

January 28, 2008

**To:** Dave Edwards

**From:** Shari Libicki, ENVIRON  
Kimberly Dehuff, ENVIRON

**Subject:** Estimation of Construction Emissions from Chatsworth Mitigation Project

As you requested, ENVIRON has calculated the emissions associated with the Chatsworth Mitigation Project. ENVIRON's report follows in this letter. As is reported in this letter, the airborne emissions from the construction project are below the South Coast Air Quality Management District (SCAQMD) California Environmental Quality Act (CEQA) thresholds.

## ■ Introduction

Emissions from construction activities include exhaust from off-road diesel-fired mobile equipment, on-road gasoline-fired vehicles, and fugitive dust from construction. Emissions are compared to the SCAQMD daily and quarterly CEQA construction emission thresholds for significance. This comparison shows that emissions from the Chatsworth Mitigation Project are below the level of significance.

## ■ Mobile Source Emissions Calculations

The calculation of the emissions from off-road diesel-fired mobile equipment and on-road gasoline-fired vehicles is discussed in this section.

### **OFF-ROAD EQUIPMENT EMISSIONS**

The off-road equipment for construction activities includes a wide variety of equipment including tractors, water trucks, compactors, bulldozers, graders, loaders, excavators, mechanical trucks, dump trucks, and fuel and lube trucks. Equipment types, number of units, hours of operation per day, and total days of operation for each piece of equipment were provided by the facility.

The emission factors for each pollutant for each type and horsepower rating of equipment were found in the South Coast Air Quality Management District (SCAQMD) summary of off-road equipment emission factors for the year 2008<sup>1</sup>. This summary of emission factors provides emission factors for several horsepower ratings for individual types of equipment. If the horsepower rating of a piece of equipment in our calculation did not match a horsepower rating listed, we did a linear interpolation between the emission factors corresponding to the horsepower ratings above and below the actual horsepower rating. For example, the CAT 950 loader is rated at 180 hp. The emissions factor summary provides emission factors at 175 hp and 250 hp. The emission factors for the loader were derived by interpolating between the emission factors for 175 hp and 250 hp in the emissions factor summary. Several

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<sup>1</sup> [www.aqmd.gov/ceqa/handbook/offroad/offroad.html](http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html)

assumptions were made in matching the equipment list to equipment listed in the emissions factors summary:

- D5 and D7 dozers are Caterpillar track tractors<sup>2</sup> and hence, correspond most closely to the equipment class in the emissions factors summary called “crawler tractors”
- It was assumed that the water trucks, end dump truck, mechanical truck, and fuel and lube truck were off-road trucks

**Table 1** presents a summary of the off-road equipment emission factors of criteria pollutants. **Table 2** presents a summary of the off-road equipment emissions of criteria pollutants for the construction activities.

### **GASOLINE-FIRED ON-ROAD VEHICLE EMISSIONS**

Site trucks for supervisors serving the construction activities will generate exhaust emissions. Vehicle exhaust criteria pollutant emissions were estimated using emission factors generated using the 2007 version of the Emission FACTor model (EMFAC) developed by CARB. EMFAC 2007 is a mathematical model that was developed to calculate emission rates from motor vehicles that operate on highways, freeways, and local roads in California and is used by CARB to project changes in future emissions from on-road mobile sources. The most recent version of this model, EMFAC 2007 (version 2.3), incorporates regional motor vehicle data, information and estimates regarding the distribution of VMT by speed, and number of starts per day. The EMFAC 2007 model generates emission factors based on the vehicle weight class. Emission factors were generated for Los Angeles County assuming an average on-site vehicle speed of 5 miles per hour (mph).

The site trucks were categorized into the light duty truck (LDT1) EMFAC vehicle classes based on vehicle weight. The site trucks were assumed to travel 5 miles per day on unpaved roads at a speed of 5 mph. Total construction emissions were calculated based on 60 days of operation.

**Table 3** presents the calculation of the on-road vehicle emissions of criteria pollutants for the construction activities.

## **■ Fugitive Dust Emissions**

Construction activities will result in the emission of fugitive dust. The sources of the dust emissions include dust generated by vehicle travel on unpaved roads and dust from material handling activities. The calculation of the fugitive dust emissions utilizes the algorithms contained in AP-42.

