Internal Use Only	
APP ID: APCD	-APP/CER
SITE ID: APCD	-SITE-

GENERAL PERMIT OR REGISTRATION APPLICATION FORM

21JUL07 PM 2:31 APCD

APCD AIR POLLUTION CONTROL DISTRICT COUNTY OF SAN DIEGO

Submittal of this application does not grant permission to construct or to operate equipment except as specified in Rule 24(c).

REASON FOR SUBMITTAL OF APPLICATION:

- ☐ New Installation
- ☐ Amendment to Existing Authority to Construct or Application
- ☑ Change of Permit Conditions
- ☐ Registration of Portable Equipment
- ☐ Existing Unpermitted Equipment or Rule 11 Change
- ☐ Change of Equipment Location
- ☐ Change Permit to Operate Status to Inactive
- ☐ Other (Specify)
- ☐ Modification of Existing Permitted Equipment
- ☐ Change of Equipment Ownership *(please provide proof of ownership)*
- ☐ Banking Emissions

List affected APP/PTO Record ID(s): APCD2009-PTO-982505

APPLICANT INFORMATION

Name of Business (DBA) Superior Ready Mix

Does this organization own or operate any other APCD permitted equipment at this or any other adjacent locations? ☑ Yes ☐ No

If yes, list assigned Site Record IDs listed on your Permits APCD2002-SITE-04628

Name of Legal Owner (if different from DBA)

Equipment Owner			Authority to Construct Mailing Address		
Name: Superior Ready Mix			Name: Superior Ready Mix		
Mailing Address: 1564 West Mission Road			Mailing Address: 1564 West Mission Road		
City: Escondido	State: CA	Zip: 92029	City: Escondido	State: CA	Zip: 92029
Phone: (760) 745-0556			Phone: (760) 745-0556		
E-Mail Address: smendoza@superiorrm.com			E-Mail Address: smendoza@superiorrm.com		

Permit To Operate Mailing Address			Invoice Mailing Address		
Name: Superior Ready Mix			Name: Superior Ready Mix		
Mailing Address: 1564 West Mission Road			Mailing Address: 1564 West Mission Road		
City: Escondido	State: CA	Zip: 92029	City: Escondido	State: CA	Zip: 92029
Phone: (760) 745-0556			Phone: (760) 745-0556		
E-Mail Address: smendoza@superiorrm.com			E-Mail Address: smendoza@superiorrm.com		

EQUIPMENT/PROCESS INFORMATION: Type of Equipment: ☑ **Stationary** ☐ **Portable,** ***if portable please enter below the equipment storage address.*** **If portable, will operation exceed 12 consecutive months at the same location** ☐ **Yes** ☐ **No**

Equipment Location Address 500 N Tulip Street City Escondido State: CA

Parcel No. 2323601700 Zip 92025 Phone (760) 745-0556 E-mail: smendoza@superiorrm.com

Site Contact Shawn Mendoza Phone (760) 745-0556

General Description of Equipment/Process Hot Mix Asphalt Plant

Application Submitted by ☑ Owner ☐ Operator ☐ Contractor ☐ Consultant Affiliation

EXPEDITED APPLICATION PROCESSING: ☐ **I hereby request Expedited Application Processing and understand that:**
a) Expedited processing will incur additional fees and permits will not be issued until the additional fees are paid in full (see Rule 40(d)(8)(iv) for details) b) Expedited processing is contingent on the availability of qualified staff c) Once engineering review has begun this request cannot be cancelled d) Expedited processing does not guarantee action by any specific date nor does it guarantee permit approval.

☐ **This application contains trade secret or confidential information** *(see reverse for instructions)*

I hereby certify that all information provided on this application is true and correct.

SIGNATURE [redacted] Date 7-2-2021

Print Name Shawn M Company Superior Ready Mix

Phone (760) 745-0556 E-mail Address smendoza@superiorrm.com

Internal Use Only

Date Staff Initials: Amt Rec'd $ Fee Schedule

RNP: EMF: NBF: TA:

GEN_APP_Form_Rev Date: Aug. 2017

SESPE
CONSULTING, INC.
A Trinity Consultants Company

3990 Old Town Ave, Suite A203 • San Diego, CA 92110
Office (619) 894-8669 • Fax (805) 667-8104

July 7, 2021

Mr. Peter Ossowski
San Diego APCD
10124 Old Grove Road
San Diego, CA 92131

Re: Risk Reduction Plan for 2014 HRA and
Application for Modified Permit Conditions (APCD-PTO-982505)
Escondido Asphalt (Facility ID 10158)

Dear Mr. Ossowski:

This letter transmits an application package for changes to certain permit conditions. These permit condition changes serve as the Risk Reduction Plan for the 2014 HRA approved for the subject facility. The proposed changes to operating permit conditions will result in the following:

1. Dryer stack nickel emissions factor from AP-42 background report to be used instead of the default factor from AP-42; and
2. Road dust control efficiency increased to 95%.

1. DRYER STACK NICKEL EMISSIONS

The default asphalt stack nickel emission factor utilized by the District in the emissions inventory/prioritization is from AP-42 Table 11.1-12[1] and has an Emission Factor Rating of "D." Page 4-247 of the *AP-42 Chapter 11.1. Hot Mix Asphalt Plants Background Document*[2] contains an emission factor for nickel from a baghouse-equipped, natural gas-fired drum mix asphalt plant, with an Emission Factor Rating of "A" that was used in the HRAs. Both emissions factors are presented in Background Document screenshots presented on the next page.

Determining factors are that natural gas is the fuel and the dryer vents to a baghouse. Permit Condition 5 is already requires the plant to be fueled by natural gas and is proposed to be appended with the following text, "**and shall only operate in conjunction with the baghouse listed in the Equipment Description on this permit.**"

[1] https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s01.pdf
[2] https://www3.epa.gov/ttn/chief/ap42/ch11/bgdocs/b11s01.pdf

Figure 1. Default Nickel Emissions Factor in AP-42 Section 11.1

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

Process	Pollutant	Emission Factor, lb/ton	Emission Factor Rating	Reference Numbers
Fuel oil-fired dryer, uncontrolled (SCC 3-05-002-58, -59,-60)	Arsenic[b]	1.3×10^{-6}	E	340
	Barium	0.00025	E	340
	Beryllium[b]	0.0	E	340
	Cadmium[b]	4.2×10^{-6}	E	340
	Chromium[b]	2.4×10^{-5}	E	340
	Cobalt[b]	1.5×10^{-5}	E	340
	Copper	0.00017	E	340
	Lead[b]	0.00054	E	340
	Manganese[b]	0.00065	E	340
	Nickel[b]	0.0013	E	340
	Phosphorus[b]	0.0012	E	340
	Selenium[b]	2.4×10^{-6}	E	340
	Thallium	2.2×10^{-6}	E	340
	Zinc	0.00018	E	340
Natural gas- or propane-fired dryer, with fabric filter (SCC 3-05-002-55, -56,-57))	Antimony	1.8×10^{-7}	E	339
	Arsenic[b]	5.6×10^{-7}	D	25, 35, 339-340
	Barium	5.8×10^{-6}	E	25, 339-340
	Beryllium[b]	0.0	E	339-340
	Cadmium[b]	4.1×10^{-7}	D	25, 35, 162, 301, 339-340
	Chromium[b]	5.5×10^{-6}	C	25, 162-164, 301, 339-340
	Cobalt[b]	2.6×10^{-8}	E	339-340
	Copper	3.1×10^{-6}	D	25, 162-164, 339-340
	Hexavalent chromium[b]	4.5×10^{-7}	E	163
	Lead[b]	6.2×10^{-7}	E	35
	Manganese[b]	7.7×10^{-5}	D	25, 162-164, 339-340
	Mercury[b]	2.4×10^{-4}	B	35, 163
	Nickel[b]	6.3×10^{-5}	D	25, 163-164, 339-340
	Phosphorus[b]	2.8×10^{-5}	E	25, 339-340
	Silver	4.8×10^{-7}	E	25, 339-340
	Selenium[b]	3.5×10^{-7}	E	339-340
	Thallium	4.1×10^{-6}	E	339-340
	Zinc	6.1×10^{-5}	C	25, 35, 162-164, 339-340

Figure 2. AP-42 Background Report Documentation for Nickel Emissions Factor

Table 4-16 (cont.)

Type of control	Fuel fired	Percent RAP used	Pollutant	No. of test runs	Data rating	Average emission factor, kg/Mg (lb/ton)[a]	Candidate emission factor, kg/Mg (lb/ton), rating[a]	Ref. No.
Fabric filter	Natural gas	0	Nickel	3	A	4.8×10^{-6} (9.6×10^{-6})	3.2×10^{-5} (6.3×10^{-5}), D	163
Fabric filter	No. 2 fuel oil	0	Nickel	3	A	0.00015 (0.00029)		164
~~Venturi scrubber~~	~~No. 5 fuel oil~~	~~35~~	~~Nickel~~	~~3~~	~~D~~	~~2.0×10^{-6} (4.1×10^{-6})~~		~~142~~
Fabric filter	Waste oil	30	Nickel	3	A	7.5×10^{-6} (1.5×10^{-5})		25
Fabric filter	Recycled No. 2 fuel oil	23[b]	Nickel	4	A	1.1×10^{-7} (2.1×10^{-7})		339
Fabric filter	No. 2 fuel oil	18[c]	Nickel	3	A	3.7×10^{-7} (7.4×10^{-7})		340
Fabric filter	Waste oil	30	Phosphorus	3	A	2.8×10^{-5} (5.5×10^{-5})	1.4×10^{-5} (2.8×10^{-5}), D	25

As shown in the preceding figures from the AP-42 Background Report for Section 11.1, the default nickel emissions factor is derived from source tests on plants burning natural gas, No. 2 fuel oil, waste oil, and Recycled No. 2 fuel oil. Data rating for each source test is "A" regardless of the fuel. The fuel that best represents the Escondido asphalt plant is natural gas which has an "A" rated emissions factor ($9.6x10^{-6}$ lb/ton) that was used in the 2014 and 2019 HRAs rather than the "D" rated default emissions factor ($6.3x10^{-5}$ lb/ton) derived by combining results from each of the tests.

2. ROAD DUST EMISSIONS AND CONTROLS

Existing language in PTO 982505 warrants control efficiency of 90% as was used in the 2019 HRA. Superior proposes to combine Conditions 29 and 30 and to change the wording as follows to achieve 95% control efficiency:

> Vehicles at the site on the haul roads shall not exceed speeds of 10 miles per hour. All paved and unpaved haul roads and areas at the site subject to vehicle traffic, excluding areas inaccessible to treatment by water truck, shall be controlled by at least one of the following methods:
>
> a. Except for momentary, non-repeatable events, prevent visible emissions exceeding zero percent (0%) opacity at a height of eight feet above the haul road except for momentary, non-repeatable events; or
> b. Water internal haul roads at two (2) hours intervals while the facility is open to haul truck traffic unless the surface is visibly wet and log each watering/observation event in a logbook for inspection by APCD enforcement staff.

Table 1. Road Dust Emission Factors and Control Efficiencies

Unpaved / Paved Uncontrolled E.F. (lb/VMT)	Control Type	Control Efficiency	Unpaved / Paved Controlled E.F. (lb/VMT)
5.25 / 1.41	Watering as needed to exceed 20% opacity less than 3-minutes in any 60-minute period (Rule 50 compliance, used by APCD in prioritization).	80%	1.05 / 0.28
	Watering every 4-hours and visibly moist (Existing operating permit Condition).	90%	0.53 / 0.14
	Watering every 2-hours or 0% opacity 8-feet above road surface except for non-repeatable, momentary events (Proposed operating permit Condition).	95%	0.26 / 0.07

Please call me at 619.300.1880 or Andre Almeida at 530.574.0231 if there are questions or additional information is needed.

Respectfully submitted,

[redacted]

Scott D. Cohen, P.E., C.I.H.
Principal Engineer
Sespe Consulting, Inc.

Att: Risk Reduction Plan Elements (Rule 1210(e)(5))
SDAPCD General Application Form
Excerpts from AP-42 Section 11.1 Background Document

(5) *The risk reduction audit and plan submitted by the owner or operator shallcontain all of the following:*

(i) *The name, location and standard industrial classification (SIC) code of thestationary source.*

Escondido Asphalt, 500 N. Tulip St, Escondido, CA 92024 – Asphalt Paving Mixtures Manufacturing (2951)

(ii) *The identification of the emission units and toxic air contaminants emitted by each emission unit that contribute to potential public health risks above the significant risk mitigation levels specified in Subsection (e)(1). Emission units shall be listed by decreasing contribution to the total potential public health risks estimated for the stationary source. Toxic air contaminants shall be listed for each emission unit by decreasing contribution to the potential public health risk estimated for that unit.*

The plan need not include identification of emission units which emit toxic air contaminants in amounts which the approved public health risk assessment indicates

do not cause maximum incremental cancer risks greater than 1.0 in a million, nor a total acute noncancer health hazard index of 1.0 or greater, nor a total chronic non- cancer health hazard index of 1.0 or greater. The plan shall include identification ofall emission units for which the owner or operator proposes to reduce toxic air contaminant emissions as part of the risk reduction audit and plan.

Formaldehyde and nickel from the asphalt plant dryer stack contribute to acute risk significance in 2014 HRA.

Road dust speciates, primarily arsenic and nickel, contribute to chronic, non-cancer risk significance in 2019 HRA.

(iii) *A listing and an evaluation of all airborne toxic risk reduction measures available to the owner or operator and which could be used to reduce emissions from the emission units identified in Subsection (e)(5)(ii). The evaluation shall identify the emission units and toxic air contaminants affected by each measure and the extentof emission reductions that would be achieved for each emission unit and each affected contaminant.*

Asphalt plant was replaced between 2014 and 2019 which likely reduced combustion contaminants including NOx and possibly some toxics due to burner replacement that may be difficult to quantify. There is no associated reduction in toxic air contaminant emissions that could result from installation of a new plant due to the nature of AP-42 default emissions factors.

The 2019 HRA was prepared using updated AERMOD and HARP2 models and more recent APCD-prepared meteorological data as compared to the 2014 HRA. The updated models and wind represent the current best science available and result in an acute risk level that is less than 1.0 H.I. Arguably, the reduction of acute risk from the 2014 inventory year is unnecessary using the best available science in the modeling for HRA.

Nevertheless, APCD has requested, and an application has been submitted, to include changes in permit wording that clarifies and updates the nickel emissions factor used in the operating permit.

In the 2019 HRA chronic non-cancer risk would require reduction if the APCD applied 80% road dust control efficiency were applied. However, the permit conditioning requires both water and visibly moisture surface for which Sespe assigned 90% control efficiency in the 2019 HRA. Regardless, application has been submitted for permit language that would achieve 95% control efficiency consistent with T-BACT language found on other similar permits issued by APCD in the past.

> (iv) *The identification of and the rationale for the airborne toxic risk reductionmeasures proposed for implementation by the owner or operator. The plan shall alsoinclude the rationale for not proposing for implementation any of the airborne toxic risk reduction measures identified as available to the owner or operator, including those identified as infeasible or not economically reasonable.*

See discussion above.

> (v) *A schedule for implementing the proposed airborne toxic risk reduction measures within five years or within a shorter or longer period as determined by the Air Pollution Control Officer pursuant to Subsections (e)(3) or (e)(4) of this rule. The schedule shall include specific increments of progress towards implementing theairborne toxic risk reduction measures. The schedule shall include dates by which applications for any authorities to construct or modified permits to operate will be submitted to the Air Pollution Control Officer, by which each measure will be in place, and by which the actual in-use effectiveness of each measure will be demonstrated to the Air Pollution Control Officer.*

Application has already been submitted. APCD has 30 days to determine it is complete and then six months thereafter to issue the permit. Emissions will be reduced when the permit is issued causing the operator to comply with the proposed condition(s) described in the Application.

> (vi) *A demonstration that the proposed airborne toxic risk reduction measures will be sufficient to reduce or eliminate toxic air contaminant emissions from the stationary source to levels sufficient to ensure that potential public health risks from such emissions are below the significant risk mitigation levels specified in Subsection(e)(1) of this rule. The demonstration shall be made through analogy with the approved public health risk assessment for the stationary source or by submission of a revised forecast risk assessment. The demonstration shall include any foreseeable new or increased emissions of toxic air contaminants from the stationary source and the estimated public health risks resulting from such new or increased emissions during the period approved for implementation of the risk reduction audit and plan.*

See 2019 HRA for demonstration that the risk reduction measures will be sufficient to reduce or eliminate risk to less than the significant risk mitigation levels. The 2019HRA used 90% for haul road dust control efficiency and so this Risk Reduction Plan will reduce emissions further by going to language that is attributed 95% control efficiency.

(vii) *A schedule for providing progress reports on reductions in emissions of toxic air contaminants and estimated public health risks achieved under the implemented plan. Progress reports shall be provided not less frequently than annually andmay be incorporated into toxic air contaminant emission inventory report updates required pursuant to Section 44344 of the Health and Safety Code.*

Upon 30-days from submittal, APCD will be contacted to obtain completeness determination letter. If the final operating permit has not been issued by six months thereafter, then APCD will be contacted to determine the cause of delay and to hopefully re-engage APCD to finish the application process.

(viii) *A certification by an engineer registered as a professional engineer pursuant to Section 6762 of the Business and Professions Code, by an individual responsible for processes or operations of the affected stationary source, or by an environmental assessor registered pursuant to Section 25570.3 of the Health and Safety Code, that the audit and plan submitted meets the requirements of Section (e) of this rule and Part 6, Chapter 6 of Division 26 of the Health and Safety Code.*

I certify that the above risk reduction plan elements are true, correct, and will result in risk reduction to levels that are less than the significant mitigation levels in Rule 1210(e)(1).

[redacted]

Scott D. Cohen, P.E., C.I.H.
Principal Engineer
Sespe Consulting –
a Trinity Consultants Company

Internal Use Only	
APP ID: APCD	-APP/CER-
SITE ID: APCD	-SITE-

GENERAL PERMIT OR REGISTRATION APPLICATION FORM

APCD AIR POLLUTION CONTROL DISTRICT COUNTY OF SAN DIEGO

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List affected APP/PTO Record ID(s): APCD2009-PTO-982505

APPLICANT INFORMATION

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Phone: (760) 745-0556			Phone: (760) 745-0556		
E-Mail Address: smendoza@superiorrm.com			E-Mail Address: smendoza@superiorrm.com		

Permit To Operate Mailing Address			**Invoice Mailing Address**		
Name: Superior Ready Mix			Name: Superior Ready Mix		
Mailing Address: 1564 West Mission Road			Mailing Address: 1564 West Mission Road		
City: Escondido	State: CA	Zip: 92029	City: Escondido	State: CA	Zip: 92029
Phone: (760) 745-0556			Phone: (760) 745-0556		
E-Mail Address: smendoza@superiorrm.com			E-Mail Address: smendoza@superiorrm.com		

EQUIPMENT/PROCESS INFORMATION: Type of Equipment: ☑ Stationary ☐ Portable, ***if portable please enter below the equipment storage address.*** **If portable, will operation exceed 12 consecutive months at the same location ☐ Yes ☐ No**

