ENGINEERING EVALUATION
Eagle Rock Aggregates Inc.
Outer Harbor Terminal within the Port of Oakland, Oakland
Application No. 30884
Facility ID 24848

1.0 BACKGROUND

Eagle Rock Aggregates, Inc. (ERA) proposes to construct and operate the ERA Oakland Terminal, a marine terminal at the Port of Oakland (Port) that would import, store, and distribute bulk construction aggregates (i.e., sand and gravel). The proposed project is located at the Port's Outer Harbor Terminal within the Oakland Outer Harbor along the San Francisco Bay. This location is within an Overburdened Community (OBC) as defined in Air District Regulation 2-1-243.

The plant would utilize Berth 22 for vessel and barge operations and approximately 18 acres of Berth 20, 21, and 22 backlands (land directly adjacent to a vessel berth) for stockpiling and distribution of construction aggregates. The project site is approximately 18 acres in size and is generally bounded by the Outer Harbor to the north and west, 14th Street and the Outer Harbor Terminal to the south, and Maritime Street to the east.

Once operational, ERA will transport sand and aggregate from British Columbia, Canada via ocean-going vessel (OGV). Material will be offloaded from OGVs to the Oakland Terminal via a self-discharging mechanism in each vessel and series of onshore conveyors. ERA expects up to 48 OGV calls per year and a total material throughput of up to 2,500,000 tons per year (TPY). Material offloaded onto the Oakland Terminal will be distributed to destination concrete ready-mix plants via trucks and barges. Material will be loaded into trucks via front-end loader and onto barges via a conveyor system.

Under the California Environmental Quality Act (CEQA), the Port is the Lead Agency, and the Bay Area Air District (Air District) is a responsible agency. A Final Supplemental Environmental Impact Report (FSEIR)[1] was prepared for the project and a Notice of Determination (NOD) was filed by the Port with the County of Alameda in February 2022 under State Clearinghouse Number (SCH#) 2001082058. The Port also adopted an Addendum to the FSEIR on August 8, 2025 to address two changes to the project.

Per Sections 2-1-301 and 2-1-302 of Air District Regulation 2, Rule 1, ERA's proposed operations of offloading, storage, transfer, and loading of sand/aggregate material are subject to permitting requirements. Therefore, ERA is applying for Authorities to Construct and Permits to Operate for the following sources of air pollution:

- **S-1 Receiving Hopper**
- **S-2 Ship Unloading & Stacking Conveyor System**
- **S-3 Sand & Aggregate Stockpiles (3 stockpiles & paved road dust)**
- **S-4 Barge Reclaim Hoppers**
- **S-5 Barge Loading Conveyor System**
- **S-6 Barge Loading**
- **S-7 Truck Loading**

[1] *FSEIR is available for review on the Port of Oakland's webpage for* [Environmental Stewardship Publications & Documents](https://www.portofoakland.com/business/bids-rfp-center/environmental-stewardship-publications-documents) *under "Eagle Rock Aggregates Oakland Terminal Project":* https://www.portofoakland.com/business/bids-rfp-center/environmental-stewardship-publications-documents

Emissions from all seven (7) of the above-mentioned sources (S-1 through S-7) will be controlled by the following abatement system, which will be assigned one abatement device ID:

A-1 Water Suppression System/Water Spray Mitigation

The following Figures show an overview of the proposed ERA facility, including the location at the Port and diagrams of the transfer points for each proposed source.

Figure 1-1: *Proposed location of ERA facility at Berth 22 of the Outer Harbor Terminal within the Port of Oakland.*

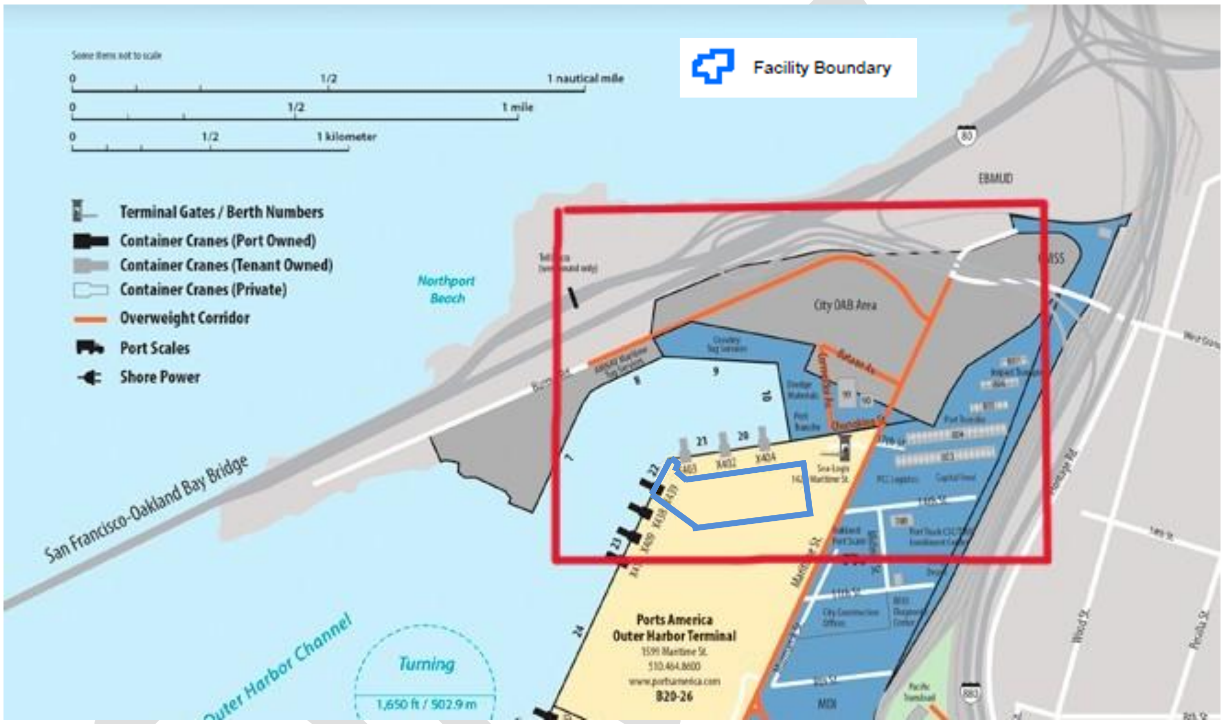


Figure 1-2: *Location and property boundary of the proposed ERA facility at Berth 22 of the Outer Harbor Terminal.*

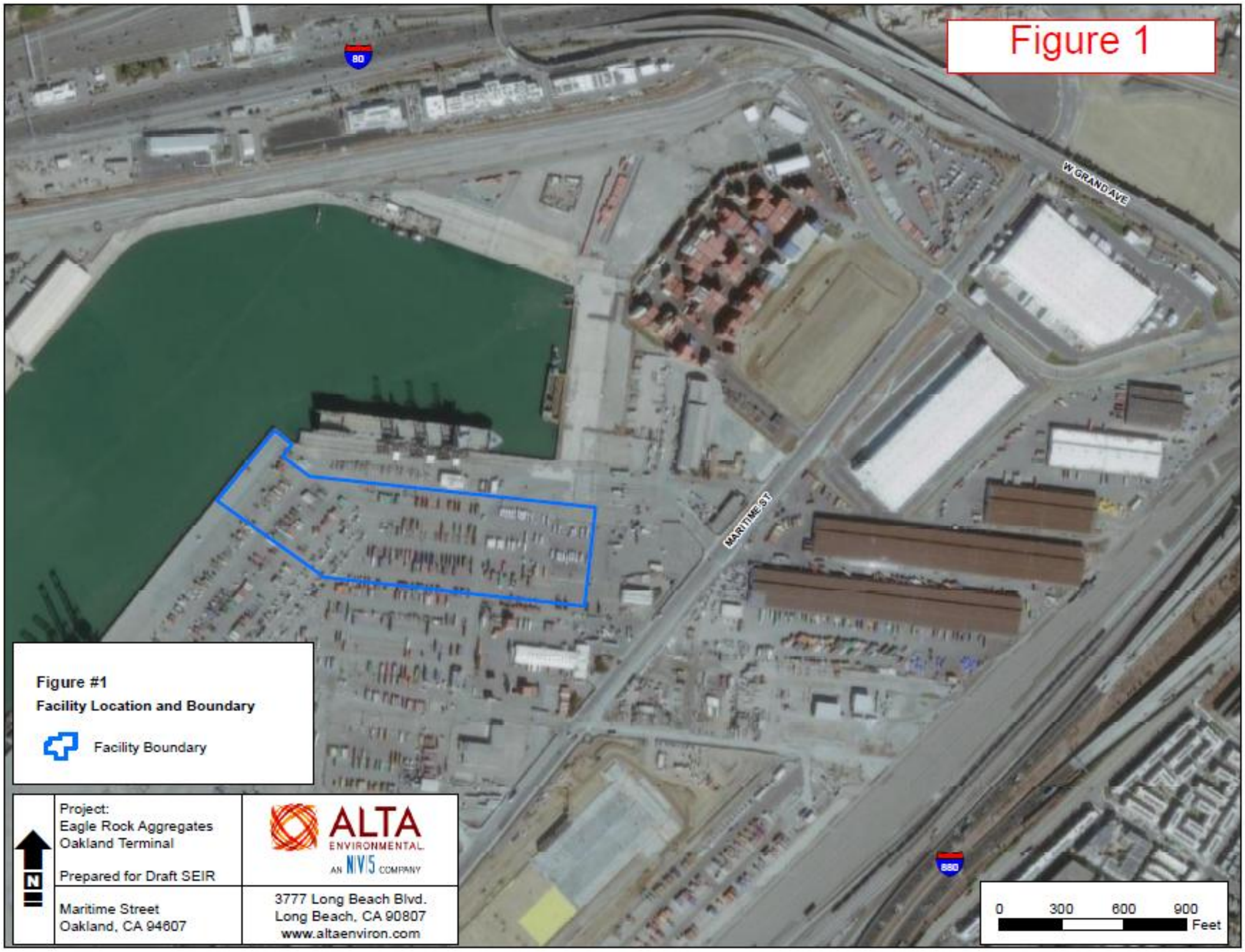


Figure 2-1: *Aerial view of site plan with identified material transfer points.*

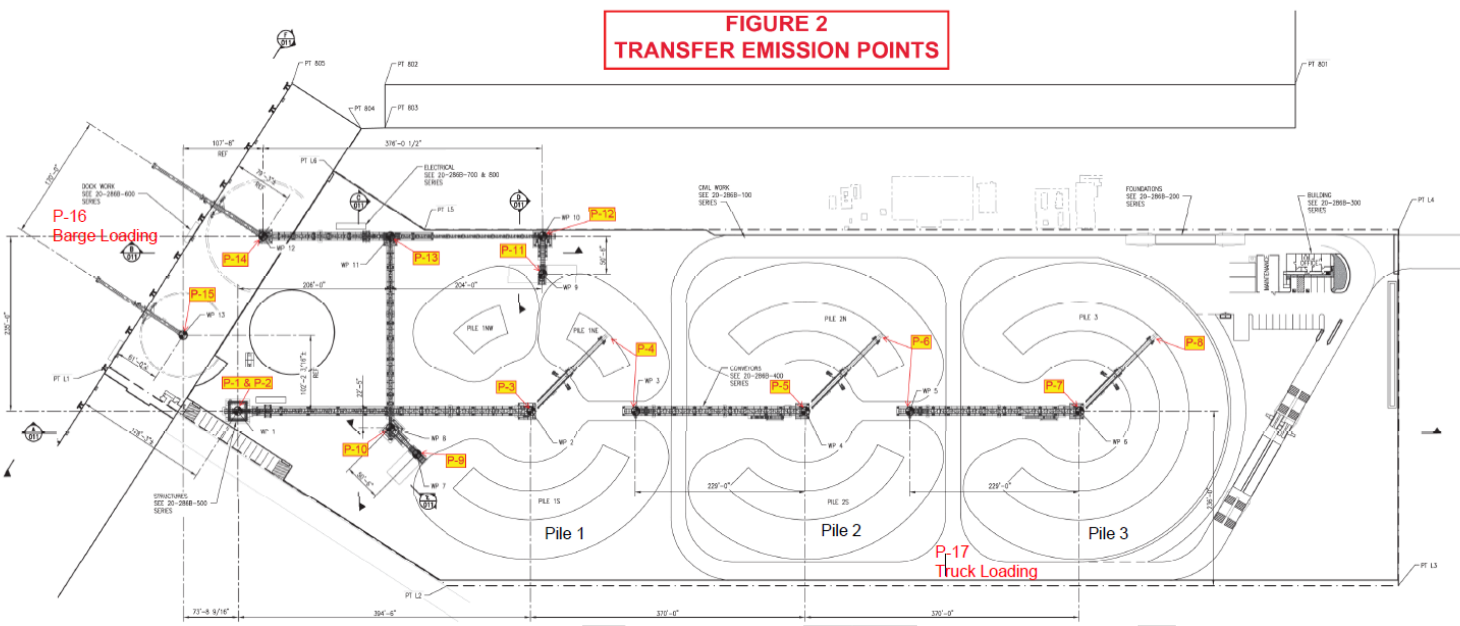


Figure 3-1: *Material transfer flow diagram for Ship Unloading, Conveyor System, and Stockpiles with identified transfer points.*

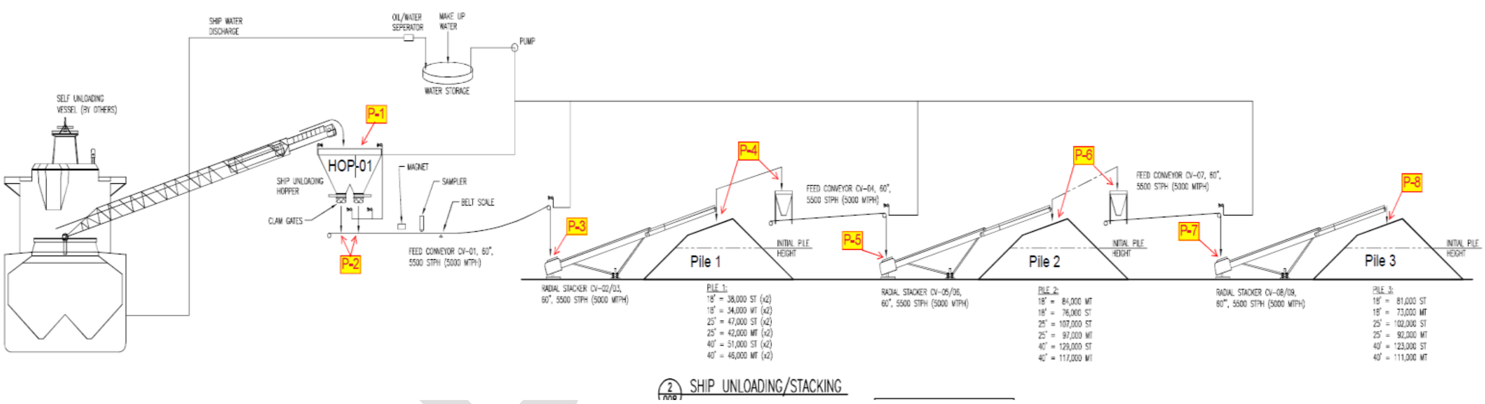


Figure 3-2: *Material transfer flow diagram for Barge Loading & Reclaim with identified transfer points.*