### **UNPAVED ROAD EMISSIONS**

The calculation of unpaved road dust emissions was based on the average weight of the vehicles, the number of miles traveled, the unpaved road surface material silt content, and the number of days with at least 0.01 inches of precipitation. **Table 4** presents the unpaved road fugitive dust emission factors and **Table 5** presents the calculated fugitive dust emissions from travel on unpaved roads.

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<sup>2</sup> [www.cat.com/cda/layout?m=37840&x=7](http://www.cat.com/cda/layout?m=37840&x=7)

**MATERIAL HANDLING ACTIVITY EMISSIONS**

Fugitive dust emissions from material handling activities occur as a result of soil loading and unloading operations. The amount of soil moved was based on estimates provided by facility personnel and an assumed soil density of 1.35 tons per cubic yard (tons/yd<sup>3</sup>). **Table 6** presents the material handling emission factors and **Table 7** presents the calculated material handling emissions.

**■ Total Construction Emissions**

**Table 8** summarizes the emissions from each construction activity. Emissions are presented on a daily basis as well as for the entire construction period. The emissions are compared to the SCAQMD's daily and quarterly CEQA construction thresholds. As shown in **Table 8**, all daily and quarterly criteria pollutant emissions are below the applicable SCAQMD CEQA construction thresholds.

**Table 1**  
**Calculation of Horsepower-Scaled Emission Factors for Off-Road Diesel-Fired Mobile Equipment<sup>1</sup>**

Equipment	Equipment Horsepower ("x <sub>3</sub> ")	Emission Factor Horsepower		Scaling Factor	ROG Emission Factor (lb/hr)			CO Emission Factor (lb/hr)			NO <sub>x</sub> Emission Factor (lb/hr)			SO <sub>2</sub> Emission Factor (lb/hr)			PM Emission Factor (lb/hr)		
		Low ("x <sub>2</sub> ")	High ("x <sub>1</sub> ")		At x <sub>1</sub> (y <sub>1</sub> )	At x <sub>2</sub> (y <sub>2</sub> )	Calculated (q)	At x <sub>1</sub> (y <sub>1</sub> )	At x <sub>2</sub> (y <sub>2</sub> )	Calculated (q)	At x <sub>1</sub> (y <sub>1</sub> )	At x <sub>2</sub> (y <sub>2</sub> )	Calculated (q)	At x <sub>1</sub> (y <sub>1</sub> )	At x <sub>2</sub> (y <sub>2</sub> )	Calculated (q)	At x <sub>1</sub> (y <sub>1</sub> )	At x <sub>2</sub> (y <sub>2</sub> )	Calculated (q)
CAT Challenger 95 tractor	410	250	500	0.36	0.290	0.160	0.243	0.96	0.445	0.774	3.14	1.794	2.654	0.0039	0.0019	0.0032	0.1102	0.060	0.092
Water truck	250	175	250	0.00	0.182	0.196	0.182	0.48	0.767	0.480	1.86	1.478	1.862	0.0019	0.0014	0.0019	0.0659	0.087	0.066
CAT D6R	175	175	250	1.00	0.226	0.215	0.215	0.64	0.773	0.773	2.16	1.647	1.647	0.0019	0.0014	0.0014	0.0880	0.094	0.094
CAT D5	100	50	120	0.29	0.174	0.163	0.171	0.51	0.371	0.474	1.00	0.286	0.797	0.0008	0.0003	0.0006	0.0901	0.035	0.074
CAT 140 H motor grader	185	175	250	0.87	0.197	0.196	0.196	0.55	0.749	0.722	2.02	1.530	1.596	0.0019	0.0014	0.0015	0.0751	0.086	0.085
CAT 950 loader	180	175	250	0.93	0.167	0.166	0.166	0.47	0.638	0.627	1.74	1.303	1.332	0.0017	0.0012	0.0012	0.0640	0.073	0.073
CAT 345 excavator	300	250	500	0.80	0.218	0.162	0.173	0.71	0.437	0.492	2.22	1.726	1.824	0.0023	0.0018	0.0019	0.0803	0.060	0.064
End dump truck	330	250	500	0.68	0.273	0.182	0.211	0.87	0.480	0.606	2.66	1.862	2.117	0.0027	0.0019	0.0021	0.0984	0.066	0.076
Fuel and lube truck	300	250	500	0.80	0.273	0.182	0.200	0.87	0.480	0.559	2.66	1.862	2.021	0.0027	0.0019	0.0020	0.0984	0.066	0.072
Mechanical truck	230	175	250	0.27	0.182	0.196	0.186	0.48	0.767	0.556	1.86	1.478	1.759	0.0019	0.0014	0.0017	0.0659	0.087	0.071

**Note:**

<sup>1</sup> Emission factors were scaled by linear interpolation as outlined below:

$\frac{x_1 - x_2}{x_1 - x_3} = \frac{y_1 - y_2}{y_1 - q}$  where x are horsepower, y are emission factors and q is the unknown horse-power specific emission factor

$y_1 - y_2 = y_1 - q$

$q = y_1 - (x_1 - x_3)/(x_1 - x_2) * (y_1 - y_2)$  where  $(x_1 - x_3)/(x_1 - x_2)$  is the "scaling factor"

**Table 2**  
**Off-Road Diesel-Fired Mobile Equipment Exhaust Emissions<sup>1</sup>**

Equipment Type	Engine Rating <sup>2</sup> (HP)	Number of Units	Operation per Unit <sup>3</sup>		Hourly Emissions <sup>4</sup> (lbs/hr)					Daily Emissions <sup>5</sup> (lbs/day)					Total Emissions <sup>6</sup> (tons)				
			(hrs/d)	(days)	CO	ROG	NO <sub>x</sub>	SO <sub>x</sub>	PM	CO	ROG	NO <sub>x</sub>	SO <sub>x</sub>	PM	CO	ROG	NO <sub>x</sub>	SO <sub>x</sub>	PM
CAT Challenger - 95 Tractor - Area 1 <sup>7</sup>	410	1	8	15	0.77	0.24	2.7	3.2E-03	9.2E-02	6.2	1.9	21.2	2.5E-02	0.74	4.6E-02	1.5E-02	0.16	1.9E-04	5.5E-03
CAT Challenger - 95 Tractor - Area 2 <sup>7</sup>	410	1	8	1.25	0.77	0.24	2.7	3.2E-03	9.2E-02	6.2	1.9	21.2	2.5E-02	0.74	3.9E-03	1.2E-03	1.3E-02	1.6E-05	4.6E-04
CAT Challenger - 95 Tractor - Area 3 <sup>7</sup>	410	1	8	8	0.77	0.24	2.7	3.2E-03	9.2E-02	6.2	1.9	21.2	2.5E-02	0.74	2.5E-02	7.8E-03	8.5E-02	1.0E-04	2.9E-03
Water truck	250	1	8	30	0.48	0.18	1.9	1.9E-03	6.6E-02	3.8	1.5	14.9	1.5E-02	0.53	5.8E-02	2.2E-02	0.22	2.2E-04	7.9E-03
CAT D6R with 4x4 Sheeps Foot (grading & compaction)	175	1	8	30	0.77	0.21	1.6	1.4E-03	9.4E-02	6.2	1.7	13.2	1.1E-02	0.75	9.3E-02	2.6E-02	0.20	1.6E-04	1.1E-02
CAT D5 Bulldozer (grading)	100	1	8	30	0.47	0.17	0.80	6.4E-04	7.4E-02	3.8	1.4	6.4	5.1E-03	0.60	5.7E-02	2.1E-02	9.6E-02	7.7E-05	8.9E-03
CAT 140 H Motor grader	185	1	4	30	0.72	0.20	1.6	1.5E-03	8.5E-02	2.9	0.78	6.4	5.9E-03	0.34	4.3E-02	1.2E-02	9.6E-02	8.8E-05	5.1E-03
CAT 950 Loader (crushed concrete and other)	180	1	6	10	0.63	0.17	1.3	1.2E-03	7.3E-02	3.8	1.0	8.0	7.4E-03	0.44	1.9E-02	5.0E-03	4.0E-02	3.7E-05	2.2E-03
CAT 345 Excavator w/ Bucket Crusher (concrete) <sup>8</sup>	300	1	8	6	0.49	0.17	1.8	1.9E-03	6.4E-02	3.9	1.4	14.6	1.5E-02	0.51	1.2E-02	4.2E-03	4.4E-02	4.5E-05	1.5E-03
End dump truck (crushed concrete placement) <sup>8</sup>	330	1	8	4	0.61	0.21	2.1	2.1E-03	7.6E-02	4.8	1.7	16.9	1.7E-02	0.61	9.7E-03	3.4E-03	3.4E-02	3.4E-05	1.2E-03
Fuel and lube truck	300	1	2	30	0.56	0.20	2.0	2.0E-03	7.2E-02	1.1	0.40	4.0	4.1E-03	0.14	1.7E-02	6.0E-03	6.1E-02	6.1E-05	2.2E-03
Mechanical truck	230	1	2	30	0.56	0.19	1.8	1.7E-03	7.1E-02	1.1	0.37	3.5	3.5E-03	0.14	1.7E-02	5.6E-03	5.3E-02	5.2E-05	2.1E-03

