3.44876		12912

		TSP Uncontrolled		
Max. Truck Emissions Paved Road In	0.2405	lbs/hr	0.4318	tons/yr
		PM10 Uncontrolled		
	0.0481	lbs/hr	0.0864	tons/yr
		PM2.5 Uncontrolled		
	0.0118	lbs/hr	0.0212	tons/yr
		TSP Uncontrolled		
Max. Truck Emissions Paved Road Aggregate Exit	0.2325	lbs/hr	0.4173	tons/yr
		PM10 Uncontrolled		
	0.0465	lbs/hr	0.0835	tons/yr
		PM2.5 Uncontrolled		
	0.0114	lbs/hr	0.0205	tons/yr
		TSP Uncontrolled		
Max. Truck Emissions Paved Road Out	0.2273	lbs/hr	0.4081	tons/yr
		PM10 Uncontrolled		
	0.0455	lbs/hr	0.0816	tons/yr
		PM2.5 Uncontrolled		
	0.0112	lbs/hr	0.0200	tons/yr
		TSP Uncontrolled		
Total	0.7003	lbs/hr	1.2571	tons/yr
		PM10 Uncontrolled		
	0.1401	lbs/hr	0.2514	tons/yr
		PM2.5 Uncontrolled		
	0.0344	lbs/hr	0.0617	tons/yr

AAI Broadway Site - NSR Asphalt Mixing Plant Emission Summary
Hot Oil Heater Emissions

Asphalt Heater #1

AP-42 1.3 (5/10)

Heater Size		Diesel			
2500000	BTU/hr	Heat Rate	128000	BTU/gal	
19.5	gal/hr	%sulfur	0.05		

Uncontrolled Hours	8760
Controlled Hours	8760

Emission Factors			
NOx	20.00	lbs/1000 gal	
CO	5.00	lbs/1000 gal	
VOC	0.34	lbs/1000 gal	
SO2	142S	lbs/1000 gal	S = % sulfur
PM	2.00	lbs/1000 gal	

Calculated Uncontrolled Emissions				
NOx	0.391	lbs/hr	1.711	tpy
CO	0.098	lbs/hr	0.428	tpy
VOC	0.0066	lbs/hr	0.029	tpy
SOx	0.139	lbs/hr	0.607	tpy
PM	0.039	lbs/hr	0.171	tpy

Calculated Controlled Emissions				
NOx	0.39	lbs/hr	1.7	tpy
CO	0.098	lbs/hr	0.43	tpy
VOC	0.0066	lbs/hr	0.029	tpy
SOx	0.14	lbs/hr	0.61	tpy
PM	0.039	lbs/hr	0.17	tpy

AP-42 1.5 (7/08)

Natural Gas or Propane				
2500000	BTU/hr	Heat Rate	91500	BTU/gal
27.3	gal/hr			

Uncontrolled Hours	8760
Controlled Hours	8760

Emission Factors		
NOx	13	lbs/1000 gal
CO	7.5	lbs/1000 gal
VOC	1	lbs/1000 gal
SO2	0.018	lbs/1000 gal
PM	0.7	lbs/1000 gal

Calculated Uncontrolled Emissions				
NOx	0.36	lbs/hr	1.6	tpy
CO	0.20	lbs/hr	0.90	tpy
VOC	0.027	lbs/hr	0.12	tpy
SOx	0.00049	lbs/hr	0.0022	tpy
PM	0.019	lbs/hr	0.084	tpy

Calculated Controlled Emissions				
NOx	0.36	lbs/hr	1.6	tpy
CO	0.20	lbs/hr	0.90	tpy
VOC	0.027	lbs/hr	0.12	tpy
SOx	0.00049	lbs/hr	0.0022	tpy
PM	0.019	lbs/hr	0.084	tpy

AAI Broadway Site - NSR Asphalt Mixing Plant Emission Summary
400 TPH

Uncontrolled Emission Totals

		NOx		CO		SO2		VOC		TSP		PM10		PM2.5		Asphalt Fumes	
		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	lbs/hr	tons/yr
1	Cold Aggregate/RAP Storage Pile									1.75	7.65	0.83	3.6	0.13	0.55		
2	Feed Bin Loading									1.09	4.76	0.51	2.2	0.078	0.34		
3	Feed Bin Unloading									0.69	3.02	0.25	1.1	0.039	0.17		
4	Scalping Screen									5.75	25.19	2.0	8.8	0.30	1.3		
5	Scalping Screen Unloading									0.69	3.02	0.25	1.1	0.039	0.17		
6	Pug Mill Load									0.71	3.10	0.26	1.1	0.040	0.18		
7	Pug Mill Unload									0.71	3.10	0.26	1.1	0.040	0.18		
8	Conveyor Transfer to Slinger Conveyor									0.71	3.10	0.26	1.1	0.040	0.18		
9	RAP Bin Loading									0.20	0.87	0.094	0.41	0.014	0.062		
10	RAP Bin Unloading									0.42	1.84	0.15	0.67	0.024	0.10		
11	RAP Screen									3.50	15.3	1.22	5.3	0.18	0.81		
	RAP Screen Unloading									0.42	1.84	0.15	0.67	0.024	0.10		
12	RAP Transfer Conveyor									0.42	1.84	0.15	0.67	0.024	0.10		
13	RAP Transfer Conveyor									0.42	1.84	0.15	0.67	0.024	0.10		
14	Mineral Filler Silo Loading									18.0	18.9	11.5	12.1	0.90	0.95		
15	Drum Dryer	22.0	96.4	52.0	227.8	23.2	101.6	12.8	56.1	11200	49056	2600	11388	626	2742	4.8	21
16	Drum Mixer Unloading			0.47	2.1			4.9	21.4	0.23	1.03	0.23	1.0	0.23	1.0	0.075	0.33
17	Asphalt Silo Unloading			0.54	2.4			1.7	7.3	0.21	0.91	0.21	0.91	0.21	0.91	0.035	0.15
20	Asphalt Heater	0.39	1.7	0.20	0.90	0.14	0.61	0.027	0.12	0.039	0.17	0.039	0.17	0.039	0.17		
21	Asphalt Cement Storage Tank			***	***			0.037	0.16							0.00048	0.0021
22	Haul Road Traffic									30.1	35.3	7.5	8.8	0.83	0.98		
23	Yard			0.14	0.62			0.44	1.9							0.0066	0.029
	Total	**22.4**	**98.1**	**53.4**	**233.7**	**23.3**	**102.2**	**19.8**	**86.9**	**11266**	**49189**	**2626**	**11440**	**629**	**2750**	**4.9**	**22**

Controlled Emission Totals

		NOx		CO		SO2		VOC		TSP		PM10		PM2.5		Asphalt Fumes	
		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	lbs/hr	tons/yr
1	Cold Aggregate/RAP Storage Pile									1.75	1.96	0.83	0.93	0.13	0.14		
2	Feed Bin Loading									1.09	1.22	0.51	0.58	0.078	0.087		
3	Feed Bin Unloading									0.032	0.036	0.011	0.012	0.0030	0.0034		
4	Scalping Screen									0.51	0.57	0.17	0.19	0.012	0.013		
5	Scalping Screen Unloading									0.032	0.036	0.011	0.012	0.0030	0.0034		
6	Pug Mill Load									0.033	0.037	0.011	0.012	0.0031	0.0035		
7	Pug Mill Unload									0.033	0.037	0.011	0.012	0.0031	0.0035		
8	Conveyor Transfer to Slinger Conveyor									0.033	0.037	0.011	0.012	0.0031	0.0035		
9	RAP Bin Loading									0.20	0.22	0.094	0.11	0.014	0.016		
10	RAP Bin Unloading									0.020	0.022	0.0064	0.0072	0.0018	0.0020		
11	RAP Screen									0.31	0.35	0.10	0.12	0.0070	0.0079		
	RAP Screen Unloading									0.020	0.022	0.0064	0.0072	0.0018	0.0020		
12	RAP Transfer Conveyor									0.020	0.022	0.0064	0.0072	0.0018	0.0020		
13	RAP Transfer Conveyor									0.020	0.022	0.0064	0.0072	0.0018	0.0020		
14	Mineral Filler Silo Baghouse									0.18	0.049	0.12	0.031	0.0090	0.0024		
15	Drum Dryer Baghouse	22.0	24.8	52.0	58.5	23.2	26.1	12.8	14.4	13.2	14.9	9.2	10.4	9.2	10.4	4.8	5.4
16	Drum Mixer Unloading			0.47	0.53			4.87	5.48	0.23	0.26	0.23	0.26	0.23	0.26	0.075	0.085
17	Asphalt Silo Unloading			0.54	0.61			1.66	1.87	0.21	0.23	0.21	0.23	0.21	0.23	0.035	0.039
20	Asphalt Heater	0.39	1.71	0.20	0.90	0.14	0.61	0.027	0.12	0.039	0.17	0.039	0.17	0.039	0.17		
21	Asphalt Cement Storage Tank			***	***			0.037	0.16							0.00048	0.0021
22	Haul Road Traffic									5.48	6.64	1.25	1.50	0.20	0.25		
23	Yard			0.14	0.16			0.44	0.50							0.0066	0.0074
	Total	**22.4**	**26.5**	**53.4**	**60.7**	**23.3**	**26.7**	**19.8**	**22.5**	**23.4**	**26.8**	**12.8**	**14.6**	**10.2**	**11.6**	**4.9**	**5.5**

Insignificant - "***"

AAI - Broadway RAP/Concrete Plant - Uncontrolled Emission Calculations
200 tph

Plant Throughput	200 tph	1752000	tons per year
Annual Hours Operation	8760 hours/yr		

Raw Material Pile, Feeder Loading, Finish Pile
AP-42 Section 13.2.4 "Aggregate Handling" (ver 11/2006)
E = k x (0.0032) x (U/5)^1.3 / (M/2)^1.4 lbs/ton

k(tsp)	0.74	
k(pm10)	0.35	
k(pm2.5)	0.053	
U Annual Hour	8.5	Albq Airport 1996-2006
M	2.00	% NMED Default

E(TSP) Annual Hour =	0.00472	lbs/ton
E(PM10) Annual Hour =	0.00223	lbs/ton
E(PM2.5) Annual Hour =	0.00034	lbs/ton

Stacker to Storage Pile Loading
AP-42 Section 13.2.4 "Aggregate Handling" (ver 11/2006)
E = k x (0.0032) x (U/5)^1.3 / (M/2)^1.4 lbs/ton

k(tsp)	0.74	
k(pm10)	0.35	
k(pm2.5)	0.053	
U Annual Hour	8.5	Albq Airport 1996-2006
M	2.00	% NMED Default

E(TSP) Annual Hour =	0.00472	lbs/ton
E(PM10) Annual Hour =	0.00223	lbs/ton
E(PM2.5) Annual Hour =	0.00034	lbs/ton

Uncontrolled Emission Factors	TSP		PM10		PM2.5		
Crusher	0.00540	lbs/ton	0.00240	lbs/ton	0.00036	lbs/ton	AP-42 Table 11.19.2-2 "Tertiary Crushing Uncontrolled"
Screen	0.02500	lbs/ton	0.00870	lbs/ton	0.00132	lbs/ton	AP-42 Table 11.19.2-2 "Screening Uncontrolled"
Uncontrolled Conveyor	0.00300	lbs/ton	0.00110	lbs/ton	0.00017	lbs/ton	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
Stacker Annual Hour	0.00472	lbs/ton	0.00223	lbs/ton	0.00034	lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2%
Feeder Annual Hour	0.00472	lbs/ton	0.00223	lbs/ton	0.00034	lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2%
Storage Pile Annual Hour	0.00472	lbs/ton	0.00223	lbs/ton	0.00034	lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2%
Raw Annual Hour	0.00472	lbs/ton	0.00223	lbs/ton	0.00034	lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2%
Product Piles Annual hour	0.00472	lbs/ton	0.00223	lbs/ton	0.00034	lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2%

PTE

Emission Point #	Process Unit Description	% of Throughput	Process Rate	TSP lbs/hr	TSP ton/yr	PM10 lbs/hr	PM10 ton/yr	PM2.5 lbs/hr	PM2.5 ton/yr
24	Raw Material Pile	100.00	200	0.94	4.13	0.45	1.96	0.068	0.296
25	Feeder	100.00	200	0.94	4.13	0.45	1.96	0.068	0.296
26	Primary Crusher	100.00	200	1.08	4.73	0.48	2.10	0.073	0.319
27	Transfer Point	100.00	200	0.60	2.63	0.22	0.96	0.033	0.146
28	Transfer Point	100.00	200	0.60	2.63	0.22	0.96	0.033	0.146
29	Transfer Point	60.00	120	0.36	1.58	0.13	0.58	0.020	0.088
30	Screen	160.00	320	8.00	35.0	2.78	12.19	0.422	1.848
31	Secondary Crusher	60.00	120	0.65	2.84	0.29	1.26	0.044	0.191
32	Transfer Point	60.00	120	0.36	1.58	0.13	0.58	0.020	0.088
33	Transfer Point	60.00	120	0.36	1.58	0.13	0.58	0.020	0.088
34	Transfer Point	100.00	200	0.60	2.63	0.22	0.96	0.033	0.146
35	Transfer Point	100.00	200	0.60	2.63	0.22	0.96	0.033	0.146
36	Transfer Point	100.00	200	0.60	2.63	0.22	0.96	0.033	0.146
37	Storage Pile Drop	100.00	200	0.94	4.13	0.45	1.96	0.068	0.296
			Total PM Engine	0.85	3.7	0.85	3.7	0.85	3.7
			Total PM Crushing Equipment	16.64	72.88	6.39	27.98	0.97	4.24
			Total Haul Roads	0	0	0	0	0	0
			Total PM	17.5	76.6	7.2	31.7	1.82	8.0

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200 tph

			Emission Factor	Emission Rate				
38	Process Unit Number	Emitted Pollutants	lbs/hp-hr	lbs/hr	Hour	Horsepower	lbs/hr	ton/yr
	Plant Engine	NOX		13.71	8760	817	13.7	60.0
	Max emissions of all potential engines	CO		2.20	8760	415	2.2	9.64
SO2 emissions based on 40 gallons/hr		SO2		0.28	8760	817	0.28	1.23
		VOC		0.27	8760	817	0.27	1.18
		PM		0.85	8760	817	0.85	3.72

NOx Total	14	lbs/hr	60	tons/yr
CO Total	2.20	lbs/hr	9.64	tons/yr
SO2 Total	0.28	lbs/hr	1.23	tons/yr
VOC Total	0.27	lbs/hr	1.18	tons/yr
TSP Total	17	lbs/hr	76.6	tons/yr
PM10 Total	7.2	lbs/hr	31.7	tons/yr
PM2.5 Total	1.8	lbs/hr	8.0	tons/yr

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200 tph

Plant Throughput	200 tph	748800	tons per year
Annual Hours Operation	3744 hours/yr		

Raw Material Pile, Feeder Loading, Finish Pile
AP-42 Section 13.2.4 "Aggregate Handling" (ver 11/2006)
E = k x (0.0032) x (U/5)^1.3 / (M/2)^1.4 lbs/ton

k(tsp)	0.74	
k(pm10)	0.35	
k(pm2.5)	0.053	
U Annual Hour	8.5	Albq Airport 1996-2006
M	2.00	% NMED Default

E(TSP) Annual Hour =	0.00472	lbs/ton
E(PM10) Annual Hour =	0.00223	lbs/ton
E(PM2.5) Annual Hour =	0.00034	lbs/ton

Stacker to Storage Pile Loading
AP-42 Section 13.2.4 "Aggregate Handling" (ver 11/2006)
E = k x (0.0032) x (U/5)^1.3 / (M/2)^1.4 lbs/ton

k(tsp)	0.74	
k(pm10)	0.35	
k(pm2.5)	0.053	
U Annual Hour	8.5	Albq Airport 1996-2006
M	2.88	%

E(TSP) Annual Hour =	0.00283	lbs/ton
E(PM10) Annual Hour =	0.00134	lbs/ton
E(PM2.5) Annual Hour =	0.00020	lbs/ton

Controlled Emission Factors	TSP	PM10	PM2.5	
Crusher	0.00120 lbs/ton	0.00054 lbs/ton	0.00010 lbs/ton	AP-42 Table 11.19.2-2 "Tertiary Crushing Controlled"
Screen	0.00220 lbs/ton	0.00074 lbs/ton	0.00005 lbs/ton	AP-42 Table 11.19.2-2 "Screening Controlled"
Uncontrolled Conveyor	0.00300 lbs/ton	0.00110 lbs/ton	0.00017 lbs/ton	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Uncontrolled"
Controlled Conveyor	0.00014 lbs/ton	0.00005 lbs/ton	0.000013 lbs/ton	AP-42 Table 11.19.2-2 "Conveyor Transfer Point Controlled"
Stacker Annual Hour	0.00283 lbs/ton	0.00134 lbs/ton	0.00020 lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2.88%
Feeder Annual Hour	0.00472 lbs/ton	0.00223 lbs/ton	0.00034 lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2%
Storage Pile Annual Hour	0.00472 lbs/ton	0.00223 lbs/ton	0.00034 lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2.88%
Raw Annual Hour	0.00472 lbs/ton	0.00223 lbs/ton	0.00034 lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2%
Product Piles Annual hour	0.00472 lbs/ton	0.00223 lbs/ton	0.00034 lbs/ton	AP-42 Section 13.2.4 "Aggregate Handling" w=8.5 MPH;M=2%

PTE

Emission Point #	Process Unit Description	% of Throughput	Process Rate	TSP lbs/hr	TSP ton/yr	PM10 lbs/hr	PM10 ton/yr	PM2.5 lbs/hr	PM2.5 ton/yr
24	Raw Material Pile	100.00	200	0.94	1.77	0.45	0.84	0.068	0.13
25	Feeder	100.00	200	0.94	1.77	0.45	0.84	0.068	0.13
26	Primary Crusher	100.00	200	0.24	0.45	0.11	0.202	0.020	0.037
27	Transfer Point	100.00	200	0.028	0.052	0.0092	0.0172	0.0026	0.0049
28	Transfer Point	100.00	200	0.028	0.052	0.0092	0.0172	0.0026	0.0049
29	Transfer Point	60.00	120	0.017	0.031	0.0055	0.0103	0.0016	0.0029
30	Screen	160.00	320	0.70	1.32	0.24	0.44	0.016	0.030
31	Secondary Crusher	60.00	120	0.14	0.27	0.065	0.121	0.012	0.0225
32	Transfer Point	60.00	120	0.017	0.031	0.0055	0.010	0.0016	0.0029
33	Transfer Point	60.00	120	0.017	0.031	0.0055	0.010	0.0016	0.0029
34	Transfer Point	100.00	200	0.028	0.052	0.0092	0.017	0.0026	0.0049
35	Transfer Point	100.00	200	0.028	0.052	0.0092	0.017	0.0026	0.0049
36	Transfer Point	100.00	200	0.028	0.052	0.0092	0.017	0.0026	0.0049
37	Storage Pile Drop	100.00	200	0.57	1.06	0.27	0.50	0.041	0.076
			Total PM Engine	0.85	1.6	0.85	1.6	0.85	1.6
			Total PM Crushing Equipment	3.73	7.0	1.63	3.06	0.241	0.452
			Total Haul Roads	0	0	0	0	0	0
			Total PM	4.6	8.6	2.5	4.6	1.09	2.0

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200 tph

38	Process Unit Number	Emitted Pollutants	Emission Factor lbs/hp-hr	Emission Rate lbs/hr	Hour	Horsepower	lbs/hr	ton/yr
	Plant Engine	NOX		13.71	3744	817	13.71	25.67
	Max emissions of all potential engines	CO		2.20	3744	415	2.20	4.12
SO2 emissions based on 40 gallons/hr times 7 lbs/gallon times fuel % sulfur content times a factor of 2.		SO2		0.28	3744	817	0.28	0.52
		VOC		0.27	3744	817	0.27	0.51
		PM		0.85	3744	817	0.85	1.59

NOx Total	13.71	lbs/hr	25.67	tons/yr
CO Total	2.20	lbs/hr	4.12	tons/yr
SO2 Total	0.28	lbs/hr	0.52	tons/yr
VOC Total	0.27	lbs/hr	0.51	tons/yr
TSP Total	4.58	lbs/hr	8.58	tons/yr
PM10 Total	2.48	lbs/hr	4.65	tons/yr
PM2.5 Total	1.09	lbs/hr	2.04	tons/yr

1.3 Fuel Oil Combustion

1.3.1 General[1-3]

Two major categories of fuel oil are burned by combustion sources: distillate oils and residual oils. These oils are further distinguished by grade numbers, with Nos. 1 and 2 being distillate oils; Nos. 5 and 6 being residual oils; and No. 4 being either distillate oil or a mixture of distillate and residual oils. No. 6 fuel oil is sometimes referred to as Bunker C. Distillate oils are more volatile and less viscous than residual oils. They have negligible nitrogen and ash contents and usually contain less than 0.3 percent sulfur (by weight). Distillate oils are used mainly in domestic and small commercial applications, and include kerosene and diesel fuels. Being more viscous and less volatile than distillate oils, the heavier residual oils (Nos. 5 and 6) may need to be heated for ease of handling and to facilitate proper atomization. Because residual oils are produced from the residue remaining after the lighter fractions (gasoline, kerosene, and distillate oils) have been removed from the crude oil, they contain significant quantities of ash, nitrogen, and sulfur. Residual oils are used mainly in utility, industrial, and large commercial applications.

1.3.2 Firing Practices[4]

The major boiler configurations for fuel oil-fired combustors are watertube, firetube, cast iron, and tubeless design. Boilers are classified according to design and orientation of heat transfer surfaces, burner configuration, and size. These factors can all strongly influence emissions as well as the potential for controlling emissions.

Watertube boilers are used in a variety of applications ranging from supplying large amounts of process steam to providing space heat for industrial facilities. In a watertube boiler, combustion heat is transferred to water flowing through tubes which line the furnace walls and boiler passes. The tube surfaces in the furnace (which houses the burner flame) absorb heat primarily by radiation from the flames. The tube surfaces in the boiler passes (adjacent to the primary furnace) absorb heat primarily by convective heat transfer.

Firetube boilers are used primarily for heating systems, industrial process steam generators, and portable power boilers. In firetube boilers, the hot combustion gases flow through the tubes while the water being heated circulates outside of the tubes. At high pressures and when subjected to large variations in steam demand, firetube units are more susceptible to structural failure than watertube boilers. This is because the high-pressure steam in firetube units is contained by the boiler walls rather than by multiple small-diameter watertubes, which are inherently stronger. As a consequence, firetube boilers are typically small and are used primarily where boiler loads are relatively constant. Nearly all firetube boilers are sold as packaged units because of their relatively small size.

A cast iron boiler is one in which combustion gases rise through a vertical heat exchanger and out through an exhaust duct. Water in the heat exchanger tubes is heated as it moves upward through the tubes. Cast iron boilers produce low pressure steam or hot water, and generally burn oil or natural gas. They are used primarily in the residential and commercial sectors.

Another type of heat transfer configuration used on smaller boilers is the tubeless design. This design incorporates nested pressure vessels with water in between the shells. Combustion gases are fired into the inner pressure vessel and are then sometimes recirculated outside the second vessel.

Table 1.3-1. (cont.)

Firing Configuration (SCC)[a]	SO_2[b]		SO_3[c]		NO_x[d]		CO[e]		Filterable PM[f]	
	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING
Boilers < 100 Million Btu/hr										
No. 6 oil fired (1-02-004-02/03) (1-03-004-02/03)	157S	A	2S	A	55	A	5	A	9.19(S)+3.22[i]	B
No. 5 oil fired (1-03-004-04)	157S	A	2S	A	55	A	5	A	10[i]	A
No. 4 oil fired (1-03-005-04)	150S	A	2S	A	20	A	5	A	7	B
Distillate oil fired (1-02-005-02/03) (1-03-005-02/03)	142S	A	2S	A	20	A	5	A	2	A
Residential furnace (A2104004/A2104011)	142S	A	2S	A	18	A	5	A	0.4[g]	B

a To convert from lb/103 gal to kg/103 L, multiply by 0.120. SCC = Source Classification Code.
b References 1-2,6-9,14,56-60. S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.
c References 1-2,6-8,16,57-60. S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.
d References 6-7,15,19,22,56-62. Expressed as NO2. Test results indicate that at least 95% by weight of NOx is NO for all boiler types except residential furnaces, where about 75% is NO. For utility vertical fired boilers use 105 lb/103 gal at full load and normal (>15%) excess air. Nitrogen oxides emissions from residual oil combustion in industrial and commercial boilers are related to fuel nitrogen content, estimated by the following empirical relationship: lb NO2 /103 gal = 20.54 + 104.39(N), where N is the weight % of nitrogen in the oil. For example, if the fuel is 1% nitrogen, then N = 1.
e References 6-8,14,17-19,56-61. CO emissions may increase by factors of 10 to 100 if the unit is improperly operated or not well maintained.
f References 6-8,10,13-15,56-60,62-63. Filterable PM is that particulate collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train. Particulate emission factors for residual oil combustion are, on average, a function of fuel oil sulfur content where S is the weight % of sulfur in oil. For example, if fuel oil is 1% sulfur, then S = 1.
g Based on data from new burner designs. Pre-1970's burner designs may emit filterable PM as high as 3.0 1b/103 gal.
h The SO2 emission factor for both no. 2 oil fired and for no. 2 oil fired with LNB/FGR, is 142S, not 157S. Errata dated April 28, 2000. Section corrected May 2010.
i The PM factors for No.6 and No. 5 fuel were reversed. Errata dated April 28, 2000. Section corrected May 2010.

Table 1.3-2. CONDENSABLE PARTICULATE MATTER EMISSION FACTORS FOR OIL COMBUSTION[a]

Firing Configuration[b] (SCC)	Controls	CPM - TOT[c, d]		CPM - IOR[c, d]		CPM - ORG[c, d]	
		Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING
No. 2 oil fired (1-01-005-01, 1-02-005-01, 1-03-005-01)	All controls, or uncontrolled	1.3[d, e]	D	65% of CPM-TOT emission factor[c]	D	35% of CPM-TOT emission factor[c]	D
No. 6 oil fired (1-01-004-01/04, 1-02-004-01, 1-03-004-01)	All controls, or uncontrolled	1.5[f]	D	85% of CPM-TOT emission factor[d]	E	15% of CPM-TOT emission factor[d]	E

[a] All condensable PM is assumed to be less than 1.0 micron in diameter.
[b] No data are available for numbers 3, 4, and 5 oil. For number 3 oil, use the factors provided for number 2 oil. For numbers 4 and 5 oil, use the factors provided for number 6 oil.
[c] CPM-TOT = total condensable particulate matter.
CPM-IOR = inorganic condensable particulate matter.
CPM-ORG = organic condensable particulate matter.
[d] To convert to lb/MMBtu of No. 2 oil, divide by 140 $MMBtu/10^3$ gal. To convert to lb/MMBtu of No. 6 oil, divide by 150 $MMBtu/10^3$ gal.
[e] References: 76-78.
[f] References: 79-82.

Table 1.3-3. EMISSION FACTORS FOR TOTAL ORGANIC COMPOUNDS (TOC), METHANE, AND NONMETHANE TOC (NMTOC) FROM UNCONTROLLED FUEL OIL COMBUSTION[a]

EMISSION FACTOR RATING: A

Firing Configuration (SCC)	TOC[b] Emission Factor ($lb/10^3$ gal)	Methane[b] Emission Factor ($lb/10^3$ gal)	NMTOC[b] Emission Factor ($lb/10^3$ gal)
Utility boilers			
No. 6 oil fired, normal firing (1-01-004-01)	1.04	0.28	0.76
No. 6 oil fired, tangential firing (1-01-004-04)	1.04	0.28	0.76
No. 5 oil fired, normal firing (1-01-004-05)	1.04	0.28	0.76
No. 5 oil fired, tangential firing (1-01-004-06)	1.04	0.28	0.76
No. 4 oil fired, normal firing (1-01-005-04)	1.04	0.28	0.76
No. 4 oil fired, tangential firing (1-01-005-05)	1.04	0.28	0.76
Industrial boilers			
No. 6 oil fired (1-02-004-01/02/03)	1.28	1.00	0.28
No. 5 oil fired (1-02-004-04)	1.28	1.00	0.28
Distillate oil fired (1-02-005-01/02/03)	0.252	0.052	0.2
No. 4 oil fired (1-02-005-04)	0.252	0.052	0.2
Commercial/institutional/residential combustors			
No. 6 oil fired (1-03-004-01/02/03)	1.605	0.475	1.13
No. 5 oil fired (1-03-004-04)	1.605	0.475	1.13
Distillate oil fired (1-03-005-01/02/03)	0.556	0.216	0.34
No. 4 oil fired (1-03-005-04)	0.556	0.216	0.34
Residential furnace (A2104004/A2104011)	2.493	1.78	0.713

a To convert from lb/103 gal to kg/103 L, multiply by 0.12. SCC = Source Classification Code.

b References 29-32. Volatile organic compound emissions can increase by several orders of magnitude if the boiler is improperly operated or is not well maintained.

Table 1.3-9. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM FUEL OIL COMBUSTION[a]

Organic Compound	Average Emission Factor[b] ($lb/10^3$ Gal)	EMISSION FACTOR RATING
Benzene	2.14E-04	C
Ethylbenzene	6.36E-05[c]	E
Formaldehyde[d]	3.30E-02	C
Naphthalene	1.13E-03	C
1,1,1-Trichloroethane	2.36E-04[c]	E
Toluene	6.20E-03	D
o-Xylene	1.09E-04[c]	E
Acenaphthene	2.11E-05	C
Acenaphthylene	2.53E-07	D
Anthracene	1.22E-06	C
Benz(a)anthracene	4.01E-06	C
Benzo(b,k)fluoranthene	1.48E-06	C
Benzo(g,h,i)perylene	2.26E-06	C
Chrysene	2.38E-06	C
Dibenzo(a,h) anthracene	1.67E-06	D
Fluoranthene	4.84E-06	C
Fluorene	4.47E-06	C
Indo(1,2,3-cd)pyrene	2.14E-06	C
Phenanthrene	1.05E-05	C
Pyrene	4.25E-06	C
OCDD	3.10E-09[c]	E

[a] Data are for residual oil fired boilers, Source Classification Codes (SCCs) 1-01-004-01/04.
[b] References 64-72. To convert from $lb/10^3$ gal to $kg/10^3$ L, multiply by 0.12.
[c] Based on data from one source test (Reference 67).
[d] The formaldehyde number presented here is based only on data from utilities using No. 6 oil. The number presented in Table 1.3-7 is based on utility, commercial, and industrial boilers.

Table 1.3-10. EMISSION FACTORS FOR TRACE ELEMENTS FROM DISTILLATE FUEL OIL COMBUSTION SOURCES[a]

EMISSION FACTOR RATING: E

Firing Configuration (SCC)	Emission Factor (lb/10^{12} Btu)										
	As	Be	Cd	Cr	Cu	Pb	Hg	Mn	Ni	Se	Zn
Distillate oil fired (1-01-005-01, 1-02-005-01, 1-03-005-01)	4	3	3	3	6	9	3	6	3	15	4

[a] Data are for distillate oil fired boilers, SCC codes 1-01-005-01, 1-02-005-01, and 1-03-005-01. References 29-32, 40-44 and 83. To convert from lb/10^{12} Btu to pg/J, multiply by 0.43.

1.5 Liquefied Petroleum Gas Combustion

1.5.1 General[1]

Liquefied petroleum gas (LPG or LP-gas) consists of propane, propylene, butane, and butylenes; the product used for domestic heating is composed primarily of propane. This gas, obtained mostly from gas wells (but also, to a lesser extent, as a refinery by-product) is stored as a liquid under moderate pressures. There are three grades of LPG available as heating fuels: commercial-grade propane, engine fuel-grade propane (also known as HD-5 propane), and commercial-grade butane. In addition, there are high-purity grades of LPG available for laboratory work and for use as aerosol propellants. Specifications for the various LPG grades are available from the American Society for Testing and Materials and the Gas Processors Association. A typical heating value for commercial-grade propane and HD-5 propane is 90,500 British thermal units per gallon (Btu/gal), after vaporization; for commercial-grade butane, the value is 97,400 Btu/gal.

The largest market for LPG is the domestic/commercial market, followed by the chemical industry (where it is used as a petrochemical feedstock) and the agriculture industry. Propane is also used as an engine fuel as an alternative to gasoline and as a standby fuel for facilities that have interruptible natural gas service contracts.

1.5.2 Firing Practices[2]

The combustion processes that use LPG are very similar to those that use natural gas. Use of LPG in commercial and industrial applications may require a vaporizer to provide the burner with the proper mix of air and fuel. The burner itself will usually have different fuel injector tips as well as different fuel-to-air ratio controller settings than a natural gas burner since the LPG stoichiometric requirements are different than natural gas requirements. LPG is fired as a primary and backup fuel in small commercial and industrial boilers and space heating equipment and can be used to generate heat and process steam for industrial facilities and in most domestic appliances that typically use natural gas.

1.5.3 Emissions[1,3-5]

1.5.3.1 Criteria Pollutants -

LPG is considered a "clean" fuel because it does not produce visible emissions. However, gaseous pollutants such as nitrogen oxides (NO_x), carbon monoxide (CO), and organic compounds are produced as are small amounts of sulfur dioxide (SO_2) and particulate matter (PM). The most significant factors affecting NO_x, CO, and organic emissions are burner design, burner adjustment, boiler operating parameters, and flue gas venting. Improper design, blocking and clogging of the flue vent, and insufficient combustion air result in improper combustion and the emission of aldehydes, CO, hydrocarbons, and other organics. NO_x emissions are a function of a number of variables, including temperature, excess air, fuel and air mixing, and residence time in the combustion zone. The amount of SO_2 emitted is directly proportional to the amount of sulfur in the fuel. PM emissions are very low and result from soot, aerosols formed by condensable emitted species, or boiler scale dislodged during combustion. Emission factors for LPG combustion are presented in Table 1.5-1.

Table 1.5-1 presents emission factors on a volume basis (lb/10^3gal). To convert to an energy basis (lb/MMBtu), divide by a heating value of 91.5 MMBtu/10^3gal for propane and 102 MMBtu/10^3gal for butane.

1.5.3.2 Greenhouse Gases[6-11] -

Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions are all produced during LPG combustion. Nearly all of the fuel carbon (99.5 percent) in LPG is converted to CO_2 during the combustion process. This conversion is relatively independent of firing configuration. Although the formation of CO acts to reduce CO_2 emissions, the amount of CO produced is insignificant compared to the amount of CO_2 produced. The majority of the 0.5 percent of fuel carbon not converted to CO_2 is due to incomplete combustion in the fuel stream.

Table 1.5-1. EMISSION FACTORS FOR LPG COMBUSTION[a]

EMISSION FACTOR RATING: E

Pollutant	Butane Emission Factor ($lb/10^3$ gal) Industrial Boilers[b] (SCC 1-02-010-01)	Butane Emission Factor ($lb/10^3$ gal) Commercial Boilers[c] (SCC 1-03-010-01)	Propane Emission Factor ($lb/10^3$ gal) Industrial Boilers[b] (SCC 1-02-010-02)	Propane Emission Factor ($lb/10^3$ gal) Commercial Boilers[c] (SCC 1-03-010-02)
PM, Filterable [d]	0.2	0.2	0.2	0.2
PM, Condensable	0.6	0.6	0.5	0.5
PM, Total	0.8	0.8	0.7	0.7
SO_2[e]	0.09S	0.09S	0.10S	0.10S
NO_x[f]	15	15	13	13
N_2O[g]	0.9	0.9	0.9	0.9
CO_2[h,j]	14,300	14,300	12,500	12,500
CO	8.4	8.4	7.5	7.5
TOC	1.1	1.1	1.0	1.0
CH_4[k]	0.2	0.2	0.2	0.2

[a] Assumes PM, CO, and TOC emissions are the same, on a heat input basis, as for natural gas combustion. Use heat contents of 91.5 x 10^6 Btu/10^3 gallon for propane, 102 x 10^6 Btu/10^3 gallon for butane, 1020 x 10^6 Btu/10^6 scf for methane when calculating an equivalent heat input basis. For example, the equation for converting from methane's emissions factors to propane's emissions factors is as follows: lb pollutant/10^3 gallons of propane = (lb pollutant /10^6 ft^3 methane) * (91.5 x 10^6 Btu/10^3 gallons of propane) / (1020 x 10^6 Btu/10^6 scf of methane). The NO_x emission factors have been multiplied by a correction factor of 1.5, which is the approximate ratio of propane/butane NO_x emissions to natural gas NO_x emissions. To convert from lb/10^3 gal to kg/10^3 L, multiply by 0.12. SCC = Source Classification Code.

[b] Heat input capacities generally between 10 and 100 million Btu/hour.

[c] Heat input capacities generally between 0.3 and 10 million Btu/hour.

[d] Filterable particulate matter (PM) is that PM collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train. For natural gas, a fuel with similar combustion characteristics, all PM is less than 10 μm in aerodynamic equivalent diameter (PM-10).

[e] S equals the sulfur content expressed in gr/100 ft^3 gas vapor. For example, if the butane sulfur content is 0.18 gr/100 ft^3, the emission factor would be (0.09 x 0.18) = 0.016 lb of SO_2/10^3 gal butane burned.

[f] Expressed as NO_2.

[g] Reference 12.

[h] Assuming 99.5% conversion of fuel carbon to CO_2.

[j] EMISSION FACTOR RATING = C.

[k] Reference 13.

11.1 Hot Mix Asphalt Plants

11.1.1 General[1-3,23, 392-394]

Hot mix asphalt (HMA) paving materials are a mixture of size-graded, high quality aggregate (which can include reclaimed asphalt pavement [RAP]), and liquid asphalt cement, which is heated and mixed in measured quantities to produce HMA. Aggregate and RAP (if used) constitute over 92 percent by weight of the total mixture. Aside from the amount and grade of asphalt cement used, mix characteristics are determined by the relative amounts and types of aggregate and RAP used. A certain percentage of fine aggregate (less than 74 micrometers [µm] in physical diameter) is required for the production of good quality HMA.

Hot mix asphalt paving materials can be manufactured by: (1) batch mix plants, (2) continuous mix (mix outside dryer drum) plants, (3) parallel flow drum mix plants, and (4) counterflow drum mix plants. This order of listing generally reflects the chronological order of development and use within the HMA industry.

In 1996, approximately 500 million tons of HMA were produced at the 3,600 (estimated) active asphalt plants in the United States. Of these 3,600 plants, approximately 2,300 are batch plants, 1,000 are parallel flow drum mix plants, and 300 are counterflow drum mix plants. The total 1996 HMA production from batch and drum mix plants is estimated at about 240 million tons and 260 million tons, respectively. About 85 percent of plants being manufactured today are of the counterflow drum mix design, while batch plants and parallel flow drum mix plants account for 10 percent and 5 percent respectively. Continuous mix plants represent a very small fraction of the plants in use ($\leq$0.5 percent) and, therefore, are not discussed further.

An HMA plant can be constructed as a permanent plant, a skid-mounted (easily relocated) plant, or a portable plant. All plants can have RAP processing capabilities. Virtually all plants being manufactured today have RAP processing capability. Most plants have the capability to use either gaseous fuels (natural gas) or fuel oil. However, based upon Department of Energy and limited State inventory information, between 70 and 90 percent of the HMA is produced using natural gas as the fuel to dry and heat the aggregate.

11.1.1.1 Batch Mix Plants –

Figure 11.1-1 shows the batch mix HMA production process. Raw aggregate normally is stockpiled near the production unit. The bulk aggregate moisture content typically stabilizes between 3 to 5 percent by weight.

Processing begins as the aggregate is hauled from the storage piles and is placed in the appropriate hoppers of the cold feed unit. The material is metered from the hoppers onto a conveyer belt and is transported into a rotary dryer (typically gas- or oil-fired). Dryers are equipped with flights designed to shower the aggregate inside the drum to promote drying efficiency.

As the hot aggregate leaves the dryer, it drops into a bucket elevator and is transferred to a set of vibrating screens, where it is classified into as many as four different grades (sizes) and is dropped into individual “hot” bins according to size. At newer facilities, RAP also may be transferred to a separate heated storage bin. To control aggregate size distribution in the final batch mix, the operator opens various hot bins over a weigh hopper until the desired mix and weight are obtained. Concurrent with the aggregate being weighed, liquid asphalt cement is pumped from a heated storage tank to an asphalt bucket, where it is weighed to achieve the desired aggregate-to-asphalt cement ratio in the final mix.

bins or storage silos. The fugitive dust sources associated with drum mix plants are similar to those of batch mix plants with regard to truck traffic and to aggregate material feed and handling operations.

Table 11.1-1 presents emission factors for filterable PM and PM-10, condensable PM, and total PM for batch mix HMA plants. Particle size data for batch mix HMA plants, based on the control technology used, are shown in Table 11.1-2. Table 11.1-3 presents filterable PM and PM-10, condensable PM, and total PM emission factors for drum mix HMA plants. Particle size data for drum mix HMA plants, based on the control technology used, are shown in Table 11.1-4. Tables 11.1-5 and -6 present emission factors for CO, CO_2, NO_x, sulfur dioxide (SO_2), total organic compounds (TOC), formaldehyde, CH_4, and VOC from batch mix plants. Tables 11.1-7 and -8 present emission factors for CO, CO_2, NO_x, SO_2, TOC, CH_4, VOC, and hydrochloric acid (HCl) from drum mix plants. The emission factors for CO, NO_x, and organic compounds represent normal plant operations without scrutiny of the burner design, operation, and maintenance. Information provided in Reference 390 indicates that attention to burner design, periodic evaluation of burner operation, and appropriate maintenance can reduce these emissions. Table 11.1-9 presents organic pollutant emission factors for batch mix plants. Table 11.1-10 presents organic pollutant emission factors for drum mix plants. Tables 11.1-11 and -12 present metals emission factors for batch and drum mix plants, respectively. Table 11.1-13 presents organic pollutant emission factors for hot (asphalt) oil systems.

11.1.2.5 Fugitive Emissions from Production Operations –

Emission factors for HMA load-out and silo filling operations can be estimated using the data in Tables 11.1-14, -15, and -16. Table 11.1-14 presents predictive emission factor equations for HMA load-out and silo filling operations. Separate equations are presented for total PM, extractable organic PM (as measured by EPA Method 315), TOC, and CO. For example, to estimate total PM emissions from drum mix or batch mix plant load-out operations using an asphalt loss-on-heating of 0.41 percent and temperature of 290°F, the following calculation is made:

$$
\begin{aligned}
EF &= 0.000181 + 0.00141(-V)e^{((0.0251)(290 + 460) - 20.43)} \\
&= 0.000181 + 0.00141(-(-0.41))e^{((0.0251)(290 + 460) - 20.43)} \\
&= 0.000181 + 0.00141(0.41)e^{(-1.605)} \\
&= 0.000181 + 0.00141(0.41)(0.2009) \\
&= 0.000181 + 0.000116 \\
&= 0.00030 \text{ lb total PM/ton of asphalt loaded}
\end{aligned}
$$

Tables 11.1-15 and -16 present speciation profiles for organic particulate-based and volatile particulate-based compounds, respectively. The speciation profile shown in Table 11.1-15 can be applied to the extractable organic PM emission factors estimated by the equations in Table 11.1-14 to estimate emission factors for specific organic PM compounds. The speciation profile presented in Table 11.1-16 can be applied to the TOC emission factors estimated by the equations in Table 11.1-14 to estimate emission factors for specific volatile organic compounds. The derivations of the predictive emission factor equations and the speciation profiles can be found in Reference 1.

For example, to estimate TOC emissions from drum mix plant load-out operations using an asphalt loss-on-heating of 0.41 percent and temperature of 290°F, the following calculation is made:

$$
\begin{aligned}
EF &= 0.0172(-V)e^{((0.0251)(290 + 460) - 20.43)} \\
&= 0.0172(-(-0.41))e^{((0.0251)(290 + 460) - 20.43)} \\
&= 0.0172(0.41)e^{(-1.605)} \\
&= 0.0172(0.41)(0.2009) \\
&= 0.0014 \text{ lb TOC/ton of asphalt loaded}
\end{aligned}
$$

To estimate the benzene emissions from the same operation, use the TOC emission factor calculated above and apply the benzene fraction for load-out emissions from Table 11.1-16:

$$\begin{aligned} EF &= 0.0014\ (0.00052) \\ &= 7.3 \times 10^{-7} \text{ lb benzene/ton of asphalt loaded} \end{aligned}$$

Emissions from asphalt storage tanks can be estimated using the procedures described in AP-42 Section 7.1, Organic Liquid Storage Tanks, and the TANKS software. Site-specific data should be used for storage tank specifications and operating parameters, such as temperature. If site-specific data for Antoine's constants for an average asphalt binder used by the facility are unavailable, the following values for an average liquid asphalt binder can be used:

A = 75,350.06
B = 9.00346

These values should be inserted into the Antoine's equation in the following form:

$$\log_{10} P = \frac{-0.05223A}{T} + B$$

where:

P = vapor pressure, mm Hg
T = absolute temperature, Kelvin

The assumed average liquid molecular weight associated with these Antoine's constants is 1,000 atomic mass units and the average vapor molecular weight is 105. Emission factors estimated using these default values should be assigned a rating of E. Carbon monoxide emissions can be estimated by multiplying the THC emissions calculated by the TANKS program by 0.097 (the ratio of silo filling CO emissions to silo filling TOC emissions).

Vapors from the HMA loaded into transport trucks continue following load-out operations. The TOC emissions for the 8-minute period immediately following load-out (yard emissions) can be estimated using an emission factor of 0.00055 kg/Mg (0.0011 lb/ton) of asphalt loaded. This factor is assigned a rating of E. The derivation of this emission factor is described in Reference 1. Carbon monoxide emissions can be estimated by multiplying the TOC emissions by 0.32 (the ratio of truck load-out CO emissions to truck load-out THC emissions).

11.2.3 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section since that date are summarized below. For further detail, consult the background report for this section. This and other documents can be found on the CHIEF Web Site at http://www.epa.gov/ttn/chief/, or by calling the Info CHIEF Help Desk at (919)541-1000.

December 2000

- All emission factors were revised and new factors were added. For selected pollutant emissions, separate factors were developed for distilate oil, No. 6 oil and waste oil fired dryers. Dioxin and Furan emission factors were developed for oil fired drum mix plants. Particulate, VOC and CO factors were developed for silo filling, truck load out and post truck load out operations at batch plants and drum mix plants. Organic species profiles were developed for silo filling, truck load out and post truck load out operations.

Table 11.1-3. PARTICULATE MATTER EMISSION FACTORS FOR DRUM MIX HOT MIX ASPHALT PLANTS[a]

Process	Filterable PM				Condensable PM[b]				Total PM			
	PM[c]	EMISSION FACTOR RATING	PM-10[d]	EMISSION FACTOR RATING	Inorganic	EMISSION FACTOR RATING	Organic	EMISSION FACTOR RATING	PM[e]	EMISSION FACTOR RATING	PM-10[f]	EMISSION FACTOR RATING
Dryer[g] (SCC 3-05-002-05,-55 to -63)												
Uncontrolled	28[h]	D	6.4	D	0.0074[j]	E	0.058[k]	E	28	D	6.5	D
Venturi or wet scrubber	0.026[m]	A	ND	NA	0.0074[n]	A	0.012[p]	A	0.045	A	ND	NA
Fabric filter	0.014[q]	A	0.0039	C	0.0074[n]	A	0.012[p]	A	0.033	A	0.023	C

[a] Factors are lb/ton of product. SCC = Source Classification Code. ND = no data. NA = not applicable. To convert from lb/ton to kg/Mg, multiply by 0.5.
[b] Condensable PM is that PM collected using an EPA Method 202, Method 5 (analysis of "back-half" or impingers), or equivalent sampling train.
[c] Filterable PM is that PM collected on or before the filter of an EPA Method 5 (or equivalent) sampling train.
[d] Particle size data from Reference 23 were used in conjunction with the filterable PM emission factors shown.
[e] Total PM is the sum of filterable PM, condensable inorganic PM, and condensable organic PM.
[f] Total PM-10 is the sum of filterable PM-10, condensable inorganic PM, and condensable organic PM.
[g] Drum mix dryer fired with natural gas, propane, fuel oil, and waste oil. The data indicate that fuel type does not significantly effect PM emissions.
[h] References 31, 36-38, 340.
[j] Because no data are available for uncontrolled condensable inorganic PM, the emission factor is assumed to be equal to the maximum controlled condensable inorganic PM emission factor.
[k] References 36-37.
[m] Reference 1, Table 4-14. Average of data from 36 facilities. Range: 0.0036 to 0.097 lb/ton. Median: 0.020 lb/ton. Standard deviation: 0.022 lb/ton.
[n] Reference 1, Table 4-14. Average of data from 30 facilities. Range: 0.0012 to 0.027 lb/ton. Median: 0.0051 lb/ton. Standard deviation: 0.0063 lb/ton.
[p] Reference 1, Table 4-14. Average of data from 41 facilities. Range: 0.00035 to 0.074 lb/ton. Median: 0.0046 lb/ton. Standard deviation: 0.016 lb/ton.
[q] Reference 1, Table 4-14. Average of data from 155 facilities. Range: 0.00089 to 0.14 lb/ton. Median: 0.010 lb/ton. Standard deviation: 0.017 lb/ton.

Table 11.1-4. SUMMARY OF PARTICLE SIZE DISTRIBUTION FOR DRUM MIX DRYERS[a]

EMISSION FACTOR RATING: E

Particle Size, µm[b]	Cumulative Mass Less Than or Equal to Stated Size (%)[c]		Emission Factors, lb/ton	
	Uncontrolled[d]	Fabric Filter	Uncontrolled[d]	Fabric Filter
1.0	ND	15[e]	ND	0.0021[e]
2.5	5.5	21[f]	1.5	0.0029[f]
10.0	23	30[g]	6.4	0.0042[g]
15.0	27	35[d]	7.6	0.0049[d]

[a] Emission factor units are lb/ton of HMA produced. Rounded to two significant figures. SCC 3-05-002-05, and 3-05-002-55 to -63. ND = no data available. To convert from lb/ton to kg/Mg, multiply by 0.5.

[b] Aerodynamic diameter.

[c] Applies only to the mass of filterable PM.

[d] Reference 23, Table 3-35. The emission factors are calculated using the particle size data from this reference in conjunction with the filterable PM emission factor shown in Table 11.1-3.

[e] References 214, 229. The emission factors are calculated using the particle size data from these references in conjunction with the filterable PM emission factor shown in Table 11.1-3.

[f] References 23, 214, 229. The emission factors are calculated using the particle size data from these references in conjunction with the filterable PM emission factor shown in Table 11.1-3.

[g] Reference 23, 25, 229. The emission factors are calculated using the particle size data from these references in conjunction with the filterable PM emission factor shown in Table 11.1-3. EMISSION FACTOR RATING: D.

Table 11.1-7. EMISSION FACTORS FOR CO, CO_2, NO_x, AND SO_2 FROM DRUM MIX HOT MIX ASPHALT PLANTS[a]

Process	CO[b]	EMISSION FACTOR RATING	CO_2[c]	EMISSION FACTOR RATING	NO_x	EMISSION FACTOR RATING	SO_2[c]	EMISSION FACTOR RATING
Natural gas-fired dryer (SCC 3-05-002-55,-56,-57)	0.13	B	33[d]	A	0.026[e]	D	0.0034[f]	D
No. 2 fuel oil-fired dryer (SCC 3-05-002-58,-59,-60)	0.13	B	33[d]	A	0.055[g]	C	0.011[h]	E
Waste oil-fired dryer (SCC 3-05-002-61,-62,-63)	0.13	B	33[d]	A	0.055[g]	C	0.058[j]	B
Coal-fired dryer[k] (SCC 3-05-002-98)	ND	NA	33[d]	A	ND	NA	0.19[m]	E

[a] Emission factor units are lb per ton of HMA produced. SCC = Source Classification Code. ND = no data available. NA = not applicable. To convert from lb/ton to kg/Mg, multiply by 0.5.

[b] References 25, 44, 48, 50, 149, 154, 197, 214, 229, 254, 339-342, 344, 346, 347, 390. The CO emission factors represent normal plant operations without scrutiny of the burner design, operation, and maintenance. Information is available that indicates that attention to burner design, periodic evaluation of burner operation, and appropriate maintenance can reduce CO emissions. Data for dryers firing natural gas, No. 2 fuel oil, and No. 6 fuel oil were combined to develop a single emission factor because the magnitude of emissions was similar for dryers fired with these fuels.

[c] Emissions of CO_2 and SO_2 can also be estimated based on fuel usage and the fuel combustion emission factors (for the appropriate fuel) presented in AP-42 Chapter 1. The CO_2 emission factors are an average of all available data, regardless of the dryer fuel (emissions were similar from dryers firing any of the various fuels). Fifty percent of the fuel-bound sulfur, up to a maximum (as SO_2) of 0.1 lb/ton of product, is expected to be retained in the product, with the remainder emitted as SO_2.

[d] Reference 1, Table 4-15. Average of data from 180 facilities. Range: 2.6 to 96 lb/ton. Median: 31 lb/ton. Standard deviation: 13 lb/ton.

[e] References 44-45, 48, 209, 341, 342.

[f] References 44-45, 48.

[g] References 25, 50, 153, 214, 229, 344, 346, 347, 352-354.

[h] References 50, 119, 255, 340

[j] References 25, 299, 300, 339, 345, 351, 371-377, 379, 380, 386-388.

[k] Dryer fired with coal and supplemental natural gas or fuel oil.

[m] References 88, 108, 189-190.

Table 11.1-8. EMISSION FACTORS FOR TOC, METHANE, VOC, AND HCl FROM DRUM MIX HOT MIX ASPHALT PLANTS[a]

Process	TOC[b]	EMISSION FACTOR RATING	CH_4[c]	EMISSION FACTOR RATING	VOC[d]	EMISSION FACTOR RATING	HCl[e]	EMISSION FACTOR RATING
Natural gas-fired dryer (SCC 3-05-002-55, -56,-57)	0.044[f]	B	0.012	C	0.032	C	ND	NA
No. 2 fuel oil-fired dryer (SCC 3-05-002-58, -59,-60)	0.044[f]	B	0.012	C	0.032	C	ND	NA
Waste oil-fired dryer (SCC 3-05-002-61, -62,-63)	0.044[f]	E	0.012	C	0.032	E	0.00021	D

[a] Emission factor units are lb per ton of HMA produced. SCC = Source Classification Code. ND = no data available. NA = not applicable. To convert from lb/ton to kg/Mg, multiply by 0.5.
[b] TOC equals total hydrocarbons as propane as measured with an EPA Method 25A or equivalent sampling train plus formaldehyde.
[c] References 25, 44-45, 48, 50, 339-340, 355. Factor includes data from natural gas-, No. 2 fuel oil, and waste oil-fired dryers. Methane measured with an EPA Method 18 or equivalent sampling train.
[d] The VOC emission factors are equal to the TOC factors minus the sum of the methane emission factors and the emission factors for compounds with negligible photochemical reactivity shown in Table 11.1-10; differences in values reported are due to rounding.
[e] References 348, 374, 376, 379, 380.
[f] References 25, 44-45, 48, 50, 149, 153-154, 209-212, 214, 241, 242, 339-340, 355.

Table 11.1-10. EMISSION FACTORS FOR ORGANIC POLLUTANT EMISSIONS FROM DRUM MIX HOT MIX ASPHALT PLANTS[a]

Process	Pollutant		Emission Factor, lb/ton	Emission Factor Rating	Ref. No.
	CASRN	Name			
Natural gas-fired dryer with fabric filter[b] (SCC 3-05-002-55, -56,-57)	Non-PAH hazardous air pollutants[c]				
	71-43-2	Benzene[d]	0.00039	A	25,44,45,50, 341, 342, 344-351, 373, 376, 377, 383, 384
	100-41-4	Ethylbenzene	0.00024	D	25,44,45
	50-00-0	Formaldehyde[e]	0.0031	A	25,35,44,45,50, 339-344, 347-349, 371-373, 384, 388
	110-54-3	Hexane	0.00092	E	339-340
	540-84-1	Isooctane (2,2,4-trimethylpentane)	$4.0x10^{-5}$	E	339-340
	71-55-6	Methyl chloroform[f]	$4.8x10^{-5}$	E	35
	108-88-3	Toluene	0.00015	D	35,44,45
	1330-20-7	Xylene	0.00020	D	25,44,45
		Total non-PAH HAPs	0.0051		
	PAH HAPs				
	91-57-6	2-Methylnaphthalene[g]	$7.4x10^{-5}$	D	44,45,48
	83-32-9	Acenaphthene[g]	$1.4x10^{-6}$	E	48
	208-96-8	Acenaphthylene[g]	$8.6x10^{-6}$	D	35,45,48
	120-12-7	Anthracene[g]	$2.2x10^{-7}$	E	35,48
	56-55-3	Benzo(a)anthracene[g]	$2.1x10^{-7}$	E	48
	50-32-8	Benzo(a)pyrene[g]	$9.8x10^{-9}$	E	48
	205-99-2	Benzo(b)fluoranthene[g]	$1.0x10^{-7}$	E	35,48
	192-97-2	Benzo(e)pyrene[g]	$1.1x10^{-7}$	E	48
	191-24-2	Benzo(g,h,i)perylene[g]	$4.0x10^{-8}$	E	48
	207-08-9	Benzo(k)fluoranthene[g]	$4.1x10^{-8}$	E	35,48
	218-01-9	Chrysene[g]	$1.8x10^{-7}$	E	35,48
	206-44-0	Fluoranthene[g]	$6.1x10^{-7}$	D	35,45,48
	86-73-7	Fluorene[g]	$3.8x10^{-6}$	D	35,45,48,163
	193-39-5	Indeno(1,2,3-cd)pyrene[g]	$7.0x10^{-9}$	E	48
	91-20-3	Naphthalene[g]	$9.0x10^{-5}$	D	35,44,45,48,163
	198-55-0	Perylene[g]	$8.8x10^{-9}$	E	48
	85-01-8	Phenanthrene[g]	$7.6x10^{-6}$	D	35,44,45,48,163
	129-00-0	Pyrene[g]	$5.4x10^{-7}$	D	45,48
		Total PAH HAPs	0.00019		

Table 11.1-10 (cont.)

Process	Pollutant CASRN	Pollutant Name	Emission Factor, lb/ton	Emission Factor Rating	Ref. No.
Natural gas-fired dryer with fabric filter[b] (SCC 3-05-002-55, -56,-57) (cont.)	Total HAPs		0.0053		
	Non-HAP organic compounds				
	106-97-8	Butane	0.00067	E	339
	74-85-1	Ethylene	0.0070	E	339-340
	142-82-5	Heptane	0.0094	E	339-340
	763-29-1	2-Methyl-1-pentene	0.0040	E	339,340
	513-35-9	2-Methyl-2-butene	0.00058	E	339,340
	96-14-0	3-Methylpentane	0.00019	D	339,340
	109-67-1	1-Pentene	0.0022	E	339-340
	109-66-0	n-Pentane	0.00021	E	339-340
		Total non-HAP organics	0.024		
No. 2 fuel oil-fired dryer with fabric filter (SCC 3-05-002-58, -59,-60)	Non-PAH HAPs[c]				
	71-43-2	Benzene[d]	0.00039	A	25,44,45,50, 341, 342, 344-351, 373, 376, 377, 383, 384
	100-41-4	Ethylbenzene	0.00024	D	25,44,45
	50-00-0	Formaldehyde[e]	0.0031	A	25,35,44,45,50, 339-344, 347-349, 371-373, 384, 388
	110-54-3	Hexane	0.00092	E	339-340
	540-84-1	Isooctane (2,2,4-trimethylpentane)	4.0×10^{-5}	E	339-340
	71-55-6	Methyl chloroform[f]	4.8×10^{-5}	E	35
	108-88-3	Toluene	0.0029	E	25, 50, 339-340
	1330-20-7	Xylene	0.00020	D	25,44,45
		Total non-PAH HAPs	0.0078		
	PAH HAPs				
	91-57-6	2-Methylnaphthalene[g]	0.00017	E	50
	83-32-9	Acenaphthene[g]	1.4×10^{-6}	E	48
	208-96-8	Acenaphthylene[g]	2.2×10^{-5}	E	50
	120-12-7	Anthracene[g]	3.1×10^{-6}	E	50,162
	56-55-3	Benzo(a)anthracene[g]	2.1×10^{-7}	E	48
	50-32-8	Benzo(a)pyrene[g]	9.8×10^{-9}	E	48
	205-99-2	Benzo(b)fluoranthene[g]	1.0×10^{-7}	E	35,48
	192-97-2	Benzo(e)pyrene[g]	1.1×10^{-7}	E	48

Table 11.1-10 (cont.)

Process	Pollutant CASRN	Pollutant Name	Emission Factor, lb/ton	Emission Factor Rating	Ref. No.
No. 2 fuel oil-fired dryer with fabric filter (SCC 3-05-002-58, -59,-60) (cont.)	191-24-2	Benzo(g,h,i)perylene[g]	$4.0x10^{-8}$	E	48
	207-08-9	Benzo(k)fluoranthene[g]	$4.1x10^{-8}$	E	35,48
	218-01-9	Chrysene[g]	$1.8x10^{-7}$	E	35,48
	206-44-0	Fluoranthene[g]	$6.1x10^{-7}$	D	35,45,48
	86-73-7	Fluorene[g]	$1.1x10^{-5}$	E	50,164
	193-39-5	Indeno(1,2,3-cd)pyrene[g]	$7.0x10^{-9}$	E	48
	91-20-3	Naphthalene[g]	0.00065	D	25,50,162,164
	198-55-0	Perylene[g]	$8.8x10^{-9}$	E	48
	85-01-8	Phenanthrene[g]	$2.3x10^{-5}$	D	50,162,164
	129-00-0	Pyrene[g]	$3.0x10^{-6}$	E	50
		Total PAH HAPs	0.00088		
		Total HAPs	0.0087		
	Non-HAP organic compounds				
	106-97-8	Butane	0.00067	E	339
	74-85-1	Ethylene	0.0070	E	339-340
	142-82-5	Heptane	0.0094	E	339-340
	763-29-1	2-Methyl-1-pentene	0.0040	E	339,340
	513-35-9	2-Methyl-2-butene	0.00058	E	339,340
	96-14-0	3-Methylpentane	0.00019	D	339,340
	109-67-1	1-Pentene	0.0022	E	339-340
	109-66-0	n-Pentane	0.00021	E	339-340
		Total non-HAP organics	0.024		

Table 11.1-10 (cont.)

Process	Pollutant CASRN	Pollutant Name	Emission Factor, lb/ton	Emission Factor Rating	Ref. No.
Fuel oil- or waste oil-fired dryer with fabric filter (SCC 3-05-002-58, -59,-60,-61,-62, -63)		Dioxins			
	1746-01-6	2,3,7,8-TCDD[g]	$2.1x10^{-13}$	E	339
		Total TCDD[g]	$9.3x10^{-13}$	E	339
	40321-76-4	1,2,3,7,8-PeCDD[g]	$3.1x10^{-13}$	E	339
		Total PeCDD[g]	$2.2x10^{-11}$	E	339-340
	39227-28-6	1,2,3,4,7,8-HxCDD[g]	$4.2x10^{-13}$	E	339
	57653-85-7	1,2,3,6,7,8-HxCDD[g]	$1.3x10^{-12}$	E	339
	19408-24-3	1,2,3,7,8,9-HxCDD[g]	$9.8x10^{-13}$	E	339
		Total HxCDD[g]	$1.2x10^{-11}$	E	339-340
	35822-46-9	1,2,3,4,6,7,8-HpCDD[g]	$4.8x10^{-12}$	E	339
		Total HpCDD[g]	$1.9x10^{-11}$	E	339-340
	3268-87-9	Octa CDD[g]	$2.5x10^{-11}$	E	339
		Total PCDD[g]	$7.9x10^{-11}$	E	339-340
		Furans			
	51207-31-9	2,3,7,8-TCDF[g]	$9.7x10^{-13}$	E	339
		Total TCDF[g]	$3.7x10^{-12}$	E	339-340
		1,2,3,7,8-PeCDF[g]	$4.3x10^{-12}$	E	339-340
		2,3,4,7,8-PeCDF[g]	$8.4x10^{-13}$	E	339
		Total PeCDF[g]	$8.4x10^{-11}$	E	339-340
		1,2,3,4,7,8-HxCDF[g]	$4.0x10^{-12}$	E	339
		1,2,3,6,7,8-HxCDF[g]	$1.2x10^{-12}$	E	339
		2,3,4,6,7,8-HxCDF[g]	$1.9x10^{-12}$	E	339
		1,2,3,7,8,9-HxCDF[g]	$8.4x10^{-12}$	E	340
		Total HxCDF[g]	$1.3x10^{-11}$	E	339-340
		1,2,3,4,6,7,8-HpCDF[g]	$6.5x10^{-12}$	E	339
		1,2,3,4,7,8,9-HpCDF[g]	$2.7x10^{-12}$	E	339
		Total HpCDF[g]	$1.0x10^{-11}$	E	339-340
	39001-02-0	Octa CDF[g]	$4.8x10^{-12}$	E	339
		Total PCDF[g]	$4.0x10^{-11}$	E	339-340
		Total PCDD/PCDF[g]	$1.2x10^{-10}$	E	339-340

Table 11.1-10 (cont.)

Process	Pollutant: CASRN	Pollutant: Name	Emission Factor, lb/ton	Emission Factor Rating	Ref. No.
Fuel oil- or waste oil-fired dryer (uncontrolled) (SCC 3-05-002-58, -59,-60,-61,-62, -63)	Hazardous air pollutants[c]				
	Dioxins				
		Total HxCDD[g]	5.4×10^{-12}	E	340
	35822-46-9	1,2,3,4,6,7,8-HpCDD[g]	3.4×10^{-11}	E	340
		Total HpCDD[g]	7.1×10^{-11}	E	340
	3268-87-9	Octa CDD[g]	2.7×10^{-9}	E	340
		Total PCDD[g]	2.8×10^{-9}	E	340
	Furans				
		Total TCDF[g]	3.3×10^{-11}	E	340
		Total PeCDF[g]	7.4×10^{-11}	E	340
		1,2,3,4,7,8-HxCDF[g]	5.4×10^{-12}	E	340
		2,3,4,6,7,8-HxCDF[g]	1.6×10^{-12}	E	340
		Total HxCDF[g]	8.1×10^{-12}	E	340
Fuel oil- or waste oil-fired dryer (uncontrolled) (SCC 3-05-002-58, -59,-60,-61,-62, -63) (cont.)		1,2,3,4,6,7,8-HpCDF[g]	1.1×10^{-11}	E	340
		Total HpCDF[g]	3.8×10^{-11}	E	340
		Total PCDF[g]	1.5×10^{-10}	E	340
		Total PCDD/PCDF[g]	3.0×10^{-9}	E	340

Table 11.1-10 (cont.)

Process	Pollutant: CASRN	Pollutant: Name	Emission Factor, lb/ton	Emission Factor Rating	Ref. No.
Waste oil-fired dryer with fabric filter (SCC 3-05-002-61, -62,-63)	Non-PAH HAPs[c]				
	75-07-0	Acetaldehyde	0.0013	E	25
	107-02-8	Acrolein	$2.6x10^{-5}$	E	25
	71-43-2	Benzene[d]	0.00039	A	25,44,45,50,341,342, 344-351, 373, 376, 377, 383, 384
	100-41-4	Ethylbenzene	0.00024	D	25,44,45
	50-00-0	Formaldehyde[e]	0.0031	A	25,35,44,45,50,339-344,347-349,371-373, 384, 388
	110-54-3	Hexane	0.00092	E	339-340
	540-84-1	Isooctane (2,2,4-trimethylpentane)	$4.0x10^{-5}$	E	339-340
	78-93-3	Methyl Ethyl Ketone	$2.0x10^{-5}$	E	25
	123-38-6	Propionaldehyde	0.00013	E	25
	106-51-4	Quinone	0.00016	E	25
	71-55-6	Methyl chloroform[f]	$4.8x10^{-5}$	E	35
	108-88-3	Toluene	0.0029	E	25, 50, 339-340
	1330-20-7	Xylene	0.00020	D	25,44,45
		Total non-PAH HAPs	0.0095		
	PAH HAPs				
	91-57-6	2-Methylnaphthalene[g]	0.00017	E	50
	83-32-9	Acenaphthene[g]	$1.4x10^{-6}$	E	48
	208-96-8	Acenaphthylene[g]	$2.2x10^{-5}$	E	50
	120-12-7	Anthracene[g]	$3.1x10^{-6}$	E	50,162
	56-55-3	Benzo(a)anthracene[g]	$2.1x10^{-7}$	E	48
	50-32-8	Benzo(a)pyrene[g]	$9.8x10^{-9}$	E	48
	205-99-2	Benzo(b)fluoranthene[g]	$1.0x10^{-7}$	E	35,48
	192-97-2	Benzo(e)pyrene[g]	$1.1x10^{-7}$	E	48
	191-24-2	Benzo(g,h,i)perylene[g]	$4.0x10^{-8}$	E	48

Table 11.1-10 (cont.)

Process	Pollutant		Emission Factor, lb/ton	Emission Factor Rating	Ref. No.
	CASRN	Name			
Waste oil-fired dryer with fabric filter (SCC 3-05-002-61, -62,-63) (cont.)	207-08-9	Benzo(k)fluoranthene[g]	$4.1x10^{-8}$	E	35,48
	218-01-9	Chrysene[g]	$1.8x10^{-7}$	E	35,48
	206-44-0	Fluoranthene[g]	$6.1x10^{-7}$	D	35,45,48
	86-73-7	Fluorene[g]	$1.1x10^{-5}$	E	50,164
	193-39-5	Indeno(1,2,3-cd)pyrene[g]	$7.0x10^{-9}$	E	48
	91-20-3	Naphthalene[g]	0.00065	D	25,50,162,164
	198-55-0	Perylene[g]	$8.8x10^{-9}$	E	48
	85-01-8	Phenanthrene[g]	$2.3x10^{-5}$	D	50,162,164
	129-00-0	Pyrene[g]	$3.0x10^{-6}$	E	50
		Total PAH HAPs	0.00088		
		Total HAPs	0.010		
	Non-HAP organic compounds				
	67-64-1	Acetone[f]	0.00083	E	25
	100-52-7	Benzaldehyde	0.00011	E	25
	106-97-8	Butane	0.00067	E	339
	78-84-2	Butyraldehyde	0.00016	E	25
	4170-30-3	Crotonaldehyde	$8.6x10^{-5}$	E	25
	74-85-1	Ethylene	0.0070	E	339, 340
	142-82-5	Heptane	0.0094	E	339, 340
	66-25-1	Hexanal	0.00011	E	25
	590-86-3	Isovaleraldehyde	$3.2x10^{-5}$	E	25
	763-29-1	2-Methyl-1-pentene	0.0040	E	339, 340
	513-35-9	2-Methyl-2-butene	0.00058	E	339, 340
	96-14-0	3-Methylpentane	0.00019	D	339, 340
	109-67-1	1-Pentene	0.0022	E	339, 340
	109-66-0	n-Pentane	0.00021	E	339, 340
	110-62-3	Valeraldehyde	$6.7x10^{-5}$	E	25
		Total non-HAP organics	0.026		

[a] Emission factor units are lb/ton of hot mix asphalt produced. Table includes data from both parallel flow and counterflow drum mix dryers. Organic compound emissions from counterflow systems are expected to be less than from parallel flow systems, but the available data are insufficient to quantify

Table 11.1-10 (cont.)

accurately the difference in these emissions. CASRN = Chemical Abstracts Service Registry Number. SCC = Source Classification Code. To convert from lb/ton to kg/Mg, multiply by 0.5.

[b] Tests included dryers that were processing reclaimed asphalt pavement. Because of limited data, the effect of RAP processing on emissions could not be determined.

[c] Hazardous air pollutants (HAP) as defined in the 1990 Clean Air Act Amendments (CAAA).

[d] Based on data from 19 tests. Range: 0.000063 to 0.0012 lb/ton; median: 0.00030; Standard deviation: 0.00031.

[e] Based on data from 21 tests. Range: 0.0030 to 0.014 lb/ton; median: 0.0020; Standard deviation: 0.0036.

[f] Compound has negligible photochemical reactivity.

[g] Compound is classified as polycyclic organic matter, as defined in the 1990 CAAA. Total PCDD is the sum of the total tetra through octa dioxins; total PCDF is sum of the total tetra through octa furans; and total PCDD/PCDF is the sum of total PCDD and total PCDF.

Table 11.1-12. EMISSION FACTORS FOR METAL EMISSIONS FROM DRUM MIX HOT MIX ASPHALT PLANTS[a]

Process	Pollutant	Emission Factor, lb/ton	Emission Factor Rating	Reference Numbers
Fuel oil-fired dryer, uncontrolled (SCC 3-05-002-58, -59,-60)	Arsenic[b]	1.3×10^{-6}	E	340
	Barium	0.00025	E	340
	Beryllium[b]	0.0	E	340
	Cadmium[b]	4.2×10^{-6}	E	340
	Chromium[b]	2.4×10^{-5}	E	340
	Cobalt[b]	1.5×10^{-5}	E	340
	Copper	0.00017	E	340
	Lead[b]	0.00054	E	340
	Manganese[b]	0.00065	E	340
	Nickel[b]	0.0013	E	340
	Phosphorus[b]	0.0012	E	340
	Selenium[b]	2.4×10^{-6}	E	340
	Thallium	2.2×10^{-6}	E	340
	Zinc	0.00018	E	340
Natural gas- or propane-fired dryer, with fabric filter (SCC 3-05-002-55, -56,-57))	Antimony	1.8×10^{-7}	E	339
	Arsenic[b]	5.6×10^{-7}	D	25, 35, 339-340
	Barium	5.8×10^{-6}	E	25, 339-340
	Beryllium[b]	0.0	E	339-340
	Cadmium[b]	4.1×10^{-7}	D	25, 35, 162, 301, 339-340
	Chromium[b]	5.5×10^{-6}	C	25, 162-164, 301, 339-340
	Cobalt[b]	2.6×10^{-8}	E	339-340
	Copper	3.1×10^{-6}	D	25, 162-164, 339-340
	Hexavalent chromium[b]	4.5×10^{-7}	E	163
	Lead[b]	6.2×10^{-7}	E	35
	Manganese[b]	7.7×10^{-6}	D	25, 162-164, 339-340
	Mercury[b]	2.4×10^{-7}	E	35, 163
	Nickel[b]	6.3×10^{-5}	D	25, 163-164, 339-340
	Phosphorus[b]	2.8×10^{-5}	E	25, 339-340
	Silver	4.8×10^{-7}	E	25, 339-340
	Selenium[b]	3.5×10^{-7}	E	339-340
	Thallium	4.1×10^{-9}	E	339-340
	Zinc	6.1×10^{-5}	C	25, 35, 162-164, 339-340

Table 11.1-12 (cont.)

Process	Pollutant	Emission Factor, lb/ton	Emission Factor Rating	Reference Numbers
No. 2 fuel oil-fired dryer or waste oil/drain oil/No. 6 fuel oil-fired dryer, with fabric filter (SCC 3-05-002-58, -59,-60,-61,-62,-63)	Antimony	1.8×10^{-7}	E	339
	Arsenic[b]	5.6×10^{-7}	D	25, 35, 339-340
	Barium	5.8×10^{-6}	E	25, 339-340
	Beryllium[b]	0.0	E	339-340
	Cadmium[b]	4.1×10^{-7}	D	25, 35, 162, 301, 339-340
	Chromium[b]	5.5×10^{-6}	C	25, 162-164, 301, 339-340
	Cobalt[b]	2.6×10^{-8}	E	339-340
	Copper	3.1×10^{-6}	D	25, 162-164, 339-340
	Hexavalent chromium[b]	4.5×10^{-7}	E	163
	Lead[b]	1.5×10^{-5}	C	25, 162, 164, 178-179, 183, 301, 315, 339-340
	Manganese[b]	7.7×10^{-6}	D	25, 162-164, 339-340
	Mercury[b]	2.6×10^{-6}	D	162, 164, 339-340
	Nickel[b]	6.3×10^{-5}	D	25, 163-164, 339-340
	Phosphorus[b]	2.8×10^{-5}	E	25, 339-340
	Silver	4.8×10^{-7}	E	25, 339-340
	Selenium[b]	3.5×10^{-7}	E	339-340
	Thallium	4.1×10^{-9}	E	339-340
	Zinc	6.1×10^{-5}	C	25, 35, 162-164, 339-340

[a] Emission factor units are lb/ton of HMA produced. SCC = Source Classification Code. To convert from lb/ton to kg/Mg, multiply by 0.5. Emission factors apply to facilities processing virgin aggregate or a combination of virgin aggregate and RAP.

[b] Arsenic, beryllium, cadmium, chromium, hexavalent chromium, cobalt, lead, manganese, mercury, nickel, and selenium compounds are HAPs as defined in the 1990 CAAA. Elemental phosphorus also is a listed HAP, but the phosphorus measured by Method 29 is not elemental phosphorus.

Table 11.1-14. PREDICTIVE EMISSION FACTOR EQUATIONS FOR LOAD-OUT AND SILO FILLING OPERATIONS[a]

EMISSION FACTOR RATING: C

Source	Pollutant	Equation
Drum mix or batch mix plant load-out (SCC 3-05-002-14)	Total PM[b]	$EF = 0.000181 + 0.00141(-V)e^{((0.0251)(T + 460) - 20.43)}$
	Organic PM[c]	$EF = 0.00141(-V)e^{((0.0251)(T + 460) - 20.43)}$
	TOC[d]	$EF = 0.0172(-V)e^{((0.0251)(T + 460) - 20.43)}$
	CO	$EF = 0.00558(-V)e^{((0.0251)(T + 460) - 20.43)}$
Silo filling (SCC 3-05-002-13)	Total PM[b]	$EF = 0.000332 + 0.00105(-V)e^{((0.0251)(T + 460) - 20.43)}$
	Organic PM[c]	$EF = 0.00105(-V)e^{((0.0251)(T + 460) - 20.43)}$
	TOC[d]	$EF = 0.0504(-V)e^{((0.0251)(T + 460) - 20.43)}$
	CO	$EF = 0.00488(-V)e^{((0.0251)(T + 460) - 20.43)}$

[a] Emission factor units are lb/ton of HMA produced. SCC = Source Classification Code. To convert from lb/ton to kg/Mg, multiply by 0.5. EF = emission factor; V = asphalt volatility, as determined by ASTM Method D2872-88 "Effects of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test - RTFOT)," where a 0.5 percent loss-on-heating is expressed as "-0.5." Regional- or site-specific data for asphalt volatility should be used, whenever possible; otherwise, a default value of -0.5 should be used for V in these equations. T = HMA mix temperature in °F. Site-specific temperature data should be used, whenever possible; otherwise a default temperature of 325°F can be used. Reference 1, Tables 4-27 through 4-31, 4-34 through 4-36, and 4-38 through 4-41.

[b] Total PM, as measured by EPA Method 315 (EPA Method 5 plus the extractable organic particulate from the impingers). Total PM is assumed to be predominantly PM-2.5 since emissions consist of condensed vapors.

