Appendix D
Air Quality and Greenhouse Gas Calculations

ESA

Attachment 1 Construction Schedule, Equipment Use, and CalEEMod Emissions

Construction Schedule and Equipment Use

Construction Activities Sargent Quarry.	Equipment Used	Hours	Duration	Estimated Maximum Disturbance Area	Crew Size	Daily Truck trips (Crew) Passenger Car equivilants	Truck trips Suppliers (One time deleiveries)	Job Sequence
Monterey Road Improvements	Bulldozer	7:00 AM to 5:00 PM	3 weeks		15	15	150	4
	Blade			1 acre				
	Paving Machine							
	2 Rollers							
	Water Truck							
Northbound 101 Accel Lane	Bulldozer	7:00 AM to 5:00 PM	2 weeks		15	15	150	4
	Blade			1.5 acres				
	Paving Machine							
	2 Rollers							
	Water Truck							
Deceleration Lane 101 South/Old Monterey road		N/A Already installed						
Maintain Old Monterey Road	Paving Machine	7:00 AM to 5:00 PM	Every 5 years		15	15	25	7
	2 Rollers			1 acre				
	Oil Truck							
Rail Spur	Crane	7:00 AM to 5:00 PM	3 weeks		8	10	10	5
	Blade			3 acres				
	Field crew							
Access Road /Conveyer Belt	Bulldozer	7:00 AM to 5:00 PM	3 months		15	15	200	3
	Blade			1 acre				
	Scraper							
	Trenching Machine							
Processing Plant	Crane	7:00 AM to 5:00 PM	4 weeks		15	15	50	1
	Blade			62 acres				
	Bulldozer							
	Excavator							
	Trenching machine							
Free-span bridge over Tar Creek	Excavator	7:00 AM to 5:00 PM	3 weeks	100ft long	10	10	35	2
	Bulldozer			50ft wide				
	Crane			1 acres				

Summary of Construction Emissions Reported by CalEEMod

Construction Criteria Air Pollutants						
Unmitigated	ROG	NOX	PM10 Exhaust	PM2.5 Exhaust	**CO2e**	
Construction Activity in 2022	Tons				MT	Workdays
Construction in 2022						
Processing Plant	0.03	0.30	0.01	0.01	40	24
Tar Creek Bridge	0.01	0.14	0.01	0.01	17	18
Access Road /Conveyer Belt	0.10	1.09	0.05	0.05	133	79
Monterey Road Improvements	0.02	0.19	0.01	0.01	26	18
Northbound 101 Accel Lane	0.01	0.13	0.01	0.01	19	12
Rail Spur	0.01	0.09	0.00	0.00	12	18
Future Construction Activities						
Maintain Old Monterey Road	0.01	0.05	0.00	0.00	9	18
	Total Tons				MT	
2022	0.18	1.94	0.09	0.08	247	157
every 5 years thereafter	0.01	0.05	0.00	0.00	9.00	18
Pounds/Workdays	*Average Daily Emissions (lbs./day)*				Workdays	
2022	2.30	24.77	1.11	1.01		**157**
Every 5th year thereafter	0.81	5.03	0.26	0.24		**18**
Threshold - lbs/day	**54.0**	**54.0**	**82.0**	**54.0**		

Attachment 2 Operational Emissions

Sargent Quarry
Summary of Proposed Criteria Pollutant and GHG Emissions

Criteria Pollutant Emissions - Project Operation 2023
Average Daily and Annual Emissions Summary - BAAQMD

	Average Daily Emissions (lb/day)*				
Emission Source	**NOx**	**CO**	**ROG**	**PM10**	**PM2.5**
Processing Equipment	-	-	-	15.3	4.3
Quarrying/Fugitives	-	-	-	8.6	3.1
Off-Road Equipment Exhaust	30.6	31.7	5.5	1.1	1.1
On-Site Quarry Vehicle Exhaust	1.2	0.2	0.0	0.0	0.0
On-Site Unpaved Road Fugitive Dust	-	-	-	77.8	7.8
Rail Emissions	17.0	4.8	0.8	0.4	0.3
Paved Road Vehicle Emissions	34.0	3.2	0.4	3.8	1.4
Total	**82.8**	**39.9**	**6.7**	**107.0**	**17.9**
	Annual Emissions (tons/year)				
Emission Source	**NOx**	**CO**	**ROG**	**PM10**	**PM2.5**
Processing Equipment	-	-	-	2.4	0.7
Quarrying/Fugitives	-	-	-	1.3	0.5
Off-Road Equipment Exhaust	4.7	4.9	0.8	0.16	0.17
On-Site Quarry Vehicle Exhaust	0.2	0.0	0.0	0.00	0.00
On-Site Unpaved Road Fugitive Dust	-	-	-	12.1	1.2
Rail Emissions	2.6	0.7	0.1	0.06	0.05
Paved Road Vehicle Emissions	5.3	0.5	0.1	0.6	0.2
Total	**12.8**	**6.2**	**1.0**	**16.6**	**2.8**

* Average daily emissions calculated based on annual emissions and 310 days per year for quarry operation

GHG Pollutant Emissions
Annual Emissions Summary - BAAQMD

Emission Source	**CO2e (tons/year)**
Off-Road Equipment Exhaust	2,498
On-Site Quarry Vehicle Exhaust	123
Rail Emissions	288
Paved Road Vehicle Emissions	5,214
Total	**8,124**

Criteria Pollutant Emissions - Project Operation 2023
Average Daily and Annual Emissions Summary - MBUAQMD

	Average Daily Emissions (lb/day)*				
Emission Source	**NOx**	**CO**	**ROG**	**PM10**	**PM2.5**
Paved Road Vehicle Emissions	4.1	0.2	0.1	0.4	0.1
	Annual Emissions (tons/year)				
Emission Source	**NOx**	**CO**	**ROG**	**PM10**	**PM2.5**
Paved Road Vehicle Emissions	0.64	0.03	0.01	0.06	0.02

GHG Pollutant Emissions
Annual Emissions Summary - MBUAQMD

Emission Source	**CO2e (tons/year)**
Off-Road Equipment Exhaust	0
On-Site Quarry Vehicle Exhaust	0
Paved Road Vehicle Emissions	562
Total	**562**

Sargent Quarry - Proposed Operation 2023
Annual and Daily Fugitive Dust Emissions From Equipment/Vehicle Travel on Unpaved Roads

Annual Average Emissions (tons/year)

Vehicle Type/Road Segment	Annual Travel Miles	Emission Factor (lb/mi)		Annual (ton/year) Uncontrolled Emissions		Control Method	Control Efficiency	Annual (ton/year) Controlled Emissions	
		PM10	PM2.5	PM10	PM2.5			PM10	PM2.5
Loader - Quarry Excavation	12,400	1.63	0.16	10.11	1.01	5	85%	1.52	0.15
Loaders - Loadout	42,780	2.07	0.21	44.26	4.43	5	85%	6.63	0.66
Motor Grader	11,160	1.38	0.14	7.71	0.77	5	85%	1.16	0.12
Scraper - Topsoil/Overburden	1,400	2.04	0.20	1.43	0.14	2	67%	0.47	0.05
Service Truck	9,300	1.75	0.18	8.16	0.82	5	85%	1.22	0.12
Pick-up Trucks	18,600	0.76	0.08	7.03	0.70	5	85%	1.05	0.11
Total	-	-	-	**78.7**	**7.9**	-	-	**12.1**	**1.2**

Daily Emissions (lb/day)

Vehicle Type	Daily Emissions (lb/day)*			
	Uncontrolled		Controlled	
	PM10	PM2.5	PM10	PM2.5
Loader - Quarry Excavation	65.2	6.5	9.8	1.0
Loaders - Loadout	285.5	28.6	42.8	4.3
Motor Grader	49.8	5.0	7.5	0.7
Scraper - Topsoil/Overburden	9.2	0.9	3.1	0.3
Service Truck	52.6	5.3	7.9	0.8
Pick-up Trucks	45.3	4.5	6.8	0.7
Total	**507.7**	**50.8**	**77.8**	**7.8**

* Based on 310 working days per year for quarry operation

Emission Factors

	Mean Vehicle Weight (W) (tons)	PM10 (lb/mi)	PM2.5 (lb/mi)
Loader - Quarry Excavation	33.2	1.63	0.16
Loader - Loadout	56.3	2.07	0.21
Motor Grader	23.0	1.38	0.14
Scraper - Topsoil/Overburden*	54.3	2.04	0.20
Service Truck	39.0	1.75	0.18
Pick-up Trucks	6.0	0.76	0.08

* Scraper assumed to be similar to a Caterpillar 621K scraper.

Emission factors from AP-42 Section 13.2.2 Unpaved Roads (11/2006)

$PM10 = 1.5 \times (s/12)^{0.9} \times (W/3)^{0.45} \times [(365-P)/365]$

$PM2.5 = 0.15 \times (s/12)^{0.9} \times (W/3)^{0.45} \times [(365-P)/365]$

Unpaved Road Parameters

Silt Content Percent (s) =	4.8	from AP-42 Table 13.2.2-1 for sand & gravel processing plant road
Days ppt >0.01 inches(P) =	58	Gilroy Climate Summary (1906-2012)

Vehicle Use and Annual Travel miles

Vehicle Type	Number of Vehicles	Daily Use (hour/day)	Average Speed (mph)	Daily Travel Miles	Annual Travel Miles
Loader - Quarry Excavation*	1	10	5	40	12,400
Loader - Loadout*	3	11.5	5	138	42,780
Motor Grader**	1	4	10	36	11,160
Scraper - Topsoil/Overburden***	1	10	10	50	1,400
Service Truck	1	2	15	30	9,300
Pick-up Trucks	2	2	15	60	18,600

* Loaders assumed to travel 80% of the time during their time in use.