Equipment Location Address 500 N Tulip Street City Escondido State: CA

Parcel No. 2323601700 Zip 92025 Phone (760) 745-0556 E-mail: smendoza@superiorrm.com

Site Contact Shawn Mendoza Phone (760) 745-0556

General Description of Equipment/Process Hot Mix Asphalt Plant

Application Submitted by ☑ Owner ☐ Operator ☐ Contractor ☐ Consultant Affiliation _____

EXPEDITED APPLICATION PROCESSING: ☐ **I hereby request Expedited Application Processing and understand that:**
a) Expedited processing will incur additional fees and permits will not be issued until the additional fees are paid in full (see Rule 40(d)(8)(iv) for details) b) Expedited processing is contingent on the availability of qualified staff c) Once engineering review has begun this request cannot be cancelled d) Expedited processing does not guarantee action by any specific date nor does it guarantee permit approval.

☐ **This application contains trade secret or confidential information** *(see reverse for instructions)*

I hereby certify that all information provided on this application is true and correct.

SIGNATURE_____ Date _____

Print Name Shawn Mendoza Company Superior Ready Mix

Phone (760) 745-0556 E-mail Address smendoza@superiorrm.com

Internal Use Only

Date _____ Staff Initials: _____ Amt Rec'd $ _____ Fee Schedule _____

RNP: _____ EMF: _____ NBF: _____ TA: _____ *GEN_APP_Form_Rev Date: Aug. 2017*

February 2004

Emission Factor Documentation for AP-42 Section 11.1

Hot Mix Asphalt Plants

Final Report

Prepared for

U. S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Measurement Center
Research Triangle Park, NC 27711

RTI Contract No. AGMT DTD 10/31/02
RTI Project No. 08682

Prepared by

RTI International
3040 Cornwallis Road
Research Triangle Park, NC 27709

The CO_2 test data are assigned a B rating because a Fyrite analyzer was used. The TOC test data are assigned a C rating because the magnitude of emissions is not consistent with emissions from similar sources. The filterable PM and CO test data are assigned an A rating. The report includes adequate detail, the test methodology was sound, and no problems were reported.

4.2.1.145 Reference 162. This reference documents an emission test conducted on a No. 2 fuel oil-fired, drum-mix dryer controlled by a wet scrubber. The facility was not processing RAP during testing. Multiple metals, lead, chromium (and hexavalent chromium (Cr^{+6}), CO2, PAH, benzene, and formaldehyde emissions were measured at the scrubber outlet. These pollutants were measured using EPA Method 29 (draft method at the time of the test), CARB Method 12, CARB Method 425, CARB Method 429, CARB Method 3 (with an unspecified analyzer), CARB Method 410A, and CARB Method 430, respectively. Two test runs were conducted for each pollutant (eight CO_2 measurements), and production rates were provided for each test run. The multiple metals test detected mercury, zinc, and manganese during both runs, and detected cadmium, copper, and lead during one run. Arsenic, beryllium, nickel, and selenium were not detected. The lead test detected lead during both test runs, and the chromium test detected chromium (however, Cr^{+6} was not detected) during both test runs. The PAH test indicated that naphthalene was the primary PAH emitted from the source. Phenanthrene was also detected by both test runs, and anthracene was detected during one run. Insufficient information on the benzene and formaldehyde tests was provided in the report.

Most of the test data are assigned a B rating. Data for compounds that were not detected during one test run are assigned a C rating, and data for pollutants that were not detected during any test run are not rated. Except as noted, the report contained adequate detail, the test methodology was sound, and no problems were reported.

4.2.1.146 Reference 163. This reference documents an emission test conducted on a natural gas-fired, drum-mix dryer controlled by a fabric filter. The facility was not processing RAP during testing. Multiple metals, chromium (and Cr^{+6}), CO2, PAH, and benzene emissions were measured at the fabric-filter outlet. These pollutants were measured using EPA Method 29 (draft method at the time of the test), CARB Method 425, CARB Method 429, CARB Method 3 (with an unspecified analyzer), and CARB Method 410A, respectively. Three test runs were conducted for each pollutant (two chromium tests and eight CO_2 measurements), and production rates were provided for each test run. The multiple metals test detected copper, mercury, nickel, zinc, and manganese during all three runs. Arsenic, beryllium, cadmium, lead, and selenium were not detected during any test run. The chromium test detected chromium during both test runs and Cr^{+6} during one test run. Hexavalent chromium emissions were estimated for the non-detect run as one-half of the detection limit. Hexavalent chromium accounted for about 18 percent of the total chromium emissions during the two tests. The PAH test indicated that naphthalene was the primary PAH emitted from the source. Fluorene and phenanthrene also were detected by all three test runs, and pyrene was detected during one run. Insufficient information on the benzene test was provided in the report.

Most of the test data are assigned an A rating. The chromium data are assigned a B rating because only two test runs were conducted, and the Cr^{+6} data are assigned a C rating because one of two runs did not detect Cr^{+6}. Except as noted, the report contained adequate detail, the test methodology was sound, and no problems were reported.