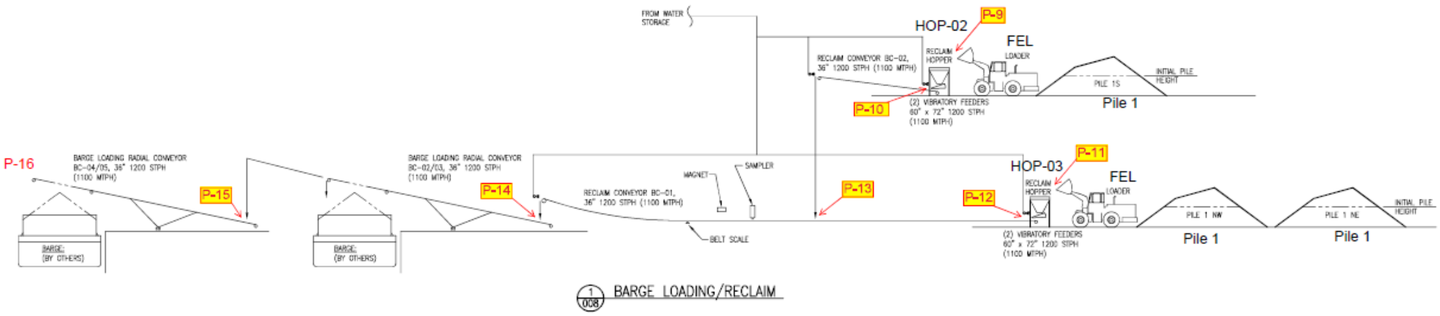
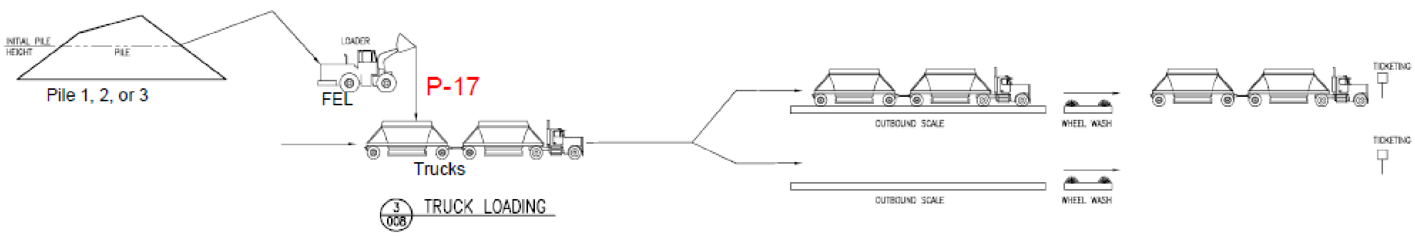


Figure 3-3: *Material transfer flow diagram for Truck Loading with identified transfer points.*



The process flow of material will begin with offloading material from ships to the Receiving Hopper (S-1) followed by the Ship Unloading & Stacking Conveyor System (S-2) that will distribute the sand/aggregate to the three (3) Sand/Aggregate Stockpiles (S-3). Sand/aggregate from the westernmost stockpile (Pile 1) will be transferred via front-end loaders to the Barge Reclaim Hoppers (S-4), from which the Barge Loading Conveyor System (S-5) will transfer material to Barge Loading (S-6) to be shipped off-site by sea. Front-end loaders will also transfer material from the two eastern stockpiles (Piles 2 & 3) to Truck Loading (S-7) to be shipped off-site by land. Off-road vehicle traffic on-site and the arrival and departure of customer trucks at the facility will generate additional emissions from road dust (included as part of S-3). Emissions from the proposed sources (excluding OGV emissions) will come from material transfer points, wind erosion, and road dust from vehicle traffic. Each of the fixed-location conveyor transfer points will be partially enclosed by a head chute, skirtboard, and dust curtains at material entry and exit points. Non-fixed transfer points will be open. The following table summarizes each identified source, the types and count of associated transfer points, and emission points as labeled in Figure 2 and Figure 3 above. The following acronyms/words are used to describe the applicable equipment:

HOP – *Hoppers*
CV – *Conveyors/Stackers used in ship unloading and stockpile stacking*
Pile – *Sand/Aggregate Stockpiles*
FEL – *Front-end Loaders*
BC – *Conveyors used for reclaim and/or barge loading*
Truck – *Trucks used to ship material off-site*

Table 1. Source Descriptions, Transfer/Emission Points for S-1 through S-7

Source ID	Source Description	# of Transfer Points	Transfer Point Type	Transfer Point Location(s)	Transfer Point ID (Fig 2/Fig 3)
S-1	Receiving Hopper	1	Open	Ship to HOP-01	P-1
S-2	Ship Unloading & Stacking Conveyor System	6	Chuted	HOP-01 to CV-01	P-2
			Chuted	CV-01 to CV-02/03	P-3
			Open	CV-02/03 to CV-04	P-4
			Chuted	CV-04 to CV-05/06	P-5
			Open	CV-05/06 to CV-07	P-6
			Chuted	CV-07 to CV-08/09	P-7
S-3	Sand/Aggregate Stockpiles	1*	Open	CV-02/03 to Pile 1; or CV-05/06 to Pile 2; or CV-08/09 to Pile 3	P-8
		Fugitive emissions from wind erosion at piles 1, 2, and 3			
		Fugitive dust emissions from on-site vehicle traffic			
S-4	Barge Reclaim Hoppers	1**	Open	FEL to HOP-02; or FEL to HOP-03	P-9; or P-11
S-5	Barge Loading Conveyor System	4**	Chuted	HOP-02 to BC-02; or HOP-03 to BC-01	P-10; or P-12
			Chuted	BC-02 to BC-01	P-13
			Chuted	BC-01 to BC-02/03	P-14
			Open	BC-02/03 to BC-04/05	P-15
S-6	Barge Loading	1	Open	BC-02/03 to Barge; or BC-04/05 to Barge	P-16
S-7	Truck Loading	1***	Open	FEL to Truck	P-17

Table 1 Notes:

* Only one transfer point into the stockpiles (S-3) can operate at once, so P-8 could be located at any one of the three stockpiles. Additional emissions from S-3 will come from wind erosion of the stockpiles and road dust from on-site vehicles.

** Under typical operating conditions, the two Barge Reclaim Hoppers (S-4) will be used one at a time and subsequently, the Barge Loading Conveyor System's (S-5) initial transfer points (P-10 and P-12) will be used one at a time. Therefore, the associated pairs of transfer points (P-9 or P-11; and P-10 or P-12) will each be considered a single transfer point for emission calculation purposes. ERA acknowledges that it is physically possible for both Barge Reclaim Hoppers to be used simultaneously, although this is an unlikely scenario because each hopper will be used to process separate materials. As shown in Figure 3-2, the Barge Loading Conveyor System downstream of P-10 and P-12 converges to one conveyor with a maximum material throughput rate equal to that of each of the upstream Barge Reclaim Hoppers and their respective outlet conveyors. In the unlikely event that both Barge Reclaim Hoppers are simultaneously in use, this design creates a bottleneck in the process flow that would constrict the sum of material throughput rates through both Barge Reclaim Hoppers to no more than the maximum throughput allowed for S-4 or S-5. Because material throughput rate is a direct factor of pollutant emission rates (discussed in more detail in the Emission Calculations section of this evaluation), simultaneous use of the Barge Reclaim Hoppers would not result in an increase of emission rates for any pollutant that are higher than the maximum emission rates from using one Barge Reclaim Hopper at a time.

***Emissions from Truck Loading (S-7) may occur at various points that may not always be consistent. However, the sum of the material processed through all points will be no higher than the maximally proposed throughput for S-7. These various "partial" transfer points are encompassed into effectively one "transfer point" that will account for all transfer point emissions from S-7.

As shown in the above figures and in Table 1, the process flow of material will begin with offloading material from ships to the Receiving Hopper (S-1) followed by the Ship Unloading & Stacking Conveyor System (S-2) that will distribute the sand/aggregate to the three (3) Sand/Aggregate Stockpiles (S-3). Sand/aggregate from the westernmost stockpile (Pile 1) will be transferred via FEL to the Barge Reclaim Hoppers (S-4), from which the Barge Loading Conveyor System (S-5) will transfer material to Barge Loading (S-6) to be shipped off-site by sea. Front-end loaders will also transfer material from the two eastern stockpiles (Piles 2 & 3) to Truck Loading (S-7) to be shipped off-site by land.

This evaluation will also consider emissions from cargo carriers for determination of the applicability of the offset requirements of Air District Regulations 2-2-302 and 2-2-303. As required in Air District Regulation 2-2-610, "a facility's potential to emit and cumulative increase shall be calculated including emissions from cargo carriers (other than motor vehicles) associated with the sources at the facility."

2.0 EMISSIONS CALCULATIONS

The criteria pollutants emitted from all the proposed sources (S-1 through S-7) include Particulate Matter (PM) with diameters ≤ 10 µm (PM_{10}) and diameters ≤ 2.5 µm ($PM_{2.5}$). Additionally, the sand/aggregate processed at this facility contains quartzite, which is a mineral that is predominantly comprised of Crystalline Silica. Respirable Crystalline Silica (CS) is a Toxic Air Contaminant (TAC).

There are four (4) categories of emissions scenarios from this proposed project that will each be evaluated using their own respective methodologies. These categories include emissions from (1) material transfer points, (2) stockpile emissions, (3) road dust, and (4) cargo carriers. All four emissions scenarios will be discussed in the following subsections.

2.1 Pollutant Emissions from On-Site Sources (excluding Cargo Carriers):

Emissions from the proposed sources will occur at the transfer points, stockpiles, and from road dust. Emissions from cargo carriers will be discussed in a later subsection. For reference, below is a summary of the emissions scenario that applies to each proposed source.

Table 2. Source Emissions Scenarios (S-1 through S-7)

Source ID	Emissions Scenario (Section)
S-1	Transfer Points (2.1.1)
S-2	Transfer Points (2.1.1)
S-3	Transfer Points (2.1.1) Stockpiles (2.1.2) Road Dust (2.1.3)
S-4	Transfer Points (2.1.1)
S-5	Transfer Points (2.1.1)
S-6	Transfer Points (2.1.1)
S-7	Transfer Points (2.1.1)

2.1.1 Emissions from Transfer Points:

All of the proposed sources (S-1 through S-7) will have material transfer points emitting PM and CS. Although it should be noted that transfer point emissions only make up part of the emissions from S-3, Stockpiles (stockpile drop point). Emissions from transfer points are calculated based on material-specific and design-specific emission factors as well as the proposed throughputs of material processed at each transfer point.

The facility has proposed a facility-wide total annual throughput of 2,500,000 tons/year (TPY) of sand/aggregate. However, this amount will not be processed through every transfer point because some of the material will be shipped off-site by barge and some by truck. Therefore, the facility has proposed a maximum annual throughput for barge and truck loading of 1,500,000 TPY each to allow for flexibility, although the total annual throughput limit of 2,500,000 TPY will not be exceeded. The annual material throughput limit of 1,500,000 TPY for both barge loading and truck loading will be used to conservatively calculate annual emission rates from the associated transfer points, but this is an overestimate because the sum of material throughput to barge loading and truck loading cannot exceed the overall limit of 2,500,000 TPY. Typical facility operation schedule will be 16 hours/day, 6 days/week and 52 weeks/year. However, operations on some days could extend to a maximum of 24 hours. The facility has also identified the maximum hourly material throughputs for each type of transfer operation. Maximum daily throughput is calculated by multiplying the maximum hourly throughput by 24 hours. Table 3 summarizes the proposed annual, daily, and hourly throughputs for each transfer operation and the sources that each operation applies to.

Table 3. Proposed Material Throughputs by Transfer Operation

Transfer Operation	Applicable Sources	Throughputs of Sand/Aggregate		
		Max Annual (ton/yr)	Max Daily[1] (ton/day)	Max Hourly (ton/hr)
Ship Unloading (Ship to Shore)	S-1, S-2, S-3	2,500,000	132,000	5,500
Barge Loading (Shore to Barge)	S-4, S-5, S-6	1,500,000	48,000	2,000
Truck Loading (Shore to Trucks)	S-7	1,500,000	48,000	2,000

Notes:
1. Max daily (ton/day) = Max Hourly (ton/hr) * 24 (hrs/day)

As shown in Table 3, the Ship to Shore throughput will be used to calculate emissions from S-1, S-2, and part of S-3, Shore to Barge throughput for S-4, S-5, and S-6, and Shore to Trucks throughput for S-7. The count and type of transfer points for each of these sources is summarized in Table 1. To conservatively calculate the maximum emissions from transfer points, the following calculations assume that all material transferred from Shore to Barge is processed through Barge Reclaim Hopper HOP-02 and loaded to barges via Barge Loading Conveyor BC-04/05. This process flow route includes the S-5 transfer points identified as P-13 and P-15, of which one or both would be bypassed when material is processed through Barge Reclaim Hopper HOP-03 and/or loaded to barges via Barge Loading Conveyor BC-02/03 (see Figure 3-2 and Table 1 for reference).

The emission factor (EF) used to calculate PM_{10}, $PM_{2.5}$, and CS from the "Open" transfer points stems from the Uncontrolled PM_{10} emission factor for Aggregate Transfer operations (0.0033 lbs/ton), which is from Table 11.12-2 of the U.S. Environmental Protection Agency (EPA) AP-42 Chapter 11.12 for Concrete Batching. Per the Air District Permit Handbook, Chapter 11.5 for Concrete Batch Plants, a PM_{10} abatement efficiency of 70% is used for operations that use water to suppress dust. Although this facility would not be a concrete batching plant, the emission factor and control efficiency from concrete batching reference materials were chosen because sand/aggregate transfer points at concrete batching plants are comparable to the "Open" transfer points in this proposed operation. Although Table 11.12-2 also has an emission factor for Sand Transfer and ERA will also process sand at the site, the emissions from the open transfer points will be calculated assuming 100% of material throughput is aggregate (i.e. gravel). This is a conservative assumption for the following reasons:

- Aggregate Transfer EF is more than 3.3 times higher than the Sand Transfer EF;
- The moisture content used to derive the listed Sand Transfer EF is less than the lower end of ERA's target moisture content range for sand; higher moisture content is expected to result in less PM emissions);
- Aggregate and Sand Transfer EFs in Table 11.12-2 are derived using an average wind speed of 10 mph, which is higher than the average wind speed for the area[2].

Considering the aforementioned points, actual PM emissions from open transfer points are expected to be lower than what will be presented in and used for this evaluation.

The emission factors (EF) used to calculate PM_{10}, $PM_{2.5}$, and CS from the "Chuted" transfer points are the Controlled PM_{10}/$PM_{2.5}$ emission factors for Conveyor Transfer Point operations (0.000046 & 0.000013 lbs/ton, respectively), which are from Table 11.19.2-2 of the EPA AP-42 Chapter 11.19.2 for Crushed Stone & Pulverized Mineral Processing. These emission factors already account for wet suppression controls and were chosen because the "chuted" design of the conveyor transfer points is similar to those found at stone/rock processing plants. The chute structure over these transfer points appears and functions similar to a partial enclosure that can reduce airborne particulate during sand and aggregate transfer. According to the reference notes for Table 11.19.2-2, the material moisture content of the study group used to derive the Controlled Conveyor Transfer Point EFs ranged from 0.55% to 2.88%, which covers ERA's target range for gravel (1% to 2%) and is significantly lower than their target range for sand (5% to 8%). Although moisture content is not the only process feature to affect emissions, higher moisture content of processed material reduces the potential for dust to become airborne and be emitted as PM. Therefore, actual emissions from the "Chuted" transfer points when processing sand would likely be less than what is presented here.

The methods for calculating PM_{10} emissions from these sources are summarized below. Below are examples of the formulas used to calculate PM_{10} emissions from each transfer point.

Equation 2.1-A:

$$\boldsymbol{Open\ Transfer\ Points\ Annual\ Abated\ PM_{10}\left(\frac{tons}{year}\right) =}$$

$$Unabated\ PM_{10}\ EF\left(\frac{0.0033\ lbs}{ton}\right) * (1 - 70\%) * (\#of\ Open\ Transfer\ Pts) * \ Annual\ Throughput\left(\frac{tons}{year}\right)$$

Equation 2.1-B:

$$\boldsymbol{Chuted\ Transfer\ Points\ Annual\ Abated\ PM_{10}\left(\frac{tons}{year}\right) =}$$

$$Unabated\ PM_{10}\ EF\left(\frac{0.000046\ lbs}{ton}\right) * (\#of\ Chuted\ Transfer\ Pts) * \ Annual\ Throughput\left(\frac{tons}{year}\right)$$

Table 4 below summarizes the PM_{10} emission rates from transfer point sources.

