ALBUQUERQUE ENVIRONMENTAL HEALTH DEPARTMENT - AIR QUALITY DIVISION
PHYSICAL ADDRESS: 1 CIVIC PLAZA NW, 3RD FLOOR, ROOM 3047, ALBUQUERQUE, NM, 87102
MAILING ADDRESS – P.O. BOX 1293, ALBUQUERQUE, NM, 87103
(505) 768 - 1972 (VOICE) 1-800-659-8331 (NEW MEXICO RELAY) (505) 768 - 1977 *(FAX)*

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AIR QUALITY DIVISION

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Authority-to-Construct Permits (20.11.41 NMAC)

NOTE: Information relating to process or production techniques unique to owner, or data relating to profits and costs not previously made public can be protected as confidential. Check confidentiality box at signature line (page 6) if requesting confidentiality for this application.

Clearly handwrite or type **Corporate Information** **Submittal Date: / /**

1. Company Name:	Ray's Sand and Gravel			**2. Company Phone:**	(505) 877-1516
3. Street Address:	3111 Love Road SW			**4. Zip:**	87121
5. Company City:	Albuquerque	**6. Company State:**	NM	**7. Company Fax:**	(505) 877-0553
8. Company Mailing Address:	same as above			**9. Zip:**	
10. Company Contact:	Raymond Gutierrez	**11. Title:**	Owner	**12. Phone:**	(505) 877-1516
13. Contact Email Address:	rayssand@hotmail.com				

Stationary Source (Facility) Information: provide a plot plan (legal description, drawing of facility property) with overlay sketch of facility processes;location of emission points;pollutant type&distances to property boundaries.

1. Facility Name:	Ray's Sand and Gracel			**2. Facility Phone:**	(505) 877-1516
3. Street Address:	3111 Love Road SW			**4. Zip:**	87121
5. Facility City:	Albuquerque	**6. Facility State:**	NM	**7. Facility Fax:**	(505) 877-0553
8. Facility Mailing Address (Local):	Same as above			**9. Zip:**	
10. Latitude - Longitude or UTM Coordinates of Facility:	342889 m E		3876010 m N		
10. Facility Contact:	Raymond Gutierrez	**11. Title:**	Owner	**12. Phone:**	(505) 877-1516
13. Contact Email Address:	rayssand@hotmail.com				

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

1. Facility Type (description of your facility operations):	Crushing and Screening Sand and Gravel (Portable Stationary Source)												
2. Standard Industrial Classification (SIC 4 digit #):	1442	**3. North American Industry Classification System (NAICS Code):**	212321										
4. Is facility currently operating in Bernalillo County	Yes	**If yes, date of original construction**		**If no, planned startup is:**									
5. Is facility permanent:	Yes	If no, give dates for requested temporary operation - from		through									
6. Is facility process equipment new:	No	If no, give actual or estimated manufacture or installation dates in the Process Equipment Table											
7. Is application for a modification, expansion, or reconstruction (altering process, or adding, or replacing process equipment, etc.) to an existing facility which will result in a change in emissions:	Yes	If yes, give the manufacture date of modified, added, or replacement equipment in the Process Equipment Table modification date column , or the operation changes to existing process/equipment which cause an emission increase. Please list all equipment, including all existing equipment.											
8.Is facility operation:	intermittent	**9. Estimated % of production**	**Jan-Mar**	25%	**Apr-Jun**	25%	**Jul-Sep**	25%	**Oct-Dec**	25%			
10. Current or requested operating times of facility:	**hrs/day:**	8	**days/wk:**	6	**mos/yr:**	12	**11. Business hours:**	7	am	to	5:00	pm	
12. Will there be special or seasonal operating times other than shown above:	No	If yes, explain											
13. Raw materials processed:	stone/rock						**14. Saleable item(s) produced:**	sand and gravel					

15. Permitting Action Being Requested

- New Permit
- ☑ Permit Modification Current Permit #: 664
- Technical Permit Revision Current Permit #:
- Administrative Permit Revision Current Permit #:

PROCESS EQUIPMENT TABLE

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator-Haul Roads-Stockpiles, etc.)

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification/ Reconstruction Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type	New (yes or no)[2]
Example 1. Generator	Unigen	B-2500	A56732195C-222	7/96	7/97	N/A	250 Hp	Diesel	yes
Example 2. Spray Gun	HVLP Systems	Spray-N-Stay 1100	k26-56-95	01/97	11/97	N/A	0.25 gal/HR.	Electric Compressor	yes
1s. Weigh Hopper	Shopmade	-	-	-			100 tph	Electric	No
2s. Screen	Gator	RMS410 X3	GTIS4103-041	2006			100 tph	Electric	No
3s. Conveyor	-	-	-	-			100 tph	Electric	No
4s. Conveyor	-	-	-	-			100 tph	Electric	No
5s. Conveyor	-	-	-	-			100 tph	Electric	No
6s. Conveyor	-	-	-	-			100 tph	Electric	No
7s. Conveyor	-	-	-	-			100 tph	Electric	No
1w. Screen	Shopmade	-	-	-			100 tph	Electric	No
2w. Conveyor. Auger	-	-	-	-			100 tph	Electric	No
3w Conveyor	-	-	-	-			100 tph	Electric	No
1c Weigh Hopper	Shopmade	-	-	-			100 tph	Diesel Engine	No
2c Screen	Unknown 5x20 approximately	-	-	-			100 tph	Diesel Engine	No

1. Basis for Equipment Size or Process Rate:

If Other, Please explain:

Submit information for each unit as an attachment

2. Please include existing equipment information.

PROCESS EQUIPMENT TABLE (Continued)

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator-Haul Roads-Stockpiles, etc.)

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification/ Reconstruction Date	Size or Process Rate (Hp,kW;Btu,ft^3;lbs; tons;yd^3;etc.)	Fuel Type	New (yes or no)[1]
Example 1. Generator	Unigen	B-2500	A56732195C-222	7/96	7/97	N/A	250 Hp	Diesel	yes
Example 2. Spray Gun	HVLP Systems	Spray-N-Stay 1100	k26-56-95	01/97	11/97	N/A	0.25 gal/HR.	Electric Compressor	yes
3c. Conveyor	-	-	-	-	-	-	100 tph	Diesel Engine	No
4c. Conveyor	-	-	-	-	-	-	100 tph	Diesel Engine	No
5c. Cone Crusher	Telsmith	1310FC	202M9402	1968	1973	-	100 tph	Diesel Engine	No
6c. Recirculation Conveyor	-	-	-	-	-	-	100 tph	Diesel Engine	No
7c. Conveyor	-	-	-	-	-	-	100 tph	Diesel Engine	No
8c. Conveyor	-	-	-	-	-	-	100 tph	Diesel Engine	No
1p thru 23p. Stockpiles	N A	N/A	N A	N/A	N/A	N/A	N/A	N A	No
RAYHR. Haul Roads	N/A	N/A	N/A	N/A	N A	N/A	N/A	N/A	No
1g Diesel engine	Caterpillar	3412DI	81Z04448	1985	-	-	604 hp	Diesel	Yes

1. . Basis for Equipment Size or Process Rate:

If Other, Please explain:

Submit information for each unit as an attachment
2 Please include existing equipment information

TABLE EXEMPTED SOURCES AND EXEMPTED ACTIVITIES

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

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft³,lbs, tons,yd³,etc.)	Fuel Type
Example 1. Generator	Unigen	B-2500	A56732195C-222	7/96	7/97	N/A	250 Hp - HR. ~~YR.~~	Diesel
Example 2. Spray Gun	HVLP Systems	Spra-N-Stay 1100	k26-56-95	01/97	11/97	N/A	0.25 gal. - HR. ~~YR.~~	Electric Compressor
1. Except for control of unpaved road emissions-Loaders, Backhoes, etc for material distribution							HR. YR.	
2.							HR YR	
3.							HR. YR.	
4.							HR. YR.	
5.							HR. YR.	
6.							HR YR.	
7.							HR. YR.	
8.							HR. YR.	
9							HR. YR.	
10.							HR. YR.	
11.							HR YR	
12.							HR YR	
13							HR. YR.	
14							HR. YR.	
15							HR. YR.	

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

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

UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

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

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	10 Micron Suspended Particulate Matter (PM_{10})	2.5 Micron Suspended Particu late Matter ($PM_{2.5}$)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
Example I. Generator	**1. 9.1 lbs/hr**	**27.7 lbs/hr**	**1.3 lbs/hr**	**0.5 lbs/hr**	**2.0 lbs/hr**	**2.0 lbs/hr**	**2.0 lbs/hr**	**AP-42**
	1a. 39.9 tons/yr	**121.3 tons/yr**	**5.7 tons/yr**	**2.2 tons/yr**	**8.8 tons/yr**	**8.8 tons/yr**	**8.8 tons/yr**	
1c. Weigh Hopper	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
2c. conveyor to screen	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.30 lbs/hr	0.11 lbs/hr	0.04 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	1.314 tons/yr	0.48 tons/yr	0.175 tons/yr	
3c. Screen	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	2.50 lbs/hr	0.87 lbs/hr	0.30 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	10.95 tons/yr	3.81 tons/yr	1.314 tons/yr	
4c. Conveyor to Aggregate Handling Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
5c. Conveyor to Aggregate Handling Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	5.855 tons/yr	4.07 tons/yr	0.613 tons/yr	
6c. Conveyor to crusher	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.30 lbs/hr	0.11 lbs/hr	0.04 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	1.314 tons/yr	0.48 tons/yr	0.175 tons/yr	
7c. Cone Crusher	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.54 lbs/hr	0.24 lbs/hr	0.08 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	2.365 tons/yr	1.05 tons/yr	0.35 tons/yr	
8c. Recirulationg Conveyor	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.30 lbs/hr	0.11 lbs/hr	0.04 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	1.314 tons/yr	0.48 tons/yr	0.175 tons/yr	
1p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
2p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
3p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	

If Method(s) used for Determination of Emissions is other, Please explain:	

* **If any one (1) of these process units, or combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet.* If all of these process units, individually and in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

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

UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES (Continued)

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

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	10 Micron Suspended Particulate Matter (PM_{10})	2.5 Micron Suspended Particulate Matter ($PM_{2.5}$)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
Example 1. Generator	**1. 9.1 lbs/hr**	**27.7 lbs/hr**	**1.3 lbs/hr**	**0.5 lbs/hr**	**2.0 lbs/hr**	**2.0 lbs/hr**	**2.0 lbs/hr**	**AP-42**
	1a. 39.9 tons/yr	**121.3 tons/yr**	**5.7 tons/yr**	**2.2 tons/yr**	**8.8 tons/yr**	**8.8 tons/yr**	**8.8 tons/yr**	
4p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
5p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
6p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
7p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
8p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
9p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
10p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	- tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
11p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	- tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
12p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
13p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	
14p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	1.96 lbs/hr	0.93 lbs/hr	0.14 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	8.585 tons/yr	4.07 tons/yr	0.613 tons/yr	

*** If any one (1) of these process units, or combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet.* If all of these process units, individually and in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

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

UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES (Continued)

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

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	10 Micron Suspended Particulate Matter (PM_{10})	2.5 Micron Suspended Particulate Matter ($PM_{2.5}$)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
Example I. Generator	1. 9.1 lbs/hr	27.7 lbs/hr	1.3 lbs/hr	0.5 lbs/hr	2.0 lbs/hr	2.0 lbs/hr	2.0 lbs/hr	AP-42
	1a. 39.9 tons/yr	121.3 tons/yr	5.7 tons/yr	2.2 tons/yr	8.8 tons/yr	8.8 tons/yr	8.8 tons/yr	
RAYHR 1. Haul Roads	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	3.65 lbs/hr	0.89 lbs/hr	0.09 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	15.99 tons/yr	3.91 tons/yr	0.39 tons/yr	
RAYHR 2. Haul Roads	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	5.15 lbs/hr	1.26 lbs/hr	0.13 lbs/hr	See Attachment
	tons/yr	tons/yr	tons/yr	tons/yr	22.58 tons/yr	5.52 tons/yr	0.55 tons/yr	
1g. Diesel Engine	3.32 lbs/hr	14.50 lbs/hr	0.43 lbs/hr	0.01 lbs/hr	0.42 lbs/hr	0.42 lbs/hr	0.42 lbs/hr	SeeAttachment
	14.55 tons/yr	63.49 tons/yr	1.87 tons/yr	0.03 tons/yr	1.85 tons/yr	1.85 tons/yr	1.85 tons/yr	
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
Total Controlled Emissions	3.32 lbs/hr	14.50 lbs/hr	0.43 lbs/hr	0.01 lbs/hr	46.48 lbs/hr	19.82 lbs/hr	3.52 lbs/hr	
	14.55 tons/yr	63.49 tons/yr	1.87 tons/yr	0.03 tons/yr	203.62 tons/yr	86.84 tons/yr	15.40 tons/yr	

*** If any one (1) of these process units, or combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet.* If all of these process units, individually and in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

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

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

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

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	10 Micron Suspended Particulate Matter (PM_{10})	2.5 Micron Suspended Particulate Matter ($PM_{2.5}$)	Control Equipment	% Efficiency
Example 1. Generator	1. 9.1 lbs/hr	27.7 lbs/hr	1.3 lbs/hr	0.5 lbs/hr	2.0 lbs/hr	2.0 lbs/hr	2.0 lbs/hr	Operating Hours	
	1a. 39.9 tpy	121.3 tpy	5.7 tons/yr	2.2 tons/yr	8.8 tons/yr	8.8 tons/yr	8.8 tons/yr		
1c. Weigh H opper	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
2c. Conveyor to Screen	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.015 lbs/hr	0.006 lbs/hr	0.002 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.016 tons/yr	0.006 tons/yr	0.002 tons/yr		
3c. Screen	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.125 lbs/hr	0.044 lbs/hr	0.015 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.131 tons/yr	0.046 tons/yr	0.016 tons/yr		
4c. Conveyor to Aggregate Handling Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
5c. Conveyor to Aggregate Handling Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
6c. Conveyor to Crusher	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.015 lbs/hr	0.006 lbs/hr	0.002 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.016 tons/yr	0.006 tons/yr	0.002 tons/yr		
7c. Cone Crusher	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.027 lbs/hr	0.012 lbs/hr	0.004 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.028 tons/yr	0.013 tons/yr	0.004 tons/yr		
8c. Recirculation Conveyor	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.015 lbs/hr	0.006 lbs/hr	0.002 lbs/hr	Watering	99%
	tons/yr	tons/yr	tons/yr	tons/yr	0.016 tons/yr	0.006 tons/yr	0.002 tons/yr		
1p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
2p. Storage Pile	lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
3p. Storage Pile	lbs/hr	lbs/hr	lbs/hr	lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		

1. Basis for Control Equipment % Efficiency:

If Other, Please explain:

Submit information for each unit as an attachment.

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

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

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

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	10 Micron Suspended Particulate Matter (PM_{10})	2.5 Micron Suspended Particulate Matter ($PM_{2.5}$)	Control Equipment	% Efficiency
Example 1. Generator	**1. 9.1 lbs/hr**	**27.7 lbs/hr**	**1.3 lbs/hr**	**0.5 lbs/hr**	**2.0 lbs/hr**	**2.0 lbs/hr**	**2.0 lbs/hr**	**Operating Hours**	
	1a. 39.9 tons/yr	**121.3 tons/yr**	**5.7 tons/yr**	**2.2 tons/yr**	**8.8 tons/yr**	**8.8 tons/yr**	**8.8 tons/yr**		
4p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
5p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
6p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
7p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
8p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
9p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
10p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
11p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
12p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
13p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		
14p. Storage Pile	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	0.098 lbs/hr	0.047 lbs/hr	0.007 lbs/hr	Watering,	95%
	tons/yr	tons/yr	tons/yr	tons/yr	0.103 tons/yr	0.049 tons/yr	0.007 tons/yr		

1. Basis for Control Equipment % Efficiency:		If Other, Please explain:	

Submit information for each unit as an attachment.

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

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES (Continued)

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

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	10 Micron Suspended Particulate Matter (PM_{10})	2.5 Micron Suspended Particulate Matter ($PM_{2.5}$)	Control Equipment	% Efficiency
Example 1. Generator	1. 9.1 lbs/hr	27.7 lbs/hr	1.3 lbs/hr	0.5 lbs/hr	2.0 lbs/hr	2.0 lbs/hr	2.0 lbs/hr	Operating Hours	
	1a. 39.9 tons/yr	121.3 tons/yr	5.7 tons/yr	2.2 tons/yr	8.8 tons/yr	8.8 tons/yr	8.8 tons/yr		
RAYHR. Haul Roads	- lbs/hr	- lbs/hr	- lbs/hr	- lbs/hr	2.64 lbs/hr	0.65 lbs/hr	0.07 lbs/hr	Watering	70%
	tons/yr	tons/yr	tons/yr	tons/yr	2.77 tons/yr	0.68 tons/yr	0.07 tons/yr		
1g. Diesel Engine	3.32 lbs/hr	14.50 lbs/hr	0.43 lbs/hr	0.01 lbs/hr	0.42 lbs/hr	0.42 lbs/hr	0.42 lbs/hr	Hours of Operation	
	3.49 tons/yr	15.22 tons/yr	0.45 tons/yr	0.01 tons/yr	0.44 tons/yr	0.44 tons/yr	0.44 tons/yr		
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr		
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr		
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr		
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr		
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr		
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr		
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr		
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr		
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr		
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr		
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr		
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr		
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr		
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr		
	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr		
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr		
Total Controlled Emissions	3.32 lbs/hr	14.50 lbs/hr	0.43 lbs/hr	0.01 lbs/hr	4.50 lbs/hr	1.51 lbs/hr	0.21 lbs/hr		
	3.49 tons/yr	15.02 tons/yr	0.45 tons/yr	0.01 tons/yr	4.73 tons/yr	1.59 tons/yr	0.22 tons/yr		

1. Basis for Control Equipment % Efficiency:		If Other, Please explain:	

Submit information for each unit as an attachment.

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

**TOXIC EMISSIONS

VOLATILE, HAZARDOUS, & VOLATILE HAZARDOUS AIR POLLUTANT EMISSION TABLE

Product Categories (Coatings, Solvents, Thinners, etc.)	Volatile Organic Compound (VOC), Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service Number (CAS) Of VOC, HAP, Or VHAP From Representative As Purchased Product	VOC, HAP, Or VHAP Concentration Of Representative As Purchased Product (pounds/gallon, or %)	1. How were Concentrations Determined (CPDS, MSDS, etc.)	Total Product Purchases For Category	(-)	Quantity Of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
EXAMPLE 1. Cleaning Solvents	TOLUENE	108883	70%	PRODUCT LABEL	lbs/yr 200 gal/yr	(-)	lbs/yr 50 gal/yr	(=)	lbs/yr 150 gal/yr
1. N A					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
2.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
3.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
4.					lbs/yr gal/yr	( )	lbs/yr gal/yr	(=)	lbs/yr gal/yr
5.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
6.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr

1. Basis for percent (%) determinations worst case scenario. Submit, as an attachment, information on one (1) product from each Category listed above which best represents the average of all the products purchased in that Category.

If Basis for percent (%) determinations is other, Please explain:	

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

MATERIAL AND FUEL STORAGE TABLE

(Tanks, barrels, silos, stockpiles, etc.) Copy this table if additional space is needed (begin numbering with 4., 5., etc.)

Storage Equipment	Product Stored	Capacity (bbls - tons gal - acres,etc)	Above or Below Ground	Construction (welded, riveted) & Color	Install Date	Loading Rate	Offloading Rate	True Vapor Pressure	Control Equipment	Seal Type	% Eff
Example 1. Tank	diesel fuel	5,000 gal.	Below	welded/ brown	3/93	3000gal/HR. ~~YR.~~	500 gal./HR. ~~YR.~~	N/A Psia	N/A	N/A	N/A
Example 2. Barrels	Solvent	55 gal Drum	Above - in storage room	welded/green	N/A	N/A HR. YR.	N/A HR. YR.	N/A Psia	N/A	N/A	N/A
1 Tank	Diesel Fuel	500 gals.	Above	welded/ brown	1985	unknown	unknown	Psia	N/A	N/A	N A
2. Tank	Diesel Fuel	1800 gals.	Above	welded/ Brown	2003	unknown	unknown	Psia	N/A	N/A	N/ A
3.								Psia			

1 Basis for Loading/Offloading Rate . If Basis for Loading/Offloading Rate is other, Please explain.

Submit information for each unit as an attachment

2. Basis for Control Equipment % Efficiency:		If Other, Please explain:	

Submit information for each unit as an attachment.

