

## **APPENDIX C**

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CALCULATIONS AND ASSUMPTIONS USED FOR  
DETERMINING CONSTRUCTION EMISSIONS  
ASSOCIATED WITH THE TRANSPORTATION AND  
SPREADING OF GRAVEL ON UNPAVED ROADS AT  
ONE CAF

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**CALCULATIONS AND ASSUMPTIONS USED FOR DETERMINING CONSTRUCTION EMISSIONS ASSOCIATED WITH THE TRANSPORTATION AND SPREADING OF GRAVEL ON UNPAVED ROADS AT ONE CAF**

Although PAR 403 does not directly require all 49 confined animal facilities (CAFs) to apply gravel to the unpaved roads at each facility, this environmental analysis assumes a “worst-case” scenario in its evaluation of potential air quality impacts. This analysis assumes that the application of gravel on unpaved roads is the “worst-case” scenario of all the conservation management practices (CMPs) to reduce fugitive dust. The CMPs are a menu of options which can be implemented individually or collectively based on how each CAF wants to proceed to reduce fugitive dust at their operations.

As a result, this appendix outlines the emissions associated with this activity based on the following assumptions.

Assumptions

1. Each CAF has an unpaved road one-quarter mile long (1,320 feet) by 10 feet wide.
2. The gravel will be ¾-inch crushed rock, spread at a depth of four inches (or 0.333 foot).
3. The amount of gravel required is 4,396 feet<sup>3</sup> [length (1,320 feet) x width (10 feet) x depth (0.333 foot)].
4. Convert feet<sup>3</sup> to yards<sup>3</sup>:  
$$4,396 \text{ feet}^3 \times 1 \text{ yard}^3 / 27 \text{ feet}^3 = 163 \text{ yards}^3.$$
5. Convert yards<sup>3</sup> to tons:  
$$163 \text{ yards}^3 \times 1.5 \text{ ton/yard}^3 = 245 \text{ tons}.$$
6. Haul trucks can transport 25 tons:  
$$245 \text{ tons} \times 1 \text{ truck} / 25 \text{ tons} = 10 \text{ trucks}.$$
7. The vehicle miles traveled (VMT) for each haul truck is 50.
8. A skip loader (rubber tired loader) will be used to spread the gravel on unpaved roads.
9. A delivery truck would be required to transport the skip loader to the CAF, with a VMT of 20.
10. Three workers would be required to support gravel spreading activities, with a VMT of 20.
11. Heavy-heavy duty truck (HHDT) emission factors were derived from CARB EMFAC 2002 (version 2.2) Burden Model for on-road HHDT, scenario year 2005.

12. Delivery truck and passenger vehicle emission factors were derived from EMFAC 2002 (version 2.2) Burden Model for on-road vehicles, scenario year 2005.
13. The skip loader emission factors were derived from CARB's off-road model (composite data provided to SCAQMD August 2004), scenario year 2005. The composite off road emission factors were derived based on the equipment category, average fleet make-up for each year through 2020, vehicle population in each equipment category by horsepower rating and load factor.
14. Reference sources to determine the type and amount of gravel, truck size and conversion factors: Jay Grady, Portland Cement (626-852-6262); Sid Rodriguez, Vulcan Materials (818-922-8842); and Nancy VonMuegge, Vulcan Materials (909-421-4161).

All of these assumptions were incorporated into the environmental evaluation conducted in this EA. The results are presented in Table C-1.

**TABLE C-1  
DETAILED CONSTRUCTION EMISSIONS ASSOCIATED WITH THE  
TRANSPORTATION AND SPREADING OF GRAVEL ON  
UNPAVED ROADS AT ONE CAF**

<b>Heavy-Heavy Duty Truck Emissions</b>		
<b>Emission Factors (lbs/mile)</b>		<b>Emissions (lbs/day) <sup>(1)</sup></b>
CO	0.006308	3.15
NO <sub>x</sub>	0.041541	20.77
VOC	0.001403	0.70
SO <sub>x</sub>	0.000404	0.20
PM10	0.000774	0.39
<sup>(1)</sup> Emissions calculation – [# of trips (10) x distance (50 miles) x EF]		
<b>Delivery Truck Emissions</b>		
<b>Emission Factors (lbs/mile)</b>		<b>Emissions (lbs/day) <sup>(2)</sup></b>
CO	0.020984	0.525
NO <sub>x</sub>	0.028142	0.704
VOC	0.002955	0.074
SO <sub>x</sub>	0.000246	0.006
PM10	0.00500	0.125
<sup>(2)</sup> Emissions calculation – [# of trips (1) x distance (25 miles) x EF]		
<b>Skip Loader (Rubber Tired Loader) Emissions</b>		
<b>Emission Factors (lbs/hr)</b>		<b>Emissions (lbs/day) <sup>(3)</sup></b>
CO	0.438	0.438
NO <sub>x</sub>	1.253	1.253
VOC	0.073	0.073
SO <sub>x</sub>	0.221	0.221
PM10	0.119	0.119
<sup>(3)</sup> Emissions calculation – [EF x time (1 hour)]		

**TABLE C-1 (continued)**  
**DETAILED CONSTRUCTION EMISSIONS ASSOCIATED WITH THE**  
**TRANSPORTATION AND SPREADING OF GRAVEL ON**  
**UNPAVED ROADS AT ONE CAF**

<b>Worker Commute Emissions</b>		
<b>Emission Factors (lbs/mile)</b>		<b>Emissions (lbs/day) <sup>(4)</sup></b>
CO	0.015165	0.911
NO <sub>x</sub>	0.001634	0.100
VOC	0.001626	0.098
SO <sub>x</sub>	0.00001	0.001
PM10	0.000079	0.005
<sup>(4)</sup> Emissions calculation – [# of trips (3) x distance (20 miles) x EF]		

Table C-2 presents a summary, or the total emissions, associated with the transportation and spreading of gravel on unpaved roads at one CAF.

**TABLE C-2**  
**SUMMARY OF CONSTRUCTION EMISSIONS ASSOCIATED WITH THE**  
**TRANSPORTATION AND SPREADING OF GRAVEL ON**  
**UNPAVED ROADS AT ONE CAF**

<b>Pollutant</b>	<b>Emissions (lbs/day)</b>	<b>SCAQMD Significance Threshold for Construction Activities (lbs/day)</b>
CO	5.02	550
NO <sub>x</sub>	22.83	100
VOC	0.95	75
SO <sub>x</sub>	0.43	150
PM10	0.64	150