[2] *According to Climate & Average Weather at Oakland International Airport (from weatherspark.com) and Annual Weather Data for the City of Oakland (from city-facts.com, which sources weather data from NOAA – the National Oceanic & Atmospheric Administration), the average wind speed for the area is 8.2-8.3 mph. Although a simple average wind speed value specifically for the Port of Oakland Outer Harbor is not readily available, NOAA has a weather station in the Outer Harbor at Berth 34, just 1 mile southwest of the proposed ERA site. According to data from this weather station, 78% of all wind speed records from years 2013-2024 are less than or equal to 4.4 m/s (9.8 mph). Link to NOAA weather station info: https://www.ndbc.noaa.gov/station_page.php?station=okxc1*

Table 4. PM_{10} Emission Rates from Transfer Points (S-1 through S-7)

Source ID & Description	PM_{10}					
	# of Open Transfer Points	**# of Chuted Transfer Points**	**Maximum Hourly Emissions (lb/hour)**	**Maximum Daily Emissions (lb/day)**	**Maximum Yearly Emissions (lb/year)**	**Maximum Yearly Emissions (ton/year)**
S-1, Receiving Hopper	1	0	5.45	130.7	2,475	1.238
S-2, Ship Unloading & Stacking Conveyor System	2	4	11.9	285.6	5,410	2.705
S-3, Stockpiles (drop point only)	1	0	5.45	130.7	2,475	1.238
S-4, Barge Reclaim Hoppers	1	0	1.98	47.5	1,485	0.743
S-5, Barge Loading Conveyor System	1	3	2.26	54.1	1,692	0.846
S-6, Barge Loading	1	0	1.98	47.5	1,485	0.743
S-7, Truck Loading	1	0	1.98	47.5	1,485	0.743
Total PM_{10} (from transfer points)			**31.0**	**744**	**16,507**	**8.254**

The methodology for calculating emissions of $PM_{2.5}$ from the open transfer points is taken from the Air District Permit Handbook Chapter 11.5 for Concrete Batching, which states that the unabated $PM_{2.5}$ emission factor (in lbs/ton) can be estimated at 15% of the unabated PM_{10} emission factor. There is no data for abated $PM_{2.5}$ emission factors, so no abatement is assumed for $PM_{2.5}$ emissions from the transfer operations. Similar to the PM_{10} emission calculation method, an example equation for annual $PM_{2.5}$ emission calculations is below. Because $PM_{2.5}$ emissions from open transfer points are calculated from the PM_{10} emission factor, the same conservative assumptions used for the PM_{10} emissions also apply to emissions of $PM_{2.5}$.

Equation 2.1-C:

$$\boldsymbol{Annual\ PM_{2.5}\left(\frac{tons}{year}\right)} =$$

$$Unabated\ PM_{10}\ EF\ \left(\frac{0.0033\ lbs}{ton}\right) * \left(15\%\frac{PM2.5}{PM10}\right) * (\#\ of\ Transfer\ Pts) *\ Annual\ Throughput\ \left(\frac{tons}{year}\right)$$

For the chuted transfer points, the previously mentioned $PM_{2.5}$ emission factor from AP-42 11.19.2 is used with the same formula shown in Equation 2.1-B.

Table 5 below summarizes the $PM_{2.5}$ emission rates from the sources that emit from transfer points.

Table 5. $PM_{2.5}$ Emission Rates from Transfer Points (S-1 through S-7)

Source ID & Description	*$PM_{2.5}$*					
	# of Open Transfer Points	**# of Chuted Transfer Points**	**Maximum Hourly Emissions (lb/hour)**	**Maximum Daily Emissions (lb/day)**	**Maximum Yearly Emissions (lb/year)**	**Maximum Yearly Emissions (ton/year)**
S-1, Receiving Hopper	1	0	2.72	65.3	1,238	0.619
S-2, Ship Unloading & Stacking Conveyor System	2	4	5.73	137.5	2,605	1.303
S-3, Stockpiles (drop point only)	1	0	2.72	65.3	1,238	0.619
S-4, Barge Reclaim Hoppers	1	0	0.99	23.8	743	0.371
S-5, Barge Loading Conveyor System	1	3	1.07	25.6	801	0.401
S-6, Barge Loading	1	0	0.99	23.8	743	0.371
S-7, Truck Loading	1	0	0.99	23.8	743	0.371
Total $PM_{2.5}$ (from transfer points)			**15.2**	**365**	**8,109**	**4.054**

Crystalline silica is a Toxic Air Contaminant (TAC) that is present in the materials that would be processed at this site. Respirable sized particles are produced when crystalline silica is processed. The emission factor used for calculating emissions of respirable crystalline silica (CS) from the transfer points is derived from composition data of the specifically proposed sand/aggregate material as well as data from a technical report, published by Air Control Techniques, P.C., regarding CS and PM emission factors for aggregate producing sources (ACT Report)[3]. This report summarizes the weight fraction relationships of PM_{10}, PM_4[4], crystalline silica (total), and crystalline silica (respirable). The latter being the substance of concern in these calculations.

The first step in deriving the respirable CS emission factor is to determine the mass fraction of respirable CS present in PM_{10} from sand/aggregate processing sources. The formula for this calculation is below, along with the description and basis of each input parameter.

Equation 2.1-D:

$$\boldsymbol{M_{CSR,10}} = M_{CST,SA} * M_{PM4,10} * m_{CSR4,CST}$$

Equation Symbol	Description	Value	Units	Basis
$M_{CST,\ SA}$	Mass fraction of total CS in material to be processed (Sand/Aggregate)	5.0%	*% by wt*	• *Maximum content of quartzite listed in the submitted safety data sheet of proposed sand/aggregate material at ERA.* • *Assumption that 100% of quartzite is comprised of crystalline silica.*
$M_{PM4,\ 10}$	Average mass fraction of respirable PM (PM_4) in PM_{10}	48.2%	*% by wt*	*ACT Report*
$m_{CSR4,\ CST}$	Average content of Respirable CS in PM_4, per CS content in material	43.3%	*% by wt*	*ACT Report*
$\boldsymbol{M_{CSR,\ 10}}$	**Mass fraction of respirable CS in PM_{10}**	**1.04%**	***% by wt***	*Calculated (Eq 2.1-C)*

[3] *Air Control Techniques, P.C., July 31, 2007, PM_4 Crystalline Silica and PM_{10} Particulate Matter Emission Factors for Aggregate Producing Sources. Link: https://www2.co.fresno.ca.us/4510/4360/environmental/KingsRiverSandGravel/Appendix_D-2007CRRNOS_Study.pdf*

[4] *Respirable particles have a maximum diameter of 4 µm, per the California Office of Environmental Health Hazard Assessment (OEHHA).*

The abated emission factor for respirable crystalline silica is calculated by multiplying the respirable CS content in PM_{10} by the PM_{10} emission factors shown in Equations 2.1-A and 2.1-B. An example for open transfer points is below.

Equation 2.1-E:

$$\boldsymbol{Abated\ EF\ for\ Respirable\ CS} \left(\frac{\mathbf{1.033*10^{-5}\ lbs}}{\mathbf{ton}}\right) =$$
$$M_{CSR,10}\ (1.04\%) * \ Unabated\ PM_{10}\ EF\ \left(\frac{0.0033\ lbs}{ton}\right) * (1-70\%)$$

Respirable CS emission rates from transfer points are calculated by multiplying the abated respirable CS emission factor by the throughput (in tons) of sand/aggregate per the associated unit of time. Table 6 below summarizes the respirable CS emission rates from the sources that emit from transfer points. Since the CS emission factor is derived from the PM_{10} emission factor, the same conservative assumptions discussed earlier in this section apply to CS emissions.

Table 6. Respirable CS Emission Rates from Transfer Points (S-1 through S-7)

Source ID & Description	*Crystalline Silica (respirable)*					
	# of Open Transfer Points	**# of Chuted Transfer Points**	**Maximum Hourly Emissions (lb/hour)**	**Maximum Daily Emissions (lb/day)**	**Maximum Yearly Emissions (lb/year)**	**Maximum Yearly Emissions (ton/year)**
S-1, Receiving Hopper	1	0	0.057	1.36	25.8	0.013
S-2, Ship Unloading & Stacking Conveyor System	2	4	0.12	2.98	56.5	0.028
S-3, Stockpiles (drop point only)	1	0	0.057	1.36	25.8	0.013
S-4, Barge Reclaim Hoppers	1	0	0.021	0.50	15.5	0.008
S-5, Barge Loading Conveyor System	1	3	0.024	0.57	17.7	0.009
S-6, Barge Loading	1	0	0.021	0.50	15.5	0.008
S-7, Truck Loading	1	0	0.021	0.50	15.5	0.008
Total CS (from transfer points)			**0.32**	**7.76**	**172.3**	**0.086**

2.1.2 Emissions from Stockpiles:

Emissions of PM_{10}, $PM_{2.5}$, and CS will also occur from wind erosion at the stockpiles (S-3, only). Table 8.19.1-1 of EPA AP-42, Fourth Edition, Chapter 8.19.1 has stockpile wind erosion emission factors for sand and gravel processing plants. An emission factor of **1.7 lbs PM_{10} / acre-day** can be used to calculate daily uncontrolled emissions of PM_{10} from wind erosion alone. "Acres" in this emission factor include the area of storage and the area among the piles. The hourly emission rates are based on all daily emissions occurring within 2 hours on any day (*lbs/day divided by 2 hours/day*). Annual emission rates assume all stockpiles will be subject to wind erosion for 365 days per year (*lbs/day * 365 days/year*). The following additional parameters and assumptions are used to calculate the emissions of PM_{10}, $PM_{2.5}$, and CS from stockpile wind erosion:

- The area used for the calculation is conservatively estimated to be the rectangular area encompassing all three stockpiles, with a length of 1,200 ft and width of 480 ft (576,000 ft^2; or 13.22 acres). For reference, when all three stockpiles are in use, the maximum total footprint area of the stockpiles alone would take up approximately 6 acres.
- 70% abatement factor from water spray applied to calculate the abated PM_{10} emission factor:
  *(Abated PM_{10} = 1.7 lbs PM_{10} / acre-day * (1 – 0.7)*

- 15% of PM_{10} emissions are assumed to be comprised of $PM_{2.5}$. Water spray abatement of $PM_{2.5}$ is considered in these calculations *(Abated $PM_{2.5}$ = Abated PM_{10} * 0.15).*
- 1.04% of PM_{10} emissions are assumed to be comprised of respirable CS (See Equation 2.1-C). Water spray abatement of CS is considered in these calculations *(Abated CS = Abated PM_{10} * 0.0104).*

Using the estimated area of 13.22 acres, the formula for calculating daily pollutant emission rates is as follows:

Equation 2.1-F:

$$\boldsymbol{Daily\ Emission\ Rate\ (lbs/day)} = Abated\ Emission\ Factor\ \left(\frac{lbs}{acre * day}\right) * 13.22\ acres$$

Table 7 below shows the abated emission factors and abated emission rates for the applicable pollutants. Actual emissions from wind erosion are expected to be lower than what is presented below because the maximum area of the proposed site that could be subject to wind erosion will be less than 13.22 acres. Furthermore, ERA may not be always using all three stockpiles and the estimated emissions assume that all three stockpiles will be at maximum capacity for 365 days per year.

Table 7. Abated Emissions of PM_{10}, $PM_{2.5}$, and CS from Wind Erosion from Stockpiles (part of S-3)

Source ID & Description	Pollutant	Abated Emission Factor (lbs/acre-day)	Maximum Hourly Emissions (lbs/hour)	Maximum Daily Emissions (lbs/day)	Maximum Annual Emissions (lbs/year)	Maximum Annual Emissions (ton/year)
S-3, Stockpiles (wind erosion only) 13.22 acres	**PM_{10}**	0.510	3.37	6.74	2,461	1.230
	$PM_{2.5}$	0.0765	0.51	1.01	369.1	0.185
	CS	0.00532	0.0352	0.0704	25.68	0.013

2.1.3 Emissions from Road Dust:

Dust generated from on-site vehicle traffic on paved roads will contribute to fugitive emissions of PM_{10}, $PM_{2.5}$, and CS, which will be included in the emissions from S-3 only. The two types of on-site vehicles include front-end loaders and customer trucks. Front-end loaders will be used for material transfer to the barge loading operation or to load material into the customer trucks. 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:

Equation 2.1-G:

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

The following table summarizes the parameters used to calculate the road dust emission factors by pollutant and vehicle type:

Table 8. Paved Road Dust Emission Factor Parameters

Parameters		Units	PM2.5	PM10	Basis
Particle Size Multiplier	k	*lbs/VMT*	0.00054	0.0022	*AP-42 Chapter 13.2.1, Paved Roads, Table 13.2.1-1*
Silt Loading Factor[1]	sL	*g/m²*	12	12	*AP-42, Chapter 13.2.1, Table 13.2.1-3*
Front-End Loader (FEL) Avg Weight	W_{FEL}	*tons*	61.0	61.0	*Applicant submitted data*
Customer Truck (CT) Avg Weight	W_{CT}	*tons*	17.5	17.5	*Applicant submitted data*
# of "wet days" during averaging period[2]	P	*days*	**64**	**64**	*Alameda County wet days, per Table 5 of 2021 Update to CARB Guidance[5] Misc. Process Methodology 7.9, Entrained Road Travel, Paved Road Dust*
Averaging Period	N	*days*	**365**	**365**	*Averaging period for annual*
Emission Factor (FEL)	E_{FEL}	*lbs/VMT*	0.328	1.337	*Calculated for front-end loader traveling on paved road*
Emission Factor (CT)	E_{HT}	*lbs/VMT*	0.092	0.374	*Calculated for customer truck traveling on paved road*

Notes:
1. Silt loading factor for Concrete Batching is used because no processing equipment (screens, crushers, etc.) is present at the facility.
2. A "wet day" is defined as a day with at least 0.01" of precipitation.

The emission calculation method for respirable crystalline silica (CS) from the haul roads is derived from the technical report published by Air Control Techniques, P.C., regarding CS and PM emission factors for aggregate producing sources (ACT Report)[6]. Approximately 2.7% of the PM emissions from haul roads are estimated to be CS.

Based on the applicant submitted data for the front loaders and trucks proposed operations, the following vehicle miles traveled (VMT) were estimated:

Table 9. On-Site Vehicle Route Information & VMT by Vehicle Type

Parameters	Front Loader (FEL)	Customer Truck (CT)
Route Length (miles – round trip)	0.10[a]	0.60
Max Daily Round Trips (trips/day)	375	375
Avg Operating Time (days/year)	365	365
Max Annual Round Trips (trips/year)	70,000	70,000
VMT/Day (miles/day)	38	225
VMT/Year (miles/year)	7,000	42,000

Notes:
[a] Round-trip distance for FEL includes up to 2 vehicles traveling 0.05 miles each.

Per the Air District Permit Handbook, Chapter 11.5 for Concrete Batch Plants, an abatement efficiency of 70% for PM_{10} and 40% for $PM_{2.5}$ is applied for operations that use water to suppress dust. The haul roads will be required by permit condition to be watered and swept to minimize dust. The following are the estimated emissions from the paved roads.

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[5] *California Air Resources Board, Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust, revised and updated March 2021. Link: https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-paved-road-dust*

[6] *Air Control Techniques, P.C., July 31, 2007, PM_4 Crystalline Silica and PM_{10} Particulate Matter Emission Factors for Aggregate Producing Sources. Link: https://www2.co.fresno.ca.us/4510/4360/environmental/KingsRiverSandGravel/Appendix_D-2007CRRNOS_Study.pdf*

Table 10. Emissions from Paved Roads (part of S-3)

Description	Pollutant	Maximum Hourly Emissions[1] (lbs/hr)	Maximum Daily Emissions (lbs/day)	Maximum Annual Emissions (lbs/year)	Maximum Annual Emissions (ton/year)
Road Dust from Paved Roads	PM_{10}	20.15	40.3	7,520	3.760
	$PM_{2.5}$	9.89	19.8	3,692	1.846
	CS	0.544	1.1	203.5	0.102

Notes:
1. Maximum hourly emission rate assumes emissions occur for a minimum of 2 hours per day.

2.1.4 Summary of Source Emissions of Criteria Pollutants:

The emission rates of PM_{10} and $PM_{2.5}$ from each proposed source, as summarized in Sections 2.1.1 through 2.1.3 above, are combined below in Table 11 to show each proposed source's emission rates of criteria pollutants.