** Motor grader assumed to travel 90% of the time during the time in use.

*** Scraper assumed to travel 50% of the time during daily use.

Operation Schedule

Hours per day =	10	(unless noted)
Quarry & Processing Days per Year =	310	
Scraper Operation Days per Year =	28	

Dust Control Methods and Control Efficiencies

Control Method	*Control* Efficiency*	*Description*
0	0%	none
1	44%	Limit maximum. speed to 25 mph
2	67%	Limit maximum. speed to 15 mph
3	55%	Watering twice per day
4	28%	Watering once per day
5	85%	Limit speed to 15 mph and watering twice per day
6	76%	Limit speed to 15 mph and watering once per day
7	84%	Apply chemical dust suppressant annually
8	95%	Annual chemical dust suppressant & limit speed to 15 mph
9	96%	Annual chemical dust suppressant , watering once per day & 15 mph

* Based on SCAQMD fugitive dust mitigation measures control efficiencies, Table XI-D and CEQA Air Quality Handbook (1993) [http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust]

Sargent Quarry: Off-Road Equipment & On-Site Vehicle Exhaust Emissions
Proposed Quarry Operation - 2023
Criteria Air Pollutants and GHGs

Analysis Year = 2023 **310 = Annual Days of Quarry Operation**

Off-Road Equipment Equipment Type	No. Units	Use	Engine Age (years)	Engine Model Year	Daily Hours In Use	Work Days Per Year	Unit Annual Hours Use	Use Factor	Load Factor	Cumulative Hours Operation Per Unit	Net Engine (hp)	Fuel Type		Emission Factor (g/hp-hr) NOx	CO	ROG	PM10	PM2.5	SO2	CO2	Average Daily Emissions (lb/day) NOx	CO	ROG	PM10	PM2.5	SO2	CO2	Annual Emissions (ton/yr) NOx	CO	ROG	PM10	PM2.5	SO2	CO2
Dozer - CAT D-10T2	1	Excavation	18	2005	10	310	3100	1.00	0.43	55,800	630	ULSD		4.36	1.14	0.44	0.119	0.123	0.005	527.0	26.0	6.8	2.6	0.71	0.74	0.030	3147	4.03	1.1	0.4	0.11	0.11	0.005	488
Excavator - CAT 374F L	1	Excavation	6	2017	10	310	3100	1.00	0.38	18,600	485	ULSD		0.25	1.14	0.21	0.029	0.029	0.005	527.0	1.0	4.6	0.8	0.12	0.12	0.020	2141	0.16	0.7	0.1	0.02	0.02	0.003	332
Loader - CAT 980M	1	Excavation	1	2022	10	310	3100	1.00	0.36	3,100	392	ULSD		0.13	0.98	0.09	0.009	0.009	0.005	527.0	0.4	3.0	0.3	0.03	0.03	0.016	1640	0.06	0.5	0.0	0.00	0.00	0.002	254
Scraper*	1	Overburden/Soil	-	-	10	28	280	1.00	0.48	-	367	ULSD		2.67	1.98	0.25	0.11	0.10	0.005	527.0	0.9	0.7	0.1	0.04	0.03	0.002	185	0.14	0.1	0.0	0.01	0.01	0.000	29
Motor Grader - CAT140M3	1	Road Maintenance	1	2022	4	310	1240	1.00	0.41	1,240	252	ULSD		0.12	0.95	0.07	0.009	0.009	0.005	527.0	0.1	0.9	0.1	0.01	0.01	0.005	480	0.02	0.1	0.0	0.00	0.00	0.001	74
Loader - CAT 988K	3	Process/Loading	1	2022	11.5	310	3565	1.00	0.36	3,565	580	ULSD		0.13	0.98	0.10	0.009	0.009	0.005	527.0	2.1	15.6	1.6	0.15	0.15	0.079	8369	0.32	2.4	0.2	0.02	0.02	0.012	1297
Emergency Generator	1	Process/Loading	1	2022	-	310	50	1.00	0.74	50	70	ULSD		2.62	3.05	0.11	0.012	0.012	0.006	586.0	0.0	0.1	0.0	0.00	0.00	0.000	11	0.01	0.0	0.0	0.00	0.00	0.000	2
Subtotal																					***30.6***	***31.7***	***5.5***	***1.1***	***1.1***	***0.2***	***15974***	***4.7***	***4.9***	***0.8***	***0.16***	***0.17***	***0.023***	***2476***
On-Road Vehicles		No. Trucks			Hours/ Day	Days/ Year	Annual Hours per Truck		Speed (mph)	Travel Miles per Day				Emission Factors (g/mi) NOx	CO	ROG	PM10	PM2.5	SO2	CO2	NOx	CO	ROG	PM10	PM2.5	SO2	CO2	NOx	CO	ROG	PM10	PM2.5	SO2	CO2
Water Trucks (2022 Ford F-750)		2	-	-	9	310	2790	-	5	45	-	ULSD	-	4.663	0.62138	0.076	0.005	0.005	0.027	2868	0.93	0.12	0.02	0.00	0.00	0.005	569	0.14	0.02	0.00	0.0002	0.0001	0.001	88
Service Truck (2022 Ford F-750)		1			2	310	620		15	30		ULSD		3.529	0.23704	0.021	0.004	0.004	0.018	1947	0.23	0.02	0.00	0.00	0.00	0.001	129	0.04	0.00	0.00	0.0000	0.0000	0.000	20
Pick-up (2022 Ford F-250)		1			2	310	620		15	30		ULSD		0.220	0.18697	0.111	0.012	0.012	0.009	972	0.01	0.01	0.01	0.00	0.00	0.001	64	0.00	0.00	0.00	0.0001	0.0001	0.000	10
Pick-up (2022 Ford F-150)		1			2	310	620		15	30		Gas		0.024	0.75607	0.012	0.003	0.002	0.005	498	0.00	0.05	0.00	0.00	0.00	0.000	33	0.00	0.01	0.00	0.0000	0.0000	0.000	5
Subtotal		5			-	-	4650		-	135		-		-	-	-	-	-	-	-	***1.17***	***0.20***	***0.02***	***0.00***	***0.00***	***0.008***	***795***	***0.18***	***0.03***	***0.00***	***0.0003***	***0.0003***	***0.001***	***123***
TOTAL		-			-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	**31.8**	**31.9**	**5.5**	**1.1**	**1.08**	**0.16**	**16,769**	**4.9**	**4.9**	**0.9**	**0.16**	**0.17**	**0.02**	**2599**

Notes: On-Road vehicle emission factors from EMFAC2021 for Santa Clara Co. for MY 2022 HHDT, LHDT2, LDT2 Trucks in 2023

* A scraper would be periodically rented for topsoil/overburden removal. Specific make and model year not known. Default scraper information and emission factors obtained from the CalEEMOD version 2020.4.0 model were used.

Emission Factors - Off-Road Compression Ignited Engines

EF ID	NOx ZH EF (g/hp-hr)	NOx DR (g/hp-hr²)	NOx Fuel CF	CO ZH EF (g/hp-hr)	CO DR (g/hp-hr²)	CO Fuel CF	THC ZH EF (g/hp-hr)	THC DR (g/hp-hr²)	THC Fuel CF	PM10 ZH EF (g/hp-hr)	PM10 DR (g/hp-hr²)	PM10 Fuel CF	PM2.5 ZH EF (g/hp-hr)	PM2.5 DR (g/hp-hr²)	PM2.5 Fuel CF	CO2 ZH EF (g/hp-hr)	CO2 DR (g/hp-hr²)	CO2 Fuel CF	SO2 (g/hp-hr)
ULSD7502005	4.04	5.35E-05	0.93	0.92	1.82E-05	1.00	0.10	2.50E-05	0.90	0.104	5.27E-06	0.71	0.1044	5.79E-06	0.71	527.0	0.00E+00	1.00	0.005
ULSD5002017	0.23	3.05E-06	0.95	0.92	1.82E-05	1.00	0.05	1.17E-05	0.90	0.02	8.14E-07	0.90	0.02	8.14E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD5002022	0.13	1.75E-06	0.95	0.92	1.82E-05	1.00	0.05	1.17E-05	0.90	0.01	3.44E-07	0.90	0.01	3.75E-07	0.90	527.0	0.00E+00	1.00	0.005
CalEEMod-2023 251-500 hp Scraper	2.67	0.00E+00	1.00	1.98	0.00E+00	1.00	0.21	0.00E+00	1.00	0.11	0.00E+00	1.00	0.10	0.00E+00	1.00	527.0	0.00E+00	1.00	0.005
ULSD5002022	0.12	1.59E-06	0.95	0.92	2.43E-05	1.00	0.05	1.17E-05	0.90	0.01	3.45E-07	0.90	0.01	3.45E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD7502022	0.13	1.75E-06	0.95	0.92	1.82E-05	1.00	0.05	1.17E-05	0.90	0.01	3.44E-07	0.90	0.01	3.44E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD1202022	2.76	3.62E-05	0.95	3.05	8.10E-05	1.00	0.10	2.50E-05	0.90	0.01	1.22E-06	0.90	0.01	1.22E-06	0.90	586.0	0.00E+00	1.00	0.006

Notes:
ZH EF = Zero hour emission factor
DR = Deterioration rate
ULSD = Ultra low sulfur diesel (15 ppmw sulfur, 0.0015% sulfur)

References:
Off-Road equipment emissions calculation methods based on ARB "California's Emissions Inventory for Off-Road Large Compression-Ignited (CI) Engines (> 25 HP)" MAC#99-32
CARB Off-Road diesel emission factors from from the OFFROAD2017 Orian modle (https://ww3.arb.ca.gov/msei/ordiesel/ordas_ef_fcf_2017_v7.xlsx)

Sargent Quarry: Off-Road Equipment & On-Site Vehicle Exhaust Emissions
Proposed Quarry Operation - 2023
Greenhouse Gases