STACK AND EMISSION MEASUREMENT TABLE

If any equipment from the Process Equipment Table (Page 2) is also listed in this Stack Table, use the same numbered line for the Process Equipment unit on both Tables to show the association between the Process Equipment and it's Stack. Copy this table if additional space is needed (begin numbering with 4., 5., etc.).

Process Equipment	Pollutant (CO,NOx,TSP, Toluene,etc)	Control Equipment	Control Efficiency	Stack Height & Diameter in feet	Stack Temp.	Stack Velocity & Exit Direction	Emission Measurement Equipment Type	Range-Sensitivity-Accuracy-
Example 1. Generator	CO, NOx, TSP, SO_2, NMHC	N/A	N/A	18 ft. - H 0.8 ft. - D	225°F	6,000 ft^3/min - V Exit - upward	N/A	N/A
Example 2. Spray Gun	TSP, xylene, toluene, MIBK	Spray Booth	99% for TSP	9 ft. - H 0.5 ft. -D	ambient	10,000 ft^3/min - V Exit - horizontal	N/A	N/A
1g Diesel Engine	CO, NOx, TSP, PM10, PM2.5, SO2 and NMHC	N/A	N A	12 Feet-H 0.6 Feet-D	850 °F	235.96 fps-V Exit-Upward	N/A	N/A
3				-H -D	"	-V Exit-		
4.				-H -D	"	-V Exit-		
5.				-H -D	"	-V Exit-		
6.				-H -D	"	-V Exit-		
7.				-H -D	"	-V Exit-		

1. Basis for Control Equipment % Efficiency:

If Other, Please explain:

Submit information for each unit as an attachment.

ADDITIONAL COMMENTS OR INFORMATION

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

Signed this 30 day of MARCH, 2018

RAYMOND GUTIERREZ	OWNER
Print Name	**Print Title**

Raymond Gutierrez
Signature

Note. The following shall be protected as confidential if requested by applicant:
- Any information relating to processes or production techniques which are unique to owner-operator
- Data relating to owner-operator profits and costs which have not previously been made public

Please check box if confidentiality is requested for this application: ☐

Application can be mailed to address across the top front of this form (Page 1), or may be hand delivered (between the hours of 8:00am - 4:00pm Mon. through Fri.) to the same address.

City of Albuquerque

Environmental Health Department
Air Quality Program

Public Notice Sign Guidelines

Any person seeking a permit under 20.11.41 NMAC, Authority-to-Construct Permits, shall do so by filing a written application with the Department. *Prior to submitting an application, the applicant shall post and maintain a weather-proof sign provided by the department. The applicant shall keep the sign posted until the department takes final action on the permit application; if an applicant can establish to the department's satisfaction that the applicant is prohibited by law from posting, at either location required, the department may waive the posting requirement and may impose different notification requirements.* **A copy of this form must be submitted with your application.**

Applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

Name: Ray's Sand and Gravel
Contact: Ray Gutierrez, Owner
Company/Business: Ray's Sand and Gravel

☑ The sign must be posted at the more visible of either the proposed or existing facility entrance (or, if approved in advance and in writing by the department, at another location on the property that is accessible to the public)

☑ The sign shall be installed and maintained in a condition such that members of the public can easily view, access, and read the sign at all times.

☑ The lower edge of the sign board should be mounted a minimum of 2' above the existing ground surface to facilitate ease of viewing

☑ Attach a picture of the completed, properly posted sign to this document

☐ **Check here if the department has waived the sign posting requirement.**
Alternative public notice details:

Ver. 11/13

Maximum Operating Schedule: 2100 hours per year

Normal Operating Schedule: 2100 hours per year

Current Contact Information for Comments and Inquires:

Name: Ray Gutierrez, Owner
Address: 3111 Love Street SW, Albuquerque, NM 87121
Phone Number: (505) 877-1516
E-Mail Address: rayssand@hotmail.com

If you have any comments about the construction or operation of the above facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to the address below:

Environmental Health Manager

Stationary Source Permitting

Albuquerque Environmental Health Department

Air Quality Program

PO Box 1293

Albuquerque, New Mexico 87103

(505) 768-1972

Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, as used in this notice or send a copy of this notice along with your comments, since the Department may not have received the permit application at the time of this notice. Please include a legible mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, if required, the Department's notice will be published in the legal section of the Albuquerque Journal and mailed to neighborhood associations and neighborhood coalitions near the facility location or near the facility proposed location.

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Checklist

Any person seeking a permit under 20.11.41 NMAC, Authority-to-Construct Permits, shall do so by filing a written application with the Department. Prior to ruling a submitted application complete each application submitted shall contain the required items listed below. **This checklist must be returned with the application.**

Applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

All applicants shall:

1. Fill out and submit the *Pre-permit Application Meeting Request* form
   a. ☐ Attach a copy to this application *NOTE: Not attached because didn't request a meeting.*

2. Attend the pre-permit application meeting
   a. ☐Attach a copy of the completed *Pre-permit Application Meeting Checklist* to this application *NOTE: Not attached because didn't have a meeting*

3. Provide public notice to the appropriate parties
   a. ☑ Attach a copy of the completed *Notice of Intent to Construct* form to this form
      i. Neighborhood Association(s): Southwest Alliance of Neighbors, Valley Gardens Neighborhood Association, South Valley Alliance of Neighborhood Associations and Southside Farms Community Association

      ii. Coalition(s): South Valley Coalition of Neighborhood Associations and Westside Coalition of Neighborhood Associations

   b. ☑ Attach a copy of the completed *Public Sign Notice Guideline* form:

4. Fill out and submit the *Permit Application*. All applications shall:

   A. ☑ be made on a form provided by the Department. Additional text, tables, calculations or clarifying information may also be attached to the form.

   B. ☑ at the time of application, include documentary proof that all applicable permit application review fees have been paid as required by 20 NMAC 11.02. Please refer to the attached permit application worksheet.

   C. ☑ contain the applicant's name, address, and the names and addresses of all other owners or operators of the emission sources.

D. ☑ contain the name, address, and phone number of a person to contact regarding questions about the facility.

E. ☑ indicate the date the application was completed and submitted

F. ☑ contain the company name, which identifies this particular site.

G. ☑ contain a written description of the facility and/or modification including all operations affecting air emissions.

H. ☑ contain the maximum and standard operating schedules for the source after completion of construction or modification in terms of hours per day, days per week, and weeks per year.

I. ☑ provide sufficient information to describe the quantities and nature of any regulated air contaminant (including any amount of a hazardous air pollutant) that the source will emit during:

- Normal operation
- Maximum operation
- Abnormal emissions from malfunction, start-up and shutdown

J. ☑ include anticipated operational needs to allow for reasonable operational scenarios to avoid delays from needing additional permitting in the future.

K. ☑ contain a map, such as a 7.5-minute USGS topographic quadrangle, showing the exact location of the source; and include physical address of the proposed source. *(Attached is a Google Map with physical address of proposed source)*

L. ☑ contain an aerial photograph showing the proposed location of each process equipment unit involved in the proposed construction, modification, relocation, or technical revision of the source except for federal agencies or departments involved in national defense or national security as confirmed and agreed to by the department in writing.

M. ☑ contain the UTM zone and UTM coordinates.

N. ☑ include the four digit Standard Industrialized Code (SIC) and the North American Industrial Classification System (NAICS).

O. ☑ contain the types and **potential emission rate** amounts of any regulated air contaminants the new source or modification will emit. Complete appropriate sections of the application; attachments can be used to supplement the application, but not replace it.

P. ☑ contain the types and **controlled** amounts of any regulated air contaminants the new source or modification will emit. Complete appropriate sections of the application; attachments can be used to supplement the application, but not replace it.

Q. ☑ contain the basis or source for each emission rate (include the manufacturer's specification sheets, AP-42 Section sheets, test data, or other data when used as the source).

R. ☑ contain all calculations used to estimate **potential emission rate** and **controlled** emissions.

S. ☑ contain the basis for the estimated control efficiencies and sufficient engineering data for verification of the control equipment operation, including if necessary, design drawings, test reports, and factors which affect the normal operation (e.g. limits to normal operation).

T. ☑ contain fuel data for each existing and/or proposed piece of fuel burning equipment.

U. ☑ contain the anticipated maximum production capacity of the entire facility and the requested production capacity after construction and/or modification.

V. ☑ contain the stack and exhaust gas parameters for all existing and proposed emission stacks.

W. ☑ provide an ambient impact analysis using a atmospheric dispersion model approved by the US Environmental Protection Agency (EPA), and the Department to demonstrate compliance with the ambient air quality standards for the City of Albuquerque and Bernalillo County (See 20.11.01 NMAC). If you are modifying an existing source, the modeling must include the emissions of the entire source to demonstrate the impact the new or modified source(s) will have on existing plant emissions.

X. ☑ contain a preliminary operational plan defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown.

Y. ☑ contain a process flow sheet, including a material balance, of all components of the facility that would be involved in routine operations. Indicate all emission points, including fugitive points.

Z. ☑ contain a full description, including all calculations and the basis for all control efficiencies presented, of the equipment to be used for air pollution control. This shall include a process flow sheet or, if the Department so requires, layout and assembly drawings, design plans, test reports and factors which affect the normal equipment operation, including control and/or process equipment operating limitations.

AA. ☑ contain description of the equipment or methods proposed by the applicant to be used for emission measurement.

BB. ☑ be signed under oath or affirmation by a corporate officer, authorized to bind the company into legal agreements, certifying to the best of his or her knowledge the truth of all information submitted.

Notice of Intent to Construct

Under 20.11.41.13B NMAC, the owner/operator is required to *provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are with-in one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located* if they propose to construct or establish a new facility or make modifications to an existing facility that is subject to 20.11.41 NMAC – Construction Permits. **A copy of this form must be included with the application.**

Applicant's Name and Address: Ray Gutierrez, 3111 Love Street SW, Albuquerque, NM 87121

Owner / Operator's Name and Address: Ray Gutierrez, Owner, 3111 Love Street SW, Albuquerque, NM 87121

Actual or Estimated Date the Application will be submitted to the Department: Early May of 2018

Exact Location of the Source or Proposed Source: 3111 Love Street SW, Albuquerque, NM 87121

Description of the Source: Portable crushing and screening plant and a portable screening plant

Nature of the Business: Crushing and screening sand and gravel

Process or Change for which the permit is requested: Ray's Sand and Gravel is applying for a permit modification. Ray's Sand and Gravel has been in business for over 60 years in Albuquerque and over 20 years at this location. The modification will consist of:

1. Replacement of the permitted 280 hp diesel fired engine with a 604hp diesel fired engine,
2. Crushing and Screening plant and Screening plant at 100 tons per hour, and
3. Limited operating hours and scenarios.

Preliminary Estimate of the Maximum Quantities of each regulated air contaminant the source will emit:

Initial Construction Permit

	Pounds Per Hour (lbs/hr)	Tons Per Year (tpy)
CO		
NOx		
SO2		
VOC		
TSP		
PM10		
PM2.5		
VHAP		

Net Changes In Emissions

(Only for permit Modifications or Technical Revisions)

	lbs/hr	tpy	Estimated Total TPY
CO	3.32	3.49	3.49
NOx	14.50	15.02	15.02
SO2	0.01	0.01	0.01
VOC	0.43	0.45	0.45
TSP	4.50	4.73	4.73
PM10	1.51	1.59	1.59
PM2.5	0.21	0.22	0.22
VHAP	N/A**	N/A**	N/A**

** Not Applicable

City of Albuquerque- Environmental Health Department
Air Quality Program- Permitting Section
Phone: (505) 768-1972 Email: aqd@cabq.gov

Maximum Operating Schedule: 2100 hours per year

Normal Operating Schedule: 2100 hours per year

Current Contact Information for Comments and Inquires:

Name: Ray Gutierrez, Owner
Address: 3111 Love Street SW, Albuquerque, NM 87121
Phone Number: (505) 877-1516
E-Mail Address: rayssand@hotmail.com

If you have any comments about the construction or operation of the above facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to the address below:

Environmental Health Manager

Stationary Source Permitting

Albuquerque Environmental Health Department

Air Quality Program

PO Box 1293

Albuquerque, New Mexico 87103

(505) 768-1972

Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, as used in this notice or send a copy of this notice along with your comments, since the Department may not have received the permit application at the time of this notice. Please include a legible mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, if required, the Department's notice will be published in the legal section of the Albuquerque Journal and mailed to neighborhood associations and neighborhood coalitions near the facility location or near the facility proposed location.

Timothy M. Keller, Mayor

Environmental Health Department

Air Quality Program

Interoffice Memorandum

Danny Nevarez, Acting Director

TO: RAYMOND GUTIERREZ, OWNER, RAY'S SAND AND GRAVEL

FROM: MELISSA PADILLA, ADMINISTRATIVE ASSISTANT

SUBJECT: DETERMINATION OF NEIGHBORHOOD ASSOCIATIONS AND COALITIONS WITHIN 0.5 MILES OF 3111 LOVE ROAD SW, ALBUQUERQUE, NM 87121

DATE: March 27, 2018

DETERMINATION:

On March 27, 2018 I used the City of Albuquerque Zoning Advanced Map Viewer (http://sharepoint.cabq.gov/gis) to review which City of Albuquerque (COA) Neighborhood Associations (NAs) and Neighborhood Coalitions (NCs) and the Bernalillo County (BC) NAs and NCs are located within 0.5 miles of 3111 Love Road SW, Albuquerque in Bernalillo County, NM.

I then used the City of Albuquerque Office of Neighborhood Coordination's Monthly Master NA List dated March 2018 and the Bernalillo County Office of Neighborhood Coordination's Monthly Master NA List for March 2018 to determine the contact information for each NA and NC located within 0.5 miles of 3111 Love Road SW, Albuquerque in Bernalillo County, NM.

From http://sharepoint.cabq.gov/gis using the zoning advanced map viewer and the list of NAs and NCs from CABQ Office of Neighborhood Coordination and the BC Office of Neighborhood Coordination. Duplicates have been deleted:

COA Association or Coalition	Name	Email or Mailing Address
South Valley Coalition of Neighborhood Associations	Rod Mahoney	rmahoney01@comcast.net
South Valley Coalition of Neighborhood Associations	Marcia Fernandez	mbfernandez1@gmail.com
Valley Gardens Neighborhood Association	Marcella Rael	valleygardensna@gmail.com
Valley Gardens Neighborhood Association	Antoinette Dominguez	ajuarez8.ad@gmail.com
Westside Coalition of Neighborhood Associations	Gerald Worrall	jfworrall@comcast.net
Westside Coalition of Neighborhood Associations	Harry Hendriksen	[illegible]

BC Association or Coalition	Name	Email or Mailing Address
South Valley Alliance of Neighborhood Associations	Sara Newton Juarez	snjart@yahoo.com
South Valley Alliance of Neighborhood Associations	Zoe Economou	zoecon@unm.edu
Southside Farms Community Association	Larry Elliott	larryaelliott@comcast.net
Southside Farms Community Association	Paul Silva	psilva@comcast.net
Southwest Alliance of Neighbors	Cherise Quezada	10304 Paso Fino Pl SW 87121
Southwest Alliance of Neighbors	Jerry Gallegos	jgallegos@wecdg.org

Notice of Intent to Construct

Under 20.11.41.13B NMAC, the owner/operator is required to *provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are with-in one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located* if they propose to construct or establish a new facility or make modifications to an existing facility that is subject to 20.11.41 NMAC – Construction Permits. **A copy of this form must be included with the application.**

Applicant's Name and Address: Ray Gutierrez, 3111 Love Street SW, Albuquerque, NM 87121

Owner / Operator's Name and Address: Ray Gutierrez, Owner, 3111 Love Street SW, Albuquerque, NM 87121

Actual or Estimated Date the Application will be submitted to the Department: Early May of 2018

Exact Location of the Source or Proposed Source: 3111 Love Street SW, Albuquerque, NM 87121

Description of the Source: Portable crushing and screening plant and a portable screening plant

Nature of the Business: Crushing and screening sand and gravel

Process or Change for which the permit is requested: Ray's Sand and Gravel is applying for a permit modification. Ray's Sand and Gravel has been in business for over 60 years in Albuquerque and over 20 years at this location. The modification will consist of:

1. Replacement of the permitted 280 hp diesel fired engine with a 604hp diesel fired engine,
2. Crushing and Screening plant and Screening plant at 100 tons per hour, and
3. Limited operating hours and scenarios.

Preliminary Estimate of the Maximum Quantities of each regulated air contaminant the source will emit:

Initial Construction Permit

	Pounds Per Hour (lbs/hr)	Tons Per Year (tpy)
CO		
NOx		
SO2		
VOC		
TSP		
PM10		
PM2.5		
VHAP		

Net Changes In Emissions

(Only for permit Modifications or Technical Revisions)

	lbs/hr	tpy	Estimated Total TPY
CO	3.32	3.49	3.49
NOx	14.50	15.02	15.02
SO2	0.01	0.01	0.01
VOC	0.43	0.45	0.45
TSP	4.50	4.73	4.73
PM10	1.51	1.59	1.59
PM2.5	0.21	0.22	0.22
VHAP	N/A**	N/A**	N/A**

** Not Applicable

City of Albuquerque- Environmental Health Department
Air Quality Program- Permitting Section
Phone: (505) 768-1972 Email: aqd@cabq.gov

Maximum Operating Schedule: 2100 hours per year

Normal Operating Schedule: 2100 hours per year

Current Contact Information for Comments and Inquires:

Name: Ray Gutierrez, Owner
Address: 3111 Love Street SW, Albuquerque, NM 87121
Phone Number: (505) 877-1516
E-Mail Address: rayssand@hotmail.com

If you have any comments about the construction or operation of the above facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to the address below:

Environmental Health Manager

Stationary Source Permitting

Albuquerque Environmental Health Department

Air Quality Program

PO Box 1293

Albuquerque, New Mexico 87103

(505) 768-1972

Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, as used in this notice or send a copy of this notice along with your comments, since the Department may not have received the permit application at the time of this notice. Please include a legible mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, if required, the Department's notice will be published in the legal section of the Albuquerque Journal and mailed to neighborhood associations and neighborhood coalitions near the facility location or near the facility proposed location.

Lopez, Angela

From: Lopez, Angela
Sent: Wednesday, May 02, 2018 10:05 AM
To: rmahoney01@comcast.net; mbfernandez1@gmail.com
Cc: rayssand@hotmail.com
Subject: Notice of Intent To Construct
Attachments: Notice of Intent to Construct.pdf

Dear Mr. Rod Mahoney, President and Ms. Marcia Fernandez, Vice President of South Valley Coalition of Neighborhood Associations,

The newly revised local air quality Construction Permit regulation 20.11.41 NMAC requires that designated representatives of recognized neighborhood associations and coalitions within one-half mile of a facility proposing to apply for an air quality permit, modification or technical permit revision be notified in advance of the permit application.

Please see the attached Notice of Intent to Construct form. If you have any comments or questions, please do not hesitate to contact me.

Angela Lopez
Senior Environmental Health Scientist
Small Business Assistance Program
Air Quality Program
Phone: (505) 768-1962
Fax: (505) 768-1977
Email: angelalopez@cabq.gov
Mailing Address:
P. O. Box 1293
Albuquerque, NM 87103
Physical Address:
1 Civic Plaza NW
City/County Building
3rd Floor, Room 3047

Lopez, Angela

From: Lopez, Angela
Sent: Wednesday, May 02, 2018 10:08 AM
To: 'valleygardensna@gmail.com'; 'ajuarez8.ad@gmail.com'
Cc: rayssand@hotmail.com
Subject: Notice of Intent to Construct
Attachments: Notice of Intent to Construct.pdf

Dear Ms. Marcella Rael, President and Ms. Antoinette Dominguez, Vice President of Valley Gardens Neighborhood Association,

The newly revised local air quality Construction Permit regulation 20.11.41 NMAC requires that designated representatives of recognized neighborhood associations and coalitions within one-half mile of a facility proposing to apply for an air quality permit, modification or technical permit revision be notified in advance of the permit application.