Table 11. Criteria Pollutant Emissions Summary (S-1 through S-7)

Source ID & Description	PM_{10}			$PM_{2.5}$		
	Maximum Daily Emissions (lb/day)	Maximum Annual Emissions (lb/year)	Maximum Annual Emissions (ton/year)	Maximum Daily Emissions (lb/day)	Maximum Annual Emissions (lb/year)	Maximum Annual Emissions (ton/year)
S-1 Receiving Hopper	130.7	2,475	1.238	65.3	1,238	0.619
S-2 Ship Unloading & Stacking Conveyor System	285.6	5,410	2.705	137.5	2,605	1.303
S-3 Stockpiles	177.7	12,456	6.228	86.1	5,298	2.649
S-4 Barge Reclaim Hoppers	47.5	1,485	0.743	23.8	743	0.371
S-5 Barge Loading Conveyor System	54.1	1,692	0.846	25.6	801	0.401
S-6 Barge Loading	47.5	1,485	0.743	23.8	743	0.371
S-7 Truck Loading	47.5	1,485	0.743	23.8	743	0.371
Total (All Sources)	**790.7**	**26,488**	**13.244**	**385.9**	**12,169**	**6.085**

2.2 Pollutant Emissions from Cargo Carriers:

Ocean-going vessels (OGVs) and tugboats will be used as cargo carriers to transport materials to and from the facility. OGVs and tugboats are sources of nitrogen oxides (NOx), carbon monoxide (CO), precursor organic compounds (POC), sulfur dioxide (SO_2), and PM from diesel combustion. In accordance with

Regulation 2-2-610, emissions of cargo carriers shall be included in the analysis for the purpose of assessing the facility cumulative increase and offset requirements. Emissions from cargo carriers **shall not be included for the purpose of applying any other provisions of Regulation 2-2.**

Sand/aggregate to be processed at S-1 through S-7 are brought to ERA Oakland Terminal by OGV. ERA is expecting up to 48 deliveries per year. OGV emissions from main engines, auxiliary engines, and boilers are calculated from inbound transit and maneuvering, hoteling, and outbound maneuvering and transit. The inbound trips include transit from the outer edge of the Precautionary Zone (PZ) to the Bay Bridge, maneuvering from the Bay Bridge to the Outer Harbor, and hoteling at the terminal. While hoteling at the terminal, the OGV will unload sand/aggregate to the facility for as long as 24 hours per delivery. Outbound trips include maneuvering from the Outer Harbor to the Bay Bridge followed by transit to the outer edge of the PZ. Mitigation Measure ERA AQ-1 from the project FSEIR requires that a minimum of 25% of annual OGV deliveries to the ERA Oakland Terminal are done by OGVs with main engines meeting the United States Environmental Protection Agency (USEPA) Tier 2 or higher emissions standards; and that requirement is to increase incrementally to a minimum of 40% by year 12 of the lease. The remaining OGV deliveries may be made by vessels rated at Tier 1 or Tier 0. ERA provided engine & boiler specifications for Tier 0- and Tier 2-rated vessels that are representative of the OGVs that will deliver material to the facility. From this provided information, OGV emissions are calculated assuming that 12 of the maximum 48 OGV deliveries/year are made by the Tier 2-rated vessel, and the emissions from the remaining 36 OGV deliveries/year are calculated from the Tier 0 vessel with the highest NOx emissions. Vessel-specific data used for the calculations include engine/boiler power ratings, cruise speeds, and auxiliary engine load percentage for specific route segments. Additional sources used for the basis of the OGV emissions include the 2020 Port of Oakland Emissions Inventory[7] and the 2021 OGV Emissions Inventory from the California Air Resources Board (CARB)[8], with the former as the preferred data source due to its specificity to the Port that ERA will operate at. OGV emissions are presented in Appendix A of this evaluation.

Tugboats, referred to herein as "Assist Tugs", would be utilized to assist in maneuvering OGVs to and from the Bay Bridge and berth at the Outer Harbor. Two (2) Assist Tugs per OGV would be required for both the inbound and outbound trips, for a maximum total of 96 Assist Tug round-trips/year. ERA provided examples of representative Assist Tugs from AmNav Maritime Corporation (AmNav) and the emissions were calculated assuming all trips are made with the boat with the highest NOx emissions. One Assist Tug round-trip includes transit from AmNav base at Berth 9 to meet the OGV at the Bay Bridge, maneuvering the OGV to the Outer Harbor, returning to AmNav base, then coming back to the Outer Harbor to pick up the OGV, maneuvering the OGV back to the Bay Bridge and then returning to AmNav base. Engine specifications, input parameters, and methodologies used to calculate emissions are from the following sources (in order of preference): 2020 Port of Oakland Emissions Inventory, Appendix H of the 2021 CARB Commercial Harbor Craft (CHC) Emissions Inventory[9], and the 2007 CARB CHC Emissions Estimation Methodology[10]. Assist Tug emissions are presented in Appendix A of this evaluation.

The proposed operations of the ERA Oakland Terminal will include the loading of barges to ship out material. Additional tugboats, referred to herein as "Barge Tugs", would be utilized to tow the barges full of sand/aggregate to customers adjacent to the water in various parts of the Bay Area. The barges don't have any engines and therefore no emissions, but emissions from the Barge Tugs are evaluated. Barge Tug emissions are calculated using the provided information on the typical shipping routes, the number of trips per year for each route, and specifications of representative Barge Tugs. The typical shipping routes are

[7] *2020 Port of Oakland Emissions Inventory report: https://www.portofoakland.com/wp-content/uploads/bsk-pdf-manager/2024/05/Port-Oakland-2020-Emissions-Inventory-Final-Report.pdf*
[8] *2021 CARB OGV Emissions Inventory report: https://ww2.arb.ca.gov/sites/default/files/2022-06/CARB_2021_OGV_Documentation_ADA.pdf*
[9] *Appendix H, 2021 CARB CHC Emissions Inventory report: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/chc2021/apph.pdf*
[10] *2007 CARB CHC Emissions Estimation Methodology document: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2007/chc07/appb.pdf*

round trips from the ERA Oakland Terminal at the Outer Harbor to Petaluma, San Francisco Pier 92, or Treasure Island and back to the ERA Oakland Terminal. Additional input parameters used for emission calculations are from the following sources (in order of preference): 2020 Port of Oakland Emissions Inventory, Appendix H of the 2021 CARB CHC Emissions Inventory, and the 2007 CARB CHC Emissions Estimation Methodology. Barge Tug emissions are also presented in Appendix A of this evaluation.

The emissions from cargo carriers are summarized below and detailed in Appendix A of this evaluation.

Table 12. Cargo Carrier Emissions

Cargo Carrier Type	Annual Emissions (tons/year)					
	POC	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$
Ocean-Going Vessels	2.621	4.640	1.643	54.398	0.725	0.668
Assist Tugs	0.392	2.554	0.003	3.451	0.143	0.137
Barge Tugs	0.293	1.913	0.002	2.590	0.120	0.115
TOTAL	**3.306**	**9.106**	**1.648**	**60.439**	**0.988**	**0.920**

To ensure that cargo carrier emissions do not exceed the rates noted above, the permit conditions will include limitations on the annual number of OGV deliveries, the Tier ratings of the OGV main engines, and the number of outgoing barge shipments to the various customer destinations.

Regarding the OGV emissions, a condition of the Lawsuit Settlement Agreement[11] concerning this project states that the Port "shall use its best efforts to make shore power available to all [OGVs] calling at the Project (Berths 20-22) by the end of calendar year 2029 at the latest, with the goal of having shore power available in the calendar year 2027." Additionally, Eagle Rock must begin using at least one (1) OGV equipped to use shore power as soon as feasible after shore power is available, with the ultimate goal of at least 50% of aggregate delivered to the site by OGVs capable of using shore power. OGVs connected to shore power would not need to use their diesel-fueled auxiliary engines during hoteling and discharging at berth, which would in turn reduce emissions during those segments of each delivery. The proportion of total OGV emissions from the auxiliary engines during hoteling/discharging vary by pollutant but make up a range of approximately 40-50% of total OGV emissions. For the highest emitting pollutant (NOx), OGV auxiliary engines during hoteling/discharging emit approximately 50% of total OGV NOx emissions, and approximately 45% of total cargo carrier NOx emissions. Therefore, the implementation of shore power at the site will reduce emissions from the levels shown in Table 12 in the long-term. However, because shore power may not be available at the commencement of site operations, the emissions reduction is not considered when determining the facility's cumulative increase and the amount of offsets necessary to satisfy the requirements of Air District Regulation 2, Rule 2.

3.0 CUMULATIVE INCREASE

The following table summarizes the facility's cumulative increase. In addition to the PM10/2.5 emissions summarized in Table 11, the cumulative increase includes emissions from the cargo carriers associated with the sources at the facility (see Table 12), as required by Air District Regulation 2-2-610. For reference, the facility's cumulative increase is equal to the facility's potential-to-emit (PTE) for all pollutants.

[11] Lawsuit Settlement Agreement made among the West Oakland Environmental Indicators Project, the People of the State of California, the City/Port of Oakland, and Eagle Rock Aggregates, Inc. Effective June 29, 2023.

Table 13. Facility Cumulative Increase

Pollutant	Existing Cumulative Increase(ton/yr)	Emission Increase from App #30884 (ton/yr)	New Cumulative Increase (ton/yr)
POC	0.000	3.306	3.306
NOx	0.000	60.439	60.439
SO_2	0.000	1.648	1.648
CO	0.000	9.106	9.106
$PM_{2.5}$	0.000	7.004	7.004
PM_{10}	0.000	14.232	14.232

4.0 OFFSETS

Per Air District Regulation 2-2-302, a facility that meets or exceeds the potential to emit (PTE) 35 tons/year or more of NOx or POC must provide offsets at a 1.15:1 ratio for any un-offset cumulative increase in emissions. If the PTE of NOx or POC between 10 and 35 tons/year, offsets must be provided at a 1:1 ratio.

The only sources of NOx and POC at ERA 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 Table 13, the PTE for NOx and POC emissions are 60.371 tons/year and 3.289, respectively. Therefore, NOx offsets are due at a 1.15:1 ratio and no offsets are required for POC.

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 ERA occur from the operation of all sources (S-1 through S-7) as well as the OGV and tugboats. SO_2 only occur from the operation of OGVs and tugboats. As previously shown in Table 13, the facility-wide PTE of PM_{10}, $PM_{2.5}$, and SO_2 are all below the 100 ton/year threshold for providing offsets, so no offsets are required for these pollutants.

The table below shows the amount of offsets required for this project. These offsets will be supplied by ERC Certificate #2016, which has a current balance of 73.248 TPY of NOx.

Table 14. Offset Requirements for Facility ID 24848

Pollutant	Cumulative Increase (TPY) from AN 30884 (see Table 13)	Offset Ratio (Reg 2-2-302.2.2)	Amount to Offset (TPY)
NOx	60.439	1.15:1	69.505

5.0 HEALTH RISK ASSESSMENT (HRA)

Respirable Crystalline Silica is the only expected TAC emitted from proposed sources S-1 through S-7 and the emissions from each source are detailed in Section 2 of this report. This is a new facility, so the project TAC emissions include only the respirable CS emissions from S-1 through S-7. The project TAC emissions are summarized below.

Table 15. Project Emissions of Respirable Crystalline Silica

Source ID	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)
S-1	5.68E-02	N/A	No	2.58E+01	1.2E+02	No
S-2	1.24E-01		No	5.65E+01		No
S-3 (drop/wind erosion)	9.20E-02		No	5.15E+01		No
S-4	2.07E-02		No	1.55E+01		No
S-5	2.35E-02		No	1.77E+01		No
S-6	2.07E-02		No	1.55E+01		No
S-7	2.07E-02		No	1.55E+01		No
Road Dust	5.44E-01		No	2.03E+02		Yes
Project	**9.02E-01**	**N/A**	**No**	**4.01E+02**	**1.2E+02**	**Yes**

The CS emissions from S-3 (road dust) and the project exceed the chronic trigger level set forth in Table 2-5-1 of Regulation 2, Rule 5. Therefore, an HRA was performed to assess the health risk resulting from the proposed operation. The HRA was based on the CS emissions as shown in Table 15 from all proposed sources (S-1 through S-7) and the results are summarized in the following tables. Note that CS is not a carcinogen and does not have acute health impacts, so the only health risk evaluated is the Chronic Hazard Index (Chronic HI).

Table 16. Source Risk Summary

Source ID	Max Source Chronic HI
S-1	0.00070
S-2	0.0058
S-3 (drop/wind erosion)	0.0049
S-4	0.00078
S-5	0.00068
S-6	0.00062
S-7	0.0031
Road Dust	0.42

Table 17. Project Risk Summary

Receptor	Chronic HI
Resident	0.0048
Worker	0.44

The HRA results indicate that the maximum project Chronic HI (worker) is **0.44**. Since the estimated project chronic HI risk does not exceed 1.0, this project complies with the District's Regulation 2-5-302 project risk requirements, for projects located within an Overburdened Community, as defined in Regulation 2-1-243. The HRA represents an analysis of all sources of TACs at this facility. Therefore, these project HRA results also represent site-wide HRA results for purposes of the Air Toxics "Hot Spots" Act (AB 2588).

6.0 BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS (TBACT)

In accordance with District Regulation 2-5-301, TBACT is triggered because the estimated source risk is greater than a cancer risk of 1.0 in a million and/or a chronic HI of 0.20. Specifically, the Fugitive Dust source from site roads (i.e. road dust) individually contributes a **chronic HI of 0.42** (~95% of the project's Chronic HI for Workers). TBACT is triggered for onsite road dust emissions of this project. For the TBACT determination, the cost of controls is not considered, but only feasibility and effectiveness are considered.

TBACT for the road dust is determined to be as follows (see Appendix B for more details and discussion):
- Paving of roads
- Water flushing of paved roads
- Street sweeping of paved roads with a "PM10-efficient" street sweeper
- Limiting visible emissions to 10% opacity

ERA has already proposed paving, water flushing, and sweeping of site roads and site surfaces. The street sweeper will be required to be a "PM10-efficient" sweeper and visible emissions cannot exceed 10% opacity. These requirements will be reflected in the permit conditions. TBACT is satisfied for road dust.

7.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

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. As shown in Table 11, the daily PTE of PM_{10} and $PM_{2.5}$ from all the proposed sources exceed this 10 lbs/day threshold. Therefore, BACT review is required for S-1 through S-7. For purposes of this section of this evaluation, the term "PM" will be used to encompass both PM_{10} and $PM_{2.5}$, unless otherwise specified.

Per Air District Regulation 2-2-202, BACT is defined as the most stringent emissions limitation, control device, or control technique that is technologically feasible and cost-effective (BACT 1) or is achieved in practice at other similar sources (BACT 2). BACT 1 is the more stringent level of BACT control and refers to the most effective control devices or techniques that are commercially available, demonstrated effective and reliable, and shown to be cost-effective on a dollar per ton of pollutant removed basis. If a potential BACT 1 control is determined to be technologically feasible and cost-effective, then it will constitute BACT for the source(s) in question. If potential BACT 1 control(s) are determined to be not feasible or not cost-effective, then BACT 2 control(s) will constitute BACT and therefore must be implemented. BACT 2 applies to the most effective emission control technology or most stringent emission limit that is achieved in practice for the type and capacity of equipment/operation comprising the source under review. To be categorized as BACT 2, the control technology or emission limit must be demonstrated to be achieved in practice for the source type under review operating under similar conditions (e.g. similar process throughput, material usage, hours of operation, site-specific limitations or opportunities, etc.). If a control technology or emission limit is achieved in practice under unsimilar conditions for the source in question, it will be considered under the category of BACT 1 for the BACT analysis.

The emission streams from the proposed sources (S-1 through S-7) are broken down into two categories for the BACT analysis. The first category is sand/aggregate handling ("Aggregate Handling") and includes the control technologies/emission limits for emissions from all transfer points (loading, hoppers, conveyors, drop points). Emissions from S-1 through S-7 are included in the first category. The second category is "Storage Piles" and includes the control technologies/emission limits for emissions from the aggregate storage piles (part of S-3 only). The control technologies proposed by ERA for this operation include water spray/wet suppression at all transfer points, watering of the stockpiles, maintaining appropriate moisture content of the materials in process, and installing dust chutes at conveyor transfer points, where possible.

To determine what level of control constitutes BACT for the proposed sources of this operation, the Air District reviewed available control technologies that can be effective at controlling PM from similar source categories of this proposed facility. This review included information submitted with this application, the Air District's own BACT determinations, regulations and permitting actions, and other agencies' emission standards, BACT guidelines, determinations and/or permitting actions. Other agencies/resources reviewed include the United States Environmental Protection Agency's RACT/BACT/LAER Clearinghouse (RBLC), the California Air Resources Board (CARB) BACT Clearinghouse, San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD), South Coast Air Quality Management District (SCAQMD), Sacramento Metropolitan Air Quality Management District (SMAQMD), San Diego County Air Pollution Control District (SDCAPCD), Santa Barbara Air Pollution Control District (SBAPCD), and the Mojave Desert Air Quality Management District (MDAQMD). Details of the BACT analysis and additional discussion are provided in Appendix B. The resulting BACT determinations for each type of activity are summarized below.

Aggregate Handling & Storage Piles (S-1 through S-7):

BACT for these operations are as follows:

- Water spray of storage piles and transfer points
- Partial enclosures at transfer points
- Maintain appropriate moisture content to prevent visible emissions exceeding 5% opacity

The proposed design of each of the fixed conveyor transfer points includes a dust chute to partially enclose the transfer point. Also, ERA has proposed water spray of the storage piles and all material transfer points, and they will be required to keep aggregates adequately moist to prevent visible emissions exceeding 5% opacity. These requirements will be reflected in the permit conditions. BACT is satisfied for S-1 through S-7.

Road Dust:

See Section 6.0 of this report on Best Available Control Technology for Toxics. The TBACT determination for the paved roads will also be considered BACT for that source. Therefore, BACT is satisfied for Road Dust.

8.0 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) requires public agencies (e.g., local, county, regional, and state government) to consider and disclose the environmental effects of their decisions to the public and governmental decisionmakers before approving a project. CEQA also mandates that agencies implement feasible mitigation measures or alternatives that would mitigate significant adverse effects on the environment. Projects must comply with the provisions of CEQA, which are found in the California Public Resources Code, Sections 21000 et seq. as well as the State CEQA Guidelines, title 14 of the California Code of Regulations, Sections 15000 et seq., which are administrative regulations governing the implementation of CEQA. The Air District also publishes guidance for evaluating the air quality and climate impacts of projects under CEQA.

The project site is in the Port of Oakland and lies within the boundary of the Oakland Army Base (OAB) Area Redevelopment Plan. An initial Environmental Impact Report for the OAB Area Redevelopment Plan (2002 EIR) was certified by the City of Oakland (City) in July 2002 under State Clearinghouse Number SCH #2001082058. The Port is the Lead Agency under CEQA and has prepared or been involved with multiple addendums to the 2002 EIR. In 2021, the Port prepared a Final Supplemental Environmental Impact Report (FSEIR)[12] for this specific project under the same State Clearinghouse Number SCH #2001082058. The Port filed a Notice of Determination (NOD) with the County of Alameda in February 2022 finding that the project will have a significant effect on the environment and as such, mitigation measures were made a condition of the approval and both a Mitigation Monitoring & Reporting Program (MMRP) and Statement of Overriding Considerations were adopted for the project.

Furthermore, the Port prepared an Addendum to the FSEIR (Addendum),[13] which the Port adopted on August 8, 2025 to address two changes to the project. First, the FSEIR had stated the project would include a visual barrier, which the FSEIR alternately identified as a wind screen, on the north, south, and east perimeter of the site. While the FSEIR stated this barrier would vary between 8 and 45 feet tall, tapering down to 8 feet at the entrance to the facility, the Air District understands that the current intent is for this entire barrier to be 8 feet tall. Second, the final proposed project will add one more barge reclaim hopper in addition to what was originally described and analyzed in the FSEIR.

In the Addendum, the Port determined that a subsequent EIR is not warranted as a result of these changes because the changes will not involve new significant environmental effects or a substantial increase in the severity of previously identified significant effects under CEQA Guidelines section 15162. The Air District reviewed and considered the Addendum and does not intend to prepare a subsequent EIR. With regard to the visual barrier/wind screen, the FSEIR did not assign any emissions abatement to the barrier and did not take the barrier into account in determining the significance of air quality impacts. And with regard to the barge reclaim hopper, the process design change has no effect on the downstream material throughput capacity of the conveyor system (i.e., the conveyor system downstream of the barge reclaim hoppers is a bottleneck in the process) and therefore, the addition of the second barge reclaim hopper results in no or negligible effects on emission rates of any pollutants.

The Air District has reviewed and considered the FSEIR and Addendum, incorporated the Port's environmental analysis into its decision-making process, and proposes to make findings pursuant to CEQA Guidelines Sections 15091 and 15096 for the Project. Based on its review of the FSEIR and Addendum, the Air District agrees that certain significant environmental impacts could occur as a result of the Project. For each significant impact, changes or alterations have been required in, or incorporated into, the Project which avoid or substantially lessen the environmental effects as identified in the FSEIR to the extent feasible. In addition, for those mitigation measures that are identified in the FSEIR to lessen impacts and that are within the responsibility or jurisdiction of another public agency, such measures either have been or can and should be adopted by such other agency if feasible. In approving this Project, the Port adopted mitigation measures

[12] FSEIR is available for review on the Port of Oakland's webpage for Environmental Stewardship Publications & Documents under "Eagle Rock Aggregates Oakland Terminal Project". Link: https://www.portofoakland.com/business/bids-rfp-center/environmental-stewardship-publications-documents

[13] The Addendum is also available for review on the same webpage referenced earlier in Footnote #12.

as a condition of the approval and adopted a mitigation monitoring plan or program. However, potentially significant and unavoidable impacts remain after mitigation.

In evaluating the project in its role as responsible agency, the Air District has reviewed and considered the project's environmental impacts in the Port's environmental analysis, and in the applicant's permit application. The Air District is incorporating mitigation measures from the FSEIR into the permit conditions for this project, but the Air District is not imposing any new mitigation measures under CEQA, so the Air District is not adopting a mitigation monitoring or reporting plan. Some of the mitigation measures that were incorporated into the Air District's evaluation of this application and will be included in the permit conditions for the proposed sources include the following:

- Accepting OGV deliveries from a minimum of 25% Tier 2 (or better) rated OGVs
- Washing of truck tires before exiting the site
- Sweeping on-site roads a minimum of twice daily during all days of operation

Before making a final decision on this application, the Air District will prepare CEQA Findings and a Statement of Overriding Considerations for the project. The Air District will make its final decision on this application after considering public comments submitted during the 30-day public comment period required by Air District Regulation 2-1-412.

9.0 PUBLIC NOTIFICATION

Regulation 2, Rule 1, Section 412, Public Notice, Schools & Overburdened Communities applies to new or modified sources located within 1,000 feet of the boundary of a K-12 school. This regulation also applies to new or modified sources located in an Overburdened Community (OBC) as defined in Regulation 2-1-243 and for which an HRA is required. The proposed sources are not located within 1,000 feet of a school. However, they are located in an OBC and require an HRA, so public notification is required. Typically, public notifications are sent to all addresses within a radius of 1,000 feet of the source, as is required by District Regulation 2-1-412.2. Because there are few addresses within 1,000 feet of the proposed sources, the public notification radius will be extended to 5,000 feet for this application to include more addresses. There will be a 30-day public comment period and the Air District will review, consider, and respond to all comments received before making a final decision on this application.

Additionally, the facility is located in a community, West Oakland, that subjects it to California Assembly Bill 617 (AB 617: Community Health Protection Program). Under the Program, West Oakland was selected for an emission reduction plan. The Air District has been working with the West Oakland Environmental Indicators Program (WOEIP) as the primary partner in West Oakland to develop and implement the plan. Air District permit staff had a meeting with representatives from WOEIP about this project. In addition, prior to initiating the public notice period for this project, Air District staff notified WOEIP separately.

10.0 STATEMENT OF COMPLIANCE

Excepting the requirements that have already been discussed, this section will discuss the proposed sources' compliance with all other applicable Air District and Federal requirements.

10.1 Air District Regulations

Regulation 2, Rule 1: Permits, 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. This project has been reviewed in accordance with CEQA requirements in Section 8.0.

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. S-1 through S-7 have been reviewed for BACT in Section 7.0.

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.

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.

Offsets requirements have been reviewed and are discussed in Section 4.0.

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. An HRA was performed and Section 5 of this evaluation report discusses compliance with this rule.

Regulation 2, Rule 6: Major Facility Review

The requirements of the 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, Sections 301 & 302, require that visible emissions do not meet or exceed Ringelmann 1.0 for periods aggregating more than 3 minutes in any hour or equivalent opacity (greater than or equal to

20% opacity). ERA will be expected to meet these requirements and, in most cases, will be limited by permit condition to opacity levels more stringent than what is required by these sections of this rule.

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 307, Visible Emissions Within and From Regulated Bulk Material Sites, limits visible emissions from Regulated Bulk Material Sites, such as this proposed ERA facility. ERA will be expected to comply with the requirements of both Sections 307.1 and 307.2 of this rule. These requirements will be included in the permit conditions for the applicable proposed sources.

Regulation 6, Rule 1, Section 311, Total Suspended Particulate (TSP) Weight Limits, limits TSP from any source based on the process weight rate. Section 311.1 applies to sources with a PTE of TSP that is less than or equal to 1,000 kg/year and Section 311.2 applies to sources that have a PTE greater than 1,000 kg per year (1.1 tons per year) of TSP. The PTE of TSP from each source were calculated using PM_{30} emission factors and the same methodologies described in Section 2 of this evaluation. Per AP-42 Chapter 13.2, Fugitive Dust Sources, PM_{30} may be used as a surrogate for TSP. The table below summarizes the process weight rates, and TSP emission rates compared to the applicable TSP emission limits for each proposed source.

Table 18. Process Weight Rates & TSP Emission Limits (S-1 through S-7)

Source ID	PTE TSP (kg/year)	Process Wt Rate[1] (lbs/hr)	Hourly TSP Emission Rate (lbs/hr)	TSP Emission Limit (lbs/hr)	Exceeds TSP Limit?
S-1 Receiving Hopper	2,347	11,000,000	11.4	30	No
S-2 Ship Unloading & Stacking Conveyor System	5,103	11,000,000	24.8	30	No
S-3 Stockpiles (drop point only)[2]	2,347	11,000,000	11.4	30	No
S-4 Barge Reclaim Hoppers	1,408	4,000,000	4.1	30	No
S-5 Barge Loading Conveyor System	1,592	4,000,000	4.7	30	No
S-6 Barge Loading	1,408	4,000,000	4.1	30	No
S-7 Truck Loading	1,408	4,000,000	4.1	30	No

Notes:
1. Hourly process weight rates are equal to maximum hourly material throughput listed in Table 3.
2. Only drop point emissions from S-3 were considered. Wind erosion and road dust do not have process weight rates to evaluate for Regulation 6-1-311.

As shown above, all proposed sources have a PTE of TSP below the applicable limits set forth in Regulation 6-1-311.2, Table 6-1-311.2. All proposed sources comply with TSP Weight Limits.

Regulation 6, Rule 1, Section 602, Methods for Determining Compliance, states that source tests are not required if a source cannot be modified to comply with source test requirements and testing is not physically possible. The proposed sources of this application do not have defined stacks and therefore are not subject to source testing to determine compliance with TSP emissions limits.

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. ERA 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 ERA 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. ERA will be expected to maintain compliance with the requirements of this rule.

10.2 Federal Regulations:

New Source Performance Standards (NSPS)

ERA is not subject to NSPS, 40 CFR 60 Subpart OOO - Standards of Performance for Nonmetallic Mineral Processing Plants 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, ERA is still expected to comply with the opacity limits of the NSPS in Table 3 – Fugitive Emission Limits. Permit conditions will include visible emission compliance requirements, which are more stringent than NSPS.

National Emission Standards for Hazardous Air Pollutants (NESHAPS)

There are no subparts under 40 CFR 61 or 40 CFR 63 that apply to bulk aggregate receiving/loading operations like the sources proposed in this application. Therefore, NESHAPS are not applicable.

11.0 PERMIT CONDITIONS

Permit Condition #100592 – Applies to S-1 through S-7

1. The owner/operator shall only receive and process aggregates at this facility. For purposes of this permit, the term "aggregate(s)" encompasses both fine and coarse aggregate materials (i.e. sand and gravel).
   (Basis: Cumulative Increase, Regulation 2-5)

2. The owner/operator shall ensure the following material throughput and storage limits listed below are not exceeded:

a. Receiving/Ship Unloading Operations (S-1 & S-2): 2,500,000 tons of aggregate through each source in any consecutive 12-month period. (Basis: Cumulative Increase)
b. Barge Loading Operations (S-4, S-5, & S-6): 1,500,000 tons of aggregate through each source in any consecutive 12-month period. (Basis: Cumulative Increase)
c. Truck Loading Operations (S-7): 1,500,000 tons of aggregate in any consecutive 12-month period. (Basis: Cumulative Increase)
d. Notwithstanding the limits set forth in Parts 2b and 2c of this condition, the owner/operator shall not exceed a combined total of 2,500,000 tons of aggregate shipped offsite by truck and barge in any consecutive 12-month period. (Basis: Cumulative Increase)

3. To demonstrate compliance with Parts 1 and 2 of this condition, the owner/operator shall maintain the following records:

    a. Throughput records of all aggregates (in tons) on a daily and monthly basis for:
        i. Ship Unloading
        ii. Barge Loading
        iii. Truck Loading
    b. The owner/operator shall use the monthly records to calculate and record the material throughput at each source (S-1 through S-7) on a consecutive, rolling 12-month basis.

    These records shall be maintained in a District-approved log for at least 24 months from the date of entry. Log entries shall be retained on-site and made available to District staff upon request.
    (Basis: Cumulative Increase, BACT, Regulation 2-1-403)

4. The owner/operator shall not accept more than forty-eight (48) ship deliveries in any consecutive 12-month period.
    (Basis: Cumulative Increase, Offsets)

5. The owner/operator shall ensure a minimum of 25% of all annual ship deliveries are made by vessels with main engines meeting USEPA Tier 2 or higher Tier emissions standards for marine compression-ignition engines. For the purposes of demonstrating compliance with this part of this permit condition, each annual reporting period shall be from July 1 to June 30 of the following year.
    (Basis: CEQA, Cumulative Increase, Offsets)

6. The owner/operator shall not ship aggregates by barge to any destinations other than those specified below, and the owner/operator shall not exceed the following barge-towing tugboat (barge-tug) trip limitations to each destination during any consecutive 12-month period:

DESTINATION	BARGE-TUG TRIP LIMIT
SF Pier 92 or Treasure Island	105 trips/year
Shamrock Petaluma	40 trips/year

    Each "trip" is defined as one (1) barge-tug traveling round-trip from Berth 22 in the Port of Oakland to the destination (or vice versa). When more than one tugboat is used, the number of barge-tug trips should be multiplied by the number of tugboats used for each round-trip from Berth 22 in the Port of Oakland to the destination.
    (Basis: Regulation 2-2-610, Offsets)

7. The owner/operator may ship aggregates to alternate locations than those specified in Part 6 and/or the owner/operator may exceed the number of barge-tug trips specified in Part 6, provided that the

owner/operator can demonstrate to the satisfaction of the APCO that the combined NOx mass emissions from all cargo carriers (including ocean-going vessels, assist tugboats, and barge-tugs) do not exceed 60.439 tons in any consecutive 12-month period.

If the NOx mass emission limit specified above is exceeded, the owner/operator shall offset the exceedance by supplying valid emission reduction credits (ERC) at a 1.15:1 ratio.
(Basis: Regulation 2-2-610, Offsets)

8. To demonstrate compliance with Parts 4, 5, 6, and 7 of this condition, the owner/operator shall maintain the following records:

    a. For each ship delivery, record the date, the name of the vessel, the vessel's International Maritime Organization (IMO) identification number, and the USEPA Tier Rating of the vessel's main engine.
    b. Maintain an index of the following information for each vessel that makes one or more deliveries to the facility:
        i. Vessel name, IMO vessel identification number, and vessel flag
        ii. Number of main and auxiliary engines
        iii. Official technical specifications and/or official data sheets for each vessel's main and auxiliary engines that include at least the following information:
            1. Model name(s)
            2. Power rating(s)
            3. USEPA Tier rating(s); or other information that can be used to discern the tier rating(s)
    c. For each outgoing barge shipment, record the date, the destination, and the number of barge-tugs used.
    d. To demonstrate compliance with Part 7 when applicable, NOx mass emission calculations from all cargo carriers in any consecutive 12-month period.