	N2O	CH4
EF (kg/gal)	0.00026	0.00058
GWP	298	25

Equipment Type	(gal/hr)	(gal/day)	(gal/yr)	N2O (kg/yr)	CH4 (kg/yr)	MT CO2e/year CO2	N2O	CH4	Total	Total CO2e (ton/year)
Dozer - CAT D-10T2	14.0	0.0	43,354	11.3	25.1	442.6	3.36	0.63	447	492
Excavator - CAT 374F L	9.5	0.0	29,495	7.7	17.1	301.1	2.29	0.43	304	335
Loader - CAT 980M	7.3	72.9	22,584	5.9	13.1	230.6	1.75	0.33	233	256
Scraper*	9.1	90.9	2,546	0.7	1.5	26.0	0.20	0.04	26	29
Motor Grader - CAT140M3	5.3	21.3	6,614	1.7	3.8	67.5	0.51	0.10	68	75
Loader - CAT 988K	32.3	371.9	115,284	30.0	66.9	1176.9	8.93	1.67	1187	1,309
Emergency Generator	3.0	-	149	0.0	0.1	1.5	0.01	0.00	2	2
Subtotal	80.5	557.0	220,026	57.2	127.6	***2246.1***	***17.0***	***3.2***	***2266***	***2,498***
On-Road Vehicles										
Water Trucks (2022 Ford F-750)				negligible	negligible	80.0	-	-	80	88
Service Truck (2022 Ford F-750)				negligible	negligible	18.1	-	-	18	20
Pick-up (2022 Ford F-250)				negligible	negligible	9.0	-	-	9	10
Pick-up (2022 Ford F-150)				negligible	negligible	4.6	-	-	5	5
Subtotal						***111.8***			***112***	***123***
TOTAL					Total	**2357.9**	**17.0**	**3.2**	**2378**	**2,621**

Sargent Quarry - Operation - 2023
Annual and Average Daily Emissions From Vehicle Travel

Vehicle Information

Vehicle Type	Annual Vehicles	Daily Vehicles
Heavy Duty Trucks		
Haul Trucks	43,090	139
Material Delivery	2,480	8
Total Heavy Duty Trucks	45,570	147
Employee Vehicles	4,650	15
Total Vehicles	**50,220**	**162**

Total Amount of Quarry Material Exported	1,142,400	tons/year
Quarry Material Exported by Rail	249,600	tons/year
Quarry Material Export	892,800	tons/year
Annual Days of Quarry Operation	310	days/year

Trip Information

Trip Type	Annual Trips	Daily Trips
Trucks	91,140	294
Employee Vehicles	9,300	30

Vehicle Trip Distribution and VMT

Trip Description	Percent	Annual Trips	Average Trip Length (mi)	Miles Within BAAQMD	Miles Within MBUAQMD
Trucks					
South on Hwy 101 (to/from Salinas)	10%	9,114	27	4	23
North on Hwy 101(to/from San Jose)	80%	72,912	40	40	0
State Route 25 (to/from Hollister)	10%	9,114	17	5	12
Employee Vehicles*	100%	9,300	18	18	0

* Employees assumed to be from Gilroy or Hollister areas (all emissions assumed to be in BAAQMD)

Emissions Within the Bay Area Air Quality Management District (BAAQMD)

			Annual Emissions (tons/year)										Metric tons/year
						PM10			PM2.5				
Trip Type	Annual Trips	Trip Length (mi)	NOx	CO	ROG	Vehicle	Road Dust	Total	Vehicle	Road Dust	Total	CO2	CO2
Heavy Duty Truck Trips													
South on Hwy 101	9,114	4	0.14	0.008	0.00	0.006	0.002	0.008	0.003	0.0002	0.003	75	68
North on Hwy 101	72,912	40	4.95	0.21	0.06	0.438	0.129	0.567	0.186	0.019	0.206	4985	4522
State Route 25	9,114	5	0.15	0.01	0.00	0.007	0.002	0.009	0.003	0.0003	0.004	91	82
Subtotal	***91,140***	**-**	***5.24***	***0.23***	***0.06***	***0.45***	***0.13***	***0.58***	***0.19***	***0.020***	***0.21***	***5,151***	***4,673***
*Worker Trips**													
Worker Vehicles - Commute	9,300	18	0.03	0.26	0.01	0.004	0.007	0.011	0.001	0.001	0.002	64	58
Total			**5.27**	**0.49**	**0.07**	**0.46**	**0.14**	**0.59**	**0.19**	**0.02**	**0.21**	**5,214**	**4,730**

* Employees assumed to be from Gilroy or Hollister areas (all emissions assumed to be in BAAQMD)

			Average Daily Emissions (lb/day)								
						PM10			PM2.5			
Trip Type	Average Daily Trips	Trip Length (mi)	NOx	CO	ROG	Vehicle	Road Dust	Total	Vehicle	Road Dust	Total	CO2
Heavy Duty Truck Trips												
South on Hwy 101	29	4	0.89	0.05	0.02	0.04	0.01	0.05	0.02	0.002	0.02	487
North on Hwy 101	235	40	31.96	1.37	0.37	2.83	0.83	3.66	1.20	0.12	1.33	32158
State Route 25	29	5	0.97	0.05	0.02	0.05	0.01	0.06	0.02	0.002	0.02	585
Subtotal	***294***	**-**	***33.82***	***1.47***	***0.41***	***2.91***	***0.86***	***3.77***	***1.24***	***0.128***	***1.37***	***33,230***
*Worker Trips**												
Worker Vehicles - Commute	30	18	0.17	1.68	0.03	0.023	0.05	0.07	0.008	0.01	0.02	411
Total			**34.0**	**3.15**	**0.4**	**2.9**	**0.9**	**3.8**	**1.2**	**0.1**	**1.4**	**33,641**

Average Daily Emissions based on annual emissions and average annual days of quarry operation (310 days)

Emissions Within the Monterey Bay Unified Air Quality Management District (MBUAQMD)

			Annual Emissions (tons/year)										Metric tons/year
						PM10			PM2.5				
Trip Type	Annual Trips	Trip Length (mi)	NOx	CO	ROG	Vehicle	Road Dust	Total	Vehicle	Road Dust	Total	CO2	CO2
Heavy Duty Truck Trips													
South on Hwy 101	9,114	23	0.39	0.018	0.01	0.032	0.009	0.041	0.014	0.0014	0.015	364	331
North on Hwy 101	72,912	0	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.0000	0.000	0	0
State Route 25	9,114	12	0.24	0.012	0.00	0.017	0.005	0.022	0.007	0.0007	0.008	197	179
Subtotal	***91,140***	**-**	***0.64***	***0.03***	***0.01***	***0.05***	***0.01***	***0.06***	***0.02***	***0.002***	***0.023***	***562***	***510***
Worker Trips													
Worker Vehicles - Commute	9,300	0	0.00	0.00	0.000	0.0000	0.000	0.000	0.0000	0.000	0.000	0	0
Total			**0.6**	**0.03**	**0.01**	**0.05**	**0.01**	**0.06**	**0.02**	**0.00**	**0.02**	**562**	**510**

			Average Daily Emissions (lb/day)								
						PM10			PM2.5			
Trip Type	Average Daily Trips	Trip Length (mi)	NOx	CO	ROG	Vehicle	Road Dust	Total	Vehicle	Road Dust	Total	CO2
Heavy Duty Truck Trips												
South on Hwy 101	29	23	2.53	0.11	0.03	0.20	0.06	0.26	0.09	0.01	0.10	2351
North on Hwy 101	235	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
State Route 25	29	12	1.58	0.08	0.03	0.11	0.03	0.14	0.05	0.00	0.05	1272
Subtotal	***294***	**-**	***4.11***	***0.19***	***0.06***	***0.31***	***0.09***	***0.40***	***0.14***	***0.014***	***0.15***	***3,623***
Worker Trips												
Worker Vehicles - Commute	30	0	0.00	0.00	0.00	0.000	0.00	0.00	0.000	0.00	0.00	0
Total			**4.1**	**0.2**	**0.1**	**0.31**	**0.09**	**0.40**	**0.14**	**0.01**	**0.15**	**3,623**

Average Daily Emissions based on annual emissions and average annual days of quarry operation (310 days)

Total Emissions

					PM10			PM2.5				Metric
Emission Period	NOx	CO	ROG	Vehicle	Road Dust	Total	Vehicle	Road Dust	Total	CO2	CO2
Tons per Year	5.9	0.5	0.1	0.5	0.2	0.7	0.2	0.02	0.2	5,776	5,240
Average Pounds per Day	38.1	3.3	0.5	3.2	1.0	4.2	1.4	0.15	1.5	37,264	-

Emission Factors

Vehicle Type	Travel Speed (mph)	Emission Factor Units	NOx	CO	ROG	PM10 (Vehicle)	PM10 (Road Dust)	PM10 (Total)	PM2.5 (Vehicle)	PM2.5 (Road Dust)	PM2.5 (Total)	CO2
Heavy-Duty Diesel Trucks[1]	55	gram/VMT	1.332	0.051	0.012	0.135	0.040	0.175	0.057	0.006	0.063	1514.1
Heavy-Duty Diesel Trucks[2]	5	gram/VMT	20.059	1.411	0.613	0.125	-		0.120	-		3493.0
Heavy-Duty Diesel Trucks[3]	Idle	gram/hour	100.29	7.055	3.064	0.627	-	0.627	0.600	-	0.600	17464.9
Worker Vehicles[1]	55	gram/VMT	0.135	1.335	0.025	0.019	0.040	0.059	0.007	0.006	0.013	326.2
Worker Vehicles[2]	5	gram/VMT	0.274	3.210	0.204	0.014	-	0.014	0.013	-	0.013	809.3
Worker Vehicles[3]	Idle	gram/hour	1.37	16.049	1.019	0.069	-	0.069	0.063	-	0.063	4046.4

Emission factors for exhaust and tire and brake wear from EMFAC2021 for Santa Clara County in 2023
Worker vehicles assumed to be light duty trucks (LDT1)
[1] Values are for running exhaust for all pollutants and inclued tire and brake wear for PM2.5 and PM10
[2] Values are for running exhaust only
3 Idle emission factors calculated using the 5 mph emissions

Truck idle time per trip (min) = 5
For Paved Road Dust Emission Factors:
Mean vehicle Weight (tons) = 2.4
Silt Loading (g/m2) = 0.015
No. days with rain >0.01 in = 64

Sargent Quarry
PM10 and PM2.5 Emissions From Quarry Processing Operations
Proposed Project

