**ENGINEERING EVALUATION**
CEMEX Construction Materials Pacific, LLC
500 Amador Street, San Francisco, CA 94124
Application: #28001
Plant: #17111

## BACKGROUND

CEMEX Construction Materials Pacific, LLC (CEMEX) is an existing facility which operates a concrete batch plant at Pier 92 in San Francisco. The facility receives aggregates, cement, and cement supplement (flyash) to produce ready mix concrete. The facility uses both a truck-mixing batch process and a central-mix batching process.

The facility submitted Application #12815 in 2005 to permit Sources S-1 through S-14. The Authority to Construct was issued in October 2005. The facility applied for throughput increases in Application #26846 and Application #27409. The Permit to Operate for both applications were issued in 2015.

This application is for an increase in sand throughput at S-14 from 60,000 tons per year (TPY) to 235,572 TPY. The facility has also requested to permit 153,803 TPY of aggregate at S-14. This application will be evaluated as a modification to the following source:

**S-14 Barge Conveyor System & Stockpile (2 Transfer Points)**
**Conveying Gravel/Sand**
**Maximum Yearly Sand Throughput: 235,572 Tons/Year**
**Maximum Daily Sand Throughput: 818 Tons/Day**
**Maximum Hourly Sand Throughput: 69 Tons/Hour**
**Maximum Yearly Aggregate Throughput: 153,803 Tons/Year**
**Maximum Daily Aggregate Throughput: 535 Tons/Day**
**Maximum Hourly Aggregate Throughput: 45 Tons/Hour**
**Abated by A-4 Water Spray System**

Per Air District Permit Handbook Chapter 11.5, Concrete Batch Plants, stockpiles shall be grouped as separate sources. Therefore, the stockpile description will be removed from S-14 and the stockpile will be considered a separate source as shown below:

**S-15 Sand and Aggregate Stockpile**
**0.25 Acre Common Area**
**Abated by A-4 Water Spray System**

S-15 is not considered a modified source. The emissions from S-15 are based on the size of the stockpile (in acres), which will not change as a result of this project. A mister and sprinkler system is located at the corners and along the north and south sides of the storage area to abate particulate matter (PM) emissions. Cemex has provided documentation which demonstrates the moisture content of the stockpile is greater than 5%.

This evaluation will also consider emissions of road dust. Road dust emissions are not considered a modification since there is no increase in vehicle miles traveled (VMT) as a result of this project. Emissions of road dust are included in this evaluation since these emissions were not discussed previously under Application #26846 and #27409. Per Regulation 2-1-115.1.5, road dust emissions from haul roads are exempt

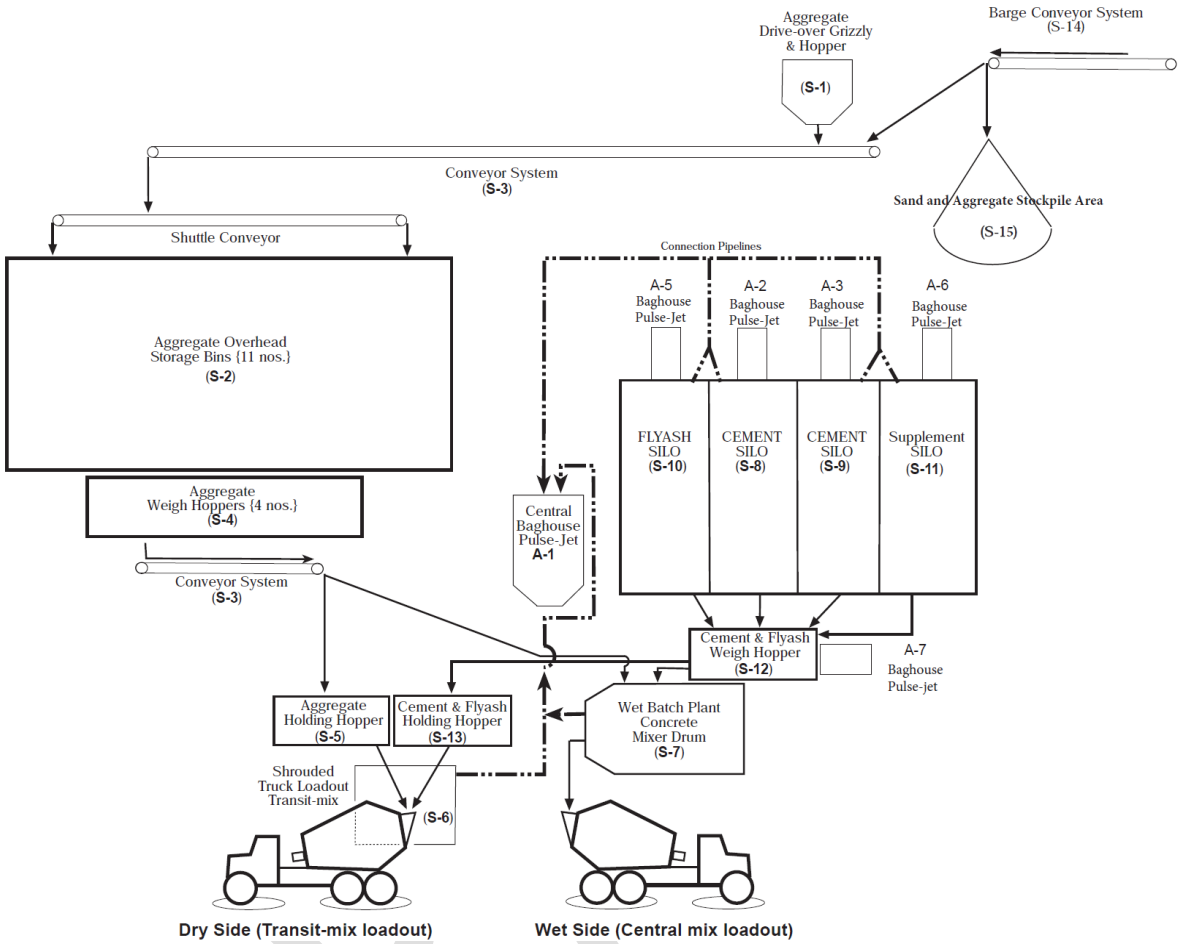
from the requirements of 2-1-301 and 302, provided that the source does not require permitting pursuant to Section 2-1-319. Calculations discussed later in this report, demonstrate that the facility emits less than five tons per year of $PM_{10}$ and $PM_{2.5}$ of road dust. and road dust does not emit toxic air contaminants (TACs) that exceed the trigger levels listed in Table 2-5-1 of Regulation 2-5. Therefore, $PM_{10}$ and $PM_{2.5}$ emissions of road dust are indeed exempt. Although the source is exempt, for clarity, road dust emissions will be assigned the following source number:

**S-16 Road Dust Emissions (exempt)**
**20,241 Vehicle Miles Traveled**

Material Receiving and Transfer

Washed dredge sand is imported from British Columbia and brought by ship. The sand is offloaded to barges at Anchorage 9. Tugboats then tug the barge to Pier 92. Sand is transferred off the barge by mobile handling equipment, such as front-end loaders. Mobile handling equipment are excluded from Air District regulations pursuant to Regulation 1-110.1. The sand and aggregate are offloaded to S-14, Barge Conveyor System. From the electrically powered conveyor system, the material is then transferred to either S-15, Sand and Aggregate Stockpile, or delivered directly to S-1, Drive-Over Grizzly and Hopper. Sand and aggregate that is first delivered to S-15, Sand and Aggregate Stockpile, will eventually be transferred to S-1, Drive-Over Grizzly and Hopper, by a front-end loader.

The diagram below illustrates the operations at the facility and identifies all sources and abatement devices.




## EMISSIONS CALCULATIONS

### Particulate Matter Emissions

Criteria pollutant emissions are from the transfer of sand and aggregate from the barge to the conveyor system (Transfer Point #1), the transfer of sand and aggregate from the conveyor system to the stockpile (Transfer Point #2), wind erosion, road dust, and tugboat and oceangoing vessel (OGV) engines.

S-14 Barge Conveyor Emissions

Emissions resulting from the transfer of sand and aggregate at Transfer Point #1 and Transfer Point #2 are associated with S-14.

PM emissions are calculated using emission factors from Chapter 11.12, Concrete Batching, of AP-42 (Fifth Edition, Volume 1). The emission factor for Uncontrolled Total $PM_{10}$ for sand transfer from Table 11.12-2 is 0.00099 lb/ton. Per Air District Permit Handbook Chapter 11.5, Concrete Batch Plants, $PM_{2.5}$ is 15% of $PM_{10}$. Also, if watering is used to suppress dust, a maximum abatement efficiency of 70% may be used in calculating emissions of $PM_{10}$.