    These records shall be maintained in a District-approved log for at least 24 months from the date of entry. Log entries shall be retained on-site and made available to District staff upon request.
    (Basis: Cumulative Increase, Offsets, Regulation 2-1-403)

9. The owner/operator shall ensure that any fugitive dust emissions from the operation of S-1 through S-7 (excluding road dust) do not exceed 5% opacity and/or Ringelmann 0.25 for a total of three (3) or more minutes in any 60-minute period, nor shall any particulate emissions result in fallout on adjacent property in such quantities as to cause public nuisance per District Regulation 1-301. To ensure compliance with this Part, the owner/operator shall visually observe all operations at the site daily by following applicable procedures in Regulation 6-1-601 and shall immediately initiate corrective actions, if any visible dust emissions are detected exceeding the opacity or Ringelmann limit that persist for longer than 3 minutes in an hour.
    (Basis: Regulation 1, BACT)

10. The owner/operator shall abate the particulate emissions from S-1 through S-7 using Water Suppression/Water Spray System (A-1) as necessary to maintain compliance with Part 9 of this condition.
    (Basis: Cumulative Increase, BACT)

11. The owner/operator shall ensure that any fugitive dust emissions from on-site vehicles (road dust) do not exceed 10% opacity and/or Ringelmann 0.5 for a total of three (3) or more minutes in any

60-minute period, nor shall any particulate emissions result in fallout on adjacent property in such quantities as to cause public nuisance per District Regulation 1-301. To ensure compliance with this Part, the owner/operator shall visually observe all operations at the site daily by following applicable procedures in Regulation 6-1-601 and shall immediately initiate corrective actions, if any visible dust emissions are detected exceeding the opacity or Ringelmann limit that persist for longer than 3 minutes in an hour.
(Basis: Regulation 1, TBACT, Regulation 6-1)

12. The owner/operator shall ensure the entire site is paved and shall utilize Water Spray/Water Suppression System (A-1) as necessary to minimize fugitive dust emissions from on-site vehicles and maintain compliance with Part 11 of this condition.
(Basis: Cumulative Increase, TBACT, Regulation 6-1)

13. The owner/operator shall properly maintain the Water Suppression/Water Spray System (A-1) and keep the associated apparatuses in good operating condition at all times.
(Basis: Regulation 2-1-403)

14. At least once per operating day, or more frequently if required by District Regulation 6-1-506, the owner/operator shall monitor for visible dust emissions from each operation (S-1 through S-7, including road dust) when the potential for visible emissions is at its highest and shall record the monitoring results and any emission mitigation measures taken. The owner/operator shall document the sources and operations monitored and maintain these records in a District-approved log and shall retain the records on site at least two (2) years from the date of entry and shall make the records available to District staff upon request.
(Basis: Regulation 6-1, Recordkeeping)

15. The owner/operator of this facility shall:

    a. Ensure all customer truck tires are washed before exiting the site onto a paved public road or shoulder of a paved public road; and
    b. Sweep on site roads a minimum of twice daily during all days of operation using a PM10-efficient street sweeper; and
    c. Utilize any additional measures as necessary to prevent and control trackout of solid materials onto paved public roads in accordance with District Regulation 6-6-301

    (Basis: CEQA, TBACT, Regulation 6-6)

16. In addition to the applicable Monitoring & Recordkeeping requirements set forth in District Regulation 6, Rule 6, the owner/operator of this facility shall document the activities required by Parts 15a, 15b, and 15c of this condition on a daily basis. These records shall be maintained in a District-approved log and shall be retained on site at least two (2) years from the date of entry and shall be made available to District staff upon request.
(Basis: Recordkeeping, Regulation 6-6)

17. During cleanup of any trackout or any material spill, the owner/operator of the facility shall not cause or allow fugitive dust visible emissions that exceeds 20% opacity and/or Ringelmann 1 for a total of three (3) or more minutes in any 60-minute period.
(Basis: Regulation 6-6)

18. The owner/operator of this facility shall ensure that the following on-site vehicle travel distance limits for each vehicle type are not exceeded:

    a. Front-end Loaders: 7,000 vehicle-miles traveled (VMT) on-site, per consecutive 12-month period.
    b. Customer Trucks: 42,000 VMT on-site, per consecutive 12-month period.

    (Basis: Cumulative Increase)

19. To demonstrate compliance with Part 18 of this condition, the owner/operator shall maintain monthly VMT records for on-site vehicles as follows:

    a. To demonstrate compliance with Part 18a, the owner/operator shall track the odometer readings of Front-end Loaders on a monthly basis.
    b. To demonstrate compliance with Part 18b, the owner/operator shall multiply the monthly number of Customer Trucks by the distance of the typical route traveled within the facility.

    These records shall be maintained in a District-approved log for at least 24 months from the date of entry. Log entries shall be retained on-site and made available to District staff upon request.
    (Basis: Regulation 2-1-403, Recordkeeping)

End of Conditions

12.0 RECOMMENDATION

The Air District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct for the proposed sources, all of which are listed below. However, the facility is located in an overburdened community and requires a public notice per Air District Regulation 2-1-412. After the comments are received and reviewed, the Air District will make a final determination on the permit.

I recommend that the Air District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct for the following sources:

S-1 Receiving Hopper
S-2 Ship Unloading & Stacking Conveyor System
S-3 Sand & Aggregate Stockpiles (3 stockpiles & paved road dust)
S-4 Barge Reclaim Hoppers
S-5 Barge Loading Conveyor System
S-6 Barge Loading
S-7 Truck Loading

By: ______________________ Date: August 27, 2025
Cameron Fee
Senior Air Quality Engineer

Appendix A
Cargo Carrier Emissions

Cargo Carrier Emissions – Ocean-Going Vessels

As described in Section 2.2 of this evaluation, the data and parameters used to calculate emissions from ocean-going vessels (OGVs) and other cargo carrier vessels are from the sources summarized below. The notations shown in parentheses below will be used throughout this Appendix to note the basis of data, parameters, or methodologies used in the calculations.

- (ERA) – Vessel specific data submitted by Eagle Rock Aggregates
- (2020 Port Oakland) – The 2020 Port of Oakland Emissions Inventory report
- (2021 CARB-OGV) – The 2021 CARB Ocean-Going Vessels Emissions Inventory report
- (2021 CARB-CHC) – Appendix H, 2021 CARB Emission Inventory for Commercial Harbor Craft
- (2007 CARB-CHC) – The 2007 CARB Emissions Estimation Methodology for Commercial Harbor Craft

The table below shows the OGV specifications for the two vessels that will be used as representative vessels for the emission calculations. The information in the table is from data submitted by ERA, unless otherwise specified.

Table A1. Ocean-Going Vessel Information

Vessel Name	Cruise/Design Speed (kn)	Max Speed[1] (kn)	Main Engine Power (kW)	Main Engine Tier Rating	# Aux Engines	Total Aux Engine Power (kW)	Aux Engine 1 (kW)	Aux Engine 2 (kW)	Aux Engine 3 (kW)	Aux Engine Tier Rating	Boiler Power (kW)
HH Jackman	15.75	16.8	12,085	Tier 0	3	2,700	900	900	900	Tier 0	132
CSL Tecumseh	14.5	15.5	10,430	Tier 2	3	3,438	1,250	1,250	938	Tier 0	132

Notes:
1. Maximum speed calculated assuming cruise speed is 93.7% of maximum speed (2020 Port of Oakland)

The emission factors used for the emission calculations are shown in the table below. For purposes of this evaluation, emissions from "HH Jackman" represent emissions from OGVs with Tier 0 main engines and emissions from "CSL Tecumseh" represent emissions from OGVs with Tier 2 main engines. Emissions from all auxiliary engines are assumed to be Tier 0.

Table A2. OGV Engine & Boiler Emission Factors

Engine Type	Tier Rating	Pollutant Emission Factors (g/kW-hr)					
		ROG (POC)	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$
Main Engine	Tier 0	0.78	1.38	0.362	17.0	0.189	0.174
Main Engine	Tier 2	0.78	1.38	0.362	14.4	0.189	0.174
Aux Engine	Tier 0	0.52	1.10	0.424	13.8	0.182	0.168
Boiler	-	0.11	0.20	0.587	1.995	0.164	0.151

Notes:
1. SO_2 emission factors are from 2021 CARB-OGV. All other pollutant emission factors are from 2020 Port Oakland.

Information on each segment of the full OGV round-trip is presented below. The route presented is representative of the longest route that an OGV would use.

Table A3. OGV Route Segment Descriptions

Segment ID	Segment Description[1]	Segment Distance[1] (nautical miles)	Vessel Speed[2] (knots)	Segment Time[3] (hours)
IN-1	Precautionary Zone (PZ) Outer Edge to Pilot Boards	6.8	15.75 / 14.5	0.43 / 0.47
IN-2	Pilot Boards to Sea Buoy	1.5	9.0	0.17
IN-3	Sea Buoy to Golden Gate	8.7	13.5	0.64
IN-4	Golden Gate to Harding Rock	2.0	13.5	0.15
IN-5	Harding Rock to Bay Bridge	4.5	13.5	0.33
MN-1	Maneuvering: Bay Bridge to Oakland Dock (Outer Terminal)	-	-	1.33[4]
H-1	Hotelling Oakland: Waiting	-	-	1.00[5]
H-2	Hotelling Oakland: Discharging	-	-	24.00[5]
H-3	Hotelling: Oakland Waiting	-	-	1.00[5]
MN-2	Maneuvering: Oakland Dock (Outer Terminal) to Bay Bridge	-	-	0.75[4]
OB-1	Bay Bridge to Harding Rock	4.8	13.5	0.36
OB-2	Harding Rock to Golden Gate	1.8	13.5	0.13
OB-3	Golden Gate to Sea Buoy	8.9	13.5	0.66
OB-4	Sea Buoy to Pilot Departs	1.5	9.0	0.17
OB-5	Pilot Departs to PZ Outer Edge	6.8	15.75 / 14.5	0.43 / 0.47

Notes:

1. Segment distances from 2020 Port Oakland.
2. Vessel speed for each segment from 2020 Port Oakland. Speeds of segments IN-1 and OB-5 are the “cruise speeds” for the representative OGVs.
3. For segments with movement, the time is calculated.
4. Maneuvering time from 2020 Port Oakland.
5. Hotelling time from ERA.

The following table shows the load factor applied for the main and auxiliary engines at each segment as a fraction of 100% load. Unless otherwise specified, the main engine load factors were calculated using Stokes Law cubic relationship for speed and load (2020 Port Oakland)[1]. Unless otherwise specified, the auxiliary engine load factors are from ERA, who obtained the information from the OGV manufacturer data logs for transit to/from the San Francisco Bay. The listed values are averages of the vessels’ auxiliary engines’ load because each vessel has multiple auxiliary engines that operate under varying load capacities at each segment. The boilers are assumed to operate at 100% capacity.

[1] Load Factor = (Vessel Speed / Vessel Maximum Speed) ^3

Table A4. OGV Main & Auxiliary Engine Load Factors

Segment ID	Tier 0 - HH Jackman		Tier 2 - CSL Tecumseh		Low-Load Adjustment Factors (LAF) – Main Engines Only[3]					
	Main Engine LF	Aux Engine LF	Main Engine LF	Aux Engine LF	HC (POC)	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$
IN-1	0.823	0.130[2]	0.823	0.130[2]	1.0	1.0	1.0	1.0	1.0	1.0
IN-2	0.153	0.313	0.197	0.197	1.36	1.32	1.32	1.06	1.11	1.11
IN-3	0.518	0.313	0.664	0.197	1.0	1.0	1.0	1.0	1.0	1.0
IN-4	0.518	0.470	0.664	0.167	1.0	1.0	1.0	1.0	1.0	1.0
IN-5	0.518	0.470	0.664	0.167	1.0	1.0	1.0	1.0	1.0	1.0
MN-1[1]	0.020	0.500	0.020	0.500	21.18	9.68	9.54	4.63	7.29	7.29
H-1	0.0	0.157	0.0	0.142	1.0	1.0	1.0	1.0	1.0	1.0
H-2	0.0	0.620	0.0	0.312	1.0	1.0	1.0	1.0	1.0	1.0
H-3	0.0	0.157	0.0	0.142	1.0	1.0	1.0	1.0	1.0	1.0
MN-2[1]	0.020	0.500	0.020	0.500	21.18	9.68	9.54	4.63	7.29	7.29
OB-1	0.518	0.470	0.664	0.164	1.0	1.0	1.0	1.0	1.0	1.0
OB-2	0.518	0.470	0.664	0.164	1.0	1.0	1.0	1.0	1.0	1.0
OB-3	0.518	0.313	0.664	0.189	1.0	1.0	1.0	1.0	1.0	1.0
OB-4	0.153	0.313	0.197	0.189	1.36	1.32	1.32	1.06	1.11	1.11
OB-5	0.823	0.130[2]	0.823	0.130[2]	1.0	1.0	1.0	1.0	1.0	1.0

Notes:

1. Maneuvering load factors for main and aux engines are from 2020 Port Oakland.
2. Aux engine load factors for IN-1 and OB-5 are from 2020 Port Oakland.
3. Low-Load Adjustment Factors applied only to main engine segments with load factors less than 20%.

Round-trip OGV emissions per delivery are the sum of the emissions from each segment. OGV emissions from each segment are equal to the sum of the emissions from the main engine (ME), auxiliary engines (AE), and boiler for each segment. Because the LLAFs apply only to the main engine, the formulas for the auxiliary engines and boilers are slightly different than for the main engines. Furthermore, the boilers are assumed to operate at maximum capacity.

$$\boldsymbol{ME\ Emissions}\left(\frac{\boldsymbol{lbs}}{\boldsymbol{segment}}\right) = Rated\ Engine\ Power\ (kW) * LF * time\ (hrs) * Emission\ Factor\ \left(\frac{g}{kW * hr}\right) * LLAF * \left(\frac{1\ lb}{453.6\ g}\right)$$

$$\boldsymbol{AE\ Emissions}\left(\frac{\boldsymbol{lbs}}{\boldsymbol{segment}}\right) = Rated\ Engine\ Power\ (kW) * LF * time\ (hrs) * Emission\ Factor\ \left(\frac{g}{kW * hr}\right) * \left(\frac{1\ lb}{453.6\ g}\right)$$

$$\textbf{Boiler Emissions}\left(\frac{lbs}{segment}\right) = Rated\ Boiler\ Power\ (kW) * time\ (hrs) * Emission\ Factor\left(\frac{g}{kW * hr}\right) * \left(\frac{1\ lb}{453.6\ g}\right)$$

Table A5. OGV Emissions

Vessel Tier	Total OGV Emissions Per Delivery (lbs/delivery)						Deliveries per Year[1]	Annual OGV Emissions (tons/year)					
	POC	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$		POC	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$
Tier 0	113.6	201.9	71.8	2,408	31.6	29.1	**36**	2.045	3.635	1.292	43.339	0.569	0.524
Tier 2	96.0	167.5	58.5	1,843	26.0	24.0	**12**	0.576	1.005	0.351	11.059	0.156	0.144
TOTAL	**209.6**	**369.4**	**130.3**	**4,251**	**57.6**	**53.1**	**48**	**2.621**	**4.640**	**1.643**	**54.398**	**0.725**	**0.668**

Notes:

1. ERA will be required by permit condition to ensure that a minimum of 25% of annual OGV deliveries are made by OGVs with main engines rated at Tier 2 or better.

Cargo Carrier Emissions – Tugboats

Tugboats are commercial harbor craft (CHC) that will be used by the proposed ERA Oakland Terminal operation. "Assist Tugs" will be utilized to assist OGVs in maneuvering in, docking, and maneuvering out of the port. "Barge Tugs" will be used to tow barges of material to customer destinations around the San Francisco Bay. The basic equation for estimating emissions from a commercial harbor craft engine (CHC) is below (2007 CARB-CHC):

$$E = EF_0 \times F \times (1 + D \times \frac{A}{UL}) \times HP \times LF \times Hr$$

Where:

E is the amount of emissions of a pollutant (ROG, CO, NOx, or PM) emitted during one period;[7]
EF₀ is the model year, horsepower and engine use (propulsion or auxiliary) specific zero hour emission factor (when engine is new);
F is the fuel correction factor which accounts for emission reduction benefits from burning cleaner fuel;
D is the horsepower and pollutant specific engine deterioration factor, which is the percentage increase of emission factors at the end of the useful life of the engine;
A is the age of the engine when the emissions are estimated;
UL is the vessel type and engine use specific engine useful life;
HP is rated horsepower of the engine;
LF is the vessel type and engine use specific engine load factor;
Hr is the number of annual operating hours of the engine.

The following table summarizes the typical Assist-Tug route from Base to maneuvering the inbound OGV and back to Base, and vice versa for the outbound OGV. The distances and time assume the tug leaves from Base and returns to Base for every trip.

