APPENDIX 4, Revised Air Quality Modeling

William W. Popenuck
Air Quality Consultant
P.O. Box 134
Orick, CA 95555

July 15, 2010

Ms Heidi Tschudin, Principal
Tschudin Consulting Group
710 21st Street
Sacramento, CA 95811

Subject: Revised Air Quality Modeling for Granite Esparto Mining Project, Yolo County

Dear Ms. Tschudin:

In response to a DEIR comment letter received from the Yolo-Solano Air Quality Management District, you engaged my services to re-run the air quality and climate change emission calculations for the Granite Esparto Mining Project and verify the results. The purpose of this correspondence is to transmit the results of my analysis and my conclusions.

For the record, I am a consulting air quality engineer with 29 years of experience in my field. I have extensive experience in air quality permitting, regulatory analysis, air quality dispersion modeling, control technology assessments, emission estimation methods, air toxics, and impact assessment. I have participated in a wide variety of air quality and emissions analyses for air quality permit applications, health risk assessments, and in support of environmental evaluations under CEQA and NEPA. I have attached a resume which provides additional details regarding my qualifications to perform this analysis for Yolo County (please see Exhibit 1, Resume for William W. Popenuck).

To provide a better estimate of potential emissions from the project and respond to specific comments on the DEIR, the emission calculations were modified and specific assumptions used for these calculations were documented. Both the criteria pollutant and GHG emission inventories were modified. The results of the modification to the DEIR emission inventory are provided in Exhibit 2 (Criteria Pollutant Emission Calculations) and Exhibit 3 (GHG Emission Calculations). Tables 4.4-4, 4.4-5, 4.4-6, 4.4-8, 4.4-9, and 4.4-10 in Section 4.4 Air Quality, and Tables 4.6-1 and 4.6-2 in Section 4.6 Climate Change, have been revised to reflect the revised emission calculations (Exhibit 4, Revised DEIR Tables). The emission calculation methods used, along with associated emission factors, and assumptions used are shown on these tables.

The revised emission inventory resulted in a decrease in NOx, ROG, PM10, fugitive dust, and diesel particulate matter (DPM) emissions. Emissions of CO and GHGs increased. Neither the decrease or increase in emissions were substantial enough to change the findings and conclusions of the DEIR air quality and climate change analyses. The biggest change in emissions was the decrease in the particulate matter (PM10, fugitive dust, and DPM) emissions. Even with this decrease in PM10 emissions, the emissions are still greater than the threshold of significance,

and the conclusions of the DEIR remain unchanged. With the decrease in DPM, it is expected that the estimated cancer risks at the high school and day care center would proportionally decrease from those presented in the DEIR.

The changes to the DEIR emission inventory are summarized below:

- Emission calculations for criteria pollutants and DPM were based on the peak annual mining rate of 1.2 million tons per year rather than the normal maximum mining rate of 1.0 million tons per year. Although the peak mining rate will not normally occur, estimating emissions at this mining rate ensures that the maximum potential impacts are evaluated. The GHG emission inventory was calculated based on the normal maximum mining rate of 1.0 million tons per year since it is the long term GHG emissions that are of concern and the long term average mining rate allowed for this project is not to exceed a 10-year running average of 1.0 million tons per year.

- The DEIR emission calculations for on road vehicles and trucks used emission factors from the South Coast Air Quality Management District. These emission factors are representative of the vehicle population, age distribution, and driving characteristics (trip lengths, number of starts, etc.) of vehicles in the South Coast Air Basin. Emission factors that are more representative of vehicles in the project region were used for the revised emission calculations. Specifically, the CARB EMFAC2007 mobile source emissions model was used to calculate emissions factors for vehicles in the YSAQMD area. These emission factors where then used to calculate emissions from on road project-related mobile sources.

- The DEIR emission calculations for off road mobile equipment were based on a national average age distribution for off road equipment in 2007 developed by the U.S. EPA for calculating nationwide GHG emissions. The off road equipment used for the proposed project will be made up of equipment specifically required for the project and will be more representative of Granite Construction Company's off road mobile equipment fleet characteristics. The revised emission calculations for off road mobile equipment used an equipment age distribution based on information from the applicant and one that would be consistent with the CARB regulatory requirements for off road diesel equipment.

