20.2.72 NMAC
AIR QUALITY
PERMIT APPLICATION

For

ASSOCIATED ASPHALT AND MATERIALS, LLC

Associated Asphalt and Materials, LLC

3810 Oliver Road • Santa Fe, NM 87507
Office: (505) 438-0390 • Fax: (505) 474-7392
info@associatedasphaltandmaterials.com

SANTA FE FACILITY
Santa Fe, NM

New NSR Permit Application

PREPARED BY
MONTROSE AIR QUALITY SERVICES, LLC
ALBUQUERQUE, NM
NOVEMBER 2019

Mail Application To:		For Department use only:
New Mexico Environment Department Air Quality Bureau Permits Section 525 Camino de los Marquez, Suite 1 Santa Fe, New Mexico, 87505 Phone: (505) 476-4300 Fax: (505) 476-4375 www.env.nm.gov/aqb		AIRS No.:

Universal Air Quality Permit Application

Use this application for NOI, NSR, or Title V sources.

Use this application for: the initial application, modifications, technical revisions, and renewals. For technical revisions, complete Sections, 1-A, 1-B, 2-E, 3, 9 and any other sections that are relevant to the requested action; coordination with the Air Quality Bureau permit staff prior to submittal is encouraged to clarify submittal requirements and to determine if more or less than these sections of the application are needed. Use this application for streamline permits as well. See Section 1-I for submittal instructions for other permits.

This application is submitted as (check all that apply): ☐ Request for a No Permit Required Determination (no fee)
☐ **Updating** an application currently under NMED review. Include this page and all pages that are being updated (no fee required).
Construction Status: **X** Not Constructed ☐ Existing Permitted (or NOI) Facility ☐ Existing Non-permitted (or NOI) Facility
Minor Source: ☐ a NOI 20.2.73 NMAC **X** 20.2.72 NMAC application or revision ☐ 20.2.72.300 NMAC Streamline application
Title V Source: ☐ Title V (new) ☐ Title V renewal ☐ TV minor mod. ☐ TV significant mod. TV Acid Rain: ☐ New ☐ Renewal
PSD Major Source: ☐ PSD major source (new) ☐ minor modification to a PSD source ☐ a PSD major modification

Acknowledgements:

X I acknowledge that a pre-application meeting is available to me upon request. ☐ Title V Operating, Title IV Acid Rain, and NPR applications have no fees.

X $500 NSR application Filing Fee enclosed OR ☐ The full permit fee associated with 10 fee points (required w/ streamline applications).

X Check No.: ______ in the amount of $500

X I acknowledge the required submittal format for the hard copy application is printed double sided 'head-to-toe', 2-hole punched (except the Sect. 2 landscape tables is printed 'head-to-head'), numbered tab separators. Incl. a copy of the check on a separate page.

☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance program (SBEAP) and qualifies for 50% of the normal application and permit fees. Enclosed is a check for 50% of the normal application fee which will be verified with the Small Business Certification Form for your company.

☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance Program (SBEAP) but does not qualify for 50% of the normal application and permit fees. To see if you qualify for SBEAP assistance and for the small business certification form go to https://www.env.nm.gov/aqb/sbap/small_business_criteria.html).

Citation: Please provide the **low level citation** under which this application is being submitted: **20.2.72.200.A NMAC**
(e.g. application for a new minor source would be 20.2.72.200.A NMAC, one example for a Technical Permit Revision is 20.2.72.219.B.1.b NMAC, a Title V acid rain application would be: 20.2.70.200.C NMAC)

Section 1 – Facility Information

Section 1-A: Company Information		AI # if known (see 1st 3 to 5 #s of permit IDEA ID No.):	Updating Permit/NOI #: New
1	Facility Name: Santa Fe Facility	Plant primary SIC Code (4 digits): HMA – 2951; Crusher – 1429, 1442 Plant NAIC code (6 digits): HMA – 324121; Crusher – 212319, 212321	
a	Facility Street Address (If no facility street address, provide directions from a prominent landmark): 86 Paseo De River, Santa Fe, NM 87507		
2	Plant Operator Company Name: Associated Asphalt and Materials, LLC	Phone/Fax: (505) 474-7094 / (505) 474-7392	
a	Plant Operator Address: 3810 Oliver Rd. Santa Fe, NM 87507		
b	Plant Operator's New Mexico Corporate ID or Tax ID: 45-5344393		

3	Plant Owner(s) name(s): Associated Asphalt and Materials, LLC	Phone/Fax: (505) 474-7094 / (505) 474-7392	
a	Plant Owner(s) Mailing Address(s): 3810 Oliver Rd. Santa Fe, NM 87507		
4	Bill To (Company): Associated Asphalt and Materials, LLC	Phone/Fax: (505) 474-7094 / (505) 474-7392	
a	Mailing Address: 3810 Oliver Rd. Santa Fe, NM 87507	E-mail: tarchuleta@espmerc.com	
5	☐ Preparer: X Consultant: Paul Wade, Montrose Air Quality Services, LLC	Phone/Fax: (505) 830-9680 x6 / (505) 830-9678	
a	Mailing Address: 3500 Comanche Rd NE, Suite G, Albuquerque, NM 87107	E-mail: pwade@montrose-env.com	
6	Plant Operator Contact: Kenny Gallegos	Phone/Fax: (505) 901-0360 / (505) 474-7392	
a	Address: 3810 Oliver Rd. Santa Fe, NM 87507	E-mail: E-mail: kgallegos@espmerc.com	
7	Air Permit Contact: Matt Lane	Title: Environmental Specialist	
a	E-mail: mlane@espmerc.com	Phone/Fax: (505) 490-0887 / (505) 474-7392	
b	Mailing Address: 3810 Oliver Rd. Santa Fe, NM 87507		
c	The designated Air permit Contact will receive all official correspondence (i.e. letters, permits) from the Air Quality Bureau.		

Section 1-B: Current Facility Status

1.a	Has this facility already been constructed? ☐ Yes **X** No	1.b If yes to question 1.a, is it currently operating in New Mexico? ☐ Yes ☐ No
2	If yes to question 1.a, was the existing facility subject to a Notice of Intent (NOI) (20.2.73 NMAC) before submittal of this application? ☐ Yes ☐ No	If yes to question 1.a, was the existing facility subject to a construction permit (20.2.72 NMAC) before submittal of this application? ☐ Yes ☐ No
3	Is the facility currently shut down? ☐ Yes **X** No	If yes, give month and year of shut down (MM/YY):
4	Was this facility constructed before 8/31/1972 and continuously operated since 1972? ☐ Yes **X** No	
5	If Yes to question 3, has this facility been modified (see 20.2.72.7.P NMAC) or the capacity increased since 8/31/1972? ☐Yes ☐No **X**N/A	
6	Does this facility have a Title V operating permit (20.2.70 NMAC)? ☐ Yes **X** No	If yes, the permit No. is: P-
7	Has this facility been issued a No Permit Required (NPR)? ☐ Yes **X** No	If yes, the NPR No. is:
8	Has this facility been issued a Notice of Intent (NOI)? ☐ Yes **X** No	If yes, the NOI No. is:
9	Does this facility have a construction permit (20.2.72/20.2.74 NMAC)? ☐ Yes **X** No	If yes, the permit No. is:
10	Is this facility registered under a General permit (GCP-1, GCP-2, etc.)? ☐ Yes **X** No	If yes, the register No. is:

Section 1-C: Facility Input Capacity & Production Rate

1	What is the facility's maximum input capacity, specify units (reference here and list capacities in Section 20, if more room is required)						
a	Current	Hourly:		Daily:		Annually:	
b	Proposed	Hourly:	Plant #2 HMA – 150 tons Plant #5 HMA – 300 tons Crush/Screen Plant – 200 tons Scalping Screen – 50 tons	Daily:	Plant #2 HMA – 1800 tons Plant #5 HMA – 3600 tons Crush/Screen Plant – 2900 tons Scalping Screen – 725 tons	Annually:	Plant #2 HMA – 190,000 tons Plant #5 HMA – 750,000 tons Crush/Screen Plant – 400,000 tons Scalping Screen – 100,000 tons
2	What is the facility's maximum production rate, specify units (reference here and list capacities in Section 20, if more room is required)						
a	Current	Hourly:		Daily:		Annually:	

b	Proposed	Hourly:	Plant #2 HMA – 150 tons Plant #5 HMA – 300 tons Crush/Screen Plant – 200 tons Scalping Screen – 50 tons	Daily:	Plant #2 HMA – 1800 tons Plant #5 HMA – 3600 tons Crush/Screen Plant – 2900 tons Scalping Screen – 725 tons	Annually:	Plant #2 HMA – 190,000 tons Plant #5 HMA – 750,000 tons Crush/Screen Plant – 400,000 tons Scalping Screen – 100,000 tons

Section 1-D: Facility Location Information

1	Section: 2, 11	Range: 8E	Township: 16N	County: Santa Fe	Elevation (ft): 6365
2	UTM Zone: ☐ 12 or **X** 13			Datum: ☐ NAD 27 **X** NAD 83 ☐ WGS 84	
a	UTM E (in meters, to nearest 10 meters): 403,000			UTM N (in meters, to nearest 10 meters): 3,944,800	
b	AND Latitude (deg., min., sec.): 35°, 38', 32.150" N			Longitude (deg., min., sec.): 106°, 04', 17.088" W	
3	Name and zip code of nearest New Mexico town: Santa Fe, NM 87507				
4	Detailed Driving Instructions from nearest NM town (attach a road map if necessary): From the intersection of Airport Rd. and Veteran's Memorial Hwy in Santa Fe, NM travel west on Airport Rd. for 0.18 miles to Colony Dr. Turn north on Colony Dr for 0.1 miles and turn east on Paseo de River. Travel on Paseo del River for 0.7 miles to the site.				
5	The facility is 0.7 miles north of the intersection of Airport Rd. and Veteran's Memorial Hwy in Santa Fe, NM				
6	Status of land at facility (check one): **X** Private ☐ Indian/Pueblo ☐ Federal BLM ☐ Federal Forest Service ☐ Other (specify)				
7	List all municipalities, Indian tribes, and counties within a ten (10) mile radius (20.2.72.203.B.2 NMAC) of the property on which the facility is proposed to be constructed or operated: Santa Fe				
8	**20.2.72** NMAC applications **only**: Will the property on which the facility is proposed to be constructed or operated be closer than 50 km (31 miles) to other states, Bernalillo County, or a Class I area (see www.env.nm.gov/aqb/modeling/class1areas.html)? ☐ Yes **X** No (20.2.72.206.A.7 NMAC) If yes, list all with corresponding distances in kilometers:				
9	Name nearest Class I area: Bandelier Wilderness Area				
10	Shortest distance (in km) from facility boundary to the boundary of the nearest Class I area (to the nearest 10 meters): 19.85 km				
11	Distance (meters) from the perimeter of the Area of Operations (AO is defined as the plant site inclusive of all disturbed lands, including mining overburden removal areas) to nearest residence, school or occupied structure: 190 meters, East				
12	Method(s) used to delineate the Restricted Area: Fencing and Signage "**Restricted Area**" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area.				
13	Does the owner/operator intend to operate this source as a portable stationary source as defined in 20.2.72.7.X NMAC? ☒ Yes ☐ No A portable stationary source is not a mobile source, such as an automobile, but a source that can be installed permanently at one location or that can be re-installed at various locations, such as a hot mix asphalt plant that is moved to different job sites.				
14	Will this facility operate in conjunction with other air regulated parties on the same property? ☒ No ☐ Yes If yes, what is the name and permit number (if known) of the other facility?				

Section 1-E: Proposed Operating Schedule (The 1-E.1 & 1-E.2 operating schedules may become conditions in the permit.)

1	Facility **maximum** operating ($\frac{hours}{day}$): 24	($\frac{days}{week}$): 7		($\frac{weeks}{year}$): 52	($\frac{hours}{year}$): 7680	
2	Facility's maximum daily operating schedule (if less than 24 $\frac{hours}{day}$)?	Start:	☐AM ☐PM	End:		☐AM ☐PM
3	Month and year of anticipated start of construction:					
4	Month and year of anticipated construction completion:					
5	Month and year of anticipated startup of new or modified facility:					

6	Will this facility operate at this site for more than one year? **X** Yes ☐ No

Section 1-F: Other Facility Information

1	Are there any current Notice of Violations (NOV), compliance orders, or any other compliance or enforcement issues related to this facility? ☐ Yes **X** No If yes, specify:		
a	If yes, NOV date or description of issue:		NOV Tracking No:
b	Is this application in response to any issue listed in 1-F, 1 or 1a above? ☐ Yes ☐ No If Yes, provide the 1c & 1d info below:		
c	Document Title:	Date:	Requirement # (or page # and paragraph #):
d	Provide the required text to be inserted in this permit:		
2	Is air quality dispersion modeling or modeling waiver being submitted with this application? **X** Yes ☐ No		
3	Does this facility require an "Air Toxics" permit under 20.2.72.400 NMAC & 20.2.72.502, Tables A and/or B? ☐ Yes **X** No		
4	Will this facility be a source of federal Hazardous Air Pollutants (HAP)? **X** Yes ☐ No		
a	If Yes, what type of source? ☐ **Major** (☐ $\geq$10 tpy of any single HAP **OR** ☐ $\geq$25 tpy of any combination of HAPS) **OR** **X Minor** (☐ <10 tpy of any single HAP **AND** **X** <25 tpy of any combination of HAPS)		
5	Is any unit exempt under 20.2.72.202.B.3 NMAC? ☐ Yes **X** No		
a	If yes, include the name of company providing commercial electric power to the facility: ___________________________ Commercial power is purchased from a commercial utility company, which specifically does not include power generated on site for the sole purpose of the user.		

Section 1-G: Streamline Application

(This section applies to 20.2.72.300 NMAC Streamline applications only)

1	☐ I have filled out Section 18, "Addendum for Streamline Applications." ☐ N/A (This is not a Streamline application.)

Section 1-H: Current Title V Information - Required for all applications from TV Sources

(Title V-source required information for all applications submitted pursuant to 20.2.72 NMAC (Minor Construction Permits), or 20.2.74/20.2.79 NMAC (Major PSD/NNSR applications), and/or 20.2.70 NMAC (Title V))

1	Responsible Official (R.O.) (20.2.70.300.D.2 NMAC):		Phone:
a	R.O. Title:	R.O. e-mail:	
b	R. O. Address:		
2	Alternate Responsible Official (20.2.70.300.D.2 NMAC):		Phone:
a	A. R.O. Title:	A. R.O. e-mail:	
b	A. R. O. Address:		
3	Company's Corporate or Partnership Relationship to any other Air Quality Permittee (List the names of any companies that have operating (20.2.70 NMAC) permits and with whom the applicant for this permit has a corporate or partnership relationship):		
4	Name of Parent Company ("Parent Company" means the primary name of the organization that owns the company to be permitted wholly or in part.):		
a	Address of Parent Company:		
5	Names of Subsidiary Companies ("Subsidiary Companies" means organizations, branches, divisions or subsidiaries, which are owned, wholly or in part, by the company to be permitted.):		
6	Telephone numbers & names of the owners' agents and site contacts familiar with plant operations:		

7	Affected Programs to include Other States, local air pollution control programs (i.e. Bernalillo) and Indian tribes: Will the property on which the facility is proposed to be constructed or operated be closer than 80 km (50 miles) from other states, local pollution control programs, and Indian tribes and pueblos (20.2.70.402.A.2 and 20.2.70.7.B)? If yes, state which ones and provide the distances in kilometers:

Section 1-I – Submittal Requirements

Each 20.2.73 NMAC (**NOI**), a 20.2.70 NMAC (**Title V**), a 20.2.72 NMAC (**NSR** minor source), or 20.2.74 NMAC (**PSD**) application package shall consist of the following:

Hard Copy Submittal Requirements:

1) One hard copy **original signed and notarized application package printed double sided 'head-to-toe' 2-hole punched** as we bind the document on top, not on the side; except Section 2 (landscape tables), which should be head-to-head. Please use **numbered tab separators** in the hard copy submittal(s) as this facilitates the review process. For NOI submittals only, hard copies of UA1, Tables 2A, 2D & 2F, Section 3 and the signed Certification Page are required. Please include a copy of the check on a separate page.

2) If the application is for a minor NSR, PSD, NNSR, or Title V application, include one working hard **copy** for Department use. This copy should be printed in book form, 3-hole punched, and **must be double sided**. Note that this is in addition to the head-to-to 2-hole punched copy required in 1) above. Minor NSR Technical Permit revisions (20.2.72.219.B NMAC) only need to fill out Sections 1-A, 1-B, 3, and should fill out those portions of other Section(s) relevant to the technical permit revision. TV Minor Modifications need only fill out Sections 1-A, 1-B, 1-H, 3, and those portions of other Section(s) relevant to the minor modification. NMED may require additional portions of the application to be submitted, as needed.

3) The entire NOI or Permit application package, including the full modeling study, should be submitted electronically. Electronic files for applications for NOIs, any type of General Construction Permit (GCP), or technical revisions to NSRs must be submitted with compact disk (CD) or digital versatile disc (DVD). For these permit application submittals, **two** CD copies are required (in sleeves, not crystal cases, please), with additional CD copies as specified below. NOI applications require only a single CD submittal. Electronic files for other New Source Review (construction) permits/permit modifications or Title V permits/permit modifications can be submitted on CD/DVD or sent through AQB's secure file transfer service.

Electronic files sent by (check one):

X CD/DVD attached to paper application

☐ secure electronic transfer. Air Permit Contact Name____________________________

Email______________________________

Phone number _______________________

a. If the file transfer service is chosen by the applicant, after receipt of the application, the Bureau will email the applicant with instructions for submitting the electronic files through a secure file transfer service. Submission of the electronic files through the file transfer service needs to be completed within 3 business days after the invitation is received, so the applicant should ensure that the files are ready when sending the hard copy of the application. The applicant will not need a password to complete the transfer. **Do not use the file transfer service for NOIs, any type of GCP, or technical revisions to NSR permits.**

4) Optionally, the applicant may submit the files with the application on compact disk (CD) or digital versatile disc (DVD) following the instructions above and the instructions in 5 for applications subject to PSD review.

5) If **air dispersion modeling** is required by the application type, include the **NMED Modeling Waiver** and/or electronic air dispersion modeling report, input, and output files. The dispersion modeling ***summary report only*** should be submitted as hard copy(ies) unless otherwise indicated by the Bureau.

6) If the applicant submits the electronic files on CD and the application is subject to PSD review under 20.2.74 NMAC (PSD) or NNSR under 20.2.79 NMC include,
   a. one additional CD copy for US EPA,
   b. one additional CD copy for each federal land manager affected (NPS, USFS, FWS, USDI) and,
   c. one additional CD copy for each affected regulatory agency other than the Air Quality Bureau.

   If the application is submitted electronically through the secure file transfer service, these extra CDs do not need to be submitted.

Electronic Submittal Requirements [in addition to the required hard copy(ies)]:

1) All required electronic documents shall be submitted as 2 separate CDs or submitted through the AQB secure file transfer service. Submit a single PDF document of the entire application as submitted and the individual documents comprising the application.

2) The documents should also be submitted in Microsoft Office compatible file format (Word, Excel, etc.) allowing us to access the text and formulas in the documents (copy & paste). Any documents that cannot be submitted in a Microsoft Office compatible

format shall be saved as a PDF file from within the electronic document that created the file. If you are unable to provide Microsoft office compatible electronic files or internally generated PDF files of files (items that were not created electronically: i.e. brochures, maps, graphics, etc,), submit these items in hard copy format. We must be able to review the formulas and inputs that calculated the emissions.

3) It is preferred that this application form be submitted as 4 electronic files (3 MSWord docs: Universal Application section 1 [UA1], Universal Application section 3-19 [UA3], and Universal Application 4, the modeling report [UA4]) and 1 Excel file of the tables (Universal Application section 2 [UA2]). Please include as many of the 3-19 Sections as practical in a single MS Word electronic document. Create separate electronic file(s) if a single file becomes too large or if portions must be saved in a file format other than MS Word.

4) The electronic file names shall be a maximum of 25 characters long (including spaces, if any). The format of the electronic Universal Application shall be in the format: "A-3423-FacilityName". The "A" distinguishes the file as an application submittal, as opposed to other documents the Department itself puts into the database. Thus, all electronic application submittals should begin with "A-". Modifications to existing facilities should use the core permit number (i.e. '3423') the Department assigned to the facility as the next 4 digits. Use 'XXXX' for new facility applications. The format of any separate electronic submittals (additional submittals such as non-Word attachments, re-submittals, application updates) and Section document shall be in the format: "A-3423-9-description", where "9" stands for the section # (in this case Section 9-Public Notice). Please refrain, as much as possible, from submitting any scanned documents as this file format is extremely large, which uses up too much storage capacity in our database. Please take the time to fill out the header information throughout all submittals as this will identify any loose pages, including the Application Date (date submitted) & Revision number (0 for original, 1, 2, etc.; which will help keep track of subsequent partial update(s) to the original submittal. Do not use special symbols (#, @, etc.) in file names. The footer information should not be modified by the applicant.

Table of Contents

Table 2-A: Regulated Emission Sources

Unit and stack numbering must correspond throughout the application package. If applying for a NOI under 20.2.73 NMAC, equipment exemptions under 2.72.202 NMAC do not apply.

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] Date of Construction/ Reconstruction[2]	Controlled by Unit # Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
P2HMAP	Cold Aggregate Storage Pile	NA	NA	NA	NA	139.1 TPH	NA TBD	NA NA	30500203	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2HMABIN	Feed Bin	Peerless	S-140	UNK	139.1 TPH	139.1 TPH	1962 TBD	NA NA	30500216	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2HMATP1	Feed Bin Conveyor	Peerless	S-140	UNK	139.1 TPH	139.1 TPH	1962 TBD	C1 NA	30500217	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2HMATP2	Transfer Conveyor	Peerless	S-140	UNK	141.3 TPH	141.3 TPH	1962 TBD	C1 NA	30500217	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2HMATP3	Sling Conveyor	Peerless	24" x 60'	UNK	141.3 TPH	141.3 TPH	1962 TBD	C1 NA	30500217	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2HMAFIL	Mineral Filler Silo and Baghouse	McNeilus	40 ton / 900 cf / 225 bbl	UNK	25 TPH	25 TPH; 5625 TPY	1962 TBD	C7 1	30500213	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2HMASTK	Drum Dryer	Stansteel	830	72-6010	141.3 TPH	141.3 TPH	1962 TBD	C8 2	30500201	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
	Drum Bucket Elevator	Stansteel	R-M50	942	141.3 TPH	141.3 TPH	1962 TBD	C8 2	30500201	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
	Hot Screens	Stansteel	48" x 14'	F27-323H	141.3 TPH	141.3 TPH	1962 TBD	C8 2	30500201	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
	Weigh Hoppers (3)	Stansteel	R-M50	942	141.3 TPH	141.3 TPH	1962 TBD	C8 2	30500201	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
	Asphalt Mixer (Pugmill)	Stansteel	RMF 5000	942	150 TPH	150 TPH	1962 TBD	C8 2	30500201	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2BATCHUL	Asphalt Mixer Unloading	Stansteel	R-M50	942	150 TPH	150 TPH	1962 TBD	NA NA	30500213	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2HMAHT	Asphalt Heater	CEI	C1000	H-563	8.46 MMBtu	8.46 MMBtu	UNK TBD	NA 3	30500208	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2HMAS	Asphalt Cement Storage Tanks (2)	CEI - Chattanooga / shop built	AT-106-OB / unk	02573-201/ unk	25,000 Gallons Each	25,000 Gallons Each	1973 / unk TBD	NA NA	30500212	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2TRCK	Haul Road Traffic	NA	NA	NA	NA	161 trucks/day	NA TBD	C5, C6 NA	30602011	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufacturer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] Date of Construction/ Reconstruction[2]	Controlled by Unit # Emissions vented to Stack #	Source Classification Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
P2YARD	Yard	NA	NA	NA	NA	150 TPH	NA TBD	NA NA	30502014	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMAP	Cold Aggregate Storage Pile	NA	NA	NA	NA	278.1 TPH	NA TBD	NA NA	30500203	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMABIN	Feed Bin	CMI	PAB432	138	278.1 TPH	278.1 TPH	1989 TBD	NA NA	30500216	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
	Auxiliary Feed Bin	CEI	RABP SS1	C12-006			1989 TBD	NA NA	30500216	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMATP1	Feed Bin Conveyor	CMI	PAB432	138	278.1 TPH	278.1 TPH	1989 TBD	C1 NA	30500217	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
	Auxiliary Feed Bin Conveyor	CEI	RABP SS1	C12-006			1989 TBD	C1 NA	30500217	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMASCR	Scalping Screen	SMICO	4 x 8 Gyrette Singledec	159	278.1 TPH	278.1 TPH	1989 TBD	C3 NA	30500204	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMATP2	Scalping Screen Conveyor	CMI	TPC-SE3047	159	278.1 TPH	278.1 TPH	1989 TBD	C1 NA	30500217	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMAPUG	Pug Mill	Kolberg	1748-4	215-1745-4-85	282.6 TPH	282.6 TPH	1989 TBD	C1 NA	30500204	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMATP3	Pug Mill Conveyor	CMI	Transfer Conveyor	106	282.6 TPH	282.6 TPH	1989 TBD	C1 NA	30500217	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMATP4	Conveyor Transfer to Slinger Conveyor	CMI	weigh belt	106	282.6 TPH	282.6 TPH	1989 TBD	C1 NA	30500217	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMAFIL	Mineral Filler Silo and Baghouse	Free Flow	SE 550	104	25 TPH	25 TPH; 5625 TPY	1989 TBD	C7 4	30500213	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMASTK	Drum Dryer and Baghouse	CMI / CMI	PVM 10X / APM900	106 / 128	300 TPH	300 TPH	1989 TBD	C9 5	30500201	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5DRUMUL	Incline Conveyor	CMI	SE184	105	300 TPH	300 TPH	1989 TBD	NA NA	30500221	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P2SILOUL	Asphalt Silo	CMI	SE185	105	300 TPH	300 TPH	UNK TBD	NA NA	30500213	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] Date of Construction/ Reconstruction[2]	Controlled by Unit # Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
P5HMAHT	Asphalt Heater	CEI	CE 1500A	H80187	1.41 MMBtu	1.41 MMBtu	NA TBD	NA 6	30500208	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5HMAS	Asphalt Cement Storage Tanks (2)	CMI / Childers	CT25P / unk	106 / unk	25,000 Gallons Each	25,000 Gallons Each	NA TBD	NA NA	30500212	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5TRCK	Haul Road Traffic	NA	NA	NA	NA	323 trucks/day	NA TBD	C5, C6 NA	30602011	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
P5YARD	Yard	NA	NA	NA	NA	300 TPH	NA TBD	NA NA	30502014	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_RAW	Crusher/Screen Plant Raw Material	NA	NA	NA	NA	200 TPH	NA TBD	NA NA	30502007	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_FP	Crusher/Screen Plant Feeder	Simplicity	44" x 17'	4518-0F95F5467	200 TPH	200 TPH	2001 TBD	NA NA	30502031	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH	Crusher/Screen Plant Crusher	Cedarapids	4340 HIS Crusher	H4340-9	200 TPH	200 TPH	2001 TBD	C2 NA	30502001	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_C1	Crusher/Screen Plant Conveyor	Excel	40' x 42"	J0801589D	200 TPH	200 TPH	2001 TBD	C1 NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_S	Crusher/Screen Plant Screen	Svedala	5' x 16', 2-deck	26A632	200 TPH	200 TPH	2001 TBD	C3 NA	30502015	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_SC1	Crusher/Screen Plant Screen Conveyor	Excel	24" x 24'	J0801589D	200 TPH	200 TPH	2001 TBD	C1 NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_RC	Crusher/Screen Plant Return Conveyor	Excel	24" x 25'	J0801589D	200 TPH	200 TPH	2001 TBD	C1 NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_SC2	Crusher/Screen Plant Screen Conveyor	Excel	36" x 30'	J0801589D	200 TPH	200 TPH	2001 TBD	C1 NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_C2	Crusher/Screen Plant Conveyor	shopbuilt	36" x 60'	NA	200 TPH	200 TPH	UNK TBD	C1 NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_C3	Crusher/Screen Plant Conveyor	shopbuilt	36" x 60'	NA	200 TPH	200 TPH	UNK TBD	C1 NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_STK	Crusher/Screen Stacker Conveyor Drop to Pile	shopbuilt	36" x 60'	NA	200 TPH	200 TPH	UNK TBD	C4 NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
CH_FP	Crusher/Screen Finish Product Storage Pile	NA	NA	NA	NA	200 TPH	NA / TBD	NA / NA	30502007	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
CH_E	Crusher/Screen Plant Generator	Caterpillar	3406B / 580MDL 1166	LM-362146-0601	360 HP	360 HP	2001 / TBD	NA / 7	30502099	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	
SS_RAW	Scalping Screen Plant Raw Material	NA	NA	NA	NA	50 TPH	NA / TBD	NA / NA	30502007	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
SS_F	Scalping Screen Plant Feeder	CEC	Screen-It 710 Boxer	6344	50 TPH	50 TPH	NA / TBD	NA / NA	30502031	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
SS	Scalping Screen Plant Screen	CEC	Screen-It 710 Boxer	6344	50 TPH	50 TPH	2006 / TBD	C3 / NA	30502015	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
SS_C	Scalping Screen Plant Conveyor	CEC	Screen-It 710 Boxer	6344	50 TPH	50 TPH	2006 / TBD	C1 / NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
SS_STK	Scalping Screen Conveyor Drop to Pile	shopbuilt	36" x 60'	NA	50 TPH	50 TPH	2006 / TBD	C4 / NA	30502006	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
SS_FP	Scalping Screen Finish Product Storage Pile	NA	NA	NA	NA	50 TPH	NA / TBD	NA / NA	30502007	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
SS_E	Scalping Sreen Plant Engine	Duetz	F31913	8738237	55 HP	55 HP	2006 / TBD	NA / 8	30502099	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	
CSHTRCK	Paved Haul Road Traffic - Crushing	NA	NA	NA	NA	161 trucks/day	NA / TBD	C6 / NA	30602011	☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		

[1] Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.
[2] Specify dates required to determine regulatory applicability.
[3] To properly account for power conversion efficiencies, generator set rated capacity shall be reported as the rated capacity of the engine in horsepower, not the kilowatt capacity of the generator set.
[4] "4SLB" means four stroke lean burn engine, "4SRB" means four stroke rich burn engine, "2SLB" means two stroke lean burn engine, "CI" means compression ignition, and "SI" means spark ignition

Table 2-B: Insignificant Activities[1] (20.2.70 NMAC) OR Exempted Equipment (20.2.72 NMAC)

All 20.2.70 NMAC (Title V) applications must list all Insignificant Activities in this table. All 20.2.72 NMAC applications must list Exempted Equipment in this table. If equipment listed on this table is exempt under 20.2.72.202.B.5, include emissions calculations and emissions totals for 202.B.5 "similar functions" units, operations, and activities in Section 6, Calculations. Equipment and activities exempted under 20.2.72.202 NMAC may not necessarily be Insignificant under 20.2.70 NMAC (and vice versa). Unit & stack numbering must be consistent throughout the application package. Per Exemptions Policy 02-012.00 (see http://www.env.nm.gov/aqb/permit/aqb_pol.html), 20.2.72.202.B NMAC Exemptions do not apply, but 20.2.72.202.A NMAC exemptions do apply to NOI facilities under 20.2.73 NMAC. List 20.2.72.301.D.4 NMAC Auxiliary Equipment for Streamline applications in Table 2-A. The List of Insignificant Activities (for TV) can be found online at http://www.env.nm.gov/aqb/forms/InsignificantListTitleV.pdf . TV sources may elect to enter both TV Insignificant Activities and Part 72 Exemptions on this form.

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction[2]	For Each Piece of Equipment, Check Onc
			Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction[2]	
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
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							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

[1] Insignificant activities exempted due to size or production rate are defined in 20.2.70.300.D.6, 20.2.70.7.Q NMAC, and the NMED/AQB List of Insignificant Activities, dated September 15, 2008. Emissions from these insignificant activities do not need to be reported, unless specifically requested.

[2] Specify date(s) required to determine regulatory applicability.

Table 2-C: Emissions Control Equipment

Unit and stack numbering must correspond throughout the application package. Only list control equipment for TAPs if the TAP's maximum uncontrolled emissions rate is over its respective threshold as listed in 20.2.72 NMAC, Subpart V, Tables A and B. In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions.

Control Equipment Unit No.	Control Equipment Description	Date Installed	Controlled Pollutant(s)	Controlling Emissions for Unit Number(s)[1]	Efficiency (% Control by Weight)	Method used to Estimate Efficiency
C1	Conveyor Transfer Points - Wet Dust Suppression System	TBD	Particulate	P2HMATP1, P2HMATP2, P2HMATP3, P5HMATP1, P5HMATP2, P5HMAPUG, P5HMATP3, P5HMATP4, CH_C1, CH_SC1, CH_RC, CH_SC2, CH_C2,CH_C3, SS_C	PM - 95.33%	AP-42 11.19.2 Emission Factors
C2	Crushers - Wet Dust Suppression System	TBD	Particulate	CH	PM - 77.78%	AP-42 11.19.2 Emission Factors
C3	Screen - Wet Dust Suppression System	TBD	Particulate	CH_S, SS	PM - 91.20%	AP-42 11.19.2 Emission Factors
C4	Conveyor Transfer to Storage Piles - Soil Moisture Content	TBD	Particulate	CH_STK, SS_STK	2.88% Soil Moisture Content 40% - Control	High Range AP-42 11.19.2
C5	Unpaved Roads - Asphalt Millings, Surfactant, and Water	TBD	Particulate	Aggregate, Mineral Filler, Asphalt Cement to HMA - P2TRCK, P5TRCK (Model ID AGG_)	90%	NMED Policy
C6	Paved Roads - Sweeped or Water Washing	TBD	Particulate	Main Access Road - P2TRCK, P5TRCK, CRHTRCK (Model ID PAV_, PCSH_)	Silt Loading - 0.6 g/M^2	AP-42 13.2.1-2 Emission Input (Ubiquitous Baseline < 500)
C7	Silo Baghouse	TBD	Particulate	P2HMAFIL, P5HMAFIL	99%	Low End of Filter Control Efficiency
C8	Batch Plant Baghouse	TBD	Particulate	P2HMASTK, P5HMASTK	99.88%	AP-42 11.1 Emission Factors
C9	Drum Mixer Baghouse	TBD	Particulate	P5HMASTK	99.88%	AP-42 11.1 Emission Factors

[1] List each control device on a separate line. For each control device, list all emission units controlled by the control device.

Table 2-D: Maximum Emissions (under normal operating conditions)

☐ **This Table was intentionally left blank because it would be identical to Table 2-E.**

Maximum Emissions are the emissions at maximum capacity and prior to (in the absence of) pollution control, emission-reducing process equipment, or any other emission reduction. Calculate the hourly emissions using the worst case hourly emissions for each pollutant. For each pollutant, calculate the annual emissions as if the facility were operating at maximum plant capacity without pollution controls for 8760 hours per year, unless otherwise approved by the Department. List Hazardous Air Pollutants (HAP) & Toxic Air Pollutants (TAPs) in Table 2-I. Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Plant #2 Hot Mix Asphalt Plant																		
P2HMAP	-	-	-	-	-	-	-	-	0.92	3.32	0.43	1.57	0.066	0.24	-	-	-	-
P2HMABIN	-	-	-	-	-	-	-	-	0.92	3.32	0.43	1.57	0.066	0.24	-	-	-	-
P2HMATP1	-	-	-	-	-	-	-	-	0.42	1.83	0.15	0.67	0.024	0.10	-	-	-	-
P2HMAPUG	-	-	-	-	-	-	-	-	0.42	1.86	0.16	0.68	0.024	0.11	-	-	-	-
P2HMATP2	-	-	-	-	-	-	-	-	0.42	1.86	0.16	0.68	0.024	0.11	-	-	-	-
P2HMAFIL	-	-	-	-	-	-	-	-	18.3	7.19	11.8	4.63	1.18	0.46	-	-	-	-
P2HMASTK	3.75	16.4	60.0	262.8	1.23	5.4	0.69	3.02	4800	21024	675	2957	43.1	189	-	-	1.34E-04	8.50E-05
P2BATCHUL	-	-	0.20	0.89	0.62	2.73	-	-	0.078	0.34	0.078	0.34	0.078	0.34	-	-	-	-
P2HMAHT	0.83	3.63	0.70	3.05	0.046	0.20	0.0047	0.021	0.063	0.28	0.063	0.28	0.063	0.28	-	-	4.00E-06	1.60E-05
P2HMAS	-	-	-	-	0.023	0.10	-	-	-	-	-	-	-	-	-	-	-	-
P2TRCK	-	-	-	-	-	-	-	-	12.33	43.7	3.05	10.81	0.35	1.25	-	-	-	-
P2YARD	-	-	0.053	0.23	0.17	0.72	-	-	-	-	-	-	-	-	-	-	-	-
Plant #5 Hot Mix Asphalt Plant																		
P5HMAP	-	-	-	-	-	-	-	-	1.84	6.64	0.87	3.14	0.13	0.48	-	-	-	-
P5HMABIN	-	-	-	-	-	-	-	-	1.84	6.64	0.87	3.14	0.13	0.48	-	-	-	-
P5HMATP1	-	-	-	-	-	-	-	-	0.83	3.65	0.31	1.34	0.047	0.21	-	-	-	-
P5HMASCR	-	-	-	-	-	-	-	-	6.95	30.5	2.42	10.60	0.37	1.61	-	-	-	-
P5HMATP2	-	-	-	-	-	-	-	-	0.83	3.65	0.31	1.34	0.047	0.21	-	-	-	-
P5HMAPUG	-	-	-	-	-	-	-	-	0.85	3.71	0.31	1.36	0.048	0.21	-	-	-	-
P5HMATP3	-	-	-	-	-	-	-	-	0.85	3.71	0.31	1.36	0.048	0.21	-	-	-	-
P5HMATP4	-	-	-	-	-	-	-	-	0.85	3.71	0.31	1.36	0.048	0.21	-	-	-	-
P5HMAFIL	-	-	-	-	-	-	-	-	18.3	14.39	11.75	9.26	1.18	0.93	-	-	-	-
P5HMASTK	7.80	34.2	39.0	171	9.60	42.0	1.02	4.47	8400	36792	1950	8541	470	2056	-	-	1.86E-04	2.33E-04
P5DRUMUL	-	-	0.35	1.55	3.66	16.0	-	-	0.18	0.77	0.18	0.77	0.18	0.77	-	-	-	-
P5SILOUL	-	-	0.40	1.77	1.25	5.46	-	-	0.16	0.69	0.16	0.69	0.16	0.69	-	-	-	-
P5HMAHT	0.14	0.61	0.12	0.51	0.0076	0.033	0.00079	0.0035	0.011	0.046	0.011	0.046	0.011	0.046	-	-	1.00E-06	3.00E-06
P5HMAS	-	-	-	-	0.030	0.13	-	-	-	-	-	-	-	-	-	-	-	-
P5TRCK	-	-	-	-	-	-	-	-	24.7	87.3	6.11	21.6	0.70	2.49	-	-	-	-
P5YARD	-	-	0.11	0.46	0.33	1.45	-	-	-	-	-	-	-	-	-	-	-	-
Crushing/Screning and Scalping Screen Plants																		
CH_RAW	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17	-	-	-	-
CH_FP	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17	-	-	-	-
CH	-	-	-	-	-	-	-	-	1.08	2.37	0.48	1.05	0.089	0.19	-	-	-	-

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
CH_C1	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14	-	-	-	-
CH_S	-	-	-	-	-	-	-	-	5.00	10.95	1.74	3.81	0.12	0.26	-	-	-	-
CH_SC1	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14	-	-	-	-
CH_RC	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14	-	-	-	-
CH_SC2	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14	-	-	-	-
CH_C2	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14	-	-	-	-
CH_C3	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14	-	-	-	-
CH_STK	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17	-	-	-	-
CH_FP	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17	-	-	-	-
CH_E	2.37	5.19	2.08	4.55	0.24	0.52	0.0037	0.0080	0.012	0.026	0.012	0.026	0.012	0.026	-	-	2.00E-05	7.40E-05
SS_RAW	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043	-	-	-	-
SS_F	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043	-	-	-	-
SS	-	-	-	-	-	-	-	-	1.25	2.74	0.44	0.95	0.029	0.064	-	-	-	-
SS_C	-	-	-	-	-	-	-	-	0.15	0.33	0.055	0.12	0.016	0.036	-	-	-	-
SS_STK	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043	-	-	-	-
SS_FP	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043	-	-	-	-
SS_E	0.83	1.82	0.37	0.80	0.14	0.30	0.00069	0.0015	0.12	0.26	0.12	0.26	0.12	0.26	-	-	4.00E-06	1.40E-05
CSHTRCK	-	-	-	-	-	-	-	-	1.68	2.38	0.34	0.48	0.082	0.12	-	-	-	-
Totals	15.72	61.8	103.4	447.4	17.3	75.1	1.72	7.52	13311	58084	2673	11590	519	2259	-	-	3.49E-04	4.25E-04

[1]**Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but PM is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

Table 2-E: Requested Allowable Emissions

Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A “-“ symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or $1.41E^{-4}$).

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Plant #2 Hot Mix Asphalt Plant																		
P2HMAP	-	-	-	-	-	-	-	-	0.92	0.48	0.43	0.23	0.066	0.068	-	-	-	-
P2HMABIN	-	-	-	-	-	-	-	-	0.92	0.48	0.43	0.23	0.066	0.068	-	-	-	-
P2HMATP1	-	-	-	-	-	-	-	-	0.019	0.012	0.0064	0.0041	0.0018	0.0023	-	-	-	-
P2HMAPUG	-	-	-	-	-	-	-	-	0.020	0.013	0.0065	0.0041	0.0018	0.0023	-	-	-	-
P2HMATP2	-	-	-	-	-	-	-	-	0.020	0.013	0.0065	0.0041	0.0018	0.0023	-	-	-	-
P2HMAFIL	-	-	-	-	-	-	-	-	0.18	0.010	0.12	0.0067	0.029	0.0016	-	-	-	-
P2HMASTK	3.75	2.38	60.00	38.00	1.23	0.78	0.69	0.44	6.30	3.99	4.05	2.57	3.81	2.41	-	-	1.34E-04	8.50E-05
P2BATCHUL	-	-	0.20	0.89	0.62	2.73	-	-	0.078	0.050	0.078	0.050	0.078	0.050	-	-	-	-
P2HMAHT	0.83	3.18	0.70	2.68	0.046	0.18	0.0047	0.018	0.063	0.24	0.063	0.24	0.063	0.24	-	-	4.00E-06	1.60E-05
P2HMAS	-	-	-	-	0.023	0.10	-	-	-	-	-	-	-	-	-	-	-	-
P2TRCK	-	-	-	-	-	-	-	-	2.68	1.37	0.60	0.30	0.11	0.055	-	-	-	-
P2YARD	-	-	0.053	0.033	0.17	0.10	-	-	-	-	-	-	-	-	-	-	-	-
Plant #5 Hot Mix Asphalt Plant																		
P5HMAP	-	-	-	-	-	-	-	-	1.84	1.90	0.87	0.90	0.13	0.14	-	-	-	-
P5HMABIN	-	-	-	-	-	-	-	-	1.84	1.90	0.87	0.90	0.13	0.14	-	-	-	-
P5HMATP1	-	-	-	-	-	-	-	-	0.039	0.049	0.013	0.016	0.0036	0.0045	-	-	-	-
P5HMASCR	-	-	-	-	-	-	-	-	0.61	0.76	0.21	0.26	0.014	0.017	-	-	-	-
P5HMATP2	-	-	-	-	-	-	-	-	0.039	0.049	0.013	0.016	0.0036	0.0045	-	-	-	-
P5HMAPUG	-	-	-	-	-	-	-	-	0.040	0.049	0.013	0.016	0.0037	0.0046	-	-	-	-
P5HMATP3	-	-	-	-	-	-	-	-	0.040	0.049	0.013	0.016	0.0037	0.0046	-	-	-	-
P5HMATP4	-	-	-	-	-	-	-	-	0.040	0.049	0.013	0.016	0.0037	0.0046	-	-	-	-
P5HMAFIL	-	-	-	-	-	-	-	-	0.18	0.041	0.12	0.026	0.029	0.0065	-	-	-	-
P5HMASTK	7.80	9.75	39.0	48.8	9.60	12.00	1.02	1.28	9.90	12.38	6.90	8.63	6.90	8.63	-	-	1.86E-04	2.33E-04
P5DRUMUL	-	-	0.35	0.44	3.66	4.57	-	-	0.18	0.22	0.18	0.22	0.18	0.22	-	-	-	-
P5SILOUL	-	-	0.40	0.51	1.25	1.56	-	-	0.16	0.20	0.16	0.20	0.16	0.20	-	-	-	-
P5HMAHT	0.14	0.17	0.12	0.15	0.0076	0.029	0.00079	0.0030	0.011	0.040	0.011	0.040	0.011	0.040	-	-	1.00E-06	3.00E-06
P5HMAS	-	-	-	-	0.030	0.13	-	-	-	-	-	-	-	-	-	-	-	-
P5TRCK	-	-	-	-	-	-	-	-	5.37	5.42	1.19	1.20	0.21	0.22	-	-	-	-
P5YARD	-	-	0.11	0.13	0.33	0.41	-	-	-	-	-	-	-	-	-	-	-	-
Crushing/Screning and Scalping Screen Plants																		
CH_RAW	-	-	-	-	-	-	-	-	1.32	1.09	0.62	0.52	0.095	0.078	-	-	-	-
CH_FP	-	-	-	-	-	-	-	-	1.32	1.09	0.62	0.52	0.095	0.078	-	-	-	-

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
CH	-	-	-	-	-	-	-	-	0.24	0.24	0.11	0.11	0.020	0.020	-	-	-	-
CH_C1	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026	-	-	-	-
CH_S	-	-	-	-	-	-	-	-	0.44	0.44	0.15	0.15	0.010	0.010	-	-	-	-
CH_SC1	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026	-	-	-	-
CH_RC	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026	-	-	-	-
CH_SC2	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026	-	-	-	-
CH_C2	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026	-	-	-	-
CH_C3	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026	-	-	-	-
CH_STK	-	-	-	-	-	-	-	-	0.79	0.65	0.37	0.31	0.057	0.047	-	-	-	-
CH_FP	-	-	-	-	-	-	-	-	1.32	1.09	0.62	0.52	0.095	0.078	-	-	-	-
CH_E	2.37	4.33	2.08	3.79	0.24	0.43	0.0037	0.0067	0.012	0.022	0.012	0.022	0.012	0.022	-	-	2.00E-05	3.70E-05
SS_RAW	-	-	-	-	-	-	-	-	0.33	0.27	0.16	0.13	0.024	0.020	-	-	-	-
SS_F	-	-	-	-	-	-	-	-	0.33	0.27	0.16	0.13	0.024	0.020	-	-	-	-
SS	-	-	-	-	-	-	-	-	0.11	0.11	0.037	0.037	0.0025	0.0025	-	-	-	-
SS_C	-	-	-	-	-	-	-	-	0.0070	0.0070	0.0023	0.0023	0.00065	0.00065	-	-	-	-
SS_STK	-	-	-	-	-	-	-	-	0.20	0.16	0.094	0.077	0.014	0.012	-	-	-	-
SS_FP	-	-	-	-	-	-	-	-	0.33	0.27	0.16	0.13	0.024	0.020	-	-	-	-
SS_E	0.83	1.52	0.37	0.67	0.14	0.25	0.00069	0.0013	0.12	0.22	0.12	0.22	0.12	0.22	-	-	4.00E-06	7.00E-06
CSHTRCK	-	-	-	-	-	-	-	-	1.68	1.09	0.34	0.22	0.082	0.053	-	-	-	-
Totals	15.72	21.7	103.4	95.6	17.3	20.9	1.72	1.74	40.2	37.0	20.0	19.2	12.69	13.14	-	-	3.49E-04	3.81E-04

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but it is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

Table 2-F: Additional Emissions during Startup, Shutdown, and Routine Maintenance (SSM)

X This table is intentionally left blank since all emissions at this facility due to routine or predictable startup, shutdown, or scehduled maintenance are no higher than those listed in Table 2-E and a malfunction emission limit is not already permitted or requested. If you are required to report GHG emissions as described in Section 6a, include any GHG emissions during Startup, Shutdown, and/or Scheduled Maintenance (SSM) in Table 2-P. Provide an explanations of SSM emissions in Section 6 and 6a.

All applications for facilities that have emissions during routine our predictable startup, shutdown or scheduled maintenance (SSM)[1], including NOI applications, must include in this table the Maximum Emissions during routine or predictable startup, shutdown and scheduled maintenance (20.2.7 NMAC, 20.2.72.203.A.3 NMAC, 20.2.73.200.D.2 NMAC). In Section 6 and 6a, provide emissions calculations for all SSM emissions reported in this table. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (https://www.env.nm.gov/aqb/permit/aqb_pol.html) for more detailed instructions. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		PM[2]		PM10[2]		PM2.5[2]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Totals																		

[1] **For instance**, if the short term steady-state Table 2-E emissions are 5 lb/hr and the SSM rate is 12 lb/hr, enter 7 lb/hr in this table. If the annual steady-state Table 2-E emissions are 21.9 TPY, and the number of scheduled SSM events result in annual emissions of 31.9 TPY, enter 10.0 TPY in the table below.