4.2.1.147 Reference 164. This reference documents an emission test conducted on a No. 2 fuel oil-fired, drum-mix dryer controlled by a fabric filter. The facility was not processing RAP during testing. Multiple metals, chromium (and Cr^{+6}), arsenic, CO2, PAH, benzene and formaldehyde emissions were measured at the fabric-filter outlet. These pollutants were measured using EPA Method 29 (draft method at the time of the test), CARB Method 425, CARB Method 423, CARB Method 429, CARB

Table 4-11 (cont.)

Type of control	Fuel fired	Percent RAP used	Pollutant	No. of test runs	Data rating	Emission factor range, kg/Mg (lb/ton)[a]	Average emission factor, kg/Mg (lb/ton)[a]	Ref. No.
Fabric filter	No. 2 fuel oil	ND	NO_x	3	B	0.010-0.019 (0.020-0.038)	0.016 (0.032)	153
Fabric filter	No. 2 fuel oil	ND	TOC as propane	3	B	0.0055-0.0068 (0.011-0.014)	0.0062 (0.012)	153
Fabric filter	No. 2 fuel oil	0	Filterable PM	3	A	0.0020-0.0038 (0.0040-0.0076)	0.0031 (0.0063)	154
Fabric filter	No. 2 fuel oil	0	CO	1	C	NA	0.091 (0.18)	154
Fabric filter	No. 2 fuel oil	0	TOC as propane	1	C	NA	0.012 (0.023)	154
Fabric filter	No. 2 fuel oil	0	CO_2	3	B	10-18 (21-37)	14 (28)	154
Fabric filter	No. 2 fuel oil	0	Filterable PM	3	A	0.0014-0.0026 (0.0028-0.0051)	0.0021 (0.0041)	160
Fabric filter	No. 2 fuel oil	0	CO_2	3	B	29-31 (57-62)	30 (59)	160
Venturi scrubber	No. 2 fuel oil	0	Cadmium	2	C	2.4×10^{-7}-1.1×10^{-6} (4.7×10^{-7}-2.1×10^{-6})	6.4×10^{-7} (1.3×10^{-6})	162
Venturi scrubber	No. 2 fuel oil	0	Copper	2	C	1.2×10^{-7}-3.2×10^{-7} (2.4×10^{-7}-6.3×10^{-7})	2.2×10^{-7} (4.4×10^{-7})	162
Venturi scrubber	No. 2 fuel oil	0	Mercury	2	B	8.0×10^{-7}-3.2×10^{-6} (1.6×10^{-6}-6.4×10^{-6})	2.0×10^{-6} (4.0×10^{-6})	162
Venturi scrubber	No. 2 fuel oil	0	Lead	4	B	6.0×10^{-7}-7.0×10^{-6} (1.2×10^{-6}-1.4×10^{-5})	2.6×10^{-6} (5.3×10^{-6})	162
Venturi scrubber	No. 2 fuel oil	0	Zinc	2	B	2.9×10^{-5}-3.8×10^{-5} (5.7×10^{-5}-7.6×10^{-5})	3.3×10^{-5} (6.6×10^{-5})	162
Venturi scrubber	No. 2 fuel oil	0	Manganese	2	B	4.6×10^{-6}-1.4×10^{-5} (9.1×10^{-6}-2.8×10^{-5})	9.3×10^{-6} (1.9×10^{-5})	162
Venturi scrubber	No. 2 fuel oil	0	CO_2	8	B	15-32 (30-63)	25 (50)	162
Venturi scrubber	No. 2 fuel oil	0	Chromium	2	B	1.5×10^{-6}-1.7×10^{-6} (3.0×10^{-6}-3.4×10^{-6})	1.6×10^{-6} (3.2×10^{-6})	162
Venturi scrubber	No. 2 fuel oil	0	Naphthalene	2	B	0.00070-0.0010 (0.0014-0.0020)	0.00086 (0.0017)	162
Venturi scrubber	No. 2 fuel oil	0	Phenanthrene	2	B	3.1×10^{-6}-8.0×10^{-6} (6.1×10^{-6}-1.6×10^{-5})	5.5×10^{-6} (1.1×10^{-5})	162
Venturi scrubber	No. 2 fuel oil	0	Anthracene	2	C	2.7×10^{-7}-2.3×10^{-6} (5.4×10^{-7}-4.5×10^{-6})	1.3×10^{-6} (2.5×10^{-6})	162
Fabric filter	Natural gas	0	Copper	3	A	1.5×10^{-6}-2.1×10^{-6} (3.0×10^{-6}-4.1×10^{-6})	1.7×10^{-6} (3.4×10^{-6})	163
Fabric filter	Natural gas	0	Mercury	3	A	1.8×10^{-7}-3.0×10^{-7} (3.5×10^{-7}-6.0×10^{-7})	2.4×10^{-7} (4.7×10^{-7})	163
Fabric filter	Natural gas	0	Nickel	3	A	2.1×10^{-6}-7.5×10^{-6} (4.1×10^{-6}-1.5×10^{-5})	4.8×10^{-6} (9.6×10^{-6})	163
Fabric filter	Natural gas	0	Zinc	3	A	1.9×10^{-5}-2.2×10^{-5} (3.8×10^{-5}-4.3×10^{-5})	2.0×10^{-5} (4.0×10^{-5})	163

Table 4-11 (cont.)