- Material throughputs for the processing plant were revised to better reflect the material flows through individual plant processing equipment rather than assuming that the entire daily throughput was processed by each piece of equipment.

- Emission factors for GHG compounds (CO_2, N_2O, and CH_4) were updated to reflect the most recent emission factors available from the California Climate Action Registry.

In conclusion, it is my opinion that this revised analysis clarifies and amplifies the likely air quality and climate change impacts of the project using more accurate assumptions and more refined modeling methods reflective of acceptable practice in the Yolo-Solano region. This information should address the questions raised by the Yolo Solano AQMD regarding the modeling done originally for the project. This revised analysis does not change the conclusions

of the DEIR and would not in my opinion trigger any of the thresholds for recirculation identified in Section 15088.5 of the CEQA Guidelines. Rather it falls under Section 15088.5(b).

Please contact me at popenuck@starband.net or (707) 488-3935 if you have any further questions. Thank you.

Sincerely,

William W. Popenuck
Air Quality Consultant

Attachments:

Exhibit 1, Resume
Exhibit 2, Criteria Pollutant & DPM Emission Calculations
Exhibit 3, GHG Emission Calculations
Exhibit 4, Revised DEIR Tables

Exhibit 1

WILLIAM W. POPENUCK
Air Quality Consulting

P.O. Box 134
Orick, CA 95555
(707) 488-3935

EDUCATION

University of California, Davis, Masters Program, Civil Engineering, 1983.
University of California, Davis, Graduate Course Work in Atmospheric Science
Humboldt State University, B.S., Environmental Resources Engineering, 1980

PROFESSIONAL HISTORY

Independent Consultant, 2000 - present
EnviroNet AeroScience, LLC, Senior Engineer / Principal, 1996-2000
Kleinfelder, Inc. - Atmospheric Science Center, Senior Project Engineer, 1995-1996
Woodward-Clyde Consultants, Project Engineer, 1986-1995
Humboldt State University, CA, Lecturer, Environmental Resources Engineering Department, 1983-1985
Woodward-Clyde Consultants, Staff Engineer, 1981-1982

PROFESSIONAL AFFILIATIONS

Air and Waste Management Association

REPRESENTATIVE EXPERIENCE

Mr. Popenuck has extensive experience in air quality permitting, regulatory analysis, air quality dispersion modeling, control technology assessments, emission estimation methods, air toxics, and impact assessment. In his 29 years of professional experience he has participated in a wide variety of air quality and emissions analyses for air quality permit applications, health risk assessments, and in support of environmental evaluations under CEQA and NEPA. He has used and is thoroughly familiar with numerous air quality dispersion models for regulatory and research applications, and has been involved with development of air quality dispersion models and emissions models for specialized applications. He has an in-depth knowledge of federal and state air quality regulations.

Mr. Popenuck's technical background includes development of emission inventories for both criteria pollutants and toxic air contaminants, modeling of impacts, evaluation of regulatory applicability, compliance audits, preparation of health risk assessments, preparation of Operating Permits (Title V) and related compliance monitoring plans, New Source Review (NSR), and Prevention of Significant Deterioration (PSD) permitting, as well as and minor source permitting. He has been involved in numerous evaluations of air quality impacts from commercial and industrial developments, power generation facilities, quarries, mines, construction projects, health risk evaluations of diesel particulate matter (DPM) for residential and commercial developments, and federal conformity evaluations for public works projects. Representative projects include:

Regulatory Analysis and Environmental Assessments

Harris Quarry Expansion, Mendocino County, California - Prepared the air quality, health risk, and odor sections for an EIR of a proposed quarry expansion and the addition of a concrete and hot mix asphalt plant at an existing quarry. The air quality evaluation included assessing impacts associated with the proposed expansion and new facilities. Emissions of criteria and toxic air pollutants from quarrying, asphalt and concrete production were calculated. A health risk evaluation was prepared to assess emissions from the asphalt plant and diesel particulate matter emