Short term fugitive Dust Emissions
Maximum fugitive dust activity occurs in month 1.

1 month of dirt moving
22 construction days per month
10 construction hours per day
60% average load factor for equipment listed (CEQA)

Dirt Piling or Material Handling

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
<th>Hours/Day</th>
<th>Material Quantity Handling (ton/day)</th>
<th>Material Handled (ton)</th>
<th>Watering Control Efficiency</th>
<th>PM10 Emissions (lb/hr)</th>
<th>PM10 Emissions (lb/day)</th>
<th>PM2.5 Emissions (lb/hr)</th>
<th>PM2.5 Emissions (lb/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scraper</td>
<td>7</td>
<td>6</td>
<td>38,449</td>
<td>845,875</td>
<td>67%</td>
<td>0.1354</td>
<td>0.0205</td>
<td>0.1230</td>
<td>0.0082</td>
</tr>
<tr>
<td>Loader</td>
<td>2</td>
<td>6</td>
<td>10,253</td>
<td>225,567</td>
<td>67%</td>
<td>0.00361</td>
<td>0.0055</td>
<td>0.0328</td>
<td>0.0023</td>
</tr>
<tr>
<td>Backhoe</td>
<td>2</td>
<td>6</td>
<td>2,563</td>
<td>56,392</td>
<td>67%</td>
<td>0.0090</td>
<td>0.0146</td>
<td>0.0023</td>
<td>0.0014</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.127,833</td>
<td>1.0832</td>
<td>0.0273</td>
<td>0.1640</td>
</tr>
</tbody>
</table>

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants (South Coast Air Quality Management District, 1993, CEQA Air Quality Handbook, Table 11-4: Mitigation for PM10 Emissions - Construction.)
assume 75% material handling is done by scrapers, 20% by loaders, and 5% by backhoe

Grading Emissions Factor
To be used for all scraping and grading activities

E = 0.051(S)²

multiply by 0.60 for PM₁₀

S = mean vehicle speed (mph)

USEPA AP42 Chapter 13.2.3 (Heavy Construction Operations), Table 13.2.3-1 - refers to

E = 0.040(S)³

multiply by 0.031 for PM₂.₅

assumed to be 4 mph

S = mean vehicle speed (mph)

USEPA AP42 Chapter 11.9 (Western Surface Coal Mining), Table 11.9-1

Grading

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
<th>Hours/Day</th>
<th>Daily VMT</th>
<th>Watering Control Efficiency</th>
<th>PM10 Emissions (lb/hr)</th>
<th>PM10 Emissions (lb/day)</th>
<th>PM2.5 Emissions (lb/hr)</th>
<th>PM2.5 Emissions (lb/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scraper</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>67%</td>
<td>0.02</td>
<td>0.11</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Grader</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>67%</td>
<td>0.05</td>
<td>0.32</td>
<td>0.00</td>
<td>0.03</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.07</td>
<td>0.44</td>
<td>0.01</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants (South Coast Air Quality Management District, 1993, CEQA Air Quality Handbook, Table 11-4: Mitigation for PM10 Emissions - Construction.)

Bulldozing/Earth clearing

E = 1.0(S)¹(M)⁻¹

multiply by 0.75 for PM₁₀

USEPA AP42 Chapter 13.2.3 (Heavy Construction Operations), Table 13.2.3-1 - refers to

E = 5.7(S)²(M)⁻²

multiply by 0.105 for PM₂.₅

19 M = Moisture content of surface material (%) (average of soil borings taken onsite at 5 ft)

50 S = Silt content (%) (from soil boring B-4)

4.30 lb/hr of PM₁₀

1.42 lb/hr of PM₂.₅

Bulldozing/Earth clearing

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
<th>Hours/Day</th>
<th>Watering Control Efficiency</th>
<th>PM10 Emissions (lb/hr)</th>
<th>PM10 Emissions (lb/day)</th>
<th>PM2.5 Emissions (lb/hr)</th>
<th>PM2.5 Emissions (lb/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dozer</td>
<td>6</td>
<td>6</td>
<td>67%</td>
<td>8.51</td>
<td>51.06</td>
<td>2.82</td>
<td>16.91</td>
</tr>
</tbody>
</table>

Total

22 construction days per month
1 Total months of soil movement

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants (South Coast Air Quality Management District, 1993, CEQA Air Quality Handbook, Table 11-4: Mitigation for PM10 Emissions - Construction.)

Cover Storage Pile

SCAQMD Table A9-9-E

E = 1.7 * G * 1.5 * (H/235)² * 1/15 * J

PM10 Emission factor from wind erosion of storage piles per day per acre

50 G = Silt content (%) (from soil boring B-4)

37 H = Mean number of days per year with at least 0.01 inches of precipitation (from WRCC for Bakersfield Airport Station)

0.3 I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height

0.5 J = Fraction of TSP that is PM₁₀ = 0.5

0.791 lb/acre/day

wind speed percentage and average based on 2000-04 (5 yrs) of wind speed data as recorded at Bakersfield Airport station
**Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants (South Coast Air Quality Management District, 1993, CEQA Air Quality Handbook, Table 11-4: Mitigation for PM10 Emissions - Construction.)*

pile size and number are assumed

**Travel on unpaved road**

\[
F = 2.1 \times \frac{G}{12} \times \frac{H}{40} \times \left(3.93 \times \frac{J}{4.86} \times 365\right) / 365
\]

Emission factor for vehicle travel on unpaved roads (lb/VMT)

\[
G = \text{Surface silt loading} \% \quad \text{value for gravel road}
\]

\[
H = \text{Mean vehicle speed} \quad \text{mph}
\]

\[
J = \text{Mean number of wheels on vehicle}
\]

\[
K = \text{Mean number of days per year with at least 0.01 inches of precipitation} \quad \text{from WRCC for Bakersfield Airport Station}
\]

water trucks operate at least 4 times per day.

PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

Water trucks operate at least 4 times per day.

PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.

PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

**Emissions (lb/hr)**

\[
\text{PM10 Emissions (lb/hr)} = E \times L \\
\text{PM10 Emissions (lb/day)} = E \times L \times 8 \times 52
\]

**TOTAL**

\[
\text{Total PM10 Emissions (lb/day)} = E \times L \times 8 \times 52
\]

worker personal vehicles

Assumed maximum travel speed is 4 mph

Equipment weight from SCAQMD Table A9-9-D and various websites

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants (South Coast Air Quality Management District, 1993, CEQA Air Quality Handbook, Table 11-4: Mitigation for PM10 Emissions - Construction.)*

PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.

PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

Water trucks operate at least 4 times per day.

10 Maximum number of construction work hours per day

**CEQA Load Factors (Table A9-8-D)**

- generator: 74
- welder: 45
- compressors: 48
- crawler dozer: 59
- drill rig: 75

**PM10 Emissions (lbs/day)**

<table>
<thead>
<tr>
<th>Description</th>
<th>PM10 Emissions (lbs/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grading</td>
<td>0.4342</td>
</tr>
<tr>
<td>Bulldozing</td>
<td>51.0596</td>
</tr>
<tr>
<td>Dirt Piling</td>
<td>1.9832</td>
</tr>
<tr>
<td>Storage Piles</td>
<td>1.6313</td>
</tr>
<tr>
<td>Travel on Unpaved Roads</td>
<td>6.7567</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>66.97</strong></td>
</tr>
</tbody>
</table>

**Average equipment load factor**

- crane: 43
- roller: 57.5
- loader: 54
- backhoe: 46.5
- grader: 57
- forklift: 47.5
- scraper: 66

**Total Annual Fugitive Dust from Onsite Equipment - Month 1**

<table>
<thead>
<tr>
<th>Description</th>
<th>PM10 Emissions (lbs/hr)</th>
<th>PM10 Emissions (lbs/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grading</td>
<td>0.4342</td>
<td>0.0354</td>
</tr>
<tr>
<td>Bulldozing</td>
<td>51.0596</td>
<td>16.9147</td>
</tr>
<tr>
<td>Dirt Piling</td>
<td>1.9832</td>
<td>0.028</td>
</tr>
<tr>
<td>Storage Piles</td>
<td>1.6313</td>
<td>0.0393</td>
</tr>
<tr>
<td>Travel on Unpaved Roads</td>
<td>6.7567</td>
<td>0.1472</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>66.97</strong></td>
<td><strong>18.89</strong></td>
</tr>
</tbody>
</table>
### Annual Fugitive Dust Emissions

Maximum annual fugitive dust activity occurs in months 1-12.

- 7 months of soil disturbance
- 10 total construction hours per work day
- 22 construction days per month
- 60% average load factor for equipment listed (CEQA)

#### Grading Emissions Factor

To be used for all scraping and grading activities (except material handling)

\[
E = 0.051(S)^{2.3} \quad \text{multiply by 0.60 for PM}_{10}
\]

\[
E = 0.040(S)^{2.5} \quad \text{multiply by 0.031 for PM}_{2.5}
\]

\[\begin{align*}
S &= 4.0 \text{ mph} \\
PM_{10} &= 0.49 \text{ lb PM}_{10}/\text{VMT} \\
PM_{2.5} &= 0.04 \text{ lb PM}_{2.5}/\text{VMT}
\end{align*}\]

#### Equipment Quantity Hours/Day Annual VMT Watering Control Efficiency PM10 Emissions (lb/yr) PM10 Emissions (ton/yr) PM2.5 Emissions (lb/yr) PM2.5 Emissions (ton/yr)

