

**SANTA BARBARA COUNTY APCD FORM-24**

**TABLE 1 - CONSTRUCTION EQUIPMENT UNCONTROLLED EMISSION FACTORS**

| CODE | TYPE                   | EMISSION FACTORS (g/hp-hr) |          |       |      |        |                     |
|------|------------------------|----------------------------|----------|-------|------|--------|---------------------|
|      |                        | EXH. THC                   | ALDEHYDE | NOx   | SOx  | CO     | PM                  |
|      | <b><u>DIESEL</u></b>   |                            |          |       |      |        |                     |
| 1    | Track-type Tractor     | 0.75                       | 0.17     | 11.00 | 0.85 | 2.15   | 0.69                |
| 2    | Wheeled Tractor        | 1.76                       | 0.28     | 11.00 | 0.85 | 7.34   | 1.27                |
| 3    | Wheeled Dozer          | 0.37                       | 0.16     | 11.00 | 0.87 | 2.28   | 0.41                |
| 4    | Scraper                | 0.55                       | 0.28     | 11.00 | 0.90 | 2.45   | 0.79                |
| 5    | Motor Grader           | 0.36                       | 0.12     | 11.00 | 0.87 | 1.54   | 0.63                |
| 6    | Wheeled Loader         | 0.97                       | 0.20     | 11.00 | 0.86 | 2.71   | 0.81                |
| 7    | Track type Loader      | 1.11                       | 0.10     | 11.00 | 0.85 | 2.26   | 0.66                |
| 8    | Off-Highway Truck      | 0.37                       | 0.22     | 11.00 | 0.89 | 2.28   | 0.50                |
| 9    | Roller                 | 0.97                       | 0.20     | 11.00 | 1.00 | 6.03   | 0.78                |
| 10   | Miscellaneous          | 1.01                       | 0.20     | 11.00 | 0.93 | 4.60   | 0.90                |
| 11   | Industrial             | 1.12                       | 0.21     | 14.00 | 0.93 | 3.03   | 1.00                |
| 12   | Marine Generator       | 0.94                       | 0.00     | 11.71 | 0.71 | 2.55   | 0.82                |
| 13   | Large Vessels          | 0.34                       | 0.00     | 14.28 | 0.71 | 2.15   | 0.62                |
| 14   | Small Vessels          | 0.44                       | 0.00     | 9.78  | 0.71 | 1.96   | 0.82                |
| 15   | Large Bore Engine      | 0.31                       | 0.00     | 11.00 | 0.75 | 2.90   | 1.10                |
| 16   | Small Bore Engine      | 1.02                       | 0.00     | 14.00 | 0.75 | 3.03   | 1.00                |
|      | <b><u>GASOLINE</u></b> |                            |          |       |      |        |                     |
| 17   | Gasoline Misc.         | 6.49                       | 0.22     | 4.79  | 0.26 | 198.00 | 0.30                |
| 18   | Fugitive Dust          |                            |          |       |      |        | 10.91<br>lb/acre-hr |

Notes:

- (a) Aldehydes include evaporative and crankcase hydrocarbons for gasoline.
- (b) Emission factor references cited in Table 2 and shown in Table 3.

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**TABLE 2 - CONSTRUCTION EQUIPMENT CONTROLLED EMISSION FACTORS**

| CODE | TYPE                   | EMISSION FACTORS (g/hp-hr) |       |      |        |                         |         |
|------|------------------------|----------------------------|-------|------|--------|-------------------------|---------|
|      |                        | ROC                        | NOx   | SOx  | CO     | PM10                    | REFS    |
|      | <b><u>DIESEL</u></b>   |                            |       |      |        |                         |         |
| 1    | Track-type Tractor     | 0.88                       | 8.80  | 0.19 | 2.15   | 0.66                    | 1,3,4,5 |
| 2    | Wheeled Tractor        | 1.95                       | 8.80  | 0.19 | 7.34   | 1.21                    | 1,3,4,5 |
| 3    | Wheeled Dozer          | 0.51                       | 8.80  | 0.20 | 2.28   | 0.39                    | 1,3,4,5 |
| 4    | Scraper                | 0.80                       | 8.80  | 0.20 | 2.45   | 0.75                    | 1,3,4,5 |
| 5    | Motor Grader           | 0.46                       | 8.80  | 0.20 | 1.54   | 0.59                    | 1,3,4,5 |
| 6    | Wheeled Loader         | 1.12                       | 8.80  | 0.19 | 2.71   | 0.76                    | 1,3,4,5 |
| 7    | Track type Loader      | 1.15                       | 8.80  | 0.19 | 2.26   | 0.62                    | 1,3,4,5 |
| 8    | Off-Highway Truck      | 0.57                       | 11.00 | 0.20 | 2.28   | 0.48                    | 1,3,4,5 |
| 9    | Roller                 | 1.12                       | 8.80  | 0.23 | 6.03   | 0.74                    | 1,3,4,5 |
| 10   | Miscellaneous          | 1.16                       | 8.80  | 0.21 | 4.60   | 0.86                    | 1,3,4,5 |
| 11   | Industrial             | 1.27                       | 11.20 | 0.21 | 3.03   | 0.95                    | 2,3,4,5 |
| 12   | Marine Generator       | 0.89                       | 8.40  | 0.16 | 2.55   | 0.78                    | 8       |
| 13   | Large Vessels          | 0.32                       | 8.57  | 0.16 | 2.15   | 0.59                    | 8       |
| 14   | Small Vessels          | 0.42                       | 8.40  | 0.16 | 1.96   | 0.78                    | 8       |
| 15   | Large Bore Engine      | 0.29                       | 8.40  | 0.19 | 2.90   | 1.05                    | 8       |
| 16   | Small Bore Engine      | 0.97                       | 8.40  | 0.19 | 3.03   | 0.95                    | 8       |
|      | <b><u>GASOLINE</u></b> |                            |       |      |        |                         |         |
| 17   | Gasoline Misc.         | 6.13                       | 4.79  | 0.26 | 198.00 | 0.30                    | 1,4,5   |
| 18   | Fugitive Dust          |                            |       |      |        | 3.49<br>lb/acre-hr      | 6,7     |
| 19   | Painting               | 16.63 lb/1000 sq ft-mil    |       |      |        |                         | 9       |
| 20   | Painting-Latex         | 25.10 lb/1000 sq ft-mil    |       |      |        |                         | 9       |
| 21   | Sandblasting           |                            |       |      |        | 0.01 lb/<br>lb abrasive | 10      |