Type of control	Fuel fired	Percent RAP used	Pollutant	No. of test runs	Data rating	Emission factor range, kg/Mg (lb/ton)[a]	Average emission factor, kg/Mg (lb/ton)[a]	Ref. No.
Fabric filter	Natural gas	0	Manganese	3	A	4.8×10^{-6}-1.2×10^{-5} (9.5×10^{-6}-2.4×10^{-5})	7.4×10^{-6} (1.5×10^{-5})	163
Fabric filter	Natural gas	0	CO_2	8	A	9.0-18 (18-35)	14 (28)	163
Fabric filter	Natural gas	0	Chromium	2	B	6.5×10^{-7}-3.9×10^{-6} (1.3×10^{-6}-7.7×10^{-6})	2.3×10^{-6} (4.5×10^{-6})	163
Fabric filter	Natural gas	0	Hexavalent chromium	2	C	1.2×10^{-7}-3.4×10^{-7} (2.3×10^{-7}-6.7×10^{-7})	2.3×10^{-7} (4.5×10^{-7})	163
Fabric filter	Natural gas	0	Naphthalene	3	A	0.00012-0.00014 (0.00024-0.00028)	0.00013 (0.00026)	163
Fabric filter	Natural gas	0	Fluorene	3	A	1.0×10^{-6}-1.3×10^{-6} (2.0×10^{-6}-2.5×10^{-6})	1.1×10^{-6} (2.2×10^{-6})	163
Fabric filter	Natural gas	0	Phenanthrene	3	A	1.6×10^{-6}-2.3×10^{-6} (3.1×10^{-6}-4.5×10^{-6})	1.9×10^{-6} (3.8×10^{-6})	163
Fabric filter	No. 2 fuel oil	0	Copper	3	A	1.7×10^{-6}-5.0×10^{-6} (3.4×10^{-6}-1.0×10^{-5})	3.6×10^{-6} (7.1×10^{-6})	164
Fabric filter	No. 2 fuel oil	0	Mercury	3	A	2.7×10^{-6}-3.1×10^{-6} (5.4×10^{-6}-6.2×10^{-6})	2.9×10^{-6} (5.7×10^{-6})	164
Fabric filter	No. 2 fuel oil	0	Nickel	3	A	6.0×10^{-6}-0.00022 (1.2×10^{-5}-0.00044)	0.00015 (0.00029)	164
Fabric filter	No. 2 fuel oil	0	Lead	3	A	1.2×10^{-6}-3.4×10^{-6} (2.4×10^{-6}-6.7×10^{-6})	2.0×10^{-6} (4.1×10^{-6})	164
Fabric filter	No. 2 fuel oil	0	Zinc	3	A	8.0×10^{-5}-0.00017 (0.00016-0.00033)	0.00012 (0.00023)	164
Fabric filter	No. 2 fuel oil	0	Manganese	3	A	3.1×10^{-6}-2.2×10^{-5} (6.1×10^{-6}-4.3×10^{-5})	1.5×10^{-5} (3.1×10^{-5})	164
Fabric filter	No. 2 fuel oil	0	CO_2	9	A	15-21 (29-41)	19 (37)	164
Fabric filter	No. 2 fuel oil	0	Chromium	3	A	5.5×10^{-6}-1.2×10^{-5} (1.1×10^{-5}-2.3×10^{-5})	8.0×10^{-6} (1.6×10^{-5})	164
Fabric filter	No. 2 fuel oil	0	Naphthalene	3	A	4.2×10^{-5}-0.00025 (8.3×10^{-5}-0.00050)	0.00014 (0.00028)	164
Fabric filter	No. 2 fuel oil	0	Fluorene	3	A	7.5×10^{-7}-3.2×10^{-6} (1.5×10^{-6}-6.3×10^{-6})	2.0×10^{-6} (4.1×10^{-6})	164
Fabric filter	No. 2 fuel oil	0	Phenanthrene	3	A	8.0×10^{-7}-2.7×10^{-6} (1.6×10^{-6}-5.3×10^{-6})	1.7×10^{-6} (3.3×10^{-6})	164
Venturi scrubber	No. 2 fuel oil	ND	Filterable PM	3	D	0.23-0.40 (0.46-0.79)	0.30 (0.60)	166
Venturi scrubber	No. 2 fuel oil	ND	CO_2	3	A	15-16 (31-33)	16 (32)	166
Fabric filter	Natural gas	0	Filterable PM	2	B	0.0025-0.0056 (0.0051-0.011)	0.0041 (0.0081)	167
Fabric filter	Natural gas	0	CO_2	3	B	8.6-9.5 (17-19)	9.0 (18)	167
Fabric filter	Natural gas	30	Filterable PM	1	C	NA	0.0036 (0.0073)	168

Table 4-16 (cont.)