Table 1. Total $PM_{10}$ Emissions from Sand Transfer at S-14

| | $PM_{10}$ | | | | | |
|---|---|---|---|---|---|---|
| | Emission Factor (lb/ton) | Maximum Daily Sand Throughput (ton/day) | Maximum Daily Sand Emissions (lb/day) | Maximum Yearly Sand Throughput (ton/year) | Maximum Yearly Sand Emissions (lb/year) | Maximum Yearly Sand Emissions (ton/year) |
| Transfer Point #1 | 0.000297[1] | 818 | 0.243 | 235,572 | 69.96 | 0.035 |
| Transfer Point #2 | 0.000297[1] | 818 | 0.243 | 235,572 | 69.96 | 0.035 |
| Total | -- | -- | 0.486 | -- | 139.92 | 0.070 |

[1]Aabatement efficiency of 70% applied to $PM_{10}$ emission factor (0.00099 lb/ton) for watering.

Table 2. Total $PM_{2.5}$ Emissions from Sand Transfer at S-14

| | $PM_{2.5}$ | | | | | |
|---|---|---|---|---|---|---|
| | Emission Factor (lb/ton) | Maximum Daily Sand Throughput (ton/day) | Maximum Daily Sand Emissions (lb/day) | Maximum Yearly Sand Throughput (ton/year) | Maximum Yearly Sand Emissions (lb/year) | Maximum Yearly Sand Emissions (ton/year) |
| Transfer Point #1 | 0.00015[1] | 818 | 0.123 | 235,572 | 35.34 | 0.018 |
| Transfer Point #2 | 0.00015[1] | 818 | 0.123 | 235,572 | 35.34 | 0.018 |
| Total | -- | -- | 0.247 | -- | 70.68 | 0.036 |

[1]There is no data for abated $PM_{2.5}$ emissions. Therefore, an abatement efficiency of 70% was not applied.

The incremental increase of yearly sand throughput (235,572 – 60,000 = 175,572 tons/year) was used to calculate the increase in PM emissions as a result of this project. The emissions in Table 3 and Table 4 below will be recorded in the cumulative increase for the facility.

Table 3. $PM_{10}$ Emissions the from Increase of Sand Throughput at S-14

| | $PM_{10}$ | | | |
|---|---|---|---|---|
| | Emission Factor (lb/ton) | Maximum Yearly Sand Throughput (ton/year) | Maximum Yearly Sand Emissions (lb/year) | Maximum Yearly Sand Emissions (ton/year) |
| Transfer Point #1 | 0.000297[1] | 175,572 | 52.14 | 0.026 |
| Transfer Point #2 | 0.000297[1] | 175,572 | 52.14 | 0.026 |
| Total | -- | -- | 104.29 | 0.052 |

[1]Aabatement efficiency of 70% applied to $PM_{10}$ emission factor (0.00099 lb/ton) for watering

Table 4. $PM_{2.5}$ Emissions the from Increase of Sand Throughput at S-14

| | $PM_{2.5}$ | | | |
|---|---|---|---|---|
| | Emission Factor (lb/ton) | Maximum Yearly Sand Throughput (ton/year) | Maximum Yearly Sand Emissions (lb/year) | Maximum Yearly Sand Emissions (ton/year) |
| Transfer Point #1 | 0.00015[1] | 175,572 | 26.34 | 0.013 |
| Transfer Point #2 | 0.00015[1] | 175,572 | 26.34 | 0.013 |
| Total | -- | -- | 52.67 | 0.026 |

[1]There is no data for abated $PM_{2.5}$ emissions. Therefore, an abatement efficiency of 70% was not applied.

Total emissions from Table 1 will be used to determine respirable crystalline silica emissions in the TAC emissions section.

The emission factor for Uncontrolled Total $PM_{10}$ for aggregate transfer from Table 11.12-2 is 0.0033 lb/ton. Per Air District Permit Handbook Chapter 11.5, Concrete Batch Plants, $PM_{2.5}$ is 15% of $PM_{10}$. Also, if watering is used to suppress dust, a maximum abatement efficiency of 70% may be used in calculating emissions of $PM_{10}$.

Table 5. Total $PM_{10}$ Emissions from Aggregate Transfer at S-14

| | $PM_{10}$ | | | | | |
|---|---|---|---|---|---|---|
| | Emission Factor (lb/ton) | Maximum Daily Aggregate Throughput (ton/day) | Maximum Daily Aggregate Emissions (lb/day) | Maximum Yearly Aggregate Throughput (ton/year) | Maximum Yearly Aggregate Emissions (lb/year) | Maximum Yearly Aggregate Emissions (ton/year) |
| Transfer Point #1 | 0.00099[1] | 535 | 0.530 | 153,803 | 152.26 | 0.076 |
| Transfer Point #2 | 0.00099[1] | 535 | 0.530 | 153,803 | 152.26 | 0.076 |
| Total | -- | -- | 1.060 | -- | 304.53 | 0.152 |

[1]Aabatement efficiency of 70% applied to $PM_{10}$ emission factor (0.0033 lb/ton) for watering

Table 6. Total $PM_{2.5}$ Emissions from Aggregate Transfer at S-14

| | $PM_{10}$ | | | | | |
|---|---|---|---|---|---|---|
| | Emission Factor (lb/ton) | Maximum Daily Aggregate Throughput (ton/day) | Maximum Daily Aggregate Emissions (lb/day) | Maximum Yearly Aggregate Throughput (ton/year) | Maximum Yearly Aggregate Emissions (lb/year) | Maximum Yearly Aggregate Emissions (ton/year) |
| Transfer Point #1 | 0.0005[1] | 535 | 0.268 | 153,803 | 76.90 | 0.038 |
| Transfer Point #2 | 0.0005[1] | 535 | 0.268 | 153,803 | 76.90 | 0.038 |
| Total | -- | -- | 0.535 | -- | 153.80 | 0.076 |

[1]There is no data for abated $PM_{2.5}$ emissions. Therefore, an abatement efficiency of 70% was not applied.

S-15 Stockpile Emissions

PM emissions at the stockpile are due to wind erosion. PM emissions at the stockpile will be calculated using two scenarios: 1) all of the stockpile is aggregate and 2) all of the stockpile is sand. The most conservative emissions will be used.

Aggregate Stockpile:

Emission factors for storage piles at concrete batch plants are from Air District Permit Handbook Chapter 11.5 for Concrete Batch Plants. The emission factor for $PM_{10}$ is:

$E_{PM10}$ = 1.7 lb/acre/day
Abated $E_{PM10}$ = 0.51 lb/acre/day

Using the assumption that $PM_{2.5}$ is 15% of $PM_{10}$, the emission factor for $PM_{2.5}$ is:

Abated $E_{PM2.5}$ = 0.08 lb/acre/day

Table 7. Stockpile Emissions Assuming All Aggregate

| Source # | Source Description | Pollutant | Abated Emissions Factor (lb/acres/day) | Maximum Sand Stockpile Area (acres) | PM Emissions (lbs/day) | PM Emissions (lbs/year) | PM Emissions (ton/year) |
|---|---|---|---|---|---|---|---|
| 15 | Aggregate Stockpile | $PM_{10}$ | 0.51 | 0.25 | 0.123 | 44.90 | 0.023 |
| | | $PM_{2.5}$ | 0.08 | 0.25 | 0.020 | 7.30 | 0.004 |

Sand Stockpile:

Emissions of $PM_{10}$ and $PM_{2.5}$ from wind erosion will also be calculated as if the entire stockpile is sand. The $PM_{10}$ emission factor for S-15 for sand is calculated using two methods. The more conservative estimate will be used.

The first method uses Equation 4-9 from the EPA document, "Control of Open Fugitive Dust Sources", dated 9/1988:

$$E_{30} = (1.7)\left(\frac{s}{1.5}\right)\left(\frac{365-p}{235}\right)\left(\frac{f}{15}\right) \text{ (lb/acre-day)}$$

Where, $E_{30}$ = $PM_{30}$ Emission Factor (lb/acre-day)
s = Silt Content of Sand, Material passing the 200-mesh typical range 0.2-1.58% = 1.58%
p = Number of Days with ≥ 0.01 inches of Precipitation Per Year, AP-42 Figure 13.2.2-1 = 65

f[1] = Percentage of Time Unobstructed Wind Speed Exceeds 12 mph., based on Mojave Desert Air Quality Management District (MDAQMD) Emissions Inventory Guidance for Mineral Handling and Processing Industries, Wind Erosion from Stockpiles section (page 18/31) = 13.3%

$$PM_{30} = (1.7)\left(\frac{1.58}{1.5}\right)\left(\frac{365-65}{235}\right)\left(\frac{13.3}{15}\right) = 2.027 \text{ lb/acre-day}$$

The EPA document referenced above estimates that $PM_{10}$ is 0.5 x $E_{30}$. Therefore, the $PM_{10}$ emission factor is:

$$PM_{10} = 0.5 \text{ x } (2.027 \text{ lb/acre-day}) = 1.014 \text{ lb/acre-day}$$

Since the stockpile is abated by A-4, Water Spray System, a control efficiency of 70% is assumed:

$$PM_{10} = (1.014 \text{ lb/acre-day}) \text{ x } (1\text{-}70\%) = 0.304 \text{ lb/acre-day}$$

Annual emissions are calculated by multiplying the emission factor by the acres of exposed stockpile area and 365 days/year. Per Air District Permit Handbook Chapter 11.5, Concrete Batch Plants, $PM_{2.5}$ is 15% of $PM_{10}$.

Table 8. PM Stockpile Emissions Assuming All Sand

| Source # | Source Description | Pollutant | Emissions Factor (lb/acres/day) | Reference | Maximum Sand Stockpile Area (acres) | PM Emissions (lbs/day) | PM Emissions (lbs/year) | PM Emissions (ton/year) |
|---|---|---|---|---|---|---|---|---|
| 15 | Sand and Aggregate Stockpile | $PM_{10}$ | 0.304 | EPA Document - "Control of Open Fugitive Dust Sources" | 0.25 | 0.076 | 27.74 | 0.014 |
| | | $PM_{2.5}$ | -- | 15% of $PM_{10}$ | 0.25 | 0.011 | 4.16 | 0.002 |

The second method to calculate PM emissions from stockpiles is derived from AP-42 Chapter 13.2.5, Industrial Wind Erosion, dated 11/2006. The equation used to determine the particulate matter emission factor is:

$$\text{Emission factor} = k \sum_{i=1} Pi$$

Where, k = particle size multiplier
N = number of disturbances per year

[1] A draft Environmental Impact Report from the San Francisco Planning Department indicates that the percentage of time wind speed exceeds 12 mph in San Francisco is 10% (Source: https://sfmea.sfplanning.org/CentralSoMaPlanDEIR_13-iv-g-wind.pdf). For a more conservative estimate of emissions, data from MDAQMD was used.

Pi = erosion potential corresponding to the observed (or probable) fastest mile of wind for the ith period between disturbances, $g/m^2$

The erosion potential function for a dry, expose surface is:

$$P = 58 (u^* - u_t^*)^2 + 25 (u^* - u_t^*)$$

$$P = 0 \text{ for } u^* \leq u_t^*$$

$$u^* = 0.053 (u_{10}^+)$$

Where, $u^*$ = friction velocity (m/s)
$u_t$ = threshold friction velocity (m/s)
$u_{10}^+$ = fastest mile of wind, m/s, at reference anemometer height of 10 m.

For Pier 92, $u_{10}^+$ = 14.0 mph (6.26 m/s) at a reference point of 10 m. Assume $u_t^*$ = 1.02 m/s for overburden at a coal mine (from Table 13.2.5-2).

$$u^* = 0.053 (6.26) = 0.33 \text{ m/s}$$

Since $u^*$ = 0.33 m/s is less than $u_t^*$ = 1.02 m/s, P = 0. Therefore, the second method estimates zero emissions from S-15 due to wind erosion.

As a conservative approach, emission estimates from the first method are used for determining emissions from S-15 if the entire stockpile is sand.

Emissions from S-15 assuming that the entire stockpile is aggregate will be used for purposes of offsets discussed later in this evaluation since they are more conservative.

S-16 Road Emissions

The following equation for emissions from paved roads is provided in Chapter 13.2.1, Paved Roads of AP-42 (updated 1/2011) for vehicles traveling on paved surfaces:

$$E = k(sL)^{0.91} \times W^{1.02} \times (1-P/4N)$$

Where, E = Emission Factor (lb/Vehicle Miles Traveled)
k = Particle size multiplier (lbs/VMT) = 0.0022, for $PM_{10}$ from Table 13.2.1-1
sL = road surface silt loading (grams per square meter $g/m^2$) = 12, mean value for concrete batching from Table 13.2.1-4
W = average weight of the vehicles (tons) = 21.77 tons
P = number of wet days with at least 0.01" precipitation = 65 days
N = number of days in the averaging period = 365 days

$$E = 0.0022 \times (12)^{0.91} \times (21.77)^{1.02} \times (1-(65/4*365)$$
$$E = 0.466 \text{ lb/VMT}$$

Provided that the VMT at Plant #17111 is 20,241, the total $PM_{10}$ emissions are:

Emissions $PM_{10}$ = 20,241 x 0.466 = 9,452 lb/yr
**Emissions $PM_{10}$ = 4.726 tons/year**

For $PM_{2.5}$ emissions, a k factor of 0.00054 lb/VMT is used:

$$E = (0.00054) \times (12)^{0.91} \times (21.77)^{1.02} \times (1-(65/4*365)$$
$$E = 0.11 \text{ lb/VMT}$$

The total $PM_{2.5}$ emissions are:

Emissions $PM_{2.5}$ = 20,241 x 0.11 = 2,320 lb/yr
**Emissions $PM_{2.5}$ = 1.160 tons/year**

Table 9. Summary of PM Emissions from S-16 Road Travel

| Source | $PM_{10}$ (ton/year) | $PM_{2.5}$ (ton/year) |
|---|---|---|
| Road Emissions | 4.726 | 1.160 |

As stated previously, road dust emissions are exempt from permitting because emissions of PM are less than 5 tons per year. Also, the source does not emit TACs that exceed the trigger levels in Table 2-5-1. The TAC calculation procedures for respirable crystalline silica are discussed in the TAC Emissions section below. The respirable crystalline silica emissions from road dust are 70.89 lb/year, which is less than the 120 lb/year trigger level.

Oceangoing Vessel and Tug Emissions:

OGVs and tugboats are used to transport material to the facility. They are sources of nitrogen oxide ($NO_x$), carbon monoxide (CO), precursor organic compounds (POC), sulfur dioxide ($SO_2$), and PM. In accordance with Regulation 2-2-610, emissions of cargo carriers shall be included in this analysis for the purpose of assessing the facility cumulative increase and offset requirements. Emissions from cargo carriers shall not be included for purposes of applying any other provisions of Regulation 2-2.

Sand and aggregate processed at S-14 is brought to CEMEX by OGV, tugboat, and barge. Emissions resulting from the operation of OGVs are calculated 11 nautical miles (nm) offshore at the Bar Pilot Station. Emissions from the OGV for the purposes of this application occur during Leg 1 (transit from Bar Pilot Station to the Golden Gate bridge), Leg 2 (transit from the Golden Gate Bridge to the Bay Bridge), Leg 3 (transit from the Bay Bridge to Anchorage #9), during hoteling at Anchorage #9 while material is being offloaded, and from the outbound trip. The facility utilizes up to 30 OGVs and tugs per year to transport material to the facility. The OGV also transports materials for companies other than CEMEX at the same time. At a minimum, the OGV delivers materials for three companies at any given time. Therefore, OGV emissions attributed to CEMEX – Pier 92 will be divided by three.

While at Anchorage #9, the OGV will remain for as long as 46.8 hours while all material is offloaded and moved onto a barge. When the material is ready to be offloaded, a tugboat, which remains stationed at Pier 50, travels to Pier 92 to pick up the barge. The tug then transports the barge to Anchorage #9 where it waits

up to six hours while material is off-loaded onto the barge. Once offloading is complete, the tugboat travels back to Pier 92 to drop off the barge at the facility and then travels back to Pier 50. There are no engines used on the barge. Therefore, there are no emissions resulting from the operation of the barge.

Since each trip varies with regards to the time needed to offload, the time needed to reach Anchorage #9, and the number of other facilities using the same OGV to transport material, etc., the maximum value for each parameter was used as a conservative estimate of cargo emissions.

Emissions from OGVs and tugs are presented in Appendix A of this evaluation.

Toxic Air Contaminant (TAC) Emissions

Crystalline silica is a TAC that is often found in sand. Respirable sized particles are produced when crystalline silica is processed. CEMEX provided a manufacturer's specification data sheet (MSDS) for the sand imported from British Columbia. According to the MSDS, 5% of the sand (considered $PM_{10}$) is crystalline silica. The MSDS did not contain information on the amount of respirable crystalline silica in the sand. Therefore, emissions of respirable crystalline silica were equated to emissions of $PM_{2.5}$ (due to the similarity in the size of the particles) and considered to be 15% of the crystalline silica.

Per Regulation 2, Rule 5, TAC emissions from new or modified sources are to be considered. In this project, there are no new sources and S-14 is the only modified source. Therefore, total respirable crystalline silica emissions from the transfer of sand at S-14 are considered for health risk analysis (HRA) purposes. Total $PM_{10}$ emissions listed in Table 1 were used to determine the values in Table 10.

Table 10. Respirable Crystalline Silica TAC Emissions

| Pollutant | Acute | | | Chronic | | |
|---|---|---|---|---|---|---|
| | Hourly Project Emission Rate (lb/hour) | Acute Trigger Level (lb/hour) | Project Exceeds Acute Trigger Level? (Yes/No) | Annual Project Emission Rate (lb/year) | Chronic Trigger Level (lb/year) | Project Exceeds Chronic Trigger Level? (Yes/No) |
| Silica Crystalline, Respirable (7631-86-9) | 1.5E-04[a] | N/A | No | 1.05E+00[b] | 1.2E+02 | No |

[a]Calculation based on sum of total daily abated emissions of $PM_{10}$ from S-14 listed in Table 1 (0.486 lb/day). The sum of the daily emissions were divided by 24 hours to determine hourly emissions (0.02 lb/hr). Hourly emission of $PM_{10}$ were further reduced by 5% and 15% as explained above.
[b]Calculation based on annual $PM_{10}$ emissions from S-14 in Table 1 (139.92 lb/year). Yearly emissions of $PM_{10}$ were further reduced by 5% and 15% as explained above.

## BEST AVAILABLE CONTROL TECHNOLOGY

Per Regulation 2-2-301, Best Available Control Technology (BACT) is required for any new or modified source with a regulated air pollutant potential to emit (PTE) equal to or greater than 10.0 lb/day.

S-14 is the only modified source in this project. The total maximum daily emissions of $PM_{10}$ from sand and aggregate handling at S-14 is the sum of 0.486 lb/day and 1.060 lb/day (listed in Tables 1 and 5), which is 1.546 lb/day.

The total maximum daily emissions of $PM_{2.5}$ from sand and aggregate handling at S-14 is the sum of 0.247 lb/day and 0.535 lb/day (listed in Tables 2 and 6), which is 0.782 lb/day.

The total maximum daily throughput at S-14 will not result in a $PM_{10}$ or $PM_{2.5}$ emission increase greater than 10.0 lb/day. Therefore, the requirements of Regulation 2-2-301 do not apply.

## OFFSETS

Regulation 2, Rule 2, Section 302

Regulation 2-2-302 requires offsets for any new or modified source at a facility that emits, or is permitted to emit, more than 10 tons per year of precursor organic compounds (POCs) or nitrogen oxides ($NO_X$).

The only sources of NOx and POC at CEMEX are OGVs and tugboats. As previously stated, emissions of cargo carriers are included in the assessment of offset requirements in accordance with Regulation 2-2-610.

As shown in Appendix A, the PTE for NOx and POC emissions are 26.803 tons/year and 1.242, respectively.

Since the facility is expected to have a PTE greater than 10 tons/year of $NO_X$ but less than 35 tons/year, offsets will be provided from the Small Facility Bank Account at a ratio of 1:1.

The facility will have a PTE less than 10 tons/year of POC; therefore, POC offsets are not required.

Regulation 2, Rule 2, Section 303

Regulation 2-2-303 requires offsets for any new or modified source at a major facility with a potential to emit 100 tons per year or more of $PM_{10}$, $PM_{2.5}$, or sulfur dioxide ($SO_2$).

Emissions of $PM_{10}$ and $PM_{2.5}$ at CEMEX occur from the operation of Sources 1 through 15, fugitive road dust, and OGV and tugboat emissions.

CEMEX is limited to 290,000 cubic yards of concrete at S-7, Central Mixing, and 155,000 cubic yards of concrete at S-6, Truck Mixing, in the permit conditions. A detailed calculation of PTE based on the limits at S-6 and S-7 (concrete batching) are in Appendix B. The emission factors used to calculate PTE were obtained from AP-42 Table 11.12-2.

CEMEX is limited to 20,241 VMT/year in the permit conditions. Therefore, the road dust emissions listed in Table 9 represents the PTE for $PM_{10}$ and $PM_{2.5}$ from road dust.

OGV and tug emissions are also a source of $PM_{10}$ and $PM_{2.5}$ at CEMEX. The PTE for $PM_{10}$ and $PM_{2.5}$ from OGV and tug operations are shown in Appendix A where $PM_{2.5}$ is assumed to equal $PM_{10}$.

Table 11. Facility Potential to Emit

| Source | $PM_{10}$ (ton/year) | $PM_{2.5}$ (ton/year) |
|---|---|---|
| Concrete Batching (S-1 through S-14) | 3.489 | 0.942 |
| Stockpile (S-15) | 0.023 | 0.004 |
| Road Emissions (S-16) | 4.726 | 1.160 |
| OGV/Tugboat | 0.622 | 0.622 |
| Total | 8.860 | 2.728 |

The facility-wide PTE is below the 100 ton/year threshold for providing offsets. Offsets for $PM_{10}$ and $PM_{2.5}$ are not required.

The only source of SOx emissions at CEMEX is from the operation of OGV and tugboats. As shown in Appendix A, the SOx PTE is 0.534 tons/year. Offsets for SOx are not required.
The following table provides the facility's cumulative increase. Road dust and ship emissions were previously calculated in Application # 12815. This application calculated total road dust and ship emissions at the facility, not just the increase resulting from a greater VMT and number of ship trips. Therefore, previously calculated emissions (from Application #12815) were subtracted to avoid double counting.

Table 12. Facility Cumulative Emission Increase

| **Pollutant** | **Existing Cumulative Increase(ton/yr)** | **Subtract Cumulative Increase Road Emissions Under App # 12815 (ton/yr)** | **Subtract Cumulative Increase Shipp Emissions Under App # 12815 (ton/yr)** | **Emission Increase from App #28001 (ton/yr)** | **New Cumulative Increase (ton/yr)** |
|---|---|---|---|---|---|
| POC | 0.010 | -- | (0.010) | 1.242 | 1.242 |
| NOx | 0.880 | -- | (0.880) | 26.803 | 26.803 |
| $SO_2$ | 0.000 | -- | -- | 0.534 | 0.534 |
| CO | 0.054 | -- | (0.054) | 3.193 | 3.193 |
| $PM_{2.5}$ | 0.000 | -- | -- | 1.888 | 1.888 |
| $PM_{10}$ | 16.204 | (10.232) | (0.010) | 5.575 | 11.537 |

## STATEMENT OF COMPLIANCE

Regulation 1: General Provisions and Definitions

Regulation 1, Section 301, Public Nuisance, states the following:

*"No person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public; or which endangers the comfort, repose, health or safety of any such persons or the public, or which causes, or has a natural tendency to cause, injury or damage to business or property. For purposes*

*of this section, three or more violation notices validly issued in a 30-day period to a facility for public nuisance shall give rise to a rebuttable presumption that the violations resulted from negligent conduct."*

The facility has not received any public nuisance violations in the past five years and is expected to meet the requirement of Regulation 1-301.

Regulation 2, Rule 1: General Requirements

Regulation 2, Rule 1, Section 310, Applicability of California Environmental Quality Act (CEQA), specifies that all proposed new and modified sources subject to District permit requirements must be reviewed in accordance with CEQA requirements, except for ministerial projects meeting the requirements of Regulation 2-1-311 or projects exempt from CEQA under Regulation 2-1-312.

The engineering review for this project used standard emission factors and procedures to estimate emissions from this project as described in Permit Handbook Chapter 11.5 Concrete Batch Plants. The decision to approve the permit for this project does not involve any element of discretion. Therefore, this project is ministerial as described in Regulation 2-1-311.

In addition, this application is categorically exempt from CEQA review pursuant to Regulation 2-1-312.11, because it involves the permitting of new or modified operations that satisfy the "No Net Emissions Increase" provisions of Regulation 2, Rule 2, and there is no possibility that the project will have any significant environmental effect in connection with resources other than air quality. In particular, the permitting of the S-15 Sand and Aggregate Stockpile meets the requirements of Regulation 2-1-312.11.1, because this application does not result in any emission increases for the existing permitted stockpile or any other significant environmental effects. This permit action corrects the permitting procedure for the stockpile. The permitting of the S-14 Barge Conveyor System meets the requirements of Regulation 2-1-312.11.4, because it involves the permitting of a modified source that results in some emission increases, but the source emissions do not trigger BACT or a health risk assessment. The permitting of the ocean-going vessel and tug emissions meet the requirements of Regulation 2-1-312.11.3, because this is a small facility that does not trigger offsets for POC emissions. This facility triggers offsets for NOx emissions, but full NOx emission offsets will be provided from the small facility banking account. There are no other significant environmental effects from the permitting of these sources. As demonstrated above, this project satisfies the Regulation 2, Rule 2 No Net Emission Increase provisions and meets the requirements of Regulation 2-1-312.11. Therefore, this permitting action is categorically exempt, and no CEQA review is required.

Regulation 2, Rule 1, Section 412, Public Notice - Schools, apply to facilities located within 1,000 feet of the boundary of a K-12 school. CEMEX is not located within 1,000 feet of a school. Therefore, the public notice requirements in Regulation 2-1-412 do not apply.

Regulation 2, Rule 2: New Source Review

Regulation 2, Rule 2, Section 301, Best Available Control Technology Requirement, requires BACT for any new or modified source with potential emissions of 10.0 lb per day or more of POC, NPOC, $NO_x$, $PM_{10}$, $PM_{2.5}$ or $SO_2$. Section 2-2-610 specifically excludes cargo carriers from BACT requirements, therefore emissions from ships are not subject to BACT. This application does not trigger BACT requirements.

Regulation 2, Rule 2, 302, Offset Requirements, Precursor Organic Compounds and Nitrogen Oxides, states that offsets must be provided for any new or modified source at a facility that emits, or is permitted to emit, more than 10 tons per year of POC or $NO_X$. If the facility emits or will be permitted to emit less than 35

tons of POC or $NO_x$ per year, the emission offsets will be provided by the District's Small Facility Banking Account.

The emissions of $NO_x$ from the facility exceed 10 tons/year but are less than 35 tons/year. Therefore, 26.803 tons of $NO_x$ credits will be provided by the District's Small Facility Banking Account. Since POC emissions are less than 10 tons per year, POC offsets are not required.

Regulation 2, Rule 2, 303, Offset Requirements, $PM_{10}$, $PM_{2.5}$, and Sulfur Dioxide, requires offsets for any new or modified source at a major facility with a PTE that exceeds 100 ton per year of $PM_{10}$, $PM_{2.5}$, or $SO_2$.

PTE of $PM_{10}$, $PM_{2.5}$, and $SO_2$ is less than 100 tons/year. Therefore, offsets for these pollutants are not required.

Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants

Pursuant to this Regulation, any modified source of TACs is required to undergo a HRA if TAC emissions exceed the hourly or annual thresholds outlined in Table 2-5-1. As mentioned previously, this project does not trigger a HRA since emissions of respirable crystalline silica do not exceed the annual trigger limit. Therefore, an HRA was not required for this project.

Regulation 2, Rule 6: Major Facility Review

The requirements of federal operating permit program have been codified in District Regulation 2, Rule 6. This rule requires that major and designated facilities apply for and obtain a Title V federal operating permit. Since this facility will emit less than 100 tons/year each of NOx, CO, POC, $PM_{10}$, and $SO_2$, less 10 tons/year of any single Hazardous Air Pollutant (HAP), and less than 25 tons/year of all HAPs combined, it is not considered to be a major facility of regulated air pollutants. This facility is also not a designated facility pursuant to any federal NSPS or NESHAP requirements. Therefore, Regulation 2, Rule 6 does not apply to this site.

Regulation 6, Rule 1: Particulate Matter – General Requirements

Regulation 6, Rule 1, Section 301, Ringelmann No. 1 Limitation, requires that visible emissions do not exceed Ringelmann 1.0 for periods aggregating more than 3 minutes in any hour or equivalent opacity.

Regulation 6, Rule 1, Section 305, Visible Particles, prohibits a public nuisance caused by the fallout of visible particulate emissions. This Section only applies if such particles fall on real property other than the property of the person responsible for the emissions.

Regulation 6, Rule 1, Section 310, Total Suspended Particulate (TSP) Concentration Limits, limits the concentration of TSP in the exhaust from devices such as baghouses and stacks. S-14 is controlled by water spray and does not exhaust to any baghouse or stack. Therefore, this Section does not apply.

Regulation 6, Rule 1, Section 311, Total Suspended Particulate (TSP) Weight Limits, limits TSP from any source based on the process weight rate. Regulation 6-1-311.2 applies to sources that have the potential to emit greater than 1000 kg per year (1.1 tons per year) of TSP. S-14 may have the potential to emit more than 1.1 tons/year, therefore, compliance with this Section must be achieved.

S-14 processes 69 tons/hour of sand and 45 tons/hour of aggregate for a total of 114 tons/hour (228,000 lb/hour). Based on this process weight rate, the TSP emission limit in Table 6-1-311.2 is 1.29 lb/hour.

From Table 11-12-2 of AP-42 Chapter 11.12 Concrete Batching, the total PM (which is also considered to be TSP) emission factor for uncontrolled sand transfer operations is 0.0021 pounds of TSP per tons of material transferred. The emission factor for uncontrolled aggregate transfer is 0.0069 pounds of TSP per tons of material transferred. Based on the emission factors for sand and aggregate, maximum hourly uncontrolled TSP emissions are 0.14 lb/hour from sand processing and 0.09 lb/hour from aggregate processing. The total hourly TSP is 0.23 lb/hour which is under the 1.29 lb/hour limit. CEMEX is in compliance with this requirement.

Regulation 6, Rule 6: Particulate Matter – Prohibition of Trackout

Regulation 6, Rule 6 limits the trackout of particulate matter onto public roadways from large bulk material sites, large construction sites, and large disturbed surface sites. CEMEX meets the definition of a large bulk material site since the facility has a stockpile of material greater than 100 square feet. Section 301 limits the extent of trackout to 25 cumulative linear feet and limits the amount of trackout material to 1 quart. Section 302 limits visible emissions during cleaning activities to 20% opacity or Ringelmann 1.0 for 3-minutes in any hour. Regulation 6-6-501 requires CEMEX to monitor the extent of trackout at the facility exits at least two times per each work-day, keep records of any times when trackout exceeds the 25 foot limit, and keep records of all related cleanup events. The Air District has verified that CEMEX is meeting the trackout limitations and expects that CEMEX will continue to comply with the Sections 301 and 302. Monitoring requirements will be added to the permit conditions.

**Federal Requirements:**

New Source Performance Standards

Cemex is not subject to New Source Performance Standards (NSPS) 40 CFR 60 Subpart OOO, 60.672(b) based on 60.670(a)(2), which states:

> (2) The provisions of this subpart do not apply to the following operations: All facilities located in underground mines; plants without crushers or grinding mills above ground; and wet material processing operations (as defined in §60.671).

Although the facility is not subject to the above NSPS, CEMEX is still expected to comply with the opacity limits of the NSPS in Table 3. Permit Condition #22534 includes visible emission compliance requirements, which are more stringent than NSPS.

There are no applicable National Emission Standards for Hazardous Air Pollutants (NESHAPS) for concrete batch plants.