[2] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but it is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

Table 2-G: Stack Exit and Fugitive Emission Rates for Special Stacks

X I have elected to leave this table blank because this facility does not have any stacks/vents that split emissions from a single source or combine emissions from more than one source listed in table 2-A. Additionally, the emission rates of all stacks match the Requested allowable emission rates stated in Table 2-E.

Use this table to list stack emissions (requested allowable) from split and combined stacks. List Toxic Air Pollutants (TAPs) and Hazardous Air Pollutants (HAPs) in Table 2-I. List all fugitives that are associated with the normal, routine, and non-emergency operation of the facility. Unit and stack numbering must correspond throughout the application package. Refer to Table 2-E for instructions on use of the "-" symbol and on significant figures.

Stack No.	Serving Unit Number(s) from Table 2-A	NOx		CO		VOC		SOx		PM		PM10		PM2.5		☐ H_2S or ☐ Lead	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Totals:																	

Table 2-H: Stack Exit Conditions

Unit and stack numbering must correspond throughout the application package. Include the stack exit conditions for each unit that emits from a stack, including blowdown venting parameters and tank emissions. If the facility has multiple operating scenarios, complete a separate Table 2-H for each scenario and, for each, type scenario name here:

Stack Number	Serving Unit Number(s) from Table 2-A	Orientation (H-Horizontal V=Vertical)	Rain Caps (Yes or No)	Height Above Ground (ft)	Temp. (F)	Flow Rate (acfs)	Flow Rate (dscfs)	Moisture by Volume (%)	Velocity (ft/sec)	Inside Diameter (ft)
1	P2HMAFIL	H	No	45	Ambient	500			262.1	1.00
2	P2HMASTK	V	No	30	285.0	29711			130.2	3.97
3	P2HMAHT	V	No	12	600.0	1315			216.4	1.00
4	P5HMAFIL	H	No	45	Ambient	500			42.4	1.00
5	P5HMASTK	V	No	40	285.0	40825			73.4	4.65
6	P5HMAHT	V	No	12	600.0	1315			20.7	1.00
7	CH_E	V	No	12	847.0	2694			228.7	0.50
8	SS_E	V	No	7	850.0	427			326.2	0.167

Table 2-I: Stack Exit and Fugitive Emission Rates for HAPs and TAPs

In the table below, report the Potential to Emit for each HAP from each regulated emission unit listed in Table 2-A, only if the entire facility emits the HAP at a rate greater than or equal to one (1) ton per year For each such emission unit, HAPs shall be reported to the nearest 0.1 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAPs shall be the sum of all HAP sources calculated to the nearest 0.1 ton per year. Per 20.2.72.403.A.1 NMAC, facilities not exempt [see 20.2.72.402.C NMAC] from TAP permitting shall report each TAP that has an uncontrolled emission rate in excess of its pounds per hour screening level specified in 20.2.72.502 NMAC. TAPs shall be reported using one more significant figure than the number of significant figures shown in the pound per hour threshold corresponding to the substance. Use the HAP nomenclature as it appears in Section 112 (b) of the 1990 CAAA and the TAP nomenclature as it listed in 20.2.72.502 NMAC. Include tank-flashing emissions estimates of HAPs in this table. For each HAP or TAP listed, fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected or the pollutant is emitted in a quantity less than the threshold amounts described above.

Stack No.	Unit No.(s)	Total HAPs		Formaldehyde x HAP or ☐ TAP		Asphalt Fumes ☐ HAP or X TAP		Calcium Hydroxide ☐ HAP or X TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
1	P2HMAFIL							0.18	0.010										
2	P2HMASTK	1.15	0.73	0.11	0.070	1.80	1.14												
3	P2HMAHT	0.016	0.060																
	P2BATCHUL					0.013	0.0083												
	P2ASPHTK					0.00029	0.0013												
	P2YARD					0.0025	0.0016												
4	P5HMAFIL							0.18	0.041										
5	P5HMASTK	1.61	2.02	0.93	1.16	3.60	4.50												
6	P5HMAHT	0.0026	0.010																
	P5DRUMUL					0.057	0.071												
	P5SILOUL					0.026	0.033												
	P5HMAS					0.00040	0.0017												
	P5YARD					0.0050	0.0062												
7	CH_E	0.015	0.0021																
8	SS_E	0.0028	0.00039																
Totals:		2.80	2.82	1.04	1.23	5.50	5.76	0.36	0.051										

Table 2-J: Fuel

Specify fuel characteristics and usage. Unit and stack numbering must correspond throughout the application package.

Unit No.	Fuel Type (low sulfur Diesel, ultra low sulfur diesel, Natural Gas, Coal, …)	Fuel Source: purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas (e.g. SRU tail gas) or other	Specify Units				
			Lower Heating Value	Hourly Usage	Annual Usage	% Sulfur	% Ash
P2HMASTK	Natural Gas	pipeline quality natural gas	980 Btu/CF			0.2 gr/100 scf	0
P2HMAHT	Natural Gas	pipeline quality natural gas	980 Btu/CF			0.2 gr/100 scf	0
P5HMASTK	Natural Gas	pipeline quality natural gas	980 Btu/CF			0.2 gr/100 scf	0
P5HMAHT	Natural Gas	pipeline quality natural gas	980 Btu/CF			0.2 gr/100 scf	0
CH_E	ultra-low sulfur Diesel	purchased commercial	128,000 Btu/Gallon	17.5 gallons	80,133 gallons	15 PPM	0
SS_E	ultra-low sulfur Diesel	purchased commercial	128,000 Btu/Gallon	3.3 gallons	15,111 gallons	15 PPM	0

Table 2-K: Liquid Data for Tanks Listed in Table 2-L

For each tank, list the liquid(s) to be stored in each tank. If it is expected that a tank may store a variety of hydrocarbon liquids, enter "mixed hydrocarbons" in the Composition column for that tank and enter the corresponding data of the most volatile liquid to be stored in the tank. If tank is to be used for storage of different materials, list all the materials in the "All Calculations" attachment, run the newest version of TANKS on each, and use the material with the highest emission rate to determine maximum uncontrolled and requested allowable emissions rate. The permit will specify the most volatile category of liquids that may be stored in each tank. Include appropriate tank-flashing modeling input data. Use additional sheets if necessary. Unit and stack numbering must correspond throughout the application package.

Tank No.	SCC Code	Material Name	Composition	Liquid Density (lb/gal)	Vapor Molecular Weight (lb/lb*mol)	Average Storage Conditions		Max Storage Conditions	
						Temperature (°F)	True Vapor Pressure (psia)	Temperature (°F)	True Vapor Pressure (psia)

Table 2-L: Tank Data

Include appropriate tank-flashing modeling input data. Use an addendum to this table for unlisted data categories. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary. See reference Table 2-L2. Note: 1.00 bbl = 10.159 M3 = 42.0 gal

Tank No.	**Date Installed**	**Materials Stored**	**Seal Type** (refer to Table 2-LR below)	**Roof Type** (refer to Table 2-LR below)	**Capacity**		**Diameter (M)**	**Vapor Space (M)**	**Color** (from Table VI-C)		**Paint Condition** (from Table VI-C)	**Annual Throughput** (gal/yr)	**Turn-overs** (per year)
					(bbl)	**(M^3)**			**Roof**	**Shell**			

Table 2-L2: Liquid Storage Tank Data Codes Reference Table

Roof Type	Seal Type, Welded Tank Seal Type		Seal Type, Riveted Tank Seal Type		Roof, Shell Color	Paint Condition
	Mechanical Shoe Seal	Liquid-mounted resilient seal	Vapor-mounted resilient seal	Seal Type		
FX: Fixed Roof					**WH**: White	Good
IF: Internal Floating Roof	**A**: Primary only	**A**: Primary only	**A**: Primary only	**A**: Mechanical shoe, primary only	**AS**: Aluminum (specular)	Poor
EF: External Floating Roof	**B**: Shoe-mounted secondary	**B**: Weather shield	**B**: Weather shield	**B**: Shoe-mounted secondary	**AD**: Aluminum (diffuse)	
P: Pressure	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**LG**: Light Gray	
					MG: Medium Gray	
					BL: Black	
					OT: Other (specify)	

Note: 1.00 bbl = 0.159 M^3 = 42.0 gal

Table 2-M: Materials Processed and Produced (Use additional sheets as necessary.)

Material Processed				Material Produced			
Description	**Chemical Composition**	**Phase (Gas, Liquid, or Solid)**	**Quantity (specify units)**	**Description**	**Chemical Composition**	**Phase**	**Quantity (specify units)**
Plant #2 HMA							
Aggregate	Aggregate	Solid	139 TPH	Asphalt	Aggregate, RAP, Mineral Filler, Asphalt Cement	Solid	150 TPH
Mineral Filler	Rock dust, Slag dust, Hydrated lime, Cement, Versabind, and/or Loess	Solid	2.25 TPH				
Asphalt Cement	Asphalt Cement	Heated Liquid	8.70 TPH				
Plant #5 HMA							
Aggregate	Aggregate	Solid	278.1 TPH	Asphalt	Aggregate, RAP, Mineral Filler, Asphalt Cement	Solid	300 TPH
Mineral Filler	Rock dust, Slag dust, Hydrated lime, Cement, Versabind, and/or Loess	Solid	4.5 TPH				
Asphalt Cement	Asphalt Cement	Heated Liquid	17.4 TPH				
Crushing and Screening Plant							
Aggregate	Aggregate	Solid	200 TPH	Aggregate	Sized Aggregate	Solid	200 TPH
Scalping Screen Plant							
Aggregate	Aggregate	Solid	50 TPH	Aggregate	Clean Fill	Solid	50 TPH

Table 2-N: CEM Equipment

Enter Continuous Emissions Measurement (CEM) Data in this table. If CEM data will be used as part of a federally enforceable permit condition, or used to satisfy the requirements of a state or federal regulation, include a copy of the CEM's manufacturer specification sheet in the Information Used to Determine Emissions attachment. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

Stack No.	Pollutant(s)	Manufacturer	Model No.	Serial No.	Sample Frequency	Averaging Time	Range	Sensitivity	Accuracy
NA									

Table 2-O: Parametric Emissions Measurement Equipment

Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

Unit No.	Parameter/Pollutant Measured	Location of Measurement	Unit of Measure	Acceptable Range	Frequency of Maintenance	Nature of Maintenance	Method of Recording	Averaging Time
NA								

Table 2-P: Greenhouse Gas Emissions

Applications submitted under 20.2.70, 20.2.72, & 20.2.74 NMAC are required to complete this Table. Power plants, Title V major sources, and PSD major sources must report and calculate all GHG emissions for each unit. Applicants must report potential emission rates in short tons per year (see Section 6.a for assistance). Include GHG emissions during Startup, Shutdown, and Scheduled Maintenance in this table. For minor source facilities that are not power plants, are not Title V, or are not PSD, there are three options for reporting GHGs 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHG as a second separate unit; OR 3) check the following box ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

		CO_2 ton/yr	N_2O ton/yr	CH_4 ton/yr	SF_6 ton/yr	PFC/HFC ton/yr[2]									Total GHG Mass Basis ton/yr[4]	Total CO_2e ton/yr[5]
Unit No.	**GWPs [1]**	**1**	**298**	**25**	**22,800**	**footnote 3**										
P2HMASTK	**mass GHG**	3515													3515	3515
	CO_2e	3515													3515	3515
P2HMAHT	**mass GHG**	3822													3822	3822
	CO_2e	3822													3822	3822
P5HMASTK	**mass GHG**	12375													12375	12375
	CO_2e	12375													12375	12375
P5HMAHT	**mass GHG**	637													637	637
	CO_2e	637													637	637
CH_E	**mass GHG**	756													756	756
	CO_2e	756													756	756
SS_E	**mass GHG**	115													115	115
	CO_2e	115													115	115
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO2e															
Total	**mass GHG**	21220													21220	21220
	CO_2e	21220													21220	21220

[1] **GWP** (Global Warming Potential): Applicants must use the most current GWPs codified in Table A-1 of 40 CFR part 98. GWPs are subject to change, therefore, applicants need to check 40 CFR 98 to confirm GWP values.

[2] For **HFCs** or **PFCs** describe the specific HFC or PFC compound and use a separate column for each individual compound.

[3] For each new compound, enter the appropriate GWP for each HFC or PFC compound from Table A-1 in 40 CFR 98.

[4] Green house gas emissions on a **mass basis** is the ton per year green house gas emission before adjustment with its GWP.

[5] **CO_2e** means Carbon Dioxide Equivalent and is calculated by multiplying the TPY mass emissions of the green house gas by its GWP.

Section 3

Application Summary

The **Application** **Summary** shall include a brief description of the facility and its process, the type of permit application, the applicable regulation (i.e. 20.2.72.200.A.X, or 20.2.73 NMAC) under which the application is being submitted, and any air quality permit numbers associated with this site. If this facility is to be collocated with another facility, provide details of the other facility including permit number(s). In case of a revision or modification to a facility, provide the lowest level regulatory citation (i.e. 20.2.72.219.B.1.d NMAC) under which the revision or modification is being requested. Also describe the proposed changes from the original permit, how the proposed modification will affect the facility's operations and emissions, de-bottlenecking impacts, and changes to the facility's major/minor status (both PSD & Title V).

The **Process** **Summary** shall include a brief description of the facility and its processes.

Startup, Shutdown, and Maintenance (SSM) routine or predictable emissions: Provide an overview of how SSM emissions are accounted for in this application. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions.

Associated Asphalt and Materials, LLC (AAM) is applying for a new 20.2.72 NMAC air quality permit for a 200 ton per hour (TPH) aggregate crushing and screening plant, 50 TPH aggregate scalping screen, a 150 TPH hot mix asphalt plant (HMA Plant #2) and a 300 TPH hot mix asphalt plant (HMA Plant #5) to be operated within county of Santa Fe, state of New Mexico. Regulation governing this permit application is 20.2.72.200.A(1) NMAC.

AAM has retained Montrose Air Quality Services, LLC (Montrose) to assist with the permit application. The plant will be identified as Santa Fe Facility and is located at 86 Paseo De River, Santa Fe, NM, 87507. While facility-wide "potential" emission rates are greater than 100 tons per year for a single pollutant potentially making it a major source; with the proposed emission controls the facility emission rates will be below 100 tons per year and will be permitted as a "synthetic minor source".

Plant #2 HMA

The 150 tph hot mix asphalt plant will include; aggregate storage piles, a 4-bin cold aggregate feeder, three (3) transfer conveyors, mineral filler silo with screw conveyor and baghouse, drum dryer/bucket elevator/hot screens/weigh hopper/asphalt mixer with baghouse, asphalt heater, and two (2) asphalt cement storage tanks. The plant will be powered by commercial line power. Processed asphalt will be transported from the HMA plant to off-site sales. The HMA plant will limit processing rates to 150 tph, 1,800 tons per day, and 190,000 tons per year (tpy). The hours of operation are presented below in Table 3-1. Daily production rates are presented below in Table 3-2.

Plant #5 HMA

The 300 tph hot mix asphalt plant will include; aggregate storage piles, a 4-bin cold aggregate feeder, auxiliary feeder, scalping screen, pug mill, mineral filler silo with screw conveyor and baghouse, drum dryer/mixer with baghouse, incline conveyor, asphalt silo, asphalt heater, five (5) transfer conveyors, and two (2) asphalt cement storage tanks. The plant will be powered by commercial line power. Processed asphalt will be transported from the HMA plant to off-site sales. The HMA plant will limit processing rates to 300 tph, 3,600 tons per day, and 750,000 tpy. The hours of operation are presented below in Table 3-1. Daily production rates are presented below in Table 3-2.

Crushing and Screening Plant

The 200 tph aggregate crushing and screening plant will include a feeder, impact crusher, screen, six (6) transfer conveyors, and stacker conveyor. The plant will be powered by a 360 horsepower (hp) engine. Processed aggregate will be transported from the aggregate crushing and screening plant to the HMA plants and/or off-site sales. The aggregate crushing and screening plant will limit hourly processing rate to 200 tph and 400,000 tpy. Aggregate processing hours will be limited from 7 AM to 5 PM daily. The hours of operation are presented below in Table 3-3.

Scalping Screen Plant

The 50 tph aggregate scalping screen plant will include a scalping screen and under conveyor and stacker conveyor. The plant will be powered by a 50 horsepower (hp) engine. Clean aggregate fill will be transported from the aggregate scalping screen plant to the HMA plants and/or off-site sales. The aggregate scalping screen plant will limit hourly processing rate to 50 tph and 100,000 tpy. Aggregate processing hours will be limited from 7 AM to 5 PM daily. The hours of operation are presented below in Table 3-3.

TABLE 3-1: HMA Plant #2 and #5 Plant Hours of Operation (MST)

	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
Total	**12**	**24**	**24**	**24**

TABLE 3-2: HMA Plant Daily Production Rates

Plant	Tons Per Day	At Max Hourly Throughput – Hours per Day
Plant #2 HMA	1800	12
Plant #5 HMA	3600	12

TABLE 3-3: Aggregate Crushing and Screening/Scalping Screen Hours of Operation (MST)

Hour of Day	Hourly Operating Factor
12:00 AM	0
1:00 AM	0
2:00 AM	0
3:00 AM	0
4:00 AM	0
5:00 AM	0
6:00 AM	0
7:00 AM	1
8:00 AM	1
9:00 AM	1
10:00 AM	1
11:00 AM	1
12:00 PM	1
1:00 PM	1
2:00 PM	1
3:00 PM	1
4:00 PM	1
5:00 PM	0
6:00 PM	0
7:00 PM	0
8:00 PM	0
9:00 PM	0
10:00 PM	0
11:00 PM	0
Total	10

Nighttime operations will follow the guidelines issued by the department "Air Quality Permitting Guidelines for Night Operations of Crushing and Screening Plants, Hot Mix Asphalt Plants, and Concrete Batch Plants" (Ver.08/14/06). Nighttime conditions acceptable to Associated Asphalt and Materials, LLC include:

Construction and Operation
The permittee shall install data logger(s) capable of continuously recording differential pressure measured by magnahelic gauges or equivalent differential pressure gauges installed on the Drum Dryer/Mixer Baghouse (Units P2HMASTK and P5HMASTK).

Monitoring
The permittee shall, during nighttime loading of the Mineral Filler Silo (Units P2HMAFIL and P5HMAFILL), monitor the differential pressure across the Mineral Filler Silo Baghouse by the use of a differential pressure gauge to ensure it is within the manufacturers or facility determined specified operating range. One reading shall be taken during the silo loading operation.

The permittee shall, during nighttime operation of the plant continuously monitor and record the differential pressure across the Drum Dryer/Mixer Baghouse (Units P2HMASTK and P5HMASTK) by the use of a differential pressure gauge with a data recording system to ensure it is within the manufacturers or facility determined specified operating range.

The permittee shall, during nighttime operating hours, ensure fugitive dust control systems are functioning correctly for Units P2HMATP1, P2HMATP2, P2HMATP3, P5HMATP1, P5HMATP2, P5HMAPUG, P5HMATP3, and P5HMATP4 per {CONDITION X}.

Recordkeeping
During night operation the permittee shall record, by the use of a data logger, a continuous record of the differential pressure across Drum Dryer/Mixer Baghouse (Units P2HMASTK and P5HMASTK).

During silo loading of the Mineral Filler Silo (Units P2HMAFIL and P5HMAFIL), the differential pressure shall be recorded once.

Routine or predictable emissions during Startup, Shutdown, and Maintenance (SSM)

No SSM emissions are predicted for this permit application. All control systems will be operational prior to the start or shutdown of asphalt production or aggregate processing. Maintenance will be performed during period with no production.

Section 4

Process Flow Sheet

A **process flow sheet** and/or block diagram indicating the individual equipment, all emission points and types of control applied to those points. The unit numbering system should be consistent throughout this application.

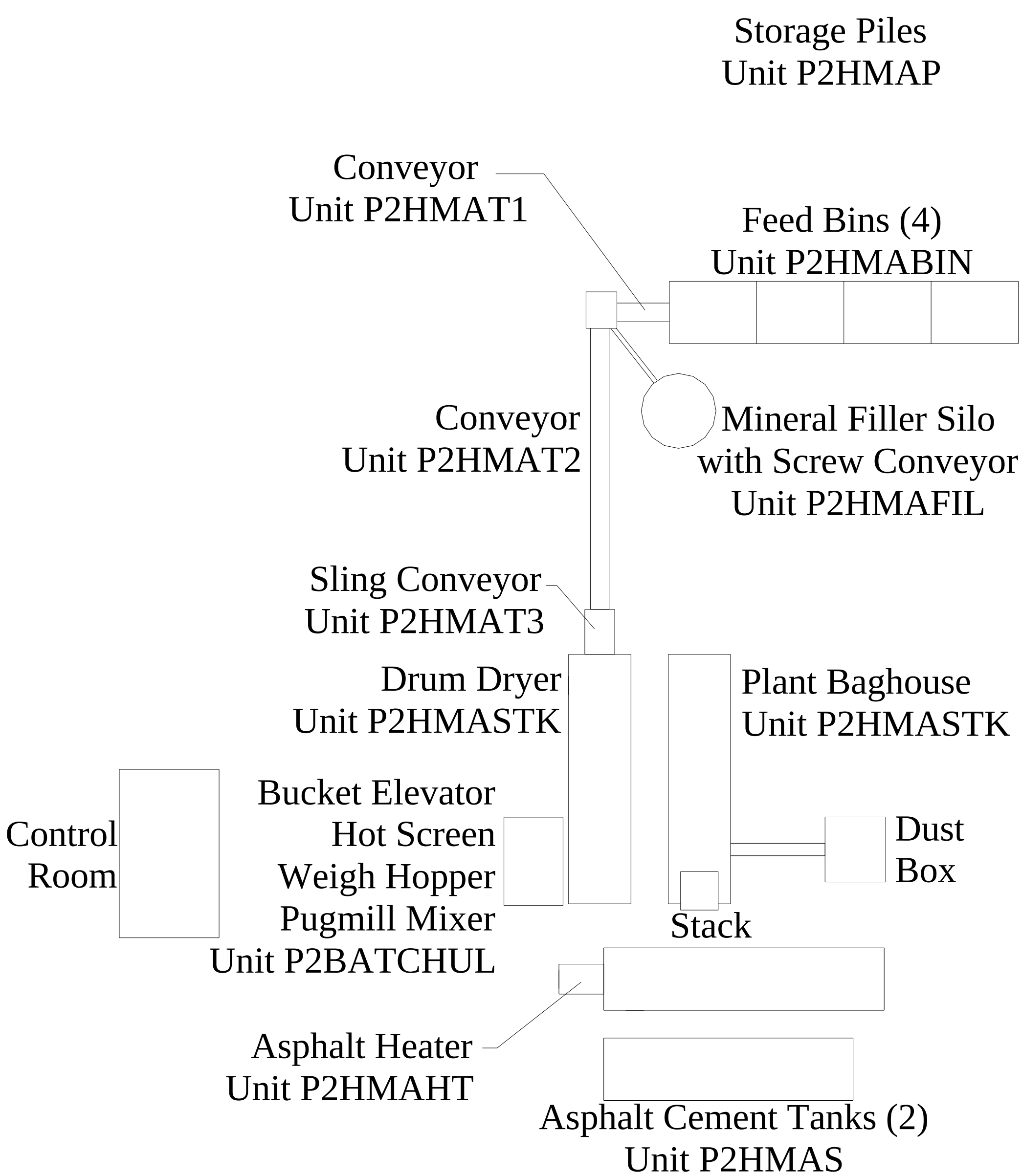

Figure 4-1: HMA Plant 2 Equipment Layout

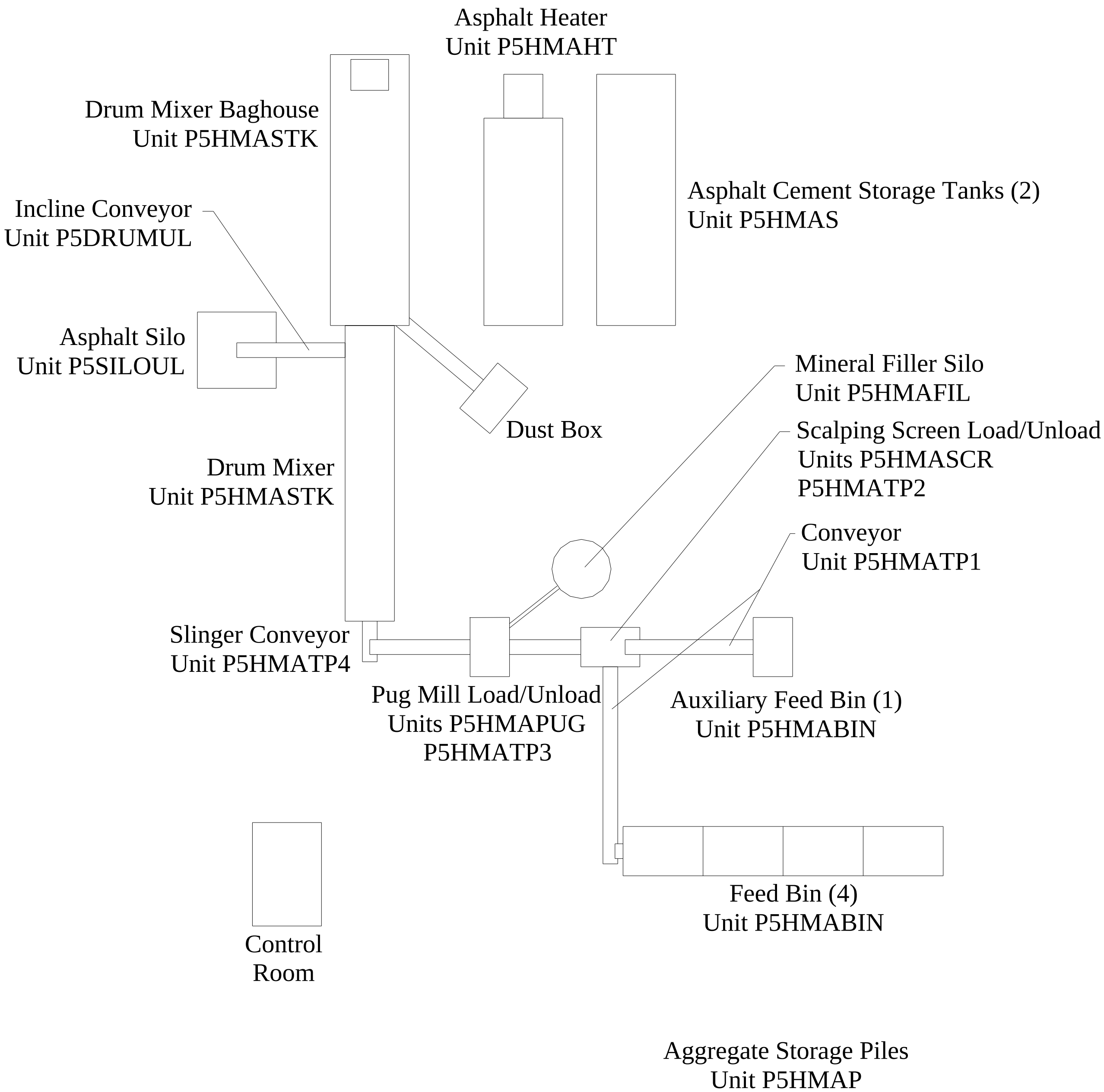

Figure 4-2: HMA Plant 5 Equipment Layout

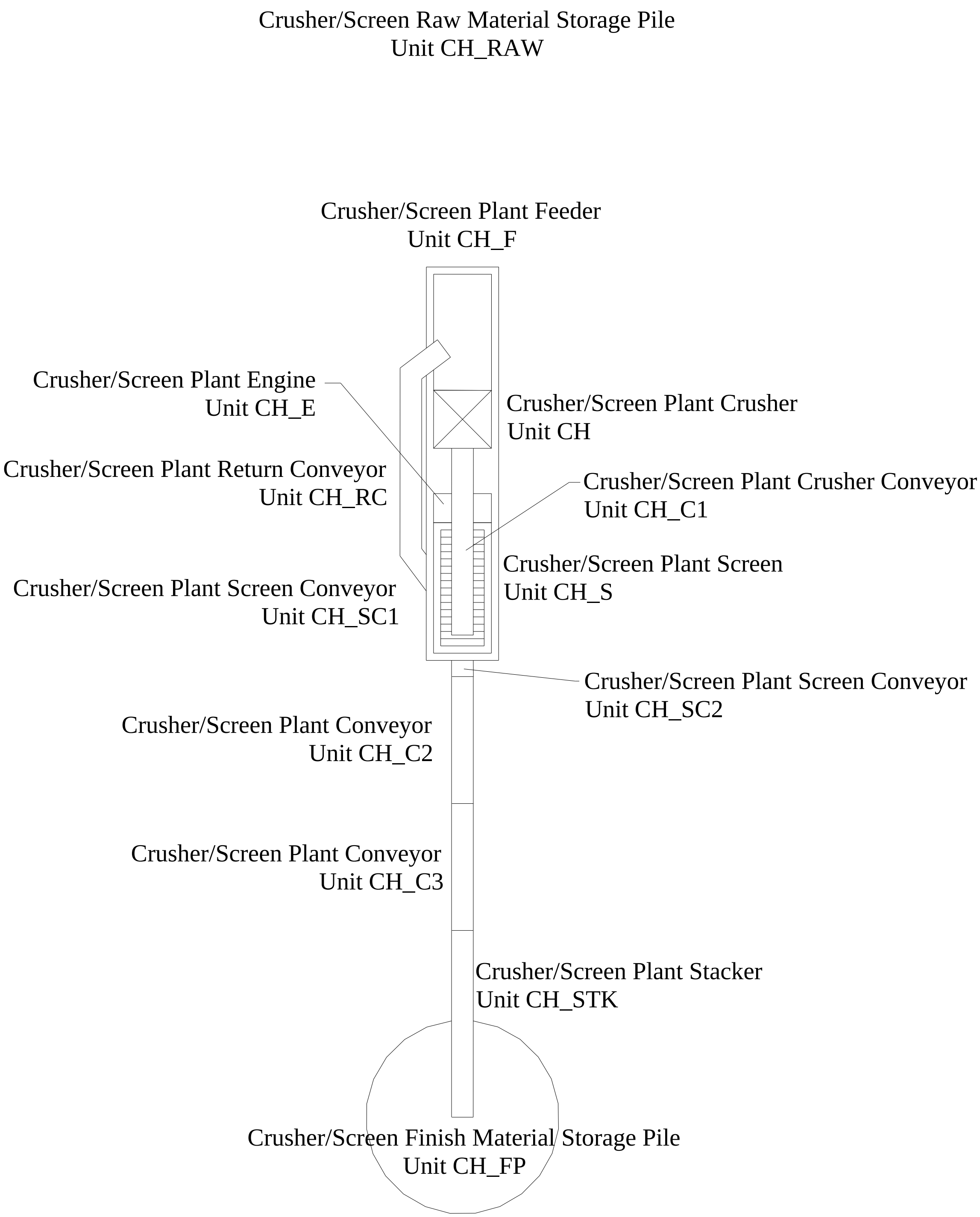

Figure 4-3: Crushing & Screening Plant Equipment Layout

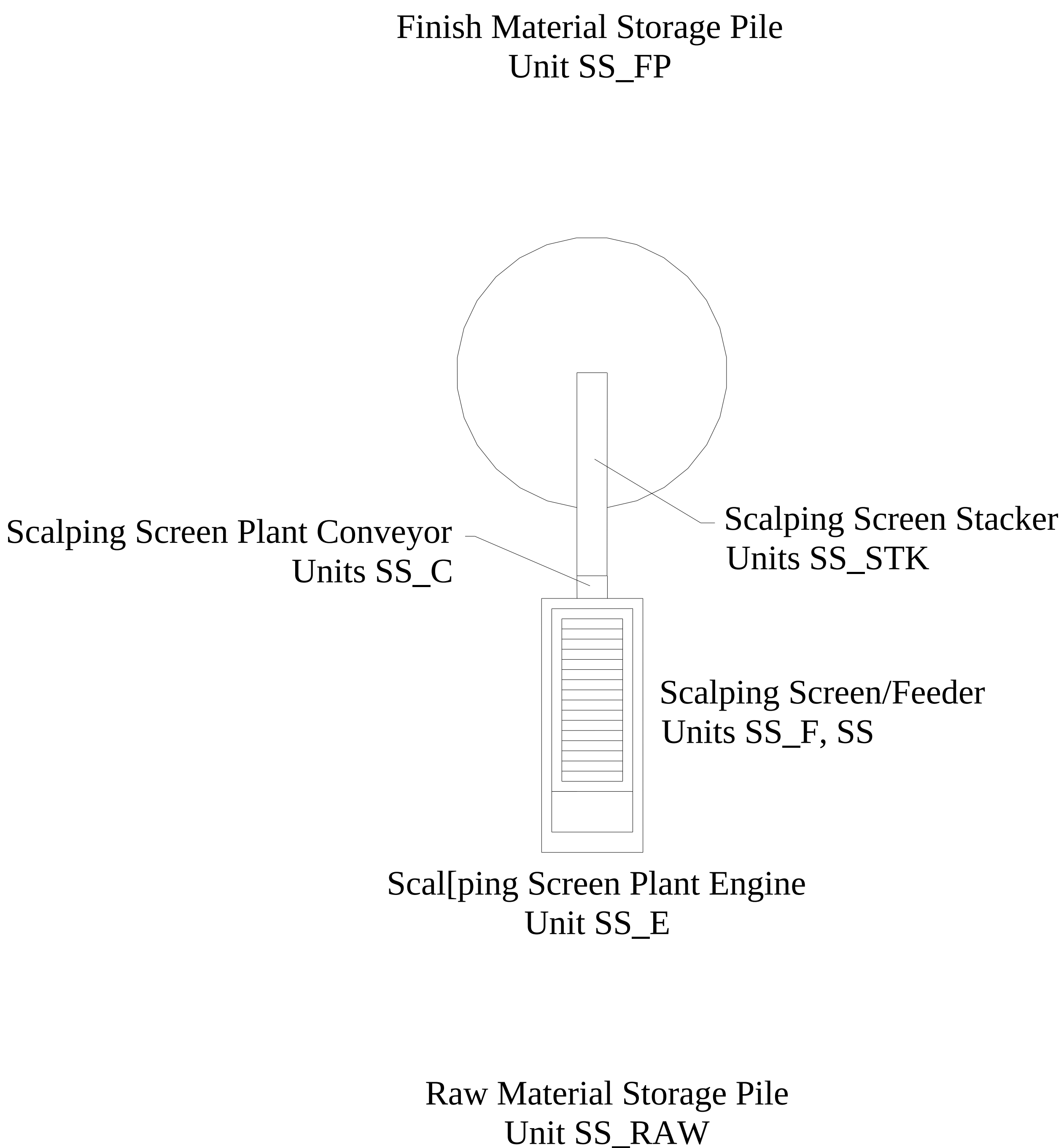

Figure 4-4: Scalping Screen Plant Equipment Layout

Section 5

Plot Plan Drawn To Scale

A **plot plan drawn to scale** showing emissions points, roads, structures, tanks, and fences of property owned, leased, or under direct control of the applicant. This plot plan must clearly designate the restricted area as defined in UA1, Section 1-D.12. The unit numbering system should be consistent throughout this application.

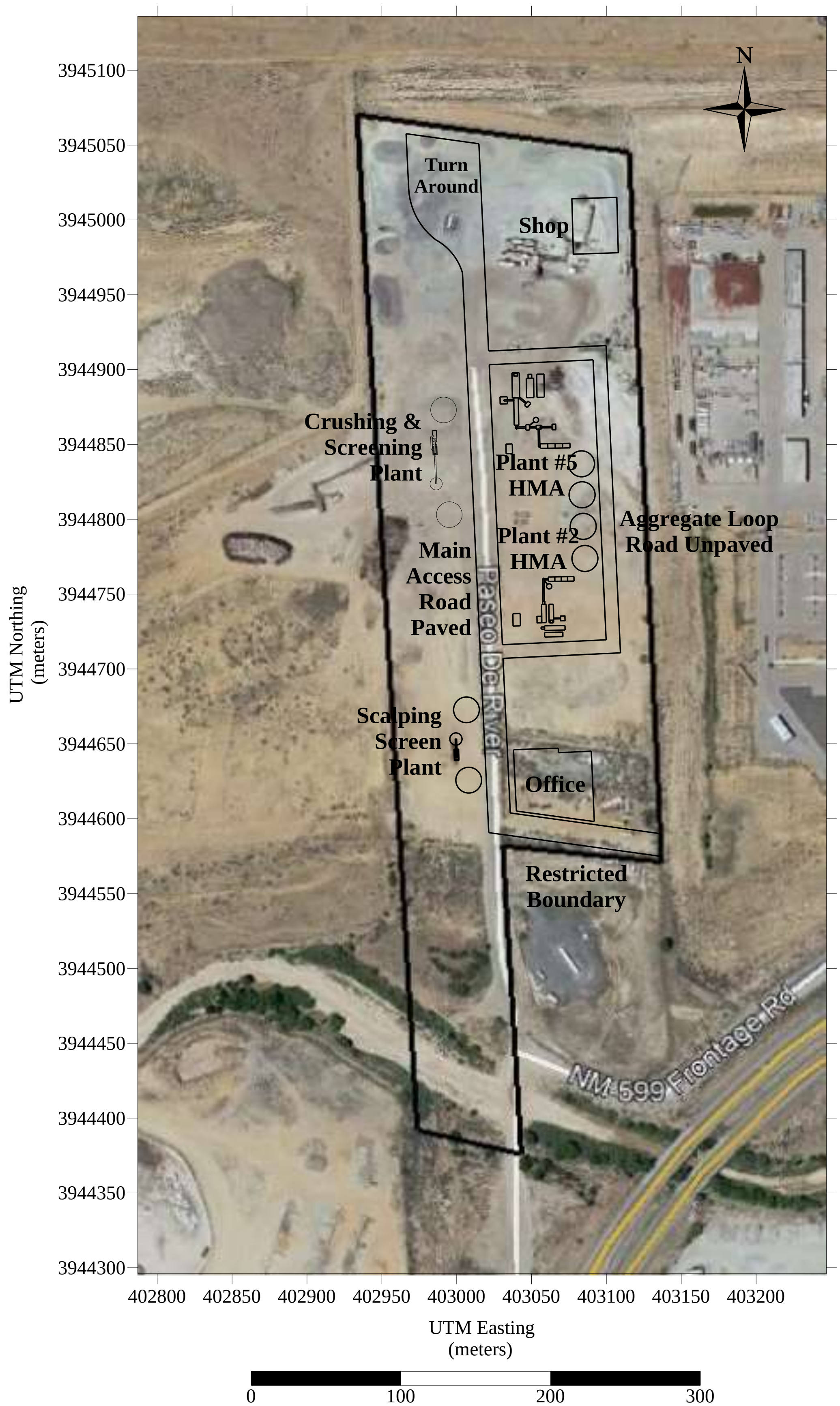

Figure 5-1: Facility Plot Plan

Section 6

All Calculations

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

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

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

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

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

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

Significant Figures:
A. All emissions standards are deemed to have at least two significant figures, but not more than three significant figures.
B. At least 5 significant figures shall be retained in all intermediate calculations.
C. In calculating emissions to determine compliance with an emission standard, the following rounding off procedures shall be used:

- **(1)** If the first digit to be discarded is less than the number 5, the last digit retained shall not be changed;
- **(2)** If the first digit discarded is greater than the number 5, or if it is the number 5 followed by at least one digit other than the number zero, the last figure retained shall be increased by one unit; **and**
- **(3)** If the first digit discarded is exactly the number 5, followed only by zeros, the last digit retained shall be rounded upward if it is an odd number, but no adjustment shall be made if it is an even number.
- **(4)** The final result of the calculation shall be expressed in the units of the standard.

Control Devices: In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions. The applicant can indicate in this section of the application if they chose to not take credit for the reduction in emission rates. For notices of intent submitted under 20.2.73 NMAC, only uncontrolled emission rates can be considered to determine applicability unless the state or federal Acts require the control. This information is necessary to determine if federally enforceable conditions are necessary for the control device, and/or if the control device produces its own regulated pollutants or increases emission rates of other pollutants.

Aggregate Crushing/Screening Plant and Scalping Screen Plant

Pre-Control Particulate Emission Rates

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

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

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

Maximum hourly production for each plant is as follows:

Material Throughputs for Each Plant

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

Uncontrolled annual emissions for tons per year (tpy) were calculated assuming daylight operation for 4579 hours per year. This limit is based on the natural limitation of daylight hours for the safety of AAM personnel.

Aggregate Material Handling – Storage Piles, and Feed Bin Loading Emission Equation:
Maximum Hour Emission Factor
E (lbs/ton) = $k \times 0.0032 \times (U/5)^{1.3} / (M/2)^{1.4}$
E_{PM} (lbs/ton) = $0.74 \times 0.0032 \times (11/5)^{1.3} / (2/2)^{1.4}$
E_{PM10} (lbs/ton) = $0.35 \times 0.0032 \times (11/5)^{1.3} / (2/2)^{1.4}$
$E_{PM2.5}$ (lbs/ton) = $0.053 \times 0.0032 \times (11/5)^{1.3} / (2/2)^{1.4}$
E_{PM} (lbs/ton) = 0.00660 lbs/ton;
E_{PM10} (lbs/ton) = 0.00312 lbs/ton
$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

Annual Emission Factor

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

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

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

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

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

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

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

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

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

Crushing = Uncontrolled Tertiary Crushing Emission Factor

Screening = Uncontrolled Screening Emission Factor

Material Handling Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Uncontrolled Crushing	0.00540	0.00240	0.00036
Uncontrolled Screening	0.02500	0.00870	0.00132
Feed Bin Unloading, and Conveyor Transfers	0.00300	0.00110	0.00017
Uncontrolled Hourly Aggregate Storage Piles, Aggregate Feeder Loading	0.00660	0.00312	0.00047
Uncontrolled Annual Aggregate Storage Piles, Aggregate Feeder Loading	0.00545	0.00258	0.00039

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

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

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

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

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

Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
CH_F	Crusher/Screen Plant Feeder	200	1.32	2.39	0.62	1.13	0.095	0.17
CH	Crusher/Screen Plant Crusher	200	1.08	2.37	0.48	1.05	0.089	0.19
CH_C1	Crusher/Screen Plant Conveyor	200	0.60	1.31	0.22	0.48	0.065	0.14
CH_S	Crusher/Screen Plant Screen	200	5.00	10.95	1.74	3.81	0.12	0.26
CH_SC1	Crusher/Screen Plant Screen Conveyor	200	0.60	1.31	0.22	0.48	0.065	0.14
CH_RC	Crusher/Screen Plant Return Conveyor	200	0.60	1.31	0.22	0.48	0.065	0.14
CH_SC2	Crusher/Screen Plant Screen Conveyor	200	0.60	1.31	0.22	0.48	0.065	0.14
CH_C2	Crusher/Screen Plant Conveyor	200	0.60	1.31	0.22	0.48	0.065	0.14
CH_C3	Crusher/Screen Plant Conveyor	200	0.60	1.31	0.22	0.48	0.065	0.14
CH_STK	Stacker Conveyor Drop to Pile	200	1.32	2.39	0.62	1.13	0.095	0.17
SS_F	Scalping Screen Plant Feeder	50	0.33	0.60	0.16	0.28	0.024	0.043
SS	Scalping Screen Plant Screen	50	1.25	2.74	0.44	0.95	0.029	0.064
SS_C	Scalping Screen Plant Conveyor	50	0.15	0.33	0.055	0.12	0.016	0.036
SS_STK	Scalping Screen Conveyor Drop to Pile	50	0.33	0.60	0.16	0.28	0.024	0.043
		TOTALS	**14.38**	**30.24**	**5.59**	**11.65**	**0.88**	**1.83**

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

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

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

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

Paved Roads

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

E = k(sL)^0.91*(W)^1.02*[1-P/4N]		*Annual emissions only include p factor*		
k PM	0.011			
k PM10	0.0022			
k PM25	0.00054			
sL	0.6	Ubiquitous Baseline g/m^2 <500		
P = days with precipitation over 0.01 inches	70			
N = number of days in averaging period	365			
Truck weight	28.75	tons – 17.5 tons truck, 22.5 tons load		
Haul Truck VMT Paved Main Access Road	1145	meter/round trip vehicle	0.71	miles/vehicle
Max. Paved Main Access Road Truck/hr	11.1	truck/hr		
Max. Paved Main Access Road Truck/yr	38,933	truck/yr		
	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved Main Access Road In	7.91	miles/hr	27,706	miles/yr

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

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

Annual Emission Rate Factor
PM = 0.17173 lbs/VMT
PM10 = 0.03435 lbs/VMT
PM2.5 = 0.00843 lbs/VMT

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

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Crusher Haul Truck Paved	7.91 miles/hr; 27,706 miles/yr	1.68	2.38	0.34	0.48	0.082	0.12

Controlled Particulate Emission Rates

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

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

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

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

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

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

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

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

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

Maximum production for each plant is as follows:

Material Throughputs for Each Plant

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

<u>Mining, Aggregate Storage Piles and Feed Bin Loading Emission Equation:</u>

Maximum Hour Emission Factor

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

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

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

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

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

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

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

<u>Aggregate Storage Pile Loading from Stacker Conveyor Emission Equation:</u>

Maximum Hour Emission Factor

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

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

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

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

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

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

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

<u>Mining, Aggregate Storage Piles and Feed Bin Loading Emission Equation:</u>

Annual Emission Factor

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

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

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

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

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

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

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

<u>Aggregate Storage Pile Loading from Stacker Conveyor Emission Equation:</u>

Annual Emission Factor

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

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

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

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

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

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

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

<u>AP-42 Emission Factors:</u>

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

Material Handling Emission Factors:

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

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

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

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

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

Table 6-4 Allowable Regulated Process Equipment Emission Rates

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

Table 6-5 Allowable Material Handling Fugitive Emission Rates

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

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

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

Paved Roads

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

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

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

	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved Main Access Road In	7.91	miles/hr	12,651	miles/yr

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

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

<u>Annual Emission Rate Factor</u>
PM = 0.17173 lbs/VMT
PM10 = 0.03435 lbs/VMT
PM2.5 = 0.00843 lbs/VMT

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

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Crusher Haul Truck Paved	7.91 miles/hr; 12,651 miles/yr	1.68	1.09	0.34	0.22	0.082	0.053

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

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

EPA Tier 4i:

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

Sulfur dioxide emission rate was calculated using the fuel consumption rate for this engine of 72.6 gallons per hour, a fuel density of 7.0 pounds per gallon, a fuel sulfur content of 15 PPM, and a sulfur to sulfur dioxide conversion factor of two (2). The following equation calculates the emission rate for sulfur dioxide (SO_2).

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

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

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

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

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

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

Table 6-7: Pre-Controlled Combustion Emission Rates

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

Table 6-8: Controlled Combustion Emission Rates

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

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

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

EPA Tier 1:

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

EPA AP-42 Section 3.3:

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

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

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

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

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

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

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

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

Table 6-9: Pre-Controlled Combustion Emission Rates

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

Table 6-10: Controlled Combustion Emission Rates

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

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

Uncontrolled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
CH_RAW	Crusher/Screen Plant Raw Material	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17
CH_F	Crusher/Screen Plant Feeder	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17
CH	Crusher/Screen Plant Crusher	-	-	-	-	-	-	-	-	1.08	2.37	0.48	1.05	0.089	0.19
CH_C1	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14
CH_S	Crusher/Screen Plant Screen	-	-	-	-	-	-	-	-	5.00	10.95	1.74	3.81	0.12	0.26
CH_SC1	Crusher/Screen Plant Screen Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14
CH_RC	Crusher/Screen Plant Return Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14
CH_SC2	Crusher/Screen Plant Screen Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14
CH_C2	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14
CH_C3	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.065	0.14
CH_STK	Crusher/Screen Stacker Conveyor Drop to Pile	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17
CH_FP	Crusher/Screen Finish Product Storage Pile	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17
CH_E	Crusher/Screen Plant Generator	2.37	5.19	2.08	4.55	0.0037	0.0080	0.24	0.52	0.012	0.026	0.012	0.026	0.012	0.026
SS_RAW	Scalping Screen Plant Raw Material	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043
SS_F	Scalping Screen Plant Feeder	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043
SS	Scalping Screen Plant Screen	-	-	-	-	-	-	-	-	1.25	2.74	0.44	0.95	0.029	0.064
SS_C	Scalping Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.15	0.33	0.055	0.12	0.016	0.036

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

Uncontrolled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
SS_STK	Scalping Screen Conveyor Drop to Pile	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043
SS_FP	Scalping Screen Finish Product Storage Pile	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043
SS_E	Scalping Screen Plant Engine	0.83	1.82	0.37	0.80	0.00069	0.0015	0.14	0.30	0.12	0.26	0.12	0.26	0.12	0.26
CSHTRCK	Paved Haul Road Traffic - Crushing	-	-	-	-	-	-	-	-	1.68	2.38	0.34	0.48	0.082	0.12
	Total	**3.20**	**7.02**	**2.44**	**5.35**	**0.0044**	**0.0096**	**0.37**	**0.82**	**19.49**	**38.88**	**7.62**	**15.24**	**1.33**	**2.67**

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

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

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

Controlled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
SS_FP	Scalping Screen Finish Product Storage Pile	-	-	-	-	-	-	-	-	0.33	0.27	0.16	0.13	0.024	0.020
SS_E	Scalping Sreen Plant Engine	0.83	1.52	0.37	0.67	0.0006 9	0.0013	0.14	0.25	0.12	0.22	0.12	0.22	0.12	0.22
CSHTRC K	Paved Haul Road Traffic - Crushing	-	-	-	-	-	-	-	-	1.68	1.09	0.34	0.22	0.082	0.053
	Total	**3.20**	**5.85**	**2.44**	**4.46**	**0.0044**	**0.0080**	**0.37**	**0.68**	**8.72**	**7.20**	**3.63**	**3.13**	**0.69**	**0.70**

Estimates for Federal HAPs Air Pollutants

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Hot Mix Asphalt Plant #2

Pre-Control Particulate Emission Rates

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

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

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

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

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

<u>Aggregate Storage Piles and Feed Bin Loading Emission Equation:</u>
Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$
E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM} (lbs/ton) = 0.00660 lbs/ton;
E_{PM10} (lbs/ton) = 0.00312 lbs/ton
$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

<u>Aggregate Storage Piles and Feed Bin Loading Emission Equation:</u>
Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$
E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM} (lbs/ton) = 0.00545 lbs/ton;
E_{PM10} (lbs/ton) = 0.00258 lbs/ton
$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

AP-42 Emission Factors:

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

Material Handling Emission Factors:

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

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

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

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

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

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

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

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

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

HMA Plant #2 Haul Truck Travel

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

Paved Roads Plant #2 HMA

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

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

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

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

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

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

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

Hourly Emission Rate Factor

PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor

PM = 0.17173 lbs/VMT
PM10 = 0.03435 lbs/VMT
PM2.5 = 0.00843 lbs/VMT

Unpaved Roads Plant #2 HMA

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

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

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

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

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

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

–

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

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

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

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

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

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Mineral Filler Truck Emissions Paved	0.07116 miles/hr; 623 miles/yr	0.01512	0.05353	0.00302	0.01071	0.00074	0.00263
Asphalt Cement Truck Emissions Paved	0.27516 miles/hr; 2410 miles/yr	0.05847	0.20697	0.01169	0.04139	0.00287	0.01016
Asphalt Truck Emissions Paved	4.74412 miles/hr; 41558 miles/yr	1.00804	3.56845	0.20161	0.71369	0.04949	0.17518
Aggregate Truck Emissions Paved	2.49975 miles/hr; 21898 miles/yr	0.53115	1.88027	0.10623	0.37605	0.02607	0.09230
Mineral Filler Truck Emissions Unpaved	0.02221 miles/hr; 195 miles/yr	0.15841	0.56077	0.04037	0.14292	0.00404	0.01429
Asphalt Cement Truck Emissions Unpaved	0.08586 miles/hr; 752 miles/yr	0.61252	2.16832	0.15611	0.55263	0.01561	0.05526
Aggregate Truck Emissions Unpaved	1.39451 miles/hr; 12216 miles/yr	9.94818	35.21656	2.53543	8.97541	0.25354	0.89754
	Total	**12.33**	**43.65**	**3.05**	**10.81**	**0.35**	**1.25**

Drum Mix Hot Mix Asphalt Plant

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

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

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

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

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

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

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

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

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

Process Unit Number	Process Unit Description	Pollutant	Average Hourly Process Rate (tons/hour)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P2HMASTK	Aggregate Drum Dryer	NO_X	150	3.75	16.43
		CO	150	60.0	262.80
		SO_2	150	0.69	3.02
		VOC	150	1.23	5.39
		PM	150	4800	21024
		PM_{10}	150	675	2957
		$PM_{2.5}$	150	43.1	189
P2BATCHU L	Asphalt Mixer Unloading	CO	150	0.20	0.89
		TOC	150	0.62	2.73
		PM	150	0.078	0.34
		PM_{10}	150	0.078	0.34
		$PM_{2.5}$	150	0.078	0.34
P2ASPHTK	Asphalt Cement Storage Tanks	TOC	50,000 gallons	0.023	0.099
P2YARD	YARD	TOC	150	0.17	0.72
		CO	150	0.053	0.23

Controlled Particulate Emission Rates

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

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

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

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

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

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

No fugitive controls or emission reductions are proposed for unloading the asphalt mixer (P2BATCHUL) with the exception of limiting annual production rates. No fugitive controls are proposed for yard emissions (P2YARD) or asphalt storage tanks (P2ASPHTK).

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

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

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

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

<u>Aggregate Storage Piles and Feed Bin Loading Emission Equation:</u>
Maximum Hour Emission Factor
E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$
E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM} (lbs/ton) = 0.00660 lbs/ton;
E_{PM10} (lbs/ton) = 0.00312 lbs/ton
$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

<u>Aggregate Storage Piles and Feed Bin Loading Emission Equation:</u>
Annual Emission Factor
E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$
E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM} (lbs/ton) = 0.00545 lbs/ton;
E_{PM10} (lbs/ton) = 0.00258 lbs/ton
$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

<u>AP-42 Emission Factors:</u>

Feed Bin Unloading = Controlled Conveyor Transfer Point Emission Factor
Transfer Conveyor = Controlled Conveyor Transfer Point Emission Factor

Material Handling Emission Factors:

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

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

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

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

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

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

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

Table 6-18 Controlled Regulated Process Equipment Emission Rates

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

Controlled Haul Truck Travel

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

Paved Roads Plant #2 HMA

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

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

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

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

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

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

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

Hourly Emission Rate Factor

PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor

PM = 0.17173 lbs/VMT
PM10 = 0.03435 lbs/VMT
PM2.5 = 0.00843 lbs/VMT

Unpaved Roads Plant #2 HMA

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

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

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

s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)
W = mean vehicle weight (28.75 tons – 17.5 tons truck, 22.5 tons load)
p = number of days with at least 0.01 in of precip. (70 days)
a = Constant PM2.5 = 0.9
PM10 = 0.9
PM = 0.7
b = Constant PM2.5 = 0.45
PM10 = 0.45
PM = 0.45
Vehicle Dust Control 90% Surfactants, Millings, Watering

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

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

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

–

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

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

Hourly Emission Rate Factor – 90% Control
PM = 0.71338 lbs/VMT
PM10 = 0.18181 lbs/VMT
PM2.5 = 0.01818 lbs/VMT

Annual Emission Rate Factor – 90% Control
PM = 0.57657 lbs/VMT
PM10 = 0.09548 lbs/VMT
PM2.5 = 0.00955 lbs/VMT

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

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Mineral Filler Truck Emissions Paved	0.07116 miles/hr; 90 miles/yr	0.01512	0.00774	0.00302	0.00155	0.00074	0.00038
Asphalt Cement Truck Emissions Paved	0.27516 miles/hr; 349 miles/yr	0.05847	0.02993	0.01169	0.00599	0.00287	0.00147
Asphalt Truck Emissions Paved	4.74412 miles/hr; 6,009 miles/yr	1.00804	0.51599	0.20161	0.10320	0.04949	0.02533
Aggregate Truck Emissions Paved	2.49975 miles/hr; 3,166 miles/yr	0.53115	0.27188	0.10623	0.05438	0.02607	0.01335
Mineral Filler Truck Emissions Unpaved	0.02221 miles/hr; 28 miles/yr	0.01584	0.00811	0.00404	0.00207	0.00040	0.00021
Asphalt Cement Truck Emissions Unpaved	0.08586 miles/hr; 109 miles/yr	0.06125	0.03135	0.01561	0.00799	0.00156	0.00080
Aggregate Truck Emissions Unpaved	1.39451 miles/hr; 1,766 miles/yr	0.99482	0.50922	0.25354	0.12978	0.02535	0.01298
	Total	**2.68**	**1.37**	**0.60**	**0.30**	**0.11**	**0.055**

Drum Mix Hot Mix Asphalt Plant

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

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

Emissions of VOCs (TOCs) from the asphalt cement storage tank (P2ASPHTK) were determined with EPA’s TANK 4.0.9d program and the procedures found in EPA’s “Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5” for input to the TANK program.

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

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

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

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

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

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

Table 6-20: Controlled Hot Mix Plant Emission Rates

Process Unit Number	Process Unit Description	Pollutant	Average Hourly Process Rate (tons/hour)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P2HMASTK	Aggregate Drum Dryer	NO_X	150	3.75	2.38
		CO	150	60.00	38.00
		SO_2	150	0.69	0.44
		VOC	150	1.23	0.78
		PM	150	6.30	3.99
		PM_{10}	150	4.05	2.57
		$PM_{2.5}$	150	3.81	2.41
P2BATCHUL	Asphalt Mixer Unloading	CO	150	0.20	0.13
		TOC	150	0.62	0.40
		PM	150	0.078	0.050
		PM_{10}	150	0.078	0.050
		$PM_{2.5}$	150	0.078	0.050
P2ASPHTK	Asphalt Cement Storage Tanks	TOC	50,000 gallons	0.023	0.099
P2YARD	YARD	TOC	150	0.17	0.10
		CO	150	0.053	0.033

Natural Gas-Fired Asphalt Heater

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

<u>AP-42 Emission Factors: Section 1.4</u>

Natural Gas/ Propane Emission Factors

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

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

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

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

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

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

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

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

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

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

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

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

Uncontrolled Emission Totals															
Unit #	Description	NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
		lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
P2HMAP	Cold Aggregate Storage Pile	-	-	-	-	-	-	-	-	0.92	3.32	0.43	1.57	0.066	0.24
P2HMA BIN	Feed Bin Loading	-	-	-	-	-	-	-	-	0.92	3.32	0.43	1.57	0.066	0.24
P2HMA TP1	Feed Bin Unloading	-	-	-	-	-	-	-	-	0.42	1.83	0.15	0.67	0.024	0.10
P2HMA TP2	Feed Bin Conveyor to Transfer Conveyor	-	-	-	-	-	-	-	-	0.42	1.86	0.16	0.68	0.024	0.11
P2HMA TP3	Transfer Conveyor to Sling Conveyor	-	-	-	-	-	-	-	-	0.42	1.86	0.16	0.68	0.024	0.11
P2HMAF IL	Mineral Filler Silo Loading	-	-	-	-	-	-	-	-	18.25	7.19	11.75	4.63	0.93	0.36
P2HMAS TK	Drum Dryer	3.75	16.43	60.0	262.8	0.69	3.02	1.23	5.39	4800	21024	675	2957	43.1	189
P2BATC HUL	Asphalt Batcher Unloading	-	-	0.20	0.89	-	-	0.62	2.73	0.078	0.34	0.078	0.34	0.078	0.34
P2HMA HT	Asphalt Heater	0.83	3.63	0.70	3.05	0.0047	0.021	0.046	0.20	0.063	0.28	0.063	0.28	0.063	0.28
P2ASPH TK	Asphalt Cement Storage Tank	-	-	-	-	-	-	0.023	0.10	-	-	-	-	-	-
P2TRCK	Haul Road Traffic	-	-	-	-	-	-	-	-	12.33	43.7	3.05	10.81	0.35	1.25
P2YARD	Yard	-	-	0.053	0.23	-	-	0.17	0.72	-	-	-	-	-	-
Total		**4.58**	**20.06**	**60.95**	**267.0**	**0.69**	**3.04**	**2.09**	**9.14**	**4834**	**21088**	**691**	**2978**	**44.7**	**191.6**

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

Controlled Emission Totals															
Unit #	Description	NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
		lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
P2HMAP	Cold Aggregate Storage Pile	-	-	-	-	-	-	-	-	0.92	0.48	0.43	0.23	0.066	0.034
P2HMA BIN	Feed Bin Loading	-	-	-	-	-	-	-	-	0.92	0.48	0.43	0.23	0.066	0.034
P2HMA TP1	Feed Bin Unloading	-	-	-	-	-	-	-	-	0.019	0.012	0.0064	0.0041	0.0018	0.0011
P2HMA TP2	Feed Bin Conveyor to Transfer Conveyor	-	-	-	-	-	-	-	-	0.020	0.013	0.0065	0.0041	0.0018	0.0012
P2HMA TP3	Transfer Conveyor to Sling Conveyor	-	-	-	-	-	-	-	-	0.020	0.013	0.0065	0.0041	0.0018	0.0012
P2HMAF IL	Mineral Filler Silo Loading	-	-	-	-	-	-	-	-	0.18	0.010	0.12	0.0067	0.0090	0.00062
P2HMAS TK	Drum Dryer	3.75	2.38	60.00	38.00	0.69	0.44	1.23	0.78	4.95	3.99	3.45	4.31	3.45	4.31
P2BATC HUL	Asphalt Batcher Unloading	-	-	0.20	0.13	-	-	0.62	0.40	0.078	0.050	0.078	0.10	0.078	0.10
P2HMA HT	Asphalt Heater	0.83	3.18	0.70	2.68	0.0047	0.018	0.046	0.18	0.063	0.24	0.063	0.24	0.063	0.24
P2ASPH TK	Asphalt Cement Storage Tank	-	-	-	-	-	-	0.023	0.10	-	-	-	-	-	-
P2TRCK	Haul Road Traffic	-	-	-	-	-	-	-	-	2.68	1.37	0.60	0.30	0.11	0.055
P2YARD	Yard	-	-	0.053	0.033	-	-	0.17	0.10	-	-	-	-	-	-
	Total	**4.58**	**5.56**	**60.95**	**40.84**	**0.69**	**0.46**	**2.09**	**1.55**	**11.20**	**6.66**	**5.79**	**3.63**	**4.21**	**2.83**

Estimates for State Toxic Air Pollutants (Asphalt Fumes)

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

Emissions of asphalt fumes from the asphalt mixer unloading (P2BATCHUL), yard (asphalt transported in asphalt trucks-P2YARD), and hot oil asphalt storage tanks (P2ASPHTK) were based on the assumption that the emissions of concern from the asphalt mixer unloading, hot oil asphalt storage tanks, and yard asphalt fumes sources are the PAH HAPs plus other semi-volatile HAPs from the particulate (PM) organics and the volatile organic HAPs from the Total Organic Compounds (TOC). These two combined make up asphalt fume emissions from the asphalt mixer unloading, hot oil asphalt storage tanks, and yard sources. Using information found in AP-42 Section 11.1, Tables 11.1-14, 15, and 16 were reviewed and the following emission equations or emission factors were used to estimate asphalt fumes emissions from asphalt mixer unloading, hot oil asphalt storage tanks, and yard.

<u>Asphalt Mixer Unloading</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 0.000087 lbs/ton or asphalt fumes emission rates of 0.013 pounds per hour and 0.0083 tons/yr (150 tph of asphalt production).

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

Emissions of asphalt fumes from the asphalt cement storage (2) tanks (P2ASPHTK) were determined with EPA's TANK 4.0.9d program and the procedures found in EPA's "Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5" for input to the TANK program. The annual VOC emissions for working and breathing losses from two 25,000 gallon tank were estimated at 198.48 pounds per year or 0.023 pounds per hour. Based on 1.3 percent of the VOC emissions (0.023 pounds per hour total from both tanks), the asphalt fumes emission rate is 0.00029 pounds per hour and 0.0013 tons/yr (150 tph of asphalt production).

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

Estimates for State Toxic Air Pollutants (Calcium Hydroxide)

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

Estimates for Federal HAPs Air Pollutants

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

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

Table 6-25: HAPs Emission Rates from the Drum Dryer/Mixer (P2HMASTK)
EPA HAPS Emissions Drum Mixer Hot Mix Asphalt Plant with Fabric Filter

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

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

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

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

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

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

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

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

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

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

Hot Mix Asphalt Plant #5

Pre-Control Particulate Emission Rates

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

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

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

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

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

Aggregate Storage Piles and Feed Bin Loading Emission Equation:
Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$
E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM} (lbs/ton) = 0.00660 lbs/ton;
E_{PM10} (lbs/ton) = 0.00312 lbs/ton
$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

Aggregate Storage Piles and Feed Bin Loading Emission Equation:
Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$
E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$
E_{PM} (lbs/ton) = 0.00545 lbs/ton;
E_{PM10} (lbs/ton) = 0.00258 lbs/ton
$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

AP-42 Emission Factors:

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

Material Handling Emission Factors:

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

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

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

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

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

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

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

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

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

HMA Plant #5 Haul Truck Travel

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

Paved Roads Plant #5 HMA

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

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

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

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

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

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

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

Hourly Emission Rate Factor

PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor

PM = 0.17173 lbs/VMT
PM10 = 0.03435 lbs/VMT
PM2.5 = 0.00843 lbs/VMT

Unpaved Roads Plant #5 HMA

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

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

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

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

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

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

–

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

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

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

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

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

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Mineral Filler Truck Emissions Paved	0.14232 miles/hr; 1247 miles/yr	0.03024	0.10705	0.00605	0.02141	0.00148	0.00526
Asphalt Cement Truck Emissions Paved	0.55032 miles/hr; 4821 miles/yr	0.11693	0.41394	0.02339	0.08279	0.00574	0.02032
Asphalt Truck Emissions Paved	9.48824 miles/hr; 83117 miles/yr	2.01607	7.13690	0.40321	1.42738	0.09897	0.35036
Aggregate Truck Emissions Paved	4.99950 miles/hr; 43796 miles/yr	1.06230	3.76055	0.21246	0.75211	0.05215	0.18461
Mineral Filler Truck Emissions Paved	0.04441 miles/hr; 389 miles/yr	0.31682	1.12155	0.08075	0.28584	0.00807	0.02858
Asphalt Cement Truck Emissions Unpaved	0.17172 miles/hr; 1504 miles/yr	1.22504	4.33665	0.31222	1.10525	0.03122	0.11053
Aggregate Truck Emissions Unpaved	2.78903 miles/hr; 24432 miles/yr	19.89636	70.43312	5.07085	17.95081	0.50709	1.79508
	Total	**24.7**	**87.3**	**6.11**	**21.6**	**0.70**	**2.49**

Drum Mix Hot Mix Asphalt Plant

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

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

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

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

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

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

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

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

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

Process Unit Number	Process Unit Description	Pollutant	Average Hourly Process Rate (tons/hour)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P5HMASTK	Asphalt Drum Dryer/Mixer	NO_X	300	7.80	34.2
		CO	300	39.0	170.8
		SO_2	300	1.02	4.47
		VOC	300	9.60	42.1
		PM	300	8400	36792
		PM_{10}	300	1950	8541
		$PM_{2.5}$	300	469.5	2056.4
P5DRUMUL	Drum Mixer Unloading	CO	300	0.35	1.55
		TOC	300	3.66	16.01
		PM	300	0.18	0.77
		PM_{10}	300	0.18	0.77
		$PM_{2.5}$	300	0.18	0.77
P5SILOUL	Asphalt Silo Unloading	CO	300	0.40	1.77
		TOC	300	1.25	5.46
		PM	300	0.16	0.69
		PM_{10}	300	0.16	0.69
		$PM_{2.5}$	300	0.16	0.69
P5ASPHTK	Asphalt Cement Storage Tanks	TOC	50,000 gallons	0.030	0.13
P5YARD	YARD	TOC	300	0.33	1.45
		CO	300	0.11	0.46

Controlled Particulate Emission Rates

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

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

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

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

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

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

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

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

No fugitive controls or emission reductions are proposed for unloading the drum dryer/mixer or asphalt silo (P5DRUMUL, P5SILOUL) with the exception of limiting annual production rates. No fugitive controls are proposed for yard emissions (P5YARD) or asphalt storage tanks (P5ASPHTK).

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

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

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

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

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Maximum Hour Emission Factor

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

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

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

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

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

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

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

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Annual Emission Factor

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

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

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

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

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

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

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

AP-42 Emission Factors:

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

Material Handling Emission Factors:

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

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

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

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

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

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

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

Table 6-30 Controlled Regulated Process Equipment Emission Rates

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

Controlled Haul Truck Travel

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

Paved Roads Plant #5 HMA

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

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

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

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

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

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

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

Hourly Emission Rate Factor

PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor

PM = 0.17173 lbs/VMT
PM10 = 0.03435 lbs/VMT
PM2.5 = 0.00843 lbs/VMT

Unpaved Roads Plant #5 HMA

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

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

Where k = constant PM2.5 = 0.15
PM10 = 1.5
PM = 4.9
s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)
W = mean vehicle weight (28.75 tons – 17.5 tons truck, 22.5 tons load)
p = number of days with at least 0.01 in of precip. (70 days)
a = Constant PM2.5 = 0.9
PM10 = 0.9
PM = 0.7
b = Constant PM2.5 = 0.45
PM10 = 0.45
PM = 0.45
Vehicle Dust Control 90% Surfactants, Millings, Watering

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

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

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

–

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

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

Hourly Emission Rate Factor – 90% Control
PM = 0.71338 lbs/VMT
PM10 = 0.18181 lbs/VMT
PM2.5 = 0.01818 lbs/VMT

Annual Emission Rate Factor – 90% Control
PM = 0.57657 lbs/VMT
PM10 = 0.09548 lbs/VMT
PM2.5 = 0.00955 lbs/VMT

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

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Mineral Filler Truck Emissions Paved	0.14232 miles/hr; 356 miles/yr	0.03024	0.03055	0.00605	0.00611	0.00148	0.00150
Asphalt Cement Truck Emissions Paved	0.55032 miles/hr; 1376 miles/yr	0.11693	0.11813	0.02339	0.02363	0.00574	0.00580
Asphalt Truck Emissions Paved	9.48824 miles/hr; 23721 miles/yr	2.01607	2.03679	0.40321	0.40736	0.09897	0.09999
Aggregate Truck Emissions Paved	4.99950 miles/hr; 12499 miles/yr	1.06230	1.07322	0.21246	0.21464	0.05215	0.05269
Mineral Filler Truck Emissions Paved	0.04441 miles/hr; 111 miles/yr	0.03168	0.03201	0.00807	0.00816	0.00081	0.00082
Asphalt Cement Truck Emissions Unpaved	0.17172 miles/hr; 429 miles/yr	0.12250	0.12376	0.03122	0.03154	0.00312	0.00315
Aggregate Truck Emissions Unpaved	2.78903 miles/hr; 6973 miles/yr	1.98964	2.01008	0.50709	0.51229	0.05071	0.05123
	Total	**5.37**	**5.42**	**1.19**	**1.20**	**0.21**	**0.22**

Drum Mix Hot Mix Asphalt Plant

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

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

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

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

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

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

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

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

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

Table 6-32: Controlled Hot Mix Plant Emission Rates

Process Unit Number	Process Unit Description	Pollutant	Average Hourly Process Rate (tons/hour)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P5HMASTK	Asphalt Drum Dryer/Mixer	NO_X	300	7.80	9.75
		CO	300	39.00	48.75
		SO_2	300	1.02	1.28
		VOC	300	9.60	12.00
		PM	300	9.90	12.38
		PM_{10}	300	6.90	8.63
		$PM_{2.5}$	300	6.90	8.63
P5DRUMUL	Drum Mixer Unloading	CO	300	0.35	0.44
		TOC	300	3.66	4.57
		PM	300	0.18	0.22
		PM_{10}	300	0.18	0.22
		$PM_{2.5}$	300	0.18	0.22
P5SILOUL	Asphalt Silo Unloading	CO	300	0.40	0.51
		TOC	300	1.25	1.56
		PM	300	0.16	0.20
		PM_{10}	300	0.16	0.20
		$PM_{2.5}$	300	0.16	0.20
P5ASPHTK	Asphalt Cement Storage Tanks	TOC	50,000 gallons	0.030	0.13
P5YARD	YARD	TOC	300	0.33	0.41
		CO	300	0.11	0.13

Natural Gas-Fired Asphalt Heater

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

AP-42 Emission Factors: Section 1.4

Natural Gas/ Propane Emission Factors

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

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

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

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

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

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

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

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

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

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

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

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

Uncontrolled Emission Totals															
Unit #	Description	NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
		lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
P5HMAP	Cold Aggregate Storage Pile									1.84	6.64	0.87	3.14	0.13	0.48
P5HMA BIN	Feed Bin Loading									1.84	6.64	0.87	3.14	0.13	0.48
P5HMA TP1	Feed Bin Unloading									0.83	3.65	0.31	1.3	0.047	0.21
P5HMAS CR	Scalping Screen									6.95	30.5	2.42	10.6	0.37	1.61
P5HMA TP2	Scalping Screen Unloading									0.83	3.65	0.31	1.34	0.047	0.21
P5HMAP UG	Pug Mill Load									0.85	3.71	0.31	1.36	0.048	0.21
P5HMA TP3	Pug Mill Unload									0.85	3.71	0.31	1.36	0.048	0.21
P5HMA TP4	Conveyor Transfer to Slinger Conveyor									0.85	3.71	0.31	1.36	0.048	0.21
P5HMAF IL	Mineral Filler Silo Baghouse									18.3	14.39	11.75	9.26	1.18	0.93
P5HMAS TK	Drum Dryer Baghouse	7.80	34.2	39.0	171	1.02	4.47	9.60	42.0	8400	36792	1950	8541	470	2056
P5DRU MUL	Drum Mixer Unloading			0.35	1.55			3.66	16.0	0.18	0.77	0.18	0.77	0.18	0.77
P5SILO UL	Asphalt Silo Unloading			0.40	1.77			1.25	5.46	0.16	0.69	0.16	0.69	0.16	0.69
P5HMA HT	Asphalt Heater	0.14	0.61	0.12	0.51	0.000 79	0.0035	0.0076	0.033	0.011	0.046	0.011	0.046	0.011	0.046
P5HMAS	Asphalt Cement Storage Tank							0.030	0.13						
P5TRCK	Haul Road Traffic									24.7	87.3	6.11	21.6	0.70	2.49
P5YARD	Yard			0.11	0.46			0.33	1.45						
	Total	**7.94**	**34.8**	**40.0**	**175.1**	**1.02**	**4.47**	**14.9**	**65.1**	**8458**	**36957**	**1974**	**8597**	**473**	**2065**

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

Controlled Emission Totals															
Unit #	Description	NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
		lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
P5HMAP	Cold Aggregate Storage Pile									1.84	1.90	0.87	0.90	0.13	0.14
P5HMA BIN	Feed Bin Loading									1.84	1.90	0.87	0.90	0.13	0.14
P5HMA TP1	Feed Bin Unloading									0.039	0.049	0.013	0.016	0.0036	0.0045
P5HMAS CR	Scalping Screen									0.61	0.76	0.21	0.26	0.014	0.017
P5HMA TP2	Scalping Screen Unloading									0.039	0.049	0.013	0.016	0.0036	0.0045
P5HMAP UG	Pug Mill Load									0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMA TP3	Pug Mill Unload									0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMA TP4	Conveyor Transfer to Slinger Conveyor									0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMAF IL	Mineral Filler Silo Baghouse									0.18	0.041	0.12	0.026	0.029	0.0065
P5HMAS TK	Drum Dryer Baghouse	7.80	9.75	39.0	48.8	1.02	1.28	9.60	12.00	9.90	12.38	6.90	8.63	6.90	8.63
P5DRU MUL	Drum Mixer Unloading			0.35	0.44			3.66	4.57	0.18	0.22	0.18	0.22	0.18	0.22
P5SILO UL	Asphalt Silo Unloading			0.40	0.51			1.25	1.56	0.16	0.20	0.16	0.20	0.16	0.20
P5HMA HT	Asphalt Heater	0.14	0.53	0.12	0.45	0.000 79	0.0030	0.0076	0.029	0.011	0.040	0.011	0.040	0.011	0.040
P5HMAS	Asphalt Cement Storage Tank							0.030	0.13						
P5TRCK	Haul Road Traffic									5.37	5.42	1.19	1.20	0.21	0.22
P5YARD	Yard			0.11	0.13			0.33	0.41						
	Total	**7.94**	**10.28**	**40.0**	**50.3**	**1.02**	**1.28**	**14.9**	**18.7**	**20.3**	**23.1**	**10.6**	**12.4**	**7.78**	**9.61**

Estimates for State Toxic Air Pollutants (Asphalt Fumes)

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

Emissions of asphalt fumes from the asphalt silo loading (P5DRUMUL), asphalt silo unloading (P5SILOUL), yard (asphalt transported in asphalt trucks-P5YARD), and hot oil asphalt storage tanks (P5ASPHTK) 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 0.057 pounds/hour/0.071 tons/yr and 0.026 pounds per hour/0.033 tons/yr (300 tph of asphalt production).

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

Emissions of asphalt fumes from the asphalt cement storage (2) tanks (P5ASPHTK) were determined with EPA's TANK 4.0.9d program and the procedures found in EPA's "Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5" for input to the TANK program. The annual VOC emissions for working and breathing losses from two 25,000 gallon tank were estimated at 266.76 pounds per year or 0.030 pounds per hour. Based on 1.3 percent of the VOC emissions (0.030 pounds per hour total from both tanks), the asphalt fumes emission rate is 0.00040 pounds per hour and 0.0017 tons/yr.

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

Estimates for State Toxic Air Pollutants (Calcium Hydroxide)

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

Estimates for Federal HAPs Air Pollutants

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

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

Table 6-37: HAPs Emission Rates from the Drum Dryer/Mixer (P5HMASTK)
EPA HAPS Emissions Drum Mixer Hot Mix Asphalt Plant with Fabric Filter

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

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

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

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

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

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

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

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

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

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

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

Uncontrolled Emission Totals															
Unit #	**Description**	**NOx**		**CO**		**SO_2**		**VOC**		**PM**		**PM_{10}**		**$PM_{2.5}$**	
		lbs/hr	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**
	Plant #2 HMA	4.58	20.1	61.0	267.0	0.69	3.04	2.09	9.1	4834	21088	691	2978	44.9	192
	Plant #5 HMA	7.94	34.8	40.0	175.1	1.02	4.47	14.9	65.1	8458	36957	1974	8597	473	2065
	Crushing & Screening/Scalping Screen	3.20	7.02	2.44	5.35	0.0044	0.010	0.37	0.82	18.3	36.3	7.18	14.28	1.20	2.38
	Total	**15.72**	**61.8**	**103.4**	**447.4**	**1.72**	**7.52**	**17.33**	**75.1**	**13310**	**58081**	**2672**	**11589**	**710**	**3098**

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

Controlled Emission Totals														
Description	**NOx**		**CO**		**SO_2**		**VOC**		**PM**		**PM_{10}**		**$PM_{2.5}$**	
	lbs/hr	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**	**lbs/hr**	**tons/yr**
Plant #2 HMA	4.58	5.56	61.0	40.8	0.69	0.46	2.09	1.55	11.20	6.66	5.79	3.63	4.22	2.83
Plant #5 HMA	7.94	10.28	40.0	50.3	1.02	1.28	14.9	18.7	20.3	23.1	10.56	12.44	7.78	9.61
Crushing & Screening/Scalping Screen	3.20	5.85	2.44	4.46	0.0044	0.008	0.37	0.68	8.66	7.15	3.61	3.11	0.68	0.69
Total	**15.72**	**21.7**	**103.4**	**95.6**	**1.72**	**1.74**	**17.33**	**20.9**	**40.1**	**36.9**	**20.0**	**19.19**	**12.69**	**13.14**

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

Controlled Emission Totals				
Description	**HAPS**		**Asphalt Fumes (State TAPS)**	
	lbs/hr	**tons/yr**	**lbs/hr**	**tons/yr**
Plant #2 HMA	1.17	0.79	1.82	1.15
Plant #5 HMA	1.61	2.03	3.69	4.61
Crushing & Screening/Scalping Screen	0.018	0.0025		
Total	**2.80**	**2.82**	**5.50**	**5.76**

Section 6.a

Green House Gas Emissions

(Submitting under 20.2.70, 20.2.72 20.2.74 NMAC)

Title V (20.2.70 NMAC), Minor NSR (20.2.72 NMAC), and PSD (20.2.74 NMAC) applicants must estimate and report greenhouse gas (GHG) emissions to verify the emission rates reported in the public notice, determine applicability to 40 CFR 60 Subparts, and to evaluate Prevention of Significant Deterioration (PSD) applicability. GHG emissions that are subject to air permit regulations consist of the sum of an aggregate group of these six greenhouse gases: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Calculating GHG Emissions:

1. Calculate the ton per year (tpy) GHG mass emissions and GHG CO_2e emissions from your facility.
2. GHG mass emissions are the sum of the total annual tons of greenhouse gases without adjusting with the global warming potentials (GWPs). GHG CO_2e emissions are the sum of the mass emissions of each individual GHG multiplied by its GWP found in Table A-1 in 40 CFR 98 <u>Mandatory Greenhouse Gas Reporting</u>.
3. Emissions from routine or predictable start up, shut down, and maintenance must be included.
4. Report GHG mass and GHG CO_2e emissions in Table 2-P of this application. Emissions are reported in **<u>short</u>** tons per year and represent each emission unit's Potential to Emit (PTE).
5. All Title V major sources, PSD major sources, and all power plants, whether major or not, must calculate and report GHG mass and CO2e emissions for each unit in Table 2-P.
6. For minor source facilities that are not power plants, are not Title V, and are not PSD there are three options for reporting GHGs in Table 2-P: 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHGs as a second separate unit; 3) or check the following **X** By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

Sources for Calculating GHG Emissions:

- Manufacturer's Data
- AP-42 Compilation of Air Pollutant Emission Factors at http://www.epa.gov/ttn/chief/ap42/index.html
- EPA's Internet emission factor database WebFIRE at http://cfpub.epa.gov/webfire/
- 40 CFR 98 <u>Mandatory Green House Gas Reporting</u> except that tons should be reported in short tons rather than in metric tons for the purpose of PSD applicability.
- API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry. August 2009 or most recent version.
- Sources listed on EPA's NSR Resources for Estimating GHG Emissions at http://www.epa.gov/nsr/clean-air-act-permitting-greenhouse-gases:

Global Warming Potentials (GWP):
Applicants must use the Global Warming Potentials codified in Table A-1 of the most recent version of 40 CFR 98 Mandatory Greenhouse Gas Reporting. The GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to that of one unit mass of CO_2 over a specified time period.

"Greenhouse gas" for the purpose of air permit regulations is defined as the aggregate group of the following six gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. **(20.2.70.7 NMAC, 20.2.74.7 NMAC).** You may also find GHGs defined in 40 CFR 86.1818-12(a).

Metric to Short Ton Conversion:
Short tons for GHGs and other regulated pollutants are the standard unit of measure for PSD and title V permitting programs. 40 CFR 98 <u>Mandatory Greenhouse Reporting</u> requires metric tons.
1 metric ton = 1.10231 short tons (per Table A-2 to Subpart A of Part 98 – Units of Measure Conversions)

Section 7

Information Used To Determine Emissions

Information Used to Determine Emissions shall include the following:

X If manufacturer data are used, include specifications for emissions units and control equipment, including control efficiencies specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.

☐ If test data are used, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.

X If the most current copy of AP-42 is used, reference the section and date located at the bottom of the page. Include a copy of the page containing the emissions factors, and clearly mark the factors used in the calculations.

☐ If an older version of AP-42 is used, include a complete copy of the section.

☐ If an EPA document or other material is referenced, include a complete copy.

☐ Fuel specifications sheet.

☐ If computer models are used to estimate emissions, include an input summary (if available) and a detailed report, and a disk containing the input file(s) used to run the model. For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., permit or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

A-XXXX-7-AP42S1-4	Asphalt Heater Combustion and HAPs Emission Factors
A-XXXX-7-AP42S1-3	Diesel-Fired Engine HAPs Emission Factors
A-XXXX-7-AP42S3-3	Diesel-Fired Engine HAPs Emission Factors
A-XXXX-7-AP42S3-4	Diesel-Fired Engine HAPs Emission Factors
A-XXXX-7-AP42S11-1	HMA Plant and HAPs Emission Factors
A-XXXX-7-AP42S11-12	Mineral Filler Silo Emission Factors
A-XXXX-7-AP42S11-19-2	Screen, Pugmill, and Transfer Point Emission Factors
A-XXXX-7-AP42S13-2-1	Paved Road Emission Factors
A-XXXX-7-AP42S13-2-2	Unpaved Road Emission Factors
A-XXXX-7-AP42S13-2-4	Material Handling Emission Factors
A-XXXX-7-WindspeedsNewMexico	Santa Fe Wind Speed Annual Average 1996 to 2006
A-XXXX-7-Tier4i	Unit CS-E: Crusher/Screen Plant Engine
A-XXXX-7-Tier1	Unit SS-E: Scalping Screen Engine
A-XXXX-7-ACTANKP2	Unit P2ASPHTNK: Plant #2 Asphalt Cement Storage Tanks (2)
A-XXXX-7-ACTANKP5	Unit P2ASPHTNK: Plant #5 Asphalt Cement Storage Tanks (2)
A-XXXX-7-AggPlant.xls	AAM Aggregate Plant Emissions Spreadsheet (Electronic File)
A-XXXX-7-P2HMA.xls	AAM HMA Plant #2 Emissions Spreadsheet (Electronic File)
A-XXXX-7-P5HMA.xls	AAM HMA Plant #5 Emissions Spreadsheet (Electronic File)

1.4 Natural Gas Combustion

1.4.1 General[1-2]

Natural gas is one of the major combustion fuels used throughout the country. It is mainly used to generate industrial and utility electric power, produce industrial process steam and heat, and heat residential and commercial space. Natural gas consists of a high percentage of methane (generally above 85 percent) and varying amounts of ethane, propane, butane, and inerts (typically nitrogen, carbon dioxide, and helium). The average gross heating value of natural gas is approximately 1,020 British thermal units per standard cubic foot (Btu/scf), usually varying from 950 to 1,050 Btu/scf.

1.4.2 Firing Practices[3-5]

There are three major types of boilers used for natural gas combustion in commercial, industrial, and utility applications: watertube, firetube, and cast iron. Watertube boilers are designed to pass water through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot combustion gases and through radiant heat transfer. The watertube design is the most common in utility and large industrial boilers. Watertube boilers are used for a variety of applications, ranging from providing large amounts of process steam, to providing hot water or steam for space heating, to generating high-temperature, high-pressure steam for producing electricity. Furthermore, watertube boilers can be distinguished either as field erected units or packaged units.

Field erected boilers are boilers that are constructed on site and comprise the larger sized watertube boilers. Generally, boilers with heat input levels greater than 100 MMBtu/hr, are field erected. Field erected units usually have multiple burners and, given the customized nature of their construction, also have greater operational flexibility and NO_x control options. Field erected units can also be further categorized as wall-fired or tangential-fired. Wall-fired units are characterized by multiple individual burners located on a single wall or on opposing walls of the furnace while tangential units have several rows of air and fuel nozzles located in each of the four corners of the boiler.

Package units are constructed off-site and shipped to the location where they are needed. While the heat input levels of packaged units may range up to 250 MMBtu/hr, the physical size of these units are constrained by shipping considerations and generally have heat input levels less than 100 MMBtu/hr. Packaged units are always wall-fired units with one or more individual burners. Given the size limitations imposed on packaged boilers, they have limited operational flexibility and cannot feasibly incorporate some NO_x control options.

Firetube boilers are designed such that the hot combustion gases flow through tubes, which heat the water circulating outside of the tubes. These boilers are used primarily for space heating systems, industrial process steam, and portable power boilers. Firetube boilers are almost exclusively packaged units. The two major types of firetube units are Scotch Marine boilers and the older firebox boilers. In cast iron boilers, as in firetube boilers, the hot gases are contained inside the tubes and the water being heated circulates outside the tubes. However, the units are constructed of cast iron rather than steel. Virtually all cast iron boilers are constructed as package boilers. These boilers are used to produce either low-pressure steam or hot water, and are most commonly used in small commercial applications.

Natural gas is also combusted in residential boilers and furnaces. Residential boilers and furnaces generally resemble firetube boilers with flue gas traveling through several channels or tubes with water or air circulated outside the channels or tubes.

1.4.3 Emissions[3-4]

The emissions from natural gas-fired boilers and furnaces include nitrogen oxides (NO_x), carbon monoxide (CO), and carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), volatile organic compounds (VOCs), trace amounts of sulfur dioxide (SO_2), and particulate matter (PM).

Nitrogen Oxides -

Nitrogen oxides formation occurs by three fundamentally different mechanisms. The principal mechanism of NO_x formation in natural gas combustion is thermal NO_x. The thermal NO_x mechanism occurs through the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most NO_x formed through the thermal NO_x mechanism occurs in the high temperature flame zone near the burners. The formation of thermal NO_x is affected by three furnace-zone factors: (1) oxygen concentration, (2) peak temperature, and (3) time of exposure at peak temperature. As these three factors increase, NO_x emission levels increase. The emission trends due to changes in these factors are fairly consistent for all types of natural gas-fired boilers and furnaces. Emission levels vary considerably with the type and size of combustor and with operating conditions (e.g., combustion air temperature, volumetric heat release rate, load, and excess oxygen level).

The second mechanism of NO_x formation, called prompt NO_x, occurs through early reactions of nitrogen molecules in the combustion air and hydrocarbon radicals from the fuel. Prompt NO_x reactions occur within the flame and are usually negligible when compared to the amount of NO_x formed through the thermal NO_x mechanism. However, prompt NO_x levels may become significant with ultra-low-NO_x burners.

The third mechanism of NO_x formation, called fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Due to the characteristically low fuel nitrogen content of natural gas, NO_x formation through the fuel NO_x mechanism is insignificant.

Carbon Monoxide -

The rate of CO emissions from boilers depends on the efficiency of natural gas combustion. Improperly tuned boilers and boilers operating at off-design levels decrease combustion efficiency resulting in increased CO emissions. In some cases, the addition of NO_x control systems such as low NO_x burners and flue gas recirculation (FGR) may also reduce combustion efficiency, resulting in higher CO emissions relative to uncontrolled boilers.

Volatile Organic Compounds -

The rate of VOC emissions from boilers and furnaces also depends on combustion efficiency. VOC emissions are minimized by combustion practices that promote high combustion temperatures, long residence times at those temperatures, and turbulent mixing of fuel and combustion air. Trace amounts of VOC species in the natural gas fuel (e.g., formaldehyde and benzene) may also contribute to VOC emissions if they are not completely combusted in the boiler.

Sulfur Oxides -

Emissions of SO_2 from natural gas-fired boilers are low because pipeline quality natural gas typically has sulfur levels of 2,000 grains per million cubic feet. However, sulfur-containing odorants are added to natural gas for detecting leaks, leading to small amounts of SO_2 emissions. Boilers combusting unprocessed natural gas may have higher SO_2 emissions due to higher levels of sulfur in the natural gas. For these units, a sulfur mass balance should be used to determine SO_2 emissions.

Particulate Matter -

Because natural gas is a gaseous fuel, filterable PM emissions are typically low. Particulate matter from natural gas combustion has been estimated to be less than 1 micrometer in size and has filterable and condensable fractions. Particulate matter in natural gas combustion are usually larger molecular weight hydrocarbons that are not fully combusted. Increased PM emissions may result from poor air/fuel mixing or maintenance problems.

Greenhouse Gases -[6-9]

CO_2, CH_4, and N_2O emissions are all produced during natural gas combustion. In properly tuned boilers, nearly all of the fuel carbon (99.9 percent) in natural gas is converted to CO_2 during the combustion process. This conversion is relatively independent of boiler or combustor type. Fuel carbon not converted to CO_2 results in CH_4, CO, and/or VOC emissions and is due to incomplete combustion. Even in boilers operating with poor combustion efficiency, the amount of CH_4, CO, and VOC produced is insignificant compared to CO_2 levels.

Formation of N_2O during the combustion process is affected by two furnace-zone factors. N_2O emissions are minimized when combustion temperatures are kept high (above 1475°F) and excess oxygen is kept to a minimum (less than 1 percent).

Methane emissions are highest during low-temperature combustion or incomplete combustion, such as the start-up or shut-down cycle for boilers. Typically, conditions that favor formation of N_2O also favor emissions of methane.

1.4.4 Controls[4,10]

NO_x Controls -

Currently, the two most prevalent combustion control techniques used to reduce NO_x emissions from natural gas-fired boilers are flue gas recirculation (FGR) and low NO_x burners. In an FGR system, a portion of the flue gas is recycled from the stack to the burner windbox. Upon entering the windbox, the recirculated gas is mixed with combustion air prior to being fed to the burner. The recycled flue gas consists of combustion products which act as inerts during combustion of the fuel/air mixture. The FGR system reduces NO_x emissions by two mechanisms. Primarily, the recirculated gas acts as a dilutent to reduce combustion temperatures, thus suppressing the thermal NO_x mechanism. To a lesser extent, FGR also reduces NO_x formation by lowering the oxygen concentration in the primary flame zone. The amount of recirculated flue gas is a key operating parameter influencing NO_x emission rates for these systems. An FGR system is normally used in combination with specially designed low NO_x burners capable of sustaining a stable flame with the increased inert gas flow resulting from the use of FGR. When low NO_x burners and FGR are used in combination, these techniques are capable of reducing NO_x emissions by 60 to 90 percent.

Low NO_x burners reduce NO_x by accomplishing the combustion process in stages. Staging partially delays the combustion process, resulting in a cooler flame which suppresses thermal NO_x formation. The two most common types of low NO_x burners being applied to natural gas-fired boilers are staged air burners and staged fuel burners. NO_x emission reductions of 40 to 85 percent (relative to uncontrolled emission levels) have been observed with low NO_x burners.

Other combustion control techniques used to reduce NO_x emissions include staged combustion and gas reburning. In staged combustion (e.g., burners-out-of-service and overfire air), the degree of staging is a key operating parameter influencing NO_x emission rates. Gas reburning is similar to the use of overfire in the use of combustion staging. However, gas reburning injects additional amounts of natural gas in the upper furnace, just before the overfire air ports, to provide increased reduction of NO_x to NO_2.

Two postcombustion technologies that may be applied to natural gas-fired boilers to reduce NO_x emissions are selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR). The SNCR system injects ammonia (NH_3) or urea into combustion flue gases (in a specific temperature zone) to reduce NO_x emission. The Alternative Control Techniques (ACT) document for NO_x emissions from utility boilers, maximum SNCR performance was estimated to range from 25 to 40 percent for natural gas-fired boilers.[12] Performance data available from several natural gas fired utility boilers with SNCR show a 24 percent reduction in NO_x for applications on wall-fired boilers and a 13 percent reduction in NO_x for applications on tangential-fired boilers.[11] In many situations, a boiler may have an SNCR system installed to trim NO_x emissions to meet permitted levels. In these cases, the SNCR system may not be operated to achieve maximum NO_x reduction. The SCR system involves injecting NH_3 into the flue gas in the presence of a catalyst to reduce NO_x emissions. No data were available on SCR performance on natural gas fired boilers at the time of this publication. However, the ACT Document for utility boilers estimates NO_x reduction efficiencies for SCR control ranging from 80 to 90 percent.[12]

Emission factors for natural gas combustion in boilers and furnaces are presented in Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.[11] Tables in this section present emission factors on a volume basis (lb/10^6 scf). To convert to an energy basis (lb/MMBtu), divide by a heating value of 1,020 MMBtu/10^6 scf. For the purposes of developing emission factors, natural gas combustors have been organized into three general categories: large wall-fired boilers with greater than 100 MMBtu/hr of heat input, boilers and residential furnaces with less than 100 MMBtu/hr of heat input, and tangential-fired boilers. Boilers within these categories share the same general design and operating characteristics and hence have similar emission characteristics when combusting natural gas.

Emission factors are rated from A to E to provide the user with an indication of how “good” the factor is, with “A” being excellent and “E” being poor. The criteria that are used to determine a rating for an emission factor can be found in the Emission Factor Documentation for AP-42 Section 1.4 and in the introduction to the AP-42 document.

1.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section are summarized below. For further detail, consult the Emission Factor Documentation for this section. These and other documents can be found on the Emission Factor and Inventory Group (EFIG) home page (http://www.epa.gov/ttn/chief).

Supplement D, March 1998

- Text was revised concerning Firing Practices, Emissions, and Controls.

- All emission factors were updated based on 482 data points taken from 151 source tests. Many new emission factors have been added for speciated organic compounds, including hazardous air pollutants.

July 1998 - minor changes

- Footnote D was added to table 1.4-3 to explain why the sum of individual HAP may exceed VOC or TOC, the web address was updated, and the references were reordered.

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b] Emission Factor (lb/10^6 scf)	NO_x[b] Emission Factor Rating	CO Emission Factor (lb/10^6 scf)	CO Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from lb/10^6 scf to kg/10^6 m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from 1b/10^6 scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_X emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_X emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6$ scf] = (3.67) (CON) (C)(D), where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, $4.2x10^4$ $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2.
Assumes sulfur content is natural gas of 2,000 $grains/10^6$ scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content ($grains/10^6$ scf) to 2,000 $grains/10^6$ scf.

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
91-57-6	2-Methylnaphthalene[b, c]	2.4E-05	D
56-49-5	3-Methylchloranthrene[b, c]	<1.8E-06	E
	7,12-Dimethylbenz(a)anthracene[b,c]	<1.6E-05	E
83-32-9	Acenaphthene[b,c]	<1.8E-06	E
203-96-8	Acenaphthylene[b,c]	<1.8E-06	E
120-12-7	Anthracene[b,c]	<2.4E-06	E
56-55-3	Benz(a)anthracene[b,c]	<1.8E-06	E
71-43-2	Benzene[b]	2.1E-03	B
50-32-8	Benzo(a)pyrene[b,c]	<1.2E-06	E
205-99-2	Benzo(b)fluoranthene[b,c]	<1.8E-06	E
191-24-2	Benzo(g,h,i)perylene[b,c]	<1.2E-06	E
205-82-3	Benzo(k)fluoranthene[b,c]	<1.8E-06	E
106-97-8	Butane	2.1E+00	E
218-01-9	Chrysene[b,c]	<1.8E-06	E
53-70-3	Dibenzo(a,h)anthracene[b,c]	<1.2E-06	E
25321-22-6	Dichlorobenzene[b]	1.2E-03	E
74-84-0	Ethane	3.1E+00	E
206-44-0	Fluoranthene[b,c]	3.0E-06	E
86-73-7	Fluorene[b,c]	2.8E-06	E
50-00-0	Formaldehyde[b]	7.5E-02	B
110-54-3	Hexane[b]	1.8E+00	E
193-39-5	Indeno(1,2,3-cd)pyrene[b,c]	<1.8E-06	E
91-20-3	Naphthalene[b]	6.1E-04	E
109-66-0	Pentane	2.6E+00	E
85-01-8	Phenanathrene[b,c]	1.7E-05	D

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
74-98-6	Propane	1.6E+00	E
129-00-0	Pyrene[b, c]	5.0E-06	E
108-88-3	Toluene[b]	3.4E-03	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

[d] The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.

TABLE 1.4-4. EMISSION FACTORS FOR METALS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor (lb/10^6 scf)	Emission Factor Rating
7440-38-2	Arsenic[b]	2.0E-04	E
7440-39-3	Barium	4.4E-03	D
7440-41-7	Beryllium[b]	<1.2E-05	E
7440-43-9	Cadmium[b]	1.1E-03	D
7440-47-3	Chromium[b]	1.4E-03	D
7440-48-4	Cobalt[b]	8.4E-05	D
7440-50-8	Copper	8.5E-04	C
7439-96-5	Manganese[b]	3.8E-04	D
7439-97-6	Mercury[b]	2.6E-04	D
7439-98-7	Molybdenum	1.1E-03	D
7440-02-0	Nickel[b]	2.1E-03	C
7782-49-2	Selenium[b]	<2.4E-05	E
7440-62-2	Vanadium	2.3E-03	D
7440-66-6	Zinc	2.9E-02	E

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. Emission factors preceeded by a less-than symbol are based on method detection limits. To convert from lb/10^6 scf to kg/10^6 m^3, multiply by l6. To convert from lb/10^6 scf to 1b/MMBtu, divide by 1,020.

[b] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

References For Section 1.4

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12. *Alternate Control Techniques Document -* NO_x *Emissions from Utility Boilers*, EPA-453/R-94-023, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1994.

AP-42 Section 1.4: Natural Gas Combustion Data Files

The data that supports the emission factors are presented in summary in the background report and are reported more completely in an electronic database. The database is in Microsoft Access 97®. The file is located on the CHIEF web site at http://www.epa.gov/ttn/chief/ap42c1.html.

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 1.3-9. 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.

Table 1.3-11. EMISSION FACTORS FOR METALS FROM UNCONTROLLED NO. 6 FUEL OIL COMBUSTION[a]

Metal	Average Emission Factor[b, d] (lb/10^3 Gal)	EMISSION FACTOR RATING
Antimony	5.25E-03[c]	E
Arsenic	1.32E-03	C
Barium	2.57E-03	D
Beryllium	2.78E-05	C
Cadmium	3.98E-04	C
Chloride	3.47E-01	D
Chromium	8.45E-04	C
Chromium VI	2.48E-04	C
Cobalt	6.02E-03	D
Copper	1.76E-03	C
Fluoride	3.73E-02	D
Lead	1.51E-03	C
Manganese	3.00E-03	C
Mercury	1.13E-04	C
Molybdenum	7.87E-04	D
Nickel	8.45E-02	C
Phosphorous	9.46E-03	D
Selenium	6.83E-04	C
Vanadium	3.18E-02	D
Zinc	2.91E-02	D

[a] Data are for residual oil fired boilers, Source Classification Codes (SCCs) 1-01-004-01/04.

[b] References 64-72. 18 of 19 sources were uncontrolled and 1 source was controlled with low efficiency ESP. To convert from lb/10^3 gal to kg/10^3 L, multiply by 0.12.

[c] References 29-32,40-44.

[d] For oil/water mixture, reduce factors in proportion to water content of the fuel (due to dilution). To adjust the listed values for water content, multiply the listed value by 1-decimal fraction of water (ex: For fuel with 9 percent water by volume, multiply by 1-0.9=.91).

3.3 Gasoline And Diesel Industrial Engines

3.3.1 General

The engine category addressed by this section covers a wide variety of industrial applications of both gasoline and diesel internal combustion (IC) engines such as aerial lifts, fork lifts, mobile refrigeration units, generators, pumps, industrial sweepers/scrubbers, material handling equipment (such as conveyors), and portable well-drilling equipment. The three primary fuels for reciprocating IC engines are gasoline, diesel fuel oil (No.2), and natural gas. Gasoline is used primarily for mobile and portable engines. Diesel fuel oil is the most versatile fuel and is used in IC engines of all sizes. The rated power of these engines covers a rather substantial range, up to 250 horsepower (hp) for gasoline engines and up to 600 hp for diesel engines. (Diesel engines greater than 600 hp are covered in Section 3.4, "Large Stationary Diesel And All Stationary Dual-fuel Engines".) Understandably, substantial differences in engine duty cycles exist. It was necessary, therefore, to make reasonable assumptions concerning usage in order to formulate some of the emission factors.

3.3.2 Process Description

All reciprocating IC engines operate by the same basic process. A combustible mixture is first compressed in a small volume between the head of a piston and its surrounding cylinder. The mixture is then ignited, and the resulting high-pressure products of combustion push the piston through the cylinder. This movement is converted from linear to rotary motion by a crankshaft. The piston returns, pushing out exhaust gases, and the cycle is repeated.

There are 2 methods used for stationary reciprocating IC engines: compression ignition (CI) and spark ignition (SI). This section deals with both types of reciprocating IC engines. All diesel-fueled engines are compression ignited, and all gasoline-fueled engines are spark ignited.

In CI engines, combustion air is first compression heated in the cylinder, and diesel fuel oil is then injected into the hot air. Ignition is spontaneous because the air temperature is above the autoignition temperature of the fuel. SI engines initiate combustion by the spark of an electrical discharge. Usually the fuel is mixed with the air in a carburetor (for gasoline) or at the intake valve (for natural gas), but occasionally the fuel is injected into the compressed air in the cylinder.

CI engines usually operate at a higher compression ratio (ratio of cylinder volume when the piston is at the bottom of its stroke to the volume when it is at the top) than SI engines because fuel is not present during compression; hence there is no danger of premature autoignition. Since engine thermal efficiency rises with increasing pressure ratio (and pressure ratio varies directly with compression ratio), CI engines are more efficient than SI engines. This increased efficiency is gained at the expense of poorer response to load changes and a heavier structure to withstand the higher pressures.[1]

3.3.3 Emissions

Most of the pollutants from IC engines are emitted through the exhaust. However, some total organic compounds (TOC) escape from the crankcase as a result of blowby (gases that are vented from the oil pan after they have escaped from the cylinder past the piston rings) and from the fuel tank and carburetor because of evaporation. Nearly all of the TOCs from diesel CI engines enter the

Table 3.3-2. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR UNCONTROLLED DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (Fuel Input) (lb/MMBtu)
Benzene[b]	9.33 E-04
Toluene[b]	4.09 E-04
Xylenes[b]	2.85 E-04
Propylene	2.58 E-03
1,3-Butadiene[b,c]	<3.91 E-05
Formaldehyde[b]	1.18 E-03
Acetaldehyde[b]	7.67 E-04
Acrolein[b]	<9.25 E-05
Polycyclic aromatic hydrocarbons (PAH)	
Naphthalene[b]	8.48 E-05
Acenaphthylene	<5.06 E-06
Acenaphthene	<1.42 E-06
Fluorene	2.92 E-05
Phenanthrene	2.94 E-05
Anthracene	1.87 E-06
Fluoranthene	7.61 E-06
Pyrene	4.78 E-06
Benzo(a)anthracene	1.68 E-06
Chrysene	3.53 E-07
Benzo(b)fluoranthene	<9.91 E-08
Benzo(k)fluoranthene	<1.55 E-07
Benzo(a)pyrene	<1.88 E-07
Indeno(1,2,3-cd)pyrene	<3.75 E-07
Dibenz(a,h)anthracene	<5.83 E-07
Benzo(g,h,l)perylene	<4.89 E-07
TOTAL PAH	1.68 E-04

[a] Based on the uncontrolled levels of 2 diesel engines from References 6-7. Source Classification Codes 2-02-001-02, 2-03-001-01. To convert from lb/MMBtu to ng/J, multiply by 430.
[b] Hazardous air pollutant listed in the *Clean Air Act*.
[c] Based on data from 1 engine.

3.4 Large Stationary Diesel And All Stationary Dual-fuel Engines

3.4.1 General

The primary domestic use of large stationary diesel engines (greater than 600 horsepower [hp]) is in oil and gas exploration and production. These engines, in groups of 3 to 5, supply mechanical power to operate drilling (rotary table), mud pumping, and hoisting equipment, and may also operate pumps or auxiliary power generators. Another frequent application of large stationary diesels is electricity generation for both base and standby service. Smaller uses include irrigation, hoisting, and nuclear power plant emergency cooling water pump operation.

Dual-fuel engines were developed to obtain compression ignition performance and the economy of natural gas, using a minimum of 5 to 6 percent diesel fuel to ignite the natural gas. Large dual-fuel engines have been used almost exclusively for prime electric power generation. This section includes all dual-fuel engines.

3.4.2 Process Description

All reciprocating internal combustion (IC) engines operate by the same basic process. A combustible mixture is first compressed in a small volume between the head of a piston and its surrounding cylinder. The mixture is then ignited, and the resulting high-pressure products of combustion push the piston through the cylinder. This movement is converted from linear to rotary motion by a crankshaft. The piston returns, pushing out exhaust gases, and the cycle is repeated.

There are 2 ignition methods used in stationary reciprocating IC engines, compression ignition (CI) and spark ignition (SI). In CI engines, combustion air is first compression heated in the cylinder, and diesel fuel oil is then injected into the hot air. Ignition is spontaneous because the air temperature is above the autoignition temperature of the fuel. SI engines initiate combustion by the spark of an electrical discharge. Usually the fuel is mixed with the air in a carburetor (for gasoline) or at the intake valve (for natural gas), but occasionally the fuel is injected into the compressed air in the cylinder. Although all diesel- fueled engines are compression ignited and all gasoline- and gas-fueled engines are spark ignited, gas can be used in a CI engine if a small amount of diesel fuel is injected into the compressed gas/air mixture to burn any mixture ratio of gas and diesel oil (hence the name dual fuel), from 6 to 100 percent diesel oil.

CI engines usually operate at a higher compression ratio (ratio of cylinder volume when the piston is at the bottom of its stroke to the volume when it is at the top) than SI engines because fuel is not present during compression; hence there is no danger of premature autoignition. Since engine thermal efficiency rises with increasing pressure ratio (and pressure ratio varies directly with compression ratio), CI engines are more efficient than SI engines. This increased efficiency is gained at the expense of poorer response to load changes and a heavier structure to withstand the higher pressures.[1]

3.4.3 Emissions And Controls

Most of the pollutants from IC engines are emitted through the exhaust. However, some total organic compounds (TOC) escape from the crankcase as a result of blowby (gases that are vented from the oil pan after they have escaped from the cylinder past the piston rings) and from the fuel tank and carburetor because of evaporation. Nearly all of the TOCs from diesel CI engines enter the atmosphere from the exhaust. Crankcase blowby is minor because TOCs are not present during compression of the charge. Evaporative losses are insignificant in diesel engines due to the low volatility of diesel fuels. In general, evaporative losses are also negligible in engines using gaseous fuels because these engines receive their fuel continuously from a pipe rather than via a fuel storage tank and fuel pump.

The primary pollutants from internal combustion engines are oxides of nitrogen (NO_x), hydrocarbons and other organic compounds, carbon monoxide (CO), and particulates, which include both visible (smoke) and nonvisible emissions. Nitrogen oxide formation is directly related to high pressures and temperatures during the combustion process and to the nitrogen content, if any, of the fuel. The other pollutants, HC, CO, and smoke, are primarily the result of incomplete combustion. Ash and metallic additives in the fuel also contribute to the particulate content of the exhaust. Sulfur oxides also appear in the exhaust from IC engines. The sulfur compounds, mainly sulfur dioxide (SO_2), are directly related to the sulfur content of the fuel.[2]

3.4.3.1 Nitrogen Oxides -

Nitrogen oxide formation occurs by two fundamentally different mechanisms. The predominant mechanism with internal combustion engines is thermal NO_x which arises from the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most thermal NO_x is formed in the high-temperature region of the flame from dissociated molecular nitrogen in the combustion air. Some NO_x, called prompt NO_x, is formed in the early part of the flame from reaction of nitrogen intermediary species, and HC radicals in the flame. The second mechanism, fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Gasoline, and most distillate oils, have no chemically-bound fuel N_2 and essentially all NO_x formed is thermal NO_x.

3.4.3.2 Total Organic Compounds -

The pollutants commonly classified as hydrocarbons are composed of a wide variety of organic compounds and are discharged into the atmosphere when some of the fuel remains unburned or is only partially burned during the combustion process. Most unburned hydrocarbon emissions result from fuel droplets that were transported or injected into the quench layer during combustion. This is the region immediately adjacent to the combustion chamber surfaces, where heat transfer outward through the cylinder walls causes the mixture temperatures to be too low to support combustion.

Partially burned hydrocarbons can occur because of poor air and fuel homogeneity due to incomplete mixing, before or during combustion; incorrect air/fuel ratios in the cylinder during combustion due to maladjustment of the engine fuel system; excessively large fuel droplets (diesel engines); and low cylinder temperature due to excessive cooling (quenching) through the walls or early cooling of the gases by expansion of the combustion volume caused by piston motion before combustion is completed.[2]

3.4.3.3 Carbon Monoxide -

Carbon monoxide is a colorless, odorless, relatively inert gas formed as an intermediate combustion product that appears in the exhaust when the reaction of CO to CO_2 cannot proceed to completion. This situation occurs if there is a lack of available oxygen near the hydrocarbon (fuel) molecule during combustion, if the gas temperature is too low, or if the residence time in the cylinder is too short. The oxidation rate of CO is limited by reaction kinetics and, as a consequence, can be accelerated only to a certain extent by improvements in air and fuel mixing during the combustion process.[2-3]

3.4.3.4 Smoke, Particulate Matter, and PM-10 -

White, blue, and black smoke may be emitted from IC engines. Liquid particulates appear as white smoke in the exhaust during an engine cold start, idling, or low load operation. These are formed in the quench layer adjacent to the cylinder walls, where the temperature is not high enough to ignite the fuel. Blue smoke is emitted when lubricating oil leaks, often past worn piston rings, into the combustion chamber and is partially burned. Proper maintenance is the most effective method of preventing blue smoke emissions from all types of IC engines. The primary constituent of black smoke is agglomerated carbon particles (soot).[2]

3.4.3.5 Sulfur Oxides -

Sulfur oxide emissions are a function of only the sulfur content in the fuel rather than any combustion variables. In fact, during the combustion process, essentially all the sulfur in the fuel is oxidized to SO_2. The oxidation of SO_2 gives sulfur trioxide (SO_3), which reacts with water to give sulfuric acid (H_2SO_4), a contributor to acid precipitation. Sulfuric acid reacts with basic substances to give sulfates, which are fine particulates that contribute to PM-10 and visibility reduction. Sulfur oxide emissions also contribute to corrosion of the engine parts.[2,3]

Table 3.4-1 contains gaseous emission factors for the pollutants discussed above, expressed in units of pounds per horsepower-hour (lb/hp-hr), and pounds per million British thermal unit (lb/MMBtu). Table 3.4-2 shows the particulate and particle-sizing emission factors. Table 3.4-3 shows the speciated organic compound emission factors and Table 3.4-4 shows the emission factors for polycyclic aromatic hydrocarbons (PAH). These tables do not provide a complete speciated organic compound and PAH listing because they are based only on a single engine test; they are to be used only for rough order of magnitude comparisons.

Table 3.4-5 shows the NO_x reduction and fuel consumption penalties for diesel and dual-fueled engines based on some of the available control techniques. The emission reductions shown are those that have been demonstrated. The effectiveness of controls on a particular engine will depend on the specific design of each engine, and the effectiveness of each technique could vary considerably. Other NO_x control techniques exist but are not included in Table 3.4-5. These techniques include internal/external exhaust gas recirculation, combustion chamber modification, manifold air cooling, and turbocharging.

3.4.4 Control Technologies

Control measures to date are primarily directed at limiting NO_x and CO emissions since they are the primary pollutants from these engines. From a NO_x control viewpoint, the most important distinction between different engine models and types of reciprocating engines is whether they are rich-burn or lean-burn. Rich-burn engines have an air-to-fuel ratio operating range that is near stoichiometric or fuel-rich of stoichiometric and as a result the exhaust gas has little or no excess oxygen. A lean-burn engine has an air-to-fuel operating range that is fuel-lean of stoichiometric; therefore, the exhaust from these engines is characterized by medium to high levels of O_2. The most common NO_x control technique for diesel and dual fuel engines focuses on modifying the combustion process. However, selective catalytic reduction (SCR) and nonselective catalytic reduction (NSCR) which are post-combustion techniques are becoming available. Control for CO have been partly adapted from mobile sources.[5]

Combustion modifications include injection timing retard (ITR), preignition chamber combustion (PCC), air-to-fuel ratio, and derating. Injection of fuel into the cylinder of a CI engine initiates the combustion process. Retarding the timing of the diesel fuel injection causes the combustion process to occur later in the power stroke when the piston is in the downward motion and combustion chamber volume is increasing. By increasing the volume, the combustion temperature and pressure are lowered, thereby lowering NO_x formation. ITR reduces NO_x from all diesel engines; however, the effectiveness is specific to each engine model. The amount of NO_x reduction with ITR diminishes with increasing levels of retard.[5]

Improved swirl patterns promote thorough air and fuel mixing and may include a precombustion chamber (PCC). A PCC is an antechamber that ignites a fuel-rich mixture that propagates to the main combustion chamber. The high exit velocity from the PCC results in improved mixing and complete combustion of the lean air/fuel mixture which lowers combustion temperature, thereby reducing NO_x emissions.[5]

The air-to-fuel ratio for each cylinder can be adjusted by controlling the amount of fuel that enters each cylinder. At air-to-fuel ratios less than stoichiometric (fuel-rich), combustion occurs under conditions of insufficient oxygen which causes NO_x to decrease because of lower oxygen and lower temperatures. Derating involves restricting engine operation to lower than normal levels of power production for the given application. Derating reduces cylinder pressures and temperatures thereby lowering NO_x formation rates.[5]

SCR is an add-on NO_x control placed in the exhaust stream following the engine and involves injecting ammonia (NH_3) into the flue gas. The NH_3 reacts with the NO_x in the presence of a catalyst to form water and nitrogen. The effectiveness of SCR depends on fuel quality and engine duty cycle (load fluctuations). Contaminants in the fuel may poison or mask the catalyst surface causing a reduction or termination in catalyst activity. Load fluctuations can cause variations in exhaust temperature and NO_x concentration which can create problems with the effectiveness of the SCR system.[5]

NSCR is often referred to as a three-way conversion catalyst system because the catalyst reactor simultaneously reduces NO_x, CO, and HC and involves placing a catalyst in the exhaust stream of the engine. The reaction requires that the O_2 levels be kept low and that the engine be operated at fuel-rich air-to-fuel ratios.[5]

3.4.5 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 memoranda describing each supplement or the background report for this section. These and other documents can be found on the CHIEF electronic bulletin board (919-541-5742), or on the new EFIG home page (http://www.epa.gov/oar/oaqps/efig/).

Supplement A, February 1996

No changes.

Supplement B, October 1996

- The general text was updated.
- Controlled NO_x factors and PM factors were added for diesel units.
- Math errors were corrected in factors for CO from diesel units and for uncontrolled NO_x from dual fueled units.

Table 3.4-1. GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESEL AND ALL STATIONARY DUAL-FUEL ENGINES[a]

	Diesel Fuel (SCC 2-02-004-01)			Dual Fuel[b] (SCC 2-02-004-02)		
Pollutant	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING
NO_x						
Uncontrolled	0.024	3.2	B	0.018	2.7	D
Controlled	0.013[c]	1.9[c]	B	ND	ND	NA
CO	5.5 E-03	0.85	C	7.5 E-03	1.16	D
SO_x[d]	8.09 E-03S_1	1.01S_1	B	4.06 E-04S_1 + 9.57 E-03S_2	0.05S_1 + 0.895S_2	B
CO_2[e]	1.16	165	B	0.772	110	B
PM	0.0007[c]	0.1[c]	B	ND	ND	NA
TOC (as CH_4)	7.05 E-04	0.09	C	5.29 E-03	0.8	D
Methane	f	f	E	3.97 E-03	0.6	E
Nonmethane	f	f	E	1.32 E-03	0.2[g]	E

[a] Based on uncontrolled levels for each fuel, from References 2,6-7. When necessary, the average heating value of diesel was assumed to be 19,300 Btu/lb with a density of 7.1 lb/gallon. The power output and fuel input values were averaged independently from each other, because of the use of actual brake-specific fuel consumption (BSFC) values for each data point and of the use of data possibly sufficient to calculate only 1 of the 2 emission factors (e. g., enough information to calculate lb/MMBtu, but not lb/hp-hr). Factors are based on averages across all manufacturers and duty cycles. The actual emissions from a particular engine or manufacturer could vary considerably from these levels. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code.

[b] Dual fuel assumes 95% natural gas and 5% diesel fuel.

[c] References 8-26. Controlled NO_x is by ignition timing retard.

[d] Assumes that all sulfur in the fuel is converted to SO_2. S_1 = % sulfur in fuel oil; S_2 = % sulfur in natural gas. For example, if sulfer content is 1.5%, then S = 1.5.

[e] Assumes 100% conversion of carbon in fuel to CO_2 with 87 weight % carbon in diesel, 70 weight % carbon in natural gas, dual-fuel mixture of 5% diesel with 95% natural gas, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and natural gas heating value of 1050 Btu/scf.

[f] Based on data from 1 engine, TOC is by weight 9% methane and 91% nonmethane.

[g] Assumes that nonmethane organic compounds are 25% of TOC emissions from dual-fuel engines. Molecular weight of nonmethane gas stream is assumed to be that of methane.

Table 3.4-2. PARTICULATE AND PARTICLE-SIZING EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Filterable particulate[b]	
< 1 µm	0.0478
< 3 µm	0.0479
< 10 µm	0.0496
Total filterable particulate	0.0620
Condensable particulate	0.0077
Total PM-10[c]	0.0573
Total particulate[d]	0.0697

[a] Based on 1 uncontrolled diesel engine from Reference 6. Source Classification Code 2-02-004-01. The data for the particulate emissions were collected using Method 5, and the particle size distributions were collected using a Source Assessment Sampling System. To convert from lb/MMBtu to ng/J, multiply by 430. PM-10 = particulate matter ≤ 10 micrometers (µm) aerometric diameter.

[b] Particle size is expressed as aerodynamic diameter.

[c] Total PM-10 is the sum of filterable particulate less than 10 µm aerodynamic diameter and condensable particulate.

[d] Total particulate is the sum of the total filterable particulate and condensable particulate.

Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Benzene[b]	7.76 E-04
Toluene[b]	2.81 E-04
Xylenes[b]	1.93 E-04
Propylene	2.79 E-03
Formaldehyde[b]	7.89 E-05
Acetaldehyde[b]	2.52 E-05
Acrolein[b]	7.88 E-06

[a]Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.
[b]Hazardous air pollutant listed in the *Clean Air Act*.

Table 3.4-4. PAH EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

PAH	Emission Factor (lb/MMBtu) (fuel input)
Naphthalene[b]	1.30 E-04
Acenaphthylene	9.23 E-06
Acenaphthene	4.68 E-06
Fluorene	1.28 E-05
Phenanthrene	4.08 E-05
Anthracene	1.23 E-06
Fluoranthene	4.03 E-06
Pyrene	3.71 E-06
Benz(a)anthracene	6.22 E-07
Chrysene	1.53 E-06
Benzo(b)fluoranthene	1.11 E-06
Benzo(k)fluoranthene	<2.18 E-07
Benzo(a)pyrene	<2.57 E-07
Indeno(1,2,3-cd)pyrene	<4.14 E-07
Dibenz(a,h)anthracene	<3.46 E-07
Benzo(g,h,l)perylene	<5.56 E-07
TOTAL PAH	<2.12 E-04

[a] Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.

[b] Hazardous air pollutant listed in the *Clean Air Act*.

Table 3.4-5. NO_x REDUCTION AND FUEL CONSUMPTION PENALTIES FOR LARGE STATIONARY DIESEL AND DUAL-FUEL ENGINES[a]

Control Approach		Diesel (SCC 2-02-004-01)		Dual Fuel (SCC 2-02-004-02)	
		NO_x Reduction (%)	ΔBSFC[b] (%)	NO_x Reduction (%)	ΔBSFC (%)
Derate	10%	ND	ND	<20	4
	20%	<20	4	ND	ND
	25%	5 - 23	1 - 5	1 - 33	1 - 7
Retard	2°	<20	4	<20	3
	4°	<40	4	<40	1
	8°	28 - 45	2 - 8	50 - 73	3 - 5
Air-to-fuel	3%	ND	ND	<20	0
	±10%	7 - 8	3	25 - 40	1 - 3
Water injection (H_2O/fuel ratio)	50%	25 - 35	2 - 4	ND	ND
SCR		80 - 95	0	80 - 95	0

[a] References 1,27-28. The reductions shown are typical and will vary depending on the engine and duty cycle. SCC = Source Classification Code. ΔBSFC = change in brake-specific fuel consumption. ND = no data.

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22. *Compliance Test Report Union Carbide Corporation Generator Exhaust Stack*, Danbury, CT, ROJAC Environmental Services, 1988.

23. *Compliance Test Report Hartford Insurance Company Emergency Generator Exhaust Stack*, Bloomfield, CT, ROJAC Environmental Services, 1987.

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25. *Compliance Test Report Southern New England Telephone Company Emergency Generator Exhaust Stack*, North Haven, CT, ROJAC Environmental Services, 1988.

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27. L. M. Campbell, *et al.*, *Sourcebook: NO_x Control Technology Data, Control Technology Center*, EPA-600/2-91-029, U. S. Environmental Protection Agency, Cincinnati, OH, July 1991.

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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 <u>batch</u> 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.

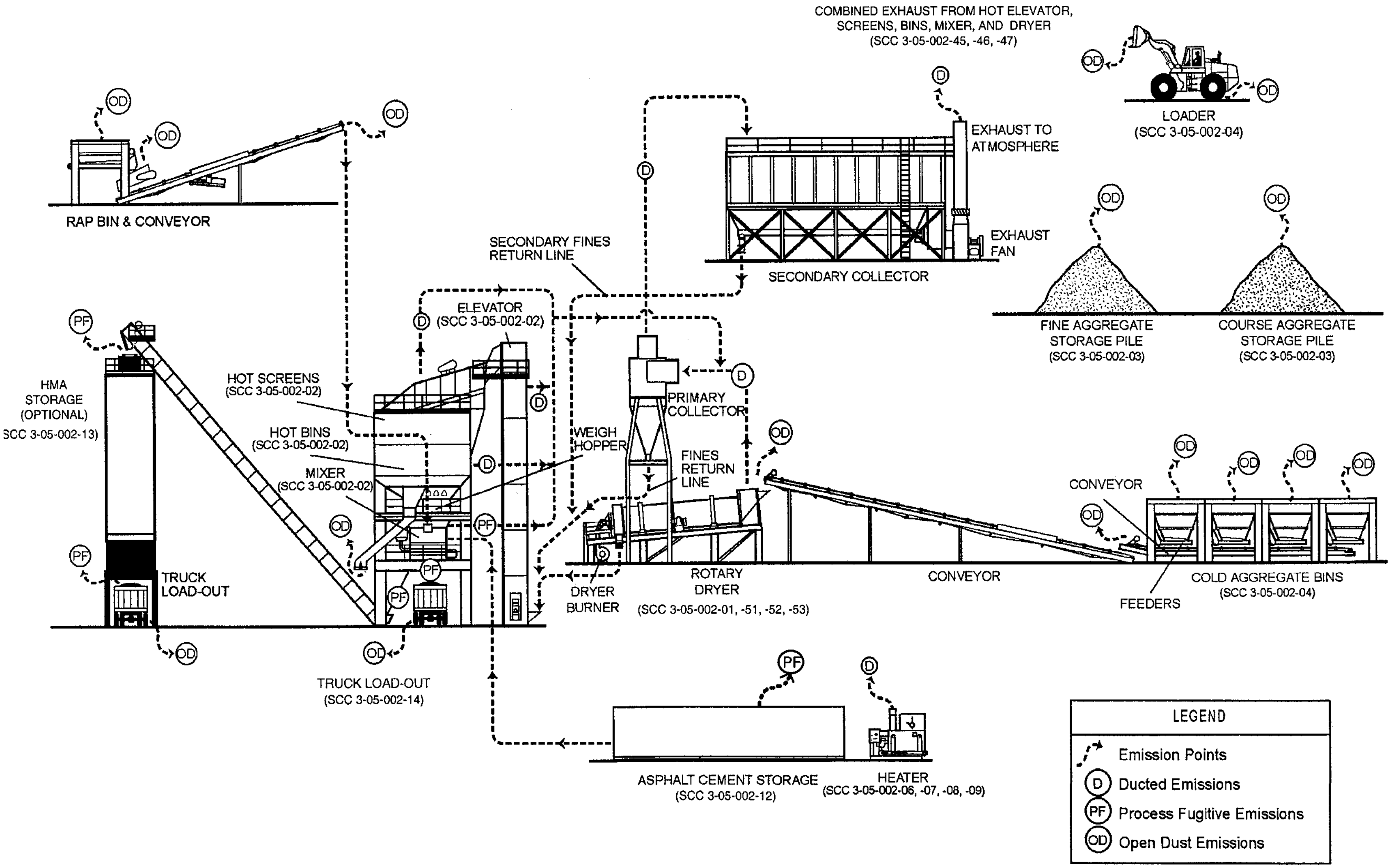

Figure 11.1-1. General process flow diagram for batch mix asphalt plants (source classification codes in parentheses).[3]

The aggregate from the weigh hopper is dropped into the mixer (pug mill) and dry-mixed for 6 to 10 seconds. The liquid asphalt is then dropped into the pug mill where it is mixed for an additional period of time. At older plants, RAP typically is conveyed directly to the pug mill from storage hoppers and combined with the hot aggregate. Total mixing time usually is less than 60 seconds. Then the hot mix is conveyed to a hot storage silo or is dropped directly into a truck and hauled to the job site.

11.1.1.2 Parallel Flow Drum Mix Plants –

Figure 11.1-2 shows the parallel flow drum mix process. This process is a continuous mixing type process, using proportioning cold feed controls for the process materials. The major difference between this process and the batch process is that the dryer is used not only to dry the material but also to mix the heated and dried aggregates with the liquid asphalt cement. Aggregate, which has been proportioned by size gradations, is introduced to the drum at the burner end. As the drum rotates, the aggregates, as well as the combustion products, move toward the other end of the drum in parallel. Liquid asphalt cement flow is controlled by a variable flow pump electronically linked to the new (virgin) aggregate and RAP weigh scales. The asphalt cement is introduced in the mixing zone midway down the drum in a lower temperature zone, along with any RAP and particulate matter (PM) from collectors.

The mixture is discharged at the end of the drum and is conveyed to either a surge bin or HMA storage silos, where it is loaded into transport trucks. The exhaust gases also exit the end of the drum and pass on to the collection system.

Parallel flow drum mixers have an advantage, in that mixing in the discharge end of the drum captures a substantial portion of the aggregate dust, therefore lowering the load on the downstream PM collection equipment. For this reason, most parallel flow drum mixers are followed only by primary collection equipment (usually a baghouse or venturi scrubber). However, because the mixing of aggregate and liquid asphalt cement occurs in the hot combustion product flow, organic emissions (gaseous and liquid aerosol) may be greater than in other asphalt mixing processes. Because data are not available to distinguish significant emissions differences between the two process designs, this effect on emissions cannot be verified.

11.1.1.3 Counterflow Drum Mix Plants –

Figure 11.1-3 shows a counterflow drum mix plant. In this type of plant, the material flow in the drum is opposite or counterflow to the direction of exhaust gases. In addition, the liquid asphalt cement mixing zone is located behind the burner flame zone so as to remove the materials from direct contact with hot exhaust gases.

Liquid asphalt cement flow is controlled by a variable flow pump which is electronically linked to the virgin aggregate and RAP weigh scales. It is injected into the mixing zone along with any RAP and particulate matter from primary and secondary collectors.

Because the liquid asphalt cement, virgin aggregate, and RAP are mixed in a zone removed from the exhaust gas stream, counterflow drum mix plants will likely have organic emissions (gaseous and liquid aerosol) that are lower than parallel flow drum mix plants. However, the available data are insufficient to discern any differences in emissions that result from differences in the two processes. A counterflow drum mix plant can normally process RAP at ratios up to 50 percent with little or no observed effect upon emissions.

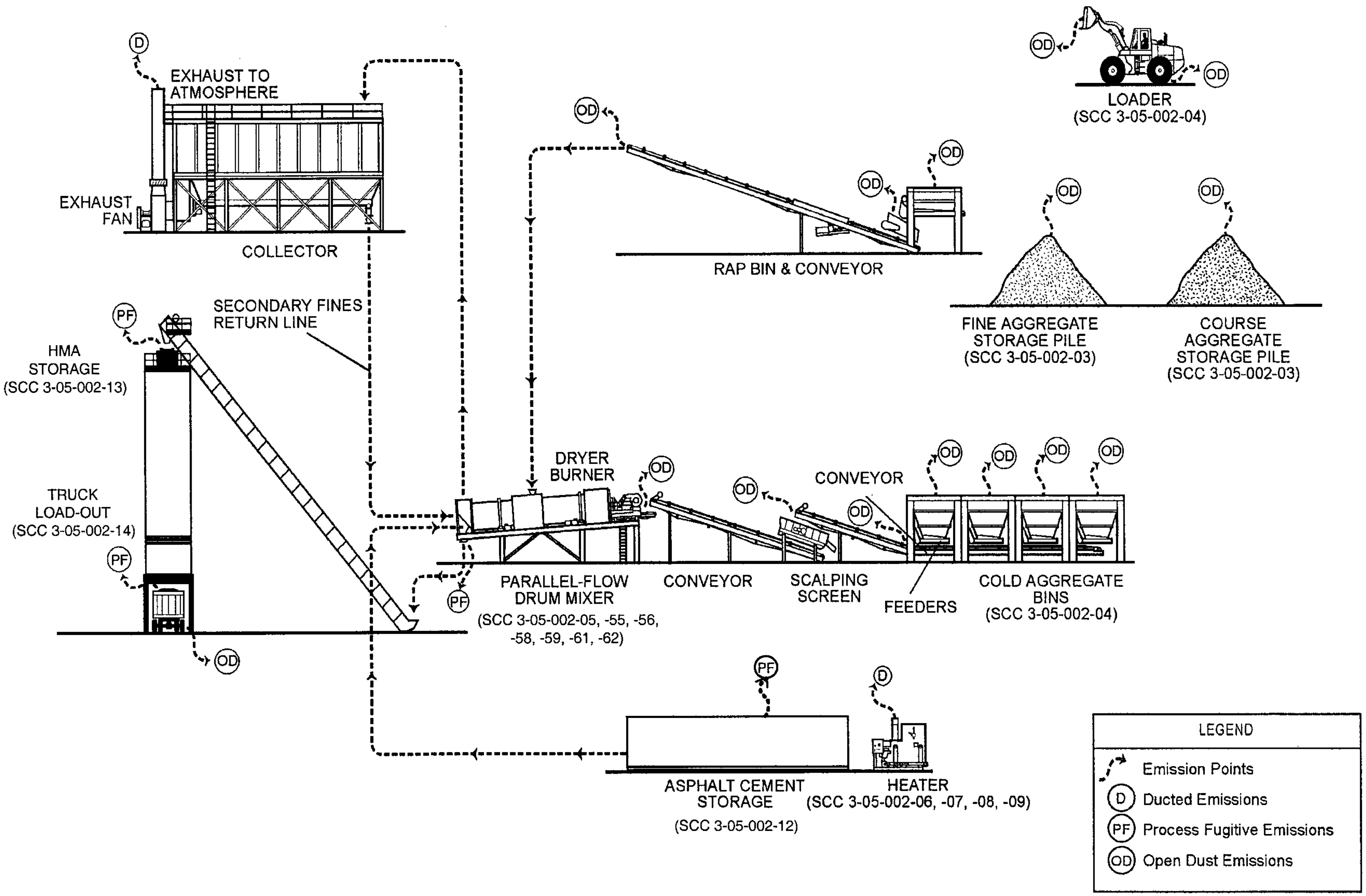

Figure 11.1-2. General process flow diagram for parallel-flow drum mix asphalt plants (source classification codes in parentheses).[3]

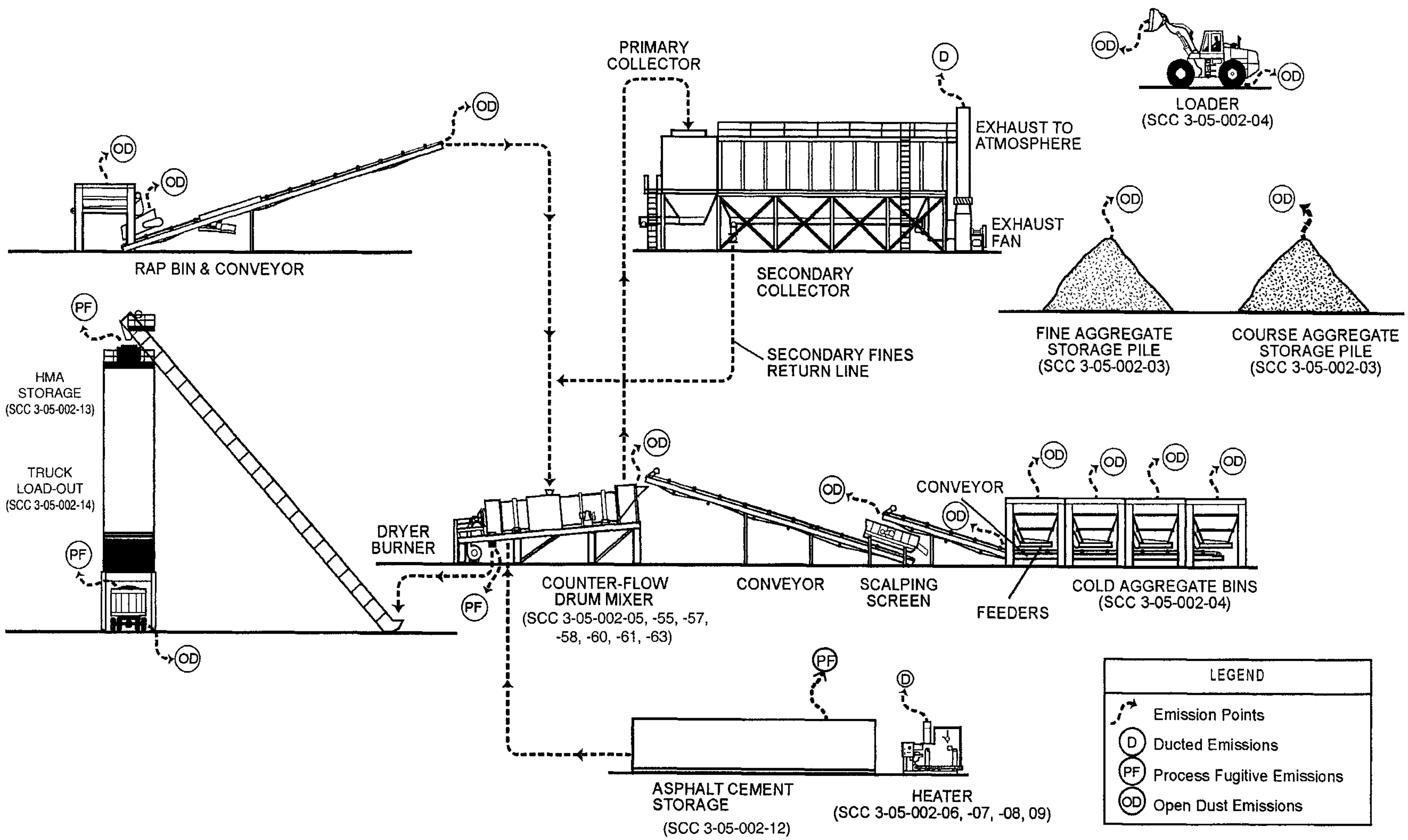

Figure 11.1-3. General process flow diagram for counter-flow drum mix asphalt plants (source classification codes in parentheses).[3]

11.1.1.4 Recycle Processes[393] –

In recent years, the use of RAP has been initiated in the HMA industry. Reclaimed asphalt pavement significantly reduces the amount of virgin rock and asphalt cement needed to produce HMA.

In the reclamation process, old asphalt pavement is removed from the road base. This material is then transported to the plant, and is crushed and screened to the appropriate size for further processing. The paving material is then heated and mixed with new aggregate (if applicable), and the proper amount of new asphalt cement is added to produce HMA that meets the required quality specifications.

11.1.2 Emissions And Controls[2-3,23]

Emissions from HMA plants may be divided into ducted production emissions, pre-production fugitive dust emissions, and other production-related fugitive emissions. Pre-production fugitive dust sources associated with HMA plants include vehicular traffic generating fugitive dust on paved and unpaved roads, aggregate material handling, and other aggregate processing operations. Fugitive dust may range from 0.1 µm to more than 300 µm in aerodynamic diameter. On average, 5 percent of cold aggregate feed is less than 74 µm (minus 200 mesh). Fugitive dust that may escape collection before primary control generally consists of PM with 50 to 70 percent of the total mass less than 74 µm. Uncontrolled PM emission factors for various types of fugitive sources in HMA plants are addressed in Sections 11.19.2, “Crushed Stone Processing”, 13.2.1, “Paved Roads”, 13.2.2, “Unpaved Roads”, 13.2.3, “Heavy Construction Operations”, and 13.2.4, “Aggregate Handling and Storage Piles.” Production-related fugitive emissions and emissions from ducted production operations are discussed below. Emission points discussed below refer to Figure 11.1-1 for batch mix asphalt plants and to Figures 11.1-2 and 11.1-3 for drum mix plants.

11.1.2.1 Batch Mix Plants –

As with most facilities in the mineral products industry, batch mix HMA plants have two major categories of emissions: ducted sources (those vented to the atmosphere through some type of stack, vent, or pipe), and fugitive sources (those not confined to ducts and vents but emitted directly from the source to the ambient air). Ducted emissions are usually collected and transported by an industrial ventilation system having one or more fans or air movers, eventually to be emitted to the atmosphere through some type of stack. Fugitive emissions result from process and open sources and consist of a combination of gaseous pollutants and PM.

The most significant ducted source of emissions of most pollutants from batch mix HMA plants is the rotary drum dryer. The dryer emissions consist of water (as steam evaporated from the aggregate); PM; products of combustion (carbon dioxide [CO_2], nitrogen oxides [NO_x], and sulfur oxides [SO_x]); carbon monoxide (CO); and small amounts of organic compounds of various species (including volatile organic compounds [VOC], methane [CH_4], and hazardous air pollutants [HAP]). The CO and organic compound emissions result from incomplete combustion of the fuel. It is estimated that between 70 and 90 percent of the energy used at HMA plants is from the combustion of natural gas.

Other potential process sources include the hot-side conveying, classifying, and mixing equipment, which are vented either to the primary dust collector (along with the dryer gas) or to a separate dust collection system. The vents and enclosures that collect emissions from these sources are commonly called “fugitive air” or “scavenger” systems. The scavenger system may or may not have its own separate air mover device, depending on the particular facility. The emissions captured and transported by the scavenger system are mostly aggregate dust, but they may also contain gaseous organic compounds and a fine aerosol of condensed organic particles. This organic aerosol is created by the condensation of vapor into particles during cooling of organic vapors volatilized from the asphalt cement in the mixer (pug mill). The amount of organic aerosol produced depends to a large extent on the temperature of the asphalt cement and aggregate entering the pug mill. Organic vapor and its associated aerosol also are emitted directly to the atmosphere as process fugitives during truck load-out, from the bed of the truck itself during transport to the job site, and from the asphalt storage tank. Both the low molecular weight organic compounds and the higher weight organic aerosol contain small amounts of HAP. The ducted emissions from the heated asphalt storage tanks include gaseous and aerosol organic compounds and combustion products from the tank heater.

The choice of applicable emission controls for PM emissions from the dryer and vent line includes dry mechanical collectors, scrubbers, and fabric filters. Attempts to apply electrostatic precipitators have met with little success. Practically all plants use primary dust collection equipment such as large diameter cyclones, skimmers, or settling chambers. These chambers often are used as classifiers to return collected material to the hot elevator and to combine it with the drier aggregate. To capture remaining PM, the primary collector effluent is ducted to a secondary collection device. Most plants use either a fabric filter or a venturi scrubber for secondary emissions control. As with any combustion process, the design, operation, and maintenance of the burner provides opportunities to minimize emissions of NO_x, CO, and organic compounds.

11.1.2.2 Parallel Flow Drum Mix Plants –

The most significant ducted source of emissions from parallel-flow drum mix plants is the rotary drum dryer. Emissions from the drum consist of water (as steam evaporated from the aggregate); PM; products of combustion; CO; and small amounts of organic compounds of various species (including VOC, CH_4, and HAP). The organic compound and CO emissions result from incomplete combustion of the fuel and from heating and mixing of the liquid asphalt cement inside the drum. Although it has been suggested that the processing of RAP materials at these type plants may increase organic compound emissions because of an increase in mixing zone temperature during processing, the data supporting this hypothesis are very weak. Specifically, although the data show a relationship only between RAP content and condensible organic particulate emissions, 89 percent of the variations in the data were the result of other unknown process variables.

Once the organic compounds cool after discharge from the process stack, some condense to form a fine organic aerosol or “blue smoke” plume. A number of process modifications or restrictions have been introduced to reduce blue smoke, including installation of flame shields, rearrangement of flights inside the drum, adjustments of the asphalt injection point, and other design changes.

11.1.2.3 Counterflow Drum Mix Plants –

The most significant ducted source of emissions from counterflow drum mix plants is the rotary drum dryer. Emissions from the drum consist of water (as steam evaporated from the aggregate); PM; products of combustion; CO; and small amounts of organic compounds of various species (including VOC, CH_4, and HAP). The CO and organic compound emissions result primarily from incomplete combustion of the fuel, and can also be released from the heated asphalt. Liquid asphalt cement, aggregate, and sometimes RAP, are mixed in a zone not in contact with the hot exhaust gas stream. As a result, kiln stack emissions of organic compounds from counterflow drum mix plants may be lower than parallel flow drum mix plants. However, variations in the emissions due to other unknown process variables are more significant. As a result, the emission factors for parallel flow and counterflow drum mix plants are the same.

11.1.2.4 Parallel and Counterflow Drum Mix Plants –

Process fugitive emissions associated with batch plant hot screens, elevators, and the mixer (pug mill) are not present in the drum mix processes. However, there are fugitive PM and VOC emissions from transport and handling of the HMA from the drum mixer to the storage silo and also from the load-out operations to the delivery trucks. Since the drum process is continuous, these plants have surge 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.

March 2004

- The emission factor for formaldehyde for oil fired hot oil heaters was revised. An emission factor for formaldehyde for gas fired hot oil heaters and emission factors for CO and CO_2 for gas and oil fired hot oil heaters were developed. (Table 11.1-13)

Table 11.1-1. PARTICULATE MATTER EMISSION FACTORS FOR BATCH MIX HOT MIX ASPHALT PLANTS[a]

	Filterable PM				Condensable PM[b]				Total PM			
Process	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, hot screens, mixer[g] (SCC 3-05-002-45, -46, -47)												
Uncontrolled	32[h]	E	4.5	E	0.013[j]	E	0.0041[j]	E	32	E	4.5	E
Venturi or wet scrubber	0.12[k]	C	ND	NA	0.013[m]	B	0.0041[n]	B	0.14	C	ND	NA
Fabric filter	0.025[p]	A	0.0098	C	0.013[m]	A	0.0041[n]	A	0.042	B	0.027	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] Batch mix dryer fired with natural gas, propane, fuel oil, waste oil, and coal. The data indicate that fuel type does not significantly effect PM emissions.

[h] Reference 5.

[j] Although no data are available for uncontrolled condensable PM, values are assumed to be equal to the controlled value measured.

[k] Reference 1, Table 4-19. Average of data from 16 facilities. Range: 0.047 to 0.40 lb/ton. Median: 0.049 lb/ton. Standard deviation: 0.11 lb/ton.

[m] Reference 1, Table 4-19. Average of data from 35 facilities. Range: 0.00073 to 0.12 lb/ton. Median: 0.0042 lb/ton. Standard deviation: 0.024 lb/ton.

[n] Reference 1, Table 4-19. Average of data from 24 facilities. Range: 0.000012 to 0.018 lb/ton. Median: 0.0026 lb/ton. Standard deviation: 0.0042 lb/ton.

[p] Reference 1, Table 4-19. Average of data from 89 facilities. Range: 0.0023 to 0.18 lb/ton. Median: 0.012 lb/ton. Standard deviation: 0.033 lb/ton.

Table 11.1-2. SUMMARY OF PARTICLE SIZE DISTRIBUTION FOR BATCH MIX DRYERS, HOT SCREENS, AND MIXERS[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	30[e]	ND	0.0075[e]
2.5	0.83	33[e]	0.27	0.0083[e]
5.0	3.5	36[e]	1.1	0.0090[e]
10.0	14	39[f]	4.5	0.0098[f]
15.0	23	47[e]	7.4	0.012[e]

[a] Emission factor units are lb/ton of HMA provided. Rounded to two significant figures. SCC 3-05-002-45, -46, -47. 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] References 23, Table 3-36. The emission factors are calculated using the particle size data from this reference in conjunction with the filterable PM emission factor shown in Table 11.1-1.