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Mailing Address:
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Albuquerque, NM 87103
Physical Address:
1 Civic Plaza NW
City/County Building
3rd Floor, Room 3047

Lopez, Angela

From: Lopez, Angela
Sent: Wednesday, May 02, 2018 10:11 AM
To: 'jfworrall@comcast.net'; 'hlhen@comcast.net'
Cc: rayssand@hotmail.com
Subject: Notice of Intent to Construct
Attachments: Notice of Intent to Construct.pdf

Dear Mr. Gerald Worrall, President and Mr. Harry Hendriksen, Vice President of Westside Coalition of Neighborhood Associations,

The newly revised local air quality Construction Permit regulation 20.11.41 NMAC requires that designated representatives of recognized neighborhood associations and coalitions within one-half mile of a facility proposing to apply for an air quality permit, modification or technical permit revision be notified in advance of the permit application.

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Mailing Address:
P. O. Box 1293
Albuquerque, NM 87103
Physical Address:
1 Civic Plaza NW
City/County Building
3rd Floor, Room 3047

Lopez, Angela

From: Lopez, Angela
Sent: Wednesday, May 02, 2018 10:16 AM
To: snjart@yahoo.com; zoecon@unm.edu
Cc: rayssand@hotmail.com
Subject: Notice of Intent to Construct
Attachments: Notice of Intent to Construct.pdf

Dear Ms. Sara Newton Juarez, President and Ms. Zoe Economou, Vice President of South Valley Alliance of Neighborhood Associations,

The newly revised local air quality Construction Permit regulation 20.11.41 NMAC requires that designated representatives of recognized neighborhood associations and coalitions within one-half mile of a facility proposing to apply for an air quality permit, modification or technical permit revision be notified in advance of the permit application.

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Mailing Address:
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Albuquerque, NM 87103
Physical Address:
1 Civic Plaza NW
City/County Building
3rd Floor, Room 3047

Lopez, Angela

From: Lopez, Angela
Sent: Wednesday, May 02, 2018 10:18 AM
To: 'larryaelliott@comcast.net'; 'psilva@comcast.net'
Cc: rayssand@hotmail.com
Subject: Notice of Intent to Construct
Attachments: Notice of Intent to Construct.pdf

Dear Mr. Larry Elliott, President and Mr. Paul Silva, Vice President of the Southside Farms Community Association,

The newly revised local air quality Construction Permit regulation 20.11.41 NMAC requires that designated representatives of recognized neighborhood associations and coalitions within one-half mile of a facility proposing to apply for an air quality permit, modification or technical permit revision be notified in advance of the permit application.

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Email: angelalopez@cabq.gov

Mailing Address:
P. O. Box 1293
Albuquerque, NM 87103
Physical Address:
1 Civic Plaza NW
City/County Building
3rd Floor, Room 3047

Lopez, Angela

From: Lopez, Angela
Sent: Wednesday, May 02, 2018 10:20 AM
To: 'jgallegos@wccdg.org'
Cc: rayssand@hotmail.com
Subject: Notice of Intent to Construct
Attachments: Notice of Intent to Construct.pdf

Dear Ms. Cherise Quezada, President and Mr. Jerry Gallegos, Vice President of the Southwest Alliance of Neighbors,

The newly revised local air quality Construction Permit regulation 20.11.41 NMAC requires that designated representatives of recognized neighborhood associations and coalitions within one-half mile of a facility proposing to apply for an air quality permit, modification or technical permit revision be notified in advance of the permit application.

Please see the attached Notice of Intent to Construct form. If you have any comments or questions, please do not hesitate to contact me.

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Small Business Assistance Program
Air Quality Program

Phone: (505) 768-1962

Fax: (505) 768-1977
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Notice of Intent to Construct

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Applicant's Name and Address: Ray Gutierrez, 3111 Love Street SW, Albuquerque, NM 87121

Owner / Operator's Name and Address: Ray Gutierrez, Owner, 3111 Love Street SW, Albuquerque, NM 87121

Actual or Estimated Date the Application will be submitted to the Department: Early May of 2018

Exact Location of the Source or Proposed Source: 3111 Love Street SW, Albuquerque, NM 87121

Description of the Source: Portable crushing and screening plant and a portable screening plant

Nature of the Business: Crushing and screening sand and gravel

Process or Change for which the permit is requested: Ray's Sand and Gravel is applying for a permit modification. Ray's Sand and Gravel has been in business for over 60 years in Albuquerque and over 20 years at this location. The modification will consist of:

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2. Crushing and Screening plant and Screening plant at 100 tons per hour, and
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Preliminary Estimate of the Maximum Quantities of each regulated air contaminant the source will emit:

Initial Construction Permit

	Pounds Per Hour (lbs/hr)	Tons Per Year (tpy)
CO		
NOx		
SO2		
VOC		
TSP		
PM10		
PM2.5		
VHAP		

Net Changes In Emissions

(Only for permit Modifications or Technical Revisions)

	lbs/hr	tpy	Estimated Total TPY
CO	3.32	3.49	3.49
NOx	14.50	15.02	15.02
SO2	0.01	0.01	0.01
VOC	0.43	0.45	0.45
TSP	4.50	4.73	4.73
PM10	1.51	1.59	1.59
PM2.5	0.21	0.22	0.22
VHAP	N/A**	N/A**	N/A**

** Not Applicable

City of Albuquerque- Environmental Health Department
Air Quality Program- Permitting Section
Phone: (505) 768-1972 Email: aqd@cabq.gov

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Review Fee Instructions

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

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

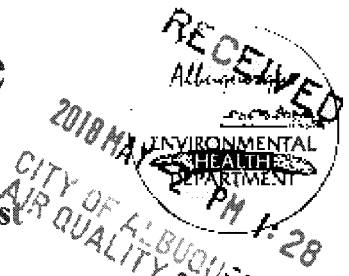
1. be delivered in person to the Albuquerque Environmental Health Department, 3rd floor, Suite 3023 or Suite 3027, Albuquerque-Bernalillo County Government Center, south building, One Civic Plaza NW, Albuquerque, NM or,

2. mailed to Attn: Air Quality Program, Albuquerque Environmental Health Department, P.O. Box 1293, Albuquerque, NM 87103.

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

City of Albuquerque

Environmental Health Department
Air Quality Program
Permit Application Review Fee Checklist



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

I. COMPANY INFORMATION:

Company Name	Ray's Sand & Gravel		
Company Address	3111 Love Road SW, Albuquerque, New Mexico 87121		
Facility Name	Ray's Sand and Gravel		
Facility Address	3111 Love Road SW		
Contact Person	Ray Gutierrez, Owner		
Contact Person Phone Number	(505) 877-1516		
Are these application review fees for an existing permitted source located within the City of Albuquerque or Bernalillo County?		**(Yes)**	**No**
If yes, what is the permit number associated with this modification?		**Permit #664**	
Is this application review fee for a Qualified Small Business as defined in 20.11.2 NMAC? (See Definition of Qualified Small Business on Page 4)		**(Yes)**	**No**

II. STATIONARY SOURCE APPLICATION REVIEW FEES:

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

Check All That Apply	Stationary Sources	Review Fee	Program Element
	Air Quality Notifications		
	AQN New Application	$549.00	2801
	AQN Technical Amendment	$300.00	2802
	AQN Transfer of a Prior Authorization	$300.00	2803
✓	*Not Applicable*	*See Sections Below*	
	Stationary Source Review Fees (Not Based on Proposed Allowable Emission Rate)		
	Source Registration required by 20.11.40 NMAC	$ 559.00	2401
	A Stationary Source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$ 1,097.00	2301
✓	*Not Applicable*	*See Sections Below*	
	Stationary Source Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)		
	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$ 823.00	2302
	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$ 1,646.00	2303
	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$ 3,291.00	2304
	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$ 4,937.00	2305
	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$ 6,582.00	2306
	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$8,228.00	2307
✓	*Not Applicable*	*See Section Above*	

Federal Program Review Fees (In addition to the Stationary Source Application Review Fees above)			
	40 CFR 60 - "New Source Performance Standards" (NSPS)	$ 1,097.00	2308
	40 CFR 61 - "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$ 1,097.00	2309
	40 CFR 63 - (NESHAPs) Promulgated Standards	$ 1,097.00	2310
	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$ 10,971.00	2311
	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$ 5,485.00	2312
	20.11.60 NMAC, Non-Attainment Area Permit	$ 5,485.00	2313
✓	*Not Applicable*	*Not Applicable*	

III. MODIFICATION TO EXISTING PERMIT APPLICATION REVIEW FEES:

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

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

IV. ADMINISTRATIVE AND TECHNICAL REVISION APPLICATION REVIEW FEES:

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

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

V. PORTABLE STATIONARY SOURCE RELOCATION FEES:

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

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

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

Section Totals	Review Fee Amount
Section II Total	$
Section III Total	$2,743.00
Section IV Total	$
Section V Total	$
Total Application Review Fee	$1,920.00

*Application review fee from Section III of $1,646.00 is halved (to $823.00) for qualified small business. Full federal source review fees for 40 CFR 63 NESHAP (promulgated standards) of $1,097.00 applies.

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

Signed this 30 **day of** MARCH **20** 18

RAYMOND GUTIERREZ
Print Name

OWNER
Print Title

Raymond Gutierrez
Signature

Definition of Qualified Small Business as defined in 20.11.2 NMAC:
"Qualified small business" means a business that meets all of the following requirements:
(1) a business that has 100 or fewer employees;

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

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

General Agreement

THIS AGREEMENT made this 30 day of MARCH, 2018, by and between

Bobby Garcia (First Party) and

Raymond Gutierrez (Second Party).

WITNESSETH: That in consideration of the mutual covenants and agreements to be kept and performed on the part of said parties hereto, respectively as herein stated:

I. Said party of the first part covenants and agrees that it shall:

I, Bobby Garcia, give permission to Raymond Gutierrez (Ray's Sand and Gravel) to use my property at 3107 Love Street SW, Albuquerque, New Mexico 87121 to operate his business as he needs it and keep it clean.

II. And said party of the second part covenants and agrees that it shall:

I, Raymond Gutierrez, may use Bobby Garcia's property at 3107 Love Street SW, Albuquerque, NM 87121 as it is needed and keep it clean, insured and responsible for up keep upon my use of the property.

III. Other terms to be observed by and between the parties:

This agreement shall be binding upon the parties, their successors, assigns and personal representatives. Time is of the essence on all undertakings. This agreement shall be enforced under the laws of the State of New Mexico.

This is the entire agreement.

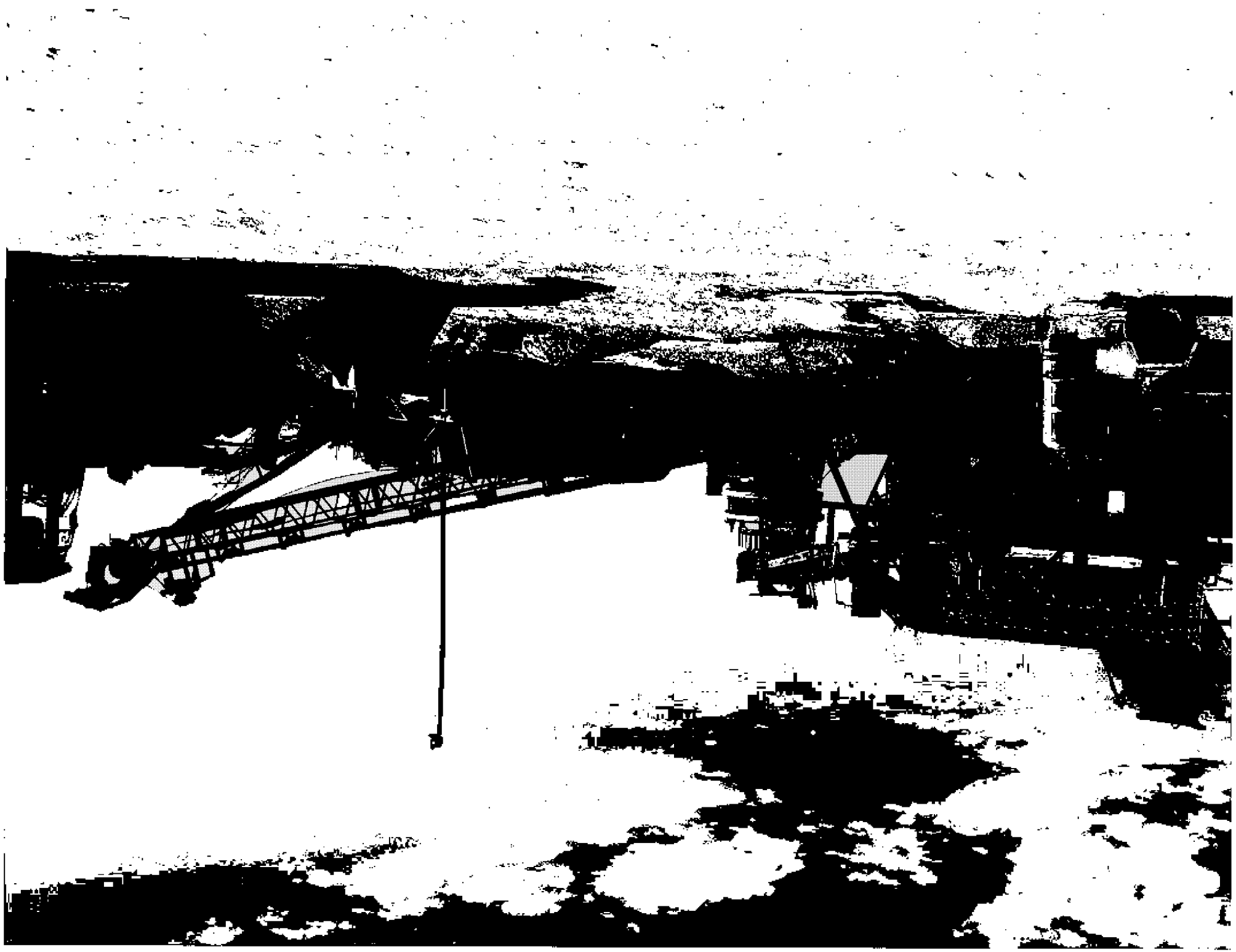
Signed the day and year first written above.

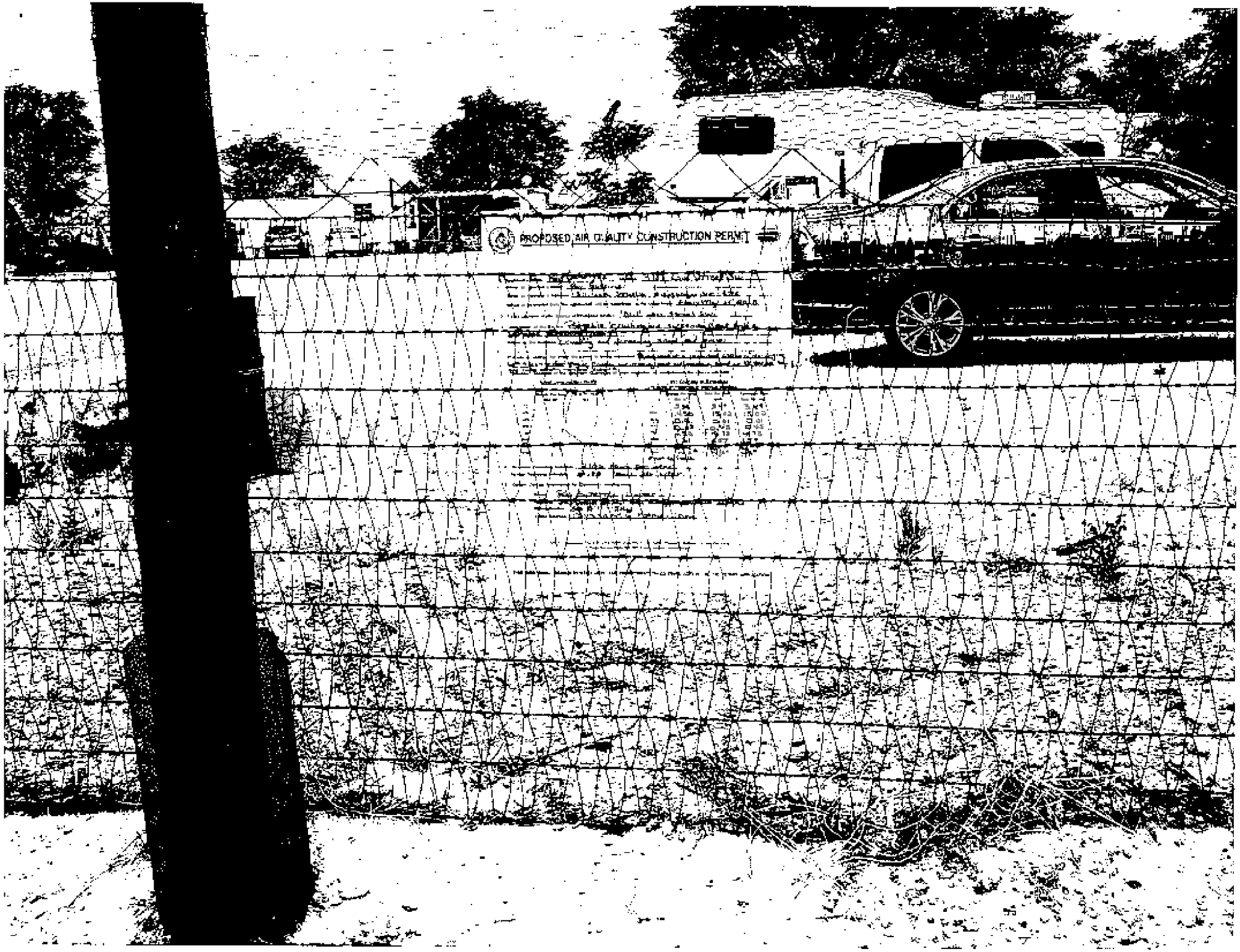
Signed in the presence of:

Witness: Carlos Bermudez First Party:

Witness: Second Party:


3111 LOVE ST SW ALB
NM 87121
OFFICE
PROPOSED AIR QUALITY CONSTRUCTION PERMIT

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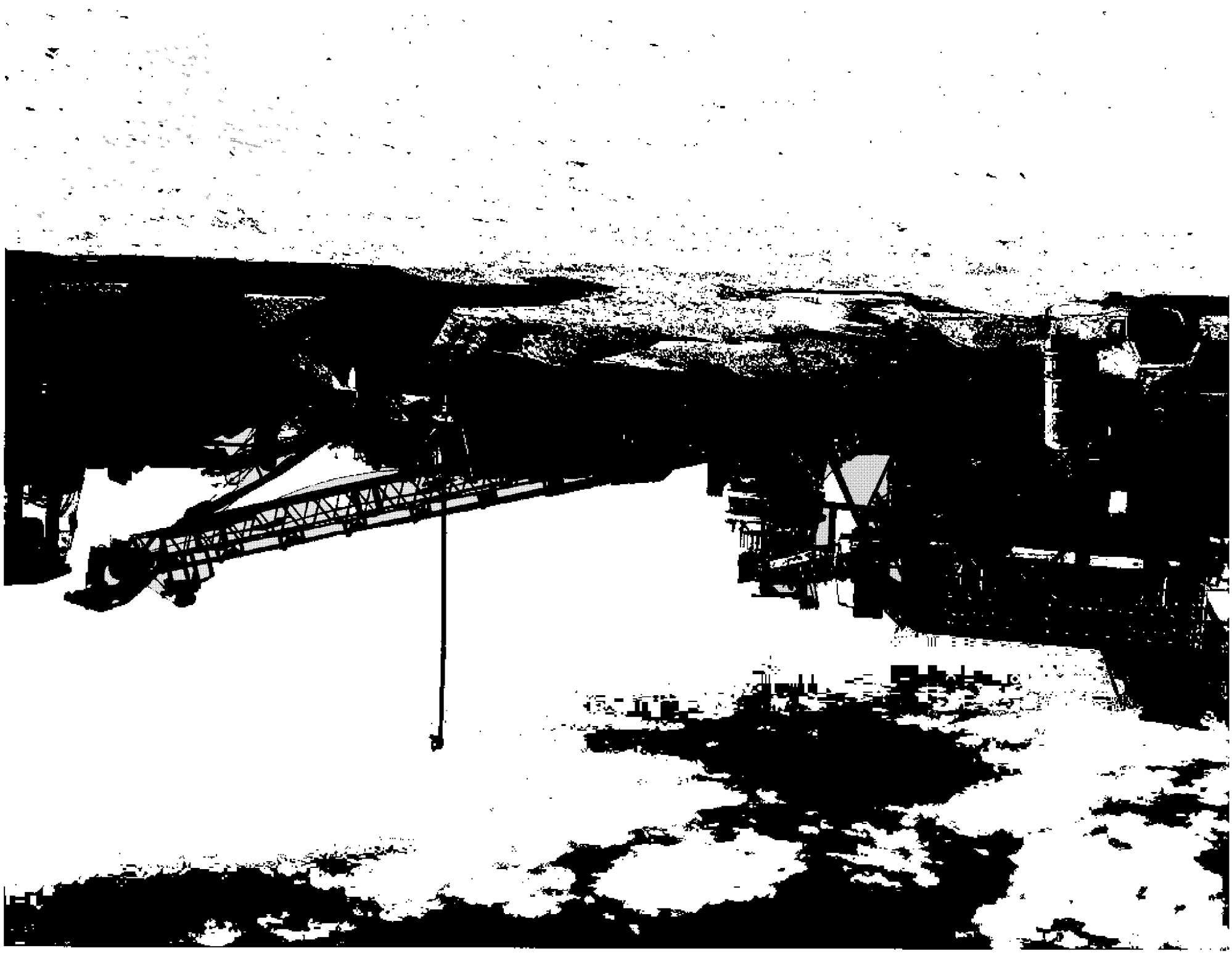

11.19.2 Crushed Stone Processing and Pulverized Mineral Processing

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.