Table Notes: (see Table 3 for notes to References).

1. Diesel

- (a) ROC equals uncontrolled exhaust THC times 0.95 (ROC/THC) plus aldehydes.
- (b) NOx equals uncontrolled 0.80 (codes 1-7 & 9-11) or times 0.6 (codes 12 through 16). Minimum NOx factor is 8.4 g/hp-hr. Off-highway trucks (code 8) not controlled.
- (c) SOx equals uncontrolled SOx times 0.227 (5/22) for codes 1 through 14 (Ref. 3) and uncontrolled SOx times 0.25 (5/20) for codes 15 and 16.
- (d) CO and PM equal uncontrolled factors
- (e) PM10 equals PM times 0.96 (Ref. 5).

2. Gasoline

- (a) THC equals uncontrolled exhaust THC plus aldehydes plus evaporative and crankcase hydrocarbons; Aldehydes column includes crankcase and evaporative HCs.
- (b) ROC equals uncontrolled exhaust THC times 0.91 (Ref. 4) plus aldehydes.
- (c) NOx, SOx, CO, and PM equal uncontrolled factors.
- (d) PM10 equals PM times .994 (Ref. 5).

3. Fugitive Dust: PM10 equals uncontrolled PM times 0.5 (Ref. 6) times 0.64 (Ref. 7)

4. NOx as NO2; SOx as SO2.

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### TABLE 3 - CONSTRUCTION EQUIPMENT REFERENCES FOR EMISSION FACTORS

1. U.S. EPA, Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources; Tables II-7-1 (Diesel) and Table II-7-2 (Gasoline) (THC, NOx, SOx {see 3 below}, CO, and PM). Uncontrolled NOx factor for construction equipment set at 11 g/hp-hr per SBCAPCD.
2. U.S. EPA, 1993. Compilation of Air Pollutant Emission Factors (AP-42), Volume 1: Stationary Point and Area Sources (revised through Supplement F). Table 3.3-1 (THC, NOx, SOx {see 3 below}, CO, and PM).
3. SOx emission factors for diesel combustion were modified to reflect use of fuel having 0.05 pct. sulfur instead of 0.22 pct. in AP-42 and 0.20 pct. in Ref. 8 below. NOx and THC diesel factors adjusted to reflect injection timing retard, and high pressure fuel injectors on some engines. Overall average NOx reduction assumed was 20% for codes 1-7 & 9-11, 40% for codes 12 through 16, and no control for code 8.
4. California ARB, 1991. Identification of Volatile Organic Compound Species Profiles. Used to define VOC as non-methane portion of THC. Profiles 561 (Diesel - ROC = 0.95\*THC) and 502 (Non-catalyst light-duty vehicles - ROC = 0.91\*THC).
5. California ARB, 1988. Method used to Develop a Size-Segregated Particulate Matter Inventory (Draft). PM10 Fractions from Profiles 118 (Diesel - PM10 = 0.96\*PM) and 117 (Gasoline - PM10 = 0.994\*PM).
6. U.S. EPA, 1993. Same as Reference 2 above. Fugitive PM based on 1.2 tons per acre per month (Section 11.2.4) and 220 hours per month. Controlled factor assumes 50% credit for watering.
7. California ARB, 1988. Same as Reference 5 above. PM10 fraction is 0.64 based on Profile 391 - Road and Building Construction Dust.
8. Technical Support Document, Net Emission Increase, Entire Source Emissions, Installation and Operation, Santa Ynez Unit/Las Flores Canyon Oil and Stripping Gas Treating Facility and Transportation Terminal. Exxon Company, U.S.A., February 29, 1988, County of Santa Barbara Air Pollution Control District (Table 3.1-2). THC factor in Table 1 is Exxon ROC factor divided by 0.95 (see note 4 above). SOx factor in the Exxon TSD was based on a sulfur content of 0.20 wt pct.
9. SCAQMD, 1993. CEQA Air Quality Handbook. Table A9-13-B, High Solid Coatings and Water-Based Coatings, interpolated to APCD Rule 323 limit of 340 grams ROC/liter.
10. SCAQMD Permit Processing Manual, 1989, as cited in Platform Harmony PTO 9101.