Type of control	Fuel fired	Percent RAP used	Pollutant	No. of test runs	Data rating	Average emission factor, kg/Mg (lb/ton)[a]	Candidate emission factor, kg/Mg (lb/ton), rating[a]	Ref. No.
Fabric filter	Natural gas	0	Nickel	3	A	4.8×10^{-6} (9.6×10^{-6})	3.2×10^{-5} (6.3×10^{-5}), D	163
Fabric filter	No. 2 fuel oil	0	Nickel	3	A	0.00015 (0.00029)		164
~~Venturi scrubber~~	~~No. 5 fuel oil~~	~~35~~	~~Nickel~~	~~3~~	~~D~~	~~2.0×10^{-5} (4.1×10^{-5})~~		~~142~~
Fabric filter	Waste oil	30	Nickel	3	A	7.5×10^{-6} (1.5×10^{-5})		25
Fabric filter	Recycled No. 2 fuel oil	23[b]	Nickel	4	A	1.1×10^{-7} (2.1×10^{-7})		339
Fabric filter	No. 2 fuel oil	18[c]	Nickel	3	A	3.7×10^{-7} (7.4×10^{-7})		340
Fabric filter	Waste oil	30	Phosphorus	3	A	2.8×10^{-5} (5.5×10^{-5})	1.4×10^{-5} (2.8×10^{-5}), D	25
Fabric filter	Recycled No. 2 fuel oil	23[b]	Phosphorus	4	A	8.5×10^{-6} (1.7×10^{-5})		339
Fabric filter	No. 2 fuel oil	18[c]	Phosphorus	3	A	5.8×10^{-6} (1.2×10^{-5})		340
Fabric filter	Waste oil	30	Silver	3	A	7.0×10^{-7} (1.4×10^{-6})	2.4×10^{-7} (4.8×10^{-7}), E	25
Fabric filter	Recycled No. 2 fuel oil	23[b]	Silver	4	B	6.6×10^{-9} (1.3×10^{-8})		339
Fabric filter	No. 2 fuel oil	18[c]	Silver	3	B	8.4×10^{-9} (1.7×10^{-8})		340
Fabric filter	Recycled No. 2 fuel oil	23[b]	Selenium	4	A	1.1×10^{-7} (2.2×10^{-7})	1.7×10^{-7} (3.5×10^{-7}), E	339
Fabric filter	No. 2 fuel oil	18[c]	Selenium	3	A	2.3×10^{-7} (4.7×10^{-7})		340
Fabric filter	Recycled No. 2 fuel oil	23[b]	Thallium	4	B	4.1×10^{-9} (8.2×10^{-9})	2.1×10^{-9} (4.1×10^{-9}), E	339
Fabric filter	No. 2 fuel oil	18[c]	Thallium	3	B	0 (0)		340
Fabric filter	Propane	ND	Zinc	3	B	1.6×10^{-5} (3.1×10^{-5})	3.1×10^{-5} (6.1×10^{-5}), C	35
Fabric filter	Natural gas	0	Zinc	3	A	2.0×10^{-5} (4.0×10^{-5})		163
Fabric filter	No. 2 fuel oil	0	Zinc	3	A	0.00012 (0.00023)		164
Venturi scrubber	No. 2 fuel oil	0	Zinc	2	B	3.3×10^{-5} (6.6×10^{-5})		162
Fabric filter	Recycled No. 2 fuel oil	23[b]	Zinc	4	A	3.1×10^{-6} (6.3×10^{-6})		339
Fabric filter	No. 2 fuel oil	18[c]	Zinc	3	A	1.6×10^{-6} (3.1×10^{-6})		340
Fabric filter	Waste oil	30	Zinc	3	A	2.7×10^{-5} (5.3×10^{-5})		25
~~None~~	~~No. 2 fuel oil~~	~~18[c]~~	~~Antimony~~	~~3~~	~~B~~	~~0 (0)~~		~~340~~
None	No. 2 fuel oil	18[c]	Arsenic	3	A	6.4×10^{-7} (1.3×10^{-6})	6.4×10^{-7} (1.3×10^{-6}), E	340
None	No. 2 fuel oil	18[c]	Barium	3	A	0.00013 (0.00025	0.00013 (0.00025), E	340
None	No. 2 fuel oil	18[c]	Beryllium	3	B	0 (0)	0 (0), E	340
None	No. 2 fuel oil	18[c]	Cadmium	3	A	2.1×10^{-6} (4.2×10^{-6})	2.1×10^{-6} (4.2×10^{-6}), E	340
None	No. 2 fuel oil	18[c]	Chromium	3	A	1.2×10^{-5} (2.4×10^{-5})	1.2×10^{-5} (2.4×10^{-5}), E	340

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