Oversized material is processed in a cone crusher or a hammermill (fines crusher) adjusted to produce small diameter material. The output is returned to the fines screen for resizing.

In certain cases, stone washing is required to meet particulate end product specifications or demands.

Pulverized Mineral Processing

Pulverized minerals are produced at specialized processing plants. These plants supply mineral products ranging from sizes of approximately 1 micrometer to more than 75 micrometers aerodynamic diameter. Pharmaceutical, paint, plastics, pigment, rubber, and chemical industries use these products. Due to the specialized characteristics of the mineral products and the markets for these products, pulverized mineral processing plants have production rates that are less than 5% of the production capacities of conventional crushed stone plants. Two alternative processing systems for pulverized minerals are summarized in Figure 11-19.2-2.

In dry processing systems, the mineral aggregate material from conventional crushing and screening operations is subject to coarse and fine grinding primarily in roller mills and/or ball mills to reduce the material to the necessary product size range. A classifier is used to size the ground material and return oversized material that can be pulverized using either wet or dry processes. The classifier can either be associated with the grinding operation, or it can be a stand-alone process unit. Fabric filters control particulate matter emissions from the grinding operation and the classifier. The products are stored in silos and are shipped by truck or in bags.

In wet processing systems, the mineral aggregate material is processed in wet mode coarse and fine grinding operations. Beneficiation processes use flotation to separate mineral impurities. Finely ground material is concentrated and flash dried. Fabric filters are used to control particulate matter emissions from the flash dryer. The product is then stored in silos, bagged, and shipped.

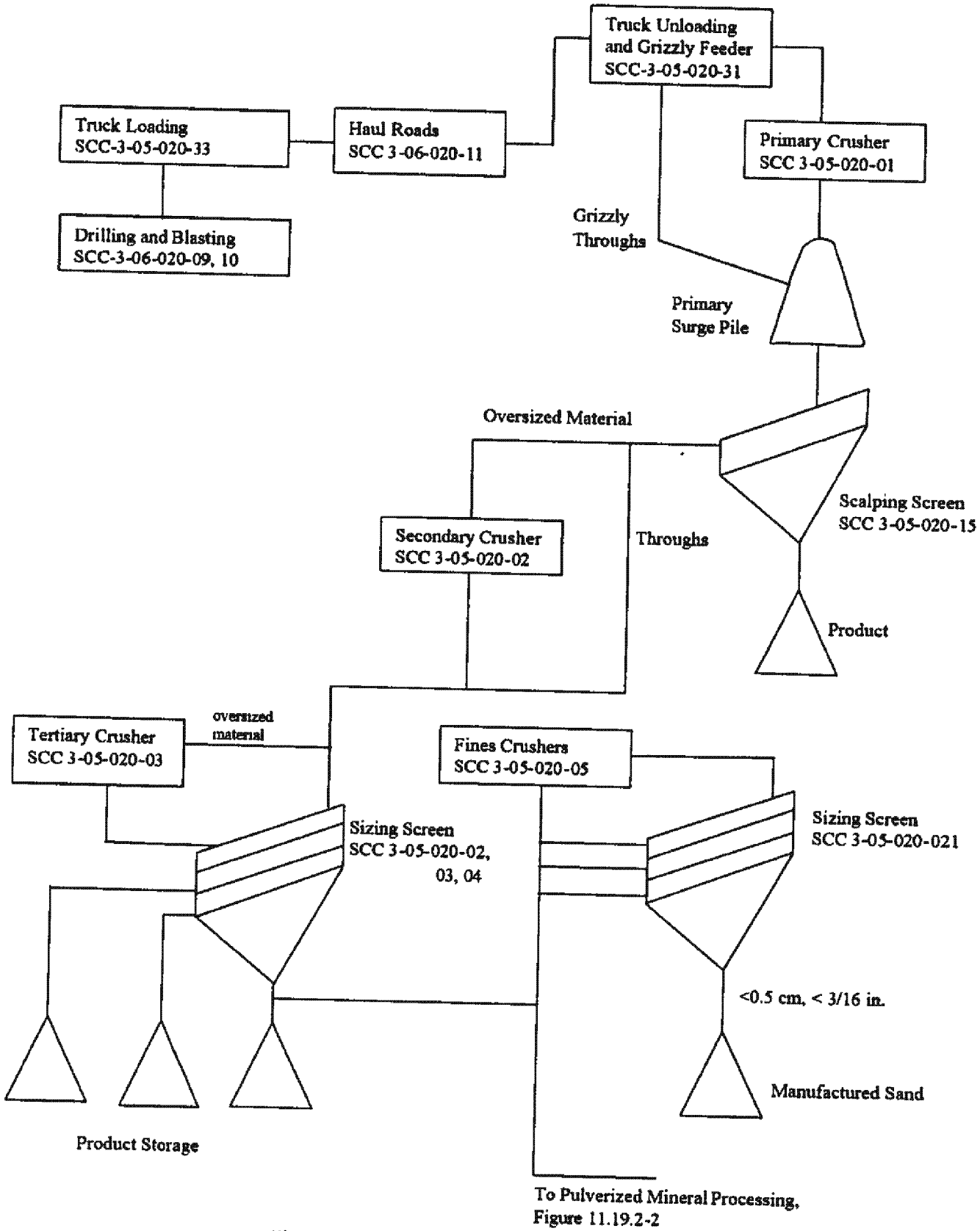

Figure 11.19.2-1. Typical stone processing plant

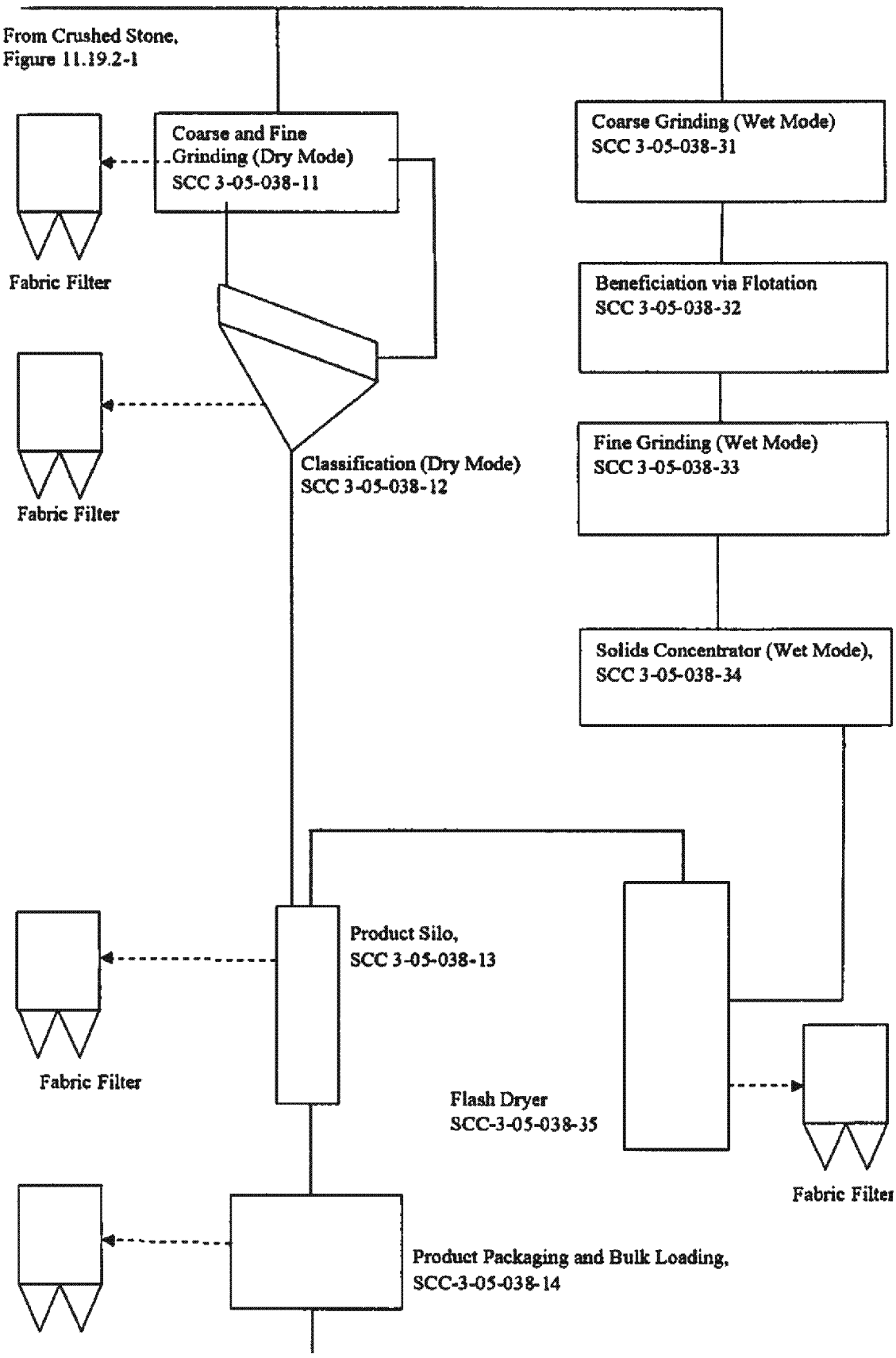

Figure 11.19.2-2 Flowchart for Pulverized Mineral Processing

11.19.2.2 Emissions and Controls [10, 11, 12, 13, 14, and 26]

Crushed Stone Processing

Emissions of PM, PM-10, and PM-2.5 occur from a number of operations in stone quarrying and processing. A substantial portion of these emissions consists of heavy particles that may settle out within the plant. As in other operations, crushed stone emission sources may be categorized as either process sources or fugitive dust sources. Process sources include those for which emissions are amenable to capture and subsequent control. Fugitive dust sources generally involve the reentrainment of settled dust by wind or machine movement. Emissions from process sources should be considered fugitive unless the sources are vented to a baghouse or are contained in an enclosure with a forced-air vent or stack. Factors affecting emissions from either source category include the stone size distribution and the surface moisture content of the stone processed, the process throughput rate, the type of equipment and operating practices used, and topographical and climatic factors.

Of graphical and seasonal factors, the primary variables affecting uncontrolled PM emissions are wind and material moisture content. Wind parameters vary with geographical location, season, and weather. It can be expected that the level of emissions from unenclosed sources (principally fugitive dust sources) will be greater during periods of high winds. The material moisture content also varies with geographical location, season, and weather. Therefore, the levels of uncontrolled emissions from both process emission sources and fugitive dust sources generally will be greater in arid regions of the country than in temperate ones and greater during the summer months because of a higher evaporation rate.

The moisture content of the material processed can have a substantial effect on emissions. This effect is evident throughout the processing operations. Surface wetness causes fine particles to agglomerate on or to adhere to the faces of larger stones, with a resulting dust suppression effect. However, as new fine particles are created by crushing and attrition and as the moisture content is reduced by evaporation, this suppressive effect diminishes and may disappear. Plants that use wet suppression systems (spray nozzles) to maintain relatively high material moisture contents can effectively control PM emissions throughout the process. Depending on the geographical and climatic conditions, the moisture content of mined rock can range from nearly zero to several percent. Because moisture content is usually expressed on a basis of overall weight percent, the actual moisture amount per unit area will vary with the size of the rock being handled. On a constant mass-fraction basis, the per-unit area moisture content varies inversely with the diameter of the rock. The suppressive effect of the moisture depends on both the absolute mass water content and the size of the rock product. Typically, wet material contains >1.5 percent water.

A variety of material, equipment, and operating factors can influence emissions from crushing. These factors include (1) stone type, (2) feed size and distribution, (3) moisture content, (4) throughput rate, (5) crusher type, (6) size reduction ratio, and (7) fines content. Insufficient data are available to present a matrix of rock crushing emission factors detailing the above classifications and variables. Available data indicate that PM-10 and PM-2.5 emissions from limestone and granite processing operations are similar. Therefore, the emission factors developed from the emissions data gathered at limestone and granite processing facilities are considered to be representative of typical crushed stone processing operations. Emission factors for filterable PM, PM-10, and PM-2.5 emissions from crushed stone processing operations are presented in Tables 11.19.2-1 (Metric units) and 11.19.2-2 (English units.)

Table 11.19.2-1 (Metric Units). EMISSION FACTORS FOR CRUSHED STONE PROCESSING OPERATIONS (kg/Mg)[a]

Source [b]	Total Particulate Matter [c,a]	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)	0.0027[d]	E	0.0012[o]	C	ND[n]	
Tertiary Crushing (controlled) (SCC 3-05-020-03)	0.0006[d]	E	0.00027[p]	C	0.00005[q]	E
Fines Crushing (SCC 3-05-020-05)	0.0195[e]	E	0.0075[e]	E	ND	
Fines Crushing (controlled) (SCC 3-05-020-05)	0.0015[f]	E	0.0006[f]	E	0.000035[q]	E
Screening (SCC 3-05-020-02, 03)	0.0125[c]	E	0.0043[l]	C	ND	
Screening (controlled) (SCC 3-05-020-02, 03)	0.0011[d]	E	0.00037[m]	C	0.000025[q]	E
Fines Screening (SCC 3-05-020-21	0.15[g]	E	0.036[g]	E	ND	
Fines Screening (controlled) (SCC 3-05-020-21)	0.0018[g]	E	0.0011[g]	E	ND	
Conveyor Transfer Point (SCC 3-05-020-06)	0.0015[h]	E	0.00055[h]	D	ND	
Conveyor Transfer Point (controlled) (SCC 3-05-020-06)	0.00007[i]	E	2.3×10^{-5}[i]	D	6.5×10^{-6}[q]	E
Wet Drilling - Unfragmented Stone (SCC 3-05-020-10)	ND		4.0×10^{-3}[j]	E	ND	
Truck Unloading - Fragmented Stone (SCC 3-05-020-31)	ND		8.0×10^{-6}[j]	E	ND	
Truck Loading - Conveyor, crushed stone (SCC 3-05-020-32)	ND		5.0×10^{-5}[k]	E	ND	

a. Emission factors represent uncontrolled emissions unless noted. Emission factors in kg/Mg of material 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 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.

Note: Truck Unloading - Conveyor, crushed stone (SCC 3-05-020-32) was corrected to Truck Loading - Conveyor, crushed stone (SCC 3-05-020-32). October 1, 2010.

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

Source [b]	Total Particulate Matter [c,d]	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[r]	E	0.000070[q]	E
Screening (SCC 3-05-020-02, 03)	0.025[c]	E	0.0087[j]	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[f]	E	0.0022[g]	E	ND	
Conveyor Transfer Point (SCC 3-05-020-06)	0.003D[h]	E	0.00110[h]	D	ND	
Conveyor Transfer Point (controlled) (SCC 3-05-020-06)	0.00014[i]	E	4.6×10^{-5}[s]	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 Loading - 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.

Note: Truck Unloading - Conveyor, crushed stone (SCC 3-05-020-32) was corrected to Truck Loading - Conveyor, crushed stone (SCC 3-05-020-32). October 1, 2010.

Emission factor estimates for stone quarry blasting operations are not presented because of the sparsity and unreliability of available tests. While a procedure for estimating blasting emissions is presented in Section 11.9, Western Surface Coal Mining, that procedure should not be applied to stone quarries because of dissimilarities in blasting techniques, material blasted, and size of blast areas. Emission factors for fugitive dust sources, including paved and unpaved roads, materials handling and transfer, and wind erosion of storage piles, can be determined using the predictive emission factor equations presented in AP-42 Section 13.2.

The data used in the preparation of the controlled PM calculations was derived from the individual A-rated tests for PM-2.5 and PM-10 summarized in the Background Support Document. For conveyor transfer points, the controlled PM value was derived from A-rated PM-2.5, PM-10, and PM data summarized in the Background Support Document.

The extrapolation line was drawn through the PM-2.5 value and the mean of the PM-10 values. PM emission factors were calculated for PM-30, PM-50, and PM-100. Each of these particle size limits is used by one or more regulatory agencies as the definition of total particulate matter. The graphical extrapolations used in calculating the emission factors are presented in Figures 11.19.2-3, -4, -5, and -6.