[c] Extractable organic PM, as measured by EPA Method 315 (methylene chloride extract of EPA Method 5 particulate plus methylene chloride extract of impinger particulate).

[d] TOC as propane, as measured with an EPA Method 25A sampling train or equivalent sampling train.

11.12 CONCRETE BATCHING

11.12-1 Process Description [1-5]

Concrete is composed essentially of water, cement, sand (fine aggregate) and coarse aggregate. Coarse aggregate may consist of gravel, crushed stone or iron blast furnace slag. Some specialty aggregate products could be either heavyweight aggregate (of barite, magnetite, limonite, ilmenite, iron or steel) or lightweight aggregate (with sintered clay, shale, slate, diatomaceous shale, perlite, vermiculite, slag pumice, cinders, or sintered fly ash). Supplementary cementitious materials, also called mineral admixtures or pozzolan minerals may be added to make the concrete mixtures more economical, reduce permeability, increase strength, or influence other concrete properties. Typical examples are natural pozzolans, fly ash, ground granulated blast-furnace slag, and silica fume, which can be used individually with portland or blended cement or in different combinations. Chemical admixtures are usually liquid ingredients that are added to concrete to entrain air, reduce the water required to reach a required slump, retard or accelerate the setting rate, to make the concrete more flowable or other more specialized functions.

Approximately 75 percent of the U.S. concrete manufactured is produced at plants that store, convey, measure and discharge these constituents into trucks for transport to a job site. At most of these plants, sand, aggregate, cement and water are all gravity fed from the weight hopper into the mixer trucks. The concrete is mixed on the way to the site where the concrete is to be poured. At some of these plants, the concrete may also be manufactured in a central mix drum and transferred to a transport truck. Most of the remaining concrete manufactured are products cast in a factory setting. Precast products range from concrete bricks and paving stones to bridge girders, structural components, and panels for cladding. Concrete masonry, another type of manufactured concrete, may be best known for its conventional 8 x 8 x 16-inch block. In a few cases concrete is dry batched or prepared at a building construction site. Figure 11.12-1 is a generalized process diagram for concrete batching.

The raw materials can be delivered to a plant by rail, truck or barge. The cement is transferred to elevated storage silos pneumatically or by bucket elevator. The sand and coarse aggregate are transferred to elevated bins by front end loader, clam shell crane, belt conveyor, or bucket elevator. From these elevated bins, the constituents are fed by gravity or screw conveyor to weigh hoppers, which combine the proper amounts of each material.

11.12-2 Emissions and Controls [6-8]

Particulate matter, consisting primarily of cement and pozzolan dust but including some aggregate and sand dust emissions, is the primary pollutant of concern. In addition, there are emissions of metals that are associated with this particulate matter. All but one of the emission points are fugitive in nature. The only point sources are the transfer of cement and pozzolan material to silos, and these are usually vented to a fabric filter or “sock”. Fugitive sources include the transfer of sand and aggregate, truck loading, mixer loading, vehicle traffic, and wind erosion from sand and aggregate storage piles. The amount of fugitive emissions generated during the transfer of sand and aggregate depends primarily on the surface moisture content of these materials. The extent of fugitive emission control varies widely from plant to plant. Particulate emission factors for concrete batching are give in Tables 11.12-1 and 11.12-2.

TABLE 11.12-2 (ENGLISH UNITS)
EMISSION FACTORS FOR CONCRETE BATCHING [a]

Source (SCC)	Uncontrolled				Controlled			
	Total PM	Emission Factor Rating	Total PM_{10}	Emission Factor Rating	Total PM	Emission Factor Rating	Total PM_{10}	Emission Factor Rating
Aggregate transfer [b] (3-05-011-04,-21,23)	0.0069	D	0.0033	D	ND		ND	
Sand transfer [b] (3-05-011-05,22,24)	0.0021	D	0.00099	D	ND		ND	
Cement unloading to elevated storage silo (pneumatic)[c] (3-05-011-07)	0.72	E	0.46	E	0.00099	D	0.00034	D
Cement supplement unloading to elevated storage silo (pneumatic)[d] (3-05-011-17)	3.14	E	1.10	E	0.0089	D	0.0049	E
Weigh hopper loading [e] (3-05-011-08)	0.0051	D	0.0024	D	ND		ND	
Mixer loading (central mix)[f] (3-05-011-09)	0.544 or Eqn. 11.12-1	B	0.134 or Eqn. 11.12-1	B	0.0173 or Eqn. 11.12-1	B	0.0048 or Eqn. 11.12-1	B
Truck loading (truck mix)[g] (3-05-011-10)	0.995	B	0.278	B	0.0568 or Eqn. 11.12-1	B	0.0160 or Eqn. 11.12-1	B
Vehicle traffic (paved roads)	See AP-42 Section 13.2.1							
Vehicle traffic (unpaved roads)	See AP-42 Section 13.2.2							
Wind erosion from aggregate and sand storage piles	See AP-42 Section 13.2.5							

ND = No data

[a] All emission factors are in lb of pollutant per ton of material loaded unless noted otherwise. Loaded material includes course aggregate, sand, cement, cement supplement and the surface moisture associated with these materials. The average material composition of concrete batches presented in references 9 and 10 was 1865 lbs course aggregate, 1428 lbs sand, 491 lbs cement and 73 lbs cement supplement. Approximately 20 gallons of water was added to this solid material to produce 4024 lbs (one cubic yard) of concrete.

[b] Reference 9 and 10. Emission factors are based upon an equation from AP-42, Section 13.2.2, with k_{PM-10} =.35, k_{PM} = .74, U = 10mph, $M_{aggregate}$ =1.77%, and M_{sand} = 4.17%. These moisture contents of the materials ($M_{aggregate}$ and M_{sand}) are the averages of the values obtained from Reference 9 and Reference 10.

[c] The uncontrolled PM & PM-10 emission factors were developed from Reference 9. The controlled emission factor for PM was developed from References 9, 10, 11, and 12. The controlled emission factor for PM-10 was developed from References 9 and 10.

[d] The controlled PM emission factor was developed from Reference 10 and Reference 12, whereas the controlled PM-10 emission factor was developed from only Reference 10.

[e] Emission factors were developed by using the Aggregate and Sand Transfer Emission Factors in conjunction with the ratio of aggregate and sand used in an average $yard^3$ of concrete. The unit for these emission factors is lb of pollutant per ton of aggregate and sand.

[f] References 9, 10, and 14. The emission factor units are lb of pollutant per ton of cement and cement supplement. The general factor is the arithmetic mean of all test data.

[g] Reference 9, 10, and 14. The emission factor units are lb of pollutant per ton of cement and cement supplement. The general factor is the arithmetic mean of all test data.

The particulate matter emissions from truck mix and central mix loading operations are calculated in accordance with the values in Tables 11.12-1 or 11.12-2 or by Equation 11.12-1[14] when site specific data are available.

$$E = k\,(0.0032)\left[\frac{U^a}{M^b}\right] + c \qquad \text{Equation 11.12-1}$$

E	=	Emission factor in lbs./ton of cement and cement supplement
k	=	Particle size multiplier (dimensionless)
U	=	Wind speed, miles per hour (mph)
M	=	Minimum moisture (% by weight) of cement and cement supplement
a, b	=	Exponents
c	=	Constant

The parameters for Equation 11.12-1 are summarized in Tables 11.12-3 and 11.12-4.

Table 11.12-3. Equation Parameters for Truck Mix Operations

Condition	Parameter Category	k	a	b	c
Controlled[1]	Total PM	0.8	1.75	0.3	0.013
	PM_{10}	0.32	1.75	0.3	0.0052
	$PM_{10-2.5}$	0.288	1.75	0.3	0.00468
	$PM_{2.5}$	0.048	1.75	0.3	0.00078
Uncontrolled[1]	Total PM	0.995			
	PM_{10}	0.278			
	$PM_{10-2.5}$	0.228			
	$PM_{2.5}$	0.050			

Table 11.12-4. Equation Parameters for Central Mix Operations

Condition	Parameter Category	k	a	b	c
Controlled[1]	Total PM	0.19	0.95	0.9	0.0010
	PM_{10}	0.13	0.45	0.9	0.0010
	$PM_{10-2.5}$	0.12	0.45	0.9	0.0009
	$PM_{2.5}$	0.03	0.45	0.9	0.0002
Uncontrolled[1]	Total PM	5.90	0.6	1.3	0.120
	PM_{10}	1.92	0.4	1.3	0.040
	$PM_{10-2.5}$	1.71	0.4	1.3	0.036
	$PM_{2.5}$	0.38	0.4	1.3	0

1. Emission factors expressed in lbs/tons of cement and cement supplement

To convert from units of lbs/ton to units of kilograms per mega gram, the emissions calculated by Equation 11.12-1 should be divided by 2.0.

Particulate emission factors per yard of concrete for an average batch formulation at a typical facility are given in Tables 11.12-4 and 11.12-5. For truck mix loading and central mix loading, the

11.19.2 Crushed Stone Processing and Pulverized Mineral Processing

11.19.2.1 Process Description [24, 25]

Crushed Stone Processing

Major rock types processed by the crushed stone industry include limestone, granite, dolomite, traprock, sandstone, quartz, and quartzite. Minor types include calcareous marl, marble, shell, and slate. Major mineral types processed by the pulverized minerals industry, a subset of the crushed stone processing industry, include calcium carbonate, talc, and barite. Industry classifications vary considerably and, in many cases, do not reflect actual geological definitions.

Rock and crushed stone products generally are loosened by drilling and blasting and then are loaded by power shovel or front-end loader into large haul trucks that transport the material to the processing operations. Techniques used for extraction vary with the nature and location of the deposit. Processing operations may include crushing, screening, size classification, material handling and storage operations. All of these processes can be significant sources of PM and PM-10 emissions if uncontrolled.

Quarried stone normally is delivered to the processing plant by truck and is dumped into a bin. A feeder is used as illustrated in Figure 11.19.2-1. The feeder or screens separate large boulders from finer rocks that do not require primary crushing, thus reducing the load to the primary crusher. Jaw, impactor, or gyratory crushers are usually used for initial reduction. The crusher product, normally 7.5 to 30 centimeters (3 to 12 inches) in diameter, and the grizzly throughs (undersize material) are discharged onto a belt conveyor and usually are conveyed to a surge pile for temporary storage or are sold as coarse aggregates.

The stone from the surge pile is conveyed to a vibrating inclined screen called the scalping screen. This unit separates oversized rock from the smaller stone. The undersized material from the scalping screen is considered to be a product stream and is transported to a storage pile and sold as base material. The stone that is too large to pass through the top deck of the scalping screen is processed in the secondary crusher. Cone crushers are commonly used for secondary crushing (although impact crushers are sometimes used), which typically reduces material to about 2.5 to 10 centimeters (1 to 4 inches). The material (throughs) from the second level of the screen bypasses the secondary crusher because it is sufficiently small for the last crushing step. The output from the secondary crusher and the throughs from the secondary screen are transported by conveyor to the tertiary circuit, which includes a sizing screen and a tertiary crusher.

Tertiary crushing is usually performed using cone crushers or other types of impactor crushers. Oversize material from the top deck of the sizing screen is fed to the tertiary crusher. The tertiary crusher output, which is typically about 0.50 to 2.5 centimeters (3/16th to 1 inch), is returned to the sizing screen. Various product streams with different size gradations are separated in the screening operation. The products are conveyed or trucked directly to finished product bins, to open area stock piles, or to other processing systems such as washing, air separators, and screens and classifiers (for the production of manufactured sand).

Some stone crushing plants produce manufactured sand. This is a small-sized rock product with a maximum size of 0.50 centimeters (3/16 th inch). Crushed stone from the tertiary sizing screen is sized in a vibrating inclined screen (fines screen) with relatively small mesh sizes.

Table 11.19.2-2 (English Units). EMISSION FACTORS FOR CRUSHED STONE PROCESSING OPERATIONS (lb/Ton)[a]

Source [b]	Total Particulate Matter [r,s]	EMISSION FACTOR RATING	Total PM-10	EMISSION FACTOR RATING	Total PM-2.5	EMISSION FACTOR RATING
Primary Crushing (SCC 3-05-020-01)	ND		ND[n]		ND[n]	
Primary Crushing (controlled) (SCC 3-05-020-01)	ND		ND[n]		ND[n]	
Secondary Crushing (SCC 3-05-020-02)	ND		ND[n]		ND[n]	
Secondary Crushing (controlled) (SCC 3-05-020-02)	ND		ND[n]		ND[n]	
Tertiary Crushing (SCC 3-050030-03)	0.0054[d]	E	0.0024[o]	C	ND[n]	
Tertiary Crushing (controlled) (SCC 3-05-020-03)	0.0012[d]	E	0.00054[p]	C	0.00010[q]	E
Fines Crushing (SCC 3-05-020-05)	0.0390[e]	E	0.0150[e]	E	ND	
Fines Crushing (controlled) (SCC 3-05-020-05)	0.0030[f]	E	0.0012[f]	E	0.000070[q]	E
Screening (SCC 3-05-020-02, 03)	0.025[c]	E	0.0087[l]	C	ND	
Screening (controlled) (SCC 3-05-020-02, 03)	0.0022[d]	E	0.00074[m]	C	0.000050[q]	E
Fines Screening (SCC 3-05-020-21)	0.30[g]	E	0.072[g]	E	ND	
Fines Screening (controlled) (SCC 3-05-020-21)	0.0036[g]	E	0.0022[g]	E	ND	
Conveyor Transfer Point (SCC 3-05-020-06)	0.0030[h]	E	0.00110[h]	D	ND	
Conveyor Transfer Point (controlled) (SCC 3-05-020-06)	0.00014[i]	E	4.6×10^{-5}[i]	D	1.3×10^{-5}[q]	E
Wet Drilling - Unfragmented Stone (SCC 3-05-020-10)	ND		8.0×10^{-5}[j]	E	ND	
Truck Unloading -Fragmented Stone (SCC 3-05-020-31)	ND		1.6×10^{-5}[j]	E	ND	
Truck Unloading - Conveyor, crushed stone (SCC 3-05-020-32)	ND		0.00010[k]	E	ND	

a. Emission factors represent uncontrolled emissions unless noted. Emission factors in lb/Ton of material of throughput. SCC = Source Classification Code. ND = No data.

b. Controlled sources (with wet suppression) are those that are part of the processing plant that employs current wet suppression technology similar to the study group. The moisture content of the study group without wet suppression systems operating (uncontrolled) ranged from 0.21 to 1.3 percent, and the same facilities operating wet suppression systems (controlled) ranged from 0.55 to 2.88 percent. Due to carry over of the small amount of moisture required, it has been shown that each source, with the exception of crushers, does not need to employ direct water sprays. Although the moisture content was the only variable measured, other process features may have as much influence on emissions from a given source. Visual observations from each source under normal operating conditions are probably the best indicator of which emission factor is most appropriate. Plants that employ substandard control measures as indicated by visual observations should use the uncontrolled factor with an appropriate control efficiency that best reflects the effectiveness of the controls employed.

c. References 1, 3, 7, and 8

d. References 3, 7, and 8

e. Reference 4

f. References 4 and 15

g. Reference 4

h. References 5 and 6

i. References 5, 6, and 15

j. Reference 11

k. Reference 12

l. References 1, 3, 7, and 8

m. References 1, 3, 7, 8, and 15

n. No data available, but emission factors for PM-10 for tertiary crushers can be used as an upper limit for primary or secondary crushing

o. References 2, 3, 7, 8

p. References 2, 3, 7, 8, and 15

q. Reference 15

r. PM emission factors are presented based on PM-100 data in the Background Support Document for Section 11.19.2

s. Emission factors for PM-30 and PM-50 are available in Figures 11.19.2-3 through 11.19.2-6.

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13.2.1 Paved Roads

13.2.1.1 General

Particulate emissions occur whenever vehicles travel over a paved surface such as a road or parking lot. Particulate emissions from paved roads are due to direct emissions from vehicles in the form of exhaust, brake wear and tire wear emissions and resuspension of loose material on the road surface. In general terms, resuspended particulate emissions from paved roads originate from, and result in the depletion of, the loose material present on the surface (i.e., the surface loading). In turn, that surface loading is continuously replenished by other sources. At industrial sites, surface loading is replenished by spillage of material and trackout from unpaved roads and staging areas. Figure 13.2.1-1 illustrates several transfer processes occurring on public streets.

Various field studies have found that public streets and highways, as well as roadways at industrial facilities, can be major sources of the atmospheric particulate matter within an area.[1-9] Of particular interest in many parts of the United States are the increased levels of emissions from public paved roads when the equilibrium between deposition and removal processes is upset. This situation can occur for various reasons, including application of granular materials for snow and ice control, mud/dirt carryout from construction activities in the area, and deposition from wind and/or water erosion of surrounding unstabilized areas. In the absence of continuous addition of fresh material (through localized track out or application of antiskid material), paved road surface loading should reach an equilibrium value in which the amount of material resuspended matches the amount replenished. The equilibrium surface loading value depends upon numerous factors. It is believed that the most important factors are: mean speed of vehicles traveling the road; the average daily traffic (ADT); the number of lanes and ADT per lane; the fraction of heavy vehicles (buses and trucks); and the presence/absence of curbs, storm sewers and parking lanes.[10]

The particulate emission factors presented in a previous version of this section of AP-42, dated October 2002, implicitly included the emissions from vehicles in the form of exhaust, brake wear, and tire wear as well as resuspended road surface material. EPA included these sources in the emission factor equation for paved roads since the field testing data used to develop the equation included both the direct emissions from vehicles and emissions from resuspension of road dust.

This version of the paved road emission factor equation only estimates particulate emissions from resuspended road surface material[28]. The particulate emissions from vehicle exhaust, brake wear, and tire wear are now estimated separately using EPA's MOVES [29] model. This approach eliminates the possibility of double counting emissions. Double counting results when employing the previous version of the emission factor equation in this section and MOVES to estimate particulate emissions from vehicle traffic on paved roads. It also incorporates the decrease in exhaust emissions that has occurred since the paved road emission factor equation was developed. Earlier versions of the paved road emission factor equation includes estimates of emissions from exhaust, brake wear, and tire wear based on emission rates for vehicles in the 1980 calendar year fleet. The amount of PM released from vehicle exhaust has decreased since 1980 due to lower new vehicle emission standards and changes in fuel characteristics.

13.2.1.3 Predictive Emission Factor Equations[10,29]

The quantity of particulate emissions from resuspension of loose material on the road surface due to vehicle travel on a dry paved road may be estimated using the following empirical expression:

$$E = k\,(sL)^{0.91} \times (W)^{1.02} \qquad (1)$$

where: E = particulate emission factor (having units matching the units of k),
k = particle size multiplier for particle size range and units of interest (see below),
sL = road surface silt loading (grams per square meter) (g/m^2), and
W = average weight (tons) of the vehicles traveling the road.

It is important to note that Equation 1 calls for the average weight of all vehicles traveling the road. For example, if 99 percent of traffic on the road are 2 ton cars/trucks while the remaining 1 percent consists of 20 ton trucks, then the mean weight "W" is 2.2 tons. More specifically, Equation 1 is *not* intended to be used to calculate a separate emission factor for each vehicle weight class. Instead, only one emission factor should be calculated to represent the "fleet" average weight of all vehicles traveling the road.

The particle size multiplier (k) above varies with aerodynamic size range as shown in Table 13.2.1-1. To determine particulate emissions for a specific particle size range, use the appropriate value of k shown in Table 13.2.1-1.

To obtain the total emissions factor, the emission factors for the exhaust, brake wear and tire wear obtained from either EPA's MOBILE6.2 [27] or MOVES2010 [29] model should be added to the emissions factor calculated from the empirical equation.

Table 13.2.1-1. PARTICLE SIZE MULTIPLIERS FOR PAVED ROAD EQUATION

Size range[a]	Particle Size Multiplier k[b]		
	g/VKT	g/VMT	lb/VMT
PM-2.5[c]	0.15	0.25	0.00054
PM-10	0.62	1.00	0.0022
PM-15	0.77	1.23	0.0027
PM-30[d]	3.23	5.24	0.011

[a] Refers to airborne particulate matter (PM-x) with an aerodynamic diameter equal to or less than x micrometers.

[b] Units shown are grams per vehicle kilometer traveled (g/VKT), grams per vehicle mile traveled (g/VMT), and pounds per vehicle mile traveled (lb/VMT). The multiplier k includes unit conversions to produce emission factors in the units shown for the indicated size range from the mixed units required in Equation 1.

[c] The k-factors for $PM_{2.5}$ were based on the average $PM_{2.5}$:PM_{10} ratio of test runs in Reference 30.

[d] PM-30 is sometimes termed "suspendable particulate" (SP) and is often used as a surrogate for TSP.

Equation 1 is based on a regression analysis of 83 tests for PM-10.[3, 5-6, 8, 27-29, 31-36] Sources tested include public paved roads, as well as controlled and uncontrolled industrial paved roads. The majority of tests involved freely flowing vehicles traveling at constant speed on relatively level roads. However, 22 tests of slow moving or "stop-and-go" traffic or vehicles under load were available for inclusion in the data base.[32-36] Engine exhaust, tire wear and break wear were subtracted from the emissions measured in the test programs prior to stepwise regression to determine Equation 1.[37, 39] The equations retain the quality rating of A (D for PM-2.5), if applied within the range of source conditions that were tested in developing the equation as follows:

Silt loading:	0.03 - 400 g/m^2 0.04 - 570 grains/square foot (ft^2)
Mean vehicle weight:	1.8 - 38 megagrams (Mg) 2.0 - 42 tons
Mean vehicle speed:	1 - 88 kilometers per hour (kph) 1 - 55 miles per hour (mph)

The upper and lower 95% confidence levels of equation 1 for PM_{10} is best described with equations using an exponents of 1.14 and 0.677 for silt loading and an exponents of 1.19 and 0.85 for weight. Users are cautioned that application of equation 1 outside of the range of variables and operating conditions specified above, e.g., application to roadways or road networks with speeds above 55 mph and average vehicle weights of 42 tons, will result in emission estimates with a higher level of uncertainty. In these situations, users are encouraged to consider an assessment of the impacts of the influence of extrapolation to the overall emissions and alternative methods that are equally or more plausible in light of local emissions data and/or ambient concentration or compositional data.

To retain the quality rating for the emission factor equation when it is applied to a specific paved road, it is necessary that reliable correction parameter values for the specific road in question be determined. With the exception of limited access roadways, which are difficult to sample, the collection and use of site-specific silt loading (sL) data for public paved road emission inventories are strongly recommended. The field and laboratory procedures for determining surface material silt content and surface dust loading are summarized in Appendices C.1 and C.2. In the event that site-specific values cannot be obtained, an appropriate value for a paved public road may be selected from the values in Table 13.2.1-2, but the quality rating of the equation should be reduced by 2 levels.

Equation 1 may be extrapolated to average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual (or other long-term) average emissions are inversely proportional to the frequency of measurable (> 0.254 mm [0.01 inch]) precipitation by application of a precipitation correction term. The precipitation correction term can be applied on a daily or an hourly basis [26, 38].

For the daily basis, Equation 1 becomes:

$$E_{ext} = [\, k\, (sL)^{0.91} \times (W)^{1.02} \,]\, (1 - P/4N) \qquad (2)$$

where k, sL, W, and S are as defined in Equation 1 and

E_{ext} = annual or other long-term average emission factor in the same units as k,

P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period, and

N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly).

Note that the assumption leading to Equation 2 is based on analogy with the approach used to develop long-term average unpaved road emission factors in Section 13.2.2. However, Equation 2 above incorporates an additional factor of "4" in the denominator to account for the fact that paved roads dry more quickly than unpaved roads and that the precipitation may not occur over the complete 24-hour day.

For the hourly basis, equation 1 becomes:

$$E_{ext} = [\, k\,(sL)^{0.91} \times (W)^{1.02}\,]\,(1 - 1.2P/N) \qquad (3)$$

where k, sL, W, and S are as defined in Equation 1 and

E_{ext} = annual or other long-term average emission factor in the same units as k,

P = number of hours with at least 0.254 mm (0.01 in) of precipitation during the averaging period, and

N = number of hours in the averaging period (e.g., 8760 for annual, 2124 for season 720 for monthly)

Note: In the hourly moisture correction term (1-1.2P/N) for equation 3, the 1.2 multiplier is applied to account for the residual mitigative effect of moisture. For most applications, this equation will produce satisfactory results. Users should select a time interval to include sufficient "dry" hours such that a reasonable emissions averaging period is evaluated. For the special case where this equation is used to calculate emissions on an hour by hour basis, such as would be done in some emissions modeling situations, the moisture correction term should be modified so that the moisture correction "credit" is applied to the first hours following cessation of precipitation. In this special case, it is suggested that this 20% "credit" be applied on a basis of one hour credit for each hour of precipitation up to a maximum of 12 hours.

Note that the assumption leading to Equation 3 is based on analogy with the approach used to develop long-term average unpaved road emission factors in Section 13.2.2.

Figure 13.2.1-2 presents the geographical distribution of "wet" days on an annual basis for the United States. Maps showing this information on a monthly basis are available in the *Climatic Atlas of the United States*[23] . Alternative sources include other Department of Commerce publications (such as local climatological data summaries). The National Climatic Data Center (NCDC) offers several products that provide hourly precipitation data. In particular, NCDC offers *Solar and Meteorological Surface Observation Network 1961-1990* (SAMSON) CD-ROM, which contains 30 years worth of hourly meteorological data for first-order National Weather Service locations. Whatever meteorological data are used, the source of that data and the averaging period should be clearly specified.

It is emphasized that the simple assumption underlying Equations 2 and 3 has not been verified in any rigorous manner. For that reason, the quality ratings for Equations 2 and 3 should be downgraded one letter from the rating that would be applied to Equation 1.

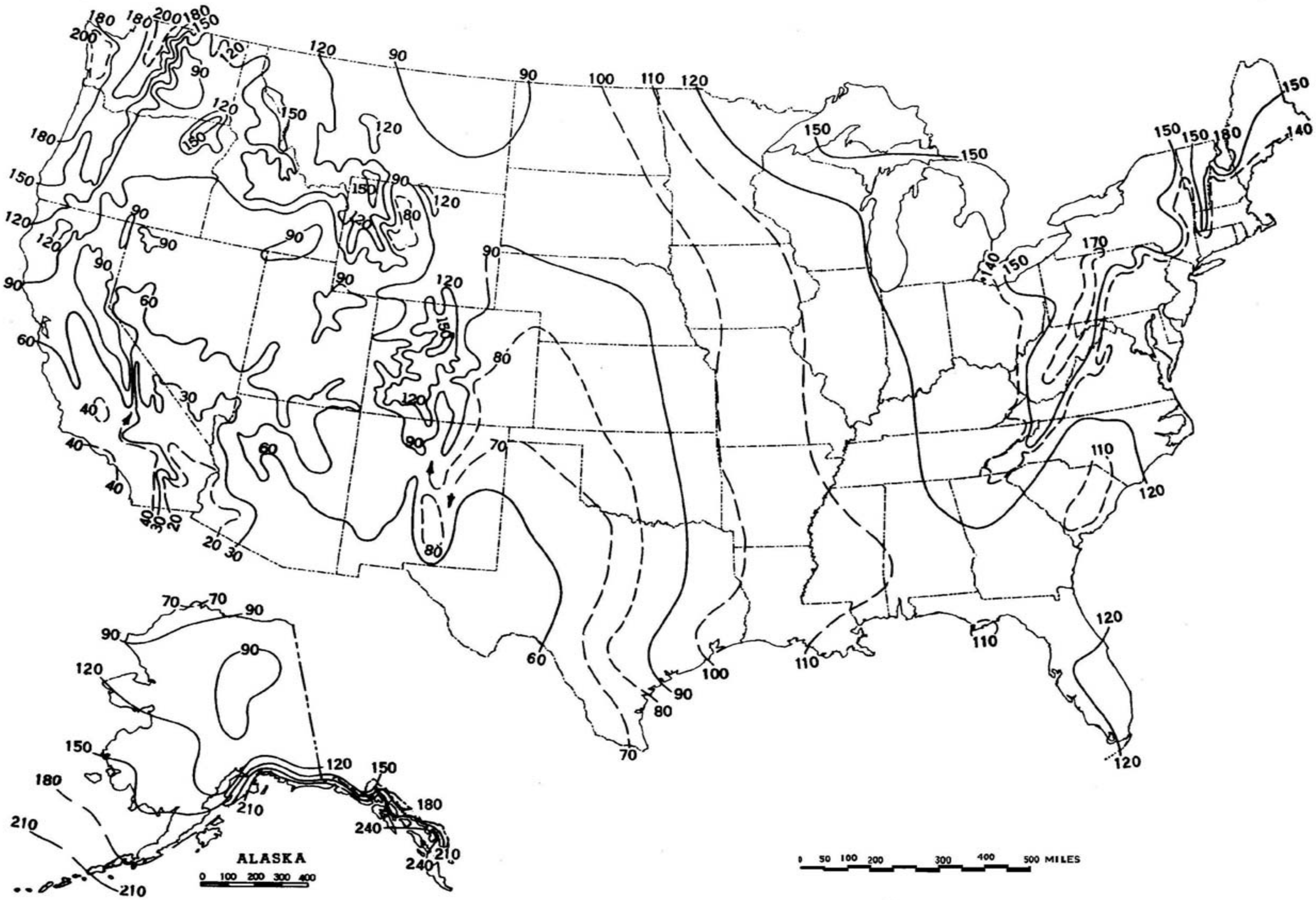


Figure 13.2.1-2. Mean number of days with 0.01 inch or more of precipitation in the United States.

Table 13.2.1-2 presents recommended default silt loadings for normal baseline conditions and for wintertime baseline conditions in areas that experience frozen precipitation with periodic application of antiskid material[24]. The winter baseline is represented as a multiple of the non-winter baseline, depending on the ADT value for the road in question. As shown, a multiplier of 4 is applied for low volume roads (< 500 ADT) to obtain a wintertime baseline silt loading of 4 X 0.6 = 2.4 g/m^2.

Table 13.2.1-2. Ubiquitous Silt Loading Default Values with Hot Spot Contributions from Anti-Skid Abrasives (g/m^2)

ADT Category	< 500	500-5,000	5,000-10,000	> 10,000
Ubiquitous Baseline g/m^2	0.6	0.2	0.06	0.03 0.015 limited access
Ubiquitous Winter Baseline Multiplier during months with frozen precipitation	X4	X3	X2	X1
Initial peak additive contribution from application of antiskid abrasive (g/m^2)	2	2	2	2
Days to return to baseline conditions (assume linear decay)	7	3	1	0.5

It is suggested that an additional (but temporary) silt loading contribution of 2 g/m^2 occurs with each application of antiskid abrasive for snow/ice control. This was determined based on a typical application rate of 500 lb per lane mile and an initial silt content of 1 % silt content. Ordinary rock salt and other chemical deicers add little to the silt loading, because most of the chemical dissolves during the snow/ice melting process.

To adjust the baseline silt loadings for mud/dirt trackout, the number of trackout points is required. It is recommended that in calculating PM_{10} emissions, six additional miles of road be added for each active trackout point from an active construction site, to the paved road mileage of the specified category within the county. In calculating $PM_{2.5}$ emissions, it is recommended that three additional miles of road be added for each trackout point from an active construction site.

It is suggested the number of trackout points for activities other than road and building construction areas be related to land use. For example, in rural farming areas, each mile of paved road would have a specified number of trackout points at intersections with unpaved roads. This value could be estimated from the unpaved road density (mi/sq. mi.).

The use of a default value from Table 13.2.1-2 should be expected to yield only an order-of-magnitude estimate of the emission factor. Public paved road silt loadings are dependent

13.2.2 Unpaved Roads

13.2.2.1 General

When a vehicle travels an unpaved road, the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

The particulate emission factors presented in the previous draft version of this section of AP-42, dated October 2001, implicitly included the emissions from vehicles in the form of exhaust, brake wear, and tire wear as well as resuspended road surface material[25]. EPA included these sources in the emission factor equation for unpaved public roads (equation 1b in this section) since the field testing data used to develop the equation included both the direct emissions from vehicles and emissions from resuspension of road dust.

This version of the unpaved public road emission factor equation only estimates particulate emissions from resuspended road surface material [23, 26]. The particulate emissions from vehicle exhaust, brake wear, and tire wear are now estimated separately using EPA's MOBILE6.2 [24]. This approach eliminates the possibility of double counting emissions. Double counting results when employing the previous version of the emission factor equation in this section and MOBILE6.2 to estimate particulate emissions from vehicle traffic on unpaved public roads. It also incorporates the decrease in exhaust emissions that has occurred since the unpaved public road emission factor equation was developed. The previous version of the unpaved public road emission factor equation includes estimates of emissions from exhaust, brake wear, and tire wear based on emission rates for vehicles in the 1980 calendar year fleet. The amount of PM released from vehicle exhaust has decreased since 1980 due to lower new vehicle emission standards and changes in fuel characteristics.

13.2.2.2 Emissions Calculation And Correction Parameters[1-6]

The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on source parameters that characterize the condition of a particular road and the associated vehicle traffic. Characterization of these source parameters allow for "correction" of emission estimates to specific road and traffic conditions present on public and industrial roadways.

Dust emissions from unpaved roads have been found to vary directly with the fraction of silt (particles smaller than 75 micrometers [µm] in diameter) in the road surface materials.[1] The silt fraction is determined by measuring the proportion of loose dry surface dust that passes a 200-mesh screen, using the ASTM-C-136 method. A summary of this method is contained in Appendix C of AP-42. Table 13.2.2-1 summarizes measured silt values for industrial unpaved roads. Table 13.2.2-2 summarizes measured silt values for public unpaved roads. It should be noted that the ranges of silt content vary over two orders of magnitude. Therefore, the use of data from this table can potentially introduce considerable error. Use of this data is strongly discouraged when it is feasible to obtain locally gathered data.

Since the silt content of a rural dirt road will vary with geographic location, it should be measured for use in projecting emissions. As a conservative approximation, the silt content of the parent soil in the area can be used. Tests, however, show that road silt content is normally lower than in the surrounding parent soil, because the fines are continually removed by the vehicle traffic, leaving a higher percentage of coarse particles.

Table 13.2.2-1. TYPICAL SILT CONTENT VALUES OF SURFACE MATERIAL ON INDUSTRIAL UNPAVED ROADS[a]

Industry	Road Use Or Surface Material	Plant Sites	No. Of Samples	Silt Content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16 - 19	17
Iron and steel production	Plant road	19	135	0.2 - 19	6.0
Sand and gravel processing	Plant road	1	3	4.1 - 6.0	4.8
	Material storage area	1	1	-	7.1
Stone quarrying and processing	Plant road	2	10	2.4 - 16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4 - 7.1	4.3
	Haul road to/from pit	1	12	3.9 - 9.7	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.8 - 18	8.4
	Plant road	2	2	4.9 - 5.3	5.1
	Scraper route	3	10	7.2 - 25	17
	Haul road (freshly graded)	2	5	18 - 29	24
Construction sites	Scraper routes	7	20	0.56-23	8.5
Lumber sawmills	Log yards	2	2	4.8-12	8.4
Municipal solid waste landfills	Disposal routes	4	20	2.2 - 21	6.4

[a]References 1,5-15.

The following empirical expressions may be used to estimate the quantity in pounds (lb) of size-specific particulate emissions from an unpaved road, per vehicle mile traveled (VMT):

For vehicles traveling on unpaved surfaces at industrial sites, emissions are estimated from the following equation:

$$E = k\ (s/12)^{a}(W/3)^{b} \tag{1a}$$

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, emissions may be estimated from the following:

$$E = \frac{k\ (s/12)^{a}(S/30)^{d}}{(M/0.5)^{c}} - C \tag{1b}$$

where k, a, b, c and d are empirical constants (Reference 6) given below and

E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
S = mean vehicle speed (mph)
C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear.

The source characteristics s, W and M are referred to as correction parameters for adjusting the emission estimates to local conditions. The metric conversion from lb/VMT to grams (g) per vehicle kilometer traveled (VKT) is as follows:

1 lb/VMT = 281.9 g/VKT

The constants for Equations 1a and 1b based on the stated aerodynamic particle sizes are shown in Tables 13.2.2-2 and 13.2.2-4. The PM-2.5 particle size multipliers (k-factors) are taken from Reference 27.

Table 13.2.2-2. CONSTANTS FOR EQUATIONS 1a AND 1b

Constant	Industrial Roads (Equation 1a)			Public Roads (Equation 1b)		
	PM-2.5	PM-10	PM-30*	PM-2.5	PM-10	PM-30*
k (lb/VMT)	0.15	1.5	4.9	0.18	1.8	6.0
a	0.9	0.9	0.7	1	1	1
b	0.45	0.45	0.45	-	-	-
c	-	-	-	0.2	0.2	0.3
d	-	-	-	0.5	0.5	0.3
Quality Rating	B	B	B	B	B	B

*Assumed equivalent to total suspended particulate matter (TSP)
"-" = not used in the emission factor equation

Table 13.2.2-2 also contains the quality ratings for the various size-specific versions of Equation 1a and 1b. The equation retains the assigned quality rating, if applied within the ranges of source conditions, shown in Table 13.2.2-3, that were tested in developing the equation:

Table 13.2.2-3. RANGE OF SOURCE CONDITIONS USED IN DEVELOPING EQUATION 1a AND 1b

Emission Factor	Surface Silt Content, %	Mean Vehicle Weight		Mean Vehicle Speed		Mean No. of Wheels	Surface Moisture Content, %
		Mg	ton	km/hr	mph		
Industrial Roads (Equation 1a)	1.8-25.2	1.8-260	2-290	8-69	5-43	4-17[a]	0.03-13
Public Roads (Equation 1b)	1.8-35	1.4-2.7	1.5-3	16-88	10-55	4-4.8	0.03-13

[a] See discussion in text.

As noted earlier, the models presented as Equations 1a and 1b were developed from tests of traffic on unpaved surfaces. Unpaved roads have a hard, generally nonporous surface that usually dries quickly after a rainfall or watering, because of traffic-enhanced natural evaporation. (Factors influencing how fast a road dries are discussed in Section 13.2.2.3, below.) The quality ratings given above pertain to the mid-range of the measured source conditions for the equation. A higher mean vehicle weight and a higher than normal traffic rate may be justified when performing a worst-case analysis of emissions from unpaved roads.

The emission factors for the exhaust, brake wear and tire wear of a 1980's vehicle fleet (*C*) was obtained from EPA's MOBILE6.2 model [23]. The emission factor also varies with aerodynamic size range average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual average emissions are inversely proportional to the number of days with measurable (more than 0.254 mm [0.01 inch]) precipitation:

$$E_{ext} = E\ [(365 - P)/365] \tag{2}$$

where:

E_{ext} = annual size-specific emission factor extrapolated for natural mitigation, lb/VMT

E = emission factor from Equation 1a or 1b

P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation (see below)

Figure 13.2.2-1 gives the geographical distribution for the mean annual number of "wet" days for the United States.

Equation 2 provides an estimate that accounts for precipitation on an annual average basis for the purpose of inventorying emissions. It should be noted that Equation 2 does not account for differences in the temporal distributions of the rain events, the quantity of rain during any event, or the potential for the rain to evaporate from the road surface. In the event that a finer temporal and spatial resolution is desired for inventories of public unpaved roads, estimates can be based on a more complex set of assumptions. These assumptions include:

1. The moisture content of the road surface material is increased in proportion to the quantity of water added;
2. The moisture content of the road surface material is reduced in proportion to the Class A pan evaporation rate;
3. The moisture content of the road surface material is reduced in proportion to the traffic volume; and
4. The moisture content of the road surface material varies between the extremes observed in the area. The CHIEF Web site (http://www.epa.gov/ttn/chief/ap42/ch13/related/c13s02-2.html) has a file which contains a spreadsheet program for calculating emission factors which are temporally and spatially resolved. Information required for use of the spreadsheet program includes monthly Class A pan evaporation values, hourly meteorological data for precipitation, humidity and snow cover, vehicle traffic information, and road surface material information.