Quarry Production Information

Total Material Extracted (ton/yr) =	2,415,000	
Topsoil/Overburden Extracted (ton/yr) =	555,000	(maximum during Phase 1)
Days of Topsoil/Overburden Removal (days/yr) =	28	
Overburden Conveyed to Berm Area (tons/yr) =	135,000	(Phase 1 activity)
Maximum Aggregate Extracted (ton/yr) =	1,860,000	
Aggregate Extracted (ton/hr) =	600	
Maximum Hours per day Extraction (hrs) =	10	
Annual Days Available for Quarry Operation (days) =	310	

Aggregate Processing Equipment Production Rate Information

Maximum Annual Raw Material Processed (ton/yr) =	1,860,000
Maximum Hourly Process rate (ton/hr) =	600
Average Daily Process Rate (ton/day)	6,000
Days to Process Annual Amount =	310
Average Hours per day Processing (hrs) =	10

Aggregate Export Information

Maximum Annual Product Exported (ton/year) =	1,142,400
Maximum Product Exported by Truck (ton/year) =	892,800
Maximum Product Exported by Rail (ton/year) =	249,600

Processing Equipment Emissions - Proposed Project						**PM10 Emissions**				**PM2.5 Emissions**		
Equipment Type	**Percent of Input**	**Process Rate (ton/hr)**	**Number of Transfers**	**Daily Operation (hours)**	**PM10 Emission Factor (lb/ton)**	**Hourly (lb/hr)**	**Average Daily (lb/day)**	**Annual Average (ton/yr)**	**PM2.5 Emission Factor (lb/ton)**	**Hourly (lb/hr)**	**Average Daily (lb/day)**	**Annual Average (ton/yr)**
Conveyance from Quarry Area to Processing Area												
Hopper & Belt Feeder	100%	600	2	10.0	0.000016	0.0192	0.192	0.030	0.000003	0.004	0.038	0.0060
Overland Conveyors - 100' Jump Conveyors (3)	100%	600	6	10.0	0.000046	0.1656	1.656	0.257	0.000013	0.047	0.468	0.0725
Overland Conveyors - 1750'of Conveyors	100%	600	35	10.0	0.000046	0.9660	9.660	1.497	0.000013	0.273	2.730	0.4232
Telestacker Conveyor	100%	600	2	10.0	0.000081	0.0969	0.969	0.150	0.000015	0.018	0.183	0.0284
Overburden Conveyance to Berm Area												
Load Hoppper to Overland Conveyor	100%	482	2	10.0	0.000016	0.0154	0.014	0.002	0.000003	0.003	0.003	0.0004
Overland Conveyors - 1750'of Conveyors	100%	482	35	10.0	0.000046	0.7763	0.701	0.109	0.000013	0.219	0.198	0.0307
Telestacker Conveyor	100%	482	2	10.0	0.000081	0.0779	0.070	0.011	0.000015	0.015	0.013	0.0021
Processing Plant												
Reclaim Tunnel Conveyor w/ (3) belt feeders	100%	600	3	10.0	0.000016	0.0288	0.288	0.045	0.000013	0.023	0.234	0.0363
Screen Feed Conveyor	100%	600	2	10.0	0.000046	0.0552	0.552	0.086	0.000013	0.016	0.156	0.0242
Wet Screening Station - wet service	100%	600	1	10.0	0a	0.0000	0.000	0.000	0a	0.000	0.000	0.0000
Log Washers (2) - wet service	50%	300	2	10.0	0a	0.0000	0.000	0.000	0a	0.000	0.000	0.0000
Transfer Conveyor - wet service	50%	300	1	10.0	0a	0.0000	0.000	0.000	0a	0.000	0.000	0.0000
Screen Feed Conveyor - wet service	50%	300	2	10.0	0a	0.0000	0.000	0.000	0a	0.000	0.000	0.0000
Wet Screening Station - wet service	50%	300	2	10.0	0a	0.0000	0.000	0.000	0a	0.000	0.000	0.0000
Transfer Conveyors (3)	17%	100	3	10.0	0.000046	0.0138	0.138	0.021	0.000013	0.004	0.039	0.0060
Radial Stacking Conveyor (3)	17%	100	6	10.0	0.000081	0.0485	0.485	0.075	0.000015	0.009	0.091	0.0142
Aggre-Dry Material Washers (2) - wet service	50%	300	2	10.0	0a	0.0000	0.000	0.000	0a	0.000	0.000	0.0000
Transfer Conveyors (2)	25%	150	2	10.0	0.000046	0.0138	0.138	0.021	0.000013	0.004	0.039	0.0060
Radial Stacking Conveyor	1.0%	6	2	10.0	0.000081	0.0010	0.010	0.002	0.000015	0.000	0.002	0.0003
Radial Stacking Conveyor	49%	294	2	10.0	0.000081	0.0475	0.475	0.074	0.000015	0.009	0.090	0.0139
Total						***2.3***	***15.3***	***2.4***		***0.6***	***4.3***	***0.7***

Notes: [a] Equipment is in wet service with negligible emissions

Sargent Quarry
PM10 and PM2.5 From Quarry Fugitive Emission Sources
Proposed Project - Fugitive Emissions

Quarry Excavation/Processing Fugitive Emission Sources - Proposed Project													
	Operation						**Emission Factors**			**PM10 Emissions**		**PM2.5 Emissions**	
	Process Rate	**Process Rate Units**	**No. of Equip.**	**Daily Hours (hours/day)**	**Days per Year**	**Annual Hours (hours/yr)**	**PM10 Emission Factor**	**PM2.5 Emission Factor**	**Emission Factor Units**	**Average Daily (lb/day)**	**Annual Average (ton/yr)**	**Average Daily (lb/day)**	**Annual Average (ton/yr)**
Quarry Mining Area													
Scraper - Topsoil/Overburden Removal	19821	ton/day	1	10	28	280	0.7528	0.4138	lb/hr	0.68	0.11	0.37	0.058
Scraper Unloading - Topsoil/Overburden	19821	ton/day	1	10	28	280	0.0002	0.00004	lb/ton	0.44	0.07	0.07	0.010
Bulldozing	-	-	1	10	310	3100	0.3764	0.20689	lb/hr	3.76	0.58	2.07	0.321
Overland Conveyor Aggregate Loading	600	ton/hr	1	10	310	3100	0.0004	0.00006	lb/ton	2.31	0.36	0.35	0.054
Processing Area													
Processing Area - Truck/Rail Car Loading	1228	ton/day	3	11.5	310	3565	0.0004	0.00006	lb/ton	1.42	0.22	0.21	0.033
Total										***8.61***	***1.33***	***3.07***	***0.48***
Total Processing and Fugitives										**24.0**	**3.7**	**7.4**	**1.1**

Sargent Quarry
Emissions Factors Used For Quarry Processing and Fugitive PM10 & PM2.5 Emissions

	PM10 Emission Factors			PM2.5 Emission Factors				
Emission Source	**Uncontrolled**	**% Control**	**Controlled**	**Uncontrolled**	**Fraction of PM10**	**Controlled**	**Units**	**Reference**
Feed Hopper	0.000016	0%	0.000016	0.000003	0.20	0.000003	lb/ton	8/04AP-42 Section 11.19.2 (Crushed Stone Processing) - uncontrolled
Primary Crushing	-	-	0.00054	-	-	0.00010	lb/ton	8/04 AP-42 Section 11.19.2 (Crushed Stone Processing) - tertiary crushing (estimate for primary crusher)
Secondary Crushing	-	-	0.00054	-	-	0.00010	lb/ton	8/04 AP-42 Section 11.19.2 (Crushed Stone Processing) - tertiary crushing (estimate for secondary crusher)
Fines Crushing	0.015	-	0.0012	-	-	0.00007	lb/ton	8/04AP-42 Section 11.19.2 (Crushed Stone Processing) - Fines Crushing
Screening	0.0087	-	0.00074	-	-	0.00005	lb/ton	8/04AP-42 Section 11.19.2 (Crushed Stone Processing) - Screening
Fines Screening	0.072	-	0.0022	-	-	0.00005	lb/ton	8/04AP-42 Section 11.19.2 (Crushed Stone Processing) - Fines screening
Conveyor Transfer Points	0.0011	-	0.000046	0.00031	-	0.000013	lb/ton	8/04 AP-42 Section 11.19.2 (Crushed Stone Processing) - Conveyor transfer point
Aggregate Loading/stockpiling*	0.0004	70%	0.000116	0.00006	0.15	0.000017	lb/ton	11/06 AP-42 Section 13.2.4 (Aggregate handling and Storage Piles) - Material drop operations
Avg of Conveyor Transfer + Stockpiling	-	-	0.00008	-	-	0.000015	lb/ton	uncontrolled drop to conveyor & controlled loadout
Overburden Unloading/stockpiling	0.00025	0%	0.00025	0.000037	0.15	0.000037	lb/ton	11/06 AP-42 Section 13.2.4 (Aggregate handling and Storage Piles) - Material drop operations
Bulldozing & Scraper (lb/hr)**	0.75276	50%	0.37638	0.41378	-	0.206889	lb/hr	AP-42 Western Surface Coal mining (overburden dozing)

Note: * Controlled emission factor assumes 70% control effectiveness for use of watering
** Controlled emission factor assumes 50% control effectiveness for use of watering

Vehicle/Process/Emission Factor Information		
Average wind speed (mph)	5.9	San Martin Airport
Overburden Material Moisture content (%) =	7.9	AP-42 - Western Surface Coal Mining (Table 11.9-3)
Overburden Material Silt Content (%) =	6.9	AP-42 - Western Surface Coal Mining (Table 11.9-3)
Aggregatel Moisture content (%) =	5	Applicant

Sargent Quarry - Rail Emissions - 2023
Annual and Average Daily Emissions From Train Hauling
Sargent Quarry to Berryessa Road, San Jose

Material Hauling information

Annual Quantity Material Hauled by Rail	199,680	tons
Quantity Material Hauled per Train	1,600	tons
Total Number of Train Loads per Year	156	
Percent of Trains to Berryessa Rd	80%	
Number of Trains per Year to Berryessa Rd	125	
One-way Train Trip Distance[a]	40	miles
Days of Quarry Operation per Year	310	days