## PERMIT CONDITIONS

COND# 22534 ----------

S-1 through S-15, tugboat and trucking activities:

(Revision: A# 26846; A# 27409; A# 28001)

1. The owner/operator shall not exceed the following material throughput listed below per consecutive 12-month period. All references of aggregate in this permit condition refer specifically to rock processed at CEMEX.
    a. S-1, S-2, S-3, S-4 and S-5: 389,375 tons of aggregate and 389,375 tons of sand at each source
    b. S-6: 155,000 cubic yard or 325,345 tons of concrete which includes 59,521 tons of cement and supplement
    c. S-7: 290,000 cubic yard or 608,710 tons of concrete which includes 111,360 tons of cement and supplement
    d. S-8 & S-9: 135,948 tons of cement at both sources combined
    e. S-10 & S-11: 34,933 tons of cement supplement at both sources combined
    f. S-12 & S-13: 170,881 tons of cement and supplement at each source
    g. S-14: 235,572tons of sand and 153,803 tons of aggregate
    h. S-15: 0.25 acres of sand and aggregate at any time during the 12-month period.
    (Basis: Cumulative Increase)

2. The owner/operator shall record the material throughput in a District approved logbook to demonstrate compliance with Part 1. Material throughput shall be totaled on a monthly and consecutive 12-month basis. The logbook shall be kept at the site for at least 24 months from the date of data entry and be made available for inspection to the District staff upon request.
(Basis: Cumulative Increase)

3. The owner/operator shall ensure that visible particulate emissions from the operation of this plant shall not exceed Ringelmann 0.5 or result in fallout on adjacent property in such quantities as to cause public nuisance per District Regulation 1-301.
(Basis: Regulations 6-1-301, 1-301, Regulation 6-6)

4. The owner/operator shall use water spray and if necessary, with chemical suppressant sufficiently for aggregate handling and storage to comply with Part 3.
(Basis: Regulations 6-1-301, 1-301)

5. The owner/operator shall pave the equipment sites, storage sites, work sites, and site truck transport roads and spray with water to minimize fugitive dust emissions from trucking activities to comply with Part 3.
(Basis: Regulations 6-1-301, 1-301, Regulation 6-6)

6. The owner/operator shall abate PM10 emissions from cement and cement supplements silos, S-8, S-9, S-10, S-11, transit-mix loadout, S-6, and premixer & central-mix loadout, S-7, by A-1 (central dust collector), during operation.
(Basis: Cumulative Increase; TBACT)

7. The owner/operator shall abate PM10 emissions from cement, cement supplement silos, S-8, S-9, S-10, S-11, and cement & supplement weigh hopper, S-12 by A-2, A-3, A-5, A-6, and A-7 (cartridge dust collectors) respectively during operation.
(Basis: Cumulative Increase; TBACT)

8. The owner/operator shall abate PM10 emissions from S-14 and S-15 using Water Spray System A-4. The owner/operator shall ensure water sprays are at each drop point at the conveyor for S-14. For the stockpile area, S-15, the owner/operator shall ensure the water spray reaches the entire surface

area of the stockpile and that the entire surface area remains wet at all times. The owner/operator is required to maintain compliance with the facility's Dust Control Plan at all times.
(Basis: Cumulative Increase, Regulation 6-1-301, and Dust Control Plan)

9. The owner/operator shall equip A-1, central dust collector with a device for measuring the pressure drop across the dust collector. This device shall be checked for plugging at least once every 3 months.
(Basis: Regulation 2-1-403)

10. The owner/operator shall minimize fugitive dust emissions from the truck traffic to comply with Part 3. If District inspections confirm fugitive dust problem exist then one or more of the following shall be implemented.
    a. Vacuum sweeping of all plant road surfaces.
    b. High power water flushing of all plant road surfaces.
    c. Truck tire washing before any haul truck is allowed off the property.
    d. Other actions deemed appropriate by the District.
    (Basis: Regulation 6-1, Regulation 6-6)

11. The owner/operator of this facility shall ensure that facility-wide vehicle miles traveled do not exceed 20,241 VMT. To demonstrate compliance with this permit condition, the owner/operator shall maintain records in a District-approved log. All records shall be retained on site for at least two years from the date of entry and be made available for inspection by District staff on request.
(Basis: Cumulative Increase, Recordkeeping)

12. The owner/operator of CEMEX shall:
    a. Monitor the extent of the trackout at each active exit from the site onto a paved public road at least twice during each workday, at times when vehicle traffic exiting the site is most likely to create an accumulation of trackout, or as otherwise specified by the APCO;
    b. Document the active exit locations monitored each workday;
    c. Document each occasion when the trackout exceeds cumulative 25 linear feet and all trackout control and cleanup actions initiated as a result of monitoring Part a of this condition; and
    d. Maintain the records required by Part b and Part c of this condition for two years, in electronic, paper hard copy or log book format, and make them available to the APCO upon request.
    (Basis: Regulation 6-6-501)

13. The owner/operator shall not exceed a total of 30 ship trips to deliver sand and aggregate to the facility per calendar year. One ship trip includes Leg 1 (transit from Bar Pilot Station to the Golden Gate bridge), Leg 2 (transit from the Golden Gate Bridge to the Bay Bridge), Leg 3 (transit from the Bay Bridge to Anchorage #9), hoteling at Anchorage #9 while material is being offloaded, and the outbound trip. To demonstrate compliance with this permit condition, the owner/operator shall maintain records in a District-approved log. All records shall be retained on site for at least two years from the date of entry and be made available for inspection by District staff on request.
(Basis: Cumulative Increase, Regulation 2-2-302, Recordkeeping)

14. The owner/operator shall ensure no barge engines are used to transport or offload sand or aggregate at S-14.
(Basis: Cumulative Increase and Regulation 2-2-302)

15. The owner/operator shall ensure all sand and aggregate processed at S-14 is offloaded from the barge by mobile handling equipment.

(Basis: Cumulative Increase and Regulation 2-2-302)

## RECOMMENDATION

Issue a Permit to Operate to CEMEX for the following sources:

**S-14 Barge Conveyor System (2 Transfer Points)**
**Conveying Gravel/Sand**
**Maximum Yearly Sand Throughput: 235,572 Tons/Year**
**Maximum Daily Sand Throughput: 818 Tons/Day**
**Maximum Hourly Sand Throughput: 69 Tons/Hour**
**Maximum Yearly Aggregate Throughput: 153,803 Tons/Year**
**Maximum Daily Aggregate Throughput: 535 Tons/Day**
**Maximum Hourly Aggregate Throughput: 45 Tons/Hour**
**Abated by A-4 Water Spray System**

**S-15 Sand and Aggregate Stockpile**
**0.25 Acre Common Area**
**Abated by A-4 Water Spray System**

_____

Simrun Dhoot
Supervising Air Quality Engineer

# Appendix A
# OGV and Tug Emissions

**OGV and Tug Inputs**

| **OGV Route** | | | | distance (nm) | Speed (knots) | Time(hrs) | Main Engine Load % | Auxiliary Engine Load % |
|---|---|---|---|---|---|---|---|---|
| Leg 1 = Transit from Bar Pilot Station to Golden Gate | | | | 11 | 11 | 5 | 13 | 47 |
| Leg 2 = Transit from Golden Gate to Bay Bridge | | | | 5.3 | 11 | 2.25 | 4 | 47 |
| Leg 3 = Transit from South of Bay Bridge to Anchorage #9 (Reduced Speed Zone) | | | | 2.6 | 4.5 | 2.25 | 4 | 47 |
| Leg 4 = Maneuvering from Anchorage #9 to Pier #92 (OGV not maneuvered to Pier 92) | | | | 0 | 0 | 0 | 0 | 0 |
| OGV Hoteling at Anchorage #9 | | | | | | 46.8 | 0 | 62 |
| Outbound route same as inbound | | | | | | | | |

| **Tugboat Route** | | | Time(hrs) for each tug | Main Engine Load % | Auxiliary Engine Load % |
|---|---|---|---|---|---|
| (to meet barge) = | Pier 50 to Pier 92 | | 0.5 | 50 | 25 |
| (maneuver barge to Anchorage 9) = | Pier 92 to Anchorage #9 | | 0.75 | 50 | 25 |
| (waiting for unloading) = | Unloading from OGV to barge | | 6 | 50 | 25 |
| (tug with barge return to Pier 92) = | Anchorage #9 to Pier 92 | | 1 | 85 | 25 |
| (tug to return to docking station)= | Pier 92 to Berth | | 0.5 | 50 | 25 |
| | | Total= | 8.75 | | |

**Assumptions:**

Daily Maximum emissions is from one OGV trip (this will vary; a trip may be longer than 24 hours)

Hydrocarbon emissions from fuel combustion are equivalent to Precursor Organic Compound (POC) emissions

| | |
|---|---|
| Number of OGV Main engines = | 1 |
| Number of OGV Auxiliary engines = | 3 |
| OGV Main engine power per engine (kW) = | 12085 |
| OGV Auxiliary engine power per engine (kW) = | 900 |

| | | |
|---|---|---|
| Tug CARB diesel usage rate (gal/hr) for entire tug = | 81 | |
| Number of Tugs assisting OGV Inbound = | 1 | |
| Number of Tugs assisting OGV Outbound = | 1 | |
| Number of Main engines on a Tug = | 2 | |
| Number of Auxiliary engines on a Tug = | 1 | |
| Tug Main Engine power per engine (hp) = | 1500 | |
| Tug Auxiliary Engine power per engine (hp) = | 109 | |
| Average age of Tug Main Engines = 21 yrs | (Model Years 1987-1998 emission factors, 1901-3300 hp/main engine) | |
| Average age of Tug Auxiliary Engines = 23 yrs | (Model Years pre-1997 emission factors, 51-120 hp/auxiliary engine) | |

1 brake horsepower = 0.7457 kilowatts
Calculated load percent for Tug engines from fuel usage rate divided by brake specific fuel consumption x hp
Information provided about fuel usage rate assumed to be for the the whole tug (not per engine) so sulfur is included in main engine emission calcs for tugs.

Sources:

OGV emission factors:
http://www.arb.ca.gov/regact/2008/fuelogv08/appdfuel.pdf
OGV boiler emission factors:
http://www.portoflosangeles.org/DOC/REPORT_Air_Emissions_Inventory_Volume1.pdf
OGV regulatory documents: http://www.arb.ca.gov/regact/2008/fuelogv08/fuelogv08.htm
Tug emission factors: http://www.arb.ca.gov/regact/2007/chc07/appb.pdf

RSZ = reduced speed zone

30 Ocean-Going Vessel (OGV) Trips per year

| Ocean-Going Vessel Operations | Engine Power kW | Engine Load % | Maximum Hrs per Trip | Maximum Hrs per Year | Emission Factors (g/kW-hr) CO | $NO_x$ | $SO_2$ | HC | $PM_{10}$ | Emissions Annual (tons) CO | $NO_x$ | $SO_2$ | HC | $PM_{10}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main Engine Transit Leg 1 (and out)[a, b] | 12085 | 13 | 3.33 | 100 | 1.10 | 17.00 | 0.36 | 0.78 | 0.25 | 0.19 | 2.94 | 0.06 | 0.14 | 0.04 |
| Main Engine Transit Leg 2 (and out)[a,b] | 12085 | 4 | 1.50 | 45 | 1.10 | 17.00 | 0.36 | 0.78 | 0.25 | 0.03 | 0.41 | 0.01 | 0.02 | 0.01 |
| Main Engine Transit RSZ Leg 3 (and out)[a,b] | 12085 | 4 | 1.50 | 45 | 1.10 | 17.00 | 0.36 | 0.78 | 0.25 | 0.03 | 0.41 | 0.01 | 0.02 | 0.01 |
| Main Engine OGV Hoteling at Anchorage #9[b] | 12085 | 0 | 15.60 | 468 | 1.10 | 17.00 | 0.36 | 0.78 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Auxiliary Engine Transit Leg 1 (and out)[a,b] | 2700 | 47 | 3.33 | 100 | 1.10 | 13.90 | 0.40 | 0.52 | 0.25 | 0.15 | 1.94 | 0.06 | 0.07 | 0.03 |
| Auxiliary Engine Leg 2 (and out)[a,b] | 2700 | 47 | 1.50 | 45 | 1.10 | 13.90 | 0.40 | 0.52 | 0.25 | 0.07 | 0.87 | 0.03 | 0.03 | 0.02 |
| Auxiliary Engine Transit Leg 3 (and out)[a,b] | 2700 | 47 | 1.50 | 45 | 1.10 | 13.90 | 0.40 | 0.52 | 0.25 | 0.07 | 0.87 | 0.03 | 0.03 | 0.02 |
| Auxiliary Engine Hoteling at Anchorage #9[b] | 2700 | 62 | 15.60 | 468.0 | 1.10 | 13.90 | 0.40 | 0.52 | 0.25 | 0.95 | 12.00 | 0.35 | 0.45 | 0.22 |
| **Tugboat Operations*** | **hp** | | **Hrs per OGV** | **Year** | **(g/hp-hr)** | | **(lb/hr)** | **(g/hp-hr)** | | | | | | |
| Main Engine to Meet Barge | 3000 | 50 | 0.50 | 15 | 2.99 | 12.98 | 0.02 | 0.84 | 0.50 | 0.07 | 0.32 | 0.00015 | 0.02 | 0.01 |
| Main Engine to Escort Barge to Anchorage #9 | 3000 | 50 | 0.75 | 23 | 2.99 | 12.98 | 0.02 | 0.84 | 0.50 | 0.11 | 0.48 | 0.00023 | 0.03 | 0.02 |
| Main Engine Unloading from OGV to Barge | 3000 | 50 | 6.00 | 180 | 2.99 | 12.98 | 0.02 | 0.84 | 0.50 | 0.89 | 3.86 | 0.00180 | 0.25 | 0.15 |
| Main Engine Idle (maneuver ship out from berth) | 3000 | 60 | 1.50 | 45 | 2.99 | 12.98 | 0.02 | 0.84 | 0.50 | 0.27 | 1.16 | 0.00045 | 0.08 | 0.04 |
| Main Engine Transporting Barge to Pier 92 | 3000 | 85 | 1.00 | 30 | 2.99 | 12.98 | 0.02 | 0.84 | 0.50 | 0.25 | 1.09 | 0.00030 | 0.07 | 0.04 |
| Main Engine Pier 92 to Docking Station (Pier 50) | 3000 | 50 | 0.50 | 15 | 2.99 | 12.98 | 0.02 | 0.84 | 0.50 | 0.07 | 0.32 | 0.00015 | 0.02 | 0.01 |
| Auxiliary Engine | 109 | 25 | 8.75 | 263 | 4.94 | 13.00 | 0.00 | 1.71 | 0.71 | 0.04 | 0.10 | 0.00000 | 0.01 | 0.01 |
| **TOTAL EMISSIONS (OGVs and Tugs)** | | | | | | | | | | **3.193** | **26.803** | **0.534** | **1.242** | **0.622** |

Note:

[a]Maximum hours per trip multiplied by two for outbound trips

[b]Maximum hours per trip divided by three for number of companies transporting materials at one time

# Appendix B
# PTE Calculations for S-6 and S-7

Total concrete, cu yd 290,000 **Central Mixing S-7**

| Composition of Concrete | | |
|---|---|---|
| Material | lb/yd | ton/yr |
| Coarse Aggregate | 1,865.00 | 270,425.00 |
| Sand | 1,428.00 | 207,060.00 |
| Cement | 491.00 | 71,195.00 |
| Cement Supplement | 73.00 | 10,585.00 |
| Water | 167.00 | 24,215.00 |
| Total Concrete | 4,024.00 | 583,480.00 |

AP-42 TABLE 11.12-2 Emission Factors from Concrete Batching

| Process | PM10 (lb/ton) | PM10 Controlled (lb/ton) | Annual PM10 (lb/yr) |
|---|---|---|---|
| Aggregate transfer to barge conveyor System* (S-14) | 0.0033 | 0.00099 | 267.72 |
| Sand transfer to barge conveyor system* (S-14) | 0.00099 | 0.000297 | 61.50 |
| Aggregate transfer to drive over grizzly and hopper or stockpile (S-14) | 0.0033 | 0.00099 | 267.72 |
| Sand transfer to drive over grizzly and hopper or stockpile (S-14) | 0.00099 | 0.000297 | 61.50 |
| Aggregate transfer from drive over grizzly and hopper to conveyor (S-1) | 0.0033 | 0.0033 | 892.40 |
| Sand transfer from drive over grizzly and hopper to conveyor (S-1) | 0.00099 | 0.00099 | 204.99 |
| Aggregate transfer to storage bins* (to S-2) | 0.0033 | 0.00099 | 267.72 |
| Sand transfer to storage bins* (to S-2) | 0.00099 | 0.000297 | 61.50 |
| Aggregate transfer to conveyors* (to S-3) | 0.0033 | 0.00099 | 267.72 |
| Sand transfer to conveyor* (to S-3) | 0.00099 | 0.000297 | 61.50 |
| Aggregate transfer to holding hopper* (S-5) | 0.0033 | 0.00099 | 267.72 |
| Sand transfer to wet batch plant concrete mixer drum* (S-7) | 0.00099 | 0.000297 | 61.50 |
| Cement delivery to silo (controlled) (S-8 and S-9) | | 0.00034 | 24.21 |
| Cement supplement delivery to silo (controlled w/ baghouse) (S-10 and S-11) | | 0.0049 | 51.87 |
| Loading to Cement and Flyash Weigh Hopper (controlled w/ baghouse) (S-12) | 0.0028 | 0.0028 | 609.41 |
| Loading to Cement and Flyash Holding Hopper (controlled w/ baghouse) (S-13) | 0.0028 | 0.0028 | 609.41 |
| Central Mix loading (controlled w/baghouse) (S-7) | 0.156 | 0.0055 | 449.79 |
| *water spray efficiency | 70% | Total = | 4,488.15 |