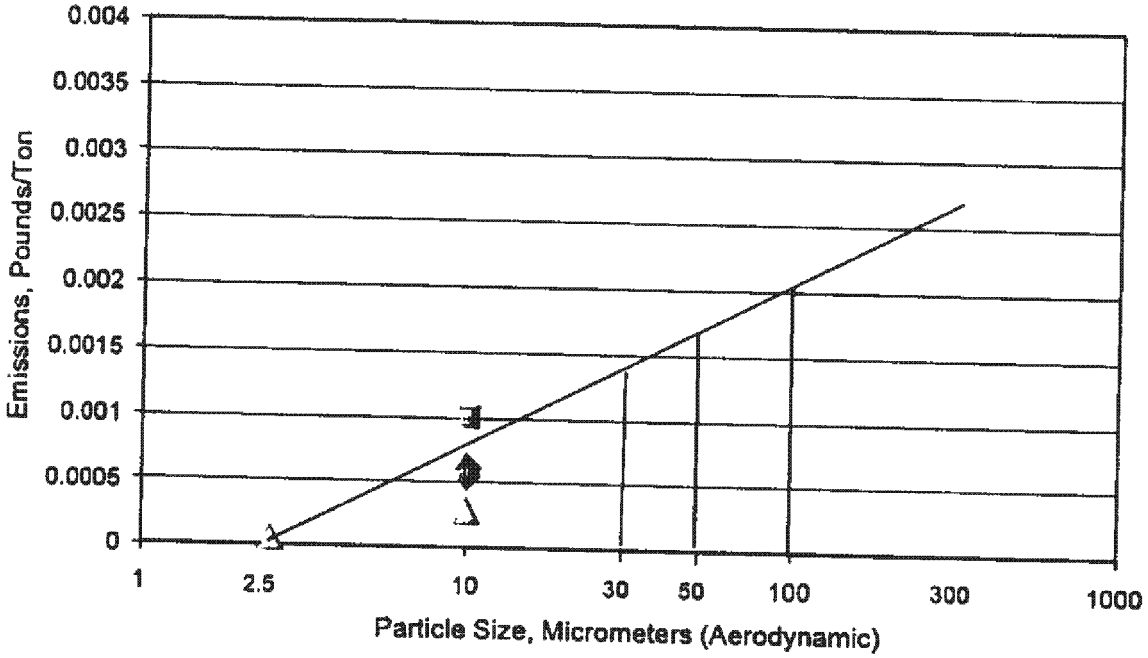

Figure 11-19-3. PM Emission Factor Calculation, Screening (Controlled)

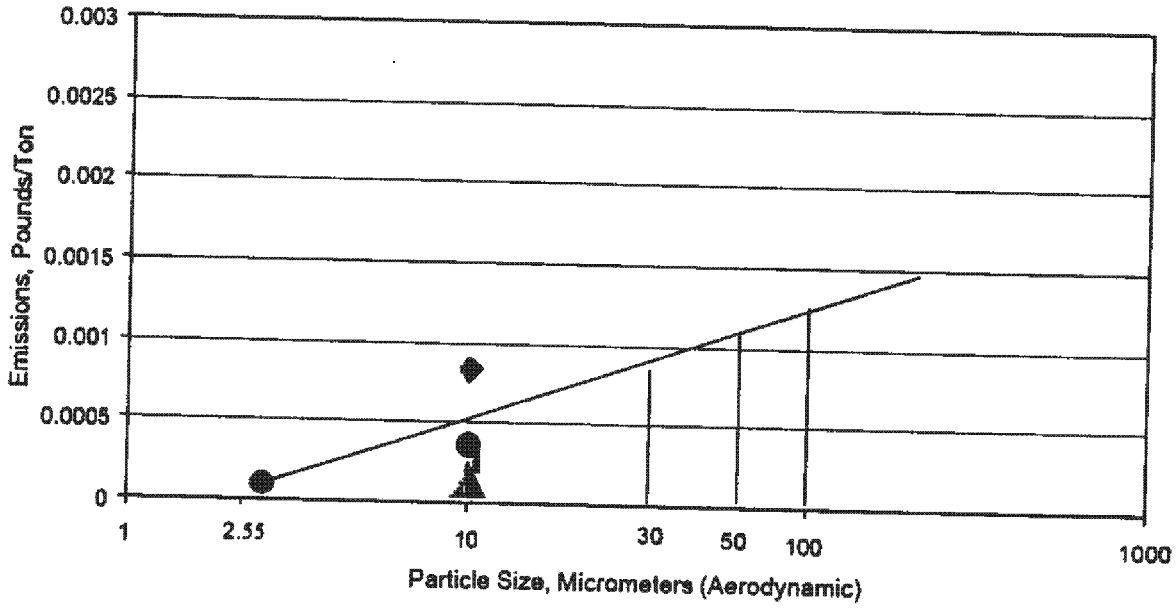

Figure 11.19-4. PM Emission Factor Calculation, Tertiary Crushing (Controlled)

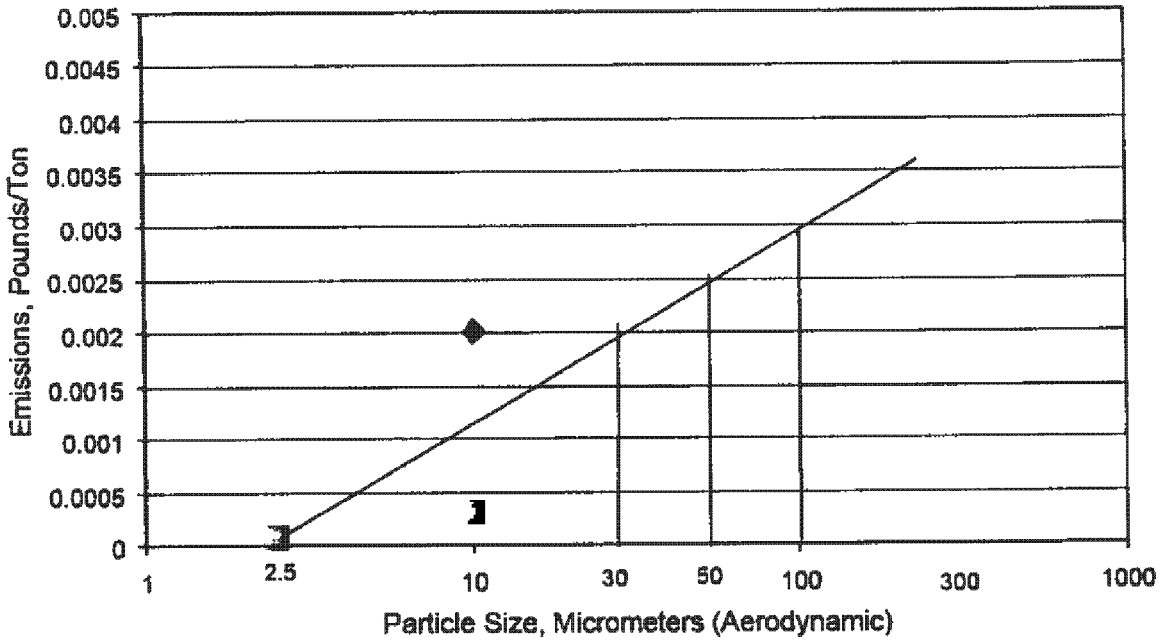

Figure 11-19.5. PM Emission Factor Calculation, Fines Crushing (Controlled)

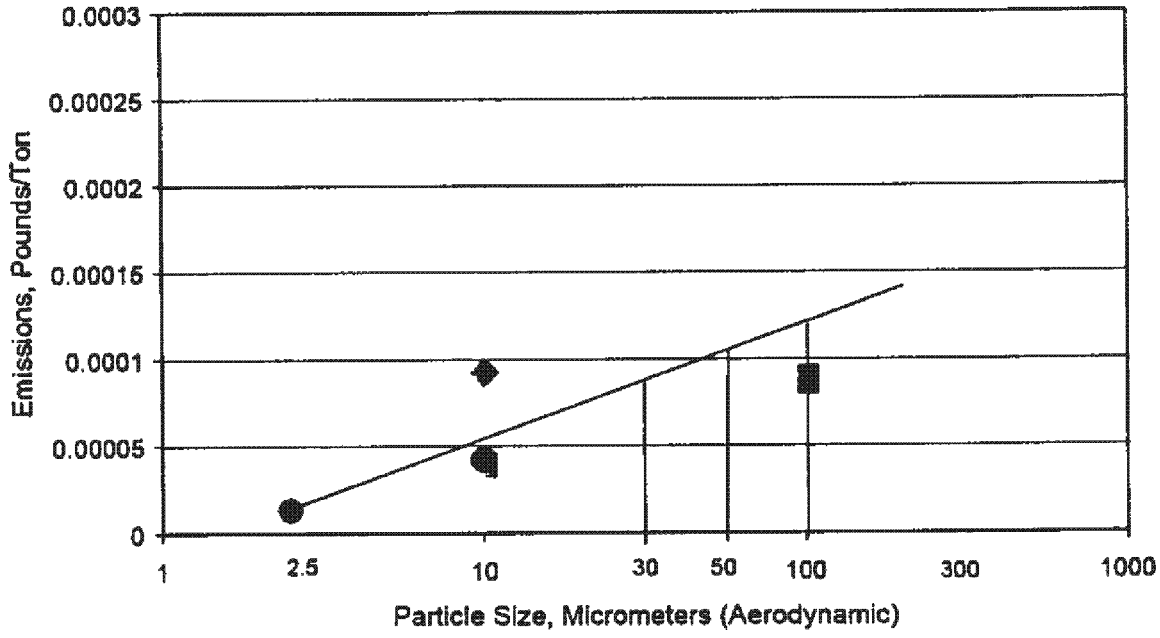

Figure 11.19-6. PM Emission Factor Calculation, Conveyor Transfer Points (Controlled)

The uncontrolled PM emission factors have been calculated from the controlled PM emission factors calculated in accordance with Figures 11.19.2-3 through 11.19.2-6. The PM-10 control efficiencies have been applied to the PM controlled emission factor data to calculate the uncontrolled PM emission rates.

Screening PM-10

Controlled = 0.00073 Lbs./Ton.

Uncontrolled = 0.00865 Lbs./Ton.

Efficiency = 91.6%

Tertiary Crushing PM-10

Controlled = 0.00054

Uncontrolled = 0.00243

Efficiency = 77.7%

Fines Crushing PM-10:

Controlled = 0.0012

Uncontrolled = 0.015

Efficiency = 92.0%

Conveyor Transfer Points PM-10

Controlled = 0.000045

Uncontrolled = 0.0011

Efficiency = 95.9%

The uncontrolled total particulate matter emission factor was calculated from the controlled total particulate matter using Equation 1:

$$\text{Uncontrolled emission factor} = \frac{\text{Controlled total particulate emission factor}}{(100\% - \text{PM-10 Efficiency \%})/100\%}$$

Equation 1

The Total PM emission factors calculated using Figures 11.19.2-3 through 11.19.2-6 were developed because (1) there are more A-rated test data supporting the calculated values and (2) the extrapolated values provide the flexibility for agencies and source operators to select the most appropriate definition for Total PM. All of the Total PM emission factors have been rated as E due to the limited test data and the need to estimate emission factors using extrapolations of the PM-2.5 and PM-10 data.

Pulvertzed Mineral Processing

Emissions of particulate matter from dry mode pulverized mineral processing operations are controlled by pulse jet and envelope type fabric filter systems. Due to the low-to-moderate gas temperatures generated by the processing equipment, conventional felted filter media are used. Collection efficiencies for fabric filter-controlled dry process equipment exceed 99.5%. Emission factors for pulverized mineral processing operations are presented in Tables 11.19.2-3 and 11.19.2-4.

Table 11.19.2-3 (Metric Units). EMISSION FACTORS FOR PULVERIZED MINERAL PROCESSING OPERATIONS [a]

Source [b]	Total Particulate Matter	EMISSION FACTOR RATING	Total PM-10	EMISSION FACTOR RATING	Total PM-2.5	EMISSION FACTOR RATING
Grinding (Dry) with Fabric Filter Control (SCC 3-05-038-11)	0.0202	D	0.0169	B	0.0060	B
Classifiers (Dry) with Fabric Filter Control (SCC 3-05-038-12)	0.0112	E	0.0052	E	0.0020	E
Flash Drying with Fabric Filter Control (SCC 3-05-038-35)	0.0134	C	0.0073	C	0.0042	C
Product Storage with Fabric Filter Control (SCC 3-05-38-13)	0.0055	E	0.0008	E	0.0003	E

a. Emission factors represent controlled emissions unless noted. Emission factors are in kg/Mg of material throughput.

b. Date from references 16 through 23

Table 11.19.2-4 (English Units). EMISSION FACTORS FOR PULVERIZED MINERAL PROCESSING OPERATIONS [a]

Source [b]	Total Particulate Matter	EMISSION FACTOR RATING	Total PM-10	EMISSION FACTOR RATING	Total PM-2.5	EMISSION FACTOR RATING
Grinding (Dry) with Fabric Filter Control (SCC 3-05-038-11)	0.0404	D	0.0339	B	0.0121	B
Classifiers (Dry) with Fabric Filter Control (SCC 3-05-038-12)	0.0225	E	0.0104	E	0.0041	E
Flash Drying with Fabric Filter Control (SCC 3-05-038-35)	0.0268	C	0.0146	C	0.0083	C
Product Storage with Fabric Filter Control (SCC 3-05-038-13)	0.0099	E	0.0016	E	0.0006	E

a. Emission factors represent controlled emissions unless noted. Emission factors are in lb/Ton of material throughput.

b. Data from references 16 through 23

References for Section 11.19.2[1]

1. J. Richards, T. Brozell, and W. Kirk, *PM-10 Emission Factors for a Stone Crushing Plant Deister Vibrating Screen,* EPA Contract No. 68-D1-0055, Task 2.84, U. S. Environmental Protection Agency, Research Triangle Park, NC, February 1992.

2. J. Richards, T. Brozell, and W. Kirk, *PM-10 Emission Factors for a Stone Crushing Plant Tertiary Crusher,* EPA Contract No. 68-D1-0055, Task 2.84, U. S. Environmental Protection Agency, Research Triangle Park, NC, February 1992.

3. W. Kirk, T. Brozell, and J. Richards, *PM-10 Emission Factors for a Stone Crushing Plant Deister Vibrating Screen and Crusher,* National Stone Association, Washington DC, December 1992.

4. T. Brozell, J. Richards, and W. Kirk, *PM-10 Emission Factors for a Stone Crushing Plant Tertiary Crusher and Vibrating Screen,* EPA Contract No. 68-DO-0122, U. S. Environmental Protection Agency, Research Triangle Park, NC, December 1992.

5. T. Brozell, *PM-10 Emission Factors for Two Transfer Points at a Granite Stone Crushing Plant,* EPA Contract No. 68-DO-0122, U. S. Environmental Protection Agency, Research Triangle Park, NC, January 1994.

6. T. Brozell, *PM-10 Emission Factors for a Stone Crushing Plant Transfer Point,* EPA Contract No. 68-DO-0122, U. S. Environmental Protection Agency, Research Triangle Park, NC, February 1993.

7. T. Brozell and J. Richards, *PM-10 Emission Factors for a Limestone Crushing Plant Vibrating Screen and Crusher for Bristol, Tennessee,* EPA Contract No. 68-D2-0163, U. S. Environmental Protection Agency, Research Triangle Park, NC, July 1993.

8. T. Brozell and J. Richards, *PM-10 Emission Factors for a Limestone Crushing Plant Vibrating Screen and Crusher for Marysville, Tennessee,* EPA Contract No. 68-D2-0163, U. S. Environmental Protection Agency, Research Triangle Park, NC, July 1993.

9. *Air Pollution Control Techniques for Nonmetallic Minerals Industry,* EPA-450/3-82-014, U. S. Environmental Protection Agency, Research Triangle Park, NC, August 1982.

10. *Review Emission Data Base and Develop Emission Factors for the Construction Aggregate Industry,* Engineering-Science, Inc., Arcadia, CA, September 1984.

11. P. K. Chalekode *et al., Emissions from the Crushed Granite Industry: State of the Art,* EPA-600/2-78-021, U. S. Environmental Protection Agency, Washington, DC, February 1978.

12. T. R. Blackwood *et al., Source Assessment: Crushed Stone,* EPA-600/2-78-004L, U. S. Environmental Protection Agency, Washington, DC, May 1978.

13. *An Investigation of Particulate Emissions from Construction Aggregate Crushing Operations and Related New Source Performance Standards,* National Crushed Stone Association, Washington, DC, December 1979.

[1] References 1 through 23 are identical to References 1 through 23 in the Background Support Document for AP-42, Section 11.19-2.

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21. Air Quality Technical Services, *Performance Testing for Flash Dryer #2, Omya, Inc. Plant in Florence, Vermont,* March 1998.

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24. *Air Pollution Control Techniques for Nonmetallic Minerals Industry*, EPA-450/3-82-014, U.S. Environmental Protection Agency, Research Triangle Park, NC, August 1982.

25. Written communication from J. Richards, Air Control Techniques, P.C. to B. Shrager, MRI, March 18, 1994.

26. C. Cowherd, Jr. et. al., *Development of Emission Factors For Fugitive Dust Sources*, EPA-450/3-74-037, U.S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

AP 42 Section 13.2.2 Unpaved Roads - Related Information

Paved Roads, Unpaved Roads, Aggregate Handling and Storage, and Industrial Wind Erosion - November 2006

- Policy Guidance on the Use of the November 1, 2006, Update to AP-42 for Re-entrained Road Dust for SIP Development and Transportation Conformity (PDF 255K) This memo provides additional details about the changes made to the AP-42 methods for road dust and how and when to use them in PM2.5 SIPs and transportation plan and transportation improvement program (TIP) conformity determinations. It also reaffirms that PM10 road dust estimates are unchanged from the previous version. This guidance supersedes the AP-42 portions of EPA's February 24, 2004, guidance, which addressed both MOBILE6.2 and AP-42. August 2, 2007.
- Analysis of the Fine Fraction of Particulate Matter in Fugitive Dust. (PDF 1.3M) Final Report for Western Governors' Association Western Regional Air Partnership (WRAP). October 12, 2005. Posted as supporting documentation for the draft AP42 sections 13.2.1 Paved Roads, 13.2.2 Unpaved Roads, 13.2.4 Aggregate Handling and Storage Piles, and 13.2.5 Industrial Wind Erosion. March 22, 2006.
- MS Excel spreadsheets that show all of the data for the wind tunnel tests that support the proposed PM2.5/PM-10 ratios.
  Wrap Phase 1 (XLS 270K)
  Wrap Phase 2 (XLS 330K)
- This spreadsheet contains a list of Surface Material Silt Content by state. EPA has used these values in the preparation of the National Emission Inventory. In the absence of locally derived surface material silt content, users may choose to use the values in this table as default values.
  r13s0202_dec03.xls - December 2003 (XLS 18K)
- This spreadsheet program is for calculating emissions 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.
  r13s0202sample.wk4 - October 1998 (WK4 5M)
  r13s0202sample.xls - October 1998 (XLS 1.25M)

AP 42 Emissions Factors by Chapter

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.

Other variables are important in addition to the silt content of the road surface material. For example, at industrial sites, where haul trucks and other heavy equipment are common, emissions are highly correlated with vehicle weight. On the other hand, there is far less variability in the weights of cars and pickup trucks that commonly travel publicly accessible unpaved roads throughout the United States. For those roads, the moisture content of the road surface material may be more dominant in determining differences in emission levels between, for example a hot, desert environment and a cool, moist location.

The PM-10 and TSP emission factors presented below are the outcomes from stepwise linear regressions of field emission test results of vehicles traveling over unpaved surfaces. Due to a limited amount of information available for PM-2.5, the expression for that particle size range has been scaled against the result for PM-10. Consequently, the quality rating for the PM-2.5 factor is lower than that for the PM-10 expression.

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

as shown in Table 13.2.2-4

Table 13.2.2-4. EMISSION FACTOR FOR 1980'S VEHICLE FLEET EXHAUST, BRAKE WEAR AND TIRE WEAR

Particle Size Range[a]	*C*, Emission Factor for Exhaust, Brake Wear and Tire Wear[b] lb/VMT
$PM_{2.5}$	0.00036
PM_{10}	0.00047
PM_{30}[c]	0.00047

[a] Refers to airborne particulate matter (PM-x) with an aerodynamic diameter equal to or less than x micrometers.
[b] Units shown are pounds per vehicle mile traveled (lb/VMT).
[c] PM-30 is sometimes termed "suspendable particulate" (SP) and is often used as a surrogate for TSP.

It is important to note that the vehicle-related source conditions refer to the average weight, speed, and number of wheels for all vehicles traveling the road. For example, if 98 percent of traffic on the road are 2-ton cars and trucks while the remaining 2 percent consists of 20-ton trucks, then the mean weight is 2.4 tons. More specifically, Equations 1a and 1b are *not* intended to be used to calculate a separate emission factor for each vehicle class within a mix of traffic on a given unpaved road. That is, in the example, one should *not* determine one factor for the 2-ton vehicles and a second factor for the 20-ton trucks. Instead, only one emission factor should be calculated that represents the "fleet" average of 2.4 tons for all vehicles traveling the road.

Moreover, to retain the quality ratings when addressing a group of unpaved roads, it is necessary that reliable correction parameter values be determined for the road in question. The field and laboratory procedures for determining road surface silt and moisture contents are given in AP-42 Appendices C.1 and C.2. Vehicle-related parameters should be developed by recording visual observations of traffic. In some cases, vehicle parameters for industrial unpaved roads can be determined by reviewing maintenance records or other information sources at the facility.

In the event that site-specific values for correction parameters cannot be obtained, then default values may be used.In the absence of site-specific silt content information, an appropriate mean value from Table 13.2.2-1 may be used as a default value, but the quality rating of the equation is reduced by two letters. Because of significant differences found between different types of road surfaces and between different areas of the country, use of the default moisture content value of 0.5 percent in Equation 1b is discouraged. The quality rating should be downgraded two letters when the default moisture content value is used. (It is assumed that readers addressing industrial roads have access to the information needed to develop average vehicle information in Equation 1a for their facility.)