Table A6. Assist-Tug Route Segment Descriptions & Time

Segment Description	Segment Distance (nautical miles)	Vessel Speed (knots)[3]	Segment Time (hours)[4]
Tugboat Base (Berth 9) to Meet OGV (Bay Bridge)	3.25	8	0.41
Maneuvering OGV into Oakland Dock (Berth 22)[1]	-	-	1.33
Oakland Dock (Berth 22) return to Tugboat Base (Berth 9)[2]	0.25	8	0.03
Tugboat Base (Berth 9) return to Oakland Dock (Berth 22)[2]	0.25	8	0.03
Maneuvering OGV out of Oakland Dock (Berth 22)[1]	-	-	0.75
Leave OGV (Bay Bridge) return to Tugboat Base (Berth 9)	3.25	8	0.41
Round Trip OGV Assist Time per Tugboat (Hr):			**3.0**

Notes:
1. No data for distance or speed of the maneuvering segments. Segment times assumed to be equal to OGV maneuvering segment times from Table A3 of this Appendix.
2. Berth 22 to Berth 9 distance estimated using Google Earth.
3. Average assist-tug transit trip speed is 8 knots (2020 Port Oakland).
4. Except for maneuvering, the segment times were calculated.

The following table provides the pertinent engine information for the Assist Tug chosen as a representative tugboat for the emission calculations. Unless otherwise specified, the data is from the 2020 Port Oakland report.

Table A7. Assist Tug Engine Information

Company - Tug Name	Model Year	Main Engine Power (HP)	Aux Engine Power (HP)	Main Engine Load Factor (LF)	Main Engine Age (yrs)	Effective Main Engine Age (A)[1]	Aux Engine Load Factor (LF)	Aux Engine Age (yrs)	Effective Aux Engine Age (A)[1]
AMNAV - Patricia Ann	2008	5,100	335	0.31	17	14	0.43	17	16

Notes:
1. Per 2021 CARB-CHC, the useful life (UL) of tugboat main and auxiliary engines is 14 and 16 years, respectively. UL is defined as the age when 50% of the engines retire in the fleet and engines continue to deteriorate until they reach their useful life. Since the Patricia Ann's engines are older than the "useful life", the effective age of each engine is assumed to be the respective UL as noted by 2021 CARB-CHC.

Three sets of barges, each with a respective tug or set of tugs, will be used to transport material from the Oakland Terminal at Berth 22 to its destination. The proposed routes, usage, and names of the barges and their tugs are summarized in the table below. A "round trip" is the distance to and from the destination, starting at the ERA Oakland terminal.

Table A8. Barge Tug Route & Usage Information

Barge Destination	round-trip distance[2] (nm)	Avg Speed[3] (kn)	Time (Hr)	Trips/year	Barge Name	# of Tugs required	Tugboat Name
San Francisco - Pier 92	13.0	8	1.63	36	Peter Lind	2	The Orion + Another[4]
Petaluma	60.9	8	7.61	10	Shamrock Barges	4	Sarah Reed[5]
Various[1]	13.0	8	1.63	33	Westar Rock Barge #2	1	Fat Cat

Notes:

1. Destination will be either SF Pier 92 or Treasure Island. The longer trip (SF Pier 92) will be used for emission calculations.
2. Distance verified using Google Earth.
3. Average tug transit speed (2020 Port Oakland).
4. The Peter Lind barge requires two tugboats, The second tugboat will be assumed to be identical to "The Orion" for the emission calculations.
5. There are four (4) Shamrock Barges and only one can be towed at a time. The Sarah Reed tugboat will often make multiple trips to complete each shipment, although some trips may be completed by Tug Lassen. Emission calculations will assume all trips to Petaluma will be completed by the Sarah Reed.

Additional information and specifications of the barge tug engines are provided in the following table.

Table A9. Barge Tug Engine Information

Barge Tug Name	Engine Type	Total Power Rating[1] (HP)	# of engines	Power Rating per Engine (hp)	Model Year[1]	Effective Engine Age[3] (A)	Load Factor[4] (LF)
The Orion	Main	3,046	2	1,523	2007	14	0.33
	Auxiliary	266	2	133	no data[2]	16	0.37
Sarah Reed	Main	1,700	2	850	2008	14	0.33
	Auxiliary	132	1	132	2008	16	0.37
Fat Cat	Main	2,028	2	1,014	2005	14	0.33
	Auxiliary	74	1	74	no data[2]	16	0.37

Notes:

1. Data from the IHS Fairplay database.
2. No information available – assume the same model year as the associated main engine.
3. See Note 1 on Table A7.
4. 2021 CARB-CHC.

The "Tug Lassen", which may occasionally be used in place of the "Sarah Reed", has main engines with higher total power rating (2,400 hp) than the Sarah Reed. However, the Sarah Reed has older engines (model year 2008 vs. 2017) that have significantly higher emission factors for NOx and PM (per 2007 CARB-CHC) and the emissions from the Sarah Reed are more affected by deterioration factors than Tug Lassen. To conservatively estimate emissions for the Shamrock Petaluma trips, all trips will be assumed to be made by the Sarah Reed.

Additional parameters specific to power class and model years of the tugboat engines (both Assist Tugs & Barge Tugs) are summarized below.

Table A10. CHC Fuel Correction Factors, Deterioration Factors, and Zero-Hour Emission Factors

(F) - Fuel Correction Factors by Pollutant & Power Class/Model Year[1]						
Power Class/Model Year	**HC (POC)**	**CO**	**SO_2**	**NOx**	**PM_{10}**	**$PM_{2.5}$**
51 < HP < 100, Model Year 1998-2010	0.72	1	1	0.948	0.8	0.8
101 < HP < 175, Model Year 1997-2010	0.72	1	1	0.948	0.8	0.8
HP > 176, Model Year 1996-2010	0.72	1	1	0.948	0.8	0.8
(D) - Deterioration Factors by Pollutant & Power Class[1]						
Power Class	**HC (POC)**	**CO**	**SO_2**	**NOx**	**PM_{10}**	**$PM_{2.5}$**
51 < HP < 250	0.28	0.16	0	0.14	0.44	0.44
HP > 251	0.44	0.25	0	0.21	0.67	0.67
(EF_0) - Zero-Hour Tugboat Main Engine Emission Factors (g/bhp-hr)[2,5]						
Power Class/Model Year Range	**ROG (POC)**	**CO**	**SO_2 [3]**	**NOx**	**PM_{10}**	**$PM_{2.5}$ [4]**
751 < HP < 1900, Model Year 2000-2006	0.68	1.97	0.0055	7.31	0.36	0.344
751 < HP < 1900, Model Year 2007-2011	0.68	3.73	0.0055	5.53	0.20	0.191
3301 < HP < 5000, Model Year 2007-2013	0.68	3.73	0.0055	5.53	0.20	0.191
(EF_0) - Zero-Hour Tugboat Auxiliary Engine Emission Factors (g/bhp-hr)[2]						
Power Class/Model Year Range	**ROG (POC)**	**CO**	**SO_2 [3]**	**NOx**	**PM_{10}**	**$PM_{2.5}$ [4]**
51 < HP < 120, Model Year 2005-2008	1.18	3.73	0.0055	5.32	0.30	0.287
121 < HP < 175, Model Year 2004-2012	0.81	3.73	0.0055	5.10	0.22	0.210
251 < HP < 500, Model Year 2004-2013	0.81	3.73	0.0055	5.10	0.15	0.143

Notes:

1. 2007 CARB-CHC
2. Emission factors for POC, CO, NOx, and PM_{10} are from 2007 CARB-CHC.
3. SO_2 emission factor calculated based on fuel sulfur content of 15 ppm.
4. $PM_{2.5}$ is 95.6% of PM_{10} (2021 CARB-CHC)
5. Power class of 3301 < HP < 5000 is the closest power range with emission factors available for the Patricia Ann tugboat with a main engine of 5,100 hp.

The pollutant emissions from tugboat main and auxiliary engines per tugboat trip are calculated using the above parameters and the equation described earlier in this section.

Total Assist-Tug emissions per trip are equal to the sum of the emissions per trip from the main and auxiliary engines. OGVs delivering material to the ERA Oakland Terminal will require up to two (2) Assist-Tugs for each round trip. With up to 48 OGV deliveries per year, there could be up to 96 Assist-Tug trips per year. The table below summarizes the emissions from Assist-Tugs.

Table A11. Assist-Tug Emissions

Total Assist-Tug Emissions Per Tug Round-Trip (lbs/trip)						Tug Trips per year	Annual Assist-Tug Emissions (tons/year)					
POC	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$		POC	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$
8.17	53.2	0.063	71.9	2.99	2.85	**96**	**0.392**	**2.554**	**0.003**	**3.451**	**0.143**	**0.137**

Total Barge Tug emissions per trip are equal to the sum of emissions per trip from the main and auxiliary engines. The number of individual barge tug trips to each destination are found by multiplying the "trips/year" by the "# of tugs required" from Table A8. Because the "Fat Cat" and "The Orion" could both be towing barges to the same location (SF Pier 92), the individual barge tup trips to "SF Pier 92" and "Various" will be combined and the higher emitting tug for each pollutant will be used to calculate the emissions. The following table shows the total annual individual barge tug trips, the emissions per trip, and the annual barge tug emission rates.

Table A12. Barge Tug Emissions

Destination	Individual Barge Tug Emissions Per Round-Trip (lbs/trip)						Tug trips per year	Annual Barge Tug Emissions (tons/year)					
	POC	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$		POC	CO	SO_2	NOx	PM_{10}	$PM_{2.5}$
SF Pier 92 (or Various)	2.81	18.4	0.022	24.9	1.25	1.19	**105**	0.148	0.965	0.001	1.306	0.065	0.063
Petaluma	7.25	47.4	0.056	64.2	2.72	2.60	**40**	0.145	0.948	0.001	1.284	0.054	0.052
							TOTAL:	**0.293**	**1.913**	**0.002**	**2.590**	**0.120**	**0.115**

Appendix B
BACT/TBACT Analysis & Determination

See the “Best Available Control Technology” and “Best Available Control Technology for Toxics” sections of this evaluation for additional background information.

Control Technology & Emissions Standards Review

Emission Category 1: Transfer Points from Aggregate Handling (S-1, S-2, part of S-3, & S-4 through S-7)

The Bay Area Air District’s and other California air districts’ BACT determinations for PM emissions from aggregate handling and related operations are summarized in Table B1. Federal, state, and regional clearinghouses and permitting actions contained determinations for controlling PM emissions from aggregate handling and related operations are summarized in Table B2.

Table B1. California Air Districts’ BACT Determinations for Aggregate Handling

Determination Info & Process Type	BACT 1 (Technologically Feasible)	BACT 2 (Achieved in Practice)
Bay Area Air District BACT Workbook – Section 11 Rock & Aggregate Processing in Crushing and Grinding Operation	Enclosure of all conveyors and material transfer points; and vent to baghouse with maximum exhaust concentration of 0.01 gr/dscf	Water spray of transfer points and conveyors
Bay Area Air District BACT Workbook – Section 11 Concrete Batch Plants (≥5 yd^3/batch)	Wind screens & water spray with chemical suppressants for aggregate handling	Water spray for aggregate handling
Santa Barbara APCD BACT Guideline – Section 5.1 Concrete Batch Plants	ND	Water spray at all sand/aggregate transfer points; and hopper loading sufficiently wetted to prevent visible emissions (minimum moisture contents of 4% for sand and 1% for rock)
South Coast AQMD Minor Source BACT Guidelines Concrete Batch Plants (≥5 yd^3/batch)	ND	Adequate moisture in aggregate
San Diego County APCD BACT Guidance – Concrete Batch Plants	ND	Water spray system for sand/aggregate transfer points; and opacity limited to 20%
San Joaquin Valley Unified APCD BACT Guideline – Section 6.1.2 Sand/Gravel/Aggregate Processing	ND	Water sprays of conveyors/transfer points such that visible emissions do not exceed 7% opacity
San Joaquin Valley Unified APCD BACT Guideline – Section 6.2.2 Concrete Batch Plants	ND	Water spray of all sand/aggregate transfer points such that opacity cannot exceed 5%
Sacramento Metropolitan AQMD BACT Determination #355 Aggregate Processing (>150 tons/hr)	ND	Water spray as necessary such that: • Conveyors & transfer points limited to most stringent opacity limit in 40 CFR 60 Subpart OOO (7% opacity) • Feed hopper loading & stockpile loading limited to 20% opacity

Table B2. Federal & Regional Permitting Actions for Aggregate Handling

Agency & Facility Details	Source Type & Throughput Details	Control Technology/Control Standards
Bay Area Air District AN 15065 (December 2006), AN 20573 (Sept. 2009) Eagle Rock Aggregate, Inc., Richmond, CA Aggregate Receiving & Storage Facility	Aggregate receiving, transfer, and loadout building • 1,500,000 tons/year	• Water spray at transfer points
Mojave Desert AQMD Permit #T004229 (July 2002) Crawford Associates, Blythe, CA Aggregate Processing Plant	Aggregate Receiving & Storage System (including Receiving Hopper, Belt Conveyors, Radial Stacker) • No throughput data	• Aggregate charged and in process shall be kept sufficiently moist to prevent dust emissions
South Coast AQMD AN 626369 (May 2021), AN 607840 (October 2018), AN 596021 (July 2017), AN 521668 (November 2011), AN 399331 (May 2010), AN 233351 (September 1995), AN 135864 (January 1989) Calmat Company, Sun Valley, CA Aggregate Processing Plant	Aggregate receiving, transfer, & stacking • 2,000 tons/hr • 48,000 tons/day • 840,000-1,400,000 tons/month	• Aggregate charged and in process shall be kept sufficiently moist to prevent excessive dust emissions (limited to 20% opacity, per SCAQMD Rule 1157)
EPA RBLC LA-0209 (August 2009) Big River Industries, Pointe Coupee County, LA Aggregate Production/Processing Plant	Truck/Rail Loading & Conveyor Systems • 40 tons/hr	• Water sprays and/or partial enclosures
EPA RBLC ID NV-0032 (December 2001) United Rock Products, Clark County, NV Sand & Gravel Processing Plant	Sand/Gravel Loaders & Conveyors • No throughput data	• Wet suppression
EPA RBLC ID NV-0045 Permit #372 (March 2008) Aggregate Industries, Sloan Quarry, Las Vegas, NV Sand/Gravel Mining & Processing Plant	Aggregate Stacking #1 (Unit A12) • 4,200 tons/hr • 5,000,000 tons/year Aggregate Stacking #2 (Unit A040, enclosed with crushers & screens) • 3,700 tons/hr • 5,000,000 tons/year Conveyors, transfer points	Aggregate Stacking #1: • Maintain 4.5% moisture content in materials with diameter < 0.25" (water spray) • Opacity limit of 20% Aggregate Stacking #2: • 4% moisture in materials with diameter < 0.25" • Vent to baghouse with 99.5% control efficiency Conveyors, transfer points: • Water spray to prevent exceeding opacity limit of 7% (based on five 6-minute averages)
EPA RBLC ID VA-0123 (December 2001) Vulcan Materials, Virginia Stone Crushing Facility	Material Transfer, Conveyor • 2,409,750 tons/year	• Minimum 3% moisture in rock • Opacity limit of 10%
EPA RBLC ID OK-0018 December 2001 Mid-Continent Materials, Inc, Tulsa, OK Rock Processing Facility	Conveyors & Truck Loading • 355 tons/hr • 625,000 tons/year	• Water spray with surfactant

Emission Category 2: Wind Erosion from Aggregate Storage Piles (part of S-3)

The Bay Area Air District's and other California air districts' BACT determinations for PM emissions from aggregate storage piles and related operations are summarized in Table B3. Federal, state, and regional clearinghouses and permitting actions contained determinations for controlling PM emissions from aggregate storage piles and related operations are summarized in Table B4.