**Notes:**

<sup>1</sup> Numbers that are presented in the form xxEyy are presented in scientific notation. This is a shorthand way of writing very large or very small numbers. The notation consists of a decimal number between 1 and 10 multiplied by an integral power of 10. For example, 47300 = 4.73E04 and 0.000000021 = 2.1E-08.

<sup>2</sup> Engine ratings provided by facility personnel.

<sup>3</sup> Hours per day and days per year of operation per unit based on information provided by facility personnel.

<sup>4</sup> Hourly emissions calculated based on number of units, engine horsepower rating, load factor, and emission factors from South Coast Air Quality Management District (SCAQMD) website: off-road equipment emission factors for Year 2008 for the South Coast Air Basin ([www.aqmd.gov/ceqa/handbook/offroad/offroad.html](http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html)).

<sup>5</sup> Daily emissions calculated based on hourly emissions and hours per day of operation.

<sup>6</sup> Total emissions calculated based on daily emissions and number of days of operation.

<sup>7</sup> Only one Cat Challenger - 95 Tractor on site at a time. Movement of dirt from areas 1, 2, and 3 to be completed in sequence (Area 1 first, Area 2 second, etc.).

<sup>8</sup> The end dump truck operations will begin the day after the excavator stops work (i.e., these pieces of equipment will not operate on the same day).

**Table 3  
Off-Road Gasoline-Fired Mobile Equipment Exhaust Emissions<sup>1</sup>**

Equipment Type	Number of Units	Vehicle Speed (mph)	Vehicle Travel (miles/day)	Operation <sup>2</sup> (days)	Emission Factors <sup>3</sup> (lb/mile)					Daily Emissions <sup>4</sup> (lbs/day)					Total Emissions <sup>5</sup> (tons)				
					CO	ROC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	CO	ROC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	CO	ROC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Site trucks for supervisors	2	5	5	60	1.4E-02	1.0E-03	1.2E-03	3.1E-05	1.9E-04	0.14	1.0E-02	1.2E-02	3.1E-04	1.9E-03	4.3E-03	3.0E-04	3.6E-04	9.2E-06	5.7E-05

**Notes:**

<sup>1</sup> Numbers that are presented in the form xxEyy are presented in scientific notation. This is a shorthand way of writing very large or very small numbers. The notation consists of a decimal number between 1 and 10 multiplied by an integral power of 10. For example, 47300 = 4.73E04 and 0.000000021 = 2.1E-08.

<sup>2</sup> Days per year of operation per unit based on information provided by facility personnel.

<sup>3</sup> Emission factors based on EMFAC2007 run for calendar year 2008 for light-duty trucks (LDT1) in Los Angeles County traveling at a speed of 5 mph.

<sup>4</sup> Daily emissions calculated based on number of units, miles traveled per day per unit, and lb/mile emission factors.

<sup>5</sup> Total emissions calculated based on daily emissions and number of days of operation.

**Table 4**  
**Material Handling Emission Factors<sup>1</sup>**

**Introduction:**

Generation point is fugitive dust emissions from material handling for dirt excavated from Areas 1, 2, and 3.