It is emphasized that <u>the simple assumption underlying Equation 2 and the more complex set of assumptions underlying the use of the procedure which produces a finer temporal and spatial resolution</u> have not been verified in any rigorous manner. For this reason, the quality ratings for either approach should be downgraded one letter from the rating that would be applied to Equation 1.

13.2.2.3 Controls[18-22]

A wide variety of options exist to control emissions from unpaved roads. Options fall into the following three groupings:

1. <u>Vehicle restrictions</u> that limit the speed, weight or number of vehicles on the road;

13.2.4 Aggregate Handling And Storage Piles

13.2.4.1 General

Inherent in operations that use minerals in aggregate form is the maintenance of outdoor storage piles. Storage piles are usually left uncovered, partially because of the need for frequent material transfer into or out of storage.

Dust emissions occur at several points in the storage cycle, such as material loading onto the pile, disturbances by strong wind currents, and loadout from the pile. The movement of trucks and loading equipment in the storage pile area is also a substantial source of dust.

13.2.4.2 Emissions And Correction Parameters

The quantity of dust emissions from aggregate storage operations varies with the volume of aggregate passing through the storage cycle. Emissions also depend on 3 parameters of the condition of a particular storage pile: age of the pile, moisture content, and proportion of aggregate fines.

When freshly processed aggregate is loaded onto a storage pile, the potential for dust emissions is at a maximum. Fines are easily disaggregated and released to the atmosphere upon exposure to air currents, either from aggregate transfer itself or from high winds. As the aggregate pile weathers, however, potential for dust emissions is greatly reduced. Moisture causes aggregation and cementation of fines to the surfaces of larger particles. Any significant rainfall soaks the interior of the pile, and then the drying process is very slow.

Silt (particles equal to or less than 75 micrometers [µm] in diameter) content is determined by measuring the portion of dry aggregate material that passes through a 200-mesh screen, using ASTM-C-136 method.[1] Table 13.2.4-1 summarizes measured silt and moisture values for industrial aggregate materials.

The quantity of particulate emissions generated by either type of drop operation, per kilogram (kg) (ton) of material transferred, may be estimated, with a rating of A, using the following empirical expression:[11]

$$E = k(0.0016)\ \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\ \text{(kg/megagram [Mg])}$$

$$E = k(0.0032)\ \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\ \text{(pound [lb]/ton)} \qquad (1)$$

where:

E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, meters per second (m/s) (miles per hour [mph])
M = material moisture content (%)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

Aerodynamic Particle Size Multiplier (k) For Equation 1				
< 30 µm	< 15 µm	< 10 µm	< 5 µm	< 2.5 µm
0.74	0.48	0.35	0.20	0.053[a]

[a] Multiplier for < 2.5 µm taken from Reference 14.

The equation retains the assigned quality rating if applied within the ranges of source conditions that were tested in developing the equation, as follows. Note that silt content is included, even though silt content does not appear as a correction parameter in the equation. While it is reasonable to expect that silt content and emission factors are interrelated, no significant correlation between the 2 was found during the derivation of the equation, probably because most tests with high silt contents were conducted under lower winds, and vice versa. It is recommended that estimates from the equation be reduced 1 quality rating level if the silt content used in a particular application falls outside the range given:

Ranges Of Source Conditions For Equation 1			
Silt Content (%)	Moisture Content (%)	Wind Speed	
		m/s	mph
0.44 - 19	0.25 - 4.8	0.6 - 6.7	1.3 - 15

To retain the quality rating of the equation when it is applied to a specific facility, reliable correction parameters must be determined for specific sources of interest. The field and laboratory procedures for aggregate sampling are given in Reference 3. In the event that site-specific values for

Permit 3691-4AR-R1

RAP Plant Engine

ENGINE TEST [81Z18858]

APRIL 04, 2011

For Help Desk Phone Numbers Click here

Sales Model: 3412
Built Date: 14Dec1995 **Tested Date:** 14Dec1995 **Shipped Date:** 20May1996
Tested: BB **Plant:** Mossville **Test Number:** 01 **Cell Number:** 07

Test Element	Eng Updates	Test Value	Test Spec Value	Label
Spec Number		2T7568	2T7568	
Arrangement Number		7E0160	7E0160	
Corr Fl Power		887	898	HP
Speed		1,801	1,800	RPM
COR FL FUEL RATE		44.9	45.5	GAL/HR
CSFC		0.358	0.358	LB/HP-HR
Adj Boost		59.9	61.3	IN HG
Fuel Pressure		30	31	PSI
Oil Pressure		63	63	PSI
TQ COR FUEL RATE				GAL/HR
TQ CK CSFC				LB/HP-HR
TQ CK ADJ BST				IN HG
Torq Ck Speed				RPM
TQ CK COR TQ				LB/FT
Low Idle Speed		1,201	1,200	RPM
Low Idle Oil Pressure		60	63	PSI
High Idle Speed		1,816	1,818	RPM
Response Time				
FL Static Fuel Setting		0.287	0.287	IN
FT Static Fuel Setting		0.287	0.287	IN
Timing Dim				
FLS (INTRCPT)				
FTS (SLOPE)				
Advertised Power			817	hp
Advertised Speed			1,800	RPM
Advertised Torque				LB/FT

GEN SET PACKAGE PERFORMANCE DATA [81Z18858]

APRIL 04, 2011

For Help Desk Phone Numbers Click here

Performance Number: DM1910 **Change Level:** 01

Sales Model: 3412CDITA **Combustion:** DI **Aspr:** TA

Engine Power:
545 W/F EKW 569 W/O F EKW
817 HP

Speed: 1,800 RPM **After Cooler:** JWAC

Manifold Type: DRY **Governor Type:** HYDRA **After Cooler Temp(F):** --

Turbo Quantity: 2 **Engine App:** GP **Turbo Arrangement:**

Hertz: 60 **Application Type:** PACKAGE-DIE **Engine Rating:** PGS **Strategy:**

Rating Type: PRIME **Certification:**

General Performance Data

GEN W/F EKW	PERCENT LOAD	ENGINE POWER BHP	ENGINE BMEP PSI	FUEL BSFC LB/BHP-HR	FUEL RATE GPH	INTAKE MFLD TEMP DEG F	INTAKE MFLD P IN-HG	INTAKE AIR FLOW CFM	EXH MFLD TEMP DEG F	EXH STACK TEMP DEG F	EXH GAS FLOW CFM
545	100	817	217.85	0.35	40.31	193.28	48.86	1,744.55	1,134.86	892.22	4,619.16
490.5	90	740	197.4	0.34	36.46	190.76	42.55	1,620.94	1,098.14	878.54	4,248.36
436	80	663	176.8	0.35	32.78	188.42	36.25	1,497.34	1,062.5	864.68	3,874.02
408.8	75	625	166.51	0.35	30.99	187.52	33.05	1,430.25	1,045.58	857.66	3,679.79
381.5	70	586	156.21	0.35	29.22	186.44	29.88	1,359.62	1,028.3	850.46	3,482.03
327	60	508	135.47	0.35	25.68	184.64	23.51	1,225.42	993.92	835.34	3,090.04
272.5	50	430	114.58	0.36	22.16	183.02	17.38	1,091.22	955.94	815.9	2,698.04
218	40	355	94.57	0.37	18.81	181.58	12.82	974.69	894.2	772.16	2,330.77
163.5	30	278	74.12	0.39	15.4	180.32	8.85	865.21	815	711.86	1,967.03
136.3	25	239	63.67	0.4	13.68	179.78	7.11	815.77	768.38	675.32	1,786.92
109	20	199	53.08	0.42	11.94	179.24	5.54	773.39	715.82	633.74	1,628.01
54.5	10	118	31.47	0.5	8.45	178.52	2.84	716.89	592.52	535.1	1,356.08

Engine Heat Rejection Data

GEN W/F EKW	PERCENT LOAD	REJ TO JW BTU/MN	REJ TO ATMOS BTU/MN	REJ TO EXHAUST BTU/MN	EXH RCOV TO 350F BTU/MN	FROM OIL CLR BTU/MN	FROM AFT CLR BTU/MN	WORK ENERGY BTU/MN	LHV ENERGY BTU/MN	HHV ENERGY BTU/MN
545	100	20,075.1	6,312.6	31,790.3	17,515.9	2,809.4	4,094.6	34,633.8	87,067.8	92,754.8
490.5	90	18,198.4	5,459.5	28,889.9	15,809.8	2,655.8	3,173.3	31,392.2	78,764.8	83,940.0
436	80	16,378.5	4,833.9	26,103.3	14,217.5	2,485.2	2,337.4	28,150.6	70,803.0	75,466.3
408.8	75	15,525.5	4,663.3	24,681.5	13,364.4	2,399.9	1,939.3	26,501.4	66,935.9	71,314.8
381.5	70	14,615.6	4,492.7	23,259.8	12,511.4	2,314.6	1,569.6	24,852.1	63,068.7	67,220.2
327	60	12,909.5	4,151.5	20,473.2	10,919.0	2,144.0	909.9	21,553.7	55,448.1	59,030.9
272.5	50	11,203.4	3,867.1	17,686.5	9,269.8	1,973.4	358.3	18,198.4	47,827.6	50,955.4
218	40	9,554.1	3,924.0	14,786.2	7,450.0	1,785.7	-45.5	15,070.5	40,605.1	43,278.0
163.5	30	7,848.0	3,867.1	11,942.7	5,630.1	1,563.9	-346.9	11,772.1	33,268.9	35,429.9
136.3	25	6,995.0	3,810.3	10,520.9	4,720.2	1,444.5	-466.3	10,122.8	29,515.5	31,449.0
109	20	6,085.1	3,696.5	9,212.9	3,924.0	1,325.1	-563.0	8,473.6	25,762.1	27,468.2

EMISSIONS DATA

Certification:

To properly apply this data you must refer to performance parameter DM1176 for additional information...

REFERENCE EXHAUST STACK DIAMETER	8 IN
WET EXHAUST MASS	7,998.4 LB/HR
WET EXHAUST FLOW (892.40 F STACK TEMP)	4,626.23 CFM
WET EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	1,656.00 STD CFM
DRY EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	1,517.47 STD CFM
FUEL FLOW RATE	40 GAL/HR

RATED SPEED "Not to exceed data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
545	100	817	13.7100	.4900	.1300	.8500	10.0000	4.8000	1.5600
408.8	75	625	11.1600	.2900	.1600	.4200	10.5000	3.5000	1.3600
272.5	50	430	8.5000	.1600	.1900	.3200	11.2000	2.6000	1.2800
136.3	25	239	5.7400	.1400	.1800	.2600	13.4000	1.7000	1.2800
54.5	10	118	3.6700	.1500	.2700	.2200	15.8000	1.4000	1.2900

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
545	100	817	11.3300	.2600	.0700	903.9	.4300	10.0000	4.8000	1.5600
408.8	75	625	9.2200	.1600	.0900	693	.2200	10.5000	3.5000	1.3600
272.5	50	430	7.0300	.0900	.1000	494.1	.1600	11.2000	2.6000	1.2800
136.3	25	239	4.7400	.0800	.1000	309	.1300	13.4000	1.7000	1.2800
54.5	10	118	3.0300	.0800	.1400	191.4	.1100	15.8000	1.4000	1.2900

Lippmann Crusher

PERFORMANCE DATA[DM7686]

October 23, 2014

Performance Number: DM7686 **Change Level: 08**

SALES MODEL:	C13
ENGINE POWER (BHP):	415
PEAK TORQUE (FT-LB):	1,398.4
COMPRESSION RATIO:	17.3
RATING LEVEL:	INDUSTRIAL B
PUMP QUANTITY:	1
FUEL TYPE:	DIESEL
MANIFOLD TYPE:	DRY
GOVERNOR TYPE:	ELEC
INJECTOR TYPE:	EUI
REF EXH STACK DIAMETER (IN):	5
MAX OPERATING ALTITUDE (FT):	4,400
COMBUSTION:	DI
ENGINE SPEED (RPM):	2,100
PEAK TORQUE SPEED (RPM):	1,400
TORQUE RISE (%):	35
ASPIRATION:	TA
AFTERCOOLER TYPE:	ATAAC
AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
INLET MANIFOLD AIR TEMP (F):	120
JACKET WATER TEMP (F):	192.2
TURBO CONFIGURATION:	SINGLE
TURBO QUANTITY:	1
TURBOCHARGER MODEL:	GTA4502BS 1.33 A/R
CERTIFICATION YEAR:	2006
PISTON SPD @ RATED ENG SPD (FT/MIN):	2,163.4

INDUSTRY	SUBINDUSTRY	APPLICATION
INDUSTRIAL	FORESTRY	INDUSTRIAL
INDUSTRIAL	GENERAL INDUSTRIAL	INDUSTRIAL
OIL AND GAS	LAND PRODUCTION	INDUSTRIAL
INDUSTRIAL	AGRICULTURE	INDUSTRIAL
INDUSTRIAL	CONSTRUCTION	INDUSTRIAL
INDUSTRIAL	MATERIAL HANDLING	INDUSTRIAL
INDUSTRIAL	MINING	INDUSTRIAL
OIL AND GAS	WELL SERVICING	INDUSTRIAL

General Performance Data

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
RPM	BHP	LB-FT	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,100	415	1,038	205	0.347	20.7	45.8	125.2	1,117.2	38.8	894.7
2,000	415	1,090	215	0.342	20.5	46.5	123.4	1,121.0	37.4	904.1
1,900	415	1,147	227	0.343	20.4	47.3	123.1	1,135.1	36.0	921.8
1,800	415	1,211	239	0.339	20.2	48.0	121.2	1,149.8	34.3	942.4
1,700	410	1,268	251	0.336	19.8	48.1	118.7	1,161.0	32.3	956.0
1,600	402	1,318	261	0.333	19.2	48.2	116.9	1,161.1	30.4	956.8
1,500	389	1,364	269	0.336	18.8	48.4	115.2	1,180.3	28.7	980.4
1,400	373	1,399	276	0.331	17.8	47.3	111.2	1,186.0	26.4	986.3
1,300	342	1,380	273	0.340	16.7	47.0	110.0	1,188.8	24.4	991.4
1,200	308	1,349	267	0.331	14.7	38.3	100.9	1,202.6	18.6	1,040.6
1,100	261	1,245	246	0.337	12.6	31.1	95.2	1,211.3	13.8	1,064.3

ENGINE SPEED	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
RPM	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,100	415	47	312.1	964.1	2,520.1	4,201.4	4,346.6	914.9	841.8
2,000	415	47	311.0	941.4	2,473.4	4,093.2	4,236.4	891.7	819.5
1,900	415	48	310.6	913.3	2,427.4	3,961.5	4,104.3	863.9	792.5
1,800	415	48	311.4	884.5	2,385.2	3,832.3	3,973.8	836.4	765.8
1,700	410	49	310.3	844.0	2,296.2	3,649.7	3,788.7	797.5	728.4
1,600	402	48	308.2	807.2	2,189.8	3,476.7	3,611.1	760.1	694.5
1,500	389	48	310.3	765.7	2,113.7	3,297.0	3,428.3	721.6	657.1
1,400	373	47	309.4	710.6	1,968.2	3,054.6	3,179.5	669.2	608.1
1,300	342	47	310.5	664.7	1,840.9	2,846.3	2,963.4	623.8	566.5
1,200	308	38	279.3	552.0	1,577.2	2,352.7	2,455.8	516.9	467.0
1,100	261	30	250.7	456.5	1,322.9	1,939.3	2,027.8	426.8	384.2

Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 2100 RPM

ENGINE POWER		BHP	415	311	208	104	41.5
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	1,437	794	417	220	140
TOTAL CO		G/HR	1,000	1,253	313	540	474
TOTAL HC		G/HR	55	75	114	137	169
PART MATTER		G/HR	83.0	82.1	48.0	75.6	72.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,613.1	1,076.6	780.1	723.6	785.1
TOTAL CO	(CORR 5% O2)	MG/NM3	1,120.7	1,705.6	597.9	1,773.9	2,665.4
TOTAL HC	(CORR 5% O2)	MG/NM3	53.0	88.8	184.8	389.8	819.8
PART MATTER	(CORR 5% O2)	MG/NM3	78.4	96.3	79.1	223.1	372.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	786	524	380	352	382
TOTAL CO	(CORR 5% O2)	PPM	897	1,364	478	1,419	2,132
TOTAL HC	(CORR 5% O2)	PPM	99	166	345	728	1,530
TOTAL NOX (AS NO2)		G/HP-HR	3.49	2.57	2.02	2.13	3.38
TOTAL CO		G/HP-HR	2.43	4.06	1.52	5.23	11.48
TOTAL HC		G/HP-HR	0.13	0.24	0.55	1.32	4.08
PART MATTER		G/HP-HR	0.20	0.27	0.23	0.73	1.75
TOTAL NOX (AS NO2)		LB/HR	3.17	1.75	0.92	0.49	0.31
TOTAL CO		LB/HR	2.20	2.76	0.69	1.19	1.05
TOTAL HC		LB/HR	0.12	0.17	0.25	0.30	0.37
PART MATTER		LB/HR	0.18	0.18	0.11	0.17	0.16

RATED SPEED NOMINAL DATA: 2100 RPM

ENGINE POWER		BHP	415	311	208	104	41.5
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	1,331	735	386	204	129
TOTAL CO		G/HR	535	670	167	289	254
TOTAL HC		G/HR	29	40	60	72	89
TOTAL CO2		KG/HR	213	172	126	71	42
PART MATTER		G/HR	42.6	42.1	24.6	38.7	37.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,493.6	996.8	722.3	670.0	727.0
TOTAL CO	(CORR 5% O2)	MG/NM3	599.3	912.1	319.7	948.6	1,425.3
TOTAL HC	(CORR 5% O2)	MG/NM3	28.0	47.0	97.8	206.2	433.8
PART MATTER	(CORR 5% O2)	MG/NM3	40.2	49.4	40.6	114.4	191.2
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	728	486	352	326	354
TOTAL CO	(CORR 5% O2)	PPM	479	730	256	759	1,140
TOTAL HC	(CORR 5% O2)	PPM	52	88	182	385	810
TOTAL NOX (AS NO2)		G/HP-HR	3.23	2.38	1.87	1.97	3.13
TOTAL CO		G/HP-HR	1.30	2.17	0.81	2.80	6.14
TOTAL HC		G/HP-HR	0.07	0.13	0.29	0.70	2.16
PART MATTER		G/HP-HR	0.10	0.14	0.12	0.38	0.90
TOTAL NOX (AS NO2)		LB/HR	2.93	1.62	0.85	0.45	0.29
TOTAL CO		LB/HR	1.18	1.48	0.37	0.64	0.56
TOTAL HC		LB/HR	0.06	0.09	0.13	0.16	0.20
TOTAL CO2		LB/HR	469	378	278	157	92
PART MATTER		LB/HR	0.09	0.09	0.05	0.09	0.08
OXYGEN IN EXH		%	10.7	12.5	14.1	15.5	17.1
DRY SMOKE OPACITY		%	1.4	1.5	0.9	2.0	2.0
BOSCH SMOKE NUMBER			0.97	1.04	0.54	1.27	1.29

Regulatory Information

EPA TIER 3		2005 - 2010		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 3	CO: 3.5 NOx + HC: 4.0 PM: 0.20

EU STAGE IIIA		2006 - 2010		
GASEOUS EMISSION DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EU 97/68/EC, ECE REGULATION NO. 96 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSION VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
EUROPE	EU	NON-ROAD	STAGE IIIA	CO: 3.5 NOx + HC: 4.0 PM: 0.20

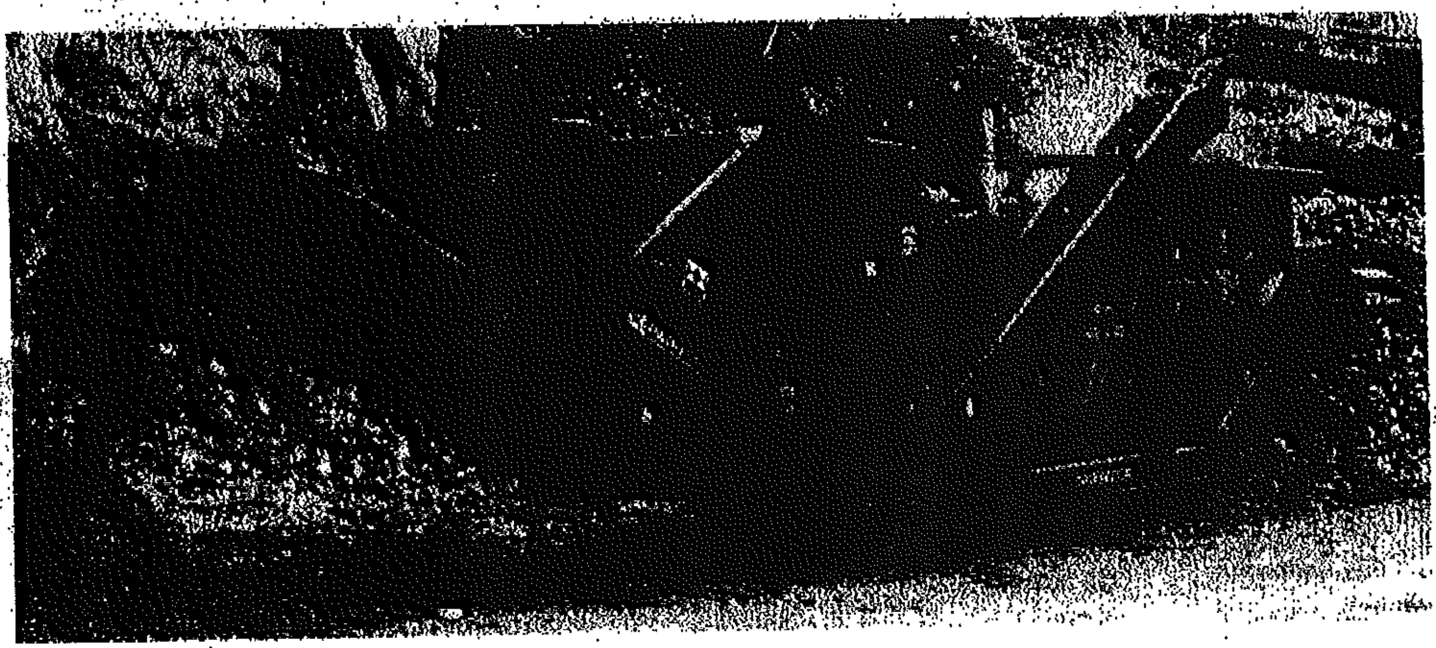
IMO II	2011 - ----
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF REVISED ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.	

Terex Crusher

NEW

4242 SR

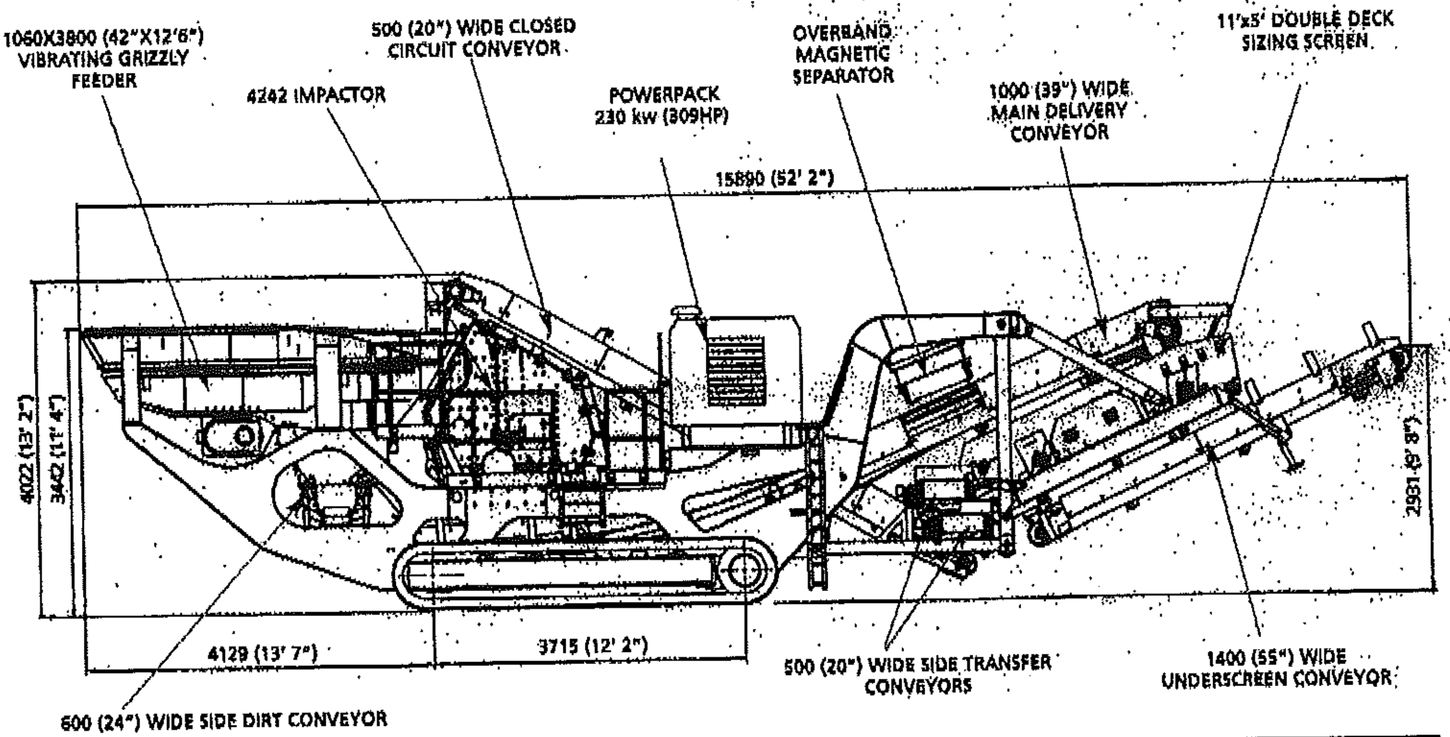
Tracked Impactor with product sizing screen & re-circulating facility



The BL-Pegson 4242 SR Tracked Impactor Plant has been designed to give a controlled product size whilst maximising throughput and product shape. Applications include: quarry, demolition and recycling.

- Rapid set-up time and ease of transportation.
- Well proven high performance 1067mm x 1067mm (42"x42") impact crusher with manganese hammers.
- Heavy duty chassis and track frame.
- 2 step self cleaning Grizzly with under screen.
- Remote control operation.
- Two way dirt chute.
- 11'x5' Double Deck Product screen beneath main conveyor.
- Re-circulating facility.
- Caterpillar Powerpack.
- Fully skirted conveyors.
- Rip stop belt on main delivery conveyor.
- Dust suppression sprays.
- Magnetic separator.
- Available with or without Grinding Path for Quarry or Recycling (specify when ordering).
- Optional blow bars for quarry or recycling (specify when ordering).
- Facility for making 1, 2 or 3 products.
- Optional mesh sizes for product screen.
- Reversible cross conveyor allowing use of receiving deck to maximise effective screen area.
- Simple access system for screen maintenance (patent pending).
- Power take off for additional stockpile conveyor.

Tracked impactor with product sizing screen & re-circulating facility



Technical Information for Impactor				
Feed Opening	Rotor Diameter	Rotor Width	Rotor Speed	No. of Hammers
1067 x 711mm (42" x 28")	1062mm (42")	1062mm (42")	504 rpm 630 rpm*	4

Working Width: (over dirt conveyor)	4,100 (13'-5")
Travel Length:	15,890 (52'-2")
Travel Width:	3,100 (10' 2")
Travel Height:	3,442 (11'- 4")
Overall Track Width:	2,560 (8'- 5")
Total Weight:	42 tonnes (46 US tons)

* Optional

Notes: Capacities are typical only based on clean, dry, quarried hard limestone weighing loose approximately 1.6t/m³ (100lb/ft³). The feed should be well graded and of a size that will readily enter the mouth of the crusher chamber. Crushing performance will vary with local conditions. For further advice contact your local dealer or BL-Pegson Ltd.

Your Local Authorised BL-Pegson Dealer:

POWER SCREENING INC.
P. O. BOX 192
HENDERSON, CO 80640
303-287-0100

BL-Pegson Ltd
Mammoth Street, Coalville,
Leicestershire, LE67 3GN. England.
Tel: +44 (0) 1530 518600
Fax: +44 (0) 1530 518618
email sales@bl-pegson.com
www.bl-pegson.com

US Office:
11001 Electron Drive, Louisville,
Kentucky, 40299 USA.
Tel: (502) 736 5200.
Fax: (502) 736 5202

US office is not ISO 9002 registered.

THE QUEEN'S AWARD FOR ENTERPRISE: INTERNATIONAL TRADE 2002

UKAS QUALITY MANAGEMENT 001

TEREX PEGSON

Publication No: 4242SR 202/3

CATERPILLAR® C-9

[redacted] bkW / [redacted] bhp

2200 rpm

Industrial

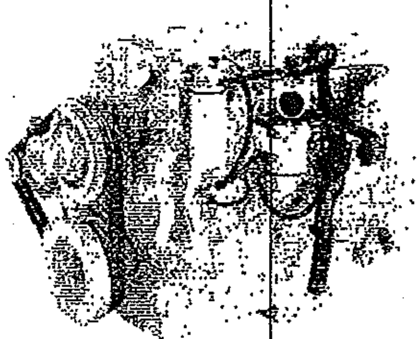


Image shown may not reflect actual engine

CATERPILLAR ENGINE SPECIFICATIONS

I-6, 4-Stroke-Cycle Diesel

Bore	112.0 mm (4.41 in)
Stroke	149.0 mm (5.87 in)
Displacement	8.81 L (537.62 in³)
Aspiration	Turbocharged / ATAAC
Compression Ratio	16.1:1
Rotation (from flywheel end)	Counterclockwise
Capacity for Liquids	
Cooling System	13.9 L (3.7 gal)
Lube Oil System (refill)	32.0 L (8.5 gal)
Engine Weight, Net Dry (approximate)	775 kg (1,710 lb)

FEATURES

Emissions

Meets Tier 2, Stage II emission requirements. Tier 2 refers to EPA (U.S.) standards. Stage II refers to European standards.

Single Source Supplier

Caterpillar
- Casts engine blocks, heads, and cylinder liners
- Machines critical components
- Assembles complete engine

Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable product.

Factory-designed systems built at Caterpillar ISO certified facilities

Testing

Prototype testing on every model:
- proves computer design
- verifies system torsional stability
- functionality tests every model

Every Caterpillar engine is dynamometer tested under full load to ensure proper engine performance.

Full Range of Attachments

Wide range of bolt-on system expansion attachments, factory designed and tested

Unmatched Product Support Offered Through Worldwide Caterpillar Dealer Network

More than 1,600 dealer outlets
Caterpillar factory-trained dealer technicians service every aspect of your industrial engine.
99.7% of parts orders filled within 24 hours worldwide.
Caterpillar parts and labor warranty.
Preventive maintenance agreements available for repair before failure options.
Scheduled Oil Sampling program matches your oil sample against Caterpillar set standards to determine:
- internal engine component condition
- presence of unwanted fluids
- presence of combustion by-products

Web Site

For all your industrial power requirements, visit www.cat-industrial.com.

200 Tons/Hour

MACHINE 4242 SR
SERIAL # 420140 CCSA 2005
ENGINE C-9 CATERPILLAR
SERIAL# CLJ09993 2004
AR# 202-0333

17 April 2006 12:30 PM

EMISSIONS DATA

EPA TIER-II 2003 - 2005 ** C2
Gaseous emissions data measurements are consistent with those described in EPA 40 CFR PART 89 SUBPART D and ISO 8178 for measuring HC, CO, PM, and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kW-hr		
U.S. (incl Calif)	EPA/TIER-2	CO:3.5	NOx + HC:6.6	PM:0.20
Europe	EU/Stage-II	CO:3.5	HC:1.0 NOx:6.0	PM:0.20

EU STAGE-2 2002 - 2009 ** C2
Gaseous emissions data measurements are consistent with those described in EPA 40 CFR PART 89 SUBPART D and ISO 8178 for measuring HC, CO, PM, and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kW-hr		
U.S. (incl Calif)	EPA/TIER-2	CO:3.5	NOx + HC:6.6	PM:0.20
Europe	EU/Stage-II	CO:3.5	HC:1.0 NOx:6.0	PM:0.20

EXHAUST STACK DIAMETER	4 IN 0.1016 m
WET EXHAUST MASS	3,362.0 LB/HR
WET EXHAUST FLOW (815.00 F STACK TEMP)	1,835.31 CFM
WET EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	701.00 STD CFM
DRY EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	642.37 STD CFM
FUEL FLOW RATE	15 GAL/HR

RATED SPEED "Not to exceed data"

ENGINE SPEED RPM	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT
2200	100	300	3.95	0.63	0.15	.060	11.40
2200	75	225	2.24	0.71	0.16	.100	12.50
2200	50	150	1.04	0.59	0.21	.130	13.80
2200	25	75	0.48	0.65	0.24	.130	15.70
2200	10	30	0.44	0.76	0.25	.110	17.00

RATED SPEED "Nominal Data"

ENGINE SPEED RPM	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT
2200	100	300	3.26	0.34	0.08	341.6	0.030	11.40
2200	75	225	1.85	0.38	0.08	268.0	0.050	12.50
2200	50	150	0.86	0.32	0.11	197.9	0.070	13.80
2200	25	75	0.39	0.35	0.13	120.5	0.060	15.70
2200	10	30	0.36	0.40	0.13	70.6	0.060	17.00

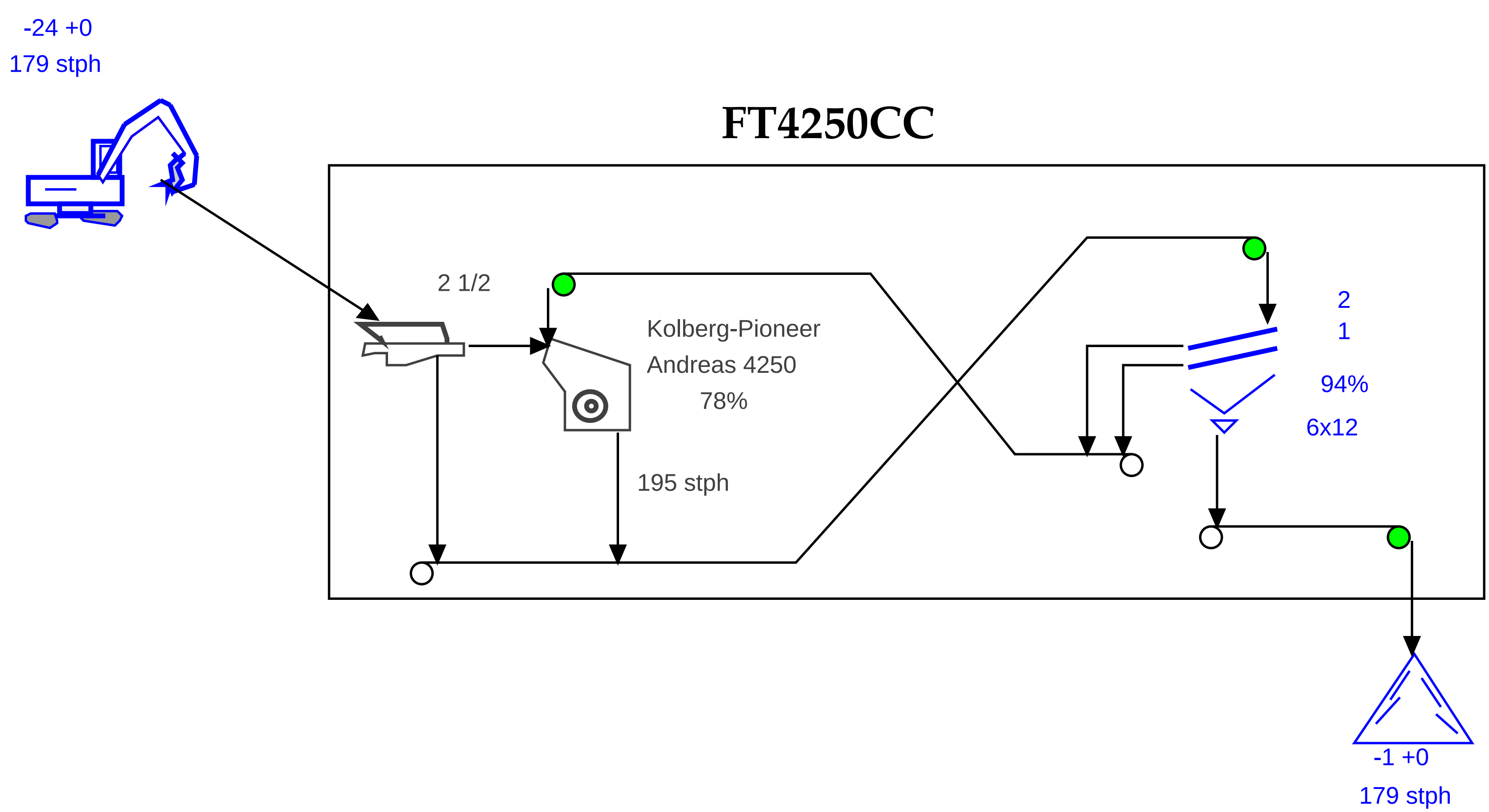
INTERMEDIATE SPEED "Not to exceed data"

ENGINE SPEED RPM	PERCENT LOAD	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	O2 IN EXHAUST PERCENT
1400	100	3.70	0.34	0.08	0.040	7.55
1400	75	1.93	0.56	0.08	0.050	9.95
1400	50	0.94	0.78	0.09	0.090	11.27
1400	25	0.42	0.78	0.12	0.080	14.25
1400	10	0.34	0.67	0.15	0.050	16.84

INTERMEDIATE SPEED "Nominal Data"

ENGINE SPEED RPM	PERCENT LOAD	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	O2 IN EXHAUST PERCENT
1400	100	3.06	0.18	0.04	291.1	0.020	7.55
1400	75	1.60	0.30	0.04	227.6	0.020	9.95
1400	50	0.78	0.42	0.05	157.3	0.050	11.27
1400	25	0.35	0.41	0.06	87.9	0.040	14.25
1400	10	0.28	0.36	0.08	46.6	0.020	16.84

KPI – JCI Crusher



Calculation results may differ due to variations in operating conditions and application of crushing and screening equipment. This information does not constitute an express or implied warranty, but shows results of calculations based on information provided by customers or equipment manufacturers. Use this information for estimating purposes only.