Table B3. California Air Districts' BACT Determinations for Aggregate Storage Piles

Determination Info & Process Type	BACT 1 (Technologically Feasible)	BACT 2 (Achieved in Practice)
Bay Area Air District BACT Workbook – Section 11 Rock & Aggregate Processing in Crushing and Grinding Operation	Water spray with chemical suppressants of storage piles	Water spray of storage piles
Bay Area Air District BACT Workbook – Section 11 Solid Material Storage – Open in Crushing and Grinding Operation	Enclosed storage	Water spray with chemical suppressants
Bay Area Air District BACT Workbook – Section 11 Concrete Batch Plants (≥5 yd^3/batch)	Wind screens & water spray with chemical suppressants for storage piles	Water spray for storage piles
Santa Barbara APCD BACT Guideline – Section 5.1 Concrete Batch Plants	Enclosed sand/aggregate storage	Outdoor sand & aggregate storage piles adequately wetted to prevent visible emissions; and minimum moisture content of 4% for sand and 1% for rock
South Coast AQMD Minor Source BACT Guidelines Bulk Solid Material Storage	ND	Open Storage – water with chemical additives
San Diego County APCD BACT Guidance – Concrete Batch Plants	ND	Sand/aggregate storage piles adequately wet to maintain minimum moisture content of 4% by weight; and opacity limited to 20%
San Joaquin Valley Unified APCD BACT Guideline – Section 6.1.2 Sand/Gravel/Aggregate Processing	Water spray with chemical suppressant	Water spray such that visible emissions don't exceed 20% opacity
San Joaquin Valley Unified APCD BACT Guideline – Section 6.2.2 Concrete Batch Plants	Sand/aggregate storage – enclosed storage vented to control device with 99% control efficiency	Outdoor sand/aggregate storage piles adequately wetted a) to prevent visible emissions greater than 5% opacity; or b) minimum moisture content of 2% for aggregate and 4% for sand
Sacramento Metropolitan AQMD BACT Determination #355 Aggregate Processing (>150 tons/hr)	ND	Water spray such that visible emissions don't exceed 20% opacity

Table B4. Federal & Regional Permitting Actions for Aggregate Storage Piles

Agency & Facility Details	Source Type & Throughput Details	Control Technology/Control Standards
Bay Area Air District AN 15065 (December 2006), AN 20573 (Sept. 2009) Eagle Rock Aggregate, Inc., Richmond, CA Aggregate Receiving & Storage Facility	Aggregate storage building • 1,500,000 tons/year • Storage building footprint: 54,500 ft^2	• Water spray
South Coast AQMD AN 626369 (May 2021), AN 607840 (October 2018), AN 596021 (July 2017), AN 521668 (November 2011), AN 399331 (May 2010), AN 233351 (September 1995), AN 135864 (January 1989) Calmat Company, Sun Valley, CA Aggregate Processing Plant	Aggregate storage • 2,000 tons/hr • 48,000 tons/day • 840,000-1,400,000 tons/month	• Aggregate charged and in process shall be kept sufficiently moist to prevent excessive dust emissions (limited to 20% opacity, per SCAQMD Rule 1157)
EPA RBLC ID NV-0045 Permit #372 (March 2008) Aggregate Industries, Sloan Quarry, Las Vegas, NV Sand/Gravel Mining & Processing	Storage piles • No throughput data	• Water spray to prevent exceeding opacity limit of 20%
EPA RBLC ID OK-0018 (December 2001) Mid-Continent Materials, Inc, Tulsa, OK Rock Processing Facility	Storage Piles • 355 tons/hr • 625,000 tons/year	• Water spray with surfactant
EPA RBLC ID VA-0123 (December 2001) Vulcan Materials, Virginia Stone Crushing Facility	Storage, Open Piles • 2,409,750 tons/year	• Wet suppression • Opacity limited to 10%

Aggregate Handling & Storage BACT Discussion: The BACT discussion for Aggregate Handling and Aggregate Storage Piles will be done together because of their similar emission streams, similar available control technologies, and the ability for both categories to be controlled by the same technology/device.

Water spray with surfactants (chemical suppressant) was considered for this project, however surfactants/chemical suppressants are “air-entraining” chemicals and their presence in construction aggregates impacts air content in concrete, which in turn affects the performance of the concrete under certain conditions. Air content in concrete can be useful for improving its thermal resistance, however increased air content also results in decreased strength. The addition of these chemicals to the material stored at this site would result in ERA’s primary customers (concrete batching plants) receiving materials with unknown quantities of air-entraining chemicals. For this reason, the addition of surfactants/chemical suppressants to the water spray was deemed infeasible for this project and therefore, will not be considered BACT.

The aggregate handling source (Aggregate Stacking #2) at Aggregate Industries in Las Vegas, NV (RBLC ID NV-0045) is vented to a baghouse, however the transfer points at that operation are located in an area with rock crushers and screens. Since the proposed aggregate handling sources are not associated with crushers/screens, the control used for Aggregate Stacking #2 at Aggregate Industries was not deemed to be achieved in practice under similar conditions and will therefore be considered a candidate for BACT 1.

Venting dust emissions to a baghouse would also require the source to be located in a fully enclosed structure. ERA's existing facility in Richmond, CA has its transfer and storage operations located inside a building that also acts as an enclosed structure. It should be noted that the building is included as part of the facility's operations and enclosing their sources was not proposed as an emission control, nor was it required by BACT or any other Bay Area Air District (Air District) regulation. The sources' location in an enclosed building was not considered in the Air District's emission calculations and was not made required by permit conditions. Although, because it can be reasonably assumed that the structure mitigates dust emissions, it is included in this analysis to demonstrate that enclosure may be technologically feasible and will therefore be considered a candidate for BACT 1.

Some of the determinations in Tables B1 through B4 list specific moisture content limits for materials. A condition of the Lawsuit Settlement Agreement[2] concerning this project states that ERA is required to maintain moisture content of fine aggregates (sand) and coarse aggregates (gravel) at target ranges of 5-8% and 1-2%, respectively. The moisture content testing results will be retained on site and made available to the Port of Oakland and the West Oakland Environmental Indicators Project (WOEIP) upon request. Since these moisture content limits were developed specifically for the materials of this proposed project and the Air District doesn't currently have set standard testing procedures for moisture content, the Air District concurs that they are appropriate for these proposed materials.

Comparing the determinations listed in Tables B1 through B4 and from the discussion above, BACT 1 and BACT 2 for Aggregate Handling & Storage Piles are summarized below:

Aggregate Handling & Storage Piles BACT 1: A cost-effectiveness analysis is necessary for the following potentially technologically feasible controls:

- Wind screens for handling and storage operations
- Enclosed handling and storage operations vented to control device with 99.5% control efficiency

Aggregate Handling & Storage Piles BACT 2: The following controls are the most stringent that are achieved in practice:

- Water spray of storage piles and transfer points
- Partial enclosures at transfer points
- Maintain appropriate moisture content to prevent visible emissions exceeding 5% opacity

The cost-effectiveness analysis for the BACT 1 controls will be discussed later in this Appendix.

Water spray, partial enclosures at transfer points, and maintaining appropriate moisture content in aggregate to prevent visible emissions exceeding 5% opacity are achieved in practice and are considered BACT 2 for aggregate handling. ERA's proposed design includes water sprays at all transfer points as well as dust chutes on hopper-to-conveyor and conveyor-to-conveyor transfer points. The dust chutes act as a partial enclosure and provide

[2] Lawsuit Settlement Agreement made among the West Oakland Environmental Indicators Project, the People of the State of California, the City/Port of Oakland, and Eagle Rock Aggregates, Inc. Effective June 29, 2023.

a buffer zone for dust to settle before it can be emitted to the atmosphere. Maintaining appropriate material moisture to prevent visible emissions exceeding 5% opacity will be reflected in the permit conditions.

Emission Category 3: Site Roads

The Bay Area Air District's and other California air districts' BACT determinations for PM emissions from site roads at aggregate handling/storage facilities are summarized in Table B5. Federal, state, and regional clearinghouses and permitting actions contained determinations for controlling PM emissions from site roads at aggregate handling/storage facilities are summarized in Table B6.

Table B5. California Air Districts' BACT Determinations for Site Roads

Determination Info & Process Type	BACT 1 (Technologically Feasible)	BACT 2 (Achieved in Practice)
Bay Area Air District BACT Workbook – Section 11 Rock & Aggregate Processing	Water spray with chemical suppressants of site road surfaces	Water spray of site road surfaces
Bay Area Air District BACT Workbook – Section 11 Concrete Batch Plants (≥5 yd^3/batch)	Paving of site road surfaces	Water spray of site road surfaces

Table B6. Federal & Regional Permitting Actions for Site Roads

Agency & Facility Details	Source Type & Throughput Details	Control Technology/Control Standards
EPA RBLC ID MO-0048 (May 2005) Lafarge Corporation, Jackson County, MO Portland Cement Manufacturing & Aggregate Plant	Paved Haul Roads • 61,000 VMT/year	• Water flushing followed by vacuum sweeping
EPA RBLC ID NV-0045 Clark County DAQ Permit #372 (March 2008) Aggregate Industries, Sloan Quarry, Las Vegas, NV Sand/Gravel Mining & Processing	Paved Roads • No throughput data	• Sweep and/or rinse site paved roads as necessary to not exceed 20% opacity
EPA RBLC ID OK-0018 (December 2001) Mid-Continent Materials, Inc, Tulsa, OK Rock Processing Facility	Site Roads • No throughput data	• Paving required

In addition the determinations shown above, South Coast AQMD Rule 1157 (PM10 Emission Reductions from Aggregate & Related Operations) states that a facility shall perform regular street sweeping with a PM10-efficient street sweeper (Rule 1186-certified sweeper).

Site Roads BACT/TBACT Discussion: Since TBACT is triggered for the site roads of this project, the cost of controls is not considered. Only feasibility and effectiveness are considered.

Water spray with chemical suppressants will not be considered TBACT because chemical suppressants that control dust from roadways are designed to work on unpaved roads. The combination of paving roads, water flushing, and regular street sweeping are more effective at controlling PM emissions from site roads.

Per Air District Regulation 6-1-307.1, the active operations from a regulated bulk material site cannot result in visible emissions that exceed 10% opacity, which is more stringent than the opacity limit imposed on paved roads at Aggregate Industries in Las Vegas, NV (RBLC ID NV-0045).

Comparing the determinations listed in Tables B5 and B6 and from the discussion above, TBACT for Site Roads is summarized below:

Site Roads TBACT: The following controls are the most effective controls that are feasible for this proposed operation:

- Paving of roads
- Water flushing of paved roads
- Street sweeping of paved roads with a “PM10-efficient” street sweeper
- Limiting visible emissions to 10% opacity

Cost-Effectiveness Analysis

As discussed earlier in this Appendix, the following control technologies have been found to be potentially technologically feasible for controlling PM emissions from the proposed sources of this operation (S-1 through S-7):

- Enclosed handling and storage operations vented to control device with 99.5% control efficiency
- Wind screens for handling and storage operations

For the purposes of this analysis, PM_{10} will be referred to as PM. The general methods used for estimating cost-effectiveness are from the Air District’s BACT Policy & Implementation Procedure[3]. Per this document, the maximum annualized cost for PM_{10} is $5,300 per ton of emissions reduced per year. Typically, cost-effectiveness analyses are performed on a source-by-source basis. However, since the proposed group of sources (S-1 through S-7) all emit PM and are configured in a manner that they could share the same control device, the cost-effectiveness analysis will be performed using their combined emissions. The combined uncontrolled PM emission rates of S-1 through S-7 is 36.964 tons/year (TPY)[4].

Enclosure Venting to Control Device: To enclose the PM emitting sources of this operation a building would need to cover almost the entirety of the 18-acre site. The applicant provided cost data for a structure that would cover approximately 14 acres, with dimensions approximately 1,300 ft long

[3] *Bay Area Air District BACT Policy & Implementation Procedure: https://www.baaqmd.gov/~/media/files/engineering/bact-tbact-workshop/bact-tbact-policy-and-implementation/policy-and-implementation-procedure.pdf?rev=0b0b698788814294b8f5e5ac87af9762&sc_lang=en*

[4] *Uncontrolled emissions for open transfer points were calculated without the 70% abatement factor of water spray. Uncontrolled emissions for the chuted transfer points were calculated using the uncontrolled “Conveyor Transfer Point” emission factor for PM10 in AP-42 Ch. 11.19.2, Table 11.19.2-2.*

and 475 ft wide (617,500 ft^2). The structure would also need a vertical clearance of 50 ft and horizontal clear span framing to accommodate the material storage and transfer equipment. According to the Geotechnical Conditions Report prepared for this project (Appendix E of the FSEIR), the site is expected to settle due to the weight of stored material and equipment and the settlement would not likely be uniform. Therefore, a building would require the design and construction of a foundation system to negate the effects of site settlement to prevent compromising the integrity of the structure.

Wind Screens: Two scenarios of wind screen designs were explored for this project. One option included screens around the perimeter of the site except for the narrow west boundary, which borders the San Francisco Bay, and the other included screens on two sides of the stockpiles only. The wind screen vendor noted that local wind data indicated the latter option would result in a "funneling" effect that would accelerate wind speeds and likely increase wind erosion and dust emissions. Therefore, only the first option was considered feasible. The fence would include 3,300 linear feet of wind screen that would reach 50 feet high to properly protect the maximum stockpile height.

Note that partial enclosure of each stockpile is similar to the second option but with a top cover. However, it will encounter the same "funneling" effect described above.

Cost data from vendor quotes obtained by ERA and methodologies laid out in the Air District's BACT Policy & Implementation Procedure were used to estimate the cost-effectiveness of the two potentially technologically feasible control options. The summary of this analysis is presented in the following Table B7.

Table B7. Cost-Effectiveness Analysis Summary

Control Type:	Enclosure Structure	Wind Screen
Total Capital Cost (TCC) =	$6,209,084	$6,025,000
Useful Life (n) =	30 years	30 years
Interest Rate (i) =	7.00%	7.00%
Capital Recovery Factor (CRF) =	8.06%	8.06%
Annualized Cost =	$500,368/year	$485,533/year
Annual PM Emissions Reduced =	36.964 TPY	36.964 TPY
Cost-Effectiveness =	$13,537 per TPY PM removed	$13,135 per TPY PM removed
Notes:	• TCC includes the cost of the building supply and installation for a 102,850 ft^2 structure. At the same rate of $60.37/$ft^2$, the building supply/installation of a 617,500 ft^2 structure would cost more than $37,000,000. • TCC **excludes** the cost of foundations, piling, doors, dust collection, lighting, baghouse, and indirect costs (taxes, engineering, permits, etc.) • Interest rate calculated per Air District policy using 6-month period from March 2024 to September 2024 • Annualized cost = TCC * CRF • Annualized cost **excludes** labor, maintenance, utilities, and indirect costs (overhead, insurance, administrative, etc.) • Emission reduction assumes 100% control efficiency of all emissions except for road dust.	• TCC includes the cost of building supply, installation, and engineering for 3,300 ft long and 50 ft tall wind screen • TCC **excludes** taxes • Interest rate calculated per Air District policy using 6-month period from March 2024 to September 2024 • Annualized cost = TCC * CRF • Annualized cost **excludes** labor, maintenance, and indirect costs (overhead, insurance, administrative, etc.) • Emission reduction assumes 100% control efficiency for all emissions except for road dust.

As shown above, the annualized costs of an enclosed structure or a wind screen are both more than double the Air District's maximum cost threshold for PM of $5,300 per TPY removed. Therefore, the potentially technologically feasible (BACT 1) control options cannot be considered BACT for the proposed Aggregate Handling & Storage Pile operations (S-1 through S-7).

Both the costs and the mitigation estimates shown above are highly conservative and are presented only to demonstrate that these technologies do not meet the Air District's cost-effectiveness threshold. The "Notes" section of Table B7 shows that, for both technologies, several additional costs were not included in the analysis and a very conservative emission control efficiency of 100% was assumed. Actual in-practice PM control efficiency from a fully enclosed aggregate storage/transfer operation that vents to a baghouse is undetermined, but it could reasonably be assumed that it would be significantly more effective than the 70% control efficiency that was assumed in this evaluation from water spray alone. For wind screens, actual in-practice PM control efficiency can vary depending on several site-specific factors and variables, but according to a 2018 Staff Report on Particulate Matter prepared by the Bay Area Air District's Rules Division, the use of wind screens alone at fugitive dust sources are estimated to be between 70%-85% effective. And including the use of water spray with wind screens can potentially increase effectiveness to more than 90%. Because, in the Air District's understanding, the wind screens here could feasibly be placed only on the east, north, and south sides of the operation—and not on the west side that is generally upwind—these estimates may not be applicable. A more refined estimation of the technologies' emission control efficiencies would result in the analysis performed using an annual reduction of PM emissions less than 36.964 TPY, which would in turn show a cost-per-tpy-PM-removed that is even higher than what was presented above.

BACT/TBACT Determination

Aggregate Handling & Storage Piles: Because the BACT 1 control options are not cost-effective, BACT 2 controls are considered BACT for this operation. These controls are summarized below:

- Water spray of storage piles and transfer points
- Partial enclosures at transfer points
- Maintain appropriate moisture content to prevent visible emissions exceeding 5% opacity

Site Roads: The cost of controls for site roads was not considered because the roads trigger TBACT. The TBACT determination for Site Roads is summarized below:

- Paving of roads
- Water flushing of paved roads
- Street sweeping of paved roads with a "PM10-efficient" street sweeper
- Limiting visible emissions to 10% opacity