[e] References 23, Page J-61. The emission factors are calculated using the particle size data from this reference in conjunction with the filterable PM emission factor shown in Table 11.1-1.

[f] References 23-24. The emission factors are calculated using the particle size data from these references in conjunction with the filterable PM emission factor shown in Table 11.1-1.

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 11.1-5. EMISSION FACTORS FOR CO, CO_2, NO_x, AND SO_2 FROM BATCH 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, hot screens, and mixer (SCC 3-05-002-45)	0.40	C	37[d]	A	0.025[e]	D	0.0046[f]	E
No. 2 fuel oil-fired dryer, hot screens, and mixer (SCC 3-05-002-46)	0.40	C	37[d]	A	0.12[g]	E	0.088[h]	E
Waste oil-fired dryer, hot screens, and mixer (SCC 3-05-002-47)	0.40	C	37[d]	A	0.12[g]	E	0.088[h]	E
Coal-fired dryer, hot screens, and mixer[j] (SCC 3-05-002-98)	ND	NA	37[d]	A	ND	NA	0.043[k]	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 24, 34, 46-47, 49, 161, 204, 215-217, 282, 370, 378, 381. 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). Based on data for drum mix facilities, 50 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 4-20. Average of data from 115 facilities. Range: 6.9 to 160 lb/ton. Median: 32 lb/ton. Standard deviation: 22 lb/ton.

[e] References 24, 34, 46-47.

[f] References 46-47.

[g] References 49, 226.

[h] References 49, 226, 228, 385.

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

[k] Reference 126.

Table 11.1-6. EMISSION FACTORS FOR TOC, METHANE, AND VOC FROM BATCH MIX HOT MIX ASPHALT PLANTS[a]

Process	TOC[b]	EMISSION FACTOR RATING	CH_4[c]	EMISSION FACTOR RATING	VOC[d]	EMISSION FACTOR RATING
Natural gas-fired dryer, hot screens, and mixer (SCC 3-05-002-45)	0.015[e]	D	0.0074	D	0.0082	D
No. 2 fuel oil-fired dryer, hot screens, and mixer (SCC 3-05-002-46)	0.015[e]	D	0.0074	D	0.0082	D
No. 6 fuel oil-fired dryer, hot screens, and mixer (SCC 3-05-002-47)	0.043[f]	E	0.0074	D	0.036	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] TOC equals total hydrocarbons as propane, as measured with an EPA Method 25A or equivalent sampling train plus formaldehyde.
[c] References 24, 46-47, 49. Factor includes data from natural gas- and No. 6 fuel 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 methane emission factors; differences in values reported are due to rounding.
[e] References 24, 46-47, 155.
[f] Reference 49.

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 11.1-9. EMISSION FACTORS FOR ORGANIC POLLUTANT EMISSIONS FROM BATCH MIX HOT MIX ASPHALT PLANTS[a]

Process	Pollutant		Emission Factor, lb/ton	Emission Factor Rating	Ref. Nos.
	CASRN	Name			
Natural gas- or No. 2 fuel oil-fired dryer, hot screens, and mixer with fabric filter (SCC 3-05-002-45,-46)	Non-PAH Hazardous Air Pollutants[b]				
	75-07-0	Acetaldehyde	0.00032	E	24,34
	71-43-2	Benzene	0.00028	D	24,34,46, 382
	100-41-4	Ethylbenzene	0.0022	D	24,46,47,49
	50-00-0	Formaldehyde	0.00074	D	24,34,46,47,49,226,382
	106-51-4	Quinone	0.00027	E	24
	108-88-3	Toluene	0.0010	D	24,34,46,47
	1330-20-7	Xylene	0.0027	D	24,46,47,49
		Total non-PAH HAPs	0.0075		
	PAH HAPs				
	91-57-6	2-Methylnaphthalene[c]	7.1×10^{-5}	D	24,47,49
	83-32-9	Acenaphthene[c]	9.0×10^{-7}	D	34,46,226
	208-96-8	Acenaphthylene[c]	5.8×10^{-7}	D	34,46,226
	120-12-7	Anthracene[c]	2.1×10^{-7}	D	34,46,226
	56-55-3	Benzo(a)anthracene[c]	4.6×10^{-9}	E	46,226
	50-32-8	Benzo(a)pyrene[c]	3.1×10^{-10}	E	226
	205-99-2	Benzo(b)fluoranthene[c]	9.4×10^{-9}	D	34,46,226
	191-24-2	Benzo(g,h,i)perylene[c]	5.0×10^{-10}	E	226
	207-08-9	Benzo(k)fluoranthene[c]	1.3×10^{-8}	E	34,226
	218-01-9	Chrysene[c]	3.8×10^{-9}	E	46,226
	53-70-3	Dibenz(a,h)anthracene[c]	9.5×10^{-11}	E	226
	206-44-0	Fluoranthene[c]	1.6×10^{-7}	D	34,46,47,226
	86-73-7	Fluorene[c]	1.6×10^{-6}	D	34,46,47,226
	193-39-5	Indeno(1,2,3-cd)pyrene[c]	3.0×10^{-10}	E	226
	91-20-3	Naphthalene	3.6×10^{-5}	D	34,46,47,49,226
	85-01-8	Phenanthrene[c]	2.6×10^{-6}	D	34,46,47,226
	129-00-0	Pyrene[c]	6.2×10^{-8}	D	34,46,226
		Total PAH HAPs	0.00011		
	Total HAPs		0.0076		
	Non-HAP organic compounds				
	100-52-7	Benzaldehyde	0.00013	E	24
	78-84-2	Butyraldehyde/ isobutyraldehyde	3.0×10^{-5}	E	24
	4170-30-3	Crotonaldehyde	2.9×10^{-5}	E	24
	66-25-1	Hexanal	2.4×10^{-5}	E	24
		Total non-HAPs	0.00019		

Table 11.1-9 (cont.)

Process	Pollutant CASRN	Pollutant Name	Emission Factor, lb/ton	Emission Factor Rating	Ref. Nos.
Waste oil-, drain oil-, or No. 6 fuel oil-fired dryer, hot screens, and mixer with fabric filter (SCC 3-05-002-47)	Non-PAH Hazardous Air Pollutants[b]				
	75-07-0	Acetaldehyde	0.00032	E	24,34
	71-43-2	Benzene	0.00028	D	24,34,46, 382
	100-41-4	Ethylbenzene	0.0022	D	24,46,47,49
	50-00-0	Formaldehyde	0.00074	D	24,34,46,47,49,226, 382
	106-51-4	Quinone	0.00027	E	24
	108-88-3	Toluene	0.0010	D	24,34,46,47
	1330-20-7	Xylene	0.0027	D	24,46,47,49
		Total non-PAH HAPs	0.0075		
	PAH HAPs[b]				
	91-57-6	2-Methylnaphthalene[c]	7.1×10^{-5}	D	24,47,49
	83-32-9	Acenaphthene[c]	9.0×10^{-7}	D	34,46,226
	208-96-8	Acenaphthylene[c]	5.8×10^{-7}	D	34,46,226
	120-12-7	Anthracene[c]	2.1×10^{-7}	D	34,46,226
	56-55-3	Benzo(a)anthracene[c]	4.6×10^{-9}	E	46,226
	50-32-8	Benzo(a)pyrene[c]	3.1×10^{-10}	E	226
	205-99-2	Benzo(b)fluoranthene[c]	9.4×10^{-9}	D	34,46,226
	191-24-2	Benzo(g,h,i)perylene[c]	5.0×10^{-10}	E	226
	207-08-9	Benzo(k)fluoranthene[c]	1.3×10^{-8}	E	34,226
	218-01-9	Chrysene[c]	3.8×10^{-9}	E	46,226
	53-70-3	Dibenz(a,h)anthracene[c]	9.5×10^{-11}	E	226
	206-44-0	Fluoranthene[c]	2.4×10^{-5}	E	49
	86-73-7	Fluorene[c]	1.6×10^{-6}	D	34,46,47,226
	193-39-5	Indeno(1,2,3-cd)pyrene[c]	3.0×10^{-10}	E	226
	91-20-3	Naphthalene	3.6×10^{-5}	D	34,46,47,49, 226
	85-01-8	Phenanthrene[c]	3.7×10^{-5}	E	49
	129-00-0	Pyrene[c]	5.5×10^{-5}	E	49
		Total PAH HAPs	0.00023		
	Total HAPs		0.0077		
	Non-HAP organic compounds				
	100-52-7	Benzaldehyde	0.00013	E	24
	78-84-2	Butyraldehyde/ isobutyraldehyde	3.0×10^{-5}	E	24
	4170-30-3	Crotonaldehyde	2.9×10^{-5}	E	24
	66-25-1	Hexanal	2.4×10^{-5}	E	24
		Total non-HAPs	0.00019		

[a] Emission factor units are lb/ton of hot mix asphalt produced. Factors represent uncontrolled emissions, unless noted. CASRN = Chemical Abstracts Service Registry Number. SCC = Source Classification Code. To convert from lb/ton to kg/Mg, multiply by 0.5.
[b] Hazardous air pollutants (HAP) as defined in the 1990 Clean Air Act Amendments (CAAA).
[c] Compound is classified as polycyclic organic matter, as defined in the 1990 CAAA.

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

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)	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)	4.0×10^{-5}	E	339-340
	71-55-6	Methyl chloroform[f]	4.8×10^{-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]	7.4×10^{-5}	D	44,45,48
	83-32-9	Acenaphthene[g]	1.4×10^{-6}	E	48
	208-96-8	Acenaphthylene[g]	8.6×10^{-6}	D	35,45,48
	120-12-7	Anthracene[g]	2.2×10^{-7}	E	35,48
	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
	191-24-2	Benzo(g,h,i)perylene[g]	4.0×10^{-8}	E	48
	207-08-9	Benzo(k)fluoranthene[g]	4.1×10^{-8}	E	35,48
	218-01-9	Chrysene[g]	1.8×10^{-7}	E	35,48
	206-44-0	Fluoranthene[g]	6.1×10^{-7}	D	35,45,48
	86-73-7	Fluorene[g]	3.8×10^{-6}	D	35,45,48,163
	193-39-5	Indeno(1,2,3-cd)pyrene[g]	7.0×10^{-9}	E	48
	91-20-3	Naphthalene[g]	9.0×10^{-5}	D	35,44,45,48,163
	198-55-0	Perylene[g]	8.8×10^{-9}	E	48
	85-01-8	Phenanthrene[g]	7.6×10^{-6}	D	35,44,45,48,163
	129-00-0	Pyrene[g]	5.4×10^{-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		Emission Factor, lb/ton	Emission Factor Rating	Ref. No.
	CASRN	Name			
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]	2.1×10^{-13}	E	339
		Total TCDD[g]	9.3×10^{-13}	E	339
	40321-76-4	1,2,3,7,8-PeCDD[g]	3.1×10^{-13}	E	339
		Total PeCDD[g]	2.2×10^{-11}	E	339-340
	39227-28-6	1,2,3,4,7,8-HxCDD[g]	4.2×10^{-13}	E	339
	57653-85-7	1,2,3,6,7,8-HxCDD[g]	1.3×10^{-12}	E	339
	19408-24-3	1,2,3,7,8,9-HxCDD[g]	9.8×10^{-13}	E	339
		Total HxCDD[g]	1.2×10^{-11}	E	339-340
	35822-46-9	1,2,3,4,6,7,8-HpCDD[g]	4.8×10^{-12}	E	339
		Total HpCDD[g]	1.9×10^{-11}	E	339-340
	3268-87-9	Octa CDD[g]	2.5×10^{-11}	E	339
		Total PCDD[g]	7.9×10^{-11}	E	339-340
		Furans			
	51207-31-9	2,3,7,8-TCDF[g]	9.7×10^{-13}	E	339
		Total TCDF[g]	3.7×10^{-12}	E	339-340
		1,2,3,7,8-PeCDF[g]	4.3×10^{-12}	E	339-340
		2,3,4,7,8-PeCDF[g]	8.4×10^{-13}	E	339
		Total PeCDF[g]	8.4×10^{-11}	E	339-340
		1,2,3,4,7,8-HxCDF[g]	4.0×10^{-12}	E	339
		1,2,3,6,7,8-HxCDF[g]	1.2×10^{-12}	E	339
		2,3,4,6,7,8-HxCDF[g]	1.9×10^{-12}	E	339
		1,2,3,7,8,9-HxCDF[g]	8.4×10^{-12}	E	340
		Total HxCDF[g]	1.3×10^{-11}	E	339-340
		1,2,3,4,6,7,8-HpCDF[g]	6.5×10^{-12}	E	339
		1,2,3,4,7,8,9-HpCDF[g]	2.7×10^{-12}	E	339
		Total HpCDF[g]	1.0×10^{-11}	E	339-340
	39001-02-0	Octa CDF[g]	4.8×10^{-12}	E	339
		Total PCDF[g]	4.0×10^{-11}	E	339-340
		Total PCDD/PCDF[g]	1.2×10^{-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	2.6×10^{-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)	4.0×10^{-5}	E	339-340
	78-93-3	Methyl Ethyl Ketone	2.0×10^{-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]	4.8×10^{-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	0.0095		
	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
	191-24-2	Benzo(g,h,i)perylene[g]	4.0×10^{-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]	4.1×10^{-8}	E	35,48
	218-01-9	Chrysene[g]	1.8×10^{-7}	E	35,48
	206-44-0	Fluoranthene[g]	6.1×10^{-7}	D	35,45,48
	86-73-7	Fluorene[g]	1.1×10^{-5}	E	50,164
	193-39-5	Indeno(1,2,3-cd)pyrene[g]	7.0×10^{-9}	E	48
	91-20-3	Naphthalene[g]	0.00065	D	25,50,162,164
	198-55-0	Perylene[g]	8.8×10^{-9}	E	48
	85-01-8	Phenanthrene[g]	2.3×10^{-5}	D	50,162,164
	129-00-0	Pyrene[g]	3.0×10^{-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	8.6×10^{-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	3.2×10^{-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	6.7×10^{-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 11.1-11. EMISSION FACTORS FOR METAL EMISSIONS FROM BATCH MIX HOT MIX ASPHALT PLANTS[a]

Process	Pollutant	Emission Factor, lb/ton	Emission Factor Rating	Reference Numbers
Dryer, hot screens, and mixer[b] (SCC 3-05-002-45,-46,-47)	Arsenic[c]	4.6×10^{-7}	D	34, 40, 226
	Barium	1.5×10^{-6}	E	24
	Beryllium[c]	1.5×10^{-7}	E	34, 226
	Cadmium[c]	6.1×10^{-7}	D	24, 34, 226
	Chromium[c]	5.7×10^{-7}	D	24, 34, 226
	Hexavalent chromium[c]	4.8×10^{-8}	E	34, 226
	Copper	2.8×10^{-6}	D	24, 34, 226
	Lead[c]	8.9×10^{-7}	D	24, 34, 226
	Manganese[c]	6.9×10^{-6}	D	24, 34, 226
	Mercury[c]	4.1×10^{-7}	E	34, 226
	Nickel[c]	3.0×10^{-6}	D	24, 34, 226
	Selenium[c]	4.9×10^{-7}	E	34, 226
	Zinc	6.8×10^{-6}	D	24, 34, 226

[a] Emission factor units are lb/ton of HMA produced. Emissions controlled by a fabric filter. SCC = Source Classification Code. To convert from lb/ton to kg/Mg, multiply by 0.5.

[b] Natural gas-, propane-, No. 2 fuel oil-, or waste oil-/drain oil-/No. 6 fuel oil-fired dryer. For waste oil-/drain oil-/No. 6 fuel oil-fired dryer, use a lead emission factor of 1.0×10^{-5} lb/ton (References 177 and 321, Emission factor rating: E) in lieu of the emission factor shown.

[c] Arsenic, beryllium, cadmium, chromium, hexavalent chromium, lead, manganese, mercury, nickel, and selenium are HAPs as defined in the 1990 CAAA.

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 11.1-13. EMISSION FACTORS FOR HOT MIX ASPHALT HOT OIL SYSTEMS[a]

Process	Pollutant CASRN	Pollutant Name	Emission factor	Emission factor units	EMISSION FACTOR RATING	Reference
Hot oil system fired with natural gas (SCC 3-05-002-06)	630-08-0	Carbon monoxide	8.9×10^{-6}	lb/ft^3	C	395
	124-38-9	Carbon dioxide	0.20	lb/ft^3	C	395
	50-00-0	Formaldehyde	2.6×10^{-8}	lb/ft^3	C	395
Hot oil system fired with No. 2 fuel oil (SCC 3-05-002-08)	630-08-0	Carbon monoxide	0.0012	lb/gal	C	395
	124-38-9	Carbon dioxide	28	lb/gal	C	395
	50-00-0	Formaldehyde	3.5×10^{-6}	lb/gal	C	395
	83-32-9	Acenaphthene[b]	5.3×10^{-7}	lb/gal	E	35
	208-96-8	Acenaphthylene[b]	2.0×10^{-7}	lb/gal	E	35
	120-12-7	Anthracene[b]	1.8×10^{-7}	lb/gal	E	35
	205-99-2	Benzo(b)fluoranthene[b]	1.0×10^{-7}	lb/gal	E	35
	206-44-0	Fluoranthene[b]	4.4×10^{-8}	lb/gal	E	35
	86-73-7	Fluorene[b]	3.2×10^{-8}	lb/gal	E	35
	91-20-3	Naphthalene[b]	1.7×10^{-5}	lb/gal	E	35
	85-01-8	Phenanthrene[b]	4.9×10^{-6}	lb/gal	E	35
	129-00-0	Pyrene[b]	3.2×10^{-8}	lb/gal	E	35
	Dioxins					
	19408-74-3	1,2,3,7,8,9-HxCDD[b]	7.6×10^{-13}	lb/gal	E	35
	39227-28-6	1,2,3,4,7,8-HxCDD[b]	6.9×10^{-13}	lb/gal	E	35
		HxCDD[b]	6.2×10^{-12}	lb/gal	E	35
	35822-46-9	1,2,3,4,6,7,8-HpCDD[b]	1.5×10^{-11}	lb/gal	E	35
		HpCDD[b]	2.0×10^{-11}	lb/gal	E	35
	3268-87-9	OCDD[b]	1.6×10^{-10}	lb/gal	E	35
		Total PCDD	2.0×10^{-10}	lb/gal	E	35
	Furans					
		TCDF[b]	3.3×10^{-12}	lb/gal	E	35
		PeCDF[b]	4.8×10^{-13}	lb/gal	E	35
		HxCDF[b]	2.0×10^{-12}	lb/gal	E	35
		HpCDF[b]	9.7×10^{-12}	lb/gal	E	35
	67562-39-4	1,2,3,4,6,7,8-HpCDF[b]	3.5×10^{-12}	lb/gal	E	35
	39001-02-0	OCDF[b]	1.2×10^{-11}	lb/gal	E	35
		Total PCDF	3.1×10^{-11}	lb/gal	E	35
		Total PCDD/PCDF	2.3×10^{-10}	lb/gal	E	35

[a] Emission factor units are lb/gal of fuel consumed. To convert from pounds per standard cubic foot ($lb/ft^{3)}$ to kilograms per standard cubic meter ($kg/m^{3)}$, multiply by 16. To convert from lb/gal to kilograms per liter (kg/l), multiply by 0.12. CASRN = Chemical Abstracts Service Registry Number. SCC = Source Classification Code.

[b] Compound is classified as polycyclic organic matter, as defined in the 1990 Clean Air Act Amendments (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 11.1-14. 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.

Table 11.1-15. SPECIATION PROFILES FOR LOAD-OUT, SILO FILLING, AND ASPHALT STORAGE EMISSIONS–ORGANIC PARTICULATE-BASED COMPOUNDS

EMISSION FACTOR RATING: C

Pollutant	CASRN[a]	Speciation Profile for Load-out and Yard Emissions[b]	Speciation Profile for Silo Filling and Asphalt Storage Tank Emissions
		Compound/Organic PM[c]	Compound/Organic PM[c]
PAH HAPs			
Acenaphthene	83-32-9	0.26%	0.47%
Acenaphthylene	208-96-8	0.028%	0.014%
Anthracene	120-1207	0.070%	0.13%
Benzo(a)anthracene	56-55-3	0.019%	0.056%
Benzo(b)fluoranthene	205-99-2	0.0076%	ND[d]
Benzo(k)fluoranthene	207-08-9	0.0022%	ND[d]
Benzo(g,h,i)perylene	191-24-2	0.0019%	ND[d]
Benzo(a)pyrene	50-32-8	0.0023%	ND[d]
Benzo(e)pyrene	192-97-2	0.0078%	0.0095%
Chrysene	218-01-9	0.103%	0.21%
Dibenz(a,h)anthracene	53-70-3	0.00037%	ND[d]
Fluoranthene	206-44-0	0.050%	0.15%
Fluorene	86-73-7	0.77%	1.01%
Indeno(1,2,3-cd)pyrene	193-39-5	0.00047%	ND[d]
2-Methylnaphthalene	91-57-6	2.38%	5.27%
Naphthalene	91-20-3	1.25%	1.82%
Perylene	198-55-0	0.022%	0.030%
Phenanthrene	85-01-8	0.81%	1.80%
Pyrene	129-00-0	0.15%	0.44%
Total PAH HAPs		5.93%	11.40%
Other semi-volatile HAPs			
Phenol		1.18%	ND[d]

[a] Chemical Abstract Service Registry Number.
[b] Emissions from loaded trucks during the period between load-out and the time the truck departs the plant.
[c] Emission factor for compound is determined by multiplying the percentage presented for the compound by the emission factor for extractable organic particulate (organic PM) as determined from Table 11.1-14.
[d] ND = Measured data below detection limits.

Table 11.1-16. SPECIATION PROFILES FOR LOAD-OUT, SILO FILLING, AND ASPHALT STORAGE EMISSIONS–ORGANIC VOLATILE-BASED COMPOUNDS

EMISSION FACTOR RATING: C

Pollutant	CASRN	Speciation Profile for Load-Out and Yard Emissions Compound/TOC[a]	Speciation Profile for Silo Filling and Asphalt Storage Tank Emissions Compound/TOC (%)[a]
VOC[b]		94%[b]	100%
Non-VOC/non-HAPs			
Methane	74-82-8	6.5%	0.26%
Acetone	67-64-1	0.046%	0.055%
Ethylene	74-85-1	0.71%	1.1%
Total non-VOC/non-HAPS		7.3%	1.4%
Volatile organic HAPS			
Benzene	71-43-2	0.052%	0.032%
Bromomethane	74-83-9	0.0096%	0.0049%
2-Butanone	78-93-3	0.049%	0.039%
Carbon Disulfide	75-15-0	0.013%	0.016%
Chloroethane	75-00-3	0.00021%	0.0040%
Chloromethane	74-87-3	0.015%	0.023%
Cumene	92-82-8	0.11%	ND[c]
Ethylbenzene	100-41-4	0.28%	0.038%
Formaldehyde	50-00-0	0.088%	0.69%
n-Hexane	100-54-3	0.15%	0.10%
Isooctane	540-84-1	0.0018%	0.00031%
Methylene Chloride	75-09-2	0.0%[d]	0.00027%
MTBE	596899	0.0%[d]	ND[c]
Styrene	100-42-5	0.0073%	0.0054%
Tetrachloroethene	127-18-4	0.0077%	ND[c]
Toluene	100-88-3	0.21%	0.062%
1,1,1-Trichloroethane	71-55-6	0.0%[d]	ND[c]
Trichloroethene	79-01-6	0.0%[d]	ND[c]
Trichlorofluoromethane	75-69-4	0.0013%	ND[c]
m-/p-Xylene	1330-20-7	0.41%	0.2%
o-Xylene	95-47-6	0.08%	0.057%
Total volatile organic HAPs		1.5%	1.3%

Table 11.1-16 (cont.)

[a] Emission factor for compound is determined by multiplying the percentage presented for the compound by the emission factor for total organic compounds (TOC) as determined from Table 11.1-14.

[b] The VOC percentages are equal to 100 percent of TOC minus the methane, acetone, methylene chloride, and 1,1,1-trichloroethane percentages.

[c] ND = Measured data below detection limits. Additional compounds that were not detected are: acrylonitrile, allyl chloride, bromodichloromethane, bromoform, 1,3-butadiene, carbon tetrachloride, chlorobenzene, chloroform, dibromochloromethane, 1,2-dibromoethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,2-dichloropropane, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 1,2-epoxybutane, ethyl acrylate, 2-hexanone, iodomethane, methyl methacrylate, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, vinyl acetate, vinyl bromide, and vinyl chloride

[d] Values presented as 0.0% had background concentrations higher than the capture efficiency-corrected measured concentration.

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.

Types of controls used may include water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, central duct collection systems, and the like. A major source of potential emissions, the movement of heavy trucks over unpaved or dusty surfaces in and around the plant, can be controlled by good maintenance and wetting of the road surface.

Predictive equations that allow for emission factor adjustment based on plant specific conditions are given in the Background Document for Chapter 11.12 and Chapter 13. Whenever plant specific data are available, they should be used with these predictive equations (e.g. Equations 11.12-1 through 11.12-3) in lieu of the general fugitive emission factors presented in Table 11.12-1 through11.12-5 in order to adjust to site specific conditions, such as moisture levels and localized wind speeds.

11.12-3 Updates since the 5th Edition.

October 2001 – This major revision of the section replaced emissions factors based upon engineering judgment and poorly documented and performed source test reports with emissions tests conducted at modern operating truck mix and central mix facilities. Emissions factors for both total PM and total PM_{10} were developed from this test data.

June 2006 – This revision of the section supplemented the two source tests with several additional source tests of central mix and truck mix facilities. The measurement of the capture efficiency, local wind speed and fines material moisture level was improved over the previous two source tests. In addition to quantifying total PM and PM_{10}, $PM_{2.5}$ emissions were quantified at all of the facilities. Single value emissions factors for truck mix and central mix operations were revised using all of the data. Additionally, parameterized emissions factor equations using local wind speed and fines material moisture content were developed from the newer data.

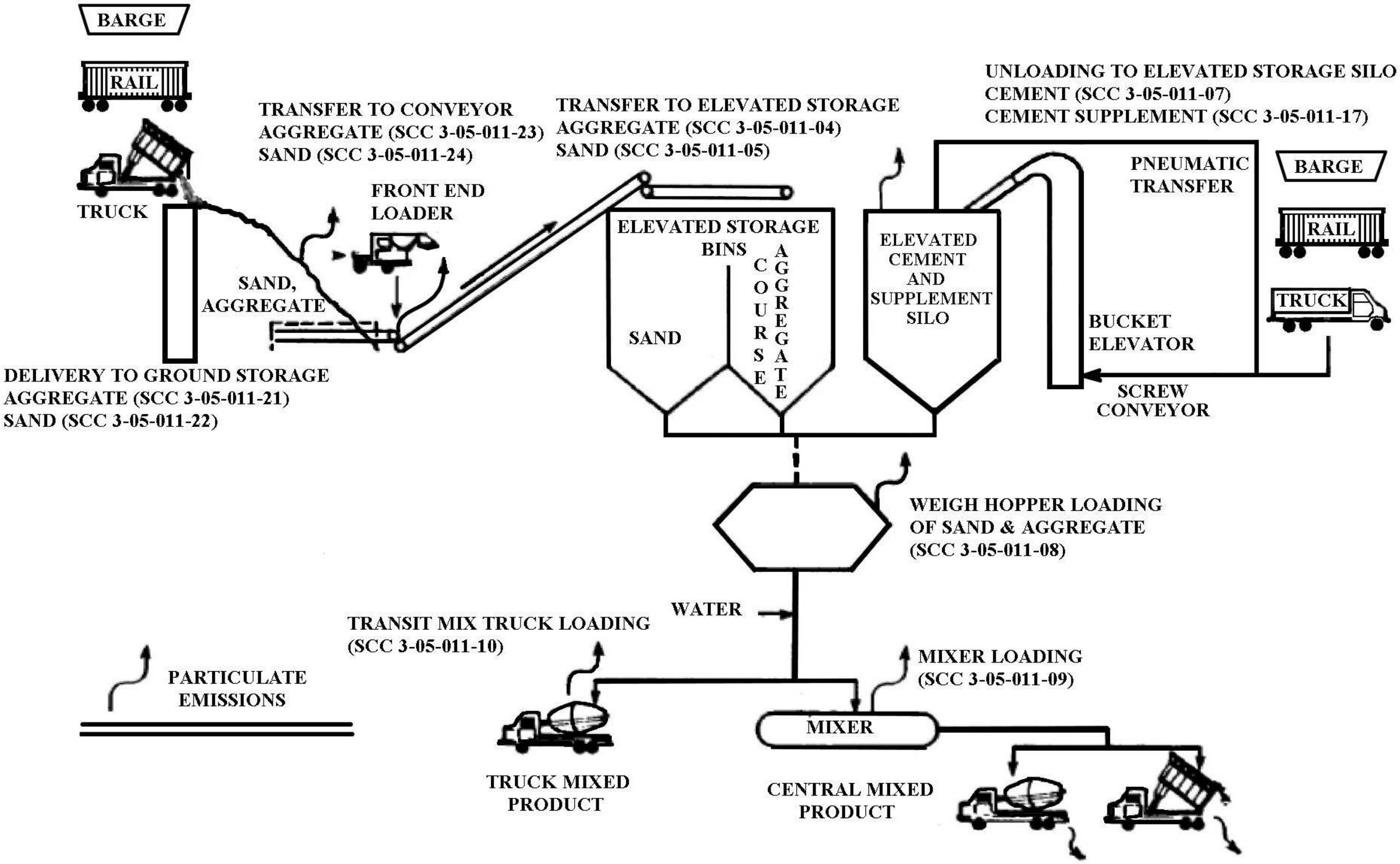

Figure 11.12-1. Typical Concrete Batching Process.

TABLE 11.12-1 (METRIC 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)	0.0035	D	0.0017	D	ND		ND	
Sand transfer [b] (3-05-011-05,22,24)	0.0011	D	0.00051	D	ND		ND	
Cement unloading to elevated storage silo (pneumatic)[c] (3-05-011-07)	0.36	E	0.23	E	0.00050	D	0.00017	D
Cement supplement unloading to elevated storage silo (pneumatic)[d] (3-05-011-17)	1.57	E	0.65	E	0.0045	D	0.0024	E
Weigh hopper loading [e] (3-05-011-08)	0.0026	D	0.0013	D	ND		ND	
Mixer loading (central mix)[f] (3-05-011-09)	0.272 or Eqn. 11.12-1	B	0.067 or Eqn. 11.12-1	B	0.0087 or Eqn. 11.12-1	B	0.0024 or Eqn. 11.12-1	B
Truck loading (truck mix)[g] (3-05-011-10)	0.498	B	0.139	B	0.0280 or Eqn. 11.12-1	B	0.0080 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 kg of pollutant per Mg 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 846 kg course aggregate, 648 kg sand, 223 kg cement and 33kg cement supplement. Approximately 75 liters of water was added to this solid material to produce 1826 kg 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 kg of pollutant per Mg of aggregate and sand.

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

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 $k_{PM\text{-}10}$ =.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
	$PM_{10\text{-}2.5}$	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			
	$PM_{10\text{-}2.5}$	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
	$PM_{10\text{-}2.5}$	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
	$PM_{10\text{-}2.5}$	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 emissions of PM, PM-10, PM-10-2.5, and PM-2.5 are calculated by multiplying the emission factor calculated using Equation 11.12-2 by a factor of 0.140 to convert from emissions per ton of cement and cement supplement to emissions per yard of concrete. This equation is based on a typical concrete formulation of 564 pounds of cement and cement supplement in a total of 4,024 pounds of material (including aggregate, sand, and water). This calculation is summarized in Equation 11.12-2.

$$\text{PM, PM10, PM10-2.5, PM2.5 emissions}\left(\frac{\text{pounds}}{\text{yd}^3\text{ of concrete}}\right) = 0.140\,(\text{Equation 11.12}-1\text{ factor or Table 11.12-2 Factor})$$

Equation 11.12-2

Metals emission factors for concrete batching are given in Tables 11.12-6 and 11.12-7. Alternatively, the metals emissions from ready mix plants can be calculated based on (1) the weighted average concentration of the metal in the cement and the cement supplement (i.e. flyash) and (2) on the total particulate matter emission factors calculated in accordance with Equation 11.12-3. Emission factors calculated using Equation 11.12-3 are rated D.

$$\text{Metal}_{EF} = \text{PM}_{EF}\left(\frac{aC + bS}{C + S}\right)$$

Equation 11.12-3

Where:

Metal_{EF}	=	Metal Emissions, Lbs. As per Ton of Cement and Cement Supplement
PM_{EF}	=	Controlled Particulate Matter Emission Factor (PM, PM10, or PM2.5) Lbs. per Ton of Cement and Cement Supplement
a	=	ppm of Metal in Cement
C	=	Quantity of Cement Used, Lbs. per hour
b	=	ppm of Metal in Cement Supplement
S	=	Quantity of Cement Supplement Used, Lbs. per hour

This equation is based on the assumption that 100% of the particulate matter emissions are material entrained from the cement and cement supplement streams. Equation 11.12-3 over-estimates total metal emissions to the extent that sand and fines from aggregate contribute to the total particulate matter emissions.

TABLE 11.12-5 (ENGLISH UNITS)
PLANT WIDE EMISSION FACTORS PER YARD OF TRUCK MIX CONCRETE [a]

	Uncontrolled		Controlled	
	PM (lb/yd^3)	PM-10 (lb/yd^3)	PM (lb/yd^3)	PM-10 (lb/yd^3)
Aggregate delivery to ground storage (3-05-011-21)	0.0064	0.0031	0.0064	0.0031
Sand delivery to ground storage (3-05-011-22)	0.0015	0.0007	0.0015	0.0007
Aggregate transfer to conveyor (3-05-011-23)	0.0064	0.0031	0.0064	0.0031
Sand transfer to conveyor (3-05-011-24)	0.0015	0.0007	0.0015	0.0007
Aggregate transfer to elevated storage (3-05-011-04)	0.0064	0.0031	0.0064	0.0031
Sand transfer to elevated storage (3-05-011-05)	0.0015	0.0007	0.0015	0.0007
Cement delivery to Silo (3-05-011-07 controlled)	0.0002	0.0001	0.0002	0.0001
Cement supplement delivery to Silo (3-05-011-17 controlled)	0.0003	0.0002	0.0003	0.0002
Weigh hopper loading (3-05-011-08)	0.0079	0.0038	0.0079	0.0038
Truck mix loading (3-05-011-10)	See Equation 11.12-2			

TABLE 11.12-6 (ENGLISH UNITS)
PLANT WIDE EMISSION FACTORS PER YARD OF CENTRAL MIX CONCRETE [a]

	Uncontrolled		Controlled	
	PM (lb/yd^3)	PM-10 (lb/yd^3)	PM (lb/yd^3)	PM-10 (lb/yd^3)
Aggregate delivery to ground storage (3-05-011-21)	0.0064	0.0031	0.0064	0.0031
Sand delivery to ground storage (3-05-011-22)	0.0015	0.0007	0.0015	0.0007
Aggregate transfer to conveyor (3-05-011-23)	0.0064	0.0031	0.0064	0.0031
Sand transfer to conveyor (3-05-011-24)	0.0015	0.0007	0.0015	0.0007
Aggregate transfer to elevated storage (3-05-011-04)	0.0064	0.0031	0.0064	0.0031
Sand transfer to elevated storage (3-05-011-05)	0.0015	0.0007	0.0015	0.0007
Cement delivery to Silo (3-05-011-07 controlled)	0.0002	0.0001	0.0002	0.0001
Cement supplement delivery to Silo (3-05-011-17 controlled)	0.0003	0.0002	0.0003	0.0002
Weigh hopper loading (3-05-011-08)	0.0079	0.0038	0.0079	0.0038
Central mix loading (3-05-011-09)	See Equation 11.12-2			

[a] Total facility emissions are the sum of the emissions calculated in Tables 11.12-4 or 11.12-5. Total facility emissions do not include road dust and wind blown dust. The emission factors in Tables 11.12-4 and 11.12-5 are based upon the following composition of one yard of concrete.

Coarse Aggregate	1865. pounds
Sand	1428. pounds
Cement	491. pounds
Cement Supplement	73. pounds
Water	20. gallons (167 pounds)

TABLE 11.12-7 (METRIC UNITS)
CONCRETE BATCH PLANT METAL EMISSION FACTORS [a]

	Arsenic	Beryllium	Cadmium	Total Chromium	Lead	Manganese	Nickel	Total Phosphorus	Selenium	Emission Factor Rating
Cement Silo Filling [b] (SCC 3-05-011-07) w/ Fabric Filter	8.38e-07 2.12e-09	8.97e-09 2.43e-10	1.17e-07 2.43e-10	1.26e-07 1.45e-08	3.68e-07 5.46e-09	1.01e-04 5.87e-08	8.83e-06 2.09e-08	5.88e-05 ND	ND ND	E E
Cement Supplement Silo Filling [c] (SCC 3-05-011-17) w/ Fabric Filter	ND 5.02e-07	ND 4.52e-08	ND 9.92e-09	ND 6.10e-07	ND 2.60e-07	ND 1.28e-07	ND 1.14e-06	ND 1.77e-06	ND 3.62e-08	E E
Central Mix Batching [e] (SCC 3-05-011-09) w/ Fabric Filter	1.16e-07 9.35e-09	ND ND	5.92e-09 3.55e-10	7.11e-07 6.34e-08	1.91e-07 1.83e-08	3.06e-05 1.89e-06	1.64e-06 1.24e-07	1.01e-05 6.04e-07	ND ND	E E
Truck Loading [g] (SCC 3-05-011-10) w/ Fabric Filter	1.52e-06 5.80e-07	1.22e-07 5.18e-08	1.71e-08 4.53e-09	5.71e-06 2.05e-06	1.81e-06 7.67e-07	3.06e-05 1.04e-05	5.99e-06 2.39e-06	1.92e-05 6.16e-06	1.31e-06 5.64e-08	E E

ND=No data

[a] All emission factors are in kg of pollutant per Mg 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 846 Kg course aggregate, 648 kg sand, 223 kg cement and 33kg cement supplement. Approximately 75 liters of water was added to this solid material to produce 1826 kg of concrete.

[b] The uncontrolled emission factors were developed from Reference 8. The controlled emission factors were developed form Reference 9 and 10. Although controlled emissions of phosphorous compounds were below detection, it is reasonable to assume that the effectiveness is comparable to the average effectiveness (98%) for the other metals.

[c] Reference 10.

[d] Reference 9. The emission factor units are kg of pollutant per Mg of cement and cement supplement. Emission factors were developed from a typical central mix operation. The average estimate of the percent of emissions captured during each run is 94%.

[e] Reference 9 and 10. The emission factor units are kg of pollutant per Mg of cement and cement supplement. Emission factors were developed from two typical truck mix loading operations. Based upon visual observations of every loading operation during the two test programs, the average capture efficiency during the testing was 71%.

TABLE 11.12-8 (ENGLISH UNITS)
CONCRETE BATCH PLANT METAL EMISSION FACTORS [a]

	Arsenic	Beryllium	Cadmium	Total Chromium	Lead	Manganese	Nickel	Total Phosphorus	Selenium	Emission Factor Rating
Cement Silo Filling [b] (SCC 3-05-011-07)	1.68e-06	1.79e-08	2.34e-07	2.52e-07	7.36e-07	2.02e-04	1.76e-05	1.18e-05	ND	E
w/ Fabric Filter	4.24e-09	4.86e-10	4.86e-10	2.90e-08	1.09e-08	1.17e-07	4.18e-08	ND	ND	E
Cement Supplement Silo Filling [c] (SCC 3-05-011-17)	ND	ND	ND	ND	ND	ND	ND	ND	ND	E
w/ Fabric Filter	1.00e-06	9.04e-08	1.98e-10	1.22e-06	5.20e-07	2.56e-07	2.28e-06	3.54e-06	7.24e-08	E
Central Mix Batching [e] (SCC 3-05-011-09)	2.32e-07	ND	1.18e-08	1.42e-06	3.82e-07	6.12e-05	3.28e-06	2.02e-05	ND	E
w/ Fabric Filter	1.87e-08	ND	7.10e-10	1.27e-07	3.66e-08	3.78e-06	2.48e-07	1.20e-06	ND	E
Truck Loading [g] (SCC 3-05-011-10)	3.04e-06	2.44e-07	3.42e-08	1.14e-05	3.62e-06	6.12e-05	1.19e-05	3.84e-05	2.62e-06	E
w/ Fabric Filter	1.16e-06	1.04e-07	9.06e-09	4.10e-06	1.53e-06	2.08e-05	4.78e-06	1.23e-05	1.13e-07	E

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] The uncontrolled emission factors were developed from Reference 8. The controlled emission factors were developed form Reference 9 and 10. Although controlled emissions of phosphorous compounds were below detection, it is reasonable to assume that the effectiveness is comparable to the average effectiveness (98%) for the other metals.

[c] Reference 10.

[d] Reference 9. The emission factor units are lb of pollutant per ton of cement and cement supplement. Emission factors were developed from a typical central mix operation. The average estimate of the percent of emissions captured during each test run is 94%.

[e] Reference 9 and 10. The emission factor units are lb of pollutant per ton of cement and cement supplement. Emission factors were developed from two typical truck mix loading operations. Based upon visual observations of every loading operation during the two test programs, the average capture efficiency during the testing was 71%.

References for Section 11.12

1. *Air Pollutant Emission Factors*, APTD-0923, U.S. Environmental Protection Agency, Research Triangle Park, NC, April 1970.

2. *Air Pollution Engineering Manual*, 2nd Edition, AP-40, U.S. Environmental Protection Agency, Research Triangle Park, NC, 1974. Out of Print.

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7. *Fugitive Dust Assessment at Rock and Sand Facilities in the South Coast Air Basin*, Southern California Rock Products Association and Southern California Ready Mix Concrete Association, Santa Monica, CA, November 1979.

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9. *Final Test Report for USEPA* [sic] *Test Program Conducted at Chaney Enterprises Cement Plant*, ETS, Inc., Roanoke, VA April 1994.

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12. *Stack Test "Confidential"* (Test obtained from State of Tennessee), Environmental Consultants, Oklahoma City, OK, February 1976.

13. *Source Sampling Report, Particulate Emissions from Cement Silo Loading*, Specialty Alloys Corporation, Gallaway, Tennessee, Reference number 24-00051-02, State of Tennessee, Department of Health and Environment, Division of Air Pollution Control, June 12, 1984.

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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.

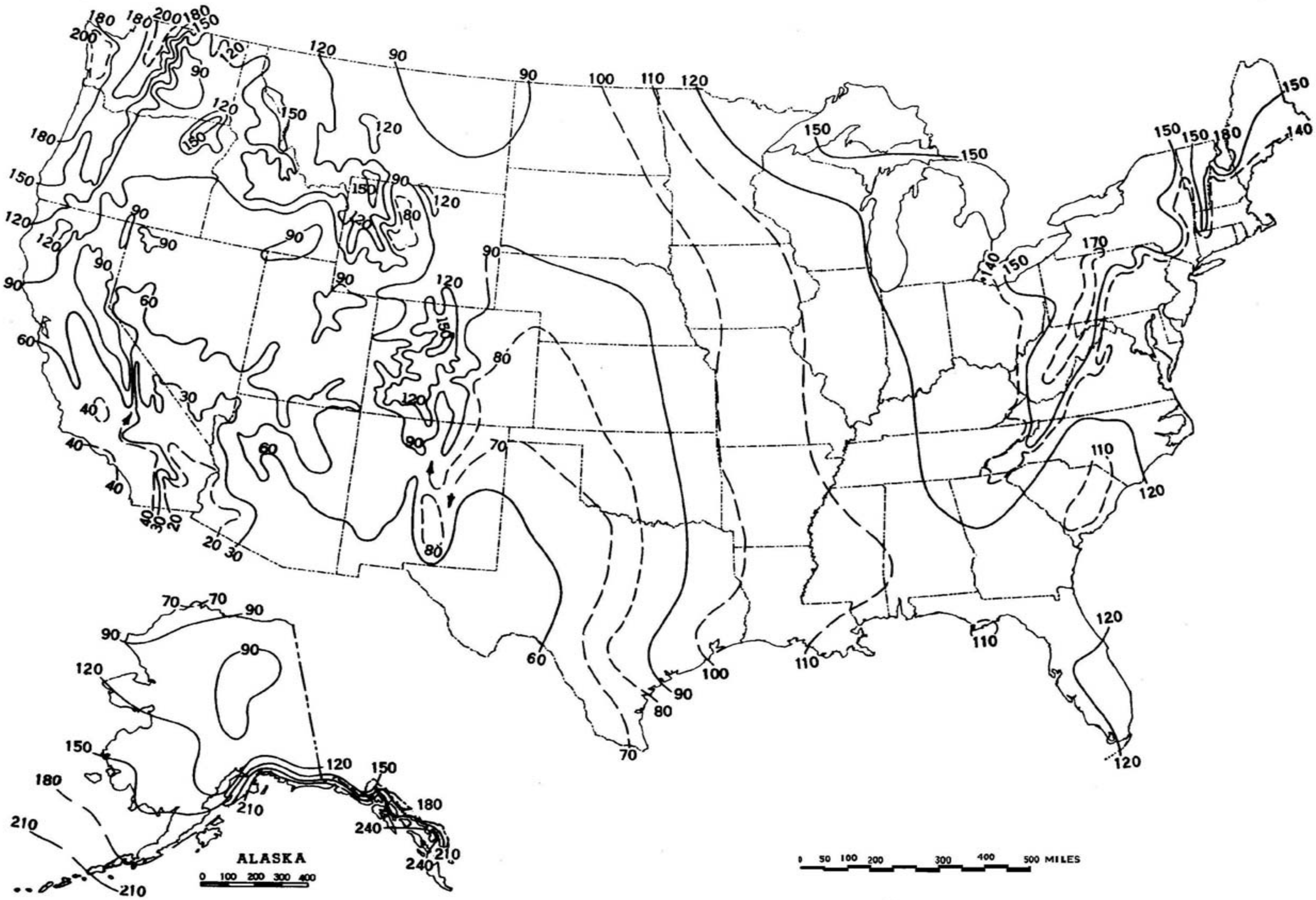

Figure 13.2.1-2. Mean number of days with 0.01 inch or more of precipitation in the United States.