All calculations performed by AggFlow. http://www.AggFlow.com

KPI-JCI-AMS
170380-F1-1 Albuquerque Asphalt
Andy Bryan
Plant Stage #1:
Project #: nil Revision #: - Date: August/28/2017

Medium Recycle Concrete

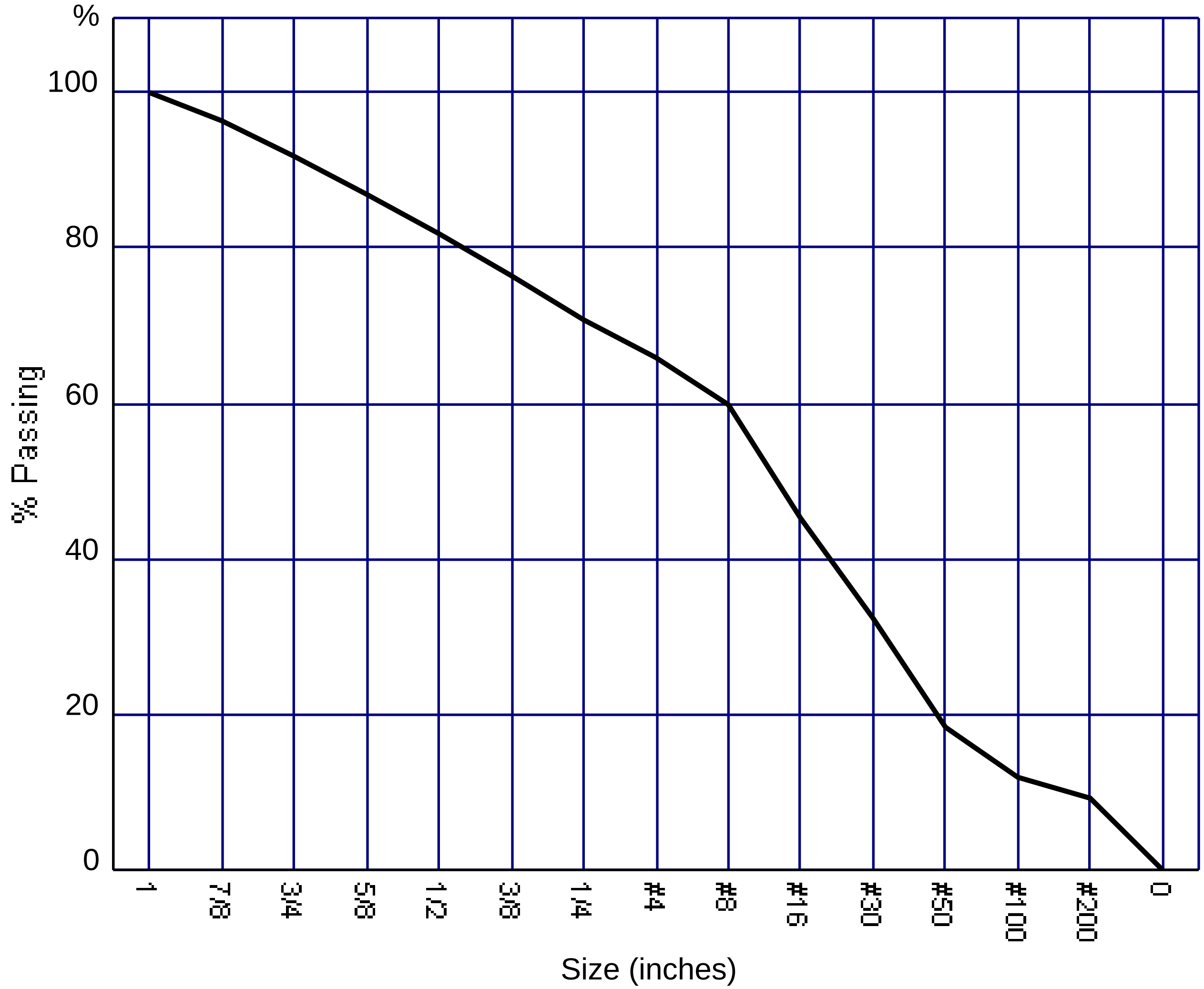
Grading	% Pass	% Ret.	TPH
24	100.0	0	0
12	70.0	30.0	53.7
10	65.0	5.0	9.0
9	63.0	2.0	3.6
8	60.0	3.0	5.4
7	58.0	2.0	3.6
6	55.0	3.0	5.4
5	53.0	2.0	3.6
4	50.0	3.0	5.4
3	45.0	5.0	9.0
2 1/2	40.0	5.0	9.0
2	35.0	5.0	9.0
1 1/2	30.0	5.0	9.0
1 1/4	27.0	3.0	5.4
1	25.0	2.0	3.6
7/8	23.0	2.0	3.6
3/4	20.0	3.0	5.4
5/8	18.0	2.0	3.6
1/2	15.0	3.0	5.4
3/8	13.0	2.0	3.6
1/4	11.0	2.0	3.6
#4	9.0	2.0	3.6
#8	7.0	2.0	3.6
#16	4.0	3.0	5.4
#30	3.0	1.0	1.8
#50	2.0	1.0	1.8
#100	1.0	1.0	1.8
0	0.0	1.0	1.8
Total	- -	100.0	179

Solids Rate	179stph
Bulk Density	100.0 lbs/ft^3
Solids Density	165.32 lbs/ft^3
Solids SG	2.65
Water Rate	0.0 gpm
Water Density	62.38 lbs/ft^3
Water SG	1.0
Slurry Rate	270 gpm
Slurry Density	165.32 lbs/ft^3
Slurry SG	2.65
Feed Name	Concrete Recycle - Medium

KPI-JCI-AMS
170380-F1-1 Albuquerque Asphalt
Andy Bryan
Plant Stage #1:
Project #: nil Revision #: - Date: August/28/2017

Crushed Base Product Pile

Grading	% Pass	% Ret.	TPH
1	100.0	0	0
7/8	96.4	3.6	6.5
3/4	91.8	4.6	8.2
5/8	86.9	4.9	8.7
1/2	81.9	5.1	9.1
3/8	76.4	5.4	9.7
1/4	70.8	5.7	10.1
#4	65.9	4.9	8.7
#8	59.9	6.1	10.8
#16	45.2	14.6	26.2
#30	32.4	12.8	23.0
#50	18.4	14.0	25.1
#100	11.9	6.4	11.5
#200	9.2	2.7	4.8
0	0.0	9.2	16.5
Total	- -	100.0	179



KPI-JCI-AMS
170380-F1-1 Albuquerque Asphalt
Andy Bryan
Plant Stage #1:
Project #: nil Revision #: - Date: August/28/2017

FT4250CC 6' x 12' - 2 Deck Inclined Screen

Grading	% Pass	% Ret.	TPH
2 1/2	100.0	0	0
2	90.8	9.2	24.6
1 1/2	83.0	7.7	20.7
1 1/4	78.1	4.9	13.2
1	73.1	5.0	13.3
7/8	69.6	3.5	9.4
3/4	65.4	4.2	11.2
5/8	61.1	4.3	11.4
1/2	56.9	4.2	11.2
3/8	52.6	4.3	11.4
1/4	48.3	4.3	11.4
#4	44.8	3.5	9.4
#8	40.6	4.3	11.4
#16	30.5	10.1	26.8
#30	21.8	8.7	23.3
#50	12.3	9.5	25.2
#100	8.0	4.3	11.5
#200	6.2	1.8	4.8
0	0.0	6.2	16.5
Total	- -	100.0	267

	Deck 1	Deck 2
Size	6x12	6x12
Cut Size(inches)	2	1
Type	mesh	mesh
Calculation method	VSMA	VSMA
Carry-over method	Near-size	Near-size
Basic Capacity (tph/ft^2)	4.9	3.56
Half Size Factor	1.79	1.56
Oversize Factor	1.14	1.05
Deck Factor	1.0	0.9
Efficiency	95	94
Efficiency Factor	1.0	1.03
Use spray	No	No
Wet Factor	1.0	1.0
Open Area %	71.0	64.0
Open Area Factor	1.0	1.0
Slot Type	square	square
Slot Factor	1.0	1.0
Weight Factor	1.0	1.0
Recycle Concrete	0.5	0.5
Actual Capacity (tph/ft^2)	4.99	2.7
Rate (fpm)	65.0	65.0
Spray Rate (gpm)	0.0	0.0
DBD Ratio	0.2	0.5
Power:(kW)	0	0
TPH onto Deck	267	230
TPH off Deck	36	51
TPH through Deck	230	179
Required Area (ft^2)	48.5	70.5
Available Area (ft^2)	72.0	72.0

Screen Efficiency Below 95%

Screen Bottom Deck at Maximum Screen Area

KPI-JCI-AMS
170380-F1-1 Albuquerque Asphalt
Andy Bryan
Plant Stage #1:
Project #: nil Revision #: - Date: August/28/2017

Limited Crusher Throughput Capacity Estimate
for Track Mount FT4250 (HSI) Crusher

Foreword

Published throughput capacities for KPI FT4250 HSI crushers are theoretical and are subject to the type of feed material including but not necessarily limited to feed size, bulk density, moisture content, fines and clay content. Capacity is also dependent on the operator's ability to feed the crusher efficiently and consistently while maintaining an optimal system balance.

Purpose/Scope

The purpose of this throughput estimate is to assure that the FT4250 Track Mounted (HSI) Crusher will produce an average throughput rate of up to 178 short tons per hour of plant through put at a 1" CSS The material is so defined:

Material Type:	**Concrete Recycle**
Moisture content:	**1.5 % by weight**
Maximum feed size:	**24" well graded feed**
Minimum feed size	**0"**
Bulk Density:	**95-100 lbs. per cubic foot**

Conclusion

Based on the attached Aggflow and estimated feed gradation, the expected plant capacity would be 178 short tons per hour. At 179 short tons per hour, the bottom deck of 6' x 12' 2-deck screen has reached maximum required area as calculated by the Vibrating Screen Manufactures Association screen area formula.

General Performance Data Top

Note(s)
INLET MANIFOLD AIR TEMPERATURE ("INLET MFLD TEMP") FOR THIS CONFIGURATION IS MEASURED AT THE OUTLET OF THE AFTERCOOLER.

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
RPM	BHP	LB-FT	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,100	440	1,100	217	0.356	22.4	51.7	122.0	1,100.2	68.4	851.5
2,000	440	1,155	228	0.350	22.0	51.9	122.0	1,099.6	65.8	856.0
1,900	440	1,216	240	0.344	21.6	52.3	122.0	1,105.9	62.2	868.0
1,800	440	1,283	254	0.339	21.3	52.3	122.0	1,118.7	58.6	888.1
1,700	436	1,346	266	0.336	20.9	52.0	122.0	1,131.3	56.1	905.6
1,600	426	1,400	277	0.337	20.5	52.2	122.0	1,164.1	55.2	926.7
1,500	413	1,446	286	0.337	19.9	51.1	122.0	1,189.5	51.9	949.5
1,400	396	1,484	293	0.338	19.1	49.6	122.0	1,213.0	48.7	971.9
1,300	357	1,441	285	0.338	17.2	44.7	122.0	1,219.8	42.6	987.8
1,200	319	1,397	276	0.344	15.7	39.6	122.0	1,235.9	36.6	1,018.0
1,100	276	1,319	261	0.349	13.8	33.1	122.0	1,245.1	29.4	1,047.3
1,000	231	1,211	239	0.356	11.7	27.4	122.0	1,238.5	24.1	1,056.3
900	189	1,103	218	0.358	9.7	21.7	122.0	1,198.0	19.5	1,036.3
800	150	986	195	0.365	7.8	13.9	122.0	1,165.0	12.5	1,027.7
700	110	825	163	0.370	5.8	8.0	122.0	1,074.7	7.7	965.2
600	75.1	657	130	0.366	3.9	4.2	122.0	920.8	4.7	840.2

ENGINE SPEED	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
RPM	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,100	440	55	342.6	812.1	1,524.6	3,554.5	3,711.1	571.7	516.8
2,000	440	55	338.9	793.0	1,498.7	3,458.6	3,612.4	560.0	505.9
1,900	440	55	336.0	765.2	1,467.4	3,319.9	3,471.3	543.4	489.8
1,800	440	55	333.0	735.7	1,446.1	3,176.0	3,325.2	527.6	474.0
1,700	436	54	330.7	712.1	1,429.7	3,061.2	3,207.8	514.9	462.1
1,600	426	54	332.3	672.2	1,410.7	2,884.5	3,028.2	500.3	447.5
1,500	413	53	330.4	637.4	1,374.9	2,725.6	2,864.8	479.7	428.1
1,400	396	52	328.4	603.7	1,341.6	2,573.6	2,707.0	460.8	410.7
1,300	357	46	313.3	544.4	1,254.7	2,311.9	2,432.3	426.2	379.6
1,200	319	41	293.5	488.7	1,150.0	2,045.4	2,155.3	382.7	339.5
1,100	276	34	270.4	416.5	1,026.7	1,732.6	1,829.1	335.0	296.0
1,000	231	28	245.1	361.6	909.1	1,497.5	1,579.6	294.9	261.0
900	189	22	215.9	312.9	786.3	1,292.3	1,360.0	258.4	229.7
800	150	15	178.7	234.0	603.2	965.3	1,020.1	199.4	175.8
700	110	8	139.4	174.4	441.0	721.6	762.3	152.2	134.3
600	75.1	5	114.0	133.7	310.8	553.6	581.1	117.5	105.1

Heat Rejection Data Top

ENGINE SPEED	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
RPM	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN

2,100	440	11,565	2,354	15,095	7,924	2,456	3,326	18,653	48,036	51,171
2,000	440	11,102	2,261	14,970	7,789	2,411	3,165	18,653	47,159	50,236
1,900	440	10,880	2,226	14,639	7,676	2,374	2,967	18,653	46,427	49,456
1,800	440	10,626	2,145	14,428	7,660	2,340	2,778	18,653	45,758	48,744
1,700	436	10,388	2,106	14,121	7,645	2,298	2,633	18,482	44,937	47,869
1,600	426	10,231	2,065	13,892	7,517	2,300	2,534	18,084	44,058	46,933
1,500	413	9,964	2,047	13,467	7,413	2,275	2,366	17,516	42,709	45,496
1,400	396	9,154	1,874	13,469	7,283	2,136	2,223	16,776	40,919	43,589
1,300	357	8,102	1,652	12,625	6,721	1,966	1,849	15,127	36,921	39,330
1,200	319	7,214	1,472	11,988	6,260	1,830	1,507	13,535	33,693	35,892
1,100	276	6,268	1,260	10,930	5,568	1,638	1,134	11,715	29,568	31,498
1,000	231	5,199	1,045	9,781	4,868	1,447	831	9,781	25,155	26,797
900	189	4,402	885	8,317	4,059	1,283	487	8,019	20,764	22,119
800	150	3,742	752	6,750	3,017	1,110	215	6,369	16,808	17,905
700	110	2,935	598	4,953	2,037	876	40	4,663	12,465	13,279
600	75.1	2,065	422	3,304	1,219	611	-27	3,185	8,429	8,979

Emissions Data Top

Units Filter All Units

RATED SPEED NOMINAL DATA: 2100 RPM

TOTAL NOX (AS NO2)		G/HR	77	30	7	20	71
TOTAL CO		G/HR	2	1	1	1	1
TOTAL HC		G/HR	3	2	1	2	3
TOTAL CO2		KG/HR	228	175	125	80	52
PART MATTER		G/HR	0.5	0.4	0.4	0.3	0.3
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	77.7	40.3	13.3	55.9	329.5
TOTAL CO	(CORR 5% O2)	MG/NM3	2.0	1.1	1.0	1.7	2.7
TOTAL HC	(CORR 5% O2)	MG/NM3	3.0	2.5	1.7	4.3	13.3

PART MATTER	(CORR 5% O2)	MG/NM3	0.4	0.4	0.6	0.8	1.3
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	38	20	6	27	161
TOTAL CO	(CORR 5% O2)	PPM	2	1	1	1	2
TOTAL HC	(CORR 5% O2)	PPM	6	5	3	8	25
TOTAL NOX (AS NO2)		G/HP-HR	0.18	0.09	0.03	0.18	1.63
TOTAL CO		G/HP-HR	0.00	0.00	0.00	0.01	0.01
TOTAL HC		G/HP-HR	0.01	0.01	0.00	0.02	0.08
PART MATTER		G/HP-HR	0.00	0.00	0.00	0.00	0.01
TOTAL NOX (AS NO2)		LB/HR	0.17	0.07	0.02	0.04	0.16
TOTAL CO		LB/HR	0.00	0.00	0.00	0.00	0.00
TOTAL HC		LB/HR	0.01	0.00	0.00	0.00	0.01
TOTAL CO2		LB/HR	503	386	276	176	115
PART MATTER		LB/HR	0.00	0.00	0.00	0.00	0.00
OXYGEN IN EXH		%	7.8	8.9	10.8	14.6	16.6
ENGINE POWER		**BHP**	**440**	**330**	**220**	**110**	**44.0**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**

SECONDARY SPEED NOMINAL DATA: 1800 RPM

TOTAL NOX (AS NO2)		G/HR	52	26	5	10	52
TOTAL CO		G/HR	2	1	0	1	1
TOTAL HC		G/HR	3	2	1	1	2
TOTAL CO2		KG/HR	219	167	116	68	41
PART MATTER		G/HR	0.6	0.3	0.2	0.1	0.3

TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	55.1	35.9	10.0	37.9	297.5
TOTAL CO	(CORR 5% O2)	MG/NM3	1.6	0.9	0.9	2.7	3.1
TOTAL HC	(CORR 5% O2)	MG/NM3	2.8	1.9	1.5	4.4	10.8
PART MATTER	(CORR 5% O2)	MG/NM3	0.5	0.3	0.3	0.4	1.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	27	18	5	18	145
TOTAL CO	(CORR 5% O2)	PPM	1	1	1	2	2
TOTAL HC	(CORR 5% O2)	PPM	5	4	3	8	20
TOTAL NOX (AS NO2)		G/HP-HR	0.12	0.08	0.02	0.09	1.20
TOTAL CO		G/HP-HR	0.00	0.00	0.00	0.01	0.01
TOTAL HC		G/HP-HR	0.01	0.00	0.00	0.01	0.05
PART MATTER		G/HP-HR	0.00	0.00	0.00	0.00	0.01
TOTAL NOX (AS NO2)		LB/HR	0.12	0.06	0.01	0.02	0.12
TOTAL CO		LB/HR	0.00	0.00	0.00	0.00	0.00
TOTAL HC		LB/HR	0.01	0.00	0.00	0.00	0.00
TOTAL CO2		LB/HR	483	368	255	151	90
PART MATTER		LB/HR	0.00	0.00	0.00	0.00	0.00
OXYGEN IN EXH		%	6.5	7.6	9.0	12.5	16.5
ENGINE POWER		**BHP**	**440**	**330**	**220**	**110**	**44.0**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**

Regulatory Information Top

EPA TIER 4 FINAL	**2014 - ----**

EPA TIER 4 FINAL	2014 - ----

GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 1039 SUBPART F AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 4 FINAL	CO: 3.5 NOx: 0.4 HC: 0.19 PM: 0.02

EU STAGE IV	2014 - ----

GASEOUS EMISSION DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EU 2010/26/EU, ECE REGULATION NO. 96 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSION VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
EUROPE	EU	NON-ROAD	STAGE IV	CO: 3.5 NOx: 0.4 HC: 0.19 PM: 0.025

Engine Emissions Data

Serial Number (Engine)	**N3F02460**
Sales Model	C13

Regulatory Build Date	07/13/2017
Interlock Code Progression	No Interlock Code Progression
As Shipped Data	
Engine Arrangement Number	3857717
Certification Arrangement	3611820
Test Spec Number	3717452
Regulatory Status	EPA / ARB / EU / R120 / MLIT / S. Korea
Labeled Model Year	2017
EPA Family Code	HCPXL12.5HTF
EPA Emissions Level	EPA TIER 4f
EU Emissions Level	EU STAGE IV
Japan Emissions Level	STEP 4 FINAL
EU Type Approval	e11*97/68QA*2012/46*2580*04
Korea Type Approval	C13(CE13C8)//15EN*CA*02
UN R120 Type Approval	120R-011014

Flash File	5175557
Flash File Progression	5175557
CORR FL Power at RPM	443 HP (330.0 KW)2100 RPM
Advertised Power	440 HP 2,100RPM
Total Displacement	12.5

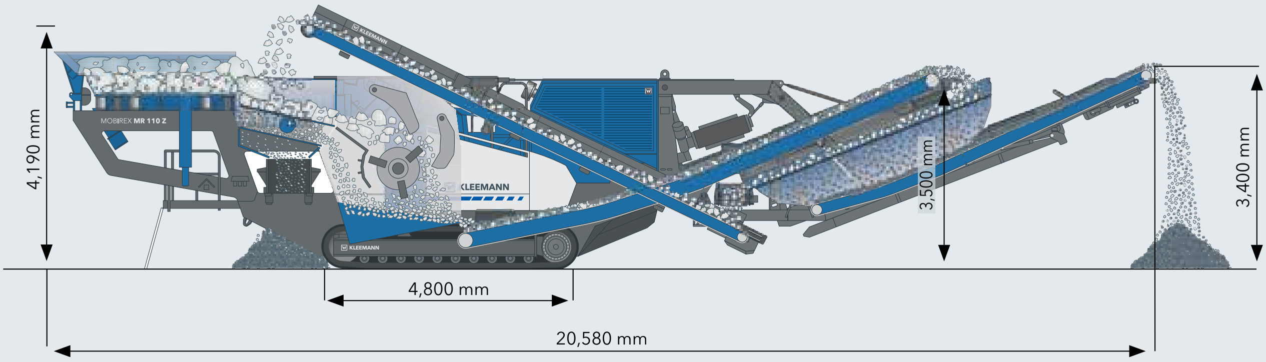
Kleemann Crusher

A WIRTGEN GROUP COMPANY

KLEEMANN

TECHNICAL INFORMATION I TRACK-MOUNTED IMPACT CRUSHERS

MOBIREX MR 110 Z/110 Zi EVO2



TECHNICAL HIGHLIGHTS

- Optimised material flow as a result of extending system widths
- Hydraulic gap setting
- Efficient and powerful diesel-direct drive
- High-performance secondary screening unit with oversize grain returning (option)

TECHNICAL INFORMATION MR 110 Z/110 Zi EVO2

Feeding unit	
Feed capacity up to approx. (t/h) [1]	350
Feed size max. (mm)	900 x 880
Feed height (with extension) (mm)	4,190 (4,547)
Hopper volume (with extension) (m³)	3.2 (6.2)
Width x Length (with extension) (mm)	2,100 x 3,700 (2,800 x 3,750)
Vibrating feeder	
Width x Length (mm)	900 x 2,600
Prescreening	
Type	double-deck heavy-piece screen
Width x Length (mm)	1,010 x 2,100
Side discharge conveyor (optional) [5]	
Width x Length (extended) (mm)	650 x 4,000 (6,000)
Discharge height approx. (extended) (mm)	2,900 (3,650)
Crusher	
Impact crusher type	SHB 110-080
Crusher inlet width x height (mm)	1,100 x 800
Crusher weight approx. (kg)	13,000
Rotor diameter (mm)	1,100
Crusher drive type / approx. (kW)	direct, 260
Adjustment of impact toggles	infinitely variable, fully hydraulic
Crushing capacity with demolished concrete up to approx. (t/h)	240 [2]
Crushing capacity with rubble up to approx. (t/h)	240 [2]
Crushing capacity with broken asphalt up to approx. (t/h)	205 [3]
Crushing capacity with limestone up to approx. (t/h)	265 [2]
Vibrating extractor	
Width x Length (mm)	1,200 x 2,400

Crusher discharge conveyor	
Width x Length (extended) (mm)	1,200 x 9,300 (11,000)
Discharge height approx. (extended) (mm)	3,500 (4,100)
Power supply unit	
Drive concept	diesel-direct
MR 110 Z EVO2: Scania (Tier 3 / Stage IIIA LRC) (kW)	371 (1,800 rpm)
Scania (LRC) (kW)	371 (1,800 rpm)
MR 110 Zi EVO2: Scania (Tier 4i / Stage IIIB) (kW)	331 (1,800 rpm)
Generator (kVA)	135
Secondary screening unit (optional)	
Type	single-deck lightweight screen
Width x Length (mm)	1,350 x 4,550
Return conveyor (mm)	500 x 9,100
Discharge height of fine grain discharge conveyor approx. (mm)	3,400
Transport [4]	
Transport height approx. (mm)	3,600
Transport length without (with) screening unit approx. (mm)	17,400 (21,100)
Transport width without (with) screening unit max. (mm)	3,000
Transport weight without (with) screening unit approx. (kg)	43,900 (52,000)
Transport weight of screening unit approx. (kg) [5]	5,500

[1] dependent on the type and composition of the feed material, the feed size, the prescreening, as well as the desired final grain size
[2] for final grain size 0 - 45 mm with approx. 10 - 15% oversize grain
[3] for final grain size 0 - 32 mm with approx. 10 - 15% oversize grain
[4] no options
[5] Side discharge conveyor and return conveyor remain attached to plant for transportation

Standard features: Hydraulically foldable feed hopper, can be operated from the ground / Frequency-controlled vibrating feeder / Frequency-controlled prescreen / Radio remote control / Control with touch panel / Lockable control cabinet, protected against dust and vibrations / Automatic gap setting / Integrated overload protection / Lock & Turn / Swivel arm for changing blow bars / Eye hooks / Spray system for dust reduction / Standard climate package / Lighting

Options: Hopper extension / Side discharge conveyor, can be mounted on left or right / Extension for side discharge conveyor / Electromagnetic separator, permanent magnet or magnet preparation / Extension for crusher discharge conveyor (hydraulically foldable) / Secondary screening unit, in comfortable container dimension, suitable for hook and lift / Belt scale / Belt cover for side discharge conveyor (aluminium, tarpaulin) / Socket 110 V / Track pads for the crawler chassis to protect subsurface / Climate packages: Hot or cold package

California Environmental Protection Agency **Air Resources Board**	SCANIA CV AB	**EXECUTIVE ORDER U-R-024-0029** New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-14-012;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engine and emission control system produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2017	HY9XL09.3DAA	9.3	Diesel	8000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Electronic Direct Injection, Turbocharger, Charge Air Cooler, Exhaust Gas Recirculation, Engine Control Module, Diesel Oxidation Catalyst, Smoke Puff Limiter, Selective Catalytic Reduction-Urea, Ammonia Oxidation Catalyst	Crane, Loader, Tractor, Pump, Dozer, Compressor, Generator

The engine models and codes are attached.

The following are the exhaust certification standards (STD) and certification levels (CERT) for non-methane hydrocarbon (NMHC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kw-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kw-hr)					OPACITY (%)		
			NMHC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
130 ≤ KW ≤ 560	Tier 4 Final	STD	0.19	0.40	N/A	3.5	0.02	N/A	N/A	N/A
		CERT	0.02	0.39	--	0.2	0.02	--	--	--

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 10 day of February 2017.

Annette Hebert, Chief
Emissions Compliance, Automotive Regulations and Science Division

ATTACHMENT 1 OF 1

Engine ModelsEZ

U-R-024-0029
1/26/2017

Engine Family	1.Engine Code	2.Engine Model	3.Dis-placement	4.Power kW @RPM	5.Fuel Rate: mm/stroke @ peak HP	6.Fuel Rate: (lbs/hr) @ peak HP	7.Torque Nm @ RPM	8.Fuel Rate: mm/stroke@ peak torque	9.Fuel Rate: (lbs/hr)@ peak torque	10.Emission Control Device
HY9XL09.3DAA	DC09 084A	2133492	9.3	202 @2100	162	95	1552 @ 1200	266	90	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 085A	2133493	9.3	232 @2100	185	109	1711 @ 1200	294	99	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 085A	2133494	9.3	243 @2100	193	114	1751 @ 1200	285	96	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 085A	2133495	9.3	257 @2100	205	121	1800 @ 1300	297	108	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 085A	2488302	9.3	232 @1800	176	104	1830 @ 1200	259	87	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 086A	2133496	9.3	276 @2100	219	129	1873 @ 1300	308	112	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 086A	2133497	9.3	294 @2100	233	138	1876 @ 1400	312	123	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 087A	2245949	9.3	202 @1800	178	90	1275 @ 1200	216	73	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 089A	2245951	9.3	202 @1800	178	90	1275 @ 1200	216	73	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 089A	2245952	9.3	237 @1800	209	105	1321 @ 1350	219	83	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL09.3DAA	DC09 092A	2265830	9.3	202 @1800	178	90	1275 @ 1200	216	73	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX

California Environmental Protection Agency **Air Resources Board**	SCANIA CV AB	**EXECUTIVE ORDER U-R-024-0030** New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-14-012;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engine and emission control system produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2017	HY9XL12.7DAA	12.7	Diesel	8000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Electronic Direct Injection, Turbocharger, Charge Air Cooler, Exhaust Gas Recirculation, Engine Control Module, Diesel Oxidation Catalyst (Except Engine Code DC13085A), Smoke Puff Limiter, Selective Catalytic Reduction-Urea, Ammonia Oxidation Catalyst	Crane, Loader, Tractor, Dozer, Pump, Compressor, Generator

The engine models and codes are attached.

The following are the exhaust certification standards (STD) and certification levels (CERT) for non-methane hydrocarbon (NMHC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kw-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kw-hr)					OPACITY (%)		
			NMHC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
$130 \leq KW \leq 560$	Tier 4 Final	STD	0.19	0.40	N/A	3.5	0.02	N/A	N/A	N/A
		CERT	0.08	0.19	--	0.2	0.02	--	--	--

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 10 day of February 2017.

Annette Hebert, Chief
Emissions Compliance, Automotive Regulations and Science Division

ATTACHMENT 1 OF 1 **Engine ModelsEZ** U-R-024-0030

1/26/2017

Engine Family	1.Engine Code	2.Engine Model	3.Dis-placement	4.Power kW @RPM	5.Fuel Rate: mm/stroke @ peak HP	6.Fuel Rate: (lbs/hr) @ peak HP	7.Torque Nm @ RPM	8.Fuel Rate: mm/stroke@ peak torque	9.Fuel Rate: (lbs/hr)@ peak torque	10.Emission Control Device
HY9XL12.7DAA	DC13 084A	2133500	12.7	294 @ 2100	198	140	2157 @ 1200	290	117	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL12.7DAA	DC13 084A	2133501	12.7	331 @ 2100	222	157	2255 @ 1300	307	134	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL12.7DAA	DC13 085A	2133502	12.7	368 @ 2100	245	173	2373 @ 1300	325	142	DDI, ECM, TC, CAC, EGR, SPL, SCR, AMOX
HY9XL12.7DAA	DC13 085A	2133503	12.7	405 @ 1900	344	220	2373 @ 1300	394	172	DDI, ECM, TC, CAC, EGR, SPL, SCR, AMOX
HY9XL12.7DAA	DC13 087A	2245984	12.7	257 @ 1800	193	117	1600 @ 1300	215	94	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL12.7DAA	DC13 087A	2258254	12.7	257 @ 2100	175	123	1720 @ 1300	232	102	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL12.7DAA	DC13 087A	2245985	12.7	283 @ 1800	211	128	1765 @ 1300	238	104	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL12.7DAA	DC13 089A	2245986	12.7	257 @ 1800	193	117	1600 @ 1300	215	94	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX
HY9XL12.7DAA	DC13 089A	2245987	12.7	283 @ 1800	211	128	1765 @ 1300	238	104	DDI, ECM, TC, CAC, EGR, SPL, DOC, SCR, AMOX

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification	
User Identification:	AAI Broadway HMA
City:	Albuquerque
State:	New Mexico
Company:	AAI
Type of Tank:	Horizontal Tank
Description:	Asphalt Cement Storage Tank
Tank Dimensions	
Shell Length (ft):	52.00
Diameter (ft):	10.00
Volume (gallons):	30,000.00
Turnovers:	195.23
Net Throughput(gal/yr):	5,856,900.00
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Red/Primer
Shell Condition	Good
Breather Vent Settings	
Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

AAI Broadway HMA - Horizontal Tank
Albuquerque, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Asphalt Cement	All	350.00	350.00	350.00	350.00	0.0347	0.0347	0.0347	105.0000			1,000.00	Option 3: A=75350.06, B=9.00346

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

AAI Broadway HMA - Horizontal Tank
Albuquerque, New Mexico

Annual Emission Calcaulations	
Standing Losses (lb):	0.0000
Vapor Space Volume (cu ft):	2,601.3188
Vapor Density (lb/cu ft):	0.0004
Vapor Space Expansion Factor:	0.0000
Vented Vapor Saturation Factor:	0.9909
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	2,601.3188
Tank Diameter (ft):	10.0000
Effective Diameter (ft):	25.7375
Vapor Space Outage (ft):	5.0000
Tank Shell Length (ft):	52.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0004
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0347
Daily Avg. Liquid Surface Temp. (deg. R):	809.6700
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	809.6700
Tank Paint Solar Absorptance (Shell):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0347
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0347
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0347
Daily Avg. Liquid Surface Temp. (deg R):	809.6700
Daily Min. Liquid Surface Temp. (deg R):	809.6700
Daily Max. Liquid Surface Temp. (deg R):	809.6700
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9909
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0347
Vapor Space Outage (ft):	5.0000
Working Losses (lb):	162.8765
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0347
Annual Net Throughput (gal/yr.):	5,856,900.0000
Annual Turnovers:	195.2300
Turnover Factor:	0.3203
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	162.8765

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

AAI Broadway HMA - Horizontal Tank
Albuquerque, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Asphalt Cement	162.88	0.00	162.88

Attachment D
USGS Topographic Maps

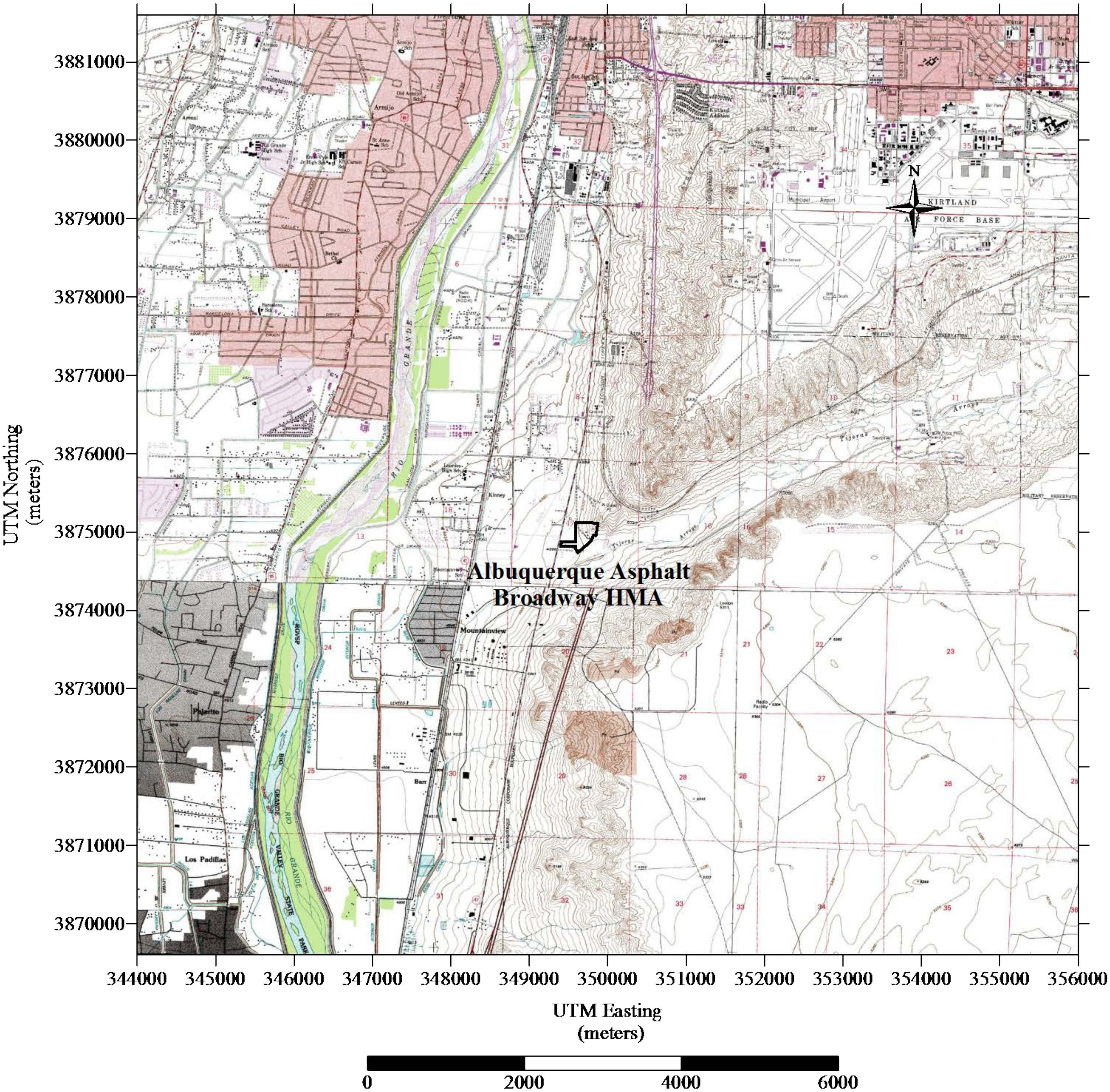


Figure D-1: 7 ½ Minute Topo Map Showing Site Location
Albuquerque West 7 ½ Minute Quadrant
NAD 83

Attachment E
Facility Process Description

Facility Process Description

The AAI Broadway HMA Plant produces hot mix asphalt concrete. The operation is typical of a continuous drum mix HMA operation. Aggregate in loaded into the Cold Aggregate Feed Bins (Unit 2), where it is metered onto the Feed Bin Conveyor (Unit 3). From the Feed Bin Conveyor the aggregate is sent to the Scalping Screen and Scalping Screen Conveyor (Units 4 and 5) and Pug Mill (Unit 6). The Mineral Filler Silo and Augur (Unit 14) meters mineral filler into the Pug Mill. The Pug Mill mixes the aggregate and mineral filler together and empties onto the Pug Mill Conveyor (Unit 7). The Pug Mill Conveyor transfers the material onto the Slinger Conveyor (Unit 8) and sends the aggregate/mineral filler to the Drum Dryer/Mixer (Unit 15). RAP is loaded into the RAP Bins (Unit 9), where it is metered onto the RAP Bin Conveyor (Unit 10) and then transferred to the RAP Screen (Unit 11). The RAP Transfer Conveyors (Units 12 and 13) transports RAP to the Drum Dryer/Mixer. There the material is dried and asphalt concrete is added to make asphalt concrete. From the Drum Dryer/Mixer the asphalt concrete is sent by the Asphalt Incline Conveyor (Unit 16) to the Asphalt Silos (Unit 17).

Control Units include a Drum Dryer/Mixer Dust Collector that captures particulates generated at the Drum Dryer/Mixer and Mineral Filler Silo Dust Collector that captures particulates generated during loading of the Mineral Filler Silo. Controlled particulates exhaust the Drum Dryer/Mixer Dust Collector Stack (Stack 1) and Mineral Filler Silo Dust Collector Stack (Stack 2).

Fugitive dust is controlled when material exits the Cold Aggregate or RAP Feed Bins to the Cold Aggregate or RAP Feed Bin Collection Conveyors with enclosures to reduce the chance that wind will blow any generated fugitive dust away and/or water sprays, as needed, at the exit of the feed bins.

Fugitive dust is controlled when material enters and exits the Scalping Screen (Unit 4), Pug Mill (Unit 6), and RAP Screen (Unit 11) with the addition of water on the material at the Scalping Screen, Pug Mill, and RAP Screen.

Baghouse fines that are captured in the Drum Dryer/Mixer Dust Collector are recycled back to the Drum Dryer using an enclosed loop.

Baghouse fines that are captured in the Mineral Filler Silo Dust Collector are recycled back to the Mineral Filler Silo.

The AAI Broadway RAP/Concrete Plant processes RAP/Concrete material. The operation is typical of a crusher plant operation. RAP/Concrete in loaded into the RAP/Concrete Feed Bin

(Unit 25), where it is resized in the primary crusher (Unit 26). From the primary crusher, material is transferred to conveyor (Unit 27) then a conveyor (Unit 28) then conveyor material is screened in the RAP/Concrete Screen (Unit 30). Oversized material from the screen is send back to the RAP/Concrete crusher (Unit 31) for further sizing by conveyors (Units 32, 33, 29). RAP/Concrete product is conveyed to the RAP/Concrete storage pile by way of transfer and stacker conveyors (Units 35, 36, and 37).

