

Combined Summer Emissions Reports (Pounds/Day)

File Name:

Project Name: SMCHS Construction

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2012 TOTALS (lbs/day unmitigated)	3.18	28.96	14.79	0.01	0.65	1.33	1.97	0.14	1.22	1.36	3,551.84
2013 TOTALS (lbs/day unmitigated)	10.32	10.18	8.47	0.00	0.01	0.84	0.85	0.00	0.77	0.78	1,171.16

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
Time Slice 7/9/2012-8/10/2012 Active Days: 25	1.05	7.40	5.67	0.00	0.58	0.52	1.09	0.12	0.48	0.60	903.18
Demolition 07/09/2012-08/10/2012	1.05	7.40	5.67	0.00	0.58	0.52	1.09	0.12	0.48	0.60	903.18
Fugitive Dust	0.00	0.00	0.00	0.00	0.57	0.00	0.57	0.12	0.00	0.12	0.00
Demo Off Road Diesel	0.98	6.77	4.49	0.00	0.00	0.49	0.49	0.00	0.45	0.45	700.30
Demo On Road Diesel	0.04	0.58	0.19	0.00	0.00	0.02	0.02	0.00	0.02	0.02	100.80
Demo Worker Trips	0.03	0.05	0.99	0.00	0.00	0.00	0.01	0.00	0.00	0.00	102.08
Time Slice 8/13/2012-10/12/2012 Active Days: 45	<b>3.18</b>	<b>28.96</b>	<b>14.79</b>	<b>0.01</b>	<b>0.65</b>	<b>1.33</b>	<b>1.97</b>	<b>0.14</b>	<b>1.22</b>	<b>1.36</b>	<b>3,551.84</b>
Mass Grading 08/13/2012-10/12/2012	3.18	28.96	14.79	0.01	0.65	1.33	1.97	0.14	1.22	1.36	3,551.84
Mass Grading Dust	0.00	0.00	0.00	0.00	0.60	0.00	0.60	0.13	0.00	0.13	0.00
Mass Grading Off Road Diesel	2.69	21.95	11.51	0.00	0.00	1.07	1.07	0.00	0.99	0.99	2,247.32
Mass Grading On Road Diesel	0.46	6.96	2.29	0.01	0.04	0.25	0.29	0.01	0.23	0.25	1,202.43
Mass Grading Worker Trips	0.03	0.05	0.99	0.00	0.00	0.00	0.01	0.00	0.00	0.00	102.08
Time Slice 10/15/2012-12/31/2012 Active Days: 56	1.06	7.98	5.26	0.00	0.00	0.49	0.49	0.00	0.45	0.45	975.68
Building 10/15/2012-05/17/2013	1.06	7.98	5.26	0.00	0.00	0.49	0.49	0.00	0.45	0.45	975.68
Building Off Road Diesel	1.03	7.87	4.56	0.00	0.00	0.49	0.49	0.00	0.45	0.45	893.39
Building Vendor Trips	0.01	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.31
Building Worker Trips	0.02	0.03	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.99
Time Slice 1/1/2013-5/17/2013 Active Days: 99	0.98	7.38	5.12	0.00	0.00	0.43	0.43	0.00	0.40	0.40	975.72

Building 10/15/2012-05/17/2013	0.98	7.38	5.12	0.00	0.00	0.43	0.43	0.00	0.40	0.40	975.72
Building Off Road Diesel	0.95	7.29	4.48	0.00	0.00	0.43	0.43	0.00	0.39	0.39	893.39
Building Vendor Trips	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.31
Building Worker Trips	0.02	0.03	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.03
Time Slice 5/20/2013-6/21/2013	<b>10.32</b>	<b>10.18</b>	<b>8.47</b>	<b>0.00</b>	<b>0.01</b>	<b>0.84</b>	<b>0.85</b>	<b>0.00</b>	<b>0.77</b>	<b>0.78</b>	<b>1,171.16</b>
Active Days: 25											
Asphalt 05/20/2013-06/21/2013	1.67	10.17	8.38	0.00	0.01	0.84	0.85	0.00	0.77	0.78	1,160.84
Paving Off-Gas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	1.61	10.07	6.79	0.00	0.00	0.83	0.83	0.00	0.77	0.77	979.23
Paving On Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.86
Paving Worker Trips	0.05	0.09	1.59	0.00	0.01	0.00	0.01	0.00	0.00	0.01	178.75
Coating 05/20/2013-06/21/2013	8.66	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.32
Architectural Coating	8.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.32

Phase Assumptions

Phase: Demolition 7/9/2012 - 8/10/2012 - Demolition

Building Volume Total (cubic feet): 2704

Building Volume Daily (cubic feet): 1352

On Road Truck Travel (VMT): 25.04

Off-Road Equipment:

1 Concrete/Industrial Saws (10 hp) operating at a 0.73 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 1 hours per day

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6 hours per day

Phase: Mass Grading 8/13/2012 - 10/12/2012 - Mass Grading

Total Acres Disturbed: 0.11

Maximum Daily Acreage Disturbed: 0.03

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 298.67

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 5/20/2013 - 6/21/2013 - Paving

Acres to be Paved: 0.06

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

Phase: Building Construction 10/15/2012 - 5/17/2013 - Building Construction

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 4 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Phase: Architectural Coating 5/20/2013 - 6/21/2013 - Coatings

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Combined Annual Emissions Reports (Tons/Year)

File Name:

Project Name: SMCHS Construction

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2012 TOTALS (tons/year unmitigated)	0.11	0.97	0.55	0.00	0.02	0.05	0.07	0.00	0.05	0.05	118.53
2013 TOTALS (tons/year unmitigated)	0.18	0.49	0.36	0.00	0.00	0.03	0.03	0.00	0.03	0.03	62.94

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2012	0.11	0.97	0.55	0.00	0.02	0.05	0.07	0.00	0.05	0.05	118.53
Demolition 07/09/2012-08/10/2012	0.01	0.09	0.07	0.00	0.01	0.01	0.01	0.00	0.01	0.01	11.29
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Demo Off Road Diesel	0.01	0.08	0.06	0.00	0.00	0.01	0.01	0.00	0.01	0.01	8.75
Demo On Road Diesel	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.26
Demo Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28
Mass Grading 08/13/2012-10/12/2012	0.07	0.65	0.33	0.00	0.01	0.03	0.04	0.00	0.03	0.03	79.92
Mass Grading Dust	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	0.06	0.49	0.26	0.00	0.00	0.02	0.02	0.00	0.02	0.02	50.56
Mass Grading On Road Diesel	0.01	0.16	0.05	0.00	0.00	0.01	0.01	0.00	0.01	0.01	27.05
Mass Grading Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30
Building 10/15/2012-05/17/2013	0.03	0.22	0.15	0.00	0.00	0.01	0.01	0.00	0.01	0.01	27.32
Building Off Road Diesel	0.03	0.22	0.13	0.00	0.00	0.01	0.01	0.00	0.01	0.01	25.01
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
Building Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.85
2013	0.18	0.49	0.36	0.00	0.00	0.03	0.03	0.00	0.03	0.03	62.94

Building 10/15/2012-05/17/2013	0.05	0.37	0.25	0.00	0.00	0.02	0.02	0.00	0.02	0.02	48.30
Building Off Road Diesel	0.05	0.36	0.22	0.00	0.00	0.02	0.02	0.00	0.02	0.02	44.22
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81
Building Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.27
Asphalt 05/20/2013-06/21/2013	0.02	0.13	0.10	0.00	0.00	0.01	0.01	0.00	0.01	0.01	14.51
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.02	0.13	0.08	0.00	0.00	0.01	0.01	0.00	0.01	0.01	12.24
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
Paving Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.23
Coating 05/20/2013-06/21/2013	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Architectural Coating	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13

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Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

**Construction-Period Health Risk Assessment  
Calculations for Diesel Particulate Matter (DPM) Cancer Risk,  
DPM Non-Cancer Hazard and PM 2.5 Exposure**

**Saint Mary's College High School Phase One**

**CANCER RISK:**

**1. URBEMIS Output**

Specifics of construction phases were entered into URBEMIS. Default assumptions regarding construction equipment were used.

Total PM10 exhaust emissions (all years) was added together and divided by the total construction period in years ( $0.05 + 0.03 / 1 \text{ year} = 0.08$  average yearly short tons as the average yearly emissions rate.

**2. Screen3**

The average yearly emissions rate was converted to micro-grams/second/square meter (using a conversion factor of 1 short ton per year = 0.0287475637 g/s) then dividing by the project area (47,000 square feet = 4,366 m<sup>2</sup>). This emission rate, calculated at 5.267E-07 g/s/m<sup>2</sup> was entered into Screen3 with these other parameters:

- Source type: area
- Urban dispersion coefficient
- Source release height: 3 meters
- Search through range of wind conditions: yes
- Simple terrain – flat
- Automated distances
- Full meteorology

This resulted in a maximum 1-hour concentration of 5.961 ug/m<sup>3</sup>, which would occur at a distance of 67 meters from the site.

**3. Scaling to Annual**

GLC = (X1-hour) (Scalar)

Where GLC is the annual average ground level concentration.

The maximum 1-hour concentration from the Screen3 output was then multiplied by the BAAQMD recommended hourly to annual Scalar of 0.1 for the following:

GLC = 0.5961 ug/m<sup>3</sup>

#### 4. Calculate Risk

This GLC was used as the concentration in air (“C air”) for calculation of inhalation dose as follows:

$$\text{Inhalation Dose} = (\text{C air} * \text{DBR} * \text{A} * \text{EF} * \text{ED} * 1 \times 10^{-6}) / \text{AT}$$

DBR = daily breathing rate = 302

A = inhalation absorption rate for DPM = 1

EF = Exposure frequency = 250 days/yr (assuming 5 days a week for 50 weeks for the entire year)

ED = Exposure duration = 1 years (full construction period)

AT = Averaging time = 25,550 (for a 70 year cancer risk)

$$\text{Inhalation Dose} = 1.76\text{E-}6$$

And from there calculated the Inhalation Cancer Risk:

Inhalation Cancer Potency factor (for DPM) = 1.1

$$\text{Inhalation Cancer Risk per million} = (\text{Inhalation Dose}) * \text{Inhalation Cancer Potency factor} * 10^6$$

$$\text{Inhalation Cancer Risk per million (adult)} = 1.938$$

Because an infant could be exposed during the construction, an age sensitivity factor of 10 is used, per BAAQMD recommendations.

Inhalation Cancer Risk \* ASF = risk adjusted for age sensitivity

$$1.938 * 10 = 19.38$$

Inhalation Cancer Risk per million (infant) = 19.38 compared to Threshold of 10

A reduction of 48.4% would be required to reduce the impact below threshold levels.

However, as seen in the following discussion of PM<sub>2.5</sub> emissions, a particulate matter reduction of 49.6% would be required to reduce all health-related impacts below significance levels. Annual emissions were reduced by this level to generate a mitigated emission rate of 2.65E-07 g/s/m<sup>2</sup>, which was entered into Screen3 and the risk calculated as described above. With mitigation requiring at least a 49.6% reduction in PM exhaust emissions, the resultant risk would be:

Mitigated Inhalation Cancer Risk per million (infant) = 9.76 compared to Threshold of 10

**FOR CHRONIC NON-HAZARD:**

Hazard Quotient = C air/REL

REL = DPM inhalation non-cancer chronic (long-term) reference exposure level = 5 ug/m<sup>3</sup>

Hazard Quotient = 0.596/ 5.0

Hazard Quotient = 0.119 compared to Threshold of 1

Note that the mitigated emissions level described above would result in a lower hazard quotient of 0.060.

**FOR PM2.5**

The total PM2.5 emissions from URBEMIS (all years added together) were summed then divided by the total construction period in years. Emissions were the same as those reported for PM10 above.

When entered into Screen3 with the same parameters as for PM10 above and scaled to an annual average, the concentration was projected to be:

Annual Average PM2.5 concentration of 0.596 ug/m<sup>3</sup> compared to the threshold of 0.3 ug/m<sup>3</sup>

A reduction of 49.6% would be required to reduce the impact below threshold levels.

Annual emissions were reduced by this level as with PM10 above. With mitigation requiring at least a 49.6% reduction in PM exhaust emissions, the resultant concentration would be:

Mitigated Annual Average PM2.5 concentration of 0.3 ug/m<sup>3</sup> compared to the threshold of 0.3 ug/m<sup>3</sup>