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:

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

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

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

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:

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

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]

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

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

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

NEW MEXICO

AVERAGE WIND SPEED - MPH

STATION	ID	Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
ALAMOGORDO AIRPORT ASOS	KALM	1996-2006	5.1	6.3	7.1	7.9	7.1	6.9	6.1	5.3	5.2	5.2	5.0	5.0	6.0
ALAMOGORDO-HOLLOMAN AFB	KHMN	1996-2006	8.5	9.7	10.6	11.8	10.8	10.6	9.8	9.1	8.8	8.5	8.1	8.3	9.6
ALBUQUERQUE AP ASOS	KABQ	1996-2006	7.0	8.2	9.3	11.1	10.0	10.0	8.7	8.3	8.0	7.9	7.2	6.9	8.5
ALBUQUERQUE-DBLE EAGLE	KAEG	1999-2006	7.1	7.9	9.0	10.6	9.5	8.6	7.0	6.2	7.0	6.5	6.5	6.1	7.7
ARTESIA AIRPORT ASOS	KATS	1997-2006	7.8	9.1	10.1	10.9	10.2	9.9	7.8	6.9	7.6	7.8	7.6	7.4	8.5
CARLSBAD AIRPORT ASOS	KCNM	1996-2006	9.2	9.8	10.9	11.4	10.4	9.9	8.5	7.7	8.2	8.5	8.4	8.8	9.3
CLAYTON MUNI AP ASOS	KCAO	1996-2006	11.9	12.7	13.4	14.6	13.4	13.0	11.7	10.8	11.8	12.1	12.1	12.0	12.4
CLINES CORNERS	KCQC	1998-2006	16.2	16.1	15.7	16.9	14.6	13.5	10.6	10.1	11.8	13.3	15.0	16.0	14.1
CLOVIS AIRPORT AWOS	KCVN	1996-2006	12.3	12.3	13.4	13.8	12.4	11.9	9.7	8.9	9.7	10.9	11.6	12.2	11.6
CLOVIS-CANNON AFB	KCVS	1996-2006	12.5	12.6	13.6	13.8	12.2	12.5	10.7	10.0	10.2	11.3	11.7	12.4	12.0
DEMING AIRPORT ASOS	KDMN	1996-2006	8.7	9.7	10.9	12.0	10.6	10.1	8.9	8.1	8.4	8.2	8.5	8.1	9.3
FARMINGTON AIRPORT ASOS	KFMN	1996-2006	7.3	8.3	9.0	9.8	9.4	9.4	8.7	8.2	8.0	7.8	7.6	7.3	8.4
GALLUP AIRPORT ASOS	KGUP	1996-2006	5.7	6.9	7.8	10.0	9.0	8.8	6.9	6.0	6.5	6.1	5.6	5.3	7.0
GRANTS-MILAN AP ASOS	KGNT	1997-2006	7.8	8.8	9.6	10.9	10.0	9.8	8.1	7.2	7.9	8.4	8.0	7.6	8.7
HOBBS AIRPORT AWOS	KHOB	1996-2006	11.3	11.9	12.6	13.4	12.5	12.3	11.0	10.0	10.2	10.6	10.7	11.1	11.4
LAS CRUCES AIRPORT AWOS	KLRU	2000-2006	6.4	7.5	8.8	10.1	8.7	8.2	6.8	6.0	6.2	6.1	6.4	6.0	7.3
LAS VEGAS AIRPORT ASOS	KLVS	1996-2006	10.9	12.2	12.5	14.3	12.4	11.8	10.0	9.2	10.9	10.8	11.0	10.9	11.4
LOS ALAMOS AP AWOS	KLAM	2005-2006	3.9	5.7	7.5	8.1	7.1	7.3	5.3	4.8	5.7	5.1	4.4	3.2	5.4
RATON AIRPORT ASOS	KRTN	1998-2006	8.9	9.4	10.4	12.2	10.8	10.2	8.4	8.1	8.6	9.0	8.6	8.5	9.4
ROSWELL AIRPORT ASOS	KROW	1996-2006	7.4	8.9	9.9	11.1	10.3	10.2	8.8	7.9	8.3	8.0	7.5	7.3	8.8
RUIDOSO AIRPORT AWOS	KSRR	1996-2006	8.8	9.6	10.0	11.6	10.0	8.4	5.9	5.3	6.4	7.4	7.9	8.7	8.3
SANTA FE AIRPORT ASOS	KSAF	1996-2006	8.9	9.5	9.9	11.2	10.6	10.5	9.2	8.8	8.8	9.1	8.7	8.5	9.5
SILVER CITY AP AWOS	KSVC	1999-2006	8.1	8.7	9.9	10.8	10.2	9.9	8.5	7.2	6.9	7.6	7.9	7.7	8.5
TAOS AIRPORT AWOS	KSKX	1996-2006	5.8	6.5	7.7	9.1	8.6	8.5	7.1	6.6	6.7	6.6	6.0	5.7	7.0
TRUTH OR CONSEQ AP ASOS	KTCS	1996-2006	7.4	8.7	9.9	11.1	10.4	9.8	8.1	7.4	7.7	8.0	7.7	7.3	8.6
TUCUMCARI AIRPORT ASOS	KTCC	1999-2006	10.0	11.2	11.9	13.6	11.9	11.6	9.9	9.3	10.0	10.0	10.4	10.2	10.8

Nonroad Compression-Ignition Engines: Exhaust Emission Standards

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr)	NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	kW < 8	1	2000-2004	-	10.5	-	1.0	8.0	20/15/50	3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	8.0			
		4	2008+	-	7.5	-	0.40 [c]	8.0			
	8 ≤ kW < 19	1	2000-2004	-	9.5	-	0.80	6.6		3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	6.6			
		4	2008+	-	7.5	-	0.40	6.6			
	19 ≤ kW < 37	1	1999-2003	-	9.5	-	0.80	5.5		5,000/7 [d]	3,000/5 [e]
		2	2004-2007	-	7.5	-	0.60	5.5			
		4	2008-2012	-	7.5	-	0.30	5.5			
			2013+	-	4.7	-	0.03	5.5			
	37 ≤ kW < 56	1	1998-2003	-	-	9.2	-	-		8,000/10	3,000/5
		2	2004-2007	-	7.5	-	0.40	5.0			
		3 [f]	2008-2011	-	4.7	-	0.40	5.0			
		4 (Option 1) [g]	2008-2012	-	4.7	-	0.30	5.0			
		4 (Option 2) [g]	2012	-	4.7	-	0.03	5.0			
		4	2013+	-	4.7	-	0.03	5.0			
	56 ≤ kW < 75	1	1998-2003	-	-	9.2	-	-			
		2	2004-2007	-	7.5	-	0.40	5.0			
		3	2008-2011	-	4.7	-	0.40	5.0			
		4	2012-2013 [h]	-	4.7	-	0.02	5.0			
			2014+ [i]	0.19	-	0.40	0.02	5.0			
	75 ≤ kW < 130	1	1997-2002	-	-	9.2	-	-			
		2	2003-2006	-	6.6	-	0.30	5.0			
		3	2007-2011	-	4.0	-	0.30	5.0			
		4	2012-2013 [h]	-	4.0	-	0.02	5.0			
			2014+	0.19	-	0.40	0.02	5.0			

Continued

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr	NOx (g/kW-hr	PM (g/kW-hr	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	130 ≤ kW < 225	1	1996-2002	1.3 [j]	-	9.2	0.54	11.4	20/15/50	8,000/10	3,000/5
		2	2003-2005	-	6.6	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	225 ≤ kW < 450	1	1996-2000	1.3 [j]	-	9.2	0.54	11.4			
		2	2001-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	450 ≤ kW < 560	1	1996-2001	1.3 [j]	-	9.2	0.54	11.4			
		2	2002-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	560 ≤ kW < 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			
	kW > 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5 [k]	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			

Notes on following page.

Notes:

- For Tier 1, 2, and 3 standards, exhaust emissions of nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and non-methane hydrocarbons (NMHC) are measured using the procedures in 40 Code of Federal Regulations (CFR) Part 89 Subpart E. For Tier 1, 2, and 3 standards, particulate matter (PM) exhaust emissions are measured using the California Regulations for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines.
- For Tier 4 standards, engines are tested for transient and steady-state exhaust emissions using the procedures in 40 CFR Part 1039 Subpart F. Transient standards do not apply to engines below 37 kilowatts (kW) before the 2013 model year, constant-speed engines, engines certified to Option 1, and engines above 560 kW.
- Tier 2 and later model naturally aspirated nonroad engines shall not discharge crankcase emissions into the atmosphere unless these emissions are permanently routed into the exhaust. This prohibition does not apply to engines using turbochargers, pumps, blowers, or superchargers.
- In lieu of the Tier 1, 2, and 3 standards for NOX, NMHC + NOX, and PM, manufacturers may elect to participate in the averaging, banking, and trading (ABT) program described in 40 CFR Part 89 Subpart C.

a Smoke emissions may not exceed 20 percent during the acceleration mode, 15 percent during the lugging mode, and 50 percent during the peaks in either mode. Smoke emission standards do not apply to single-cylinder engines, constant-speed engines, or engines certified to a PM emission standard of 0.07 grams per kilowatt-hour (g/kW-hr) or lower. Smoke emissions are measured using procedures in 40 CFR Part 86 Subpart I.

b Useful life and warranty period are expressed hours and years, whichever comes first.

c Hand-startable air-cooled direct injection engines may optionally meet a PM standard of 0.60 g/kW-hr. These engines may optionally meet Tier 2 standards through the 2009 model years. In 2010 these engines are required to meet a PM standard of 0.60 g/kW-hr.

d Useful life for constant speed engines with rated speed 3,000 revolutions per minute (rpm) or higher is 5 years or 3,000 hours, whichever comes first.

e Warranty period for constant speed engines with rated speed 3,000 rpm or higher is 2 years or 1,500 hours, whichever comes first.

f These Tier 3 standards apply only to manufacturers selecting Tier 4 Option 2. Manufacturers selecting Tier 4 Option 1 will be meeting those standards in lieu of Tier 3 standards.

g A manufacturer may certify all their engines to either Option 1 or Option 2 sets of standards starting in the indicated model year. Manufacturers selecting Option 2 must meet Tier 3 standards in the 2008-2011 model years.

h These standards are phase-out standards. Not more than 50 percent of a manufacturer’s engine production is allowed to meet these standards in each model year of the phase out period. Engines not meeting these standards must meet the final Tier 4 standards.

i These standards are phased in during the indicated years. At least 50 percent of a manufacturer’s engine production must meet these standards during each year of the phase in. Engines not meeting these standards must meet the applicable phase-out standards.

j For Tier 1 engines the standard is for total hydrocarbons.

k The NOx standard for generator sets is 0.67 g/kW-hr.

l The PM standard for generator sets is 0.03 g/kW-hr.

Citations: Code of Federal Regulations (CFR) citations:

- 40 CFR 89.112 = Exhaust emission standards
- 40 CFR 1039.101 = Exhaust emission standards for after 2014 model year
- 40 CFR 1039.102 = Exhaust emission standards for model year 2014 and earlier
- 40 CFR 1039 Subpart F = Exhaust emissions transient and steady state test procedures
- 40 CFR 86 Subpart I = Smoke emission test procedures
- 40 CFR 1065 = Test equipment and emissions measurement procedures

Nonroad Compression-Ignition Engines: Exhaust Emission Standards

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr)	NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	kW < 8	1	2000-2004	-	10.5	-	1.0	8.0	20/15/50	3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	8.0			
		4	2008+	-	7.5	-	0.40 [c]	8.0			
	8 ≤ kW < 19	1	2000-2004	-	9.5	-	0.80	6.6		3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	6.6			
		4	2008+	-	7.5	-	0.40	6.6			
	19 ≤ kW < 37	1	1999-2003	-	9.5	-	0.80	5.5		5,000/7 [d]	3,000/5 [e]
		2	2004-2007	-	7.5	-	0.60	5.5			
		4	2008-2012	-	7.5	-	0.30	5.5			
			2013+	-	4.7	-	0.03	5.5			
	37 ≤ kW < 56	1	1998-2003	-	-	9.2	-	-		8,000/10	3,000/5
		2	2004-2007	-	7.5	-	0.40	5.0			
		3 [f]	2008-2011	-	4.7	-	0.40	5.0			
		4 (Option 1) [g]	2008-2012	-	4.7	-	0.30	5.0			
		4 (Option 2) [g]	2012	-	4.7	-	0.03	5.0			
		4	2013+	-	4.7	-	0.03	5.0			
	56 ≤ kW < 75	1	1998-2003	-	-	9.2	-	-			
		2	2004-2007	-	7.5	-	0.40	5.0			
		3	2008-2011	-	4.7	-	0.40	5.0			
		4	2012-2013 [h]	-	4.7	-	0.02	5.0			
			2014+ [i]	0.19	-	0.40	0.02	5.0			
	75 ≤ kW < 130	1	1997-2002	-	-	9.2	-	-			
		2	2003-2006	-	6.6	-	0.30	5.0			
		3	2007-2011	-	4.0	-	0.30	5.0			
		4	2012-2013 [h]	-	4.0	-	0.02	5.0			
			2014+	0.19	-	0.40	0.02	5.0			

Continued

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr	NOx (g/kW-hr	PM (g/kW-hr	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	130 ≤ kW < 225	1	1996-2002	1.3 [j]	-	9.2	0.54	11.4	20/15/50	8,000/10	3,000/5
		2	2003-2005	-	6.6	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	225 ≤ kW < 450	1	1996-2000	1.3 [j]	-	9.2	0.54	11.4			
		2	2001-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	450 ≤ kW < 560	1	1996-2001	1.3 [j]	-	9.2	0.54	11.4			
		2	2002-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	560 ≤ kW < 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			
	kW > 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5 [k]	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			

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Notes:

- For Tier 1, 2, and 3 standards, exhaust emissions of nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and non-methane hydrocarbons (NMHC) are measured using the procedures in 40 Code of Federal Regulations (CFR) Part 89 Subpart E. For Tier 1, 2, and 3 standards, particulate matter (PM) exhaust emissions are measured using the California Regulations for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines.
- For Tier 4 standards, engines are tested for transient and steady-state exhaust emissions using the procedures in 40 CFR Part 1039 Subpart F. Transient standards do not apply to engines below 37 kilowatts (kW) before the 2013 model year, constant-speed engines, engines certified to Option 1, and engines above 560 kW.
- Tier 2 and later model naturally aspirated nonroad engines shall not discharge crankcase emissions into the atmosphere unless these emissions are permanently routed into the exhaust. This prohibition does not apply to engines using turbochargers, pumps, blowers, or superchargers.
- In lieu of the Tier 1, 2, and 3 standards for NOX, NMHC + NOX, and PM, manufacturers may elect to participate in the averaging, banking, and trading (ABT) program described in 40 CFR Part 89 Subpart C.

a Smoke emissions may not exceed 20 percent during the acceleration mode, 15 percent during the lugging mode, and 50 percent during the peaks in either mode. Smoke emission standards do not apply to single-cylinder engines, constant-speed engines, or engines certified to a PM emission standard of 0.07 grams per kilowatt-hour (g/kW-hr) or lower. Smoke emissions are measured using procedures in 40 CFR Part 86 Subpart I.

b Useful life and warranty period are expressed hours and years, whichever comes first.

c Hand-startable air-cooled direct injection engines may optionally meet a PM standard of 0.60 g/kW-hr. These engines may optionally meet Tier 2 standards through the 2009 model years. In 2010 these engines are required to meet a PM standard of 0.60 g/kW-hr.

d Useful life for constant speed engines with rated speed 3,000 revolutions per minute (rpm) or higher is 5 years or 3,000 hours, whichever comes first.

e Warranty period for constant speed engines with rated speed 3,000 rpm or higher is 2 years or 1,500 hours, whichever comes first.

f These Tier 3 standards apply only to manufacturers selecting Tier 4 Option 2. Manufacturers selecting Tier 4 Option 1 will be meeting those standards in lieu of Tier 3 standards.

g A manufacturer may certify all their engines to either Option 1 or Option 2 sets of standards starting in the indicated model year. Manufacturers selecting Option 2 must meet Tier 3 standards in the 2008-2011 model years.

h These standards are phase-out standards. Not more than 50 percent of a manufacturer's engine production is allowed to meet these standards in each model year of the phase out period. Engines not meeting these standards must meet the final Tier 4 standards.

i These standards are phased in during the indicated years. At least 50 percent of a manufacturer's engine production must meet these standards during each year of the phase in. Engines not meeting these standards must meet the applicable phase-out standards.

j For Tier 1 engines the standard is for total hydrocarbons.

k The NOx standard for generator sets is 0.67 g/kW-hr.

l The PM standard for generator sets is 0.03 g/kW-hr.

Citations: Code of Federal Regulations (CFR) citations:

- 40 CFR 89.112 = Exhaust emission standards
- 40 CFR 1039.101 = Exhaust emission standards for after 2014 model year
- 40 CFR 1039.102 = Exhaust emission standards for model year 2014 and earlier
- 40 CFR 1039 Subpart F = Exhaust emissions transient and steady state test procedures
- 40 CFR 86 Subpart I = Smoke emission test procedures
- 40 CFR 1065 = Test equipment and emissions measurement procedures

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

Identification	
User Identification:	AAMP2
City:	Albuquerque
State:	New Mexico
Company:	Associated Asphalt Materials
Type of Tank:	Horizontal Tank
Description:	Associated Asphalt Materials Plant #2
Tank Dimensions	
Shell Length (ft):	43.00
Diameter (ft):	10.00
Volume (gallons):	25,000.00
Turnovers:	94.36
Net Throughput(gal/yr):	2,359,000.00
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Aluminum/Specular
Shell Condition	Good
Breather Vent Settings	
Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological 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

AAMP2 - 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)

AAMP2 - Horizontal Tank
Albuquerque, New Mexico

Annual Emission Calcaulations	
Standing Losses (lb):	0.0000
Vapor Space Volume (cu ft):	2,151.0905
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):	2,151.0905
Tank Diameter (ft):	10.0000
Effective Diameter (ft):	23.4045
Vapor Space Outage (ft):	5.0000
Tank Shell Length (ft):	43.0000
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):	0.3900
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):	99.2431
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0347
Annual Net Throughput (gal/yr.):	2,359,000.0000
Annual Turnovers:	94.3600
Turnover Factor:	0.4846
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	99.2431

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

Emissions Report for: Annual

AAMP2 - Horizontal Tank
Albuquerque, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Asphalt Cement	99.24	0.00	99.24

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

Identification	
User Identification:	AAMP5
City:	Albuquerque
State:	New Mexico
Company:	Associated Asphalt Materials
Type of Tank:	Horizontal Tank
Description:	Associated Asphalt Materials Plant #5
Tank Dimensions	
Shell Length (ft):	43.00
Diameter (ft):	10.00
Volume (gallons):	25,000.00
Turnovers:	188.72
Net Throughput(gal/yr):	4,718,000.00
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Aluminum/Specular
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

AAMP5 - 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)

AAMP5 - Horizontal Tank
Albuquerque, New Mexico

Annual Emission Calcaulations	
Standing Losses (lb):	0.0000
Vapor Space Volume (cu ft):	2,151.0905
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):	2,151.0905
Tank Diameter (ft):	10.0000
Effective Diameter (ft):	23.4045
Vapor Space Outage (ft):	5.0000
Tank Shell Length (ft):	43.0000
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):	0.3900
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):	133.3756
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0347
Annual Net Throughput (gal/yr.):	4,718,000.0000
Annual Turnovers:	188.7200
Turnover Factor:	0.3256
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	133.3756

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

Emissions Report for: Annual

AAMP5 - Horizontal Tank
Albuquerque, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Asphalt Cement	133.38	0.00	133.38

Section 8

Map(s)

A map such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 0.8km (0.5 miles)	Access and haul roads
Topographic features of the area	Facility property boundaries
The name of the map	The area which will be restricted to public access
A graphical scale	

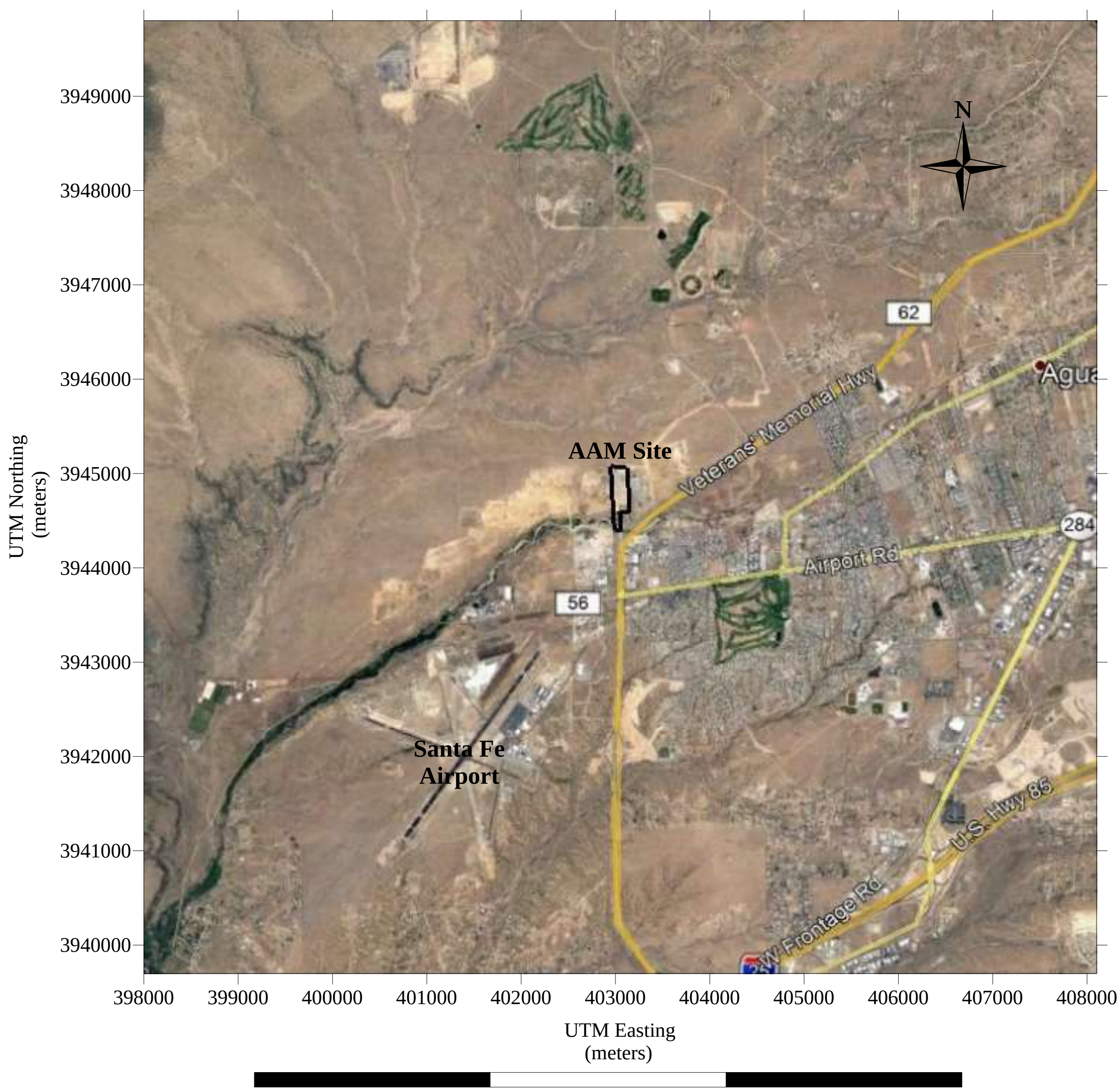

Figure 8-1: Site Location of Associated Asphalt and Material's Santa Fe Site

Section 9

Proof of Public Notice

(for NSR applications submitting under 20.2.72 or 20.2.74 NMAC)
(This proof is required by: 20.2.72.203.A.14 NMAC "Documentary Proof of applicant's public notice")

X I have read the AQB "Guidelines for Public Notification for Air Quality Permit Applications"
This document provides detailed instructions about public notice requirements for various permitting actions. It also provides public notice examples and certification forms. Material mistakes in the public notice will require a re-notice before issuance of the permit.

Unless otherwise allowed elsewhere in this document, the following items document proof of the applicant's Public Notification. Please include this page in your proof of public notice submittal with checkmarks indicating which documents are being submitted with the application.

New Permit and **Significant Permit Revision** public notices must include all items in this list.

Technical Revision public notices require only items 1, 5, 9, and 10.

Per the Guidelines for Public Notification document mentioned above, include:

1. X A copy of the certified letter receipts with post marks (20.2.72.203.B NMAC)
2. X A list of the places where the public notice has been posted in at least four publicly accessible and conspicuous places, including the proposed or existing facility entrance. (e.g: post office, library, grocery, etc.)
3. X A copy of the property tax record (20.2.72.203.B NMAC).
4. X A sample of the letters sent to the owners of record.
5. X A sample of the letters sent to counties, municipalities, and Indian tribes.
6. X A sample of the public notice posted and a verification of the local postings.
7. X A table of the noticed citizens, counties, municipalities and tribes and to whom the notices were sent in each group.
8. X A copy of the public service announcement (PSA) sent to a local radio station and documentary proof of submittal.
9. X A copy of the classified or legal ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
10. X A copy of the display ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
11. X A map with a graphic scale showing the facility boundary and the surrounding area in which owners of record were notified by mail. This is necessary for verification that the correct facility boundary was used in determining distance for notifying land owners of record.

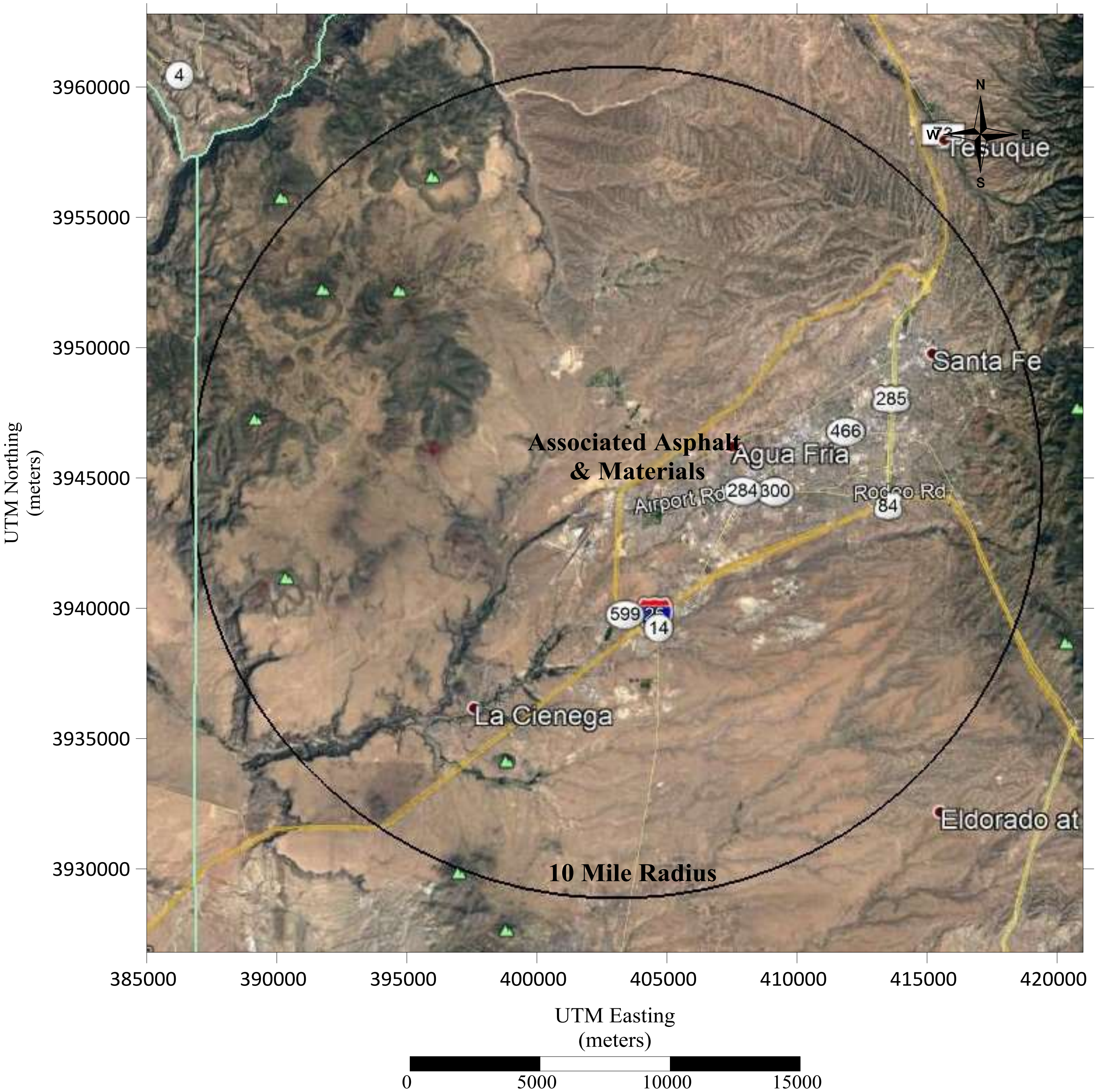

Figure 9-1: 10-Mile Radius around Santa Fe Facility

Municipalities, Counties, and Indian Tribes List Within 10 Miles

City of Santa Fe
Yolanda Y. Vigil, CMC
City Clerk
PO Box 909
Santa Fe, New Mexico 87504-0909

Santa Fe County
Geraldine Salazar
Santa Fe County Clerk
102 Grant Ave
Santa Fe, New Mexico 87501

Sandoval County
Eileen Garbagni
Sandoval County Clerk
PO Box 40
Bernalillo, New Mexico 87004

Neighbor List Within 100 Feet

New Mexico State Land Office
PO Box 1148
Santa Fe, NM 87504

PARKER, PAUL E & MARY JO
PO Box 459
Los Alamos, NM 87544

STATE OF NM HIGHWAY & TRANS
PO Box 1149
Santa Fe, NM 87504

VULCAN LANDS, INC.
1200 Urban Center Dr.
Birmingham, AL 35242

PENA BLANCA PTNSHP
PO Box 38
Espanola, NM 87532

SANTA FE COUNTY
PO Box 276
Santa Fe, NM 87504-0276
New Mexico State Land Office

Associated Asphalt and Materials, LLC
3810 Oliver Road • Santa Fe, NM 87507
Office: (505) 438-0300 • Fax: (505) 474-7262

October 29, 2019

SANTA FE COUNTY
PO Box 276
Santa Fe, NM 87504-0276

To whom it may concern:

Associated Asphalt and Materials, LLC (AAM) announces its intent to apply to the New Mexico Environment Department for a new air quality construction permit for an aggregate and hot mix asphalt (HMA) processing facility (Santa Fe Facility). The date the notarized permit application will be submitted to the Air Quality Bureau is estimated to be November 15, 2019.

The exact location for AAM Santa Fe Facility is 86 Paseo De River, Santa Fe, NM, 87507 at latitude 35°, 38', 32.150" N and longitude 106°, 04', 17.088" W, NAD83. The approximate location of the AAM Santa Fe Facility is 0.7 miles north of the intersection of Airport Rd. and Veteran's Memorial Hwy in Santa Fe, NM.

The proposed permit, under regulation 20.2.72.200.A.(1) NMAC, consists of a 200 ton per hour (TPH) aggregate crushing and screening plant, 50 TPH aggregate scalping screen, a 150 TPH hot mix asphalt batch plant (HMA Plant #2) and a 300 TPH hot mix asphalt drum mix plant (HMA Plant #5).

The estimated maximum quantities of any regulated air contaminants will be as follows in pound per hour (pph) and tons per year (tpy). These reported emissions could change slightly during the course of the Department's review:

Pollutant:	Pounds per hour	Tons per year
PM_{10} (Total Facility – Regulated and Fugitive Sources)	20.0 pph	19.2 tpy
$PM_{2.5}$ (Total Facility – Regulated and Fugitive Sources)	12.7 pph	13.1 tpy
Sulfur Dioxide (SO_2)	1.72 pph	1.74 tpy
Nitrogen Oxides (NO_x)	15.7 pph	21.7 tpy
Carbon Monoxide (CO)	103.4 pph	95.6 tpy
Volatile Organic Compounds (VOC)	17.3 pph	20.9 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	2.80 pph	2.82 tpy
Toxic Air Pollutant (TAP)	5.86 pph	5.81 tpy
Green House Gas Emissions as Total CO_2e	n/a	<75,000 tpy

The maximum operating schedule of the plant is 24 hours per day, 7 days a week, and a maximum of 52 weeks per year for annual operating hours of 7680 hours per year for the HMA plants and 3650 hours per year for the aggregate processing plants. The standard operating schedule of the plant is 12 hours per day, 7 days a week, and a maximum of 52 weeks per year.

The owner and/or operator of the Facility are:

Associated Asphalt and Materials, LLC
3810 Oliver Dr
Santa Fe, NM 87507

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505)

Associated Asphalt and Materials, LLC

476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

With your comments, please refer to the company name and facility name, or send a copy of this notice along with your comments. This information is necessary since the Department may have not yet received the permit application. Please include a legible return mailing address. Once the Department has completed its preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

Attención

Este es un aviso de la Agencia de Calidad de Aire del Departamento de Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor de comunicarse con la oficina de Calidad de Aire al teléfono 505-476-5557.

Notice of Non-Discrimination

NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non- discrimination programs, policies or procedures, you may contact: Kristine Pintado, Non-Discrimination Coordinator, New Mexico Environment Department, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. If you believe that you have been discriminated against with respect to a NMED program or activity, you may contact the Non-Discrimination Coordinator identified above or visit our website at https://www.env.nm.gov/NMED/EJ/index.html to learn how and where to file a complaint of discrimination

Sincerely,

Associated Asphalt and Materials, LLC
3810 Oliver Dr
Santa Fe, NM 87507

7017 3040 0000 9917 8381

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- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage $ .50
Total Postage and Fees $ 4.00

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Sent To: Yolanda Y. Vigil, CMC
Street and Apt. No.: Santa Fe City Clerk
City, State, ZIP+4: P. O. Box 909
Santa Fe, NM 87504-0909

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage $ .50
Total Postage and Fees $ 4.00

Postma Here — ALBUQUER OCT 31 201 USPS 1088

Sent To: Geraldine Salazar
Street and Apt.: Santa Fe County Clerk
City, State, ZIP: 102 Grant Avenue
Santa Fe, NM 87501-2061

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse fo

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- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage $ .50
Total Postage and Fees $ 4.00

Postmark Here — ALBUQUERQUE, NM 87110-3801 OCT 31 2019 USPS

Sent To: Eileen Garbagni
Street and A: Sandoval Conty Clerk
City, State, Z: P. O. Box 40
Bernalillo, NM 87004-0040

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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- ☐ Return Receipt (hardcopy) $
- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage $ .50
Total Postage and Fees $ 4.00

Postm Here — ALBUQUERQUE, N OCT 31 2019 USPS 108

Sent To: New Mexico State Land Office
Street and Apt. I: P. O. Box 1148
City, State, ZIP+: Santa Fe, NM 87504-1148

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse f

7017 3040 0000 9917 8411

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Extra Services & Fees *(check box, add fee as appropriate)*
- ☐ Return Receipt (hardcopy) $
- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage $ .50
Total Postage and Fees $ 4.00

Postmark Here — ALBUQUERQUE, NM 87110-3801 OCT 31 2019 USPS

Sent To: Parker, Paul E & Mary Jo
Street and Apt. I: P. O. Box 459

7017 3040 0000 9917 8428

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Certified Mail Fee $ 3.50
Extra Services & Fees *(check box, add fee as appropriate)*
- ☐ Return Receipt (hardcopy) $
- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage $ .50
Total Postage and Fees $ 4.00

Postm Her — ALBUQUERQUE OCT 31 USPS

Sent To: State of NM Highway & Trans
Street and Apt. No.: P. O. Box 1148
City, State, ZIP+4: Santa Fe, NM 87504-1148

7017 3040 0000 9917 8435

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Certified Mail Fee $ 3.50

Extra Services & Fees *(check box, add fee as appropriate)*
- ☐ Return Receipt (hardcopy) $
- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postmark Here

ALBUQUERQUE, NM 87110-3801 OCT 31 2019 USPS 1085

Postage $ .50

Total Postage and Fees $ 4.00

Sent To: Vulcan Lands, Inc.

Street and Apt.: 1200 Urban Center Dr.

City, State, ZIP+4: Birmingham, AL 35242-2545

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7017 3040 0000 9917 8442

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Certified Mail Fee $ 3.50

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- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

ALBUQ... USPS

Postage $ .50

Total Postage and Fees $ 4.00

Sent To: Pena Blanca Ptnshp

Street and Apt. No.: P. O. Box 38

City, State, ZIP+4: Espanola, NM 87532-0038

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Re...

7017 3040 0000 9917 8459

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- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

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ALBUQUERQUE, NM 87110-3801 OCT 31 2019 USPS 1085

Postage $ .50

Total Postage and Fees $ 4.00

Sent To: Santa Fe County

Street and Apt. No.: P. O. Box 276

City, State, ZIP+4: Santa Fe, NM 87504-0276

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

Santa Fe County Assessor's Office

(http://www.santafecountynm.gov/assessor)

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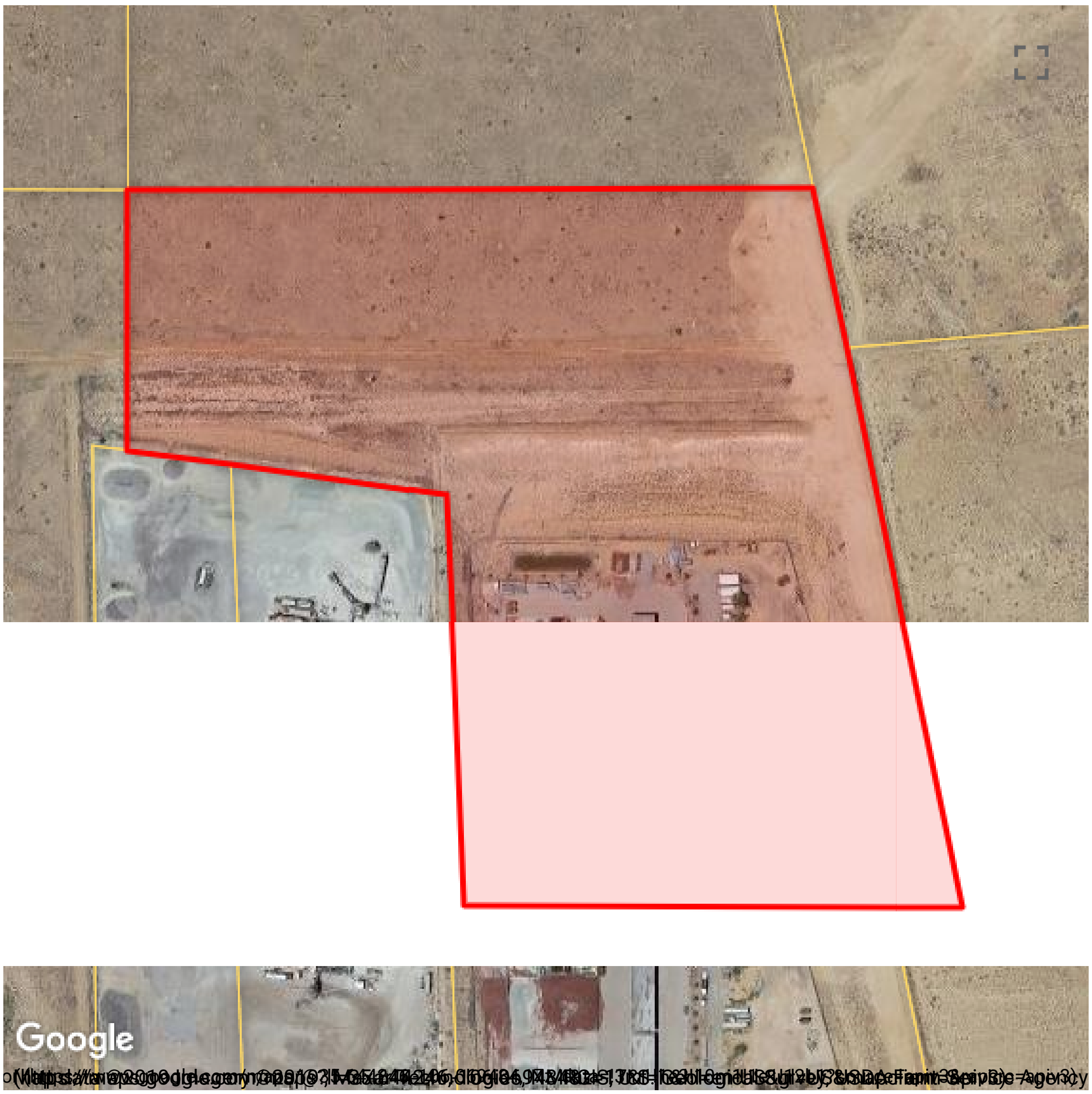

PROPERTY INFORMATION

Parcel Number: 910008659

UPC: 1047096076212000000

Physical Address:

424 NM 599 FRONTAGE RD

SANTA FE, NM 87507

Owner Name:

STATE PROPERTY

Owner Mailing Address:

UNDETERMINED ADDRESS

SANTA FE, NM 87501

Tax Code Area: CO-N

Section Township Range:

S2 T16N R8E

Legal Description:

T16N R 8E S2 LOT 18 MAPPING PURPOSES ONLY STATE PROPERTY

Plat Book:

Most Recent Deed:

Neighborhood: 2221002

Paseo Real 599 Comm

Property Class: COMM

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

Santa Fe County Assessor's Office

(http://www.santafecountynm.gov/assessor)

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PROPERTY INFORMATION

Parcel Number: 910008660

UPC: 1047096094091000000

Physical Address:

424 NM 599 FRONTAGE RD

SANTA FE, NM 87507

Owner Name:

STATE OF NEW MEXICO

Owner Mailing Address:

1110 S ST FRANCIS DR

SANTA FE, NM 87504

Tax Code Area: CO-N

Section Township Range:

S2 T16N R8E

Legal Description:

T16N R8E S2 LOT 19 MAPPING PURPOSES ONLY STATE PROPERTY

Plat Book:

661/035

Most Recent Deed:

Neighborhood: 2221002

Paseo Real 599 Comm

Property Class: COMM

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

LAND DETAIL

Extension	Line	Type	Square Footage	Acreage
1	1	Commercial	815008	18.71

PRIMARY STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built	Bedrooms
No records found					

ADDITIONAL STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built
C01	01	Other [COMCNPYA]	1599	2000
C01	02	Other [PARKLOT]	85	2000
C01	03	Utility Room	448	2000
C01	C	Other [GOVTBLDG]	10812	2000

Sketch for C01

Santa Fe County Assessor's Office

(http://www.santafecountynm.gov/assessor)

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PROPERTY INFORMATION

Parcel Number: 910005682

UPC: 1047096042023000000

Physical Address:

54 PASEO DE RIVER

SANTA FE, NM 87507

Owner Name:

PARKER, PAUL E & MARY JO

Owner Mailing Address:

PO BOX 459

LOS ALAMOS, NM 87544

Tax Code Area: CO-N

Section Township Range:

S2 T16N R8E

Legal Description:

T16N R 8E S11 5.830 AC LOT 1

Plat Book:

492/026

Most Recent Deed:

Neighborhood: 2221002

Paseo Real 599 Comm

Property Class: VAC

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

LAND DETAIL

Extension	Line	Type	Square Footage	Acreage
1	1	Non-Residential Vacant	253954	5.83

PRIMARY STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built	Bedrooms
No records found					

ADDITIONAL STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built
No records found				

Santa Fe County Assessor's Office

(http://www.santafecountynm.gov/assessor)

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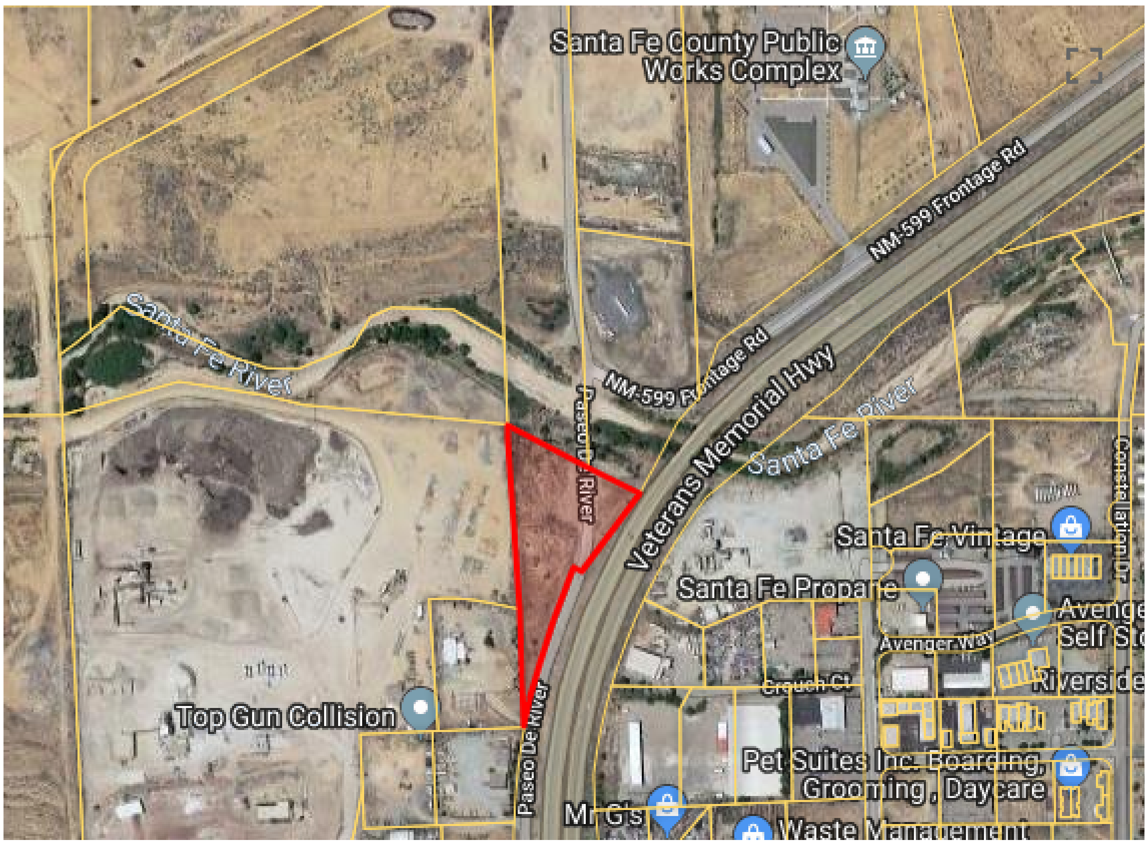

Google

PROPERTY INFORMATION

Parcel Number: 99306927

UPC: 1047095022492000000

Physical Address:

UNASSIGNED

SANTA FE, NM 87507

Owner Name:

STATE OF NM HIGHWAY & TRANS

Owner Mailing Address:

PO BOX 1149

SANTA FE, NM 87504

Tax Code Area: CI-N

Section Township Range:

Legal Description:

N.M.TRANSPORTATION DEPT. PARCEL 11-14-A 11-11-B PARCEL 11-14

Plat Book:

PB344 P048

Most Recent Deed:

Neighborhood: 1121007

SW COMM Industrial

Property Class: VAC

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

LAND DETAIL

Extension	Line	Type	Square Footage	Acreage
1	1	Non-Residential Vacant	174240	4

PRIMARY STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built	Bedrooms
No records found					

ADDITIONAL STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built
No records found				

Santa Fe County Assessor's Office

(http://www.santafecountynm.gov/assessor)

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PROPERTY INFORMATION

Parcel Number: 99308897

UPC: 1046095453443000000

Physical Address:

30 COLONY DR

SANTA FE, NM 87507

Owner Name:

VULCAN LANDS, INC.

Owner Mailing Address:

1200 URBAN CENTER DR

BIRMINGHAM, AL 35242

Tax Code Area: CI-N

Section Township Range:

Legal Description:

T16N R8E SEC 10 LOT 5A

Plat Book:

822/21-23

Most Recent Deed:

Neighborhood: 1121007

SW COMM Industrial

Property Class: COMM

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

LAND DETAIL

Extension	Line	Type	Square Footage	Acreage
1	1	Commercial	2170595	49.83

PRIMARY STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built	Bedrooms
No records found					

ADDITIONAL STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built
C01	C	Other [LMFG]	1860	1990

Sketch for C01

Santa Fe County Assessor's Office

(http://www.santafecountynm.gov/assessor)

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PROPERTY INFORMATION

Parcel Number: 99308898

UPC: 1046096471013000000

Physical Address:

53 PASEO DE RIVER

SANTA FE, NM 87507

Owner Name:

VULCAN LANDS, INC.

Owner Mailing Address:

1200 URBAN CENTER DR

BIRMINGHAM, AL 35242

Tax Code Area: CI-N

Section Township Range:

Legal Description:

T16N R8E SEC 3 LOT 5B

Plat Book:

822/21-23

Most Recent Deed:

Neighborhood: 2221002

Paseo Real 599 Comm

Property Class: VAC

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

LAND DETAIL

Extension	Line	Type	Square Footage	Acreage
1	1	Non-Residential Vacant	284011	6.52

PRIMARY STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built	Bedrooms
No records found					

ADDITIONAL STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built
No records found				

Santa Fe County Assessor's Office

(http://www.santafecountynm.gov/assessor)

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PROPERTY INFORMATION

Parcel Number: 99308893

UPC: 1046096476070000000

Physical Address:

UNASSIGNED

SANTA FE, NM 87507

Owner Name:

PENA BLANCA PTNSHP

Owner Mailing Address:

PO BOX 38

ESPANOLA, NM 87532

Tax Code Area: CO-N

Section Township Range:

Legal Description:

T16N R8E SEC 3 TRACT B1A

Plat Book:

822/17

Most Recent Deed:

Neighborhood: 2221002

Paseo Real 599 Comm

Property Class: VAC

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

LAND DETAIL

Extension	Line	Type	Square Footage	Acreage
1	1	Non-Residential Vacant	1176904	27.018

PRIMARY STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built	Bedrooms
No records found					

ADDITIONAL STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built
No records found				

(http://www.santafecountynm.gov/assessor)

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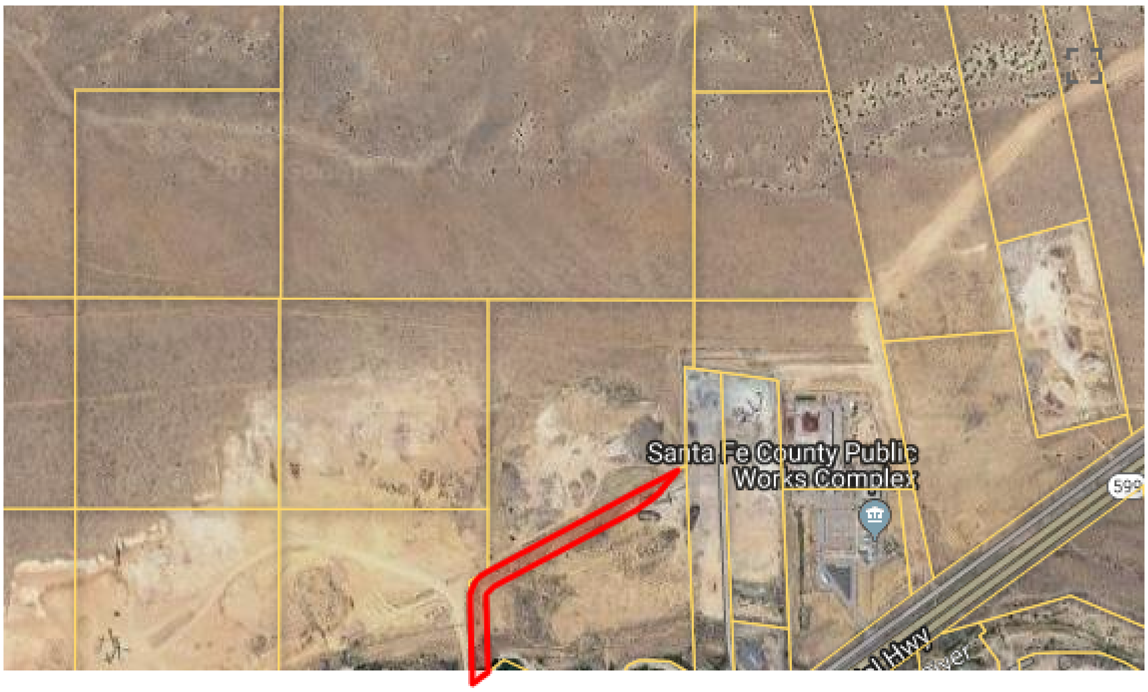

PROPERTY INFORMATION

Parcel Number: 99308892

UPC: 1046096424096000000

Physical Address:

UNASSIGNED

SANTA FE, NM 87507

Owner Name:

SANTA FE COUNTY

Owner Mailing Address:

PO BOX 276

SANTA FE, NM 87504-0276

Tax Code Area: CO-N

Section Township Range:

Legal Description:

T16N R8E SEC3 TRACT B1B ROW/UTILITY EASEMENT

Plat Book:

822/17

Most Recent Deed:

Neighborhood: 2221002

Paseo Real 599 Comm

Property Class: VAC

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

LAND DETAIL

Extension	Line	Type	Square Footage	Acreage
1	1	Non-Residential Vacant	191446	4.395

PRIMARY STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built	Bedrooms
No records found					

ADDITIONAL STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built
No records found				

Santa Fe County Assessor's Office

(http://www.santafecountynm.gov/assessor)

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PROPERTY INFORMATION

Parcel Number: 910008675

UPC: 1046096455194000000

Physical Address:

0 STATE PROPERTY

SANTA FE, NM 87507

Owner Name:

STATE PROPERTY

Owner Mailing Address:

UNDETERMINED ADDRESS

SANTA FE, NM 87501

Tax Code Area: CO-N

Section Township Range:

S3 T16N R8E

Legal Description:

MAPPING PURPOSES ONLY T16N R 8E S2 LOT 9 STATE PROPERTY

Plat Book:

Most Recent Deed:

Neighborhood: 2221002

Paseo Real 599 Comm

Property Class: VAC

Assessed Value:

See Notice of Value on Document Manager Page (http://assrdocs.santafecountynm.gov/AXPortal)

LAND DETAIL

Extension	Line	Type	Square Footage	Acreage
1	1	Non-Residential Vacant	1725412	39.61

PRIMARY STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built	Bedrooms
No records found					

ADDITIONAL STRUCTURES DETAIL

Extension	ID	Type	Square Footage	Year Built
No records found				

NOTICE

Associated Asphalt and Materials, LLC (AAM) announces its intent to apply to the New Mexico Environment Department for a new air quality construction permit for an aggregate and hot mix asphalt (HMA) processing facility (Santa Fe Facility). The date the notarized permit application will be submitted to the Air Quality Bureau is estimated to be November 15, 2019.