Fugitive dust is controlled when material exits the RAP/Concrete Plant Feed Bins with enclosures to reduce the chance that wind will blow any generated fugitive dust away and/or water sprays, as needed, at the exit of the feed bins.

Fugitive dust is controlled when material exits the RAP/Concrete Primary Crusher (Unit 26) and RAP/Concrete Secondary Crusher (Unit 31). If needed, water sprays will be used to prevent excess visible emissions by the addition of water on the material at the RAP/Concrete Plant Screen.

There are no pollution controls for the Aggregate or RAP/Concrete Storage Piles (Unit 1, 24), Aggregate or RAP/Concrete Feed Bin (Units 2, 9, 25), Incline Belt (Unit 16), Asphalt Silo (Units 17), RAP/Concrete Plant Generator (Unit 38), Asphalt Heater (Unit 20), or Hot Oil Asphalt Storage Tanks (Unit 21).

All truck traffic travels to the HMA Plant on the main access road. The road in and out of the site is paved to limit fugitive emissions from truck traffic. Paved roads will be periodically swept to reduce the buildup of silt on the road surface. Around the HMA plant, roads will be unpaved and controlled with surfactants/millings or equivalent plus routine watering to limit fugitive emissions from truck traffic. Aggregate/RAP/Concrete material is delivered by trucks and stored in on-site stockpiles.

Annual emissions are controlled by permit limits on annual production for processing equipment and hours of operation for the RAP/Concrete plant generator and asphalt heater. Commercial line power will provide electricity to power the HMA plant.

Process flow diagrams are presented in Attachment A.

Attachment F

Dispersion Modeling Summary

DISPERSION MODEL REPORT
FOR ALBUQUERQUE ASPHALT, INC.
BROADWAY HMA PLANT
SIGNIFICANT PERMIT MODIFICATION
PERMIT 3291-1AR-R1

Albuquerque, New Mexico

PREPARED FOR
ALBUQUERQUE ASPHALT, INC.

November 27, 2017

Prepared by

Class One Technical Services, Inc.

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1.0 INTRODUCTION

This dispersion modeling analysis will be conducted by Class One Technical Services, Inc. (CTS) on behalf of Albuquerque Asphalt, Inc. (AAI), to evaluate ambient air quality impacts for the significant permit modification of their 400 tph hot mix asphalt (HMA) plant and 200 tph recycled asphalt and concrete plant (RAP/Concrete) operating under Permit #3291-1AR-R1 located at 5028 Broadway Blvd SE. With this permit modification, the crusher plant will be permitted to process both concrete and RAP. The crusher plant will be one of four optional crusher plants or one of four crusher plant engines/generators. The crusher plant will decrease the plant's hourly process capacity from 300 TPH to 200 TPH and increase the annual throughput from 315,000 tpy to 748,800 tpy. Additionally, AAI will model for the option of relocating their KMA plant operating under Permit #1955 to this site. For the modeling analysis, the worst-case scenario and engine for the crusher plant will be used in the analysis. The objective of this evaluation is to determine whether ambient air concentrations from the maximum operation of the revised facility for nitrogen dioxide, (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter; total suspended particles (TSP), and both 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$); are below Class II federal and state ambient air quality standards (NAAQS and NMAAQS) found in 40 CFR part 50 and the City of Albuquerque Environmental Health Department (AEHD) air quality regulation 20.11.8 NMAC.

The dispersion modeling will be conducted using the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD), Version 16216r. This model is recommended by EPA for determining Class II impacts within 50 km of the source being assessed. Additionally, AERMOD was developed to handle complex terrain. In this analysis, AERMOD will be used to estimate pollutant ambient air concentrations of NO_2, CO, SO_2, TSP, PM_{10}, and $PM_{2.5}$ from the AAI HMA and crushing plant emission sources. CTS employs the general modeling procedures outlined in "Permit Modeling Guidelines, Albuquerque Environmental Health Department", revised 02/03/2016, "New Mexico Air Pollution Control Bureau, Dispersion Modeling Guidelines", revised 08/08/2017, and the most up to date EPA's *Guideline on Air Quality Models*.

Additional sources at the site will be included in the air quality impact analysis dispersion models. Co-located on the site will be Albuquerque Asphalt's KMA plant permitted under Permit #1955 and AAI's Complete Concrete and Excavation Permit #1838-4AR.

Figure 1 below shows the location of the site and proposed equipment layout. Figure 2 shows the equipment process flow for the HMA plant and Figure 3 shows the equipment process flow for the Crusher (RAP/Concrete) plant.

HMA and RAP/Concrete Crusher Plant material handling equipment, stockpiles, and haul roads will be input into the model as volume sources. Exhaust stack sources will be input into the model as point sources. Model input parameters for feeders, screens, crushers, pug mill, and transfer points will follow the NMED model guidelines Table 23. Model input parameters for haul roads will follow the NMED model guidelines Tables 24 and 25.

July 5, 2017 a permit for Black Rock Services RAP plant was issued. Since it has not been constructed, it will be included in all cumulative impact analysis (CIA) dispersion models. In their permit dispersion modeling analysis they had two modeling scenarios, morning and afternoon operating hours. Of the two, the morning scenario resulted in the highest concentrations and will be used in all CIA modeling analysis.

Recently, Black Rock Services submitted a permit modification application for its HMA plant operating under Permit #1694-M2-RV4 to the AHED air quality program (AQP). It too will be included in all CIA dispersion models, since the modified facility is not presently included in the monitored background under this operating scenario. Permit modification dispersion modeling for its application included 12 modeling scenarios to determine the worst-case modeling hours over a 24 hour period with limitations on daily throughput. Preliminary modeling shows that impacts from Black Rock Services HMA on AAI site is highest with scenario 12 operating hours from 10 PM to 11 AM. This hourly scenario will be used for Black Rock Services HMA sources in all 24 hour and annual CIA dispersion modeling analysis.

Additional restrictions beyond what the permit allows in facility operation and equipment will be requested for this permit modification. These limits will be included in the dispersion modeling analysis. The following is a list of these restrictions and discussion on revised modeling:

1. The HMA plant will reduce daily throughput to the following;

Month	Tons Per Day
January	2800
February	2800
March	2800
April	3600
May	3600
June	4000
July	4000
August	4000
September	3600
October	3600
November	2400
December	2400

2. The HMA plant equipment has now been purchased and the HMA baghouse and Asphalt Heater exhaust stack specifications have been obtained from the manufacturer. The following are the manufacturers' specification for the baghouse exhaust parameters;

Parameter	Baghouse	Asphalt Heater
Stack Height	30 feet	14 feet
Stack Exit Diameter	4.235 feet	1 feet
Stack Exhaust Temperature	200° F	600° F
Stack Exhaust Flowrate	69,685 ACFM	976 ACFM
Stack Exhaust Velocity	82.45 ft/sec	20.7 ft/sec

3. There are 4 possible engines that will be used for the crusher plant. The worst-case emission rates were used in the modeling analysis. The model parameters follow the engine with the highest emission rates.

Parameter	Permitted #3292 Lb/Hr	Terex Plant Engine Lb/Hr	KPI Plant Engine Lb/Hr	Lippman Engine Lb/Hr
Horsepower	817	300	440	415
NOx	13.71	3.95	0.17	3.17
CO	0.49	0.71	0.00	2.20
SO2	0.28	0.11	0.16	0.14
PM	0.85	0.13	0.00	0.18

Emission rates highlighted in yellow are worst-case engine emission rates that will be used in modeling

Parameter	Permitted #3292	Terex Plant Engine	KPI Plant Engine	Lippman Engine
Horsepower	817	300	440	415
Stack Height	15 feet	15 feet	15 feet	15 feet
Stack Exit Diameter	0.667 feet	0.333 feet	0.5 feet	0.5 feet
Stack Exhaust Temperature	892° F	815° F	851.5° F	894.7° F
Stack Exhaust Flowrate	4626 ACFM	1835.3 ACFM	1524.6 ACFM	2520.1 ACFM
Stack Exhaust Velocity	220.9 ft/sec	350.6 ft/sec	129.4 ft/sec	213.9 ft/sec

Parameters highlighted in yellow will be used in modeling. Along with emission rates (except for CO) the presently permitted emission rates is the worst-case model scenario for this application.

4. Based on modeling submitted for relocation of Mountain States Permit #3291 to the location at 5028 Broadway Blvd SE, NOx and SO_2 model inputs, site location, and emission rates are unchanged. Since they are unchanged and previously accepted, no additional modeling will be submitted with this permit modification. The dispersion modeling that is included in the permit modification application will include carbon monoxide (CO), and particulate matter; total suspended particles (TSP), and both 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$). Below is a comparison table showing no change from Permit #3291 relocation modeling and model input for this permit modification for NO_2 and SO_2.

	Permit #3291 Relocation Model			Permit #3291 Modification Application		
Parameter	**HMA Stack**	**HMA Asphalt Heater**	**Crusher Engine**	**HMA Stack**	**HMA Asphalt Heater**	**Crusher Engine**
Stack Height (meters)	9.144	4.2672	4.572	9.144	4.2672	4.572
Stack Exit Diameter (meters)	1.2908	0.3048	0.2032	1.2908	0.3048	0.2032
Stack Exhaust Temperature (K)	366.48	588.71	750.928	366.48	588.71	750.928
Stack Exhaust Velocity (m/s)	25.1308	6.3128	67.316	25.1308	6.3128	67.316
NOx (lbs/hr)	22.00000	0.39063	13.71000	22.00000	0.39063	13.71000
SO_2 (lbs/hr)	23.20000	0.13867	0.28000	23.20000	0.13867	0.28000

5. The HMA plant annual hourly factor for annual particulate modeling is changed from 0.684 to 0.747 to account for the decrease on daily throughputs. With the daily limits discussed above, the maximum annual production is 1,205,600 tons per year. The annual permit limit is 900,000 tons per year. The annual modeled hourly factor is then 900,000/1,205,600 = 0.747.
6. The maximum hourly throughput for the crusher plant will be permitted for 200 tph.
7. The RAP/Concrete Crusher Plant annual throughput will be increased from 315,000 tons per year to 748,800 tons per year. With the present and requested generator limits on annual operating hours of 3744 and hourly throughput limits of 200 tons per hour, the maximum annual production is 748,800 tons per year. Because of the increase in truck traffic due to the increase in annual throughput, RAP/Concrete Crusher Plant traffic has been separated in the model from the HMA Plant traffic.
8. The HMA plant will operate on line power, so no HMA plant generators are included for the modification of Permit #3291.
9. The co-located Albuquerque Asphalt's KMA plant permitted under Permit #1955 will limit winter (December, January, February) hours of operation to 8 AM to 5 PM daily; and October, November, and March hours of operation to 3 AM to 9 PM daily
10. The co-located Complete Concrete and Excavation permitted under Permit #1838-4AV will limit annual production to 265,000 cubic yards per year. Presently, Permit #1838-4AV limits production to 100 cubic yards per hour, 1000 cubic yards per day, and 365 days per year or 365,000 cubic yards per year. Operating hours are limited to 14 hours per day from 3 AM to 5 PM, 7 days per week and 52 weeks per year. Because of the limit on hourly and daily production this limits operating at maximum (100 cubic yards per hour) to 10 hours per day. The short-term particulate model hours are then limited to 10 hours per day from 3 AM to 1 PM with an hourly factor of 1, since the worst-case model concentrations are traditionally produced in early morning and evening hours. For annual particulate models, the modeled hourly factor used as input to the model is reduced to a factor of 0.726 based on the ratio of 265,000 cubic yards/365,000 cubic yards.

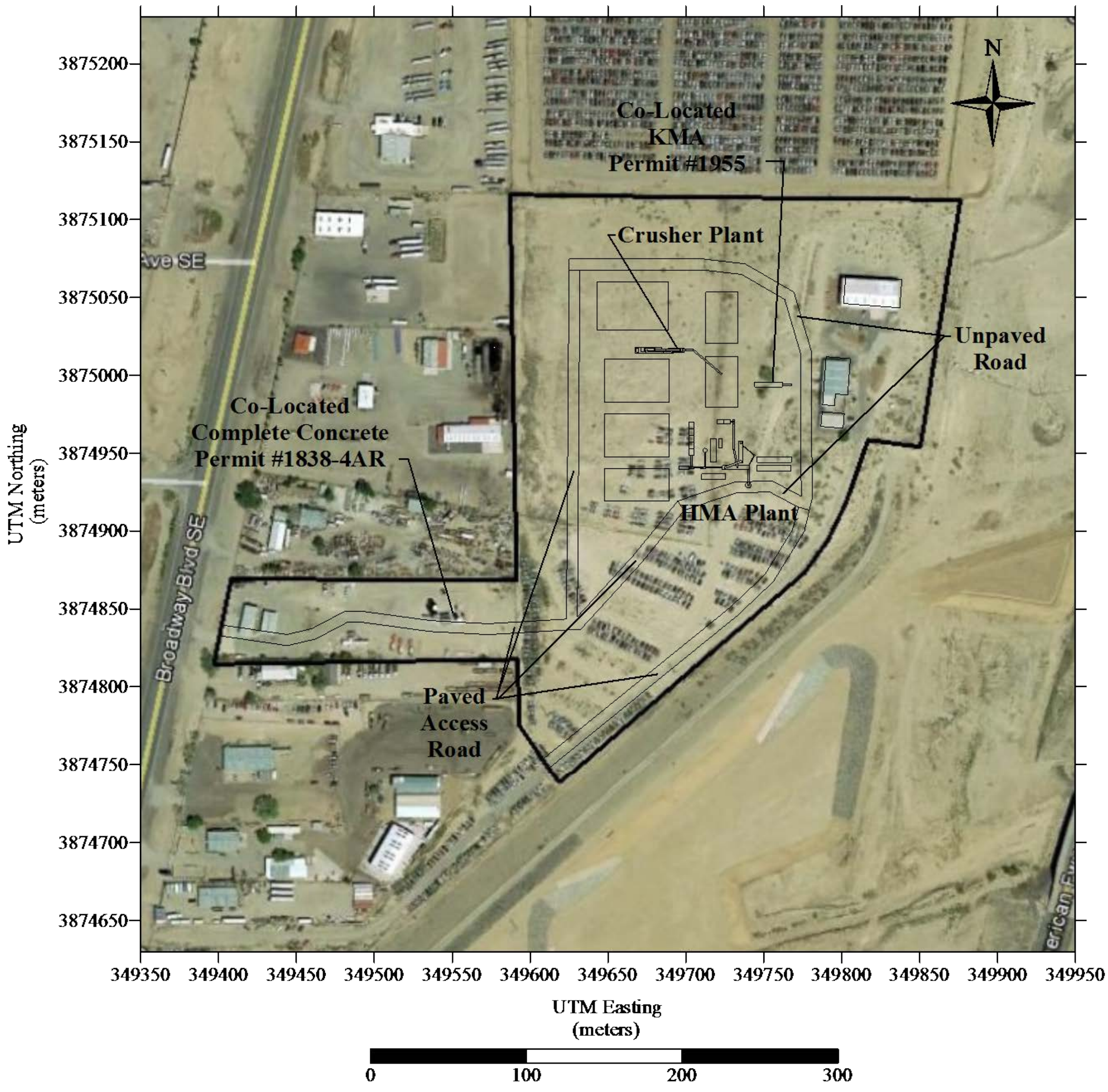

FIGURE 1: Albuquerque Asphalt, Inc's 400 TPH HMA Layout Plan

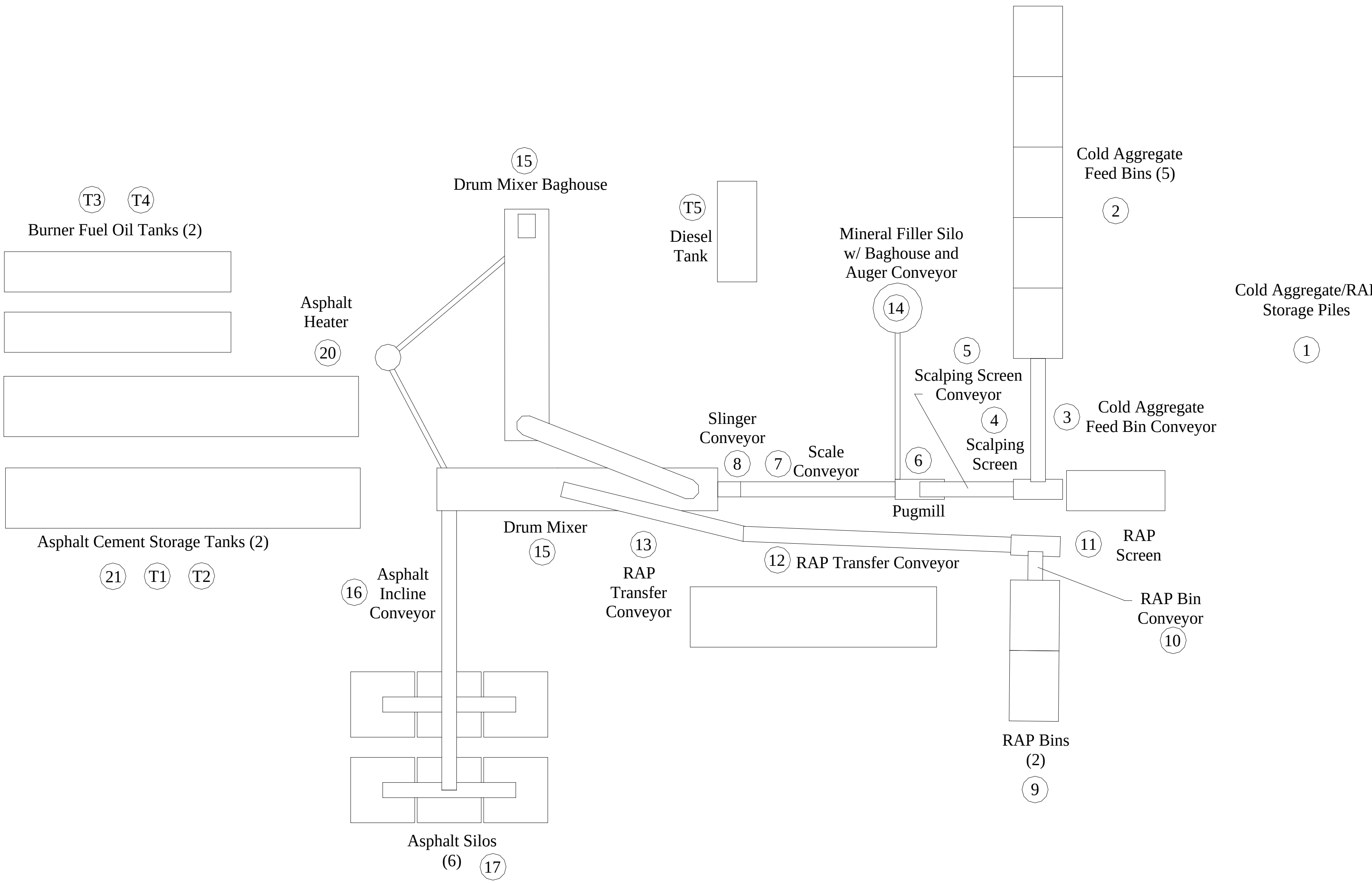

FIGURE 2: Albuquerque Asphalt, Inc's 400 TPH HMA Layout Plan

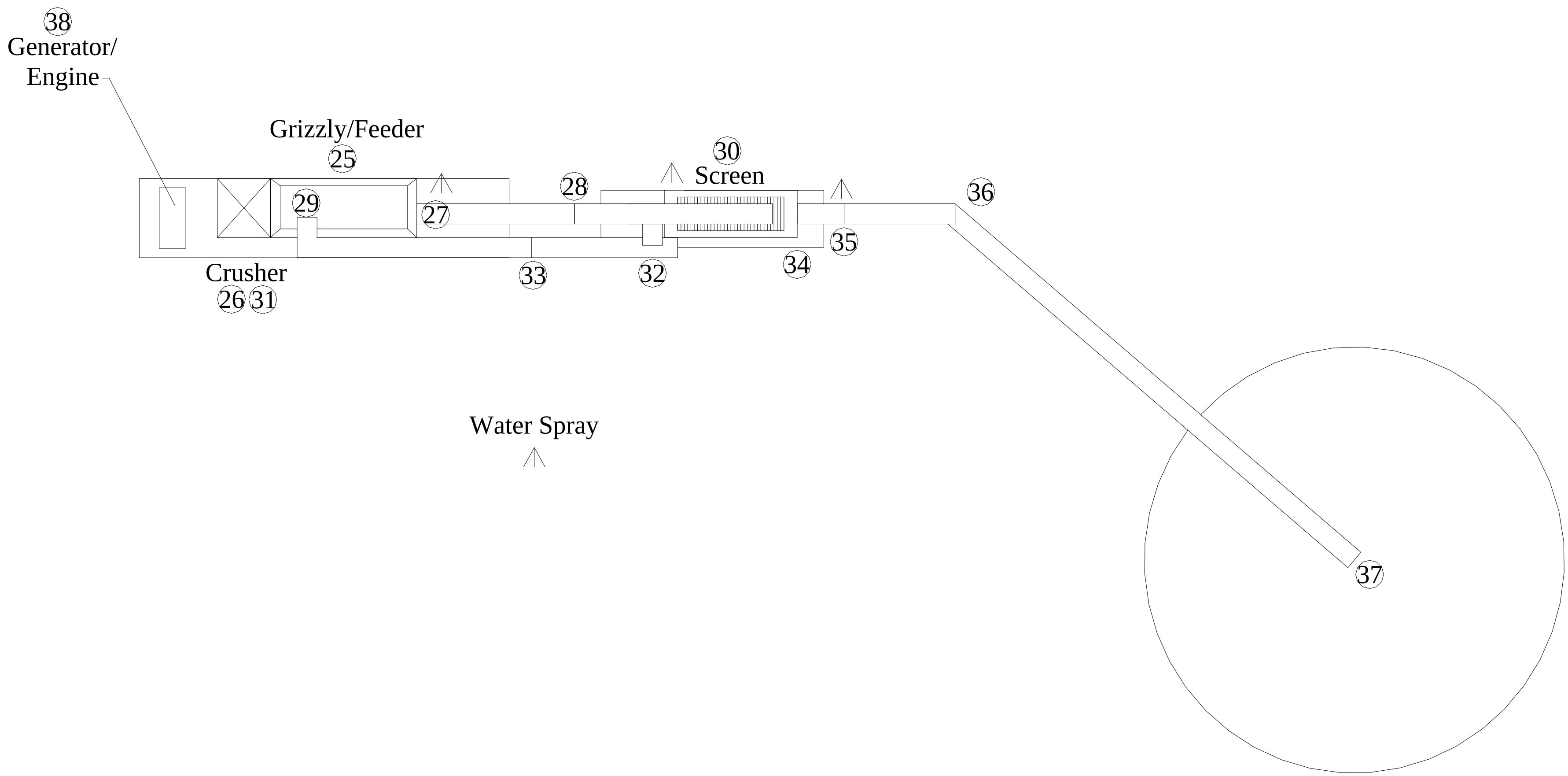

FIGURE 3: Albuquerque Asphalt, Inc's 200 TPH RAP/Concrete Crusher Plant Layout Plan

2.0 DISPERSION MODELING PROTOCOL

This section identifies the technical approach and dispersion model inputs that will be used for the Class II federal and State ambient air quality standards for this source. AEHD AQP requires that all applicable criteria pollutant emissions be modeled using the most recent versions of US EPA's approved models and be compared with National Ambient Air Quality Standards (NAAQS), and New Mexico Ambient Air Quality Standards (NMAAQS). Table 1 shows the NAAQS and NMAAQS that the source's ambient impacts must meet in order to demonstrate compliance. Table 1 also lists the Class II Significant Impact Levels (SILs) which are used to assess whether a source has a significant impact at downwind receptors.

The dispersion modeling analysis will be performed to estimate concentrations resulting from the operation of the AAI HMA and RAP/Concrete Crusher Plants using the maximum hourly emission rates while all emission sources are operating. The modeling will determine maximum off site concentrations for carbon monoxide (CO) and particulate matter; total suspended particles (TSP), and both 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$), for comparison with modeling significance levels, national/New Mexico ambient air quality standards (AAQS). The modeling will follow the guidance and protocols outlined in the "Permit Modeling Guidelines, Albuquerque Environmental Health Department", revised 02/03/2016, "New Mexico Air Pollution Control Bureau, Dispersion Modeling Guidelines", revised 08/08/2017, and the most up to date EPA's *Guideline on Air Quality Models*.

Initial modeling will be performed with AAI HMA Plant and RAP/Concrete Crusher Plant sources only to determine pollutant and averaging periods that exceeds pollutant SILs. If initial modeling for any pollutant and averaging period exceeds SILs, than cumulative modeling will be performed for those pollutants and averaging periods that exceeds the SILs will include co-located sources and significant neighboring sources along with background ambient concentrations.

TABLE 1: National and New Mexico Ambient Air Quality Standard Summary

Pollutant	Avg. Period	Sig. Lev. (μg/m^3)	Class I Sig. Lev. (μg/m^3)	NAAQS	NMAAQS	PSD Increment Class I	PSD Increment Class II
CO	8-hour	500		9,000 ppb$^{(1)}$	8,700 ppb$^{(2)}$		
	1-hour	2,000		35,000 ppb$^{(1)}$	13,100 ppb$^{(2)}$		
NO_2	annual	1.0	0.1	53 ppb$^{(3)}$	50 ppb$^{(2)}$	2.5 μg/m^3	25 μg/m^3
	24-hour	5.0			100 ppb$^{(2)}$		
	1-hour	7.54		100 ppb$^{(4)}$			
$PM_{2.5}$	annual	0.3	0.06	12 μg/m$^{3(5)}$		1 μg/m^3	4 μg/m^3
	24-hour	1.2	0.07	35 μg/m$^{3(6)}$		2 μg/m^3	9 μg/m^3
PM_{10}	annual	1.0	0.2			4 μg/m^3	17 μg/m^3
	24-hour	5.0	0.3	150 μg/m$^{3(7)}$		8 μg/m^3	30 μg/m^3
TSP	7-day				110 μg/m^3		
	30-day				90 μg/m^3		
	annual	1.0			60μg/m^3		
	24-hour	5.0			150μg/m^3		
SO_2	annual	1.0	0.1		20 ppb$^{(2)}$	2 μg/m^3	20 μg/m^3
	24-hour	5.0	0.2		100 ppb$^{(2)}$	5 μg/m^3	91 μg/m^3
	3-hour	25.0	1.0	500 ppb$^{(1)}$		25 μg/m^3	512 μg/m^3
	1-hour	7.8		75 ppb$^{(8)}$			

Standards converted from ppb to μg/m^3 use a reference temperature of 25° C and a reference pressure of 760 millimeters of mercury.
(1) Not to be exceeded more than once each year.
(2) Not to be exceeded.
(3) Annual mean.
(4) 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
(5) Annual mean, averaged over 3 years.
(6) 98th percentile, averaged over 3 years.
(7) Not to be exceeded more than once per year on average over 3 years.
(8) 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

TABLE 2: Standards for Which Modeling Is Not Required by NMED AQB.

Standard not Modeled	Surrogate that Demonstrates Compliance
SO_2 3-hour NAAQS	SO_2 1-hour NAAQS
TSP 7-day NMAAQS	TSP 24-hour NMAAQS

2.1 DISPERSION MODEL SELECTION

The dispersion modeling will be conducted using the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD), Version 16216r. This model is recommended by EPA for determining Class II impacts within 50 km of the source being assessed. Additionally, AERMOD was developed to handle complex terrain. In this analysis, AERMOD will be used to estimate pollutant ambient air concentrations of CO, TSP, PM_{10}, and $PM_{2.5}$ from AAI's revised HMA and RAP/Concrete Crusher Plant emission sources.

AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principles for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes. AERMOD modeling system has three components: AERMAP, AERMET, and AERMOD. AERMAP is the terrain preprocessor program. AERMET is the meteorological data preprocessor. AERMOD includes the dispersion modeling algorithms and was developed to handle simple and complex terrain issues using improved algorithms. AERMOD uses the dividing streamline concept to address plume interactions with elevated terrain.

AERMOD will be run using all the regulatory default options including use of:

- Gradual Plume Rise
- Stack-tip Downwash
- Buoyancy-induced Dispersion
- Calms and Missing Data Processing Routine
- Upper-bound downwash concentrations for super-squat buildings
- Default wind speed profile exponents
- Calculate Vertical Potential Temperature Gradient
- No use of gradual plume rise
- Rural Dispersion

2.2 BUILDING WAKE EFFECTS

Several buildings are located at the permit modification site. Buildings located near point sources will be included in building downwash calculations.

2.3 METEOROLOGICAL DATA

Dispersion model meteorological input file to be used in this modeling analysis are years 2001 - 2005 Albuquerque met data (AERMET version 16216 dated 01/30/2017) available from the AEHD AQP. For TSP modeling only, one year, 2003, will be used for the modeling analysis.

2.4 RECEPTORS AND TOPOGRAPHY

Modeling will be completed using as many receptor locations to ensure that the maximum estimated impacts are identified. SIL modeling receptors will be based on previous modeling during relocation of the facility.

The refined receptor grid will include receptors located at 50 meters apart out to 1000 meters from the property line, 100 meters apart from 1000 meters out to 2000 meters, and 250 meters apart from 2000 meters out to 3000 meters. Fenceline receptor spacing will be 25 meters.

All refined model receptors will be preprocessed using the AERMAP software associated with AERMOD. The AERMAP software establishes a base elevation and a height scale for each receptor location. The height scale is a measure of the receptor's location and base elevation and its relation to the terrain feature that has the greatest influence in dispersion for that receptor. AERMAP will be run using U.S. Geological Survey (USGS) national elevation data (NED) data. Output from AERMAP will be used as input to the AERMOD runstream file for each model run.

2.5 MODELED EMISSION SOURCES INPUTS

For the facility's proposed site, the proposed operating time for the HMA plant will be 24 hours per day, 7 days per week, and 8760 hours per year. For the modification site location, AAI will take site-specific conditions on daily HMA operating throughput. For the months of January through March the daily throughput will be limited to 2800 tons (7 hours maximum at 400 tph) For the months of April, May, September, and October the daily throughput will be limited to 3600 tons (9 hours maximum at 400 tph). For the months of June through August the daily throughput will be limited to 4000 tons (10 hours maximum at 400 tph). For the months of November and December the daily throughput will be limited to 2400 tons (6 hours maximum at 400 tph). For modeling, the hourly blocks vary starting from midnight then shifting on 2 hour intervals for the 24 hour period or 12 separate model runs as summarized on Table 3. For the RAP/Concrete Crusher Plant, it will be limited to the hours specified in Table 4.

For annual averaging period TSP and $PM_{2.5}$ dispersion modeling, the HMA plant hourly emission factor included in the model is based on the annual throughput limit. Permit 3291 limits the HMA plant to 400 tons per hour and 900,000 tons per year. If the HMA plant were run 365 days per year at the daily limits discussed above, that would be equivalent to 1,205,600 tons per year. For HMA annual model, the hourly emission factor reduces the hourly emission factor to 0.747 (1 * 900,000/1,205,600) for all throughput based emission rate sources.

TABLE 3: HMA Model Scenario Time Segments

Model Scenario	Time Segments 10-Hour Blocks
1	12 AM to 10 AM
2	2 AM to 12 PM
3	4 AM to 2 PM
4	6 AM to 4 PM
5	8 AM to 6 PM
6	10 AM to 8 PM
7	12 PM to 10 PM
8	2 PM to 12 AM
9	4 PM to 2 AM
10	6 PM to 4 AM
11	8 PM to 6 AM
12	10 PM to 8 AM

TABLE 4: Modeled RAP/Concrete Crusher Plant Hours of Operation

	Winter	Spring	Summer	Fall
12:00 AM	0	0	0	0
1:00 AM	0	0	0	0
2:00 AM	0	0	0	0
3:00 AM	0	0	0	0
4:00 AM	0	0	0	0
5:00 AM	0	0	0	0
6:00 AM	0	0	0	0
7:00 AM	0	1	1	1
8:00 AM	1	1	1	1
9:00 AM	1	1	1	1
10:00 AM	1	1	1	1
11:00 AM	1	1	1	1
12:00 PM	1	1	1	1
1:00 PM	1	1	1	1
2:00 PM	1	1	1	1
3:00 PM	1	1	1	1
4:00 PM	1	1	1	1
5:00 PM	0	0	1	0
6:00 PM	0	0	1	0
7:00 PM	0	0	0	0
8:00 PM	0	0	0	0
9:00 PM	0	0	0	0
10:00 PM	0	0	0	0
11:00 PM	0	0	0	0
Total	**9**	**10**	**12**	**10**

2.5.1 AAI Broadway HMA Road Vehicle Traffic Model Inputs

The access road fugitive dust for truck traffic will be modeled as a line of volume sources. The NMED AQB's approved procedure for Modeling Haul Roads will be followed to develop modeling input parameters for haul roads. Volume source characterization followed the steps described in the Air Quality Bureau's Guidelines.

2.5.2 AAI Broadway HMA Material Handling Volume Source Model Inputs

Particulate emissions from material handling and process from both HMA and RAP/Concrete Crusher Plants will be modeled as volume sources. Model input parameters for feeders, crushers, screens, and transfer points follow the NMED AQB model guidelines Table 23.

2.5.3 AAI Broadway HMA Point Source Model Inputs

Emissions from exhaust stacks from both HMA and RAP/Concrete Crusher Plants will be modeled as point sources. Model input parameters are based on actual release height, release diameter, release velocity or flow rate, and release temperature. For exhaust releases at ambient temperature, the modeled temperature input will be zero Kelvin. For horizontal or raincap releases, the AERMOD version for horizontal and raincap releases will be used with actual release parameters. For AAI asphalt heater (HMAHEAT), it will be modeled as a raincap release. For AAI HMA mineral filler silo (Unit 14) and the KMA cement silo (Unit 4) will be modeled as a horizontal release source.

Tables 5, 6 and 7 summarize the model inputs for the AAI 400 TPH HMA Plant.

TABLE 5: Summary of Model Inputs for Point Sources at the AAI HMA Plant - Combustion

Neighbor Description	Model ID	Stack Height (m)	Stack Temp. (K)	Exit Vel. (m/s)	Stack Dia. (m)	NOx Emission Rate (lb/hr)	CO Emission Rate (lb/hr)	SO2 Emission Rate (lb/hr)
AAI HMA Baghouse Stack Unit 15	HMASTK	9.1440	366.4800	25.1308	1.2908	22.00000	52.00000	23.20000
AAI HMA Asphalt Cement Heater Unit 20	HMAHEAT	4.2672	588.7100	6.3128	0.3048	0.39063	0.20492	0.13867
AAI Main RAP/Concrete Plant Generator Unit 37	GEN	4.572	750.928	67.316	0.2032	13.71000	2.20000	0.28000

TABLE 6: Summary of Model Inputs for Point Sources at the AAI HMA Plant - Particulate

Neighbor Description	Model ID	Stack Height (m)	Stack Temp. (K)	Exit Vel. (m/s)	Stack Dia. (m)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
AAI HMA Baghouse Stack Unit 15	HMASTK	9.1440	366.4800	25.1308	1.2908	13.20000	9.20000	9.20000
AAI HMA Asphalt Cement Heater Unit 20	HMAHEAT	4.2672	588.7100	6.3128	0.3048	0.03906	0.03906	0.03906
AAI HMA Mineral Filler Silo Loading Unit 14	HMAFILL	9.1440	0.0000	12.9360	0.1520	0.18000	0.11500	0.00900
AAI Main RAP/Concrete Plant Generator Unit 37	GEN	4.572	750.928	67.316	0.2032	0.85000	0.85000	0.85000

TABLE 7: Summary of Model Inputs for Volume Sources at the AAI HMA Plant

Neighbor Description	Model ID	Release Height (meter)	Horizontal Dimension (meters)	Vertical Dimension (meters)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
AAI HMA Asphalt Silo Loading Unit 16	DRUMUNL	2.00	0.47	0.93	0.23436	0.23436	0.23436
					CO Emission Rate (lbs/hr)		0.47199
AAI HMA Asphalt Silo Unloading Unit 17	HMASILO	4.00	0.47	0.93	0.20877	0.20877	0.20877
					CO Emission Rate (lbs/hr)		0.53970
AAI HMA Storage Pile Handling 1 Unit 1	HMAPILE1	2.44	7.16	2.27	0.43662	0.20651	0.03127
AAI HMA Storage Pile Handling 2 Unit 1	HMAPILE2	2.44	7.16	2.27	0.43662	0.20651	0.03127
AAI HMA Storage Pile Handling 3 Unit 1	HMAPILE3	2.44	7.16	2.27	0.43662	0.20651	0.03127
AAI HMA Storage Pile Handling 4 Unit 1	HMAPILE4	2.44	7.16	2.27	0.43662	0.20651	0.03127
AAI HMA Bin Loading Unit 2	HMABIN	6.00	1.16	2.33	1.08566	0.51349	0.07776
AAI HMA Bin Unloading Unit 3	HMATP1	2.00	0.47	0.93	0.03220	0.01058	0.00299
AAI HMA Scalping Screen Unit 4	HMASCR	4.00	1.16	2.33	0.50600	0.17020	0.01150
AAI HMA Scalping Screen Unloading Unit 5	HMATP2	2.00	0.47	0.93	0.03220	0.01058	0.00299
AAI HMA Pug Mill Unit 6	HMAPUG	4.00	1.16	2.33	0.03304	0.01086	0.00307
AAI HMA Pug Mill Unloading Unit 7	HMATP3	2.00	0.47	0.93	0.03304	0.01086	0.00307
AAI HMA Conveyor Transfer to Drum Conveyor Unit 8	HMATP4	2.00	0.47	0.93	0.03304	0.01086	0.00307
AAI HMA RAP Bin Loading Unit 9	RAPBIN	6.00	1.16	2.33	0.19825	0.09377	0.01420
AAI HMA RAP Bin Unloading Unit 10	RAPTP1	2.00	0.47	0.93	0.01960	0.00644	0.00182
AAI HMA RAP Screen Unit 11a	RAPSCR	4.00	1.16	2.33	0.30800	0.10360	0.00700
AAI HMA RAP Screen Unloading Unit 11b	RAPTP2	2.00	0.47	0.93	0.01960	0.00644	0.00182
AAI HMA RAP Transfer Point Unit 12	RAPTP3	2.00	0.47	0.93	0.01960	0.00644	0.00182
AAI HMA RAP Transfer Point Unit 13	RAPTP4	2.00	0.47	0.93	0.01960	0.00644	0.00182

Neighbor Description	Model ID	Release Height (meter)	Horizontal Dimension (meters)	Vertical Dimension (meters)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
AAI Raw Material Pile Unit 24	RAW	2.50	4.25	2.33	0.94405	0.44651	0.06761
AAI Feeder Unit 25	FEEDER	6.00	1.16	2.33	0.94405	0.44651	0.06761
AAI Primary Crusher Unit 26	PCRUSH	6.00	1.16	2.33	0.24000	0.10800	0.02000
AAI Transfer Point Unit 27	TP1	2.00	0.47	0.93	0.02800	0.00920	0.00260
AAI Transfer Point Unit 28	TP2	2.00	0.47	0.93	0.02800	0.00920	0.00260
AAI Transfer Point Unit 29	TP3	2.00	0.47	0.93	0.01680	0.00552	0.00156
AAI Screen Unit 30	SCRN	4.00	1.16	2.33	0.70400	0.23680	0.01600
AAI Secondary Crusher Unit 31	SCRUSH	2.00	0.47	0.93	0.14400	0.06480	0.01200
AAI Transfer Point Unit 32	TP4	2.00	0.47	0.93	0.01680	0.00552	0.00156
AAI Transfer Point Unit 33	TP5	2.00	0.47	0.93	0.01680	0.00552	0.00156
AAI Transfer Point Unit 34	TP6	2.00	0.47	0.93	0.02800	0.00920	0.00260
AAI Transfer Point Unit 35	TP7	2.00	0.47	0.93	0.02800	0.00920	0.00260
AAI Transfer Point Unit 36	TP8	2.00	0.47	0.93	0.02800	0.00920	0.00260
AAI Stacker Drop to Finish Storage Pile Unit 37	PPILE	4.00	0.47	0.93	0.56661	0.26799	0.04058
AAI HMA Haul Road Paved In Volume 1-17	PVI_0001-17	3.40	6.05	3.16	0.79375	0.15875	0.03897
AAI HMA Haul Road Paved Asphalt Volume 1-9	PAS_0001-9	3.40	6.05	3.16	0.22775	0.04555	0.01118
					CO Emission Rate (lbs/hr) (1-9)		0.04224
AAI HMA Haul Road Paved Aggregate Volume 1-19	PAG_0001-19	3.40	6.05	3.16	0.27430	0.05486	0.01347
AAI HMA Paved Exit Volume 1-16	PVO_0001-16	3.40	6.05	3.16	0.75018	0.15004	0.03683
					CO Emission Rate (lbs/hr) (1-16)		0.07509

Neighbor Description	Model ID	Release Height (meter)	Horizontal Dimension (meters)	Vertical Dimension (meters)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
AAI HMA Haul Road Unpaved Aggregate Volume 1-22	UPA_0001-22	3.40	6.05	3.16	1.14424	0.29162	0.02916
AAI HMA Haul Road Unpaved Asphalt Volume 1-8	UPS_0001-8	3.40	6.05	3.16	0.62429	0.15911	0.01591
					CO Emission Rate (lbs/hr) (4-8)		0.02347
AAI RAP/Concrete Haul Road Volume 1-74	RAP_0001-74	3.40	6.05	3.16	1.67001	0.38720	0.05909

Tables 8, 9 and 10 summarize the model inputs for the co-located Albuquerque Asphalt's KMA plant permitted under Permit #1955 and Complete Concrete and Excavation Permit #1838-4AV. For the KMA generators (Unit 7 and 8) and KMA cement silo (Unit 4), stack parameters were verified using manufactures' data for the engines and equipment inspection for the stack release height and stack diameter.