The effect of routine watering to control emissions from unpaved roads is discussed below in Section 13.2.2.3, "Controls". However, all roads are subject to some natural mitigation because of rainfall and other precipitation. The Equation 1a and 1b emission factors can be extrapolated to annual

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 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 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. Vehicle restrictions that limit the speed, weight or number of vehicles on the road;

2. Surface improvement, by measures such as (a) paving or (b) adding gravel or slag to a dirt road; and

3. Surface treatment, such as watering or treatment with chemical dust suppressants.

Available control options span broad ranges in terms of cost, efficiency, and applicability. For example, traffic controls provide moderate emission reductions (often at little cost) but are difficult to enforce. Although paving is highly effective, its high initial cost is often prohibitive. Furthermore, paving is not feasible for industrial roads subject to very heavy vehicles and/or spillage of material in transport. Watering and chemical suppressants, on the other hand, are potentially applicable to most industrial roads at moderate to low costs. However, these require frequent reapplication to maintain an acceptable level of control. Chemical suppressants are generally more cost-effective than water but not in cases of temporary roads (which are common at mines, landfills, and construction sites). In summary, then, one needs to consider not only the type and volume of traffic on the road but also how long the road will be in service when developing control plans.

Vehicle restrictions. These measures seek to limit the amount and type of traffic present on the road or to lower the mean vehicle speed. For example, many industrial plants have restricted employees from driving on plant property and have instead instituted bussing programs. This eliminates emissions due to employees traveling to/from their worksites. Although the heavier average vehicle weight of the busses increases the base emission factor, the decrease in vehicle-miles-traveled results in a lower overall emission rate.

Surface improvements. Control options in this category alter the road surface. As opposed to the "surface treatments" discussed below, improvements are relatively "permanent" and do not require periodic retreatment.

The most obvious surface improvement is paving an unpaved road. This option is quite expensive and is probably most applicable to relatively short stretches of unpaved road with at least several hundred vehicle passes per day. Furthermore, if the newly paved road is located near unpaved areas or is used to transport material, it is essential that the control plan address routine cleaning of the newly paved road surface.

The control efficiencies achievable by paving can be estimated by comparing emission factors for unpaved and paved road conditions. The predictive emission factor equation for paved roads, given in Section 13.2.1, requires estimation of the silt loading on the traveled portion of the paved surface, which in turn depends on whether the pavement is periodically cleaned. Unless curbing is to be installed, the effects of vehicle excursion onto unpaved shoulders (berms) also must be taken into account in estimating the control efficiency of paving.

Other improvement methods cover the road surface with another material that has a lower silt content. Examples include placing gravel or slag on a dirt road. Control efficiency can be estimated by comparing the emission factors obtained using the silt contents before and after improvement. The silt content of the road surface should be determined after 3 to 6 months rather than immediately following placement. Control plans should address regular maintenance practices, such as grading, to retain larger aggregate on the traveled portion of the road.

Surface treatments refer to control options which require periodic reapplication. Treatments fall into the two main categories of (a) "wet suppression" (i. e., watering, possibly with surfactants or other additives), which keeps the road surface wet to control emissions and (b) "chemical stabilization/ treatment", which attempts to change the physical characteristics of the surface. The necessary reapplication frequency varies from several minutes for plain water under summertime conditions to several weeks or months for chemical dust suppressants.

Watering increases the moisture content, which conglomerates particles and reduces their likelihood to become suspended when vehicles pass over the surface. The control efficiency depends on how fast the road dries after water is added. This in turn depends on (a) the amount (per unit road surface area) of water added during each application; (b) the period of time between applications; (c) the weight, speed and number of vehicles traveling over the watered road during the period between applications; and (d) meteorological conditions (temperature, wind speed, cloud cover, etc.) that affect evaporation during the period.

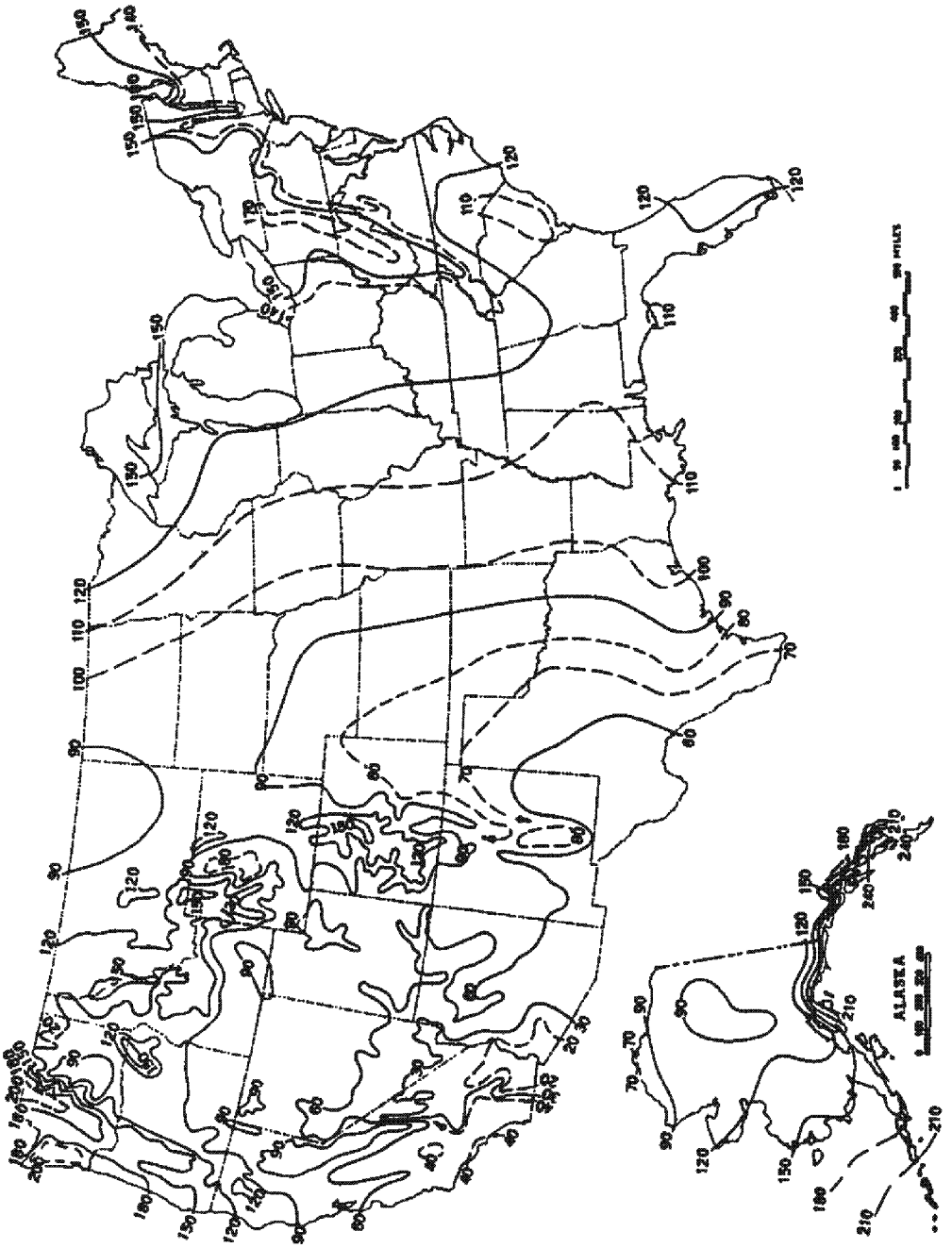

Figure 13.2.2-1. Mean number of days with 0.01 inch or more of precipitation in United States.

Figure 13.2.2-2 presents a simple bilinear relationship between the instantaneous control efficiency due to watering and the resulting increase in surface moisture. The moisture ratio "M" (i.e., the x-axis in Figure 13.2.2-2) is found by dividing the surface moisture content of the watered road by the surface moisture content of the uncontrolled road. As the watered road surface dries, both the ratio M and the predicted instantaneous control efficiency (i.e., the y-axis in the figure) decrease. The figure shows that between the uncontrolled moisture content and a value twice as large, a small increase in moisture content results in a large increase in control efficiency. Beyond that, control efficiency grows slowly with increased moisture content.

Given the complicated nature of how the road dries, characterization of emissions from watered roadways is best done by collecting road surface material samples at various times between water truck passes. (Appendices C.1 and C.2 present the sampling and analysis procedures.) The moisture content measured can then be associated with a control efficiency by use of Figure 13.2.2-2. Samples that reflect average conditions during the watering cycle can take the form of either a series of samples between water applications or a single sample at the midpoint. It is essential that samples be collected during periods with active traffic on the road. Finally, because of different evaporation rates, it is recommended that samples be collected at various times during the year. If only one set of samples is to be collected, these must be collected during hot, summertime conditions.

When developing watering control plans for roads that do not yet exist, it is strongly recommended that the moisture cycle be established by sampling similar roads in the same geographic area. If the moisture cycle cannot be established by similar roads using established watering control plans, the more complex methodology used to estimate the mitigation of rainfall and other precipitation can be used to estimate the control provided by routine watering. An estimate of the maximum daytime Class A pan evaporation (based upon daily evaporation data published in the monthly Climatological Data for the state by the National Climatic Data Center) should be used to insure that adequate watering capability is available during periods of highest evaporation. The hourly precipitation values in the spreadsheet should be replaced with the equivalent inches of precipitation (where the equivalent of 1 inch of precipitation is provided by an application of 5.6 gallons of water per square yard of road). Information on the long term average annual evaporation and on the percentage that occurs between May and October was published in the Climatic Atlas (Reference 16). Figure 13.2.2-3 presents the geographical distribution for "Class A pan evaporation" throughout the United States. Figure 13.2.2-4 presents the geographical distribution of the percentage of this evaporation that occurs between May and October. The U. S. Weather Bureau Class A evaporation pan is a cylindrical metal container with a depth of 10 inches and a diameter of 48 inches. Periodic measurements are made of the changes of the water level.

The above methodology should be used only for prospective analyses and for designing watering programs for existing roadways. The quality rating of an emission factor for a watered road that is based on this methodology should be downgraded two letters. Periodic road surface samples should be collected and analyzed to verify the efficiency of the watering program.

As opposed to watering, chemical dust suppressants have much less frequent reapplication requirements. These materials suppress emissions by changing the physical characteristics of the existing road surface material. Many chemical unpaved road dust suppressants form a hardened surface that binds particles together. After several applications, a treated road often resembles a paved road except that the surface is not uniformly flat. Because the improved surface results in more grinding of small particles, the silt content of loose material on a highly controlled surface may be substantially higher than when the surface was uncontrolled. For this reason, the models presented as Equations 1a and 1b cannot be used to estimate emissions from chemically stabilized roads. Should the road be allowed to return to an

uncontrolled state with no visible signs of large-scale cementing of material, the Equation 1a and 1b emission factors could then be used to obtain conservatively high emission estimates.

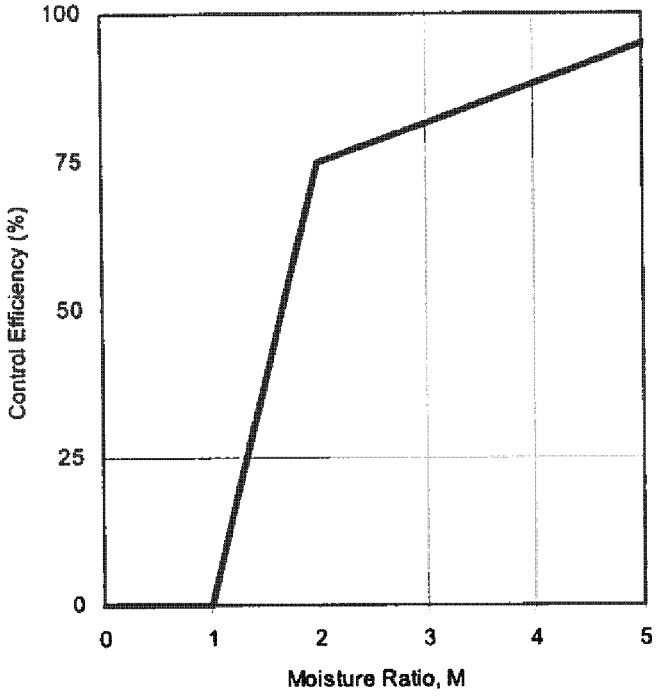

Figure 13.2.2-2. Watering control effectiveness for unpaved travel surfaces

The control effectiveness of chemical dust suppressants appears to depend on (a) the dilution rate used in the mixture; (b) the application rate (volume of solution per unit road surface area); (c) the time between applications; (d) the size, speed and amount of traffic during the period between applications; and (e) meteorological conditions (rainfall, freeze/thaw cycles, etc.) during the period. Other factors that affect the performance of dust suppressants include other traffic characteristics (e. g., cornering, track-on from unpaved areas) and road characteristics (e. g., bearing strength, grade). The variabilities in the above factors and differences between individual dust control products make the control efficiencies of chemical dust suppressants difficult to estimate. Past field testing of emissions from controlled unpaved roads has shown that chemical dust suppressants provide a PM-10 control efficiency of about 80 percent when applied at regular intervals of 2 weeks to 1 month.

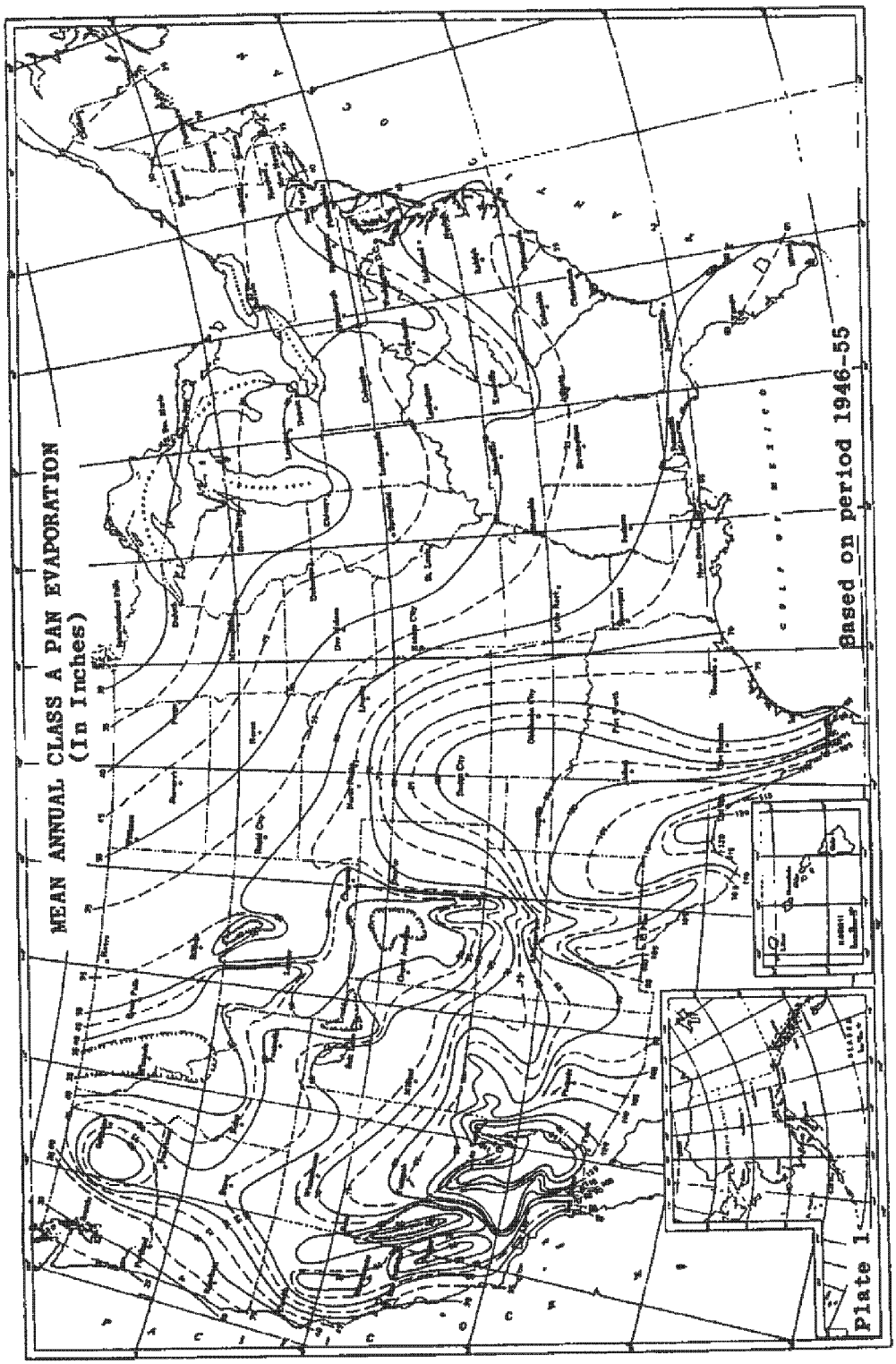

Figure 13.2.2-3. Annual evaporation data.

Figure 13.2.2-4. Geographical distribution of the percentage of evaporation occurring between May and October.

Petroleum resin products historically have been the dust suppressants (besides water) most widely used on industrial unpaved roads. Figure 13.2.2-5 presents a method to estimate average control efficiencies associated with petroleum resins applied to unpaved roads.[20] Several items should be noted:

1. The term "ground inventory" represents the total volume (per unit area) of petroleum resin concentrate (*not solution*) applied since the start of the dust control season.

2. Because petroleum resin products must be periodically reapplied to unpaved roads, the use of a time-averaged control efficiency value is appropriate. Figure 13.2.2-5 presents control efficiency values averaged over two common application intervals, 2 weeks and 1 month. Other application intervals will require interpolation.

3. Note that zero efficiency is assigned until the ground inventory reaches 0.05 gallon per square yard (gal/yd^2). Requiring a minimum ground inventory ensures that one must apply a reasonable amount of chemical dust suppressant to a road before claiming credit for emission control. Recall that the ground inventory refers to the amount of petroleum resin concentrate rather than the total solution.

As an example of the application of Figure 13.2.2-5, suppose that Equation 1a was used to estimate an emission factor of 7.1 lb/VMT for PM-10 from a particular road. Also, suppose that, starting on May 1, the road is treated with 0.221 gal/yd^2 of a solution (1 part petroleum resin to 5 parts water) on the first of each month through September. Then, the average controlled emission factors, shown in Table 13.2.2-5, are found.

Table 13.2-2-5. EXAMPLE OF AVERAGE CONTROLLED EMISSION FACTORS FOR SPECIFIC CONDITIONS

Period	Ground Inventory, gal/yd^2	Average Control Efficiency, %[a]	Average Controlled Emission Factor, lb/VMT
May	0.037	0	7.1
June	0.073	62	2.7
July	0.11	68	2.3
August	0.15	74	1.8
September	0.18	80	1.4

[a] From Figure 13.2.2-5, ≤ 10 μm. Zero efficiency assigned if ground inventory is less than 0.05 gal/yd^2. 1 lb/VMT = 281.9 g/VKT. 1 gal/yd^2 = 4.531 L/m^2.

Besides petroleum resins, other newer dust suppressants have also been successful in controlling emissions from unpaved roads. Specific test results for those chemicals, as well as for petroleum resins and watering, are provided in References 18 through 21.