| | |
|---|---|
| Total PM10 Emissions (lb/yr) | 4,488.15 |
| Total PM10 Emissions (lb/day) | 12.30 |
| **Total PM10 Emissions (TPY)** | **2.244** |

| Process | PM2.5 (lb/ton) | PM2.5 Controlled (lb/ton) | Annual PM2.5 (lb/yr) |
|---|---|---|---|
| Aggregate transfer to barge conveyor System* (S-14) | 0.0005 | 0.0005 | 135.21 |
| Sand transfer to barge conveyor system* (S-14) | 0.00015 | 0.00015 | 31.06 |
| Aggregate transfer to drive over grizzly and hopper or stockpile (S-14) | 0.0005 | 0.0005 | 135.21 |
| Sand transfer to drive over grizzly and hopper or stockpile (S-14) | 0.00015 | 0.00015 | 31.06 |
| Aggregate transfer from drive over grizzly and hopper to conveyor (S-1) | 0.0005 | 0.0005 | 135.21 |
| Sand transfer from drive over grizzly and hopper to conveyor (S-1) | 0.00015 | 0.00015 | 31.06 |
| Aggregate transfer to storage bins* (to S-2) | 0.0005 | 0.0005 | 135.21 |
| Sand transfer to storage bins* (to S-2) | 0.00015 | 0.00015 | 31.06 |
| Aggregate transfer to conveyors* (to S-3) | 0.0005 | 0.0005 | 135.21 |
| Sand transfer to conveyor* (to S-3) | 0.00015 | 0.00015 | 31.06 |
| Aggregate transfer to holding hopper* (S-5) | 0.0005 | 0.0005 | 135.21 |
| Sand transfer to wet batch plant concrete mixer drum* (S-7) | 0.00015 | 0.00015 | 31.06 |
| Cement delivery to silo (controlled) (S-8 and S-9) | | 0.00005 | 3.56 |
| Cement supplement delivery to silo (controlled w/ baghouse) (S-10 and S-11) | | 0.0007 | 7.41 |
| Loading to Cement and Flyash Weigh Hopper (controlled w/ baghouse) (S-12) | 0.0004 | 0.0004 | 32.71 |
| Loading to Cement and Flyash Holding Hopper (controlled w/ baghouse) (S-13) | 0.0004 | 0.0004 | 32.71 |
| Central Mix loading (controlled w/baghouse) (S-7) | 0.156 | 0.0008 | 65.42 |
| *water spray efficiency | 70% | Total = | 1,139.45 |

| | |
|---|---|
| Total PM2.5 Emissions (lb/yr) | 1,139.45 |
| Total PM2.5 Emissions (lb/day) | 3.12 |
| **Total PM2.5 Emissions (TPY)** | **0.570** |

Total concrete, cu yd (445,400 x 35%) | 155,000 | **Truck Mixing S-6**

| Composition of Concrete | | |
|---|---|---|
| Material | lb/yd | ton/yr |
| Aggregate | 1865 | 144,537.50 |
| Sand | 1428 | 110,670.00 |
| Cement | 491 | 38,052.50 |
| Cement Supplement | 73 | 5,657.50 |
| Water | 167 | 12,942.50 |
| Total Concrete | 4024 | 311,860.00 |

AP-42 TABLE 11.12-2 Emission Factors from Concrete Batching

| Process | PM10 (lb/ton) | PM10 Controlled (lb/ton) | Annual PM10 (lb/yr) |
|---|---|---|---|
| Aggregate transfer to barge conveyor System* (S-14) | 0.0033 | 0.00099 | 143.09 |
| Sand transfer to barge conveyor system* (S-14) | 0.00099 | 0.000297 | 32.87 |
| Aggregate transfer to drive over grizzly and hopper or stockpile (S-14) | 0.0033 | 0.00099 | 143.09 |
| Sand transfer to drive over grizzly and hopper or stockpile (S-14) | 0.00099 | 0.000297 | 32.87 |
| Aggregate transfer from drive over grizzly and hopper to conveyor (S-1) | 0.0033 | 0.00099 | 143.09 |
| Sand transfer from drive over grizzly and hopper to conveyor (S-1) | 0.00099 | 0.000297 | 32.87 |
| Aggregate transfer to storage bins* (to S-2) | 0.0033 | 0.00099 | 143.09 |
| Sand transfer to storage bins* (to S-2) | 0.00099 | 0.000297 | 32.87 |
| Aggregate transfer to conveyors* (to S-3) | 0.0033 | 0.00099 | 143.09 |
| Sand transfer to conveyor* (to S-3) | 0.00099 | 0.000297 | 32.87 |
| Aggregate transfer to holding hopper* (S-5) | 0.0033 | 0.00099 | 143.09 |
| Sand transfer to wet batch plant concrete mixer drum* (S-7) | 0.00099 | 0.000297 | 32.87 |
| Cement delivery to silo (controlled) (S-8 and S-9) | | 0.00034 | 12.94 |
| Cement supplement delivery to silo (controlled w/ baghouse) (S-10 and S-11) | | 0.0049 | 27.72 |
| Loading to Cement and Flyash Weigh Hopper (controlled w/ baghouse) (S-12) | 0.0028 | 0.0028 | 122.39 |
| Loading to Cement and Flyash Holding Hopper (controlled w/ baghouse) (S-13) | 0.0028 | 0.0028 | 122.39 |
| Truck Mix loading (controlled w/baghouse) (S-6) | | 0.0263 | 1149.57 |
| Water Spray Efficiency* | 70% | Total = | 2490.78 |

| | |
|---|---|
| Total PM10 Emissions (lb/yr) | 2,490.78 |
| Total PM10 Emissions (lb/day) | 1.05 |
| **Total PM10 Emissions (TPY)** | **1.245** |

| Process | PM2.5 (lb/ton) | PM2.5 Controlled (lb/ton) | Annual PM2.5 (lb/yr) |
|---|---|---|---|
| Aggregate transfer to barge conveyor System* (S-14) | 0.0005 | 0.0005 | 72.27 |
| Sand transfer to barge conveyor system* (S-14) | 0.00015 | 0.00015 | 16.60 |
| Aggregate transfer to drive over grizzly and hopper or stockpile (S-14) | 0.0005 | 0.0005 | 72.27 |
| Sand transfer to drive over grizzly and hopper or stockpile (S-14) | 0.00015 | 0.00015 | 16.60 |
| Aggregate transfer from drive over grizzly and hopper to conveyor (S-1) | 0.0005 | 0.0005 | 72.27 |
| Sand transfer from drive over grizzly and hopper to conveyor (S-1) | 0.00015 | 0.00015 | 16.60 |
| Aggregate transfer to storage bins* (to S-2) | 0.0005 | 0.0005 | 72.27 |
| Sand transfer to storage bins* (to S-2) | 0.00015 | 0.00015 | 16.60 |
| Aggregate transfer to conveyors* (to S-3) | 0.0005 | 0.0005 | 72.27 |
| Sand transfer to conveyor* (to S-3) | 0.00015 | 0.00015 | 16.60 |
| Aggregate transfer to holding hopper* (S-5) | 0.0005 | 0.0005 | 72.27 |
| Sand transfer to wet batch plant concrete mixer drum* (S-7) | 0.00015 | 0.00015 | 16.60 |
| Cement delivery to silo (controlled) (S-8 and S-9) | | 0.00005 | 1.90 |
| Cement supplement delivery to silo (controlled w/ baghouse) (S-10 and S-11) | | 0.0007 | 3.96 |
| Loading to Cement and Flyash Weigh Hopper (controlled w/ baghouse) (S-12) | 0.0004 | 0.0004 | 17.48 |
| Loading to Cement and Flyash Holding Hopper (controlled w/ baghouse) (S-13) | 0.0004 | 0.0004 | 17.48 |
| Truckl Mix loading (controlled w/baghouse) (S-7) | | 0.0039 | 170.47 |
| *water spray efficiency | 70% | Total = | 744.52 |

| | |
|---|---|
| Total PM2.5 Emissions (lb/yr) | 744.52 |
| Total PM2.5 Emissions (lb/day) | 2.04 |
| **Total PM2.5 Emissions (TPY)** | **0.372** |