Train Information

Empty Rail Car Weight[b]	33	tons
Aggregate Weight per Rail Car	100	tons
Locomotive Weight[c]	204	tons
Number of Locomotives	1	locomotives/train
Cars per Train	16	cars/train
Train - Gross Ton Weight - Unloaded	728	tons
Train - Gross Ton Weight - Loaded	2,328	tons
Average Gross Ton Weight	1,528	tons
2011 Fuel Productivity Factor[d]	731	gross ton miles/gallon (GTM/gal)
2023 Fuel Efficiency Factor[d]	0.8864	
2023 Fuel Productivity Factor[d]	825	gross ton miles/gallon (GTM/gal)

Emissions From Train Travel[e]

Pollutant	Fleet Average Emission Factor (g/gallon)	Average GTW (tons)	Train Roundtrip Distance (miles)	Fuel Productivity Factor (GTM/gallon)	Train Loads per Year	Emission per Trip (pounds)	Annual Emisisons (pounds/year)	Annual Emisisons (tons/year)	Average Daily Emissions (lb/day)
NOx	92.90	1528	80	825	125	30.4	3,789	1.89	12.22
CO	26.62	1528	80	825	125	8.7	1,086	0.54	3.50
ROG	4.14	1528	80	825	125	1.4	169	0.08	0.54
PM10	2.02	1528	80	825	125	0.7	83	0.04	0.27
PM2.5	1.87	1528	80	825	125	0.6	76	0.04	0.25
CO_2	10206	1528	80	825	125	3335.2	416,229	208.1	-

Train Idle Emissions[f]

Pollutant	Fleet Average Emission Factor (g/hour)	Idle[g] Time per Load (hours)	Train Loads per Year	Annual Emisisons (pounds/year)	Annual Emisisons (tons/year)	Average Daily Emissions (lb/day)
NOx	418.12	1.0	125	115.04	0.058	0.37
CO	54.30	1.0	125	14.94	0.007	0.05
ROG	34.29	1.0	125	9.43	0.005	0.03
PM10	9.14	1.0	125	2.52	0.001	0.01
PM2.5	8.99	1.0	125	2.47	0.001	0.01
CO_2	33,552	1.0	125	9,231	4.62	29.8

Total Train Hauling Emissions (travel + idle)

Pollutant	Annual Emissions (tons/year)	Average Daily Emissions (lb/day)
NOx	2.0	12.6
CO	0.6	3.6
ROG	0.1	0.6
PM10	0.0	0.3
PM2.5	0.0	0.3
CO_2	212.7	-

Notes:
a Estimated travel between the Sargent Ranch Quarry and 11711 Berryessa Rd in San Jose (measured from Google Earth).
b Empty car weight for representative rail car obtained from BNSF (https://www.bnsf.com/ship-with-bnsf/ways-of-shipping/equipment/pdf/52ft_Gons.pdf)
c The locomotive weight was estimated based on ARB Technology Assessment: Freight Locomotives (2016)
d Fuel Productivity (GTM/gal). An average value was calculated based on the GTM/gal values for the Bay Area in 2011 (ARB 2014)
and adjusted for increased fuel efficiency in 2023 (2016 ARB Vision 2.1, Locomotive Module)
e Train running emission factors and fleet mix are from the California Air Resources Board (CARB) Vision 2.1 Locomotive Inventory Database
ARB. 2016. Vision 2.1 Locomotive Module. Available at: http://www.arb.ca.gov/planning/vision/downloads.htm
f Locomotive Tier Emission Factors for HC, CO, NOx and PM10 are developed based on locomotive data from EPA research document (USEPA 1998) and USEPA 2009.
g Train idling time assumptions are based on ARB/Railroad Statewide Agreementand information provided by applicant
Idle time assumes 15 minutes idling on arrival and 15 minutes idling upon departure at both the quarry and final destination.

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ARB, BNSF Railway Company (BNSF), and Union Pacific Railroad Company (UPRR). 2005. ARB/Railroad Statewide Agreement:
Particulate Emissions Reduction Program at California Rail Yards. June. Available at: http://www.arb.ca.gov/railyard/ryagreement/ryagreement.htm .

Sargent Quarry - Rail Emissions - 2023
Annual and Average Daily Emissions From Train Hauling
Sargent Quarry to Graniterock at Port of Redwood City

Material Hauling information

Annual Quantity Material Hauled by Rail	49,920	tons
Quantity Material Hauled per Train	1,600	tons
Total Number of Train Loads per Year	156	
Percent of Trains to Port of Redwood City	20%	
Number of Trains per Year to Port of Redwood City	31	
One-way Train Trip Distance[a]	57	miles
Days of Quarry Operation per Year	310	days

Train Information

Empty Rail Car Weight[b]	33	tons
Aggregate Weight per Rail Car	100	tons
Locomotive Weight[c]	204	tons
Number of Locomotives	1	locomotives/train
Cars per Train	16	cars/train
Train - Gross Ton Weight - Unloaded	728	tons
Train - Gross Ton Weight - Loaded	2,328	tons
Average Gross Ton Weight	1,528	tons
2011 Fuel Productivity Factor[d]	731	gross ton miles/gallon (GTM/gal)
2023 Fuel Efficiency Factor[d]	0.8864	
2023 Fuel Productivity Factor[d]	825	gross ton miles/gallon (GTM/gal)

Emissions From Train Travel[e]

Pollutant	Fleet Average Emission Factor (g/gallon)	Average GTW (tons)	Train Roundtrip Distance (miles)	Fuel Productivity Factor (GTM/gallon)	Train Loads per Year	Emission per Trip (pounds)	Annual Emisisons (pounds/year)	Annual Emisisons (tons/year)	Average Daily Emissions (lb/day)
NOx	92.90	1528	114	825	31	43.3	1,350	0.67	4.35
CO	26.62	1528	114	825	31	12.4	387	0.19	1.25
ROG	4.14	1528	114	825	31	1.9	60	0.03	0.19
PM10	2.02	1528	114	825	31	0.9	29	0.01	0.09
PM2.5	1.87	1528	114	825	31	0.9	27	0.01	0.09
CO_2	10206	1528	114	825	31	4752.6	148,282	74.1	-

Train Idle Emissions[f]

Pollutant	Fleet Average Emission Factor (g/hour)	Idle[g] Time per Load (hours)	Train Loads per Year	Annual Emisisons (pounds/year)	Annual Emisisons (tons/year)	Average Daily Emissions (lb/day)
NOx	418.12	1.0	31	28.76	0.014	0.09
CO	54.30	1.0	31	3.73	0.002	0.01
ROG	34.29	1.0	31	2.36	0.001	0.01
PM10	9.14	1.0	31	0.63	0.000	0.00
PM2.5	8.99	1.0	31	0.62	0.000	0.00
CO_2	33,552	1.0	31	2,308	1.15	7.4

Total Train Hauling Emissions (travel + idle)

Pollutant	Annual Emissions (tons/year)	Average Daily Emissions (lb/day)
NOx	0.7	4.4
CO	0.2	1.3
ROG	0.0	0.2
PM10	0.0	0.1
PM2.5	0.0	0.1
CO_2	75.3	-

Notes:
a Estimated travel between the Sargent Ranch Quarry and the Graniterock facility at thePort of Redwood City (measured from Google Earth).
b Empty car weight for representative rail car obtained from BNSF (https://www.bnsf.com/ship-with-bnsf/ways-of-shipping/equipment/pdf/52ft_Gons.pdf)
c The locomotive weight was estimated based on ARB Technology Assessment: Freight Locomotives (2016)
d Fuel Productivity (GTM/gal). An average value was calculated based on the GTM/gal values for the Bay Area in 2011 (ARB 2014)
and adjusted for increased fuel efficiency in 2023 (2016 ARB Vision 2.1, Locomotive Module)
e Train running emission factors and fleet mix are from the California Air Resources Board (CARB) Vision 2.1 Locomotive Inventory Database
ARB. 2016. Vision 2.1 Locomotive Module. Available at: http://www.arb.ca.gov/planning/vision/downloads.htm
f Locomotive Tier Emission Factors for HC, CO, NOx and PM10 are developed based on locomotive data from EPA research document (USEPA 1998) and USEPA 2009.
g Train idling time assumptions are based on ARB/Railroad Statewide Agreementand information provided by applicant
Idle time assumes 15 minutes idling on arrival and 15 minutes idling upon departure at both the quarry and final destination.

References: 2016. Vision 2.1 Locomotive Module. Available at: http://www.arb.ca.gov/planning/vision/downloads.htm
ARB. 2014. Locomotive Inventory Update: Line Haul Activity.
Available at: http://www.arb.ca.gov/msei/goods_movement_emission_inventory_line_haul_octworkshop_v3.pdf
USEPA. 1998. Locomotive Emission Standards Regulatory Support Document. Available at: https://www3.epa.gov/otaq/documents/420r98101.pdf
USEPA 2009. Emission Factors for Locomotives (EPA-420-F-09-025), April 2009.
ARB, BNSF Railway Company (BNSF), and Union Pacific Railroad Company (UPRR). 2005. ARB/Railroad Statewide Agreement:
Particulate Emissions Reduction Program at California Rail Yards. June. Available at: http://www.arb.ca.gov/railyard/ryagreement/ryagreement.htm .