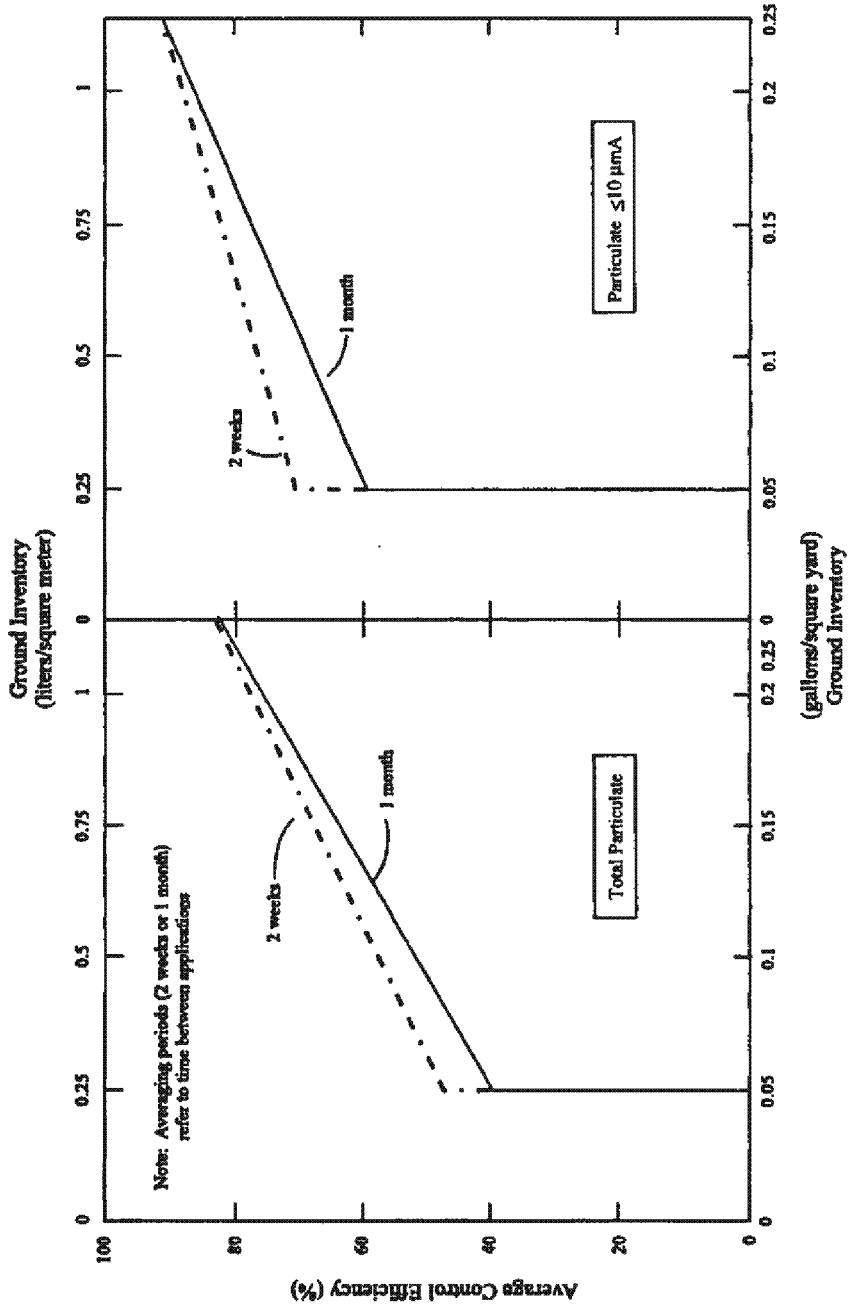

Figure 13.2.2-5. Average control efficiencies over common application intervals.

13.2.2.4 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 (Reference 6).

October 1998 (Supplement E)– This was a major revision of this section. Significant changes to the text and the emission factor equations were made.

October 2001 – Separate emission factors for unpaved surfaces at industrial sites and publicly accessible roads were introduced. Figure 13.2.2-2 was included to provide control effectiveness estimates for watered roads.

December 2003 – The public road emission factor equation (equation 1b) was adjusted to remove the component of particulate emissions from exhaust, brake wear, and tire wear. The parameter C in the new equation varies with aerodynamic size range of the particulate matter. Table 13.2.2-4 was added to present the new coefficients.

January 2006 – The PM-2.5 particle size multipliers (i.e., factors) in Table 13.2.2-2 were modified and the quality ratings were upgraded from C to B based on the wind tunnel studies of a variety of dust emitting surface materials.

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15. *Oregon Fugitive Dust Emission Inventory*, EPA Contract 68-D0-0123, Midwest Research Institute, Kansas City, MO, January 1992.

16. *Climatic Atlas Of The United States*, U. S. Department Of Commerce, Washington, DC, June 1968.

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19. G. E. Muleski, *et al., Extended Evaluation Of Unpaved Road Dust Suppressants In The Iron And Steel Industry*, EPA-600/2-84-027, U. S. Environmental Protection Agency, Cincinnati, OH, February 1984.

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APPENDIX B.2

GENERALIZED PARTICLE SIZE DISTRIBUTIONS

CONTENTS

Appendix B.2

Generalized Particle Size Distributions

B.2.1 Rationale For Developing Generalized Particle Size Distributions

The preparation of size-specific particulate emission inventories requires size distribution information for each process. Particle size distributions for many processes are contained in appropriate industry sections of this document. Because particle size information for many processes of local impact and concern are unavailable, this appendix provides "generic" particle size distributions applicable to these processes. The concept of the "generic" particle size distribution is based on categorizing measured particle size data from similar processes generating emissions from similar materials. These generic distributions have been developed from sampled size distributions from about 200 sources.

Generic particle size distributions are approximations. They should be used only in the absence of source-specific particle size distributions for areawide emission inventories.

B.2.2 How To Use The Generalized Particle Size Distributions For Uncontrolled Processes

Figure B.2-1 provides an example calculation to assist the analyst in preparing particle size-specific emission estimates using generic size distributions.

The following instructions for the calculation apply to each particulate emission source for which a particle size distribution is desired and for which no source specific particle size information is given elsewhere in this document:

1. Identify and review the AP-42 section dealing with that process.

2. Obtain the uncontrolled particulate emission factor for the process from the main text of AP-42, and calculate uncontrolled total particulate emissions.

3. Obtain the category number of the appropriate generic particle size distribution from Table B.2-1.

4. Obtain the particle size distribution for the appropriate category from Table B.2-2. Apply the particle size distribution to the uncontrolled particulate emissions.

Instructions for calculating the controlled size-specific emissions are given in Table B.2-3 and illustrated in Figure B.2-1.

Figure B.2-1. Example calculation for determining uncontrolled and controlled particle size-specific emissions.

SOURCE IDENTIFICATION
Source name and address: ABC Brick Manufacturing
24 Dusty Way
Anywhere, USA

Process description: Dryers/Grinders
AP-42 Section: 8.3, Bricks And Related Clay Products
Uncontrolled AP-42 emission factor: 96 lbs/ton (units)
Activity parameter: 63,700 tons/year (units)
Uncontrolled emissions: 3057.6 tons/year (units)

UNCONTROLLED SIZE EMISSIONS
Category name: Mechanically Generated/Aggregated, Unprocessed Ores
Category number: 3

	Particle size (μm)		
	≤ 2.5	≤ 6	≤ 10
Generic distribution, Cumulative percent equal to or less than the size:	15	34	51
Cumulative mass ≤ particle size emissions (tons/year):	458.6	1039.6	1559.4

CONTROLLED SIZE EMISSIONS*
Type of control device: Fabric Filter

	Particle size (μm)		
	0 - 2.5	2.5 - 6	6 - 10
Collection efficiency (Table B.2-3):	99.0	99.5	99.5
Mass in size range** before control (tons/year):	458.6	581.0	519.8
Mass in size range after control (tons/year):	4.59	2.91	2.60
Cumulative mass (tons/year):	4.59	7.50	10.10

* These data do not include results for the greater than 10 μm particle size range.
** Uncontrolled size data are cumulative percent equal to or less than the size. Control efficiency data apply only to size range and are not cumulative.

Table B.2-1. PARTICLE SIZE CATEGORY BY AP-42 SECTION

AP-42 Section	Source Category	Category Number*
	External combustion	
1.1	Bituminous and subbituminous coal combustion	a
1.2	Anthracite coal combustion	a
1.3	Fuel oil combustion	
	Residual oil	
	Utility	a
	Commercial	a
	Distillate oil	
	Utility	a
	Commercial	a
	Residential	a
1.4	Natural gas combustion	a
1.5	Liquefied petroleum gas	a
1.6	Wood waste combustion in boilers	a
1.7	Lignite combustion	a
1.8	Bagasse combustion	b
1.9	Residential fireplaces	a
1.10	Residential wood stoves	a
1.11	Waste oil combustion	a
	Solid waste disposal	
2.1	Refuse combustion	a
2.2	Sewage sludge incineration	a
2.7	Conical burners (wood waste)	2
	Internal combustion engines	
	Highway vehicles	c
3.2	Off highway vehicles	1
	Organic chemical processes	
6.4	Paint and varnish	4
6.5	Phthalic anhydride	9
6.8	Soap and detergents	a
	Inorganic chemical processes	
8.2	Urea	a
8.3	Ammonium nitrate fertilizers	a
8.4	Ammonium sulfate	
	Rotary dryer	b
	Fluidized bed dryer	b
8.5	Phosphate fertilizers	3
8.5 3	Ammonium phosphates	
	Reactor/ammoniator-granulator	4
	Dryer/cooler	4
8.7	Hydrofluoric acid	
	Spar drying	3
	Spar handling	3
	Transfer	3
8.9	Phosphoric acid (thermal process)	a
8.10	Sulfuric acid	b
8.12	Sodium carbonate	a
	Food and agricultural	
9.3.1	Defoliation and harvesting of cotton	
	Trailer loading	6
	Transport	6
9.3.2	Harvesting of grain	
	Harvesting machine	6
	Truck loading	6
	Field transport	6
9.5.2	Meat smokehouses	9
9.7	Cotton ginning	b
9.9.1	Grain elevators and processing plants	a
9.9.4	Alfalfa dehydrating	
	Primary cyclone	b
	Meal collector cyclone	7
	Pellet cooler cyclone	7
	Pellet regrind cyclone	7
9.9.7	Starch manufacturing	7
9.12	Fermentation	6,7
9.13.2	Coffee roasting	6
	Wood products	
10.2	Chemical wood pulping	a
10.7	Charcoal	9
	Mineral products	
11.1	Hot mix asphalt plants	a
11.3	Bricks and related clay products	
	Raw materials handling	
	Dryers, grinders, etc.	b

Table B.2-1 (cont.).

AP-42 Section	Source Category	Category Number*
	Tunnel/periodic kilns	
	Gas fired	a
	Oil fired	a
	Coal fired	a
11.5	Refractory manufacturing	
	Raw material dryer	3
	Raw material crushing and screening	3
	Electric arc melting	8
	Curing oven	3
11.6	Portland cement manufacturing	
	Dry process	
	Kilns	a
	Dryers, grinders, etc.	4
	Wet process	
	Kilns	a
	Dryers, grinders, etc.	4
11.7	Ceramic clay manufacturing	
	Drying	3
	Grinding	4
	Storage	3
11.8	Clay and fly ash sintering	
	Fly ash sintering, crushing, screening, yard storage	5
	Clay mixed with coke	
	Crushing, screening, yard storage	3
11.9	Western surface coal mining	a
11.10	Coal cleaning	3
11.12	Concrete batching	3
11.13	Glass fiber manufacturing	
	Unloading and conveying	3
	Storage bins	3
	Mixing and weighing	3
	Glass furnace - wool	a
	Glass furnace - textile	a
11.15	Glass manufacturing	a
11.16	Gypsum manufacturing	
	Rotary ore dryer	a
	Roller mill	4
	Impact mill	4
	Flash calciner	a
	Continuous kettle calciner	a
11.17	Lime manufacturing	a
11.18	Mineral wool manufacturing	
	Cupola	8
	Reverberatory furnace	8
	Blow chamber	8
	Curing oven	9
	Cooler	9
11.19.1	Sand and gravel processing	
	Continuous drop	
	Transfer station	a
	Pile formation - stacker	a
	Batch drop	a
	Active storage piles	a
	Vehicle traffic on unpaved road	a
11.19.2	Crushed stone processing	
	Dry crushing	
	Primary crushing	a
	Secondary crushing and screening	a
	Tertiary crushing and screening	3
	Recrushing and screening	4
	Fines mill	4
	Screening, conveying, handling	a
11.21	Phosphate rock processing	
	Drying	a
	Calcining	a
	Grinding	b
	Transfer and storage	3
11.23	Taconite ore processing	
	Fine crushing	4

Table B.2-1 (cont.).

AP-42 Section	Source Category	Category Number*
	Waste gas	a
	Pellet handling	4
	Grate discharge	5
	Grate feed	4
	Bentonite blending	4
	Coarse crushing	3
	Ore transfer	3
	Bentonite transfer	4
	Unpaved roads	a
11.24	Metallic minerals processing	a
	Metallurgical	
12.1	Primary aluminum production	
	Bauxite grinding	4
	Aluminum hydroxide calcining	5
	Anode baking furnace	9
	Prebake cell	a
	Vertical Soderberg	8
	Horizontal Soderberg	a
12.2	Coke manufacturing	a
12.3	Primary copper smelting	a
12.4	Ferroalloy production	a
12.5	Iron and steel production	
	Blast furnace	
	Slips	a
	Cast house	a
	Sintering	
	Windbox	a
	Sinter discharge	a
	Basic oxygen furnace	a
	Electric arc furnace	a
12.6	Primary lead smelting	a
12.7	Zinc smelting	8
12.8	Secondary aluminum operations	
	Sweating furnace	8
	Smelting	
	Crucible furnace	8
	Reverberatory furnace	a
12.9	Secondary copper smelting and alloying	8
12.10	Gray iron foundries	a
12.11	Secondary lead processing	a
12.12	Secondary magnesium smelting	8
12.13	Steel foundries - melting	b
12.14	Secondary zinc processing	8
12.15	Storage battery production	b
12.18	Leadbearing ore crushing and grinding	4
	Miscellaneous sources	
13.1	Wildfires and prescribed burning	a
13.2	Fugitive dust	a

* Data for numbered categories are given Table B.2-2. Particle size data on "a" categories are found in the AP-42 text; for "b" categories, in Appendix B.1; and for "c" categories, in AP-42 *Volume II: Mobile Sources.*

Figure B.2-2. CALCULATION SHEET

SOURCE IDENTIFICATION
Source name and address: _____
_____
_____

Process description: _____
AP-42 Section: _____
Uncontrolled AP-42 emission factor: _____ (units)
Activity parameter: _____ (units)
Uncontrolled emissions: _____ (units)

UNCONTROLLED SIZE EMISSIONS
Category name: _____
Category number: _____

	Particle size (μm)		
	≤ 2.5	≤ 6	≤ 10
Generic distribution, Cumulative percent equal to or less than the size:			
Cumulative mass ≤ particle size emissions (tons/year):			

CONTROLLED SIZE EMISSIONS*
Type of control device: _____

	Particle size (μm)		
	0 - 2.5	2.5 - 6	6 - 10
Collection efficiency (Table B.2-3):			
Mass in size range** before control (tons/year):			
Mass in size range after control (tons/year):			
Cumulative mass (tons/year):			

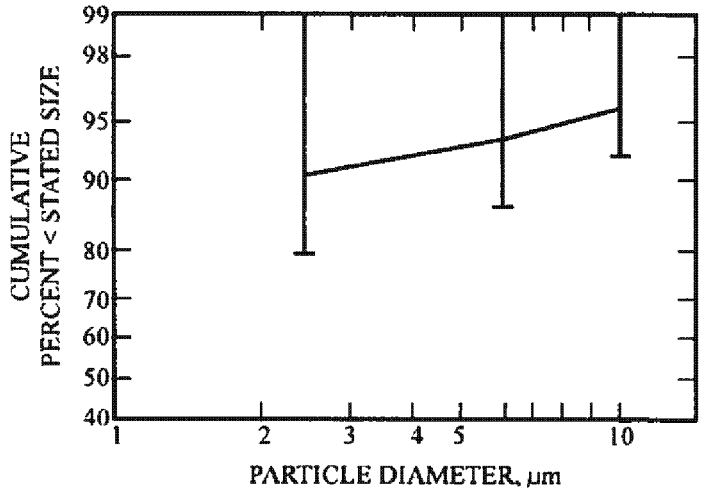
* These data do not include results for the greater than 10 μm particle size range.
** Uncontrolled size data are cumulative percent equal to or less than the size. Control efficiency data apply only to size range and are not cumulative.

Table B.2-2. DESCRIPTION OF PARTICLE SIZE CATEGORIES

Category: 1
Process: Stationary Internal Combustion Engines
Material: Gasoline and Diesel Fuel

Category 1 covers size-specific emissions from stationary internal combustion engines. The particulate emissions are generated from fuel combustion.

REFERENCES: 1,9



Particle Size, μm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	82			
2.0[a]	88			
2.5	90	78	99	11
3.0[a]	90			
4.0[a]	92			
5.0[a]	93			
6.0	93	86	99	7
10.0	96	92	99	4

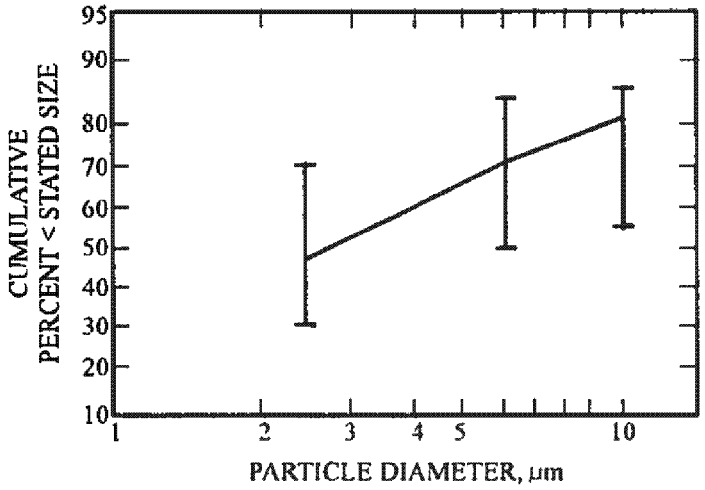
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 2
Process: Combustion
Material: Mixed Fuels

Category 2 covers boilers firing a mixture of fuels, regardless of the fuel combination. The fuels include gas, coal, coke, and petroleum. Particulate emissions are generated by firing these miscellaneous fuels.

REFERENCE: 1



Particle Size, μm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	23			
2.0[a]	40			
2.5	45	32	70	17
3.0[a]	50			
4.0[a]	58			
5.0[a]	64			
6.0	70	49	84	14
10.0	79	56	87	12

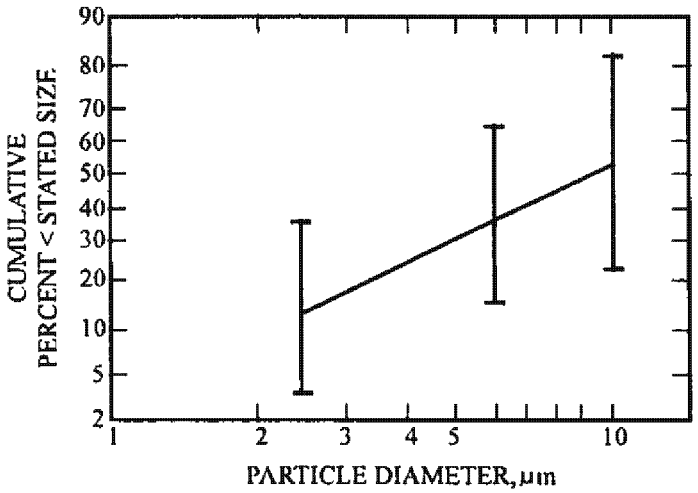
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 3
Process: Mechanically Generated
Material: Aggregate, Unprocessed Ores

Category 3 covers material handling and processing of aggregate and unprocessed ore. This broad category includes emissions from milling, grinding, crushing, screening, conveying, cooling, and drying of material. Emissions are generated through either the movement of the material or the interaction of the material with mechanical devices.

REFERENCES: 1-2,4,7



Particle Size, µm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	4			
2.0[a]	11			
2.5	15	3	35	7
3.0[a]	18			
4.0[a]	25			
5.0[a]	30			
6.0	34	15	65	13
10.0	51	23	81	14

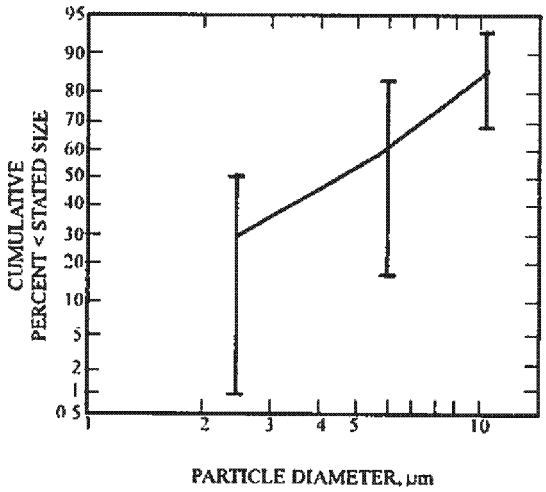
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 µm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 4
Process: Mechanically Generated
Material: Processed Ores and Nonmetallic Minerals

Category 4 covers material handling and processing of processed ores and minerals. While similar to Category 3, processed ores can be expected to have a greater size consistency than unprocessed ores. Particulate emissions are a result of agitating the materials by screening or transfer during size reduction and beneficiation of the materials by grinding and fine milling and by drying.

REFERENCE: 1



Particle Size, μm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	6			
2.0[a]	21			
2.5	30	1	51	19
3.0[a]	36			
4.0[a]	48			
5.0[a]	58			
6.0	62	17	83	17
10.0	85	70	93	7

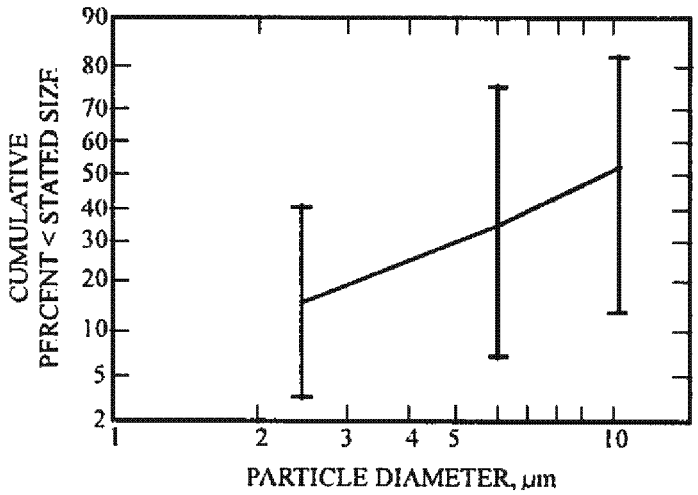
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 5
Process: Calcining and Other Heat Reaction Processes
Material: Aggregate, Unprocessed Ores

Category 5 covers the use of calciners and kilns in processing a variety of aggregates and unprocessed ores. Emissions are a result of these high temperature operations.

REFERENCES: 1-2,8



Particle Size, μm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	6			
2.0[a]	13			
2.5	18	3	42	11
3.0[a]	21			
4.0[a]	28			
5.0[a]	33			
6.0	37	13	74	19
10.0	53	25	84	19

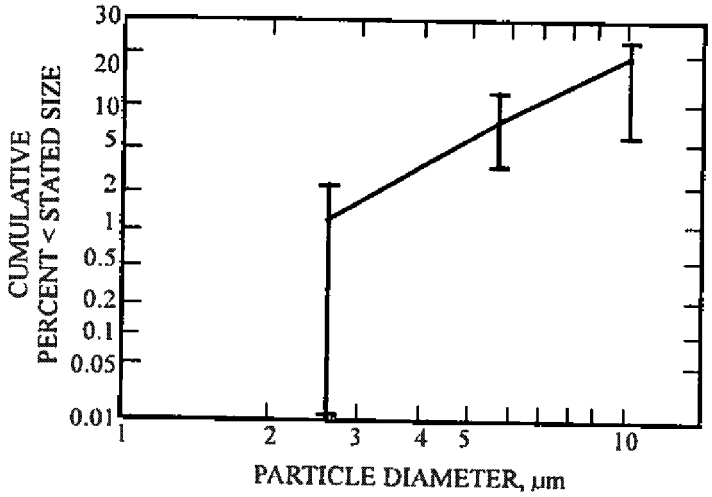
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 6
Process: Grain Handling
Material: Grain

Category 6 covers various grain handling (versus grain processing) operations. These processes could include material transfer, ginning and other miscellaneous handling of grain. Emissions are generated by mechanical agitation of the material.

REFERENCES: 1,5



Particle Size, μm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	0.07			
2.0[a]	0.60			
2.5	1	0	2	1
3.0[a]	2			
4.0[a]	3			
5.0[a]	5			
6.0	7	3	12	3
10.0	15	6	25	7

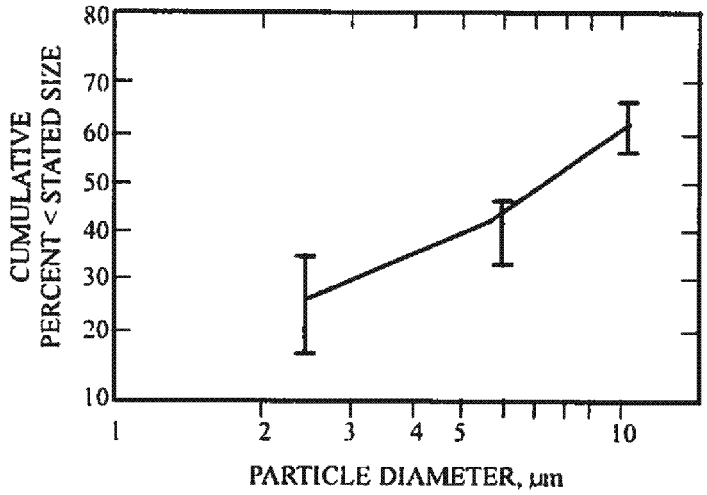
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 7
Process: Grain Processing
Material: Grain

Category 7 covers grain processing operations such as drying, screening, grinding, and milling. The particulate emissions are generated during forced air flow, separation, or size reduction.

REFERENCES: 1-2



Particle Size, μm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	8			
2.0[a]	18			
2.5	23	17	34	9
3.0[a]	27			
4.0[a]	34			
5.0[a]	40			
6.0	43	35	48	7
10.0	61	56	65	5

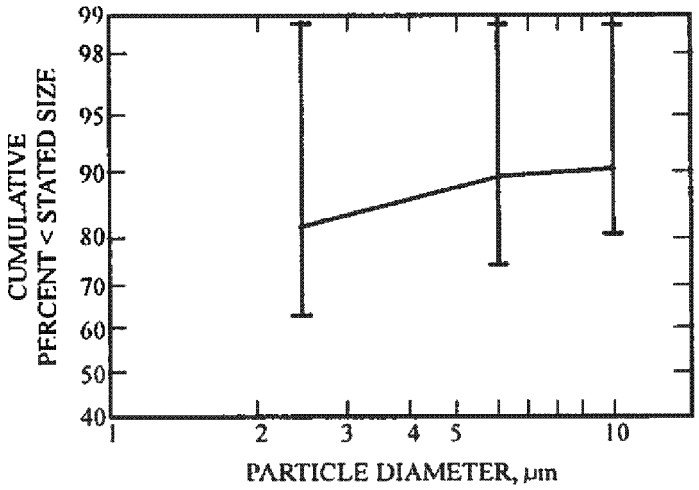
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 8
Process: Melting, Smelting, Refining
Material: Metals, except Aluminum

Category 8 covers the melting, smelting, and refining of metals (including glass) other than aluminum. All primary and secondary production processes for these materials which involve a physical or chemical change are included in this category. Materials handling and transfer are not included. Particulate emissions are a result of high temperature melting, smelting, and refining.

REFERENCES: 1-2



Particle Size, μm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	72			
2.0[a]	80			
2.5	82	63	99	12
3.0[a]	84			
4.0[a]	86			
5.0[a]	88			
6.0	89	75	99	9
10.0	92	80	99	7

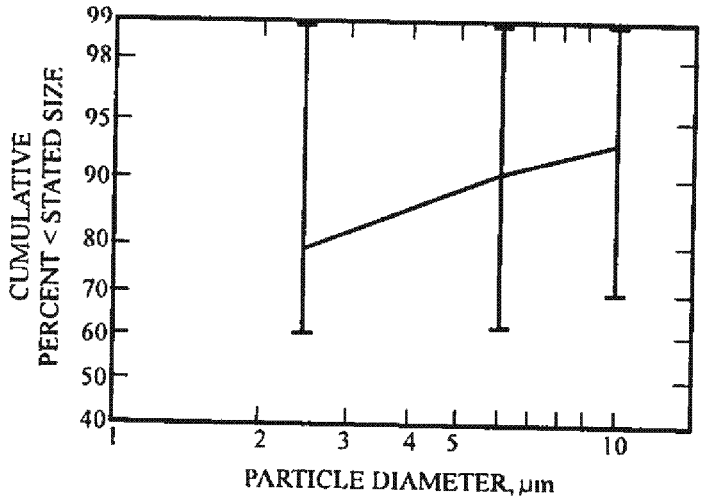
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 9
Process: Condensation, Hydration, Absorption, Prilling, and Distillation
Material: All

Category 9 covers condensation, hydration, absorption, prilling, and distillation of all materials. These processes involve the physical separation or combination of a wide variety of materials such as sulfuric acid and ammonium nitrate fertilizer. (Coke ovens are included since they can be considered a distillation process which separates the volatile matter from coal to produce coke.)

REFERENCES: 1,3



Particle Size, µm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	60			
2.0[a]	74			
2.5	78	59	99	17
3.0[a]	81			
4.0[a]	85			
5.0[a]	88			
6.0	91	61	99	12
10.0	94	71	99	9

[a] Value calculated from data reported at 2.5, 6.0, and 10.0 µm. No statistical parameters are given for the calculated value.

B.2.3 How To Use The Generalized Particle Size Distributions For Controlled Processes

To calculate the size distribution and the size-specific emissions for a source with a particulate control device, the user first calculates the uncontrolled size-specific emissions. Next, the fractional control efficiency for the control device is estimated using Table B.2-3. The Calculation Sheet provided (Figure B.2-2) allows the user to record the type of control device and the collection efficiencies from Table B.2-3, the mass in the size range before and after control, and the cumulative mass. The user will note that the uncontrolled size data are expressed in cumulative fraction less than the stated size. The control efficiency data apply only to the size range indicated and are not cumulative. These data do not include results for the greater than 10 μm particle size range. In order to account for the total controlled emissions, particles greater than 10 μm in size must be included.

B.2.4 Example Calculation

An example calculation of uncontrolled total particulate emissions, uncontrolled size-specific emissions, and controlled size specific emission is shown in Figure B.2-1. A blank Calculation Sheet is provided in Figure B.2-2.

Table B.2-3. TYPICAL COLLECTION EFFICIENCIES OF VARIOUS PARTICULATE CONTROL DEVICES[a]
(%)

AIRS Code[b]	Type Of Collector	Particle Size (μm)		
		0 - 2.5	2.5 - 6	6 - 10
001	Wet scrubber - hi-efficiency	90	95	99
002	Wet scrubber - med-efficiency	25	85	95
003	Wet scrubber - low-efficiency	20	80	90
004	Gravity collector - hi-efficiency	3.6	5	6
005	Gravity collector - med-efficiency	2.9	4	4.8
006	Gravity collector - low-efficiency	1.5	3.2	3.7
007	Centrifugal collector - hi-efficiency	80	95	95
008	Centrifugal collector - med-efficiency	50	75	85
009	Centrifugal collector - low-efficiency	10	35	50
010	Electrostatic precipitator - hi-efficiency	95	99	99.5
011	Electrostatic precipitator - med-efficiency			
	boilers	50	80	94
	other	80	90	97
012	Electrostatic precipitator - low-efficiency			
	boilers	40	70	90
	other	70	80	90
014	Mist eliminator - high velocity >250 FPM	10	75	90
015	Mist eliminator - low velocity <250 FPM	5	40	75

Table B.2-3 (cont.).

AIRS Code[b]	Type Of Collector	Particle Size (μm)		
		0 - 2.5	2.5 - 6	6 - 10
016	Fabric filter - high temperature	99	99.5	99.5
017	Fabric filter - med temperature	99	99.5	99.5
018	Fabric filter - low temperature	99	99.5	99.5
046	Process change	NA	NA	NA
049	Liquid filtration system	50	75	85
050	Packed-gas absorption column	90	95	99
051	Tray-type gas absorption column	25	85	95
052	Spray tower	20	80	90
053	Venturi scrubber	90	95	99
054	Process enclosed	1.5	3.2	3.7
055	Impingement plate scrubber	25	95	99
056	Dynamic separator (dry)	90	95	99
057	Dynamic separator (wet)	50	75	85
058	Mat or panel filter - mist collector	92	94	97
059	Metal fabric filter screen	10	15	20
061	Dust suppression by water sprays	40	65	90
062	Dust suppression by chemical stabilizer or wetting agents	40	65	90
063	Gravel bed filter	0	5	80
064	Annular ring filter	80	90	97
071	Fluid bed dry scrubber	10	20	90
075	Single cyclone	10	35	50
076	Multiple cyclone w/o fly ash reinjection	80	95	95
077	Multiple cyclone w/fly ash reinjection	50	75	85
085	Wet cyclonic separator	50	75	85
086	Water curtain	10	45	90

[a] Data represent an average of actual efficiencies. Efficiencies are representative of well designed and well operated control equipment. Site-specific factors (e. g., type of particulate being collected, varying pressure drops across scrubbers, maintenance of equipment, etc.) will affect collection efficiencies. Efficiencies shown are intended to provide guidance for estimating control equipment performance when source-specific data are not available. NA = not applicable.

[b] Control codes in Aerometric Information Retrieval System (AIRS), formerly National Emissions Data Systems.

References For Appendix B.2

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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.

Table 13.2.4-1. TYPICAL SILT AND MOISTURE CONTENTS OF MATERIALS AT VARIOUS INDUSTRIES[a]

Industry	No. Of Facilities	Material	Silt Content (%)			Moisture Content (%)		
			No. Of Samples	Range	Mean	No. Of Samples	Range	Mean
Iron and steel production	9	Pellet ore	13	1.3 - 13	4.3	11	0.64 - 4.0	2.2
		Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.0	5.4
		Coal	12	2.0 - 7.7	4.6	11	2.8 - 11	4.8
		Slag	3	3.0 - 7.3	5.3	3	0.25 - 2.0	0.92
		Flue dust	3	2.7 - 23	13	1	—	7
		Coke breeze	2	4.4 - 5.4	4.9	2	6.4 - 9.2	7.8
		Blended ore	1	—	15	1	—	6.6
		Sinter	1	—	0.7	0	—	—
		Limestone	3	0.4 - 2.3	1.0	2	ND	0.2
Stone quarrying and processing	2	Crushed limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
		Various limestone products	8	0.8 - 14	3.9	8	0.46 - 5.0	2.1
Taconite mining and processing	1	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.0	0.9
		Tailings	2	ND	11	1	—	0.4
Western surface coal mining	4	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
		Overburden	15	3.8 - 15	7.5	0	—	—
		Exposed ground	3	5.1 - 21	15	3	0.8 - 6.4	3.4
Coal-fired power plant	1	Coal (as received)	60	0.6 - 4.8	2.2	59	2.7 - 7.4	4.5
Municipal solid waste landfills	4	Sand	1	—	2.6	1	—	7.4
		Slag	2	3.0 - 4.7	3.8	2	2.3 - 4.9	3.6
		Cover	5	5.0 - 16	9.0	5	8.9 - 16	12
		Clay/dirt mix	1	—	9.2	1	—	14
		Clay	2	4.5 - 7.4	6.0	2	8.9 - 11	10
		Fly ash	4	78 - 81	80	4	26 - 29	27
		Misc. fill materials	1	—	12	1	—	11

[a] References 1-10. ND = no data.

13.2.4.3 Predictive Emission Factor Equations

Total dust emissions from aggregate storage piles result from several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Loadout of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

Either adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front-end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

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]

$$E = k(0.0016) \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (kg/megagram [Mg])} \quad (1)$$

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

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

correction parameters cannot be obtained, the appropriate mean from Table 13.2.4-1 may be used, but the quality rating of the equation is reduced by 1 letter.

For emissions from equipment traffic (trucks, front-end loaders, dozers, etc.) traveling between or on piles, it is recommended that the equations for vehicle traffic on unpaved surfaces be used (see Section 13.2.2). For vehicle travel between storage piles, the silt value(s) for the areas among the piles (which may differ from the silt values for the stored materials) should be used.

Worst-case emissions from storage pile areas occur under dry, windy conditions. Worst-case emissions from materials-handling operations may be calculated by substituting into the equation appropriate values for aggregate material moisture content and for anticipated wind speeds during the worst case averaging period, usually 24 hours. The treatment of dry conditions for Section 13.2.2, vehicle traffic, "Unpaved Roads", follows the methodology described in that section centering on parameter p. A separate set of nonclimatic correction parameters and source extent values corresponding to higher than normal storage pile activity also may be justified for the worst-case averaging period.

13.2.4.4 Controls[12-13]

Watering and the use of chemical wetting agents are the principal means for control of aggregate storage pile emissions. Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Watering is useful mainly to reduce emissions from vehicle traffic in the storage pile area. Watering of the storage piles themselves typically has only a very temporary slight effect on total emissions. A much more effective technique is to apply chemical agents (such as surfactants) that permit more extensive wetting. Continuous chemical treating of material loaded onto piles, coupled with watering or treatment of roadways, can reduce total particulate emissions from aggregate storage operations by up to 90 percent.[12]

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Unpaved Road Surface Material Silt C

comment

State	Unpaved Road Surface Material Silt Content (%)
Alabama	3.9
Alaska	3.8
Arizona	3.0
Arkansas	3.9
California	2.6
Colorado	1.5
Connecticut	3.9
Delaware	3.9
DC	0.0
Florida	3.9
Georgia	3.9
Hawaii	3.8
Idaho	3.9
Illinois	2.6
Indiana	2.6
Iowa	2.5
Kansas	3.9
Kentucky	3.9
Louisiana	3.9
Maine	3.9
Maryland	3.9
Massachusetts	3.9
Michigan	3.9
Minnesota	2.6
Mississippi	2.7
Missouri	3.9
Montana	6.5
Nebraska	6.6
Nevada	4.2
New Hampshire	1.7
New Jersey	3.9
New Mexico	3.9
New York	4.3
North Carolina	4.7
North Dakota	5.1
Ohio	3.9
Oklahoma	3.1
Oregon	4.4
Pennsylvania	7.2
Rhode Island	3.3
South Carolina	3.9
South Dakota	3.9
Tennessee	3.1
Texas	2.0
Utah	5.6
Vermont	3.9
Virginia	3.9
Washington	3.2
West Virginia	3.9
Wisconsin	3.9
Wyoming	4.2
	7.1
	3.8

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 3.3-1. EMISSION FACTORS FOR UNCONTROLLED GASOLINE AND DIESEL INDUSTRIAL ENGINES[a]

Pollutant	Gasoline Fuel (SCC 2-02-003-01, 2-03-003-01)		Diesel Fuel (SCC 2-02-001-02, 2-03-001-01)		EMISSION FACTOR RATING
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	
NO_x	0.011	1.63	0.031	4.41	D
CO	6.96 E-03[d]	0.99[d]	6.68 E-03	0.95	D
SO_x	5.91 E-04	0.084	2.05 E-03	0.29	D
PM-10[b]	7.21 E-04	0.10	2.20 E-03	0.31	D
CO_2[c]	1.08	154	1.15	164	B
Aldehydes	4.85 E-04	0.07	4.63 E-04	0.07	D
TOC					
Exhaust	0.015	2.10	2.47 E-03	0.35	D
Evaporative	6.61 E-04	0.09	0.00	0.00	E
Crankcase	4.85 E-03	0.69	4.41 E-05	0.01	E
Refueling	1.08 E-03	0.15	0.00	0.00	E

[a] References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. 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. TOC = total organic compounds.

[b] PM-10 = particulate matter less than or equal to 10 μm aerodynamic diameter. All particulate is assumed to be ≤ 1 μm in size.

[c] Assumes 99% conversion of carbon in fuel to CO_2 with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

[d] Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

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

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

Pollutant	Diesel Fuel (SCC 2-02-004-01)			Dual Fuel[b] (SCC 2-02-004-02)		
	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.