**Parameters:**

		<b><u>Units</u></b>	<b><u>Notes</u></b>
Mean wind speed	3.4	mph	Average wind speed based on 1981 meteorological data for Newhall (from <a href="http://www.aqmd.gov/smog/metdata/MetDataTable1.html">www.aqmd.gov/smog/metdata/MetDataTable1.html</a> )
Material moisture content	14	%	AP-42, Section 13.2.4, Table 13.2.4-1, Municipal solid waste landfills - clay/dirt mix (USEPA 1995)
TSP particle size multiplier, k	0.74		AP-42, Section 13.2.4 (USEPA 1995)
PM <sub>10</sub> particle size multiplier, k	0.35		AP-42, Section 13.2.4 (USEPA 1995)
PM <sub>2.5</sub> particle size multiplier, k	0.11		AP-42, Section 13.2.4 (USEPA 1995)

**Emission factors:**

TSP	9.4E-05	lb/ton	AP-42, Section 13.2.4, Equation 1, Drop operations (USEPA 1995)
PM <sub>10</sub>	4.5E-05	lb/ton	AP-42, Section 13.2.4, Equation 1, Drop operations (USEPA 1995)

**Note:**

<sup>1</sup> Numbers that are presented in the form xxEyy are presented in scientific notation. This is a shorthand way of writing very large or very small numbers. The notation consists of a decimal number between 1 and 10 multiplied by an integral power of 10. For example, 47300 = 4.73E04 and 0.000000021 = 2.1E-08.

**Reference:**

U.S. Environmental Protection Agency (USEPA). 1995. *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary, Point, and Area Sources, Section 13.2.4*. Research Triangle Park, North Carolina: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. January.

**Table 5**  
**Material Handling Emissions<sup>1</sup>**

Source	Number of Days of Operation	Soil Density (tons/yd <sup>3</sup> )	Amount of Soil Moved		Emission Factors (lb/ton)		Daily Material Handling (lb/day)		Total Material Handling (tons)	
			(yd <sup>3</sup> )	(tons/day)	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>
Excavation of dirt from Area 1	15	1.35	55,000	4,950	9.4E-05	4.5E-05	0.47	0.22	3.5E-03	1.7E-03
Excavation of dirt from Area 2	1.25	1.35	4,500	4,860	9.4E-05	4.5E-05	0.46	0.22	2.9E-04	1.4E-04
Excavation of dirt from Area 3	8	1.35	25,150	4,244	9.4E-05	4.5E-05	0.40	0.19	1.6E-03	7.6E-04
Deposition of dirt from Area 1 at stockpile	15	1.35	55,000	4,950	9.4E-05	4.5E-05	0.47	0.22	3.5E-03	1.7E-03
Deposition of dirt from Area 2 at stockpile	1.25	1.35	4,500	4,860	9.4E-05	4.5E-05	0.46	0.22	2.9E-04	1.4E-04
Deposition of dirt from Area 3 at stockpile	8	1.35	25,150	4,244	9.4E-05	4.5E-05	0.40	0.19	1.6E-03	7.6E-04

**Note:**

<sup>1</sup> Numbers that are presented in the form xxEyy are presented in scientific notation. This is a shorthand way of writing very large or very small numbers. The notation consists of a decimal number between 1 and 10 multiplied by an integral power of 10. For example, 47300 = 4.73E04 and 0.000000021 = 2.1E-08.

**Table 6**  
**Unpaved Road Fugitive Dust Emission Factors**

**Introduction:**

Generation point is fugitive dust emissions from vehicles on unpaved roads moving excavated dirt from Areas 1, 2, and 3 to stockpile location.