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Quantity</th>
<th>Hours/Day</th>
<th>Annual VMT</th>
<th>Watering Control Efficiency</th>
<th>PM10 Emissions</th>
<th>PM10 Emissions</th>
<th>PM2.5 Emissions</th>
<th>PM2.5 Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scraper</td>
<td>24</td>
<td>6</td>
<td>634</td>
<td>67%</td>
<td>597</td>
<td>0.30</td>
<td>48.4</td>
<td>0.02</td>
</tr>
<tr>
<td>Grader</td>
<td>24</td>
<td>6</td>
<td>3,696</td>
<td>67%</td>
<td>102</td>
<td>0.05</td>
<td>8.3</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Total: 700 lb/yr, 0.35 ton/yr, 56.7 lb/yr, 0.03 ton/yr

#### Bulldozing/Earth clearing

\[
E = 1.0(S)^{0.5}(M)^{0.4} \quad \text{multiply by 0.75 for PM}_{10}
\]

\[
E = 5.7(S)^{0.5}(M)^{0.3} \quad \text{multiply by 0.105 for PM}_{2.5}
\]

\[\begin{align*}
50 s &= \text{Silt content} \% \text{ (from soil boring B-4)} \\
19 M &= \text{Moisture content of surface material} \% \text{ (average of soil borings taken onsite at 5 ft)} \\
4.30 &= \text{lb/hr of PM}_{10} \\
1.42 &= \text{lb/hr of PM}_{2.5}
\end{align*}\]

#### Dirt Piling or Material Handling

\[
E = k \cdot 0.0032 \cdot (U/5)^{1.3} / (M/2)^{1.4}
\]

\[\begin{align*}
k &= 0.35 \text{ k for PM}_{10} \\
0.053 \text{ k for PM}_{2.5} \\
6.25 U &= \text{Mean Wind speed (mph) average for Bakersfield Airport 2000-2004} \\
19 M &= \text{Moisture content of surface material} \% \text{ (average of soil borings taken onsite at 5 ft)} \\
0.00006 &= \text{lb/ton of PM}_{10} \\
0.00001 &= \text{lb/ton of PM}_{2.5}
\end{align*}\]

#### Equipment Annual Material Handled (ton) Watering Control Efficiency Watering Control Efficiency PM10 Emissions (ton/yr) PM2.5 Emissions (ton/yr)

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Annual Material Handled (ton)</th>
<th>Watering Control Efficiency</th>
<th>PM10 Emissions (ton/yr)</th>
<th>PM2.5 Emissions (ton/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scraper</td>
<td>1,691,750</td>
<td>67%</td>
<td>0.0179</td>
<td>0.0027</td>
</tr>
<tr>
<td>Loader</td>
<td>1,522,575</td>
<td>67%</td>
<td>0.0161</td>
<td>0.0024</td>
</tr>
<tr>
<td>Backhoe</td>
<td>169,175</td>
<td>67%</td>
<td>0.0018</td>
<td>0.0003</td>
</tr>
</tbody>
</table>

Total: 3,383,500 lb/yr, 0.0357 ton/yr, 0.0054 ton/yr

#### Cover Storage Pile

SCAQMD Table A9-9-E

\[
E = 1.7 \cdot 0.5 \cdot (365-H/235) \cdot 115 \cdot J
\]

PM10 Emission factor from wind erosion of storage piles per day per acre

- \[50 G = \text{Silt content} \% \text{ (from soil boring B-4)}\]
- \[37 H = \text{Mean number of days per year with at least 0.01 inches of precipitation (from WRCC for Bakersfield Airport Station)}\]
- \[0.3 I = \text{Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height}\]
- \[0.5 J = \text{Fraction of TSP that is PM10 = 0.5}\]
- \[0.791 \text{ lb/acre/day} = \text{wind speed percentage and average based on 2000-04 (5 yrs) of wind speed data as recorded at Bakersfield Airport station}\]

\[\begin{align*}
18,619 \text{ yd}^3/\text{day} &= 21,971 \text{ ton/day} \\
2,867,373 \text{ yd}^3 &= 3,383,500 \text{ tons} \\
354.75 \text{ acres} &= 2,867,373 \text{ cubic yds, assume depth of soils moved is 1.67 yd}
\end{align*}\]
Travel on unpaved roads

\[
F = 2.1 \times G \times H \times (J/3)^{1/2} \times (K/365)^{1/2}
\]

SCAQMD Table A9-9-D

Emission factor for vehicle travel on unpaved roads (lbs/VMT)

Water trucks operate at least 4 times per day.

PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.

PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.

except for worker vehicles - parking area will be gravelled and main road onsite will be paved

F = 2.1 \times G/12 \times H/30 \times (J/3)

value listed in table I = Mean number of wheels on vehicle

value listed in table J = Mean vehicle weight (ton)

37 K = Mean number of days per year with at least 0.01 inches of precipitation (from WRCC for Bakersfield Airport Station)

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants (South Coast Air Quality Management District, 1993, CEQA Air Quality Handbook, Table 11-4: Mitigation for PM10 Emissions - Construction.)