TABLE 8: Summary of Model Inputs for Point Sources at Albuquerque Asphalt's KMA and Complete Concrete and Excavation

Neighbor Description	Source ID	Model ID	Stack Height (m)	Stack Temp. (K)	Exit Vel. (m/s)	Stack Dia. (m)	NO_2 Emission Rate (lb/hr)	CO Emission Rate (lb/hr)	SO_2 Emission Rate (lb/hr)
KMA Generator Unit 7	7	KMAGEN1	3.962	848.150	67.831	0.1016	1.12000	0.29000	0.36000
KMA Generator Unit 8	8	KMAGEN2	1.829	786.150	36.387	0.1016	0.76000	0.81000	0.20000
Complete hot water heater	5	COM5	6.096	338.710	1.000	0.076	0.06000	0.01500	0.42600

TABLE 9: Summary of Model Inputs for Point Sources at Albuquerque Asphalt's KMA and Complete Concrete and Excavation

Neighbor Description	Source ID	Model ID	Stack Height (m)	Stack Temp. (K)	Exit Vel. (m/s)	Stack Dia. (m)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
KMA Generator Unit 7	7	KMAGEN1	3.962	848.150	67.831	0.1016	0.02000	0.02000	0.02000
KMA Generator Unit 8	8	KMAGEN2	1.829	786.150	36.387	0.1016	0.07000	0.07000	0.07000
KMA Cement Silo Unit 4	4	KMASILO	4.267	0.000	15.240	0.3050	0.18000	0.12000	0.04000
Complete cement silo	1	COM1	16.154	0.000	1.000	0.305	0.20200	0.12900	0.04500
Complete flyash silo	2	COM2	13.716	0.000	1.000	0.305	0.22000	0.07700	0.02700
Complete hot water heater	5	COM5	6.096	338.710	1.000	0.076	0.00600	0.00600	0.00600

TABLE 10: Summary of Model Inputs for Volume Sources at Albuquerque Asphalt's KMA and Complete Concrete and Excavation

Neighbor Description	Source ID	Model ID	Release Height (meter)	Horizontal Dimension (meters)	Vertical Dimension (meters)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
KMA Hopper/Screen/Pugmill/Conveyor	1-3	KMA	6.00	1.16	2.33	1.16000	0.55000	0.08000
KMA Raw Material Pile	5	KMAPILE	2.44	7.16	2.27	0.11000	0.05000	0.00800
KMA Finish Pile	6	KMAFPILE	2.00	0.47	0.93	0.04000	0.02000	0.00300
KMA Traffic	9	KMA001_0074	3.40	6.05	3.16	0.37000	0.10000	0.01000
Complete raw matl. piles	3	COM3	1.524	5.100	1.420	0.10800	0.03800	0.00500
Complete raw material feed hopper	3A	COM3A	2.743	0.350	0.850	0.09700	0.03300	0.00400
Complete 4 and 4a-c; concrete batch plant	4	COM4	2.743	4.610	0.850	0.52200	0.15300	0.04600
Complete Haul Roads	13	COM001_0012	3.40	6.05	3.16	0.19300	0.05200	0.00530

Tables 11, 12 and 13 summarize the model inputs for neighboring Black Rock Services 300 TPH HMA Plant.

TABLE 11: Summary of Combustion Model Inputs for Point Sources at the Neighboring Black Rock 300 TPH HMA Plant

Neighbor Description	Source ID	Model ID	Stack Height (m)	Stack Temp. (K)	Exit Vel. (m/s)	Stack Dia. (m)	CO Emission Rate (lb/hr)
Black Rock HMA Baghouse Stack	5	BPBM	8.230	394.260	19.583	1.036	22.00000
Black Rock HMA Asphalt Cement Heater	15	BRAH	2.438	394.260	15.240	0.254	0.16440

TABLE 12: Summary of Particulate Model Inputs for Point Sources at the Neighboring Black Rock 300 TPH HMA Plant

Neighbor Description	Source ID	Model ID	Stack Height (m)	Stack Temp. (K)	Exit Vel. (m/s)	Stack Dia. (m)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
Black Rock HMA Baghouse Stack	5	BPBM	8.230	394.260	19.583	1.036	17.30	5.40	1.62
Black Rock HMA Asphalt Cement Heater	15	BRAH	2.438	394.260	15.240	0.254	0.02	0.02	0.02
Black Rock HMA Mineral Filler Silo Loading	7	BPLS	12.192	0.000	6.468	0.305	0.05	0.03	0.01

TABLE 13: Summary of Model Inputs for Volume Sources at the Neighboring Black Rock 300 TPH HMA Plant

Neighbor Description	Source ID	Model ID	Release Height (meter)	Horizontal Dimension (meters)	Vertical Dimension (meters)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
Black Rock HMA Asphalt Silo Loading	11-13	BPAS	2.00	0.47	0.93	0.08000	0.08000	0.08000
						CO Emission Rate (lbs/hr)		0.08000
Black Rock HMA Asphalt Silo Unloading	16	BRPL	6.00	0.47	0.93	0.06000	0.06000	0.06000
						CO Emission Rate (lbs/hr)		0.08000
Black Rock HMA Storage Pile 1	17-18	BRAGGP1	2.44	7.16	2.27	0.32000	0.15000	0.02300
Black Rock HMA Storage Pile 2		BRAGGP2	2.44	7.16	2.27			
Black Rock HMA Storage Pile 3		BRAGGP3	2.44	7.16	2.27			
Black Rock HMA Storage Pile 4		BRAGGP4	2.44	7.16	2.27			
Black Rock HMA Bin Loading	1	BRRB	6.00	1.16	2.33	0.83000	0.40000	0.06000
Black Rock Lime Pugmill	3	BRLP	4.00	1.16	2.33	0.05000	0.02000	0.00300
Black Rock HMA RAP Bin Loading	14	BRRAPB	6.00	1.16	2.33	0.45000	0.22000	0.03000
Black Rock HMA Propane Volume 1-43	20	BRP_ 0001-43	3.40	6.05	3.16	1.12000	0.31000	0.03100
Black Rock HMA Customer Volume 1-32		BRC_ 0001-32	3.40	6.05	3.16			
Black Rock HMA Aggregate Volume 1-46		BRA_ 0001-46	3.40	6.05	3.16			

Table 14 summarizes the model input for the neighboring Black Rock Services 300 TPH RAP Plant.

TABLE 14: Summary of Model Inputs for Volume Sources at the Neighboring Black Rock 300 TPH RAP Plant

Source Description	Source ID	Model ID	Release Height (meter)	Horizontal Dimension (meters)	Vertical Dimension (meters)	TSP Emission Rate (lb/hr)	PM10 Emission Rate (lb/hr)	PM2.5 Emission Rate (lb/hr)
Raw Material Storage Pile	9	RAW	2.50	4.25	2.33	0.42482	0.20093	0.03043
Feeder	1	FEED	6.00	1.16	2.33	0.42482	0.20093	0.03043
Primary Crusher	2	PCRUSH	6.00	1.16	2.33	0.36000	0.16200	0.03000
Conveyor Transfer Point	3	TP1	2.00	0.47	0.93	0.04200	0.01380	0.00390
Screen	4	SCR	4.00	1.16	2.33	0.66000	0.22200	0.01500
Conveyor Transfer Point	4a	TP2	2.00	0.47	0.93	0.02100	0.00690	0.00195
Conveyor Transfer Point	4b	TP3	2.00	0.47	0.93	0.02100	0.00690	0.00195
Conveyor Transfer Point	4c	TP4	2.00	0.47	0.93	0.02520	0.00828	0.00234
Conveyor Transfer Point	5	TP5	2.00	0.47	0.93	0.02520	0.00828	0.00234
Conveyor Transfer Point	6	TP5	2.00	0.47	0.93	0.02520	0.00828	0.00234
Stacker Conveyor Drop 1	7	STK1	4.00	0.47	0.93	0.12749	0.06030	0.00913
Stacker Conveyor Drop 2	8	STK2	4.00	0.47	0.93	0.12749	0.06030	0.00913
Finish Storage Pile 1	10	FPILE1	2.50	4.25	2.33	0.21241	0.10046	0.01521
Finish Storage Pile 2		FPILE2	2.50	4.25	2.33	0.21241	0.10046	0.01521
Black Rock RAP Plant Haul Road Volume 1-43	11	BRR_0001-0043	3.40	6.05	3.16	2.21383	0.56422	0.05642

Tables 15 and 16 summarize the model inputs for neighboring sources; PG Industries, WWTF, and PNM Rio Bravo Generating Station.

TABLE 15: Summary of Combustion Model Inputs for Point Sources at Neighboring PG Enterprises, WWTF, and PNM Rio Bravo Generating Station

Neighbor Description	Model ID	Stack Height (m)	Stack Temp. (K)	Exit Vel. (m/s)	Stack Dia. (m)	CO Emission Rate (lb/hr)
PG Enterprise Screen engine	PGSCRENG	3.658	793.150	171.650	0.101	1.38940
PG Enterprise Crusher engine	PGCRHENG	3.658	793.150	171.650	0.101	1.94390
WWTF	COGEN1	12.192	449.820	30.480	0.381	20.60000
WWTF	COGEN2	12.192	449.820	30.480	0.381	20.60000
WWTF	COGEN3	12.192	598.710	27.737	0.329	9.60000
WWTF	COGEN4	12.192	605.370	33.528	0.329	9.60000
Rio Bravo Turbine Stack 100% Fuel Oil	PNMRBGS	15.850	913.150	45.967	5.182	159.00000

TABLE 16: Summary of Model Inputs for Volume Sources at Neighboring PG Enterprises

Source Description	Model ID	Release Height (meter)	Horizontal Dimension (meters)	Vertical Dimension (meters)	TSP – PM10 Emission Rate (lb/hr)
PG Enterprise Triple Deck Screen with Belt Transfer % 1/8 ag handl	PGSCRN	3.000	3.540	2.840	0.76400
PG Enterprise Crusher w/ batch load-2 drops and a pile and 1/8 ag handl	PGCRSHR	2.000	3.220	1.840	0.71900
PG Enterprise Screen hopper with Batch load and Batch unload and 1/8 ag handl	PGSCRNHP	1.500	0.850	1.420	0.44400
PG Enterprise Haul road section #7	PGHAUL7	0.914	18.600	1.400	0.20100
PG Enterprise Haul road section #6	PGHAUL6	0.914	18.600	1.400	0.20100
PG Enterprise Haul road section #5	PGHAUL5	0.914	18.600	1.400	0.20100
PG Enterprise Haul road section #4	PGHAUL4	0.914	18.600	1.400	0.20100
PG Enterprise Haul road section #3	PGHAUL3	0.914	18.600	1.400	0.20100
PG Enterprise Haul road section #2	PGHAUL2	0.914	18.600	1.400	0.20100
PG Enterprise Haul road section #1	PGHAUL1	0.914	18.600	1.400	0.20100

2.6 PARTICLE SIZE DISTRIBUTION

TSP emissions are modeled using plume depletion. Plume deposition simulates the effect of gravity as particles '"fall-out" from the plume to the ground as the plume travels downwind. Therefore, the farther the plume travels from the emission point to the receptor, the greater the effect of plume deposition and the greater the decrease in modeled impacts or concentrations. Particle size distribution, particle mass fraction, and particle density are required inputs to the model to perform this function.

The particle size distribution data used in the modeling for aggregate handling (aggregate, RAP, concrete) is based upon data obtained from the City of Albuquerque AQB's "Air Dispersion Modeling Guidelines for Air Quality Permitting", revised 01/21/10, Table 1. Particle size distribution for fugitive road dust was obtained from the particle size *k* factors found in the AP-42 13.2.2 emission equations for unpaved roads (ver. 11/06). Silo loading for co-located baghouse emission sources (mineral filler) particle size distribution came from NMED AQB accepted values derived from a fly ash classification analysis plus a baghouse that controls to 94% of particles less than 2.5 micrometers, 99% of particles between 2.5 and ten micrometers, and 99.5% of particles between ten and 30 micrometers for a total control efficiency of 99%. Particle size distribution for co-located HMA baghouse stack emissions was obtained from New Mexico Environmental Department (NMED) Air Quality Bureau accepted values for hot mix asphalt plant stack particle size distributions.

The mass-mean particle diameter was calculated using the formula:

$$d = ((d^3{}_1 + d^2{}_1 d_2 + d_1 d^2{}_2 + d^3{}_2) / 4)^{1/3}$$

Where: d = mass-mean particle diameter
d_1 = low end of particle size category range
d_2 = high end of particle size category range

Representative average particle densities for particle types emitted in the modeling analysis were obtained from NMED accepted values. The list below summarizes these values.

Material	Bulk Density (g/cm^3)	Density Information Source
Lime (Mineral Filler)	3.3	NMED
Aggregate, Road Dust	2.5	NMED
Soot (Exhaust)	1.5	NMED
Asphalt Exhaust	1.5	NMED

The densities and size distribution for TSP emission sources are presented in Tables 17, 18, 19, 20, and 21.

TABLE 17: Aggregate Handling Fugitive Source Depletion Parameters

Particle Size Category (μm)	**Mass Mean Particle Diameter (μm)**	**Mass Weighted Size Distribution (%)**	Density **(g/cm^3)**
TSP			
2.5 – 5	3.88	6.0	2.5
5 – 10	7.77	20.5	2.5
10 – 15	12.66	16.0	2.5
15 – 20	17.62	17.5	2.5
20 – 30	25.33	22.5	2.5
30 – 45	38.00	17.5	2.5

Parameters based on values from the Albuquerque Air Quality Division Modeling Guidelines.

TABLE 18: HMA Mineral Filler Silo Baghouse Source Depletion Parameters

Particle Size Category (μm)	**Mass Mean Particle Diameter (μm)**	**Mass Weighted Size Distribution (%)**	Density **(g/cm^3)**
TSP			
0 – 2.5	1.57	34.7	3.3
2.5 – 10	6.91	34.7	3.3
10 – 30	21.54	30.6	3.3

Parameters based on fly ash particle size distribution and a baghouse control efficiency of 99%

TABLE 19: HMA Baghouse Stack Depletion Parameters

Particle Size Category (μm)	**Mass Mean Particle Diameter (μm)**	**Mass Weighted Size Distribution (%)**	Density **(g/cm^3)**
TSP			
0 – 1.0	0.63	15.0	1.5
1.0– 2.5	1.85	6.0	1.5
2.5 – 5	6.92	9.0	1.5
5 – 10	12.66	5.0	1.5
15 – 30	23.3	65.0	1.5

Based on AP-42 Section 11.1 Tables 11.1-3 and 11.1-4.

TABLE 20: Combustion Depletion Parameters

Particle Size Category (µm)	Mass Mean Particle Diameter (µm)	Mass Weighted Size Distribution (%)	Density (g/cm^3)
TSP			
0 – 2.5	1.57	100.0	1.5

TABLE 21: Vehicle Fugitive Dust Depletion Parameters

Particle Size Category (µm)	Mass Mean Particle Diameter (µm)	Mass Weighted Size Distribution (%)	Density (g/cm^3)
TSP			
0 – 2.5	1.57	2.6	2.5
2.5 – 10	6.92	22.9	2.5
10 – 30	21.54	74.5	2.5

Based on AP-42 Section 13.2.2 k factors

2.7 $PM_{2.5}$ SECONDARY EMISSIONS MODELING

The form of the $PM_{2.5}$ 24 hour design value is based on the 98th percentile or the highest 8th high result. Calculated $PM_{2.5}$ combustion emission rates included into the model consist of both filterable and condensable components. Secondary $PM_{2.5}$ emissions from combustion sources are created by the conversion to nitrates and sulfates as the exhaust plume travels away from the source and mixes with ambient air. Fugitive dust emission sources do not consist of a condensable component and will not create secondary emissions of $PM_{2.5}$.

$PM_{2.5}$ secondary emission concentration analysis will follow EPA guidelines and EPA Appendix W. Based on preliminary emission rate estimations, Tier 3 analysis will be used since direct $PM_{2.5}$ emissions are greater than 10 tpy, and NOx and SO_2 emission are greater than 40 tpy. The impacts for secondary emissions will be based on the model analysis for direct $PM_{2.5}$ and the previous relocation modeling analysis for NOx results. Since time is a factor in creation of secondary pollutants, the analysis will look at the receptor concentrations of NOx and direct $PM_{2.5}$ as you travel from the model boundary. If the highest concentrations are at the boundary where there is not time to convert to secondary pollutants and concentration drop-off is significant as you travel away from the site, then qualitatively you are not going to find higher concentrations then what is seen at the model boundary. If this is true, then $PM_{2.5}$ highest concentrations will only be from direct emission contribution and not secondary emissions contribution and the comparison with the $PM_{2.5}$ 24 hour NAAQS will be based on the 98th percentile or highest 8th high.

2.8 NO_2 AND SO_2 DISPERSION MODELING ANALYSIS

Since no change in NOx and SO_2 emission rates, equipment location, and stack parameters has changed since the relocation modeling, no new NOx or SO_2 modeling will be performed.

2.9 AMBIENT MODELING BACKGROUND

Ambient background concentrations will be added to the dispersion modeling results and compared to the NAAQS and NMAAQS. Background concentrations were obtained from the AEHD AQP Modeling Section.

CO 1-hr:	2635 micrograms per cubic meter
CO 8-hr:	1718 micrograms per cubic meter
TSP Annual, 24-hr:	31 micrograms per cubic meter
PM_{10} 24-hr:	31 micrograms per cubic meter
$PM_{2.5}$ 24-hr:	18.0 micrograms per cubic meter
$PM_{2.5}$ annual:	7.1 micrograms per cubic meter

3.0 MODEL SUMMARY

This section summarizes the model results, following the technical approach approved in Section 2 of this report for Class II federal ambient air quality standards for this facility. Model results show for each modeled criteria pollutant and applicable averaging periods for carbon monoxide (CO), total suspended particulate (TSP) matter, and particulate matter with aerodynamic diameter less than 10 micrometers (PM_{10}) and particulate matter with aerodynamic diameter less than 2.5 micrometers ($PM_{2.5}$), the proposed permit modification of the Broadway HMA facility does not contribute to an exceedance of the national/New Mexico ambient air quality standards (AAQS). The modeling followed the guidance and protocols outlined in the protocol found in Section 2 of this report, the "Permit Modeling Guidelines, Albuquerque Environmental Health Department", revised 02/03/2016, "New Mexico Air Pollution Control Bureau, Dispersion Modeling Guidelines", revised 08/08/2017, and the most up to date EPA's *Guideline on Air Quality Models*.

For the AAI HMA plant, 12 hour scenarios were modeled. These represent the HMA plant operating 6 to 10 hours per day as discussed in Section 2.5 of this report. Table 22 below shows the hours of operation of the AAI HMA for each modeled scenario.

TABLE 22: Model Scenario Time Segments

Model Scenario	**Time Segments** **10-Hour Blocks**
1	12 AM to 10 AM
2	2 AM to 12 PM
3	4 AM to 2 PM
4	6 AM to 4 PM
5	8 AM to 6 PM
6	10 AM to 8 PM
7	12 PM to 10 PM
8	2 PM to 12 AM
9	4 PM to 2 AM
10	6 PM to 4 AM
11	8 PM to 6 AM
12	10 PM to 8 AM

3.1 SIGNIFICANT IMPACT LEVEL (SILs) MODELING ANALYSIS

Significant impact level AERMOD dispersion modeling was completed for TSP, PM_{10}, $PM_{2.5}$, and CO. All significant impact models were run in terrain mode and building downwash with Broadway HMA and Crusher emission sources only. Table 23 lists the results of the modeling for pollutant and averaging period that falls below the applicable SILs.

TABLE 23: Summary of Air Dispersion Modeling Results below SILs

Parameter	Maximum Modeled Concentration ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)	% of SIL
CO 1 Hr.	497	2000	24.9
CO 8 Hr.	230	500	46.0

For CO, the results show impacts below the NAAQS SILs of 2000 $\mu g/m^3$ for the 1 hour averaging period and NAAQS SILs of 500 $\mu g/m^3$ for the 8 hour averaging period. CO CIA results with significant neighboring sources and background are summarized in Section 3.2.1 below.

3.2 CUMULATIVE IMPACT ANALYSIS (CIA) MODEL RESULTS

The following CIA dispersion models were used to show compliance with all applicable state and national AAQS. The list was discussed in the modeling protocol found in Section 2.

TABLE 24: Standards for Which Modeling Is Not Required

Standard not Modeled	Surrogate that Demonstrates Compliance
TSP 7-day NMAAQS	TSP 24-hour NMAAQS

The model results using the maximum operation at AAI's Broadway HMA, significant neighboring sources, and approved ambient background are summarized below in Tables 25 and 26. Dispersion modeling analysis followed the modeling protocol outline in Section 2 of this report.

TABLE 25: Summary of CIA PM Modeling Results Including all TSP Neighboring Sources and Background

Parameter	Maximum Modeled Concentration (µg/m^3)	Significant Impact Level (µg/m^3)	Maximum Modeled Concentration With Background (µg/m^3)	Lowest Applicable Standard (µg/m^3)	% of Standard
$PM_{2.5}$ 24 Hr. High 8th High	15.6	1.2	33.6	35	96.0
$PM_{2.5}$ Annual	4.1	0.3	11.2	12	93.3
PM_{10} 24 Hr. High 2nd High	66.9	5	97.9	150	65.3
TSP 24 Hr.	116.0	5	147.0	150	98.0
TSP Annual	28.7	1	59.7	60	99.5

Note: Background concentrations are found in Section 2.9 of the modeling protocol. Dispersion modeling inputs and settings are presented in Section 2.

TABLE 26: Summary of CIA CO Modeling Results Including All CO Neighboring Sources and Background

Parameter	Maximum Modeled Concentration (µg/m^3)	Significant Impact Level (µg/m^3)	Maximum Modeled Concentration With Background (µg/m^3)	Lowest Applicable Standard (µg/m^3)	% of Standard
CO 1 Hr.	520.6	2000	3155.6	14997.5	21.0
CO 8 Hr.	234.3	500	1952.3	9960.1	19.6

Note: Background concentrations are found in Section 2.9 of the modeling protocol. Dispersion modeling inputs and settings are presented in Section 2.

3.2.1 CO Cumulative Impact Analysis Modeling Results

CO modeling was performed with terrain elevations and building downwash for AAI proposed permit modification site, significant neighboring sources, and background concentrations. CO emission rates represented the maximum hourly rate for AAI proposed point sources and significant neighboring sources.

CIA CO modeling was performed with terrain and meteorology which included 5 years of data, 2001 – 2005 Albuquerque Meteorological data, obtained from the AEHD AQP. Modeling was performed for both the 1 and 8 hour averaging periods. Del Norte monitor representative 1 and 8 hour background concentrations was added to the modeled results and compared to the lowest applicable ambient standard, see Section 2.9 of this report.

Results of the CO 1 and 8 hour modeling show compliance with the NMAAQS. The highest modeled concentration was located on the eastern boundary of the Broadway HMA site.

TABLE 27: CO CIA MODEL RESULTS

Parameter	Modeled Concentration ($\mu g/m^3$)	Modeled Concentration With Background ($\mu g/m^3$)	NMAAQS ($\mu g/m^3$)	Location UTMs E/N	
1 Hour Highest High	520.6	3155.6	14997.5	349791	3874894
8 Hour Average Highest High	234.3	1952.3	9960.1	349776	3874873

Figures 4 and 5 summarize the results of the modeling analysis.

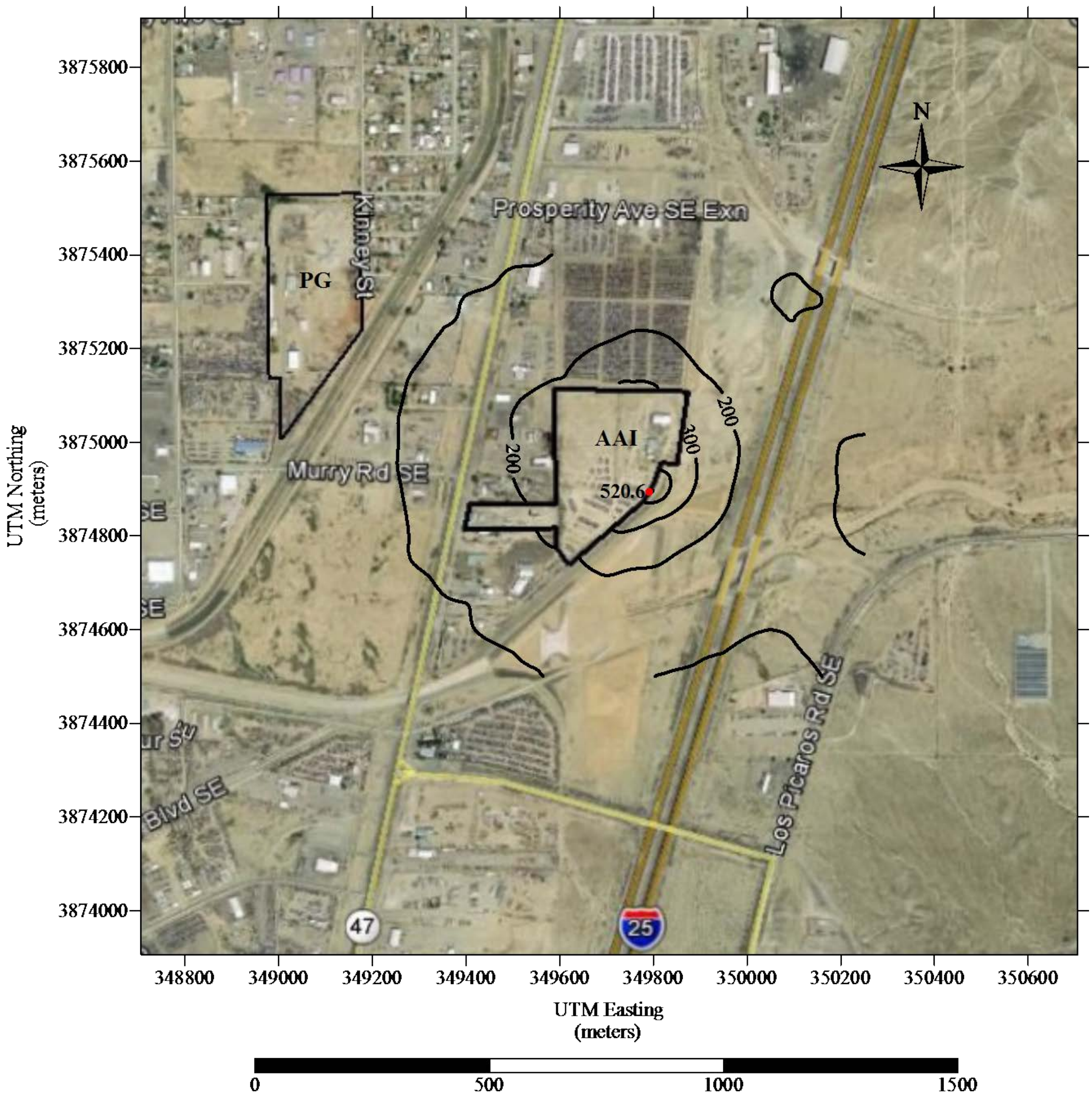

Figure 4: Contour Map of CO 1st High 1 Hour Model Results (μg/m^3)

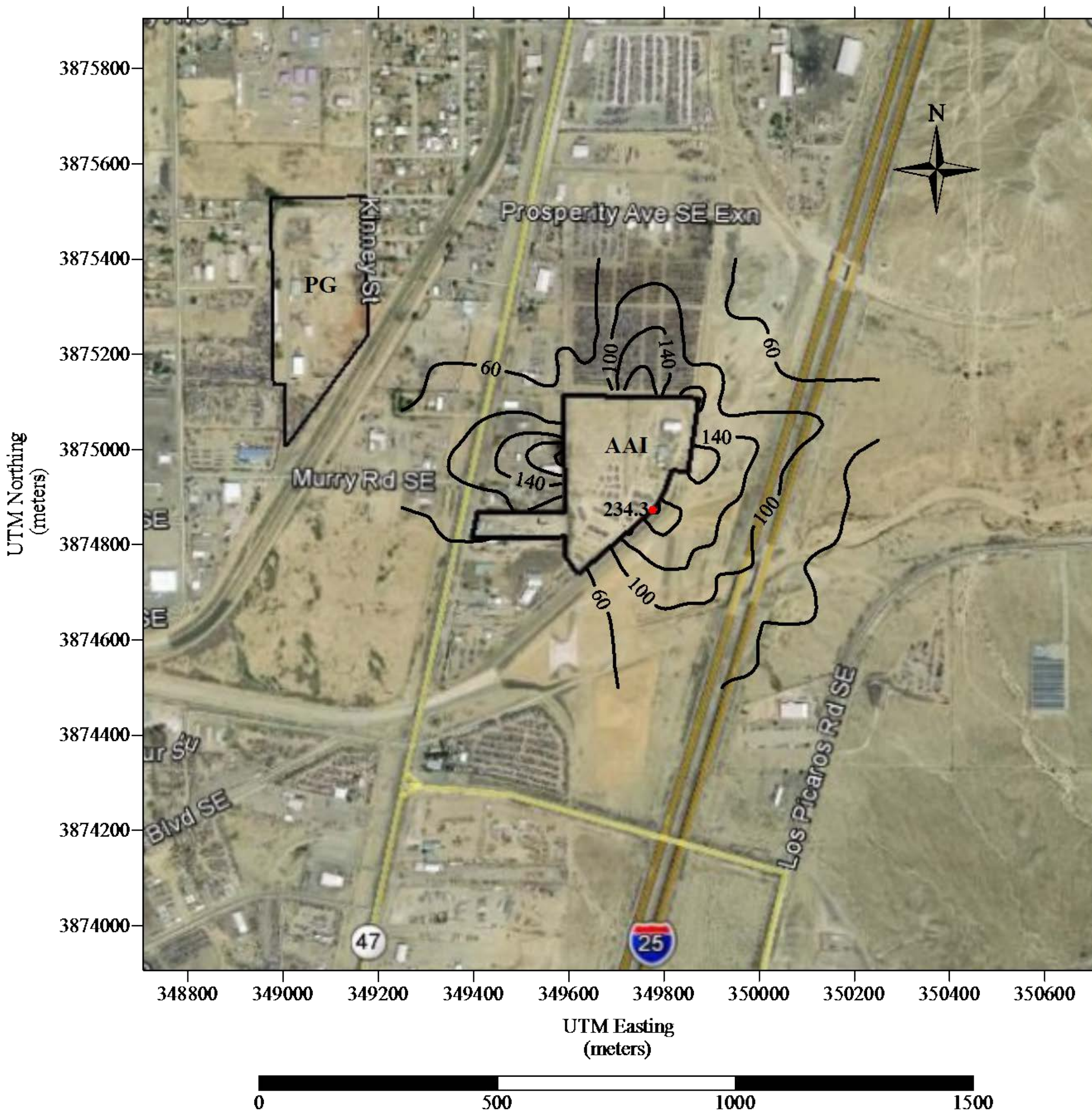

Figure 5: Contour Map of CO 1st High 8 Hour Model Results (μg/m^3)

3.2.2 $PM_{2.5}$ Direct and Secondary Formation CIA Modeling Results

Particulate matter includes both "primary" PM, which is directly emitted into the air, and "secondary" PM, which forms indirectly from fuel combustion and other sources. Primary PM consists of carbon (soot)—emitted from cars, trucks, heavy equipment, forest fires, and burning waste—and crustal material from unpaved roads, stone crushing, construction sites, and metallurgical operations. Secondary PM forms in the atmosphere from gases. Some of these reactions require sunlight and/or water vapor. Secondary PM includes:

- Sulfates formed from sulfur dioxide emissions from power plants and industrial facilities;
- Nitrates formed from nitrogen oxide emissions from cars, trucks, industrial facilities, and power plants; and
- Carbon formed from reactive organic gas emissions from cars, trucks, industrial facilities, forest fires, and biogenic sources such as trees.

AERMOD does not account for secondary formation of $PM_{2.5}$ for near-field modeling. Any secondary contribution of the AAI Broadway HMA's source emissions is not explicitly accounted for in the model results. While representative background monitoring data for $PM_{2.5}$ should adequately account for secondary contribution from existing background sources, the AAI Broadway HMA emits less than significant emission rate (SER) of $PM_{2.5}$ precursors (NO_X), so no assessment of their potential contribution to cumulative impacts as secondary $PM_{2.5}$ was performed. Total permit modification AAI Broadway HMA emissions of precursors include:

- Nitrogen Oxides (NO_X) – 33.9 tons per year (below SER)
- Sulfur Dioxides(SO_2) – 26.9 tons per year (below SER)
- Volatile Organic Carbon (VOC) – 22.8 tons per year (below SER).

CIA direct "primary" $PM_{2.5}$ modeling was performed with terrain and meteorology which included 5 years of data, 2001 – 2005 Albuquerque Meteorological data, obtained from the AEHD AQP. Modeling was performed for both 24 hour and annual averaging periods. $PM_{2.5}$ emission rates represented the maximum hourly rate for all emission sources. South Valley representative 24-hour and annual $PM_{2.5}$ background concentrations was added to the modeled results and compared to the lowest applicable ambient standard. The 24-hour and annual background concentrations that were used for $PM_{2.5}$ averaging periods are found in Section 2.9 of this report. Maximum concentrations occurred along the AAI Broadway HMA restricted boundaries.

Annual $PM_{2.5}$ model results show the highest 5 year annual average occurred during modeling scenario 1 (12 AM to 10 AM).

TABLE 28: Results $PM_{2.5}$ Annual Model Scenario Time Segments

Model Scenario	$PM_{2.5}$ 5-Year Annual Average High ($\mu g/m^3$)
1	**11.20**
2	11.09
3	10.65
4	10.20
5	10.09
6	10.05
7	10.12
8	10.12
9	10.20
10	10.40
11	10.81
12	11.12

$PM_{2.5}$ 5-Year 24 Hr. High 8^{th} High model results show the highest 5 year 24 hour average occurred during modeling scenario 1 (12 AM to 10 AM).

TABLE 29: Results $PM_{2.5}$ 24 Hour Model Scenario Time Segments

Model Scenario	$PM_{2.5}$ 5-Year 24 Hr. High 8^{th} High ($\mu g/m^3$)
1	**33.6**
2	32.6
3	30.2
4	27.5
5	26.0
6	26.2
7	28.2
8	29.1
9	29.7
10	30.3
11	31.3
12	32.5

For the AAI Broadway HMA, direct “primary” $PM_{2.5}$ emission rates are greater than 10 tons per year (Significant Emission Rate - SER), and NO_X and SO_2 emission rates are less than 40 tons per year (SER), falling into category “Case 2” in EPA’s May, 2014 “Guidance for $PM_{2.5}$ Permit Modeling”. For Case 2, no secondary $PM_{2.5}$ ambient impacts associated with the AAI Broadway HMA are required to be addressed. Direct “primary” $PM_{2.5}$ concentrations were estimated using the AERMOD dispersion model (see Table 30).

Results showed that direct “primary” $PM_{2.5}$ from AAI Broadway HMA sources are located on the eastern facility boundary. The result from direct “primary” $PM_{2.5}$ emissions dispersion modeling, plus a representative $PM_{2.5}$ background concentrations from Section 2.9 of this report, which includes monitored secondary $PM_{2.5}$ concentrations, were used to show compliance with national $PM_{2.5}$ annual and 24 hour average AAQS.

TABLE 30: $PM_{2.5}$ CIA MODEL RESULTS

	Modeled Concentration (µg/m^3)	Modeled Concentration With Background (µg/m^3)	Location UTMs E/N	
24 Hour Average Highest 8th High	15.6	33.6	349740.9	3874843
Annual Average	4.1	11.2	349740.9	3874843

Figures 6 and 7 summarize the results of the modeling analysis.