**Parameters:**

	<b><u>Units</u></b>	<b><u>Notes</u></b>
Empty vehicle weight	13.0 tons	Assumption
Vehicle capacity	27.0 tons	Calculated based on total volume excavated, soil density of 1.35 tons/yd <sup>3</sup> , and total number of trips
Mean vehicle weight - Tractors	26.5 tons	Calculated based on empty vehicle weight and vehicle capacity
Mean vehicle weight - Site supervisor trucks	1.9 tons	Based on upper end of weight range for LDT1 category in EMFAC2002
Number of days with at least 0.01 inches of precipitation	40 days/yr	AP-42, Section 13.2.2, Figure 13.2.2-1 (USEPA 2003)
TSP particle size multiplier, k (industrial sites)	4.9 lb/VMT	AP-42, Section 13.2.2, Table 13.2.2-2 (USEPA 2006)
PM <sub>10</sub> particle size multiplier, k (industrial sites)	1.5 lb/VMT	AP-42, Section 13.2.2, Table 13.2.2-2 (USEPA 2006)
Constant a, for industrial sites TSP equation	0.7	AP-42, Section 13.2.2, Table 13.2.2-2 (USEPA 2006)
Constant b, for industrial sites TSP equation	0.45	AP-42, Section 13.2.2, Table 13.2.2-2 (USEPA 2006)
Constant a, for industrial sites PM <sub>10</sub> equation	0.9	AP-42, Section 13.2.2, Table 13.2.2-2 (USEPA 2006)
Constant b, for industrial sites PM <sub>10</sub> equation	0.45	AP-42, Section 13.2.2, Table 13.2.2-2 (USEPA 2006)
Surface material silt content	2.2 %	AP-42, Section 13.2.2, Table 13.2.2-1, Low end of range for municipal solid waste landfills (USEPA 2003)

**Emission factors:**

*Tractors*

TSP 3.5 lb/VMT Equations (1a) and (2) in AP-42, Section 13.2.2 (USEPA 2006)

PM<sub>10</sub> 0.77 lb/VMT Equations (1a) and (2) in AP-42, Section 13.2.2 (USEPA 2006)

*Site supervisor trucks*

TSP 1.1 lb/VMT Equations (1a) and (2) in AP-42, Section 13.2.2 (USEPA 2006)

PM<sub>10</sub> 0.23 lb/VMT Equations (1a) and (2) in AP-42, Section 13.2.2 (USEPA 2006)

**Reference:**

U.S. Environmental Protection Agency (USEPA). 2006. *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary, Point, and Area Sources, Section 13.2.2*. Research Triangle Park, North Carolina: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. November.

**Table 7**  
**Unpaved Road Fugitive Dust Emissions<sup>1</sup>**

Source	Total Number of Trips	Number of Days of Operation	Number of Truck Trips per Day <sup>2</sup>	Average Roundtrip Distance		Vehicle Miles <sup>3</sup> (miles/day)	Unpaved Road Emission Factors (lb/mile)		Daily Unpaved Road Emissions (lb/day)		Total Unpaved Road Emissions (tons)	
				(feet)	(miles)		TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>
Excavated dirt transfer from Area 1 to stockpile	1,375	15	92	1,100	0.21	19.1	3.5	0.77	67.7	14.8	0.51	0.11
Excavated dirt transfer from Area 2 to stockpile	113	1.25	90	1,100	0.21	18.8	3.5	0.77	66.5	14.5	4.2E-02	9.1E-03
Excavated dirt transfer from Area 3 to stockpile	629	8	79	2,400	0.45	35.7	3.5	0.77	126.7	27.6	0.51	0.11
Supervisor site truck travel		60				10.0	1.1	0.23	10.8	2.3	0.32	7.0E-02

**Notes:**

<sup>1</sup> Numbers that are presented in the form xxEyy are presented in scientific notation. This is a shorthand way of writing very large or very small numbers. The notation consists of a decimal number between 1 and 10 multiplied by an integral power of 10. For example, 47300 = 4.73E04 and 0.000000021 = 2.1E-08.

<sup>2</sup> Number of truck trips per day is based on total number of truck trips and the number of days of operation.

<sup>3</sup> Vehicle miles traveled per day on unpaved roads for excavated dirt transfer calculated based on number of truck trips per day and average roundtrip distance. Vehicle miles traveled per day on unpaved roads for supervisor site trucks based on 2 trucks traveling 5 miles per day (assumption).