The exact location for AAM Santa Fe Facility is 86 Paseo De River, Santa Fe, NM, 87507 at latitude 35°, 38', 32.150" N and longitude 106°, 04', 17.088" W, NAD83. The approximate location of the AAM Santa Fe Facility is 0.7 miles north of the intersection of Airport Rd. and Veteran's Memorial Hwy in Santa Fe, NM.

The proposed permit, under regulation 20.2.72.200.A.(1) NMAC, consists of a 200 ton per hour (TPH) aggregate crushing and screening plant, 50 TPH aggregate scalping screen, a 150 TPH hot mix asphalt batch plant (HMA Plant #2) and a 300 TPH hot mix asphalt drum mix plant (HMA Plant #5).

The estimated maximum quantities of any regulated air contaminants will be as follows in pound per hour (pph) and tons per year (tpy). These reported emissions could change slightly during the course of the Department's review:

Pollutant:	Pounds per hour	Tons per year
PM_{10} (Total Facility – Regulated and Fugitive Sources)	20.0 pph	19.2 tpy
$PM_{2.5}$ (Total Facility – Regulated and Fugitive Sources)	12.7 pph	13.1 tpy
Sulfur Dioxide (SO_2)	1.72 pph	1.74 tpy
Nitrogen Oxides (NO_x)	15.7 pph	21.7 tpy
Carbon Monoxide (CO)	103.4 pph	95.6 tpy
Volatile Organic Compounds (VOC)	17.3 pph	20.9 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	2.80 pph	2.82 tpy
Toxic Air Pollutant (TAP)	5.86 pph	5.81 tpy
Green House Gas Emissions as Total CO_2e	n/a	<75,000 tpy

The maximum operating schedule of the plant is 24 hours per day, 7 days a week, and a maximum of 52 weeks per year for annual operating hours of 7680 hours per year for the HMA plants and 3650 hours per year for the aggregate processing plants. The standard operating schedule of the plant is 12 hours per day, 7 days a week, and a maximum of 52 weeks per year.

The owner and/or operator of the Facility are:

Associated Asphalt and Materials, LLC
3810 Oliver Dr
Santa Fe, NM 87507

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

With your comments, please refer to the company name and facility name, or send a copy of this notice along with your comments. This information is necessary since the Department may have not yet received the permit application. Please include a legible return mailing address. Once the Department has completed its preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

Attención

Este es un aviso de la Agencia de Calidad de Aire del Departamento de Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor de comunicarse con la oficina de Calidad de Aire al teléfono 505-476-5557.

Notice of Non-Discrimination

NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non- discrimination programs, policies or procedures, you may contact: Kristine Pintado, Non-Discrimination Coordinator, New Mexico Environment Department, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. If you believe that you have been discriminated against with respect to a NMED program or activity, you may contact the Non-Discrimination Coordinator identified above or visit our website at https://www.env.nm.gov/NMED/EJ/index.html to learn how and where to file a complaint of discrimination.

General Posting of Notices – Certification

I, _Matthew Lane____, the undersigned, certify that on 11/12/2019, posted a true and correct copy of the attached Public Notice in the following publicly accessible and conspicuous places in Snata Fe of Santa Fe County, State of New Mexico on the following dates:

1. Facility entrance 11/09/2019
2. Santa Fe Public Library Southeast Side Branch 11/09/2019
3. Nancy Rodriguez Community Center 11/09/2019
4. Genoveva Chavez Community Center 11/12/2019

Signed this 12 day of November, 2019,

____
Signature

__11/12/2019____________
Date

__Matthew Lane______________________
Printed Name

__Associated Asphalt Materials, LLC Environmental Specialist______________________
Title


Southwest Propane
505.407.2260
PRIVATE PROPERTY
PROPIEDAD PRIVADA
NO TRESPASSING
PROHIBIDO EL PASO
NOTICE


NOTICE


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NO SMOKING

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Training provided
Very rewarding
Flexible scheduling
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Become a CAREGiver 505.471.2777
1. Call Us: 505.954.4601
2. Complete the application (if needed, our staff can work with you).
3. Meet with a Family Services Assistant and tour the facility of your choice
12 locations in Santa Fe County
Services are provided at no cost
Nutritious meals and snacks provided through the Child & Adult Care Food Program
Free diapers, wipes, formula and baby food
PMS
PRESBYTERIAN MEDICAL SERVICES
Our Purpose is You.
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Call Us 505.954.4601
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Three Day Live Event
December 6th-8th, 2019 · Santa Fe, NM
Free Program
"Preview of 2020 FEP Health In
Presented by
Kelley Walter, Blue Cross/Blue Shield of NM Fe
Mark Michelsen, Government Employees H
at the monthly meeting of the Santa F
of National Active & Retired Federal Emplo
Monday, November 11, 2019 at
Pecos Trail Café, 2239 Old Peco
For more information: Rosemary at
Series No. 5
THE SANTA FE Symphony
bringing great music to life
Sunday, November 17, 2019—3:00 pm
SANTA FE PUBLIC LIBRARY • SOUTHSIDE BRANCH
LOCATION: 6599 JAGUAR DRIVE, SANTA FE
505.955.2828 santafelibrary.org/children/
FREE Family Concert
... for children and their families!
PRESENTED BY THE SYMPHONY'S MUSIC EDUCATION COMMITTEE
Don't miss the fifth of The Santa Fe Symphony's FREE Family Concert series featuring THE SYMPHONY BASSOON TRIO: Principal Bassoonist Stefanie Przybylska; Bassoonist Leslie Shultis; and Bassoonist Beth VanArsdel. Musicians will demonstrate each of their instruments and play a variety of music!
NO REGISTRATION REQUIRED. ALL AGES ARE WELCOME!
santafesymphony.org Let's connect!
Principal Bassoonist Stefanie Przybylska
Please put today's date on your flyer
Undated material will be removed immediately
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(or after event date)
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ROADWAY TRANSIT WALK BIKE
YOUR VOICE MATTERS
Santa Fe MPO
TAKE OUR SURVEY & LET US HEAR YOUR VOICE FOR THE 2020-2045 METROPOLITAN TRANSPORTATION PLAN
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WHEN: Novembe
WHERE: UU Santa
TICKETS $10
Free!
English Classes!
For the whole family - Includes a light meal, childcare for children over 3 years old, and tutoring for school-age children
Westminster Presbyterian Church
841 W. Manhattan Ave - 87501
Corner of St. Francis & Manhattan
Telephone: 505-983-8939
Every Monday (5:30-7:00 PM)
HOLIDAY OLE' ARTS AND CRAFTS
The Altar Society from St. John the Baptist Catholic Church, 1301 Osage Avenue, Santa Fe, will host the annual Holiday Ole' on Sunday, December 1st from 9:00 am to 3:00 pm in Lamy Hall. In addition to the arts & crafts made by various vendors, there will also be food and drinks for sale. Come and join the festivities!
MERRY CHRISTMAS
NEW MEXICO CENTER FOR THERAPEUTIC RIDING
"CHANGING LIVES ONE STRIDE AT A TIME"

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Carbon Monoxide (CO)	103.4 pph	95.6 tpy
Volatile Organic Compounds (VOC)	17.3 pph	20.9 tpy
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Green House Gas Emissions as Total CO_2e	n/a	<75,000 tpy

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Santa Fe, NM 87507

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With your comments, please refer to the company name and facility name, or send a copy of this notice along with your comments. This information is necessary since the Department may have not yet received the permit application. Please include a legible return mailing address. Once the Department has completed its preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

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PORTUGAL & SPAIN
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FROM $3,299 AIR & LAND
9 DAYS, 7 NIGHTS INCLUDING HOTELS, MEALS, DAY TRIPS, AND AIRFARE FROM ALBUQUERQUE, NM
Early-Bird Special!
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Text: 505-261-3730
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Para adultos con una o más condiciones crónicas de salud
Caminos de Salud
Taller GRATUITO
Participe, aprenda y tome control.
Acerca de Caminos de Salud NM: Técnicas para Vivir Mejor
NEW MEXICO DEPARTMENT OF HEALTH
Santa Fe Pony Club
www.PonyClub.org
Winter Celebration
YOUTH NIGHT
FUN ACTIVITIES, FOOD AND MUSIC!
New Vistas
December 6th, 2019 • 5:00 pm to 7:00 pm
Contact: Kendra Garcia • Call: (505) 471-1001 ext. 104
• Email: kgarcia@newvistas.org
LegalShield
Emily Johnson
True Essence Bodywork
2019-2020 NEW MEXICO ICE WOLVES SCHEDULE
Santa Fe
505.429.1523
SANTA FE PROMUSICA
2019-20 SEASON
SKI SANTA FE NEW MEXICO
JOB FAIR
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NOTICE OF AIR QUALITY PERMIT APPLICATION

Associated Asphalt and Materials, LLC (AAM) announces its intent to apply to the New Mexico Environment Department for a new air quality construction permit for an aggregate and hot mix asphalt (HMA) processing facility (Santa Fe Facility). The date the notarized permit application will be submitted to the Air Quality Bureau is estimated to be November 15, 2019.

The exact location for AAM Santa Fe Facility is 86 Paseo De River, Santa Fe, NM, 87507 at latitude 35°, 38', 32.150" N and longitude 106°, 04', 17.088" W, NAD83. The approximate location of the AAM Santa Fe Facility is 0.7 miles north of the intersection of Airport Rd. and Veteran's Memorial Hwy in Santa Fe, NM.

The proposed permit, under regulation 20.2.72.200.A.(1) NMAC, consists of a 200 ton per hour (TPH) aggregate crushing and screening plant, 50 TPH aggregate scalping screen, a 150 TPH hot mix asphalt batch plant (HMA Plant #2) and a 300 TPH hot mix asphalt drum mix plant (HMA Plant #5).

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PM_{10} (Total Facility – Regulated and Fugitive Sources)	20.0 pph	19.2 tpy
$PM_{2.5}$ (Total Facility – Regulated and Fugitive Sources)	12.7 pph	13.1 tpy
Sulfur Dioxide (SO_2)	1.72 pph	1.74 tpy
Nitrogen Oxides (NO_x)	15.7 pph	21.7 tpy
Carbon Monoxide (CO)	103.4 pph	95.6 tpy
Volatile Organic Compounds (VOC)	17.3 pph	20.9 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	2.80 pph	2.82 tpy
Toxic Air Pollutant (TAP)	5.86 pph	5.81 tpy
Green House Gas Emissions as Total CO_2e	n/a	<75,000 tpy

The maximum operating schedule of the plant is 24 hours per day, 7 days a week, and a maximum of 52 weeks per year for annual operating hours of 7680 hours per year for the HMA plants and 3650 hours per year for the aggregate processing plants. The standard operating schedule of the plant is 12 hours per day, 7 days a week, and a maximum of 52 weeks per year.

The owner and/or operator of the Facility are:

Associated Asphalt and Materials, LLC
3810 Oliver Dr
Santa Fe, NM 87507

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

With your comments, please refer to the company name and facility name, or send a copy of this notice along with your comments. This information is necessary since the Department may have not yet received the permit application. Please include a legible return mailing address. Once the Department has completed its preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

Attención

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Notice of Non-Discrimination

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Border wall, impeachment battle imperil budget progress

By Andrew Taylor
Associated Press

WASHINGTON — The Senate passed a long-overdue, $209 billion bundle of bipartisan spending bills Thursday, but a bitter fight over funding demanded by President Donald Trump for border fencing imperils broader Capitol Hill efforts to advance $1.4 trillion worth of annual Cabinet agency budgets.

The 84-9 vote sends the measure into House-Senate negotiations but doesn't much change the big picture. There has been little progress, if any, on the tricky trade-offs needed to balance Democratic demands for social programs with President Donald Trump's ballooning border wall demands.

To amplify the point, Democrats shortly thereafter filibustered a much larger measure anchored by the $695 billion Pentagon funding bill, protesting Trump's plans to again transfer billions of dollars from the Pentagon to the border wall project. The mostly party-line vote triggered a familiar round of finger-pointing.

"This delay is because they insist on including in this bill authority for President Trump to raid American tax dollars from our military — money that is intended for specific military priorities — to pay for his wall, which he promised that Mexico would pay for," said Sen. Patrick Leahy, D-Vt. "And that is unacceptable."

Passage of the annual appropriations bills is one of the few areas in which divided government in Washington has been able to deliver results in the Trump era, despite last winter's 35-day partial government shutdown. Trump has only reluctantly signed the measures, however, and the White House has been unyielding so far on its wall demands during this spending round.

A sense of optimism in the aftermath of a July budget and debt deal has yielded to pessimism now, and the poisonous political fallout from the ongoing impeachment battle isn't helping matters. The budget pact blended a must-do increase in the government's borrowing cap with relief from the return of stinging automatic budget cuts known as sequestration that were left over from a long-failed 2011 budget deal.

At issue are the agency appropriations bills that Congress passes each year to keep the government running. The hard-won budget and debt deal this summer produced a top-line framework for the 12 yearly spending bills, but filling in the details is proving difficult.

While it appears likely that lawmakers will prevent a government shutdown next month with a government-wide stopgap spending bill, the impasse over agency appropriations bills shows no signs of breaking.

Democrats say White House demands for $5 billion for Trump's long-sought U.S.-Mexico border wall have led the GOP-controlled Senate to shortchange Democratic domestic priorities.

They say negotiations can't begin in earnest until spending hikes permitted under the July budget deal are allocated among the 12 appropriations subcommittees more to their liking. Trump is demanding a huge border funding increase that comes mostly at the expense of a major health and education spending bill.

Senate Appropriations Committee Chairman Richard Shelby, R-Ala., said Democrats "seem more focused on scoring political points than ensuring our military has the certainty and funding it needs to counter our adversaries."

North Korea launches two missiles

By Simon Denyer
Washington Post

TOKYO — North Korea launched two missiles Thursday, marking its 12th test since May, in an apparent effort to pressure the United States to return to denuclearization talks with a better offer.

The missile test comes four days after North Korea warned it was losing patience with the United States and its "hostile policy" and restated its end-of-year deadline for Washington to change its approach.

The missiles were launched from the province immediately north of the capital, Pyongyang, South Korea's Joint Chiefs of Staff said in a statement. Japan's Defense Ministry said the first projectile appeared to be a ballistic missile but did not fall in its territorial waters or exclusive economic zone.

The missiles were fired a day after North Korean leader Kim Jong Un sent a condolence letter to his South Korean counterpart, Moon Jae-in, over the death of his mother.

Kim expressed his "deep condolences" and offered a "consoling message to President Moon" in the letter delivered via the border village of Panmunjom late Wednesday, South Korea said Thursday.

But the missile tests only underlined how badly relations have deteriorated this year between North and South Korea, and with the United States.

Talks between North Korean and U.S. officials broke down in Stockholm earlier this month. After an eight-month stalemate, the United States had hoped to breathe new life into the negotiations, but North Korea walked away, calling the discussions "sickening."

Then, two weeks ago, Kim was shown riding a white horse in the snow on the sacred Mount Paektu, with state media saying he was planning a "great operation."

Last week, Kim ordered the removal of South Korean facilities at a shuttered joint tourist project, and he has since rebuffed Seoul's attempt to hold talks on the issue.

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The owner and/or operator of the Facility are:

Associated Asphalt and Materials, LLC
3810 Oliver Dr
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SANTA FE NEW MEXICAN

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MONTROSE AIR QUALITY SERVICES L
3500 COMANCHE RD NE
BUILDING G
ALBUQUERQUE, NM 87107

ACCOUNT: 32513

AD NUMBER: 0000268056

LEGAL NO 86488 P.O. #:

1 TIME(S)	280.00
AFFIDAVIT	10.00
TAX	24.47
TOTAL	314.47

AFFIDAVIT OF PUBLICATION

STATE OF NEW MEXICO
COUNTY OF SANTA FE

I, C. Valdez, being first duly sworn declare and say that I am Legal Advertising Representative of THE SANTA FE NEW MEXICAN, a daily newspaper published in the English language, and having a general circulation in the Counties of Santa Fe, Rio Arriba, San Miguel, and Los Alamos, State of New Mexico and being a newspaper duly qualified to publish legal notices and advertisements under the provisions of Chapter 167 on Session Laws of 1937; that the Legal No 86488 a copy of which is hereto attached was published in said newspaper 1 day(s) between 11/01/2019 and 11/01/2019 and that the notice was published in the newspaper proper and not in any supplement; the first date of publication being on the 1st day of November, 2019 and that the undersigned has personal knowledge of the matter and things set forth in this affidavit.

/S/ C. Valdez

LEGAL ADVERTISEMENT REPRESENTATIVE

Subscried and sworn to before me on this 1st day of November, 2019

Notary Anne M Icenhower

Commission Expires: 2-20-22

OFFICIAL SEAL
Anne M Icenhower
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires 2-20-22

LEGAL # 86488

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RADIO ANNOUNCEMENT

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Public notice postings for this permit application can be found at the follow locations:

AAM Santa Fe Facility Entrance

Santa Fe Public Library Southside Branch @ 6599 Jaguar Drive, Santa Fe, NM

Nancy Rodriguez Community Center @ 1 Prairie Dog Loop, Santa Fe, NM

Genoveva Chavez Community Center @ 3221 Rodeo Rd, Santa Fe, NM

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Permit Programs Manager

New Mexico Environment Department

Air Quality Bureau

525 Camino de los Marquez, Suite 1

Santa Fe, New Mexico; 87505-1816

Telephone Number (505) 476-4300 or 1 800 224-7009

November 14, 2019

Enchantment FM
551 W Cordova Rd
Suite C
Santa Fe, NM 87505

CERTIFIED MAIL

Dear Enchantment FM Radio:

SUBJECT: PSA Request - Proposed Revision to the Air Quality Construction Permit for the Associated Asphalt and Materials, LLC's AAM Santa Fe Facility.

Attached is a copy of a public service announcement regarding a proposed air quality construction permit for AAM Santa Fe Facility. This announcement is being submitted by Montrose Air Quality Services, Albuquerque, NM on behalf of Associated Asphalt and Materials, LLC.

The announcement request is being made to fulfill the requirements of the New Mexico Environmental Department air quality permitting regulations. Please consider reading the attached announcement as a public service message.

If you have any questions or need additional information, please contact me at (505) 830-9680 ext 6 (voice), (505) 830-9678 (fax) or email at pwade@montrose-env.com. Thank you.

Sincerely,

Paul Wade

Paul Wade
Senior Engineer

Montrose Air Quality Services, LLC
3500 Comanche Road NE Suite G
Albuquerque, NM 87107-4546

T: 505.830.9680 ext. 6
F: 505.830.9678
Pwade@montrose-env.com
www.montrose-env.com

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Santa Fe, NM 87505-1800

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

Section 10

Written Description of the Routine Operations of the Facility

A written description of the routine operations of the facility. Include a description of how each piece of equipment will be operated, how controls will be used, and the fate of both the products and waste generated. For modifications and/or revisions, explain how the changes will affect the existing process. In a separate paragraph describe the major process bottlenecks that limit production. The purpose of this description is to provide sufficient information about plant operations for the permit writer to determine appropriate emission sources.

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TABLE 10-1: Material Throughputs for Each Plant

Plant	Tons Per Hour	Tons Per Day	Tons Per Year
Plant #2 HMA	150	1,800	190,000
Plant #5 HMA	300	3,600	750,000
Crushing and Screening Plant	200	2,000	400,000
Scalping Screen Plant	50	500	100,000

Plant #2 HMA

The 150 tph hot mix asphalt plant will include; aggregate storage piles, a 4-bin cold aggregate feeder, three (3) transfer conveyors, mineral filler silo with screw conveyor and baghouse, drum dryer/bucket elevator/hot screens/weigh hopper/asphalt mixer with baghouse, asphalt heater, and two (2) asphalt cement storage tanks. The plant will be powered by commercial line power. Processed asphalt will be transported from the HMA plant to off-site sales. Aggregate/mineral filler/asphalt cement is transported to the site by haul truck (P2TRCK). Cold aggregate from the aggregate storage piles (P2HMAP) is transferred to the feed bin (P2HMABIN). From the feed bin the aggregate is conveyed by conveyor (P2HMATP1) to a transfer conveyer (P2HMATP2) where mineral filler (P2HMAFIL) is added. The transfer conveyor conveys the material to the drum sling conveyor (P2HMATP3), where the aggregate sent to the drum dryer (P2HMASTK) is dried. From the drum dryer, a bucket elevator (P2HMASTK) conveys to hot aggregate to the hot screens (P2HMASTK), where the aggregate is size and dropped to the appropriate feed hopper (P2HMASTK). From the feed hopper, the aggregate is sent to the asphalt mixer (P2HMASTK) where asphalt cement, from one of two asphalt cement tanks (P2ASPHTNK), is mixed with the aggregate. Each batch from the mixer is then loaded (P2BATCHUL) into asphalt trucks (P2TRCK) for delivery. A baghouse is used to control particulate emissions during loading of mineral filler to the mineral filler silo. A baghouse is used to control particulate emissions for the drum dryer/bucket elevator/hot screens/feed hoppers/asphalt mixer during asphalt production. A process flow diagram is presented as Figure 4-1.

Plant #5 HMA

The 300 tph hot mix asphalt plant will include; aggregate storage piles, a 4-bin cold aggregate feeder, auxiliary feeder, scalping screen, pug mill, mineral filler silo with screw conveyor and baghouse, drum dryer/mixer with baghouse, incline conveyor, asphalt silo, asphalt heater, five (5) transfer conveyors, and two (2) asphalt cement storage tanks. The plant will be powered by commercial line power. Processed asphalt will be transported from the HMA plant to off-site sales. Aggregate/mineral filler/asphalt cement is transported to the site by haul truck (P5TRCK). Cold aggregate from the aggregate storage piles (P5HMAP) is transferred to the feed bin or auxiliary feed bin (P5HMABIN). From the feed bin or auxiliary feed bin the aggregate is conveyed by either the feed bin conveyor or auxiliary feed bin conveyor (P5HMATP1) to the scalping screen

(P5HMASCR), where oversized aggregate is removed. The scalping screen conveyor (P5HMATP2) conveys the material to the pugmill (P5HMAPUG), where mineral filler (P5HMAFIL) is added. The pugmill conveyor (P5HMATP3) conveys the material to the drum sling conveyor (P5HMATP4), where the aggregate sent to the drum dryer/mixer (P5HMASTK) is dried and asphalt cement, from one of two asphalt cement tanks (P5ASPHTNK), is added. From the drum dryer/mixer, asphalt is sent by incline conveyor (P5DRUMUL) to the asphalt storage silo (P5SILOUL), where the asphalt is loaded into asphalt trucks (P5TRCK) for delivery. A baghouse is used to control particulate emissions during loading of mineral filler to the mineral filler silo. A baghouse is used to control particulate emissions for the drum dryer/mixer during asphalt production. A process flow diagram is presented as Figure 4-2.

Crushing and Screening Plant

The 200 tph aggregate crushing and screening plant will include a feeder, impact crusher, screen, six (6) transfer conveyors, and stacker conveyor. The plant will be powered by a 360 horsepower (hp) generator. Processed aggregate will be transported from the aggregate crushing and screening plant to the HMA plants and/or off-site sales. Aggregate/recycle material is delivered to the site by haul truck (CSHTRCK) and stored in the raw material storage pile (CH_RAW). From the raw material storage pile, the material is transported to the crusher/screen plant feeder (CH_F). From the feeder, the material is crushed (CH), conveyed (CH_C1), and sized in the plant screen (CH_S). From the screen, oversized material is sent back to the crusher by a screen conveyor (CH_SC1) and recycle conveyor (CH_RC). Product from the screen is conveyed by a screen conveyor (CH_SC2), and transfer conveyors (CH_C2 and CH_C3) to the stacker conveyor (CH_STK) where the processed material is dropped into a pile. Processed material is stored in a finish storage pile (CH_FP) until needed or loaded into haul trucks. A process flow diagram is presented as Figure 4-3.

Scalping Screen Plant

The 50 tph aggregate scalping screen plant will include a scalping screen and under conveyor and stacker conveyor. The plant will be powered by a 50 horsepower (hp) engine. Clean aggregate fill will be transported from the aggregate scalping screen plant to the HMA plants and/or off-site sales. Fill is delivered to the site by haul truck (CSHTRCK) and stored in the raw material storage pile (SS_RAW). From the raw material storage pile, the material is transported to the scalping screen plant feeder (SS_F). From the feeder, the material is sized in the plant screen (SS). From the screen, clean fill is conveyed by a screen conveyor (SS_C) to the stacker conveyor (SS_STK) where the processed material is dropped into a pile. Clean fill is stored in a storage pile (SS_FP) until needed or loaded into haul trucks. A process flow diagram is presented as Figure 4-4.

Section 11
Source Determination

Source submitting under 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC

Sources applying for a construction permit, PSD permit, or operating permit shall evaluate surrounding and/or associated sources (including those sources directly connected to this source for business reasons) and complete this section. Responses to the following questions shall be consistent with the Air Quality Bureau's permitting guidance, Single Source Determination Guidance, which may be found on the Applications Page in the Permitting Section of the Air Quality Bureau website.

Typically, buildings, structures, installations, or facilities that have the same SIC code, that are under common ownership or control, and that are contiguous or adjacent constitute a single stationary source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes. Submission of your analysis of these factors in support of the responses below is optional, unless requested by NMED.

A. Identify the emission sources evaluated in this section (list and describe)**:** Plant #2 Hot Mix Asphalt Plant – SIC Code 2951, Plant #5 Hot Mix Asphalt Plant – SIC Code 2951, Aggregate Crushing and Screening Plant – SIC Codes 1429, 1442, and Aggregate Scalping Screen Plant – SIC Codes 1429, 1442.

B. Apply the 3 criteria for determining a single source:

SIC Code: Surrounding or associated sources belong to the same 2-digit industrial grouping (2-digit SIC code) as this facility, OR surrounding or associated sources that belong to different 2-digit SIC codes are support facilities for this source.

☐ **Yes** ☒ **No**

Common Ownership or Control: Surrounding or associated sources are under common ownership or control as this source.

☒ **Yes** ☐ **No**

Contiguous or Adjacent: Surrounding or associated sources are contiguous or adjacent with this source.

☒ **Yes** ☐ **No**

C. Make a determination:

☐ The source, as described in this application, constitutes the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes. If in "A" above you evaluated only the source that is the subject of this application, all "**YES**" boxes should be checked. If in "A" above you evaluated other sources as well, you must check **AT LEAST ONE** of the boxes "**NO**" to conclude that the source, as described in the application, is the entire source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes.

☒ The source, as described in this application, **does not** constitute the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes (A permit may be issued for a portion of a source). The entire source consists of the following facilities or emissions sources (list and describe):

Section 12

Section 12.A
PSD Applicability Determination for All Sources

(Submitting under 20.2.72, 20.2.74 NMAC)

A PSD applicability determination for all sources. For sources applying for a significant permit revision, apply the applicable requirements of 20.2.74.AG and 20.2.74.200 NMAC and to determine whether this facility is a major or minor PSD source, and whether this modification is a major or a minor PSD modification. It may be helpful to refer to the procedures for Determining the Net Emissions Change at a Source as specified by Table A-5 (Page A.45) of the EPA New Source Review Workshop Manual to determine if the revision is subject to PSD review.

A. This facility is a "synthetic minor" source

B. **This facility is not one of the listed 20.2.74.501 Table I – PSD Source Categories.**

   a. **NOx: 21.7 TPY**
   b. **CO: 95.6 TPY**
   c. **VOC: 20.9 TPY**
   d. **SOx: 1.74 TPY**
   e. **PM: 36.9 TPY**
   f. **PM10: 19.2 TPY**
   g. **PM2.5: 13.14 TPY**
   h. **Lead: 0.0035 TPY**
   i. **GHG: 21,220 TPY**

E. If this is an existing PSD major source, or any facility with emissions greater than 250 TPY (or 100 TPY for 20.2.74.501 Table 1 – PSD Source Categories), determine whether any permit modifications are related, or could be considered a single project with this action, and provide an explanation for your determination whether a PSD modification is triggered.

   No, this facility is not a major source. The facility consists of aggregate processing plants and HMA plants. Aggregate processing falls under 2-digit SIC Code Group 14 and HMA plants falls under 2-digit SIC Code Group 29. While aggregate material from aggregate processing plants is used in the HMA plant, since they are operating under different SIC Codes they are separate facilities for major source determination. Additionally, the combined emissions from the facility of any PSD pollutant is less than 100 tons per year.

Section 13

Determination of State & Federal Air Quality Regulations

This section lists each state and federal air quality regulation that may apply to your facility and/or equipment that are stationary sources of regulated air pollutants.

Not all state and federal air quality regulations are included in this list. Go to the Code of Federal Regulations (CFR) or to the Air Quality Bureau's regulation page to see the full set of air quality regulations.

Required Information for Specific Equipment:
For regulations that apply to specific source types, in the 'Justification' column **provide any information needed to determine if the regulation does or does not apply**. **For example**, to determine if emissions standards at 40 CFR 60, Subpart IIII apply to your three identical stationary engines, we need to know the construction date as defined in that regulation; the manufacturer date; the date of reconstruction or modification, if any; if they are or are not fire pump engines; if they are or are not emergency engines as defined in that regulation; their site ratings; and the cylinder displacement.

Required Information for Regulations that Apply to the Entire Facility:
See instructions in the 'Justification' column for the information that is needed to determine if an 'Entire Facility' type of regulation applies (e.g. 20.2.70 or 20.2.73 NMAC).

Regulatory Citations for Regulations That Do Not, but Could Apply:
If there is a state or federal air quality regulation that does not apply, but you have a piece of equipment in a source category for which a regulation has been promulgated, you must **provide the low level regulatory citation showing why your piece of equipment is not subject to or exempt from the regulation. For example** if you have a stationary internal combustion engine that is not subject to 40 CFR 63, Subpart ZZZZ because it is an existing 2 stroke lean burn stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, your citation would be 40 CFR 63.6590(b)(3)(i). **We don't want a discussion of every non-applicable regulation, but if it is possible a regulation could apply, explain why it does not. For example,** if your facility is a power plant, you do not need to include a citation to show that 40 CFR 60, Subpart OOO does not apply to your non-existent rock crusher.

Regulatory Citations for Emission Standards:
For each unit that is subject to an emission standard in a source specific regulation, such as 40 CFR 60, Subpart OOO or 40 CFR 63, Subpart HH, include the low level regulatory citation of that emission standard. Emission standards can be numerical emission limits, work practice standards, or other requirements such as maintenance. **Here are examples:** a glycol dehydrator is subject to the general standards at 63.764C(1)(i) through (iii); an engine is subject to 63.6601, Tables 2a and 2b; a crusher is subject to 60.672(b), Table 3 and all transfer points are subject to 60.672(e)(1)

Federally Enforceable Conditions:
All federal regulations are federally enforceable. All Air Quality Bureau State regulations are federally enforceable except for the following: affirmative defense portions at 20.2.7.6.B, 20.2.7.110(B)(15), 20.2.7.11 through 20.2.7.113, 20.2.7.115, and 20.2.7.116; 20.2.37; 20.2.42; 20.2.43; 20.2.62; 20.2.63; 20.2.86; 20.2.89; and 20.2.90 NMAC. Federally enforceable means that EPA can enforce the regulation as well as the Air Quality Bureau and federally enforceable regulations can count toward determining a facility's potential to emit (PTE) for the Title V, PSD, and nonattainment permit regulations.

INCLUDE ANY OTHER INFORMATION NEEDED TO COMPLETE AN APPLICABILITY DETERMINATION OR THAT IS RELEVENT TO YOUR FACILITY'S NOTICE OF INTENT OR PERMIT.

EPA Applicability Determination Index for 40 CFR 60, 61, 63, etc: http://cfpub.epa.gov/adi/

Table for STATE REGULATIONS:

STATE REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION: (You may delete instructions or statements that do not apply in the justification column to shorten the document.)
20.2.1 NMAC	General Provisions	Yes	Facility	General Provisions apply to Notice of Intent, Construction, and Title V permit applications.
20.2.3 NMAC	Ambient Air Quality Standards NMAAQS	Yes	Facility	20.2.3 NMAC is a SIP approved regulation that limits the maximum allowable concentration of Sulfur Compounds, Carbon Monoxide and Nitrogen Dioxide.
20.2.7 NMAC	Excess Emissions	Yes	Facility	This facility is subject to 20.2.7 NMAC.
20.2.61.109 NMAC	Smoke & Visible Emissions	Yes	P2HM AHT, P5HM AHT, CH_E, SS_E	Engines and heaters are Stationary Combustion Equipment. Specify units subject to this regulation. The facility stationary combustion equipment are subject to a 20 percent opacity limit.
20.2.70 NMAC	Operating Permits	No	Facility	This facility is not a Title V Operating Permit source. The facility consists of aggregate processing plants and HMA plants. Aggregate processing falls under 2-digit SIC Code Group 14 and HMA plants falls under 2-digit SIC Code Group 29. While aggregate material from aggregate processing plants is used in the HMA plant, since they are operating under different SIC Codes they are separate facilities for major source determination.
20.2.71 NMAC	Operating Permit Fees	No	Facility	This facility is not a Title V Operating Permit source.
20.2.72 NMAC	Construction Permits	Yes	Facility	Potential emission rate (PER) for the facility is greater than 10 pph or greater than 25 tpy for any pollutant subject to a state or federal ambient air quality standard.
20.2.73 NMAC	NOI & Emissions Inventory Requirements	Yes	Facility	**NOI:** 20.2.73.200 NMAC applies (requiring a NOI application) **Emissions Inventory Reporting:** 20.2.73.300 NMAC applies.
20.2.74 NMAC	Permits – Prevention of Significant Deterioration (PSD)	No	Facility	This facility is not a PSD major source.
20.2.75 NMAC	Construction Permit Fees	Yes	Facility	This facility is subject to 20.2.72 NMAC and is in turn subject to 20.2.75 NMAC.
20.2.77 NMAC	New Source Performance	Yes	Units subject to 40 CFR 60	This is a stationary source, which is subject to the requirements of 40 CFR Part 60.
20.2.78 NMAC	Emission Standards for HAPS	No	Units Subject to 40 CFR 61	This facility doesn't emits hazardous air pollutants which are subject to the requirements of 40 CFR Part 61.
20.2.79 NMAC	Permits – Nonattainment Areas	No	Facility	This facility is located in an Attainment Area.
20.2.80 NMAC	Stack Heights	Yes	P2HM ASTK, P2HM AHT, P5HM ASTK, P5HM AHT, CH_E, SS_E	The objective of this Part is to establish requirements for the evaluation of stack heights and other dispersion techniques in permitting decisions. The Department shall give no credit for reductions in emissions due to the length of a source's stack height that exceeds good engineering practice or due to any other dispersion technique. The facility will meet all requirements of good engineering practices.

STATE REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION: (You may delete instructions or statements that do not apply in the justification column to shorten the document.)
20.2.82 NMAC	MACT Standards for source categories of HAPS	Yes	CH_E, SS_E	This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 63.

Table for Applicable FEDERAL REGULATIONS:

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
40 CFR 50	NAAQS	Yes	Facility	This is a 20.2.72 NMAC permit application.
NSPS 40 CFR 60, Subpart A	General Provisions	Yes	Units subject to 40 CFR 60	Subparts OOO, IIII, and I in 40 CFR 60 applies.
NSPS 40 CFR60.40, Subpart I	Subpart I, Performance Standards for **Hot Mix Asphalt Facilities**	Yes	P2HMASTK, P2HMAFIL, P5HMASTK, P5HMAFIL	The affected facility, that commences construction or modification after June 11, 1973, to which the provisions of this subpart apply is each hot mix asphalt facility. For the purpose of this subpart, a hot mix asphalt facility is comprised only of any combination of the following: dryers; systems for screening, handling, storing, and weighing hot aggregate; systems for loading, transferring, and storing mineral filler, systems for mixing hot mix asphalt; and the loading, transfer, and storage systems associated with emission control systems.
NSPS 40 CFR 60, Subpart Kb	Standards of Performance for **Volatile Organic Liquid Storage Vessels** (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced **After** July 23, 1984	No		This facility does not have storage vessels with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984.
NSPS 40 CFR Part 60 Subpart OOO	Standards of Performance for **Nonmetallic Mineral Processing Plants**	Yes	CH, CH_C1, CH_S, CH_SC1, CH_RC, CH_C2, CH_C3, CH_SC2, CH_STK	NSPS standards for non-metallic minerals apply to applicable crushers, screens, and conveyors.
NSPS 40 CFR 60 Subpart IIII	Standards of performance for Stationary Compression Ignition Internal Combustion Engines	Yes	CH_E, SS_E	The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE). Units CH_E and SS_E are potentially applicable to Subpart IIII.
NSPS 40 CFR Part 60 Subpart JJJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines	No		See 40 CFR 60.4230 and EPA Region 1's Reciprocating Internal Combustion Guidance website.
NESHAP 40 CFR 61 Subpart A	General Provisions	No	Units Subject to 40 CFR 61	Applies if any other Subpart in 40 CFR 61 applies.
MACT 40 CFR 63, Subpart A	General Provisions	Yes	Units Subject to 40 CFR 63	Applies if any other Subpart in 40 CFR 63 applies.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
MACT 40 CFR 63 Subpart ZZZZ	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (**RICE MACT**)	Yes	CH_E, SS_E	Facilities are subject to this subpart if they own or operate a stationary RICE, except if the stationary RICE is being tested at a stationary RICE test cell/stand.

Section 14

Operational Plan to Mitigate Emissions

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

☐ **Title V Sources** (20.2.70 NMAC)**:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Emissions During Startups, Shutdowns, and Emergencies** defining the measures to be taken to mitigate source emissions during startups, shutdowns, and emergencies as required by 20.2.70.300.D.5(f) and (g) NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☒ **NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Source Emissions During Malfunction, Startup, or Shutdown** defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown as required by 20.2.72.203.A.5 NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☒ **Title V** (20.2.70 NMAC)**, NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has established and implemented a Plan to Minimize Emissions During Routine or Predictable Startup, Shutdown, and Scheduled Maintenance through work practice standards and good air pollution control practices as required by 20.2.7.14.A and B NMAC. This plan shall be kept on site or at the nearest field office to be made available to the Department upon request. This plan should not be submitted with this application.

Operational Plan to Mitigate Emissions and **Plan of Work Practices**

Startup

Prior to the production of asphalt, the drum mixer dust collector will be operational and functioning correctly per 20.2.11.108.A, 20.2.11.109, and applicable permit conditions.

Prior to loading of mineral filler, the mineral filler silo dust collector will be operational and functioning correctly per 20.2.11.108.A, 20.2.11.109, and applicable permit conditions.

Prior to the production of asphalt, feeder bin exit enclosures or other control measures will be functioning correctly to control fugitive emissions to an opacity limit of 20 percent per EPA Reference Method 9.

Prior to the production of asphalt, water sprays, or other control measures, for the scalping screen and pug mill will be functioning correctly and used as needed, to control fugitive emissions to an opacity limit of 20 percent per EPA Reference Method 9.

Prior to unloading of the drum mixer dust collector baghouse fines, dust control measures will be functioning correctly to control fugitive emissions to an opacity limit of 20 percent per EPA Reference Method 9.

Prior to the production of aggregate, water sprays, or other control measures, for the crushing and screening plant will be functioning correctly and used as needed, to control fugitive emissions to an opacity limit in compliance with NSPS Subpart OOO standards per EPA Reference Method 9.

Prior to the production of aggregate, water sprays, or other control measures, for the scalping screening plant will be functioning correctly and used as needed, to control fugitive emissions to an opacity limit of 20 percent per EPA Reference Method 9.

Upon visual inspection, all paved haul roads will be cleaned to minimize fugitive dust as required under applicable permit conditions.

Upon visual inspection, all unpaved haul roads will be controlled with surfactants or other equivalent control methods, to minimize fugitive dust as required under applicable permit conditions.

<u>Shutdown</u>
All required control equipment will operate until all asphalt production ceases.

<u>Maintenance</u>
The feeder bin exit enclosures, asphalt drum mixer, drum mixer dust collector, equipment water sprays, and mineral filler silo dust collector will be maintained to prevent excess emissions during startup or shutdown. This facility will not have excess emissions during any maintenance procedures.

<u>Malfunction</u>
Upon malfunction where excess particulate emissions are observed from the feeder bin exit enclosures, asphalt drum mixer, drum mixer dust collector, scalping screen and pug mill water sprays, mineral filler silo dust collector, and baghouse loadout enclosure and watering, all asphalt production will cease until repairs to control equipment are made.

Upon malfunction where excess particulate emissions are observed from the feeder bin exit enclosures, and equipment water sprays, all aggregate processing will cease until repairs to control equipment are made.

Section 15

Alternative Operating Scenarios

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

Alternative Operating Scenarios: Provide all information required by the department to define alternative operating scenarios. This includes process, material and product changes; facility emissions information; air pollution control equipment requirements; any applicable requirements; monitoring, recordkeeping, and reporting requirements; and compliance certification requirements. Please ensure applicable Tables in this application are clearly marked to show alternative operating scenario.

Construction Scenarios: When a permit is modified authorizing new construction to an existing facility, NMED includes a condition to clearly address which permit condition(s) (from the previous permit and the new permit) govern during the interval between the date of issuance of the modification permit and the completion of construction of the modification(s). There are many possible variables that need to be addressed such as: Is simultaneous operation of the old and new units permitted and, if so for example, for how long and under what restraints? In general, these types of requirements will be addressed in Section A100 of the permit, but additional requirements may be added elsewhere. Look in A100 of our NSR and/or TV permit template for sample language dealing with these requirements. Find these permit templates at: https://www.env.nm.gov/aqb/permit/aqb_pol.html. Compliance with standards must be maintained during construction, which should not usually be a problem unless simultaneous operation of old and new equipment is requested.

In this section, under the bolded title "Construction Scenarios", specify any information necessary to write these conditions, such as: conservative-realistic estimated time for completion of construction of the various units, whether simultaneous operation of old and new units is being requested (and, if so, modeled), whether the old units will be removed or decommissioned, any PSD ramifications, any temporary limits requested during phased construction, whether any increase in emissions is being requested as SSM emissions or will instead be handled as a separate Construction Scenario (with corresponding emission limits and conditions, etc.

No alternative operating scenarios are proposed for this facility.

Section 16

Air Dispersion Modeling

1) Minor Source Construction (20.2.72 NMAC) and Prevention of Significant Deterioration (PSD) (20.2.74 NMAC) ambient impact analysis (modeling): Provide an ambient impact analysis as required at 20.2.72.203.A(4) and/or 20.2.74.303 NMAC and as outlined in the Air Quality Bureau's Dispersion Modeling Guidelines found on the Planning Section's modeling website. If air dispersion modeling has been waived for one or more pollutants, attach the AQB Modeling Section modeling waiver approval documentation.
2) SSM Modeling: Applicants must conduct dispersion modeling for the total short term emissions during routine or predictable startup, shutdown, or maintenance (SSM) using realistic worst case scenarios following guidance from the Air Quality Bureau's dispersion modeling section. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions modeling requirements.
3) Title V (20.2.70 NMAC) ambient impact analysis: Title V applications must specify the construction permit and/or Title V Permit number(s) for which air quality dispersion modeling was last approved. Facilities that have only a Title V permit, such as landfills and air curtain incinerators, are subject to the same modeling required for preconstruction permits required by 20.2.72 and 20.2.74 NMAC.

What is the purpose of this application?	Enter an X for each purpose that applies
New PSD major source or PSD major modification (20.2.74 NMAC). See #1 above.	
New Minor Source or significant permit revision under 20.2.72 NMAC (20.2.72.219.D NMAC). See #1 above. **Note:** Neither modeling nor a modeling waiver is required for VOC emissions.	**X**
Reporting existing pollutants that were not previously reported.	
Reporting existing pollutants where the ambient impact is being addressed for the first time.	
Title V application (new, renewal, significant, or minor modification. 20.2.70 NMAC). See #3 above.	
Relocation (20.2.72.202.B.4 or 72.202.D.3.c NMAC)	
Minor Source Technical Permit Revision 20.2.72.219.B.1.d.vi NMAC for like-kind unit replacements.	
Other: i.e. SSM modeling. See #2 above.	
This application does not require modeling since this is a No Permit Required (NPR) application.	
This application does not require modeling since this is a Notice of Intent (NOI) application (20.2.73 NMAC).	
This application does not require modeling according to 20.2.70.7.E(11), 20.2.72.203.A(4), 20.2.74.303, 20.2.79.109.D NMAC and in accordance with the Air Quality Bureau's Modeling Guidelines.	

Check each box that applies:

☐ See attached, approved modeling **waiver for all** pollutants from the facility.
☐ See attached, approved modeling **waiver for some** pollutants from the facility.
X Attached in Universal Application Form 4 (UA4) is a **modeling report for all** pollutants from the facility.
☐ Attached in UA4 is a **modeling report for some** pollutants from the facility.
☐ No modeling is required.

Universal Application 4

Air Dispersion Modeling Report

Refer to and complete Section 16 of the Universal Application form (UA3) to assist your determination as to whether modeling is required. If, after filling out Section 16, you are still unsure if modeling is required, e-mail the completed Section 16 to the AQB Modeling Manager for assistance in making this determination. If modeling is required, a modeling protocol would be submitted and approved prior to an application submittal. The protocol should be emailed to the modeling manager. A protocol is recommended but optional for minor sources and is required for new PSD sources or PSD major modifications. Fill out and submit this portion of the Universal Application form (UA4), the "Air Dispersion Modeling Report", only if air dispersion modeling is required for this application submittal. This serves as your modeling report submittal and should contain all the information needed to describe the modeling. No other modeling report or modeling protocol should be submitted with this permit application.

16-A: Identification	
1	Name of facility: Santa Fe Facility
2	Name of company: Associated Asphalt and Materials, LLC
3	Current Permit number: New Permit
4	Name of applicant's modeler: Paul Wade
5	Phone number of modeler: (505) 830-9680 ext 6
6	E-mail of modeler: pwade@montrose-env.com

16-B: Brief			
1	Why is the modeling being done? Other (describe below) Application for new minor source NSR.		
2	Describe the permit changes relevant to the modeling. N/A		
3	What geodetic datum was used in the modeling? NAD83		
4	How long will the facility be at this location? Permanent		
5	Is the facility a major source with respect to Prevention of Significant Deterioration (PSD)?	Yes	No **X**
6	Identify the Air Quality Control Region (AQCR) in which the facility is located. 157		

7	List the PSD baseline dates for this region (minor or major, as appropriate). N/A
8	Provide the name and distance to Class I areas within 50 km of the facility (300 km for PSD permits). Bandelier Wilderness Area – 19.8 km; Pecos Wilderness Area – 24.2 km
9	Is the facility located in a non-attainment area? If so, describe. No
10	Describe any special modeling requirements, such as streamline permit requirements. N/A

16-C: Modeling History of Facility

1	Describe the modeling history of the facility, including the air permit numbers, the pollutants modeled, the National Ambient Air Quality Standards (NAAQS), New Mexico AAQS (NMAAQS), and PSD increments modeled. (Do not include modeling waivers).			
	Pollutant	Latest permit and modification number that modeled the pollutant facility-wide.	Date of Permit	Comments
	CO	N/A	N/A	New Permitted Facility
	NO_2	N/A	N/A	New Permitted Facility
	SO_2	N/A	N/A	New Permitted Facility
	H_2S	N/A	N/A	Not a significant facility pollutant
	PM2.5	N/A	N/A	New Permitted Facility
	PM10	N/A	N/A	New Permitted Facility
	~~TSP~~[1]			
	Lead	N/A	N/A	Not a significant facility pollutant
	Ozone (PSD only)	N/A	N/A	Not a PSD Source
	NM Toxic Air Pollutants (20.2.72.402 NMAC)	N/A	N/A	New Permitted Facility

1. The New Mexico Ambient Air Quality Standard for TSP was repealed by the Environmental Improvement Board effective November 30, 2018.