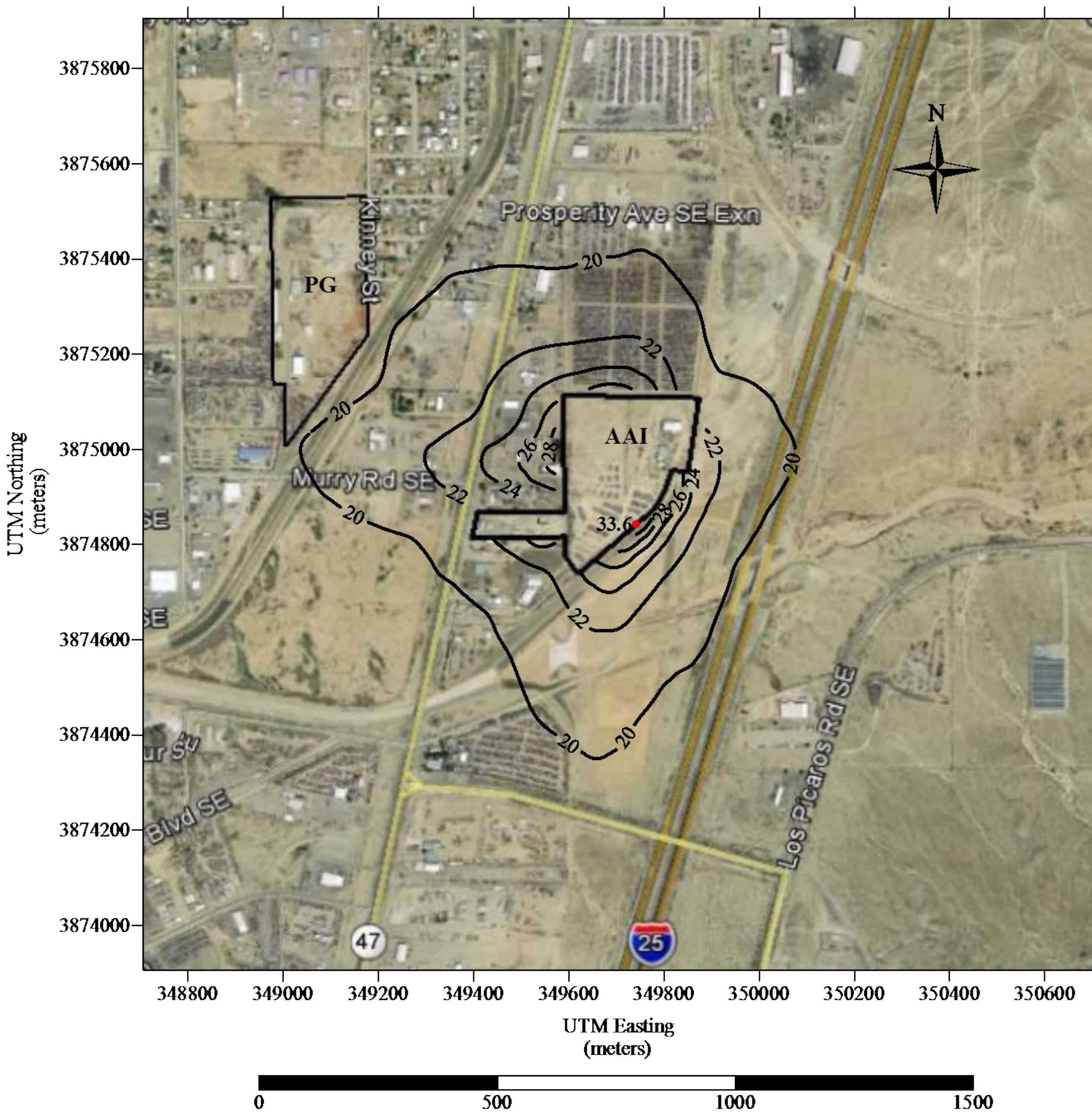

Figure 6: Contour Map of $PM_{2.5}$ 8th Highest Daily Maximum High 24 Hour Model Results ($\mu g/m^3$)

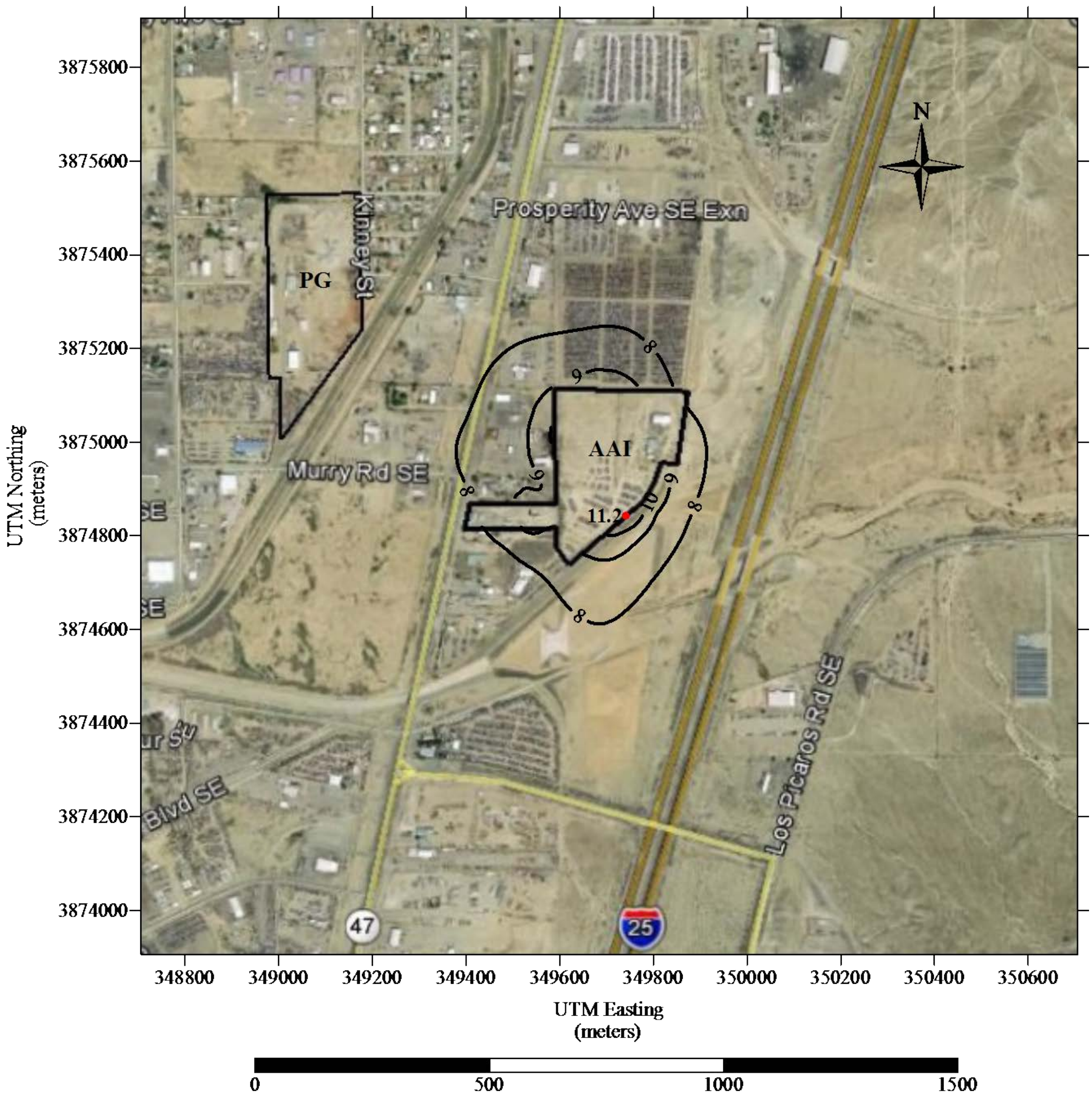

Figure 7: Contour Map of $PM_{2.5}$ Annual Model Results ($\mu g/m^3$)

3.2.3 PM_{10} Cumulative Impact Analysis Modeling Results

CIA PM_{10} modeling was performed with terrain and meteorology which included 5 years of data, 2001 – 2005 Albuquerque Meteorological data, obtained from the AEHD AQP. Modeling was performed for the 24 hour averaging period. PM_{10} emissions rates represented the maximum hourly rate for all emission sources. South Valley representative 24-hour PM_{10} background concentrations was added to the modeled results and compared to the lowest applicable ambient standard. The 24-hour background concentrations that were used for PM_{10} 24 hour averaging period is found in Section 2.9 of this report. Maximum concentrations occurred along the AAI Broadway HMA restricted boundaries.

PM_{10} 5-Year 24 Hr. Highest 2nd High model results show the highest 5 year 24 hour average occurred during modeling scenario 1 (12 AM to 10 AM).

TABLE 31: Results PM_{10} 24 Hour Model Scenario Time Segments

Model Scenario	PM_{10} 5-Year 24 Hr. Highest 2nd High (µg/m^3)
1	**97.9**
2	90.5
3	80.0
4	76.2
5	76.8
6	74.7
7	83.7
8	87.6
9	95.9
10	96.9
11	97.8
12	97.7

TABLE 32: PM_{10} CIA MODEL RESULTS

	Modeled Concentration (µg/m^3)	Modeled Concentration With Background (µg/m^3)	Location UTMs E/N	
24 Hour Average Highest 2nd High	66.9	97.9	349593.0	3875009.5

Figure 8 summarize the results of the modeling analysis.

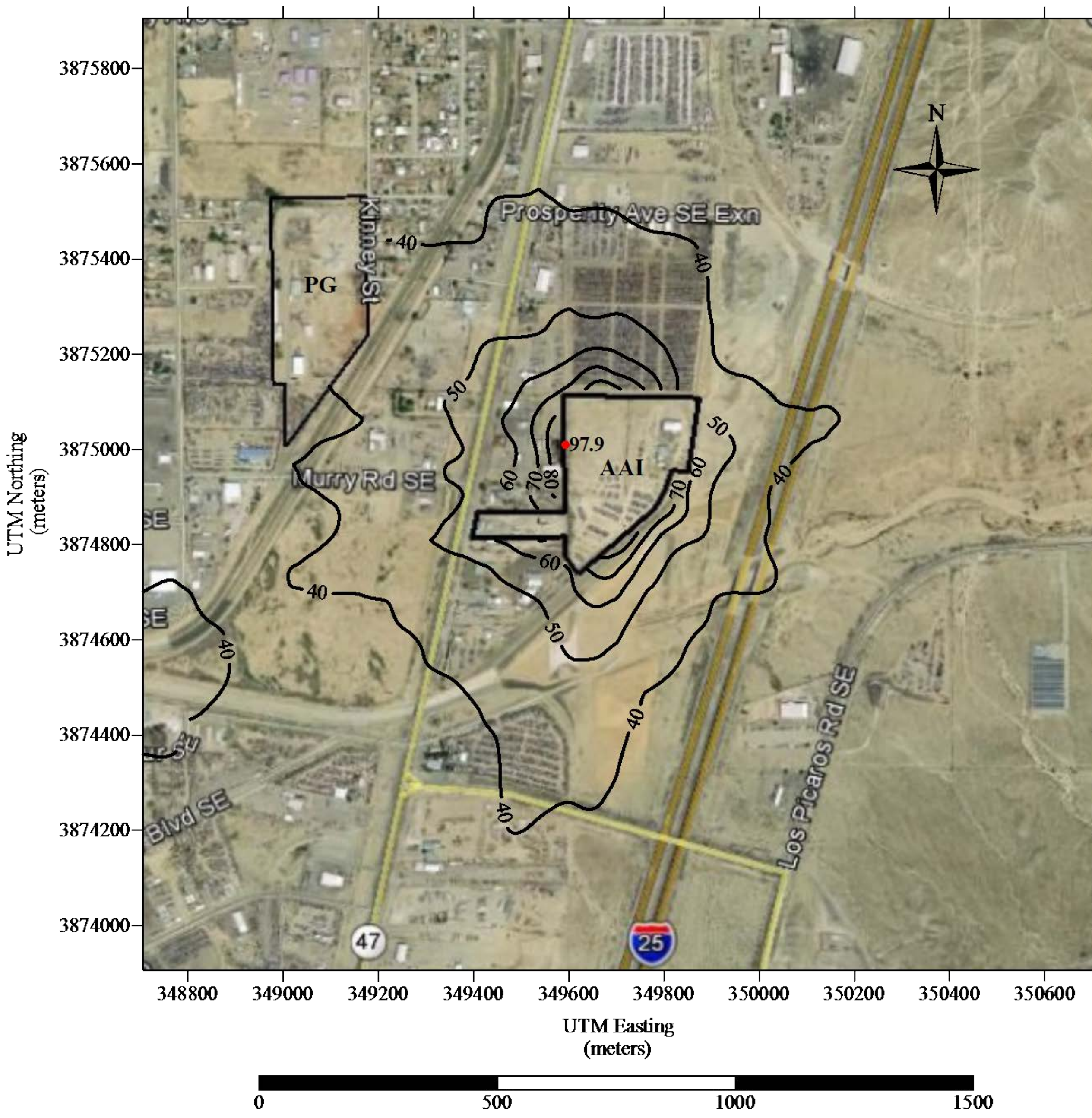

Figure 8: Contour Map of PM_{10} Highest 2nd High 24 Hour Model Results ($\mu g/m^3$)

3.2.4 TSP Cumulative Impact Analysis Modeling Results

CIA TSP modeling was performed with terrain and meteorology which included 1 year of data, 2003 Albuquerque Meteorological data, obtained from the AEHD AQP. For TSP dispersion modeling, neighboring sources were included. For PG Enterprises, only particle sizes greater than 10 microns were included.

TSP emissions are modeled using plume depletion. Plume deposition simulates the effect of gravity as particles '"fall-out" from the plume to the ground as the plume travels downwind. Therefore, the farther the plume travels from the emission point to the receptor, the greater the effect of plume deposition and the greater the decrease in modeled impacts or concentrations. Particle size distribution, particle mass fraction, and particle density are required inputs to the model to perform this function (see Section 2.6).

Modeling was performed for the 24 hour and annual averaging periods. TSP emissions rates represented the maximum hourly rate for all emission sources. South Valley representative 24-hour and annual TSP background concentrations were added to the modeled results and compared to the lowest applicable ambient standard. The 24-hour and annual background concentrations that were used for TSP 24 hour and annual averaging periods are found in Section 2.9 of this report. Maximum concentrations occurred along the AAI Broadway HMA restricted boundaries.

Annual TSP model results show the highest annual average occurred during modeling scenario 12 (10 PM to 8 AM).

TABLE 33: Results TSP Annual Model Scenario Time Segments

Model Scenario	**TSP Annual Average High ($\mu g/m^3$)**
1	59.04
2	58.39
3	57.05
4	55.22
5	54.29
6	54.52
7	55.49
8	56.65
9	57.83
10	58.88
11	59.60
12	**59.66**

TSP 24 hour highest high model results show the highest concentration occurred during modeling scenario 9 (4 PM to 2 AM).

TABLE 34: Results TSP 24 Hour Model Scenario Time Segments

Model Scenario	TSP 24 Hr. Highest High (µg/m^3)
1	136.7
2	133.0
3	128.1
4	126.3
5	121.4
6	122.7
7	130.0
8	133.8
9	**147.0**
10	143.7
11	144.2
12	140.4

Initial modeling showed exceedance of the TSP highest 24 hour NMAAQS. The exceedance was the result of modeled emissions from the neighboring PG Enterprise sources.

For PG Enterprise, the exceedances caused by PG Enterprise sources were located within the boundary of PG Enterprise. Further analysis of the model results showed that excluding the emissions from PG Enterprise sources eliminated the TSP highest 24 hour and Annual NMAAQS violations for receptors within PG Enterprise facility boundaries. Outside of the PG Enterprise facility boundary the highest model results for the Annual and 24 hour averaging period is on the AAI Broadway HMA facility boundary.

TABLE 35: TSP CIA MODEL RESULTS

	Modeled Concentration (µg/m^3)	Modeled Concentration With Background (µg/m^3)	Location UTMs E/N	
24 Hour Average Highest High	116.0	147.0	349616.6	3875124.0
Annual Average	41.7	59.7	349524.8	3874872.5

Figures 9 and 10 summarize the results of the modeling analysis.

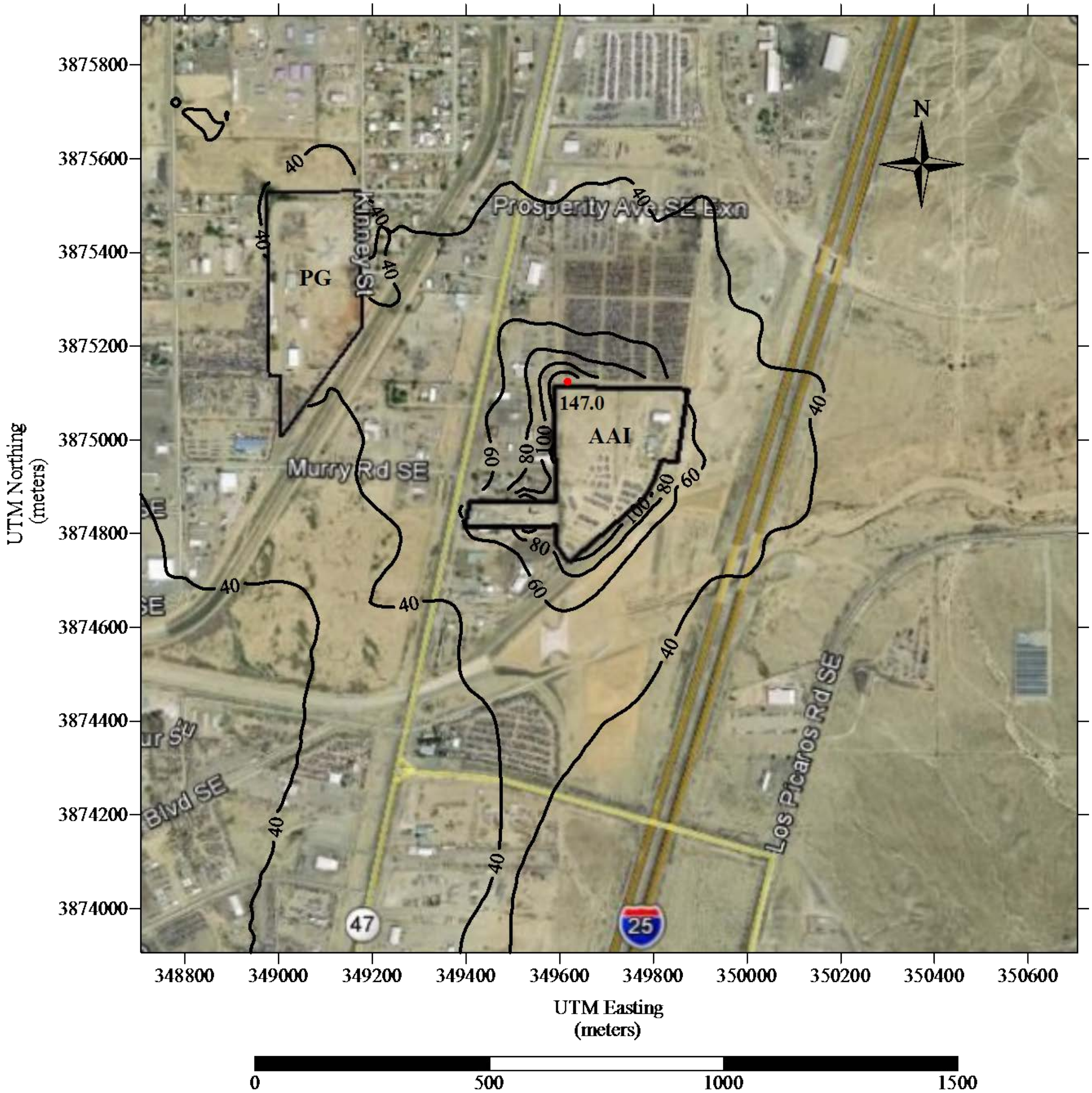

Figure 9: Contour Map of TSP Highest High 24 Hour Model Results (μg/m^3)

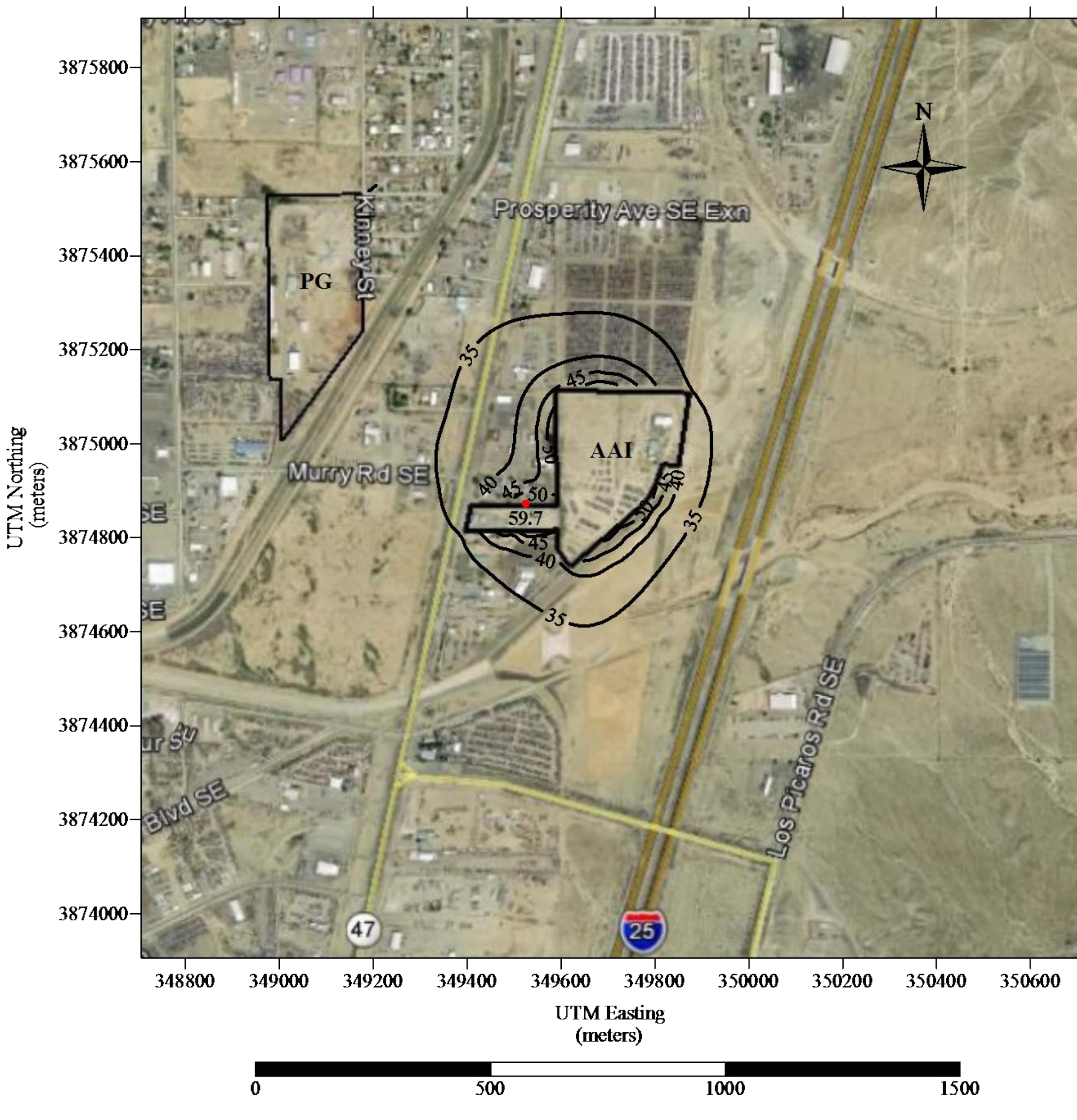

Figure 10: Contour Map of TSP Annual Model Results (µg/m^3)

Modeling File List

Model File Name	Description
AAI CO ROI	AAI Only Sources CO 1 and 8 hour ROI modeling
AAI PM S1 ROI	AAI Only Sources PM2.5 and PM10 24 hour and annual ROI modeling – Scenario 1
AAI TSP S1 ROI	AAI Only Sources TSP 24 hour and annual ROI modeling – Scenario 1

Model File Name	Description
AAI CO	Cumulative CO Modeling – 1 and 8 Hour
AAI PM 24hr Sxx	Cumulative $PM_{2.5}$ and PM_{10} Modeling – 24 Hour - Scenarios 1 through 12
AAI PM25 Annual Sxx	Cumulative $PM_{2.5}$ Modeling – Annual – Scenarios 1 through 12
AAI TSP 24hr Sxx	Cumulative TSP Modeling – 24 Hour – Scenarios 1 through 12
AAI TSP Annual Sxx	Cumulative TSP Modeling – Annual – Scenarios 1 through 12

Excel File Name	Description
Final Model Results	CO, TSP, PM10, PM2.5 model results

MONTROSE
AIR QUALITY SERVICES

Paul Wade <pwade@montrose-env.com>

comments on protocol for Alb Asphalt protocol...planned revision to permit 3291

15 messages

Stonesifer, Jeff W. <JStonesifer@cabq.gov> Wed, Nov 15, 2017 at 4:29 PM
To: "pwade@montrose-env.com" <pwade@montrose-env.com>
Cc: "Dickerson, Lauren H." <ldickerson@cabq.gov>, "Tavarez, Isreal L." <ITavarez@cabq.gov>, "Eyerman, Regan V." <reyerman@cabq.gov>, "dan.alb-asphalt.com (dan@alb-asphalt.com)" <dan@alb-asphalt.com>

Paul,

Our comments on the protocol for the revision to permit #3291 are:

1. Please make sure the RAP secondary crusher has appropriate release height and dimensions

2. If you include the KMA truck traffic emissions in the roads for the HMA (as opposed to creating separate sources), please make sure the report breaks down the percentage of emissions that belong to KMA vs the HMA/RAP vs the concrete batch plant

3. Please explain why the emissions for some of the RAP sources increase (e.g. Raw Material Pile, Feeder, Primary Crusher) with a decreasing throughput 300 TPH → 200 TPH. It's especially curious given that the change in emissions for the secondary crusher reflects the decrease in throughput.

Regards,

Jeff Stonesifer

City of Albuquerque

Environmental Health Department

Staff Meteorologist

(505)767-5624

Paul Wade <pwade@montrose-env.com> Wed, Nov 15, 2017 at 5:22 PM
To: "Stonesifer, Jeff W." <JStonesifer@cabq.gov>
Cc: "Dickerson, Lauren H." <ldickerson@cabq.gov>, "Tavarez, Isreal L." <ITavarez@cabq.gov>, "Eyerman, Regan V." <reyerman@cabq.gov>, "dan.alb-asphalt.com (dan@alb-asphalt.com)" <dan@alb-asphalt.com>

Jeff
Below is the response to your comments.

(1) The RAP secondary crusher for the crusher plant options proposed by Albuquerque Asphalt is just recycling oversized material from the screen back to the primary crusher. So in the model the primary and secondary crusher is the same source location.

(2) The modeling and application will distinguish between the different plant vehicle haul road traffic sources in the model and in the application.

(3) Part of the change for the RAP plant is including the option to crushes concrete. This changes the emission rate by excluding EPAs reduction in emissions due to crushing RAP, which is a 70% reduction for material handling. This is represents the increase in emission rates even though there is a reduction in hourly throughput.

Let me know if you have any additional questions.

Thanks
[Quoted text hidden]
--

MEG Logo_Signature

Paul Wade

Sr. Engineer

Air Quality Services

Class One Technical Services

(an affiliate of Montrose Environmental Group, Inc.)

3500 G Comanche Rd. NE, Albuquerque, NM 87107

T: 505.830.9680 x6 | F: 505.830.9678

PWade@montrose-env.com

www.montrose-env.com

To: Paul Wade <pwade@montrose-env.com>
Cc: "Dickerson, Lauren H." <ldickerson@cabq.gov>, "Tavarez, Isreal L." <ITavarez@cabq.gov>, "Eyerman, Regan V." <reyerman@cabq.gov>, "dan.alb-asphalt.com (dan@alb-asphalt.com)" <dan@alb-asphalt.com>

Stonesifer, Jeff W. <JStonesifer@cabq.gov> Thu, Nov 16, 2017 at 11:07 AM

Paul,

This all sounds good. Please go ahead and submit the modeling when you are ready.

Regards,
Jeff

Attachment G
Public Notice Documents

Richard J. Berry, Mayor

Environmental Health Department
Air Quality Program
Interoffice Memorandum

Mary Lou Leonard, Director

TO: PAUL WADE, SENIOR ENGINEER, MONTROSE ENVIRONMENTAL GROUP

FROM: MELISSA PADILLA, ADMINISTRATIVE ASSISTANT

SUBJECT: DETERMINATION OF NEIGHBORHOOD ASSOCATIONS AND COALITIONS WITHIN 0.5 MILES OF 5028 BROADWAY, ALBUQUERQUE, NM

DATE: 11/14/2017

DETERMINATION:

On 11/14/2017 I used the City of Albuquerque Zoning Advanced Map Viewer (http://sharepoint.cabq.gov/gis) to review which City of Albuquerque (COA) Neighborhood Associations (NAs) and Neighborhood Coalitions (NCs) and which Bernalillo County (BC) NAs and NCs are located within 0.5 miles of 5028 Broadway Blvd SE, Albuquerque in Bernalillo County, NM.

I then used the City of Albuquerque Office of Neighborhood Coordination's Monthly Master NA List dated November 2017 and the Bernalillo County Monthly Neighborhood Association November 2017 Excel file to determine the contact information for each NA and NC located within 0.5 miles of 5028 Broadway Blvd SE, Albuquerque in Bernalillo County, NM.
(X:\ENVIRONMENTAL HEALTH\SHARE\EH-Staff\Permitting Section\Neighborhood Association Lists\2017\November)

The table below contains the contact information which will be used in the applicant's public notice.

COA Association or Coalition	Name	Email or Mailing Address
South Valley Coalition of NAs	Rod Mahoney	rmahoney01@comcast.net
	Marcia Fernandez	mbfernandez1@gmail.com

BC Association or Coalition	Name	Email or Mailing Address
Mountain View NA	Julian Vargas	julianv@gmail.com
	Nora Garcia	ngarcia49@yahoo.com
Mountain View Community Action	Marla Painter	marladesk@gmail.com
	Maria Globus	mlglobus@gmail.com
South Valley Alliance	Zoe Economou	zoecon@unm.edu
	Sara Newton Juarez	snjart@yahoo.com

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Paul Wade <pwade@montrose-env.com>

"Notice of Intent" Significant Revision Permit 3291-4AR-R1

2 messages

Paul Wade <pwade@montrose-env.com> Thu, Nov 30, 2017 at 3:19 PM
To: rmahoney01@comcast.net, mbfernandez1@gmail.com, julianv@gmail.com, ngarcia49@yahoo.com, marladesk@gmail.com, mlglobus@gmail.com, zoecon@unm.edu, snjart@yahoo.com
Cc: Dan Fisher <dan@alb-asphalt.com>

Dear Neighborhood Association/Coalition Representative(s)

This email is sent to you per the requirements of Bernalillo County/City of Albuquerque Air Quality Regulation 20.11.41.B.1 NMAC "Applicant's Public Notice Requirements". The attached "Notice of Intent" (NOI) addresses a modification to "Authority to Construct" permit 3291-4AV-R1 for Albuquerque Asphalts, Inc.'s Broadway HMA Facility. Attached also is the NOI cover letter.

Thank You

--

MEG Logo_Signature

Paul Wade

Sr. Engineer

Air Quality Services

Class One Technical Services

(an affiliate of Montrose Environmental Group, Inc.)

3500 G Comanche Rd. NE, Albuquerque, NM 87107

T: 505.830.9680 x6 | F: 505.830.9678

PWade@montrose-env.com

www.montrose-env.com

2 attachments

AAI HMA NOI Cover Letter.pdf
74K

AAI HMA NOI.pdf
66K

Paul Wade <pwade@montrose-env.com> Thu, Nov 30, 2017 at 4:04 PM
To: rmahoney01@comcast.net, mbfernandez1@gmail.com, julianv@gmail.com, ngarcia49@yahoo.com, marladesk@gmail.com, mlglobus@gmail.com, zoecon@unm.edu, snjart@yahoo.com
Cc: Dan Fisher <dan@alb-asphalt.com>

Please accept this revision of the Notice of Intent. An error was made in transferring the emission rates into the Net Change Table.

Sorry for the inconvenience.

Thank You
[Quoted text hidden]

AAI HMA NOI.pdf
65K

SUBJECT: Public Notice of Proposed Air Quality Construction Permit Application

Dear Neighborhood Association/Coalition Representative(s),

Why did I receive this public notice?
You are receiving this notice in accordance with New Mexico Administrative Code (NMAC) 20.11.41.13.B(1) which requires any applicant seeking an Air Quality Construction Permit pursuant to 20.11.41 NMAC to provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.

What is the Air Quality Permit application review process?
The City of Albuquerque, Environmental Health Department, Air Quality Program (Program) is responsible for the review and issuance of Air Quality Permits for any stationary source of air contaminants within Bernalillo County. Once the application is received, the Program reviews each application and rules it either complete or incomplete. Complete applications will then go through a 30-day public comment period. Within 90 days after the Program has ruled the application complete, the Program shall issue the permit, issue the permit subject to conditions, or deny the requested permit or permit modification. The Program shall hold a Public Information Hearing pursuant to 20.11.41.15 NMAC if the Director determines there is significant public interest and a significant air quality issue is involved.

What do I need to know about this proposed application?

Applicant Name	Albuquerque Asphalt, Inc.
Site or Facility Name	Broadway HMA Plant
Site or Facility Address	202 94th St SW, Albuquerque, NM 87121
New or Existing Source	Existing Source
Anticipated Date of Application Submittal	December 4, 2017
Summary of Proposed Source to Be Permitted	For the permit modification, AAI will take permit conditions on daily HMA operating throughput, will crush both RAP and concrete with the RAP/Concrete crushing plant, the RAP/Concrete crushing plant will decrease throughput from 300 tph to 200 tph and the annual throughput will increase from 315,000 tons per year to 748,800 tons per year, and will allow them to operate one of four potential RAP/Concrete crushing plants for flexibility.

What emission limits and operating schedule are being requested?
See attached Notice of Intent to Construct form for this information.

How do I get additional information regarding this proposed application?
For inquiries regarding the proposed source, contact:

- Dan Fisher
- Dan@alb-asphalt.com
- (505) 831-7311

For inquiries regarding the air quality permitting process, contact:

- City of Albuquerque Environmental Health Department Air Quality Program
- aqd@cabq.gov
- (505) 768-1972

Notice of Intent to Construct

Under 20.11.41.13B NMAC, the owner/operator is required to *provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are with-in one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located* if they propose to construct or establish a new facility or make modifications to an existing facility that is subject to 20.11.41 NMAC – Construction Permits. **A copy of this form must be included with the application.**

Applicant's Name and Address: Albuquerque Asphalt, Inc., 202 94th St SW, Albuquerque, NM 87121

Owner / Operator's Name and Address: Dan Fisher, Vice President of Engineering, 202 94th St SW, Albuquerque, NM 87121

Actual or Estimated Date the Application will be submitted to the Department: December 4, 2017

Exact Location of the Source: 5028 Broadway Blvd SE, Albuquerque, NM

Description of the Source: Hot Mix Asphalt Plant and Recycle Crushing Plant

Nature of the Business: Produce hot mix asphalt cement for road and highway projects, and recycle asphalt and concrete materials.

Change for which the permit is requested: For the permit modification, AAI will take permit conditions on daily HMA operating throughput, will crush both RAP and concrete with the RAP/Concrete crushing plant, the RAP/Concrete crushing plant will decrease throughput from 300 tph to 200 tph and the annual throughput will increase from 315,000 tons per year to 748,800 tons per year, and will allow them to operate one of four potential RAP/Concrete crushing plants for flexibility.

Preliminary Estimate of the Maximum Quantities of each regulated air contaminant the source will emit:

Initial Construction Permit

	Pounds Per Hour (lbs/hr)	Tons Per Year (tpy)
CO	66.2	88.2
NOx	55.0	91.9
SO_2	24.0	28.9
VOC	22.4	26.9
TSP	27.2	29.7
PM10	15.7	17.6
PM2.5	12.2	14.4
VHAP	4.3	4.7

Net Changes In Emissions

(Only for permit Modifications or Technical Revisions)

	lbs/hr	tpy	Estimated Total TPY
CO	-10.6	-23.4	64.8
NOx	-18.9	-39.8	52.1
SO_2	-0.4	-1.7	27.2
VOC	-2.3	-3.9	23.0
TSP	0.8	5.7	35.4
PM10	-0.4	1.6	19.2
PM2.5	-1.0	-0.8	13.6
VHAP	-0.07	-0.01	4.7

Maximum Operating Schedule: 24 hrs/day, 7 days per week, 52 weeks per year.

Normal Operating Schedule: 10 hrs/day, 7 days per week, 52 weeks per year.

Current Contact Information for Comments and Inquires:

Name: Dan Fisher
Address: 202 94th St SW, Albuquerque, NM 87121
Phone Number: (505) 831-7311
E-Mail Address: Dan@alb-asphalt.com

If you have any comments about the construction or operation of the above facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to the address below:

Environmental Health Manager
Stationary Source Permitting
Albuquerque Environmental Health Department
Air Quality Program
PO Box 1293
Albuquerque, New Mexico 87103
(505) 768-1972

Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, as used in this notice or send a copy of this notice along with your comments, since the Department may not have received the permit application at the time of this notice. Please include a legible mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, if required, the Department's notice will be published in the legal section of the Albuquerque Journal and mailed to neighborhood associations and neighborhood coalitions near the facility location or near the facility proposed location.

PROPOSED AIR QUALITY CONSTRUCTION PERMIT

City of Albuquerque, New Mexico, 1706

Albuquerque Environmental Health Department

1. Applicant's Name: Albuquerque Asphalt, Inc. Address: 202 94th. St. SW, Albuquerque, NM 87121

   Owner or Operator's Name: Dan Fisher, Vice President of Engineering

   Owner or Operator's Address: 202 94th. St. SW, Albuquerque, NM 87121

   Actual or Estimated Date the Application will be Submitted to the Department: December 04, 2017

2. Exact Location of the Source or Proposed Source: ~~5208~~ 5028 Broadway Blvd. SE, Albuquerque, NM [redacted]

3. Description of the Source: Hot Mix Asphalt Plant and Recycle Crushing Plant

   Nature of the Business: Produce Hot Mix Asphalt Cement for Road and Highway projects, and Recycle Asphalt and Concrete Materials

   Process or Change for which the permit is being requested: For the permit modification, AAI will take permit conditions on daily HMA operating throughput, will crush both RAP and concrete with the RAP/Concrete crushing plant, the RAP/Concrete crushing plant will decrease throughput from 300 tph to 200 tph and the annual throughput will increase from 315,000 tons per year to 748,800 tons per year, and will allow them to operate one of four potential RAP/Concrete crushing plants for flexibility.

   Preliminary Estimate of the Maximum Quantities of each regulated air contaminant the source will emit:

Initial Construction Permit

	Pounds Per Hour (lbs/hr)	Tons Per Year (tpy)
CO	66.2	88.2
NOx	55.0	91.9
SO2	24.0	28.9
VOC	22.4	26.9
TSP	27.2	29.7
PM10	15.7	17.6
PM2.5	12.2	14.4
VHAP	4.3	4.7

Net Changes In Emissions

(for permit Modifications or Technical Revisions)

	Pounds Per Hour (lbs/hr)	Tons Per Year (tpy)	Estimated Total Tons Per Year
CO	+/- [redacted] -10.6	+/- [redacted] -23.4	[redacted] 64.8
NOx	+/- [redacted] -18.9	+/- [redacted] -39.8	[redacted] 52.1
SO2	+/- [redacted] -0.4	+/- [redacted] -1.7	[redacted] 27.2
VOC	+/- [redacted] -2.3	+/- [redacted] -3.9	[redacted] 23.0
TSP	+/- [redacted] +0.8	+/- [redacted] +5.7	[redacted] 35.4
PM10	+/- [redacted] -0.4	+/- [redacted] +1.6	[redacted] 19.2
PM2.5	+/- [redacted] -1.0	+/- [redacted] -0.8	[redacted] 13.6
VHAP	+/- -0.07	+/- -0.01	4.7

4. Maximum Operating Schedule: 24 hrs/day, 7 days per week, 52 weeks per year.

   Normal Operating Schedule: 10 hrs/day, 7 days per week, 52 weeks per year

5. Current Contact Information for Comments and Inquires:

   Name: Dan Fisher

   Address: 202 94th. St. SW, Albuquerque, NM 87121

   Phone Number: (505) 831-7311

   E-Mail Address: dan@alb-asphalt.com

City of Albuquerque - Environmental Health Department - Air Quality Program - Stationary Source Permitting
Phone Number (505) 768-1972 E-Mail Address: aqd@cabq.gov

THIS SIGN SHALL REMAIN POSTED UNTIL THE DEPARTMENT TAKES FINAL ACTION ON THE PERMIT APPLICATION


HCZU 292860 6
22G1