**Table 8**  
**Construction Emissions Summary<sup>a</sup>**

Source		Daily Construction Emissions (lbs/day)					Total Construction Emissions (tons)				
		CO	ROC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	CO	ROC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Mobile Source Exhaust Emission Sources	Cat Challenger - 95 Tractor - Area 1	b	b	b	b	b	4.6E-02	1.5E-02	0.16	1.9E-04	5.5E-03
	Cat Challenger - 95 Tractor - Area 2	b	b	b	b	b	3.9E-03	1.2E-03	1.3E-02	1.6E-05	4.6E-04
	Cat Challenger - 95 Tractor - Area 3	6.2	1.9	21.2	2.5E-02	0.74	2.5E-02	7.8E-03	8.5E-02	1.0E-04	2.9E-03
	Water truck	3.8	1.5	14.9	1.5E-02	0.53	5.8E-02	2.2E-02	0.22	2.2E-04	7.9E-03
	Cat D6R with 4x4 Sheeps Foot (grading & compaction)	6.2	1.7	13.2	1.1E-02	0.75	9.3E-02	2.6E-02	0.20	1.6E-04	1.1E-02
	Cat D5 Bulldozer (grading)	3.8	1.4	6.4	5.1E-03	0.60	5.7E-02	2.1E-02	9.6E-02	7.7E-05	8.9E-03
	CAT 140 H Motor grader	2.9	0.78	6.4	5.9E-03	0.34	4.3E-02	1.2E-02	9.6E-02	8.8E-05	5.1E-03
	CAT 950 Loader (crushed concrete and other)	3.8	1.0	8.0	7.4E-03	0.44	1.9E-02	5.0E-03	4.0E-02	3.7E-05	2.2E-03
	CAT 345 Excavator w/Bucket Crusher (concrete)	c	c	c	c	c	1.2E-02	4.2E-03	4.4E-02	4.5E-05	1.5E-03
	End dump truck (crushed concrete placement)	4.8	1.7	16.9	1.7E-02	0.61	9.7E-03	3.4E-03	3.4E-02	3.4E-05	1.2E-03
	Fuel and lube truck	1.1	0.40	4.0	4.1E-03	0.14	1.7E-02	6.0E-03	6.1E-02	6.1E-05	2.2E-03
	Mechanical truck	1.1	0.37	3.5	3.5E-03	0.14	1.7E-02	5.6E-03	5.3E-02	5.2E-05	2.1E-03
	Site trucks for supervisors	0.14	1.0E-02	1.2E-02	3.1E-04	1.9E-03	4.3E-03	3.0E-04	3.6E-04	9.2E-06	5.7E-05
Material Handling Emission Sources	Excavation of dirt from Area 1					b					1.7E-03
	Excavation of dirt from Area 2					b					1.4E-04
	Excavation of dirt from Area 3					0.19					7.6E-04
	Deposition of dirt from Area 1 at stockpile					b					1.7E-03
	Deposition of dirt from Area 2 at stockpile					b					1.4E-04
	Deposition of dirt from Area 3 at stockpile					0.19					7.6E-04
Fugitive Dust from Travel on Unpaved Roads	Excavated dirt transfer from Area 1 to stockpile					b					0.11
	Excavated dirt transfer from Area 2 to stockpile					b					9.1E-03
	Excavated dirt transfer from Area 3 to stockpile					27.6					0.11
	Supervisor site truck travel					2.3					7.0E-02
<b>Total Emissions</b>		<b>33.9</b>	<b>10.7</b>	<b>94.6</b>	<b>0.095</b>	<b>34.6</b>	<b>0.40</b>	<b>0.13</b>	<b>1.1</b>	<b>0.001</b>	<b>0.36</b>
<b>SCAQMD CEQA Significance Thresholds</b>		<b>550</b>	<b>75</b>	<b>100</b>	<b>150</b>	<b>150</b>	<b>24.75</b>	<b>2.5</b>	<b>2.5</b>	<b>6.75</b>	<b>6.75</b>
<b>Exceeds Threshold?</b>		<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

**Notes:**

<sup>a</sup> Numbers that are presented in the form xxEyy are presented in scientific notation. This is a shorthand way of writing very large or very small numbers. The notation consists of a decimal number between 1 and 10 multiplied by an integral power of 10. For example, 47300 = 4.73E04 and 0.000000021 = 2.1E-08.

<sup>b</sup> Tractor operation at Areas 1, 2, and 3 will occur sequentially. Therefore, on a daily basis, the tractors will only be operation at either Area 1, Area 2, or Area 3.

<sup>c</sup> The end dump truck operations will begin the day after the excavator stops work (i.e., these pieces of equipment will not operate on the same day). Daily emissions for the end dump truck are included here since this equipment has higher daily emissions than the excavator.