Sargent Ranch Quarry - Rail Emission Factors Calculations
Rail - Material Export Emissions

2023 CARB Locomotive Tier Distribution and Emission Factors

Locomotive Tier Level	Percent[a] in Fleet (%)	Locomotive Emission Factors (g/gal)[b] PM10	PM2.5	ROG	NOx	CO	CO2
Tier 0r	24.3%	4.16	3.83	7.55	149.76	26.62	10,206
Tier 1r	11.3%	4.16	3.83	7.30	139.36	26.62	10,206
Tier 2r	19.8%	1.66	1.53	3.27	102.96	26.62	10,206
Tier 3	17.0%	1.66	1.53	3.27	102.96	26.62	10,206
Tier 4	27.6%	0.31	0.29	1.01	20.8	26.62	10,206
Total	100.0%						
Fleet Average Emission Factors		2.18	2.01	4.14	95.77	26.62	10206
Adjustment Factor [c]		0.93	0.93	1	0.97	1	1
Adjusted Emission Factors		2.02	1.87	4.14	92.90	26.62	10206

2020 CARB Locomotive Tier Distribution and Emission Factors for Locomotives Idling

Locomotive Tier Level	Percent[a] in Fleet (%)	Idle Emission Factors (g/hour)[d] PM10	PM2.5	ROG	NOx	CO	CO2
Tier 0r	33.9%	21	21	72	777	95	33,552
Tier 1r	11.9%	11	10	36	376	49	33,552
Tier 2r	20.6%	3.4	3.3	13	296	30	33,552
Tier 3	17.7%	3.4	3.3	13	296	30	33,552
Tier 4	15.9%	0.64	0.62	3.9	60	30	33,552
Total	100.0%						
Fleet Average Emission Factors		9.83	9.67	34.29	431.06	54.30	33552
Adjustment Factor [c]		0.93	0.93	1	0.97	1	1
Adjusted Emission Factors		9.14	8.99	34.29	418.12	54.30	33552

a Tier distribution for Bay Area from the California Air Resources Board (CARB) Vision 2.0 Locomotive Inventory Database
b Train running emission factors and fleet mix are from the California Air Resources Board (CARB) Vision 2.1 Locomotive Inventory Database
ARB. 2016. Vision 2.1 Locomotive Module. Available at: http://www.arb.ca.gov/planning/vision/downloads.htm
c Emission adjustment factors from the California Air Resources Board (CARB) Vision 2.0 Locomotive Inventory Database
d Locomotive idle emisison factors are developed based on locomotive data from EPA research document (USEPA 1998) and USEPA 2009 and
Recology Ostrom Road Projects. Draft Environmental Impact Report (State Clearinghouse No. 2015122071).
Yuba County Planning Department. May 2018.

Sargent Quarry
Summary of Proposed Criteria Pollutant and GHG Emissions
Mitigated Emissions

Criteria Pollutant Emissions - Project Operation 2023
Average Daily and Annual Emissions Summary - BAAQMD

	Average Daily Emissions (lb/day)*				
Emission Source	**NOx**	**CO**	**ROG**	**PM10**	**PM2.5**
Processing Equipment	-	-	-	15.3	4.3
Quarrying/Fugitives	-	-	-	8.6	3.1
Off-Road Equipment Exhaust	4.5	30.4	3.4	0.4	0.4
On-Site Quarry Vehicle Exhaust	1.2	0.2	0.0	0.0	0.0
On-Site Unpaved Road Fugitive Dust	-	-	-	50.2	5.0
Rail Emissions	17.0	4.8	0.8	0.4	0.3
Paved Road Vehicle Emissions	34.0	3.2	0.4	3.8	1.4
Total	**56.7**	**38.5**	**4.6**	**78.7**	**14.5**
	Annual Emissions (tons/year)				
Emission Source	**NOx**	**CO**	**ROG**	**PM10**	**PM2.5**
Processing Equipment	-	-	-	2.4	0.7
Quarrying/Fugitives	-	-	-	1.3	0.5
Off-Road Equipment Exhaust	0.7	4.7	0.5	0.06	0.06
On-Site Quarry Vehicle Exhaust	0.2	0.0	0.0	0.00	0.00
On-Site Unpaved Road Fugitive Dust	-	-	-	7.8	0.8
Rail Emissions	2.6	0.7	0.1	0.06	0.05
Paved Road Vehicle Emissions	5.3	0.5	0.1	0.6	0.2
Total	**8.8**	**6.0**	**0.7**	**12.2**	**2.2**

* Average daily emissions calculated based on annual emissions and 310 days per year for quarry operation

GHG Pollutant Emissions
Annual Emissions Summary - BAAQMD

Emission Source	**CO2e (tons/year)**
Off-Road Equipment Exhaust	2,498
On-Site Quarry Vehicle Exhaust	123
Rail Emissions	288
Paved Road Vehicle Emissions	5,214
Total	**8,124**

Criteria Pollutant Emissions - Project Operation 2023
Average Daily and Annual Emissions Summary - MBUAQMD

	Average Daily Emissions (lb/day)*				
Emission Source	**NOx**	**CO**	**ROG**	**PM10**	**PM2.5**
Paved Road Vehicle Emissions	4.1	0.2	0.1	0.4	0.1
	Annual Emissions (tons/year)				
Emission Source	**NOx**	**CO**	**ROG**	**PM10**	**PM2.5**
Paved Road Vehicle Emissions	0.64	0.03	0.01	0.06	0.02

GHG Pollutant Emissions
Annual Emissions Summary - MBUAQMD

Emission Source	**CO2e (tons/year)**
Off-Road Equipment Exhaust	0
On-Site Quarry Vehicle Exhaust	0
Paved Road Vehicle Emissions	562
Total	**562**

Sargent Quarry - Proposed Operation 2023
Annual and Daily Fugitive Dust Emissions From Equipment/Vehicle Travel on Unpaved Roads
With Mitigation

Annual Average Emissions (tons/year)

Vehicle Type/Road Segment	Annual Travel Miles	Emission Factor (lb/mi)		Annual (ton/year) Uncontrolled Emissions		Control Method	Control Efficiency	Annual (ton/year) Controlled Emissions	
		PM10	PM2.5	PM10	PM2.5			PM10	PM2.5
Loader - Quarry Excavation	12,400	1.63	0.16	10.11	1.01	5	85%	1.52	0.15
Loaders - Loadout with Mitigation	42,780	2.07	0.21	44.26	4.43	8	95%	2.36	0.24
Motor Grader	11,160	1.38	0.14	7.71	0.77	5	85%	1.16	0.12
Scraper - Topsoil/Overburden	1,400	2.04	0.20	1.43	0.14	2	67%	0.47	0.05
Service Truck	9,300	1.75	0.18	8.16	0.82	5	85%	1.22	0.12
Pick-up Trucks	18,600	0.76	0.08	7.03	0.70	5	85%	1.05	0.11
Total	**-**	**-**	**-**	**78.7**	**7.9**	**-**	**-**	**7.8**	**0.8**

Daily Emissions (lb/day)

Vehicle Type	Daily Emissions (lb/day)*			
	Uncontrolled		Controlled	
	PM10	PM2.5	PM10	PM2.5
Loader - Quarry Excavation	65.2	6.5	9.8	1.0
Loaders - Loadout	285.5	28.6	15.2	1.5
Motor Grader	49.8	5.0	7.5	0.7
Scraper - Topsoil/Overburden	9.2	0.9	3.1	0.3
Service Truck	52.6	5.3	7.9	0.8
Pick-up Trucks	45.3	4.5	6.8	0.7
Total	**507.7**	**50.8**	**50.2**	**5.0**

* Based on 310 working days per year for quarry operation

Emission Factors

	Mean Vehicle Weight (W) (tons)	PM10 (lb/mi)	PM2.5 (lb/mi)
Loader - Quarry Excavation	33.2	1.63	0.16
Loader - Loadout	56.3	2.07	0.21
Motor Grader	23.0	1.38	0.14
Scraper - Topsoil/Overburden*	54.3	2.04	0.20
Service Truck	39.0	1.75	0.18
Pick-up Trucks	6.0	0.76	0.08

* Scraper assumed to be similar to a Caterpillar 621K scraper.

Emission factors from AP-42 Section 13.2.2 Unpaved Roads (11/2006)

$PM10 = 1.5 \times (s/12)^{0.9} \times (W/3)^{0.45} \times [(365-P)/365]$

$PM2.5 = 0.15 \times (s/12)^{0.9} \times (W/3)^{0.45} \times [(365-P)/365]$

Unpaved Road Parameters

Silt Content Percent (s) =	4.8	from AP-42 Table 13.2.2-1 for sand & gravel processing plant road
Days ppt >0.01 inches(P) =	58	Gilroy Climate Summary (1906-2012)

Vehicle Use and Annual Travel miles

Vehicle Type	Number of Vehicles	Daily Use (hour/day)	Average Speed (mph)	Daily Travel Miles	Annual Travel Miles
Loader - Quarry Excavation*	1	10	5	40	12,400
Loader - Loadout*	3	11.5	5	138	42,780
Motor Grader**	1	4	10	36	11,160
Scraper - Topsoil/Overburden***	1	10	10	50	1,400
Service Truck	1	2	15	30	9,300
Pick-up Trucks	2	2	15	60	18,600

* Loaders assumed to travel 80% of the time during their time in use.

** Motor grader assumed to travel 90% of the time during the time in use.

*** Scraper assumed to travel 50% of the time during daily use.

Operation Schedule

Hours per day =	10	(unless noted)
Quarry & Processing Days per Year =	310	
Scraper Operation Days per Year =	28	

Dust Control Methods and Control Efficiencies

Control Method	*Control* Efficiency*	*Description*
0	0%	none
1	44%	Limit maximum. speed to 25 mph
2	67%	Limit maximum. speed to 15 mph
3	55%	Watering twice per day
4	28%	Watering once per day
5	85%	Limit speed to 15 mph and watering twice per day
6	76%	Limit speed to 15 mph and watering once per day
7	84%	Apply chemical dust suppressant annually
8	95%	Annual chemical dust suppressant & limit speed to 15 mph
9	96%	Annual chemical dust suppressant , watering once per day & 15 mph

* Based on SCAQMD fugitive dust mitigation measures control efficiencies, Table XI-D and CEQA Air Quality Handbook (1993) [http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust]

Sargent Quarry: Off-Road Equipment & On-Site Vehicle Exhaust Emissions - With Mitigation
Proposed Quarry Operation - 2023
Criteria Air Pollutants and GHGs

Analysis Year = 2023 **310 = Annual Days of Quarry Operation**

Off-Road Equipment														Emission Factor (g/hp-hr)							Average Daily Emissions (lb/day)							Annual Emissions (ton/yr)						
Equipment Type	No. Units	Use	Engine Age (years)	Engine Model Year	Daily Hours In Use	Work Days Per Year	Unit Annual Hours Use	Use Factor	Load Factor	Cumulative Hours Operation Per Unit	Net Engine (hp)	Fuel Type		NOx	CO	ROG	PM10	PM2.5	SO2	CO2	NOx	CO	ROG	PM10	PM2.5	SO2	CO2	NOx	CO	ROG	PM10	PM2.5	SO2	CO2
Dozer - CAT D-10T2	1	Excavation	1	2022	10	310	3100	1.00	0.43	3,100	630	ULSD		0.13	0.98	0.09	0.009	0.009	0.005	527.0	0.8	5.8	0.6	0.06	0.06	0.030	3147	0.12	0.9	0.1	0.01	0.01	0.005	488
Excavator - CAT 374F L	1	Excavation	6	2017	10	310	3100	1.00	0.38	18,600	485	ULSD		0.25	1.14	0.21	0.029	0.029	0.005	527.0	1.0	4.6	0.8	0.12	0.12	0.020	2141	0.16	0.7	0.1	0.02	0.02	0.003	332
Loader - CAT 980M	1	Excavation	1	2022	10	310	3100	1.00	0.36	3,100	392	ULSD		0.13	0.98	0.09	0.009	0.009	0.005	527.0	0.4	3.0	0.3	0.03	0.03	0.016	1640	0.06	0.5	0.0	0.00	0.00	0.002	254
Scraper*	1	Overburden/Soil	1	2022	10	28	280	1.00	0.48	280	367	ULSD		0.13	0.93	0.06	0.008	0.008	0.005	527.0	0.04	0.3	0.02	0.003	0.003	0.002	185	0.01	0.1	0.0	0.00	0.00	0.000	29
Motor Grader - CAT140M3	1	Road Maintenance	1	2022	4	310	1240	1.00	0.41	1,240	252	ULSD		0.12	0.95	0.07	0.009	0.009	0.005	527.0	0.1	0.9	0.1	0.01	0.01	0.005	480	0.02	0.1	0.0	0.00	0.00	0.001	74
Loader - CAT 988K	3	Process/Loading	1	2022	11.5	310	3565	1.00	0.36	3,565	580	ULSD		0.13	0.98	0.10	0.009	0.009	0.005	527.0	2.1	15.6	1.6	0.15	0.15	0.079	8369	0.32	2.4	0.2	0.02	0.02	0.012	1297
Emergency Generator	1	Process/Loading	1	2022	-	310	50	1.00	0.74	50	70	ULSD		2.62	3.05	0.11	0.012	0.012	0.006	586.0	0.0	0.1	0.0	0.00	0.00	0.000	11	0.01	0.0	0.0	0.00	0.00	0.000	2
Subtotal																					***4.5***	***30.4***	***3.4***	***0.4***	***0.4***	***0.2***	***15974***	***0.7***	***4.7***	***0.5***	***0.06***	***0.06***	***0.023***	***2476***

On-Road Vehicles	No. Trucks			Hours/ Day	Days/ Year	Annual Hours per Truck		Speed (mph)	Travel Miles per Day				Emission Factors (g/mi)																				
													NOx	CO	ROG	PM10	PM2.5	SO2	CO2	NOx	CO	ROG	PM10	PM2.5	SO2	CO2	NOx	CO	ROG	PM10	PM2.5	SO2	CO2
Water Trucks (2022 Ford F-750)	2	-	-	9	310	2790	-	5	45	-	ULSD	-	4.663	0.62138	0.076	0.005	0.005	0.027	2868	0.93	0.12	0.02	0.00	0.00	0.005	569	0.14	0.02	0.00	0.0002	0.0001	0.001	88
Service Truck (2022 Ford F-750)	1			2	310	620		15	30		ULSD		3.529	0.23704	0.021	0.004	0.004	0.018	1947	0.23	0.02	0.00	0.00	0.00	0.001	129	0.04	0.00	0.00	0.0000	0.0000	0.000	20
Pick-up (2022 Ford F-250)	1			2	310	620		15	30		ULSD		0.220	0.18697	0.111	0.012	0.012	0.009	972	0.01	0.01	0.01	0.00	0.00	0.001	64	0.00	0.00	0.00	0.0001	0.0001	0.000	10
Pick-up (2022 Ford F-150)	1			2	310	620		15	30		Gas		0.024	0.75607	0.012	0.003	0.002	0.005	498	0.00	0.05	0.00	0.00	0.00	0.000	33	0.00	0.01	0.00	0.0000	0.0000	0.000	5
Subtotal	5			-	-	4650		-	135		-		-	-	-	-	-	-	-	***1.17***	***0.20***	***0.02***	***0.00***	***0.00***	***0.008***	***795***	***0.18***	***0.03***	***0.00***	***0.0003***	***0.0003***	***0.001***	***123***
TOTAL	-			-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	5.7	30.6	3.4	0.4	0.37	0.16	16,769	0.9	4.7	0.5	0.06	0.06	0.02	2599

Notes: On-Road vehicle emission factors from EMFAC2021 for Santa Clara Co. for MY 2022 HHDT, LHDT2, LDT2 Trucks in 2023

* A scraper would be periodically rented for topsoil/overburden removal. Specific make and model year not known. Default scraper information obtained from the CalEEMOD version 2020.4.0 model was used.

Emission Factors - Off-Road Compression Ignited Engines

	NOx			CO			THC			PM10			PM2.5			CO2			SO2
EF ID	ZH EF (g/hp-hr)	DR (g/hp-hr^2)	Fuel CF	ZH EF (g/hp-hr)	DR (g/hp-hr^2)	Fuel CF	ZH EF (g/hp-hr)	DR (g/hp-hr^2)	Fuel CF	ZH EF (g/hp-hr)	DR (g/hp-hr^2)	Fuel CF	ZH EF (g/hp-hr)	DR (g/hp-hr^2)	Fuel CF	ZH EF (g/hp-hr)	DR (g/hp-hr^2)	Fuel CF	(g/hp-hr)
ULSD7502022	0.13	1.75E-06	0.95	0.92	1.82E-05	1.00	0.05	1.17E-05	0.90	0.01	3.44E-07	0.90	0.01	3.75E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD5002017	0.23	3.05E-06	0.95	0.92	1.82E-05	1.00	0.05	1.17E-05	0.90	0.02	8.14E-07	0.90	0.02	8.14E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD5002022	0.13	1.75E-06	0.95	0.92	1.82E-05	1.00	0.05	1.17E-05	0.90	0.01	3.44E-07	0.90	0.01	3.44E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD5002022	0.13	1.75E-06	0.95	0.92	1.82E-05	1.00	0.05	1.17E-05	0.90	0.01	3.44E-07	0.90	0.01	3.44E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD5002022	0.12	1.59E-06	0.95	0.92	2.43E-05	1.00	0.05	1.17E-05	0.90	0.01	3.45E-07	0.90	0.01	3.45E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD7502022	0.13	1.75E-06	0.95	0.92	1.82E-05	1.00	0.05	1.17E-05	0.90	0.01	3.44E-07	0.90	0.01	3.44E-07	0.90	527.0	0.00E+00	1.00	0.005
ULSD1202022	2.76	3.62E-05	0.95	3.05	8.10E-05	1.00	0.10	2.50E-05	0.90	0.01	1.22E-06	0.90	0.01	1.22E-06	0.90	586.0	0.00E+00	1.00	0.006

Notes:

ZH EF = Zero hour emission factor

DR = Deterioration rate

ULSD = Ultra low sulfur diesel (15 ppmw sulfur, 0.0015% sulfur)

References:

Off-Road equipment emissions calculation methods based on ARB "California's Emissions Inventory for Off-Road Large Compression-Ignited (CI) Engines (> 25 HP)" MAC#99-32

CARB Off-Road diesel emission factors from from the OFFROAD2017 Orian modle (https://ww3.arb.ca.gov/msei/ordiesel/ordas_ef_fcf_2017_v7.xlsx)

Sargent Quarry: Off-Road Equipment & On-Site Vehicle Exhaust Emissions
Proposed Quarry Operation - 2023
Greenhouse Gases

	N2O	CH4
EF (kg/gal)	0.00026	0.00058
GWP	298	25

						MT CO2e/year				Total CO2e
Equipment Type	(gal/hr)	(gal/day)	(gal/yr)	N2O (kg/yr)	CH4 (kg/yr)	CO2	N2O	CH4	Total	(ton/year)
Dozer - CAT D-10T2	14.0	0.0	43,354	11.3	25.1	442.6	3.36	0.63	447	492
Excavator - CAT 374F L	9.5	0.0	29,495	7.7	17.1	301.1	2.29	0.43	304	335
Loader - CAT 980M	7.3	72.9	22,584	5.9	13.1	230.6	1.75	0.33	233	256
Scraper*	9.1	90.9	2,546	0.7	1.5	26.0	0.20	0.04	26	29
Motor Grader - CAT140M3	5.3	21.3	6,614	1.7	3.8	67.5	0.51	0.10	68	75
Loader - CAT 988K	32.3	371.9	115,284	30.0	66.9	1176.9	8.93	1.67	1187	1,309
Emergency Generator	3.0	-	149	0.0	0.1	1.5	0.01	0.00	2	2
Subtotal	80.5	557.0	220,026	57.2	127.6	***2246.1***	***17.0***	***3.2***	***2266***	***2,498***
n-Road Vehicles										
Water Trucks (2022 Ford F-750)				negligible	negligible	80.0	-	-	80	88
Service Truck (2022 Ford F-750)				negligible	negligible	18.1	-	-	18	20
Pick-up (2022 Ford F-250)				negligible	negligible	9.0	-	-	9	10
Pick-up (2022 Ford F-150)				negligible	negligible	4.6	-	-	5	5
Subtotal						***111.8***			***112***	***123***
TOTAL					Total	**2357.9**	**17.0**	**3.2**	**2378**	**2,621**

Attachment 3

Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[1] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[2] This HRA used the 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[3] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency and duration of exposure. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD for residential exposures, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. For children at schools and daycare facilities, BAAQMD recommends using the 95th percentile breathing rates. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways). For workers, assumed to be adults, a 25-year exposure period is recommended by the BAAQMD.

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0).

Functionally, cancer risk is calculated using the following parameters and formulas:

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[1] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

[2] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

[3] BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. December 2016.

Cancer Risk (per million) = $CPF \times Inhalation\ Dose \times ASF \times ED/AT \times FAH \times 10^6$

Where:

CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = $C_{air} \times DBR \times A \times (EF/365) \times 10^{-6}$

Where:

C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

The health risk parameters used in this evaluation are summarized as follows:

Parameter	*Exposure Type* →	Infant		Child		Adult
	Age Range →	3rd Trimester	0<2	2 < 9	2 < 16	16 - 30
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day) 80th Percentile Rate		273	758	631	572	261
Daily Breathing Rate (L/kg-day) 95th Percentile Rate		361	1,090	861	745	335
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Exposure Duration (years)		0.25	2	14	14	14
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73

Non-Cancer Hazards

Non-cancer health risk is usually determined by comparing the predicted level of exposure to a chemical to the level of exposure that is not expected to cause any adverse effects (reference exposure level), even to the most susceptible people. Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). The HI value represents the maximum concentration at which no adverse health effects to the respiratory system are anticipated to occur. OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

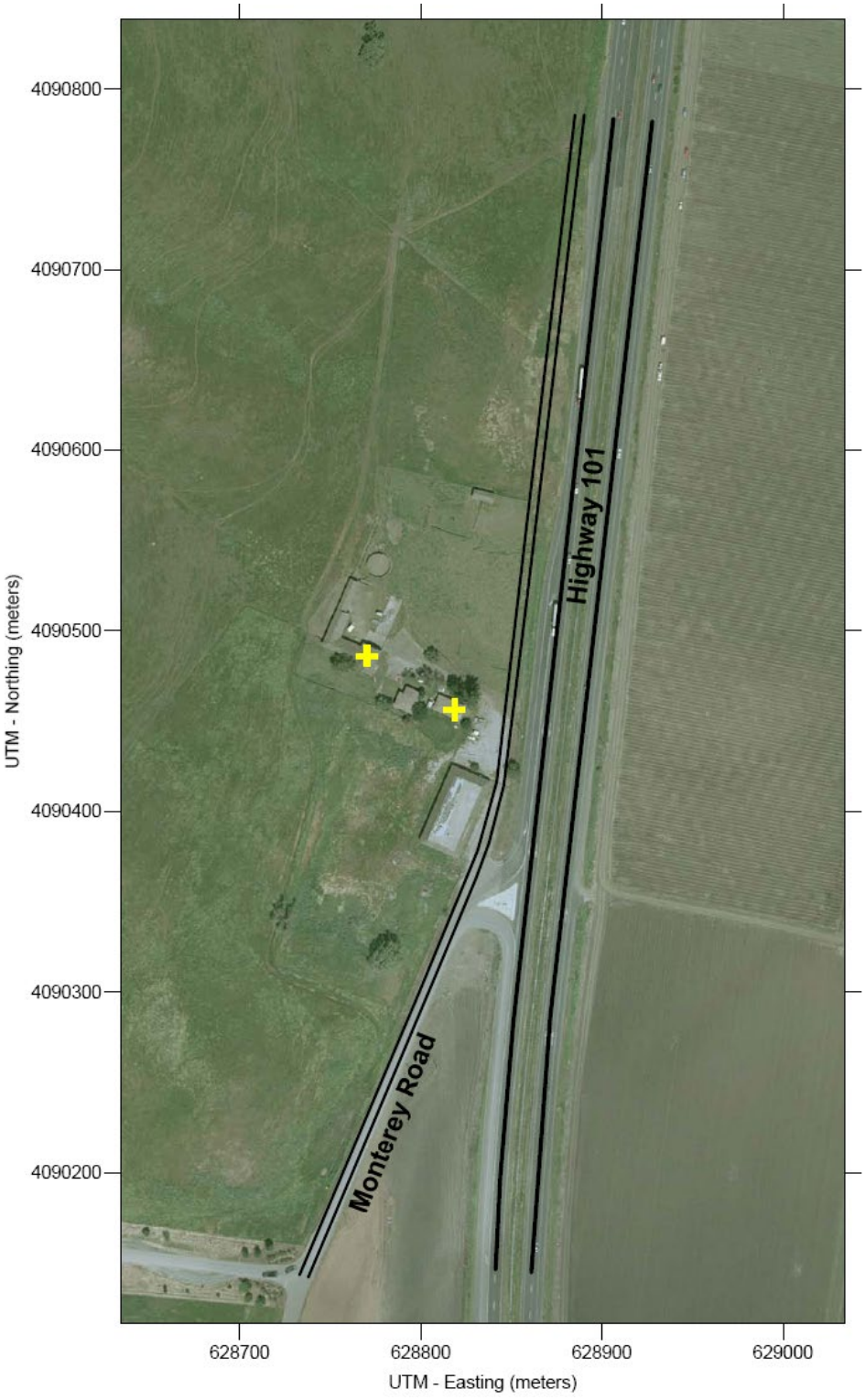
Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter $(\mu g/m^3)$.

Annual $PM_{2.5}$ Concentrations

While not a TAC, fine particulate matter ($PM_{2.5}$) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for $PM_{2.5}$ (project level and cumulative) are in terms of an increase in the annual average concentration. When considering $PM_{2.5}$ impacts, the contribution

from all sources of $PM_{2.5}$ emissions should be included. For projects with potential impacts from nearby local roadways, the $PM_{2.5}$ impacts should include those from vehicle exhaust emissions, $PM_{2.5}$ generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Residential Receptors and Road Segments used for Health Risk Modeling



Sargent Quarry - Truck emissions for Cancer Risk & PM2.5 Modeling
New Roads - Old Monterey Road & Highway 101- Proposed Project Traffic
Off -Site Truck DPM & PM2.5 Modeling - Roadway Links, Traffic Volumes, and DPM Emission Factors
Year = 2020

Link No.	Description	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	Annual Trucks	Hours per Day	Trucks per Hour	Average Speed (mph)
Haul Truck Travel										
H101N	Highway 101 North	2	641.2	44	13.3	3.0	36,972	24	4.2	55
H101S	Highway 101 South	2	266.1	44	13.3	3.0	4,108	24	0.5	55
MR_N	Monterey Road North	1	248.3	32	9.7	3.0	8,216	24	0.9	30
MR_S	Monterey Road South	1	222.7	32	9.7	3.0	11,502	24	1.3	30

Emission Factors

Vehicle Type	Travel Speed (mph)	Emission Factor Units	DPM (Exhaust)	PM2.5 (Fugitive)	PM2.5 (Total)
Heavy-Duty Diesel Trucks	55	gram/VMT	0.0706	0.048	0.119
Heavy-Duty Diesel Trucks	30	gram/VMT	0.0531	0.048	0.101

Emission factors from EMFAC2017 for Santa Clara County in 2020

For Paved Road Dust:
Mean vehicle Weight (tons) = 2.4
Silt Loading (g/m2) = 0.015

Sargent Quarry - Hwy 101 and Monterey Road DPM & PM2.5
Cal3qhcr Risk Modeling Parameters and Maximum Concentrations
Maximum Impact Off-Site Residential Receptor
Emissions Year = 2020

Receptor Information

Number of Receptors 1
Receptor Height = 1.5 meters
Receptor distances = 80 ft from roadway

Meteorological Conditions

Gilroy (BAAQMD) 1991-1993, 1995-1996
Land Use Classification rural
Wind speed = variable
Wind direction = variable

MEI Maximum Concentrations

Meteorological Data Year	Concentration ($\mu g/m^3$)	
	DPM	Total PM2.5
1991	0.00164	0.0029
1992	0.00191	0.0034
1993	0.00177	0.0031
1995	0.00164	0.0029
1996	0.00180	0.0032
Maximum	**0.0019**	**0.0034**
Average	**0.0018**	**0.0031**

Sargent Quarry - Maximum Cancer Risks & PM2.5 from Project Heavy Duty Diesel Trucks
Maximum Impact Off-Site Residential Receptor
30-Year Residential Exposure

Cancer Risk Calculation Method

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values **Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$**

TAC	CPF
DPM	1.10E+00

	Infant/Child			Adult
Age -->	3rd Trimester	0 - <2	2 - <16	16 - 30
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	0.85	0.72	0.72	0.73

* 95th percentile breathing rates

Road Traffic Cancer Risk by Year - Maximum Impact Receptor Location

				Maximum - Exposure Information		
Exposure Year	Year	Exposure Duration (years)	Age	Age Sensitivity Factor	Annual DPM Conc (ug/m3)	Increased Cancer Risk (per million)
0	2020	0.25	-0.25 - 0*	10	0.0018	0.020
1	2020	1	1	10	0.0018	0.21
2	2021	1	2	10	0.0018	0.21
3	2022	1	3	3	0.0018	0.03
4	2023	1	4	3	0.0018	0.03
5	2024	1	5	3	0.0018	0.03
6	2025	1	6	3	0.0018	0.03
7	2026	1	7	3	0.0018	0.03
8	2027	1	8	3	0.0018	0.03
9	2028	1	9	3	0.0018	0.03
10	2029	1	10	3	0.0018	0.03
11	2030	1	11	3	0.0018	0.03
12	2031	1	12	3	0.0018	0.03
13	2032	1	13	3	0.0018	0.03
14	2033	1	14	3	0.0018	0.03
15	2034	1	15	3	0.0018	0.03
16	2035	1	16	3	0.0018	0.03
17	2036	1	17	1	0.0018	0.01
18	2037	1	18	1	0.0018	0.01
19	2038	1	19	1	0.0018	0.01
20	2039	1	20	1	0.0018	0.01
21	2040	1	21	1	0.0018	0.01
22	2041	1	22	1	0.0018	0.01
23	2042	1	23	1	0.0018	0.01
24	2043	1	24	1	0.0018	0.01
25	2044	1	25	1	0.0018	0.01
26	2045	1	26	1	0.0018	0.01
27	2046	1	27	1	0.0018	0.01
28	2047	1	28	1	0.0018	0.01
29	2048	1	29	1	0.0018	0.01
30	2049	1	30	1	0.0018	0.01
Increased Cancer Risk			**Total**			**1.0**

* Third trimester of pregnancy