16-D: Modeling performed for this application

1	For each pollutant, indicate the modeling performed and submitted with this application. Choose the most complicated modeling applicable for that pollutant, i.e., culpability analysis assumes ROI and cumulative analysis were also performed.					
	Pollutant	ROI	Cumulative analysis	Culpability analysis	Waiver approved	Pollutant not emitted or not changed.
	CO	X				
	NO_2	X	X			
	SO_2	X	X			
	H_2S					X
	PM2.5	X	X	X		
	PM10	X	X	X		
	Lead					X
	Ozone					Not a PSD Source
	State air toxic(s) (20.2.72.402 NMAC)	X				

16-E: New Mexico toxic air pollutants modeling

1	List any New Mexico toxic air pollutants (NMTAPs) from Tables A and B in 20.2.72.502 NMAC that are modeled for this application. Dispersion modeling was performed for Asphalt Fumes from the two HMA plants.
	List any NMTAPs that are emitted but not modeled because stack height correction factor. Add additional rows to the table below, if required.

	Pollutant	Emission Rate (pounds/hour)	Emission Rate Screening Level (pounds/hour)	Stack Height (meters)	Correction Factor	Emission Rate/ Correction Factor
	Calcium hydroxide	0.36	0.333	13.7	5	1.665

16-F: Modeling options

1	What model(s) were used for the modeling? Why? The dispersion modeling was conducted using the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD), Version 19191. 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. The objective of this evaluation is to determine whether ambient air concentrations from the maximum operation of the facility for asphalt fumes, nitrogen dioxide, (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter; 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 state of New Mexico's air quality regulation 20.2.3 NMAC from AAM Santa Fe Facility emission sources.
2	What model options were used and why were they considered appropriate to the application? Selected Source Flat Terrain: Volume sources modeled as flat terrain particulate matter sources. Impacts from ground release sources will be highest at the model boundary.

16-G: Surrounding source modeling

1	If the surrounding source inventory provided by the Air Quality Bureau was believed to be inaccurate, describe how the sources modeled differ from the inventory provided. If changes to the surrounding source inventory were made, use the unmerged list of sources to describe the changes. For GCP sources, emissions were adjusted to reflect GCP regulated emissions and hours of operation – GCP2 and 3 Daylight hours; Annual emission rate 95 tpy (NOx and CO), 50 tpy (SO2), 71.25 tpy (PM10), 17.875 tpy (PM2.5). For Vulcan Materials-Santa Fe HMAP NSR 0324 particulate matter modeling, the previous Permit 0324 modeling was used to include boundaries, modeled hours of operation, and annual average model emission rate hourly factor.
2	Date of surrounding source retrieval. 9/9/2019 Angela Raso

	AQB Source ID	Description of Corrections

PM10 and PM2.5 GCP emission sources were set to 71.25 tpy and 17.875 tpy, respectively.
GCP2 hours of operation were limited to daylight hours only.
For Vulcan Materials-Santa Fe HMAP NSR 0324 particulate matter modeling, the previous Permit 0324 modeling was used to include boundaries, modeled hours of operation, and annual average model emission rate hourly factor.

The table below list surrounding sources where the UTM coordinates were verified using Goggle Earth and corrected.

NumberID	Facility	UTMEast	UTMNorth
8	Eker Bros - 300TPH Portable Crusher No2223	401827.0	3944555.0
10	Vulcan Materials-Osuna S and G No0836	403577.0	3944686.0
12	RL Leeder - 200 TPH Portable Rock Crusher	403670.0	3944990.0

14	RL Stacy - Portable Crusher No1549	403240.0	3944280.0
18	Vulcan Materials-Santa Fe HMAP NSR 0324	402632.0	3944233.0
19	Vulcan Materials-Santa Fe HMAP NSR 0324	402632.0	3944238.0
20	Vulcan Materials-Santa Fe HMAP NSR 0324	402637.0	3944238.0
21	Vulcan Materials-Santa Fe HMAP NSR 0324	402637.0	3944233.0
22	Vulcan Materials-Santa Fe HMAP NSR 0324	402637.0	3944228.0
23	Vulcan Materials-Santa Fe HMAP NSR 0324	402632.0	3944228.0
24	Vulcan Materials-Santa Fe HMAP NSR 0324	402627.0	3944228.0
25	Vulcan Materials-Santa Fe HMAP NSR 0324	402627.0	3944233.0
26	Vulcan Materials-Santa Fe HMAP NSR 0324	402627.0	3944238.0
27	Vulcan Materials-Santa Fe HMAP NSR 0324	402627.0	3944243.0
28	Vulcan Materials-Santa Fe HMAP NSR 0324	402632.0	3944243.0
29	Vulcan Materials-Santa Fe HMAP NSR 0324	402637.0	3944243.0
30	Vulcan Materials-Santa Fe HMAP NSR 0324	402642.0	3944243.0
32	Vulcan Materials-Santa Fe HMAP NSR 0324	402642.0	3944228.0
37	Vulcan Materials - Santa Fe Concrete Facility GCP5-1400A	402625.5	3944105.4
38	LM Concrete Pumping - Santa Fe Location, GCP5-3534	402678.3	3943962.6
41	Santa Fe Concrete - Aviation GCP5-2651	402632.9	3943411.7

16-H: Building and structure downwash

1	How many buildings are present at the facility?	2 – Office and Shop	
2	How many above ground storage tanks are present at the facility?	6	
3	Was building downwash modeled for all buildings?	Yes **X**	No
4	If not, explain why.		
5	Building comments		

16-I: Receptors and modeled property boundary

1	"Restricted Area" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with a steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area. A Restricted Area is required in order to exclude receptors from the facility property. If the facility does not have a Restricted Area, then receptors shall be placed within the property boundaries of the facility. Describe the fence or other physical barrier at the facility that defines the restricted area. Fencing and gate surround facility.		
2	Receptors must be placed along publicly accessible roads in the restricted area. Are there public roads passing through the restricted area?	Yes	No X

3	Are restricted area boundary coordinates included in the modeling files?	Yes X	No
4	Describe the receptor grids and their spacing. For each pollutant, the radius of significant impact around the facility is established using a Cartesian grid. A 25-meter grid spacing is used for the facility boundary receptors. A 50-meter spacing and 100-meter spacing are extended to 500-meters and 1-km beyond the facility boundary, respectively from the facility boundary in each direction for a very fine grid resolution. Receptors for a fine grid resolution are placed with 250-meter spacing to a distance of 3-km from the facility boundary. Receptors for a course grid resolution are placed with 500-meter, and 1000-meter spacing to a distance of 5-km, and 8-km, respectively from the facility boundary.		
5	Describe receptor spacing along the fence line. Fenceline receptor spacing will be 25 meters.		
6	Describe the PSD Class I area receptors. N/A		

16-J: Sensitive areas

1	Are there schools or hospitals or other sensitive areas near the facility? This information is optional (and purposely undefined), but may help determine issues related to public notice.	Yes	No X
2	If so, describe.		
3	The modeling review process may need to be accelerated if there is a public hearing. Are there likely to be public comments opposing the permit application?	Yes	No X

16-K: Modeling Scenarios

1	Identify, define, and describe all modeling scenarios. Examples of modeling scenarios include using different production rates, times of day, times of year, simultaneous or alternate operation of old and new equipment during transition periods, etc. Alternative operating scenarios should correspond to all parts of the Universal Application and should be fully described in Section 15 of the Universal Application (UA3). For HMA Plants #2 and #5, they will limit model hours to the equivalent of 12 hours per day if operating at maximum to account for the requested permit daily production rate. For particulate modeling 12 scenarios were run beginning with spring, summer, and fall months operating 12 hours starting at 12:00 AM to 12 PM. Scenario 2 modeling hours for spring, summer, and fall months two hours from 2 AM to 2 PM. This trend continues for all 12 scenarios.		
2	Which scenario produces the highest concentrations? Why? PM10 24 hour – Scenario 10, operating nighttime hours with low winds and low boundary layer PM2.5 24 hour – Scenario 10, operating nighttime hours with low winds and low boundary layer PM2.5 annual – Scenario 10, operating nighttime hours with low winds and low boundary layer		
3	Were emission factor sets used to limit emission rates or hours of operation?	Yes X	No

	(This question pertains to the "SEASON", "MONTH", "HROFDY" and related factor sets, not to the factors used for calculating the maximum emission rate.)		
4	If so, describe factors for each group of sources. List the sources in each group before the factor table for that group. (Modify or duplicate table as necessary. It’s ok to put the table below section 16-K if it makes formatting easier.) Sources:		
5	HMA Plant #2 (PLANT2), Plant #5 (PLANT5), and HMA truck traffic (HMAROAD) will limit model hours to the equivalent of 12 hours per day when operating at maximum. For particulate modeling 12 scenarios were run beginning with spring, summer, and fall months operating 12 hours starting at 12:00 AM. Scenario 2 modeling hours for spring, summer, and fall months two hours from 2 AM to 2 PM. This trend continues on for 12 scenarios.		

Table of hours of operation for HMA Plant #2 (PLANT2) and HMA Plant #5 (PLANT5)

	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
Total	12	24	24	24

Table of each model scenario hours of operation for HMA Plant #2 (PLANT2) and HMA Plant #5 (PLANT5)

Model Scenario	**Winter**	**Spring**	**Summer**	**Fall**
1	6 AM to 6 PM	12 AM to 12 PM	12 AM to 12 PM	12 AM to 12 PM
2	6 AM to 6 PM	2 AM to 2 PM	2 AM to 2 PM	2 AM to 2 PM
3	6 AM to 6 PM	4 AM to 4 PM	4 AM to 4 PM	4 AM to 4 PM
4	6 AM to 6 PM	6 AM to 6 PM	6 AM to 6 PM	6 AM to 6 PM
5	6 AM to 6 PM	8 AM to 8 PM	8 AM to 8 PM	8 AM to 8 PM
6	6 AM to 6 PM	10 AM to 10 PM	10 AM to 10 PM	10 AM to 10 PM
7	6 AM to 6 PM	12 PM to 12 AM	12 PM to 12 AM	12 PM to 12 AM

8	6 AM to 6 PM	2 PM to 2 AM	2 PM to 2 AM	2 PM to 2 AM
9	6 AM to 6 PM	4 PM to 4 AM	4 PM to 4 AM	4 PM to 4 AM
10	6 AM to 6 PM	6 PM to 6 AM	6 PM to 6 AM	6 PM to 6 AM
11	6 AM to 6 PM	8 PM to 8 AM	8 PM to 8 AM	8 PM to 8 AM
12	6 AM to 6 PM	10 PM to 10 AM	10 PM to 10 AM	10 PM to 10 AM

Hours of operation for the crusher/screen plant (CRUSH), scalping screen plant (SCALP), and crusher truck traffic (CSHROAD) will be limited and modeled for the following times.

12:00 AM	0
1:00 AM	0
2:00 AM	0
3:00 AM	0
4:00 AM	0
5:00 AM	0
6:00 AM	0
7:00 AM	1
8:00 AM	1
9:00 AM	1
10:00 AM	1
11:00 AM	1
12:00 PM	1
1:00 PM	1
2:00 PM	1
3:00 PM	1
4:00 PM	1
5:00 PM	0
6:00 PM	0
7:00 PM	0
8:00 PM	0
9:00 PM	0
10:00 PM	0
11:00 PM	0
Total	10

If hourly, variable emission rates were used that were not described above, describe them here: N/A

6	Were different emission rates used for short-term and annual modeling?	Yes X	No
7	If yes, describe. Annual particulate matter modeling included hourly factors based on limitations on annual production.		

	HMA Plant #2 – Production at maximum 657,000 tpy; Requested permit limit 190,000 tpy; Hourly factor 0.289 HMA Plant #5 – Production at maximum 1,314,000 tpy; Requested permit limit 750,000 tpy; Hourly factor 0.571

16-L: NO_2 Modeling

1	Which types of NO_2 modeling were used? Check all that apply.	
		100% NO_X to NO_2 conversion
		ARM
		PVMRM
		OLM
	X	ARM2: 1 Hour and Annual Average
		Other:
2	Describe the NO_2 modeling. ARM2 modeling used for the 1 hour and annual average periods. Cumulative modeling includes all AAM Santa Fe Facility sources plus background concentrations based on Monitor 1ZB.	
3	In-stack NO_2/NO_X ratio(s) used in modeling. N/A	
4	Equilibrium NO_2/NO_X ratio(s) used in modeling. N/A	
5	Describe/justify the use of the ratios chosen. N/A	
6	Describe the design value used for each averaging period modeled. 1-hour: 98th percentile as calculated by AERMOD	

16-M: Particulate Matter Modeling

1	Select the pollutants for which plume depletion modeling was used.		
		PM2.5	
		PM10	
	X	None	
2	Describe the particle size distributions used. Include the source of information. N/A		
3	Was secondary PM modeled for PM2.5? Only required for PSD major modifications that are significant for NOx and/or SOx. Optional for minor sources, but allows use of high eighth high.	Yes X	No
	Following recent EPA guidelines for conversion of NO_X and SO_2 emission rates to secondary $PM_{2.5}$ emissions, AAM Santa Fe Facility emissions are compared to appropriate western MERPs values (NO_X 24 Hr – 1155 tpy; NO_X Annual – 3184 tpy; SO_2 24 Hr – 225 tpy; SO_2 Annual – 2289 tpy). The following equation, found in NMED AQB modeling guidance document on MERPs, was used to determine if secondary emission would cause violation with $PM_{2.5}$ NAAQS. $PM_{2.5}$ annual = ((NO_X emission rate (tpy)/3184 + (SO_2 emission rate (tpy)/2289)) x 0.2 $\mu g/m^3$ $PM_{2.5}$ 24 hour = ((NO_X emission rate (tpy)/1155 + (SO_2 emission rate (tpy)/225)) x 1.2 $\mu g/m^3$		

	PM2.5 Annual $0.0015\ \mu g/m^3 = (21.7/3184 + 1.74/2289) \times 0.2\ \mu g/m^3$ PM2.5 24 Hour $0.032\ \mu g/m^3 = (21.7/1155 + 1.74/225) \times 1.2\ \mu g/m^3$

16-N: Setback Distances and Source Classification

1	Portable sources or sources that need flexibility in their site configuration requires that setback distances be determined between the emission sources and the restricted area boundary (e.g. fence line) for both the initial location and future locations. Describe the setback distances for the initial location. N/A		
2	Describe the requested, modeled, setback distances for future locations, if this permit is for a portable stationary source. Include a haul road in the relocation modeling. N/A		
3	The unit numbers in the Tables 2-A, 2-B, 2-C, 2-E, 2-F, and 2-I should match the ones in the modeling files. Do these match?	Yes X	No
4	Provide a cross-reference table between unit numbers if they do not match. It's ok to place the table below section 16-N for easier formatting.		
5	The emission rates in the Tables 2-E and 2-F should match the ones in the modeling files. Do these match?	Yes	No X
6	If not, explain why. Hourly model emission rates for material handling sources (Emissions calculated using AP-42 Section 13.2.4) are calculated using annual average windspeed for Santa Fe 2006 - 2016.		

Emission Point #	Process Unit Description	PM10 lbs/hr	PM2.5 lbs/hr
HMA Plant #2			
P2HMAP1	Plant 2 HMA Storage Pile Handling 1	0.08968	0.01358
P2HMAP2	Plant 2 HMA Storage Pile Handling 2	0.08968	0.01358
P2HMAP3	Plant 2 HMA Storage Pile Handling 3	0.08968	0.01358
P2HMAP4	Plant 2 HMA Storage Pile Handling 4	0.08968	0.01358
P2HMABIN	Plant 2 HMA Bin Loading	0.35873	0.05432
HMA Plant #5			
P5HMAP1	Plant 5 HMA Storage Pile Handling 1	0.17937	0.02716
P5HMAP2	Plant 5 HMA Storage Pile Handling 2	0.17937	0.02716
P5HMAP3	Plant 5 HMA Storage Pile Handling 3	0.17937	0.02716
P5HMAP4	Plant 5 HMA Storage Pile Handling 4	0.17937	0.02716
P5HMABIN	Plant 5 HMA Bin Loading	0.71746	0.10864
Crusher/Screen Plant			
CH_RAW	Crusher/Screen Plant Raw Material	0.51597	0.07813
CH_F	Crusher/Screen Plant Feeder	0.51597	0.07813
CH_STK	Crusher/Screen Stacker Conveyor Drop to Pile	0.30969	0.04690
CH_FP	Crusher/Screen Finish Product Storage Pile	0.51597	0.07813
Scalping Screen Plant			
SS_RAW	Scalping Screen Plant Raw Material	0.12899	0.01953
SS_F	Scalping Screen Plant Feeder	0.12899	0.01953

	SS_STK	Scalping Screen Conveyor Drop to Pile	0.07742	0.01172	
	SS_FP	Scalping Screen Finish Product Storage Pile	0.12899	0.01953	

7	Have the minor NSR exempt sources or Title V Insignificant Activities" (Table 2-B) sources been modeled?	Yes	No X
8	Which units consume increment for which pollutants? N/A		
9	PSD increment description for sources. (for unusual cases, i.e., baseline unit expanded emissions after baseline date). N/A		
10	Are all the actual installation dates included in Table 2A of the application form, as required? This is necessary to verify the accuracy of PSD increment modeling.	Yes	No X New Permit
11	If not please explain how increment consumption status is determined for the missing installation dates. N/A		

16-O: Flare Modeling

1	For each flare or flaring scenario, complete the following			
	Flare ID (and scenario)	Average Molecular Weight	Gross Heat Release (cal/s)	Effective Flare Diameter (m)
	N/A			

16-P: Volume and Related Sources

1	Were the dimensions of volume sources different from standard dimensions in the Air Quality Bureau (AQB) Modeling Guidelines?	Yes X	No
2	If the dimensions of volume sources are different from standard dimensions in the AQB Modeling Guidelines, describe how the dimensions were determined. For storage piles the model inputs were based on the size of the pile/4.3 (sigma-Y) and a release height of 8 feet or a sigma-Z of 8ft*2/2.15. All others followed standard dimensions from Air Quality Bureau (AQB) Modeling Guidelines.		
3	Describe the determination of sigma-Y and sigma-Z for fugitive sources.		
4	Describe how the volume sources are related to unit numbers. Or say they are the same. They are the same.		
5	Describe any open pits. N/A		
6	Describe emission units included in each open pit. N/A		

16-Q: Background Concentrations

1	Identify and justify the background concentrations used. The ambient background concentrations are listed in the Air Quality Bureau Guidelines for NO2, SO2, PM10, and PM2.5. For SO2, AAM used backgrounds for the generic “Rest of New Mexico”. For PM10 and PM2.5, AAM used backgrounds from Santa Fe (Monitor ID 3HM). For NO2, AAM is used backgrounds from Bloomfield (Monitor ID 1ZB).

Per model protocol and NMED model protocol approval.

	1 Hour ($\mu g/m^3$)	3 Hour ($\mu g/m^3$)	8 Hour ($\mu g/m^3$)	24 Hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
NO_2	85.1				19.6
SO_2	8.84				
$PM_{2.5}$				9.45	4.32
PM_{10}				23.0	

2	Were background concentrations refined to monthly or hourly values?	Yes	No X

16-R: Meteorological Data

1	Identify and justify the meteorological data set(s) used. Dispersion model meteorological input file used in this modeling analysis is year 2016 Santa Fe provided by the NMED AQB Modeling Section.
2	Discuss how missing data were handled, how stability class was determined, and how the data were processed, if the Bureau did not provide the data.

16-S: Terrain

1	Was complex terrain used in the modeling? If no, describe why. Yes, for point sources only. For volume sources, model was run in source selected flat terrain mode.
2	What was the source of the terrain data? USGS National Elevation Data (NED)

16-T: Modeling Files

1 Describe the modeling files:
Particulate matter modeling was done using 12 scenarios. This accounted for the proposed limit on daily throughput productions on the HMA plants with proposed operating hours. For particulate matter annual modeling, hourly emission factors were used to account for the limit on annual production for each plant.

File name (or folder and file name)	Pollutant(s)	Purpose (ROI/SIA, cumulative, culpability analysis, other)
AAMSantaFeCombustROI	CO, SO2, NO2	ROI/SIA
AAMSantaFePM24ROIS1-12	PM10, PM2.5 24 Hour Average	ROI
AAMSantaFePM25YRROIS1-S12	PM2.5 Annual Average	ROI
AAMSantaFeAF	Asphalt Fumes	CIA
AAMSantaFeNO21HrCIA	NOx 1 Hour	CIA
AAMSantaFeNO2YrCIA	NOx Annual	CIA
AAMSantaFeSO21HrCIA	SO2 1 Hour	CIA
AAMSantaFePM24CIAS1-S12	PM10, PM2.5 24 Hour Average	CIA
AAMSantaFePM25YRCIAS1-S12	PM2.5 Annual Average	CIA

16-U: PSD New or Major Modification Applications

1	A new PSD major source or a major modification to an existing PSD major source requires additional analysis. Was preconstruction monitoring done (see 20.2.74.306 NMAC and PSD Preapplication Guidance on the AQB website)?	Yes	No X
2	If not, did AQB approve an exemption from preconstruction monitoring?	Yes	No
3	Describe how preconstruction monitoring has been addressed or attach the approved preconstruction monitoring or monitoring exemption. N/A		
4	Describe the additional impacts analysis required at 20.2.74.304 NMAC. N/A		
5	If required, have ozone and secondary PM2.5 ambient impacts analyses been completed? Yes, for secondary PM2.5.		

16-V: Modeling Results

1	If ambient standards are exceeded because of surrounding sources, a culpability analysis is required for the source to show that the contribution from this source is less than the significance levels for the specific pollutant. <u>PM2.5 24-Hour</u> PM2.5 24-hour average concentrations exceeded the NAAQS for 7 receptors. Review of these receptors found them located within neighboring source boundaries. The sources included Montano Crushing Plant No. 3167 (402500,3942500) and Vulcan Materials-Santa Fe HMAP NSR 0324 (402650,3944250; 402650,3944200; 402700,3944250; 402750,3944350; 402600,3944250; 402600,3944300). The PM2.5 24-hour average highest 8th high concentration, where AAM concentrations were above SILs, was located near Eker Bros - Portable Screen NSR 2712 (Receptor - 402200,3945200). The highest concentration near Associated Asphalt Materials where AAM concentrations were significant is 33.1 µg/m^3 (Receptor – 402971.7,3944442). <u>PM2.5 Annual</u> PM2.5 annual average concentrations exceeded the NAAQS for 4 receptors. Review of these receptors found them located within neighboring source boundaries. The sources included Vulcan Materials-Santa Fe HMAP NSR 0324 (402650,3944250; 402750,3944350), Eker Bros - Portable Screen NSR 2712 (402300,3945400), and Santa Fe Concrete - Aviation GCP5-2651 (402600,3943500). The PM2.5 annual average highest concentration, where AAM concentrations were above SILs, was located near RL Stacy - Portable Crusher No1549 (Receptor – 403250,3944200). The highest concentration near Associated Asphalt Materials where AAM concentrations were significant is 11.2 µg/m^3 (Receptor – 403032,3944584). <u>PM10 24-Hour</u> PM10 24-hour average concentrations exceeded the NAAQS for 2 receptors. Review of these receptors found them located within neighboring source boundaries. The sources included Montano Crushing Plant No. 3167 (402500,3942500) and Vulcan Materials-Santa Fe HMAP NSR 0324 (402650,3944250). The PM10 24-hour average high 2nd high concentration, where AAM concentrations were above SILs, was located near Santa Fe Concrete - Aviation GCP5-2651 (Receptor – 402800,3943400). The high 2nd high concentration near Associated Asphalt Materials where AAM concentrations were significant is 115.4 µg/m^3 (Receptor – 403128,3944811.5).
2	Identify the maximum concentrations from the modeling analysis.

Pollutant	Period	Facility Concentration (µg/m3)	Total Modeled Concentration (µg/m3)	Total Modeled Concentration (PPM)	Background Concentration	Cumulative Concentration	Standard	Value of Standard	Units of Standard, Background, and Total	Percent of Standard
Asphalt Fumes	8 Hour	25.5	25.5	---	---	---	20.2.72.502	50	µg/m^3	51.0
NOx	1 Hour	59.7	59.7	---	85.1	144.8	NAAQS	188.03	µg/m^3	77.0
NOx	Annual	6.2	6.2	---	19.6	25.8	NMAAQS	94.02	µg/m^3	27.4
CO	1 Hour	665.9	---	---	---	---	SIL	2000	µg/m^3	33.3
CO	8 Hour	499.5	---	---	---	---	SIL	500	µg/m^3	99.9
SO_2	1 Hour	8.8	8.8	---	8.84	17.6	NAAQS	196.4	µg/m^3	9.0
$PM_{2.5}$	24 Hour	1.87	25.0	---	9.45	34.5	NAAQS	35	µg/m^3	98.6
$PM_{2.5}$	Annual	0.44	7.27	---	4.32	11.59	NAAQS	12	µg/m^3	96.6
PM_{10}	24 Hour	6.2	92.8	---	23.0	115.8	NAAQS	150	µg/m^3	77.2

16-W: Location of maximum concentrations

1	Identify the locations of the maximum concentrations.

Pollutant	Period	UTM East (m)	UTM North (m)	Elevation (m)	Distance (m)	Radius of Impact (ROI) (m)
Asphalt Fumes	8 Hour	403066.7	3944580.0	1937.25	Border	N/A
NOx	1 Hour	403066.7	3944580.0	1937.25	Border	9825.7
NOx	Annual	403032.0	3944584.0	1936.48	Border	1123.7
CO	1 Hour	402951.0	3944880.0	1942.69	Border	Below SIL
CO	8 Hour	403066.7	3944580.0	1937.25	Border	Below SIL
SO_2	1 Hour	403101.3	3944576.0	1938.15	Border	270.4
$PM_{2.5}$	24 Hour	402200.0	3945200.0	1939.75	752	3884.5
$PM_{2.5}$	Annual	403250.0	3944200.0	1944.82	274	2085.3
PM_{10}	24 Hour	402800.0	3943400.0	1933.56	1005	1687.4

16-X: Summary/conclusions

1	A statement that modeling requirements have been satisfied and that the permit can be issued. Dispersion modeling was performed for the new permit application. All facility pollutants with ambient air quality standards were modeled to show compliance with those standards. All results of this modeling showed the facility in compliance with applicable ambient air quality standards.

DISPERSION MODEL PROTOCOL
ASSOCIATED ASPHALT AND MATERIALS, LLC
NSR MINOR SOURCE PERMIT APPLICATION

Santa Fe, New Mexico

PREPARED FOR

Associated Asphalt and Materials, LLC

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Dated August 21, 2019

Prepared by

Montrose Air Quality Services, LLC

MONTROSE
AIR QUALITY SERVICES

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1.0 INTRODUCTION

This dispersion modeling analysis will be conducted by Montrose Air Quality Services, LLC (Montrose) on behalf of Associated Asphalt and Materials, LLC (AAM), to evaluate ambient air quality impacts from the proposed Santa Fe Facility, as part of a minor source NSR permitting action. This permit application is for a 300 tph hot mix asphalt (HMA) plant, 150 tph hot mix asphalt (HMA) plant, 200 tph crushing and screening plant, and 50 tph scalping screen plant.

The objective of this modeling evaluation is to predict if, operating at requested maximums, the facility operations would result in exceedances of New Mexico and federal ambient air quality standards, NMAAQS and NAAQS respectively, for nitrogen dioxide, (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter; both 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$). Since Santa Fe Facility is a minor source for NSR permitting and is located in AQRC Region 157, where the minor source baseline date has not been triggered for any pollutant, a PSD Class I and II Increment analysis will not be performed.

The dispersion modeling will be conducted using the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD), Version 18081. 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. The objective of this evaluation is to determine whether ambient air concentrations from the maximum operation of the facility for nitrogen dioxide, (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter; 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 state of New Mexico's air quality regulation 20.2.3 NMAC from Santa Fe Facility emission sources.

1.1 FACILITY DESCRIPTION

AAM's Santa Fe Facility will operate two (2) HMA plants, a crushing and screening plant for base course, and a scalping screen for clean fill. The facility is located at 86 Paseo De River, Santa Fe, NM in Santa Fe County. Hours of operation for the two HMA plants will be limited to 6 AM to 6 PM for winter months (Dec – Feb) and 24 hours per day for spring, summer, and fall months (Mar – Nov). Hours of operation for the two aggregate plants will be limited to daylight hours.

1.1.1 Plant #2 HMA

The 150 tph hot mix asphalt plant will include a 4-bin cold aggregate feeder, pug mill, mineral filler silo with baghouse, drum dryer with baghouse, incline conveyor, asphalt silo, asphalt heater, and two (2) transfer conveyors. The plant will be powered by commercial line power. Processed asphalt will be transported from the HMA plant to off-site sales. The HMA plant will limit processing rates to 150 tph and 375,000 tons per year (tpy). The hours of operation are presented below in Table 1. Daily production rates are presented below in Table 2.

1.1.2 Plant #5 HMA

The 300 tph hot mix asphalt plant will include a 4-bin cold aggregate feeder, auxiliary feeder, scalping screen, pug mill, mineral filler silo with baghouse, drum dryer with baghouse, incline conveyor, asphalt silo, asphalt heater, and five (5) transfer conveyors. The plant will be powered by commercial line power. Processed asphalt will be transported from the HMA plant to off-site sales. The HMA plant will limit processing rates to 300 tph and 750,000 tpy. The hours of operation are presented below in Table 1. Daily production rates are presented below in Table 2.

1.1.3 Crushing and Screening Plant

The 200 tph aggregate crushing and screening plant will include a feeder, impact crusher, screen, four (4) transfer conveyors, and stacker conveyor. The plant will be powered by a 360 horsepower (hp) generator. Processed aggregate will be transported from the aggregate crushing and screening plant to the HMA plants and/or off-site sales. The aggregate crushing and screening plant will limit hourly processing rate to 200 tph and 400,000 tpy. Aggregate processing hours will be limited to daylight hours. The hours of operation are presented below in Table 3.

1.1.4 Scalping Screen Plant

The 50 tph aggregate scalping screen plant will include a scalping screen and under conveyor and stacker conveyor. The plant will be powered by a 50 horsepower (hp) engine. Clean aggregate fill will be transported from the aggregate scalping screen plant to the HMA plants and/or off-site sales. The aggregate scalping screen plant will limit hourly processing rate to 50 tph and 100,000 tpy. Aggregate processing hours will be limited to daylight hours. The hours of operation are presented below in Table 3.

TABLE 1: HMA Plant Hours of Operation (MST)

	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
Total	**12**	**24**	**24**	**24**

TABLE 2: HMA Plant Daily Production Rates

Plant	Tons Per Day	At Max Hourly Throughput – Hours per Day
Plant #2 HMA	1800	12
Plant #5 HMA	3600	12

TABLE 3: Aggregate Processing Daylight Hours of Operation (MST)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	1	1	1	1	1	0.5	0	0	0
6:00 AM	0	0.5	1	1	1	1	1	1	1	1	0.5	0
7:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
8:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
9:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
10:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
11:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
12:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
1:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
2:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
3:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
4:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
5:00 PM	0.5	1	1	1	1	1	1	1	1	1	0	0
6:00 PM	0	0	0	1	1	1	1	1	0.5	0	0	0
7:00 PM	0	0	0	0	0	0.5	0.5	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	10.5	11.5	12	14	14	14.5	14.5	14	13	12	10.5	10

Since the HMA daily production rate is less than the proposed hours of operation running at maximum hourly production rate, twelve (12) PM modeling scenarios will be performed for ROI modeling to determine the scenarios that would produce the highest concentrations for each averaging period. The highest four (4) scenario will be used in the cumulative modeling analysis. For each scenario the hours of operation are shifted by two hours.

1.2 FACILITY IDENTIFICATION AND LOCATION

AAM's Santa Fe Facility is located 0.7 miles north of the intersection of Airport Rd. and Veteran's Memorial Hwy in Santa Fe, New Mexico in Santa Fe County. The UTM Coordinates of the facility are 403,050 meters East and 3,944,800 meters North, Zone 13, with NAD83 datum at an elevation of approximately 6,365 feet above mean sea level.

Figure 1 below presents a layout of the site showing the area where each plant is located.

FIGURE 1: AAM's Santa Fe Facility Aerial View

2.0 SIGNIFICANT MONITORING AIR QUALITY IMPACT ANALYSIS

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. NMED AQB 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 4 shows the NAAQS and NMAAQS (without footnotes) that the source's ambient impacts must meet in order to demonstrate compliance. Table 4 also lists the Class II Significant Impact Levels (SILs) which are used to assess whether a source has a significant impact at downwind receptors. Table 5 lists all standards for which modeling is not required by NMED AQB.

The dispersion modeling analysis will be performed to estimate concentrations resulting from the operation of the Santa Fe Facility using the maximum hourly emission rates while all emission sources are operating. The modeling will determine maximum off site concentrations for nitrogen dioxide, (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter with aerodynamic diameter less than 10 micrometers (PM_{10}) and particulate matter with aerodynamic diameter less than 2.5 micrometers ($PM_{2.5}$), for comparison with model significance levels, and national/New Mexico ambient air quality standards (AAQS). The modeling will follow the guidance and protocols outlined in the New Mexico Air Quality Bureau "Air Dispersion Modeling Guidelines" (Revised 01/01/2019) and the most up to date EPA's *Guideline on Air Quality Models*.

Initial modeling will be performed with Santa Fe Facility sources only to determine pollutant and averaging periods that exceeds pollutant SILs. If initial modeling for any pollutant and averaging period exceeds the SILs, than cumulative impact analysis (CIA) modeling will be performed for those pollutants, receptors with concentrations over the SIL, and averaging periods and will include significant neighboring sources along with background ambient concentrations as defined in the NMED's modeling guidelines.

TABLE 4: 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	7.52		100 ppb(4)			
$PM_{2.5}$	annual	0.2	0.05	12 μg/m^3(5)		1 μg/m^3	4 μg/m^3
	24-hour	1.2	0.27	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
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 5: Standards for Which Modeling Is Not Required by NMED AQB.

Standard not Modeled	Surrogate that Demonstrates Compliance
CO 8-hour NAAQS	CO 8-hour NMAAQS
CO 1-hour NAAQS	CO 1-hour NMAAQS
NO_2 annual NAAQS	NO_2 annual NMAAQS
NO_2 24-hour NMAAQS	NO_2 1-hour NAAQS
O_3 8-hour	Regional modeling
SO_2 annual NMAAQS	SO_2 1-hour NAAQS
SO_2 24-hour NMAAQS	SO_2 1-hour NAAQS
SO_2 3-hour NAAQS	SO_2 1-hour NAAQS

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 18081. 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, PM_{10} and $PM_{2.5}$ from AAM's Santa Fe Facility 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 stack-tip downwash, buoyancy-induced dispersion, calms processing routines, upper-bound downwash concentrations for super-squat buildings, default wind speed profile exponents, vertical potential temperature gradients, no use of gradual plume rise, and horizontal release stacks. Alpha options include the use of flat terrain mode for fugitive ground release sources. The model incorporated local terrain into the calculations for point sources and neighboring sources only.

2.2 BUILDING WAKE EVALUATION

AERMOD can account for building downwash and cavity zone effects. Evaluation of building downwash on adjacent stack sources is deemed necessary, since most (if not all) of the stack source heights may be below Good Engineering Practice (GEP) heights. The formula for GEP height estimation is:

$$H_s = H_b + 1.50L_b$$

where: H_s = GEP stack height
H_b = building height
L_b = the lesser building dimension of the height, length, or width

The effects of aerodynamic downwash due to buildings and other structures will be accounted for by using wind direction-specific building parameters calculated by the USEPA-approved Building Parameter Input Program Prime (BPIP-Prime (*Version 04274*)) and the algorithms included in the AERMOD air dispersion model. Two buildings (office and shop) are located at the site that could cause building wake effects for facility point sources and will be analyzed with BPIP-Prime.

2.3 METEOROLOGICAL DATA

Dispersion model meteorological input file to be used in this modeling analysis is year 2016 Santa Fe met data available from the NMED AQP.

2.4 RECEPTORS AND TOPOGRAPHY

For each pollutant, the radius of significant impact around the facility is established using a Cartesian grid. A 50-meter grid spacing is used for the facility boundary receptors. A 50-meter spacing and 100-meter spacing are extended to 500-meters and 1-km beyond the facility boundary, respectively from the facility boundary in each direction for a very fine grid resolution. Receptors for a fine grid resolution are placed with 250-meter spacing to a distance of 3-km from the facility boundary. Receptors for a course grid resolution are placed with 500-meter and 1000-meter spacing to a distance of 5-km and 7-km, respectively from the facility boundary.

AERMAP (*Version 18081*) will be used to calculate the receptor elevations and the controlling hill heights. Terrain files for the area will be obtained from the 10-meter resolution DEM files. The AERMAP domain will be large enough to encompass the 10 percent slope factor required for calculating the controlling hill height.

2.5 MODELED EMISSION SOURCES INPUTS

Santa Fe Facility operates 7 days per week, 52 weeks per year with the two HMAs daily hours of operation summarized in Table 6 and the two aggregate plants daily hours of operation summarized in Table 7. For the HMA plants, Plant #2 HMA will limit the daily asphalt production to 1800 tph and Plant #5 HMA will limit the daily asphalt production to 3600 tph.

For annual PM2.5 modeling, a hourly factor will be input in the model. This hourly factor takes into account the limits on annual asphalt production for Plant #2 HMA and Plant #5 HMA. Below are the calculations for these hourly factors.

Plant Description	Annual Asphalt Production (TPY)	Annual Asphalt Production based on Daily Asphalt Production (TPY)	Annual $PM_{2.5}$ Model Hourly Factor
Plant #2 HMA	375,000	657,000	0.571
Plant #5 HMA	750,000	1,314,000	0.571

TABLE 6: HMA Plant Hours of Operation (MST)

	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
Total	**12**	**24**	**24**	**24**

TABLE 7: Aggregate Processing Daylight Hours of Operation (MST)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	1	1	1	1	1	0.5	0	0	0
6:00 AM	0	0.5	1	1	1	1	1	1	1	1	0.5	0
7:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
8:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
9:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
10:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
11:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
12:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
1:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
2:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
3:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
4:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
5:00 PM	0.5	1	1	1	1	1	1	1	1	1	0	0
6:00 PM	0	0	0	1	1	1	1	1	0.5	0	0	0
7:00 PM	0	0	0	0	0	0.5	0.5	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	10.5	11.5	12	14	14	14.5	14.5	14	13	12	10.5	10

2.5.1 Santa Fe Facility Road Vehicle Traffic Model Inputs

The paved and unpaved road fugitive dust for truck traffic is modeled as a line of volume sources. The AQB's approved procedure for Modeling Haul Roads was followed to develop modeling input parameters for paved and unpaved haul roads. Volume source characterization followed the steps described in the Air Quality Bureau's Guidelines.

2.5.2 Santa Fe Facility Material Handling Volume Source Model Inputs

Material handling and processing will follow the procedure found in AQB's Modeling Guidelines for Fugitive Equipment Sources (Section 5.3.2).

2.5.3 Santa Fe Facility Material Handling Point Source Model Inputs

For exhaust from engines and heaters, the release height will be the height from the ground to the exhaust exit height. All other model input data will be based on manufacture information or stack test results.

2.6 $PM_{2.5}$ 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. Following recent EPA guidelines for conversion of NO_X and SO_2 emission rates to secondary $PM_{2.5}$ emissions, AAM' Santa Fe Facility emissions are compared to appropriate western MERPs values (NO_X 24 Hr – 1155 tpy; NO_X Annual – 3184 tpy; SO_2 24 Hr – 225 tpy; SO_2 Annual – 2289 tpy). $PM_{2.5}$ secondary formation concentrations will be estimated using the following method derived from the MERP guidance[1].

$$[PM_{2.5}]\text{annual} = ((NO_X \text{ emission rate (tons/year) }/3184) + (SO_2 \text{ emission rate (tons/year) }/2289)) \times 0.2\ \mu g/m3$$

$$[PM_{2.5}]\text{24-hour} = ((NO_X \text{ emission rate (tons/year) }/1155) + (SO_2 \text{ emission rate (tons/year) }/225)) \times 1.2\ \mu g/m3$$

Results of the secondary formation from the facility will be added to the modeled value.

[1] Guidance on the Development of Modeled Emission Rates for Precursors (MERPS) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program, Richard A. Wayland, EPA, December 2, 2016.

2.7 NO_2 DISPERSION MODELING ANALYSIS

The AERMOD model predicts ground-level concentrations of any generic pollutant without chemical transformations. Thus, the modeled NO_X emission rate will give ground-level modeled concentrations of NO_X. NAAQS values are presented as NO_2.

EPA has a three-tier approach to modeling NO_2 concentrations.

- Tier I – total conversion, or all NOx = NO_2
- Tier II –Ambient Ratio Method 2 (ARM2)
- Tier III – case-by-case detailed screening methods, such as OLM and Plume Volume Molar Ratio Method (PVMRM) and NO_2/NO_X in-stack ratio

Initial modeling will be performed using both Tier I and Tier II methodologies. If these modeling iterations demonstrate that less conservative methods for determining 1-hour, 24-hour, and annual NO_2 compliance would be needed for this project, then ambient impact of 1-hour, 24-hour, and annual NOx predicted by the model will use Tier III – OLM or PVMRM.

For OLM or PVMRM, three inputs can be selected in the model, the ISR, the NO_2/NO_X equilibrium ratio for the ambient air, and the ambient ozone concentration. The ISR will be determined for each source or group of sources. The NO_2/NO_X equilibrium ratio will be the EPA default of 0.90. Ozone input will be from monitored ozone data collected from an approved monitoring station.

Based on EPA's ISR databases, a proposed conservative NO_2/NO_X ISR ratio for Diesel-fired RICE is 0.15. No data could be found for a hot mix asphalt drum, so to be conservative the EPA default ISR of 0.50 will be used. For natural gas combustion, to be conservative, the EPA default ISR of 0.50 will be used. For neighboring sources, since the ISR has a diminishing impact on ambient NO_2/NO_X ratios as a plume is transported farther downwind due to mixing and reaction towards background ambient NO_2/NO_X ratios, a default ISR of 0.20[2] in lieu of source specific data will be used. Table 8 summarizes the ISR selected for each NO_X source in the NO_2 1-hour modeling.

TABLE 8: Summary of Selected ISR

Source Description	Selected ISR
HMA Baghouse Stack	0.50
HMA Asphalt Cement Heater	0.50
Plant Generator/Engine	0.15
Neighboring Sources	0.20

[2] Technical support document (TSD) for NO2-related AERMOD modifications, EPA- 454/B-15-004, July 2015

2.8 SIGNIFICANT NEIGHBORING BACKGROUND SOURCES

For all Cumulative Impact Analysis (CIA) combustion emissions dispersion modeling (NO_X, CO, SO_2), only monitored background will be included. CIA particulate dispersion modeling will include all significant neighboring sources within 10 kilometers of the Santa Fe Facility and regional monitored background. These sources will be obtained from the Air Quality Bureau's database.

2.9 REGIONAL BACKGROUND CONCENTRATIONS

Ambient background concentrations represent the contribution of pollutant sources that are not included in the modeling analysis, including naturally occurring sources. If the modeled concentration of a criteria pollutant is above the modeling significance level, the background concentration for each criteria pollutant will be added to the maximum modeled concentration to calculate the total estimated pollutant concentration for comparison with the AAQS.

The ambient background concentrations are listed in the Air Quality Bureau Guidelines for NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$ and Ozone. For CO and SO_2, AAM is proposing using backgrounds for the generic "Rest of New Mexico". For PM_{10} and $PM_{2.5}$, AAM is proposing using backgrounds from Santa Fe (Monitor ID 3HM). For NO_2, AAM is proposing using backgrounds from Bloomfield (Monitor ID 1ZB).

	$PM_{2.5}$ (µg/m^3)	**PM_{10} (µg/m^3)**	**NO_2 (µg/m^3)**	**CO (µg/m^3)**	**SO_2 (µg/m^3)**	**Ozone (µg/m^3)**
1 Hour			85.1	2203	8.84	139.7
8 Hour				1524		
24 Hour	9.45	23.0				
Annual	4.32		19.6			

MONTROSE ENVIRONMENTAL

Paul Wade <pwade@montrose-env.com>

Model Protocol AAM New Site

5 messages

Paul Wade <pwade@montrose-env.com> Tue, Aug 27, 2019 at 1:36 PM
To: Sufi Mustafa <sufi.mustafa@state.nm.us>, Eric Peters <eric.peters@state.nm.us>, Matt Lane <mlane@espmerc.com>

Sufi and Eric
Attached is a modeling protocol for a new permit for Associated Asphalt and Materials, LLC. The site is north of Airport road and the bypass. Please let me know if you have any questions or concerns.

I will also need the neighboring sources inventory for UTM Coordinates 403,050 meters East and 3,944,800 meters North, Zone 13, with NAD83 datum.

Thanks

--

MEG Logo_Signature

Paul Wade

Sr. Engineer

Montrose Air Quality Services, LLC

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

AAMSantaFeModelProtocol082119.pdf
359K

Raso, Angela, NMENV <Angela.Raso@state.nm.us> Thu, Sep 5, 2019 at 4:01 PM
To: "pwade@montrose-env.com" <pwade@montrose-env.com>
Cc: "Mustafa, Sufi A., NMENV" <sufi.mustafa@state.nm.us>

Hi Paul,

I have approved this protocol.

Best,

Angela Raso, PhD

Dispersion Modeler

New Mexico Environment Department

Air Quality Bureau

525 Camino de Los Marquez Suite 1

Santa Fe, New Mexico, 87505

Phone: (505) 476-4345

Email: angela.raso@state.nm.us

From: Mustafa, Sufi A., NMENV <sufi.mustafa@state.nm.us>
Sent: Tuesday, August 27, 2019 5:27 PM
To: Raso, Angela, NMENV <Angela.Raso@state.nm.us>
Subject: FW: [EXT] Model Protocol AAM New Site

Angela

Please review this modeling protocol.

Thank you.

Sufi Mustafa

From: Paul Wade <pwade@montrose-env.com>
Sent: Tuesday, August 27, 2019 1:36 PM
To: Mustafa, Sufi A., NMENV <sufi.mustafa@state.nm.us>; Peters, Eric, NMENV <eric.peters@state.nm.us>; Matt Lane <mlane@espmerc.com>
Subject: [EXT] Model Protocol AAM New Site

Section 17

Compliance Test History

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

To show compliance with existing NSR permits conditions, you must submit a compliance test history. The table below provides an example.

New NSR facility.

Section 20

Other Relevant Information

<u>Other relevant information</u>. Use this attachment to clarify any part in the application that you think needs explaining. Reference the section, table, column, and/or field. Include any additional text, tables, calculations or clarifying information.

Additionally, the applicant may propose specific permit language for AQB consideration. In the case of a revision to an existing permit, the applicant should provide the old language and the new language in track changes format to highlight the proposed changes. If proposing language for a new facility or language for a new unit, submit the proposed operating condition(s), along with the associated monitoring, recordkeeping, and reporting conditions. In either case, please limit the proposed language to the affected portion of the permit.

No additional relevant information is required for this facility.

Section 22: Certification

Company Name: Associated Asphalt and Materials, LLC

I, Katharine C. Fishman, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 21st day of November, 2019, upon my oath or affirmation, before a notary of the State of

New Mexico.

*Signature 11/21/2019 Date

Katharine C. Fishman
Printed Name

President of The Espanola Mercantile Company, its Manager
Title

Scribed and sworn before me on this 21st day of November, 2019.

My authorization as a notary of the State of New Mexico expires on the

31st day of March, 2021.

Notary's Signature 11/21/2019 Date

Rebecca M. Martinez
Notary's Printed Name

REBECCA M. MARTINEZ NOTARY PUBLIC STATE OF NEW MEXICO

*For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC.

MONTROSE
AIR QUALITY SERVICES

November 25, 2019

New Mexico Environment Department
Air Quality Bureau
Permits Section
525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico 87507-3313

Subject: Permit Application for AAM Santa Fe Facility

To Whom it May Concern:

Attached please find two (2) hardcopies and three (3) electronic (CD) copies of the 20.2.72 NMAC Permit Application for Associated Asphalt and Material's Santa Fe Facility. This letter is attached to the application copy that has the original notarized signature page (Section 22), along with an application submittal fee of $500.

Associated Asphalt and Materials, LLC is applying for a new 20.2.72 NMAC air quality permit for a 200 ton per hour (TPH) aggregate crushing and screening plant, 50 TPH aggregate scalping screen, a 150 TPH hot mix asphalt plant (HMA Plant #2) and a 300 TPH hot mix asphalt plant (HMA Plant #5) to be operated within county of Santa Fe, state of New Mexico. Regulation governing this permit application is 20.2.72.200.A(1) NMAC.

Please let me know if you have any questions or need additional information.

Sincerely,

Paul Wade
Sr. Engineer
Montrose Air Quality Services, LLC

Cc: Matt Lane, AAM

Montrose Air Quality Services, LLC
3500 Comanche Road NE Suite G
Albuquerque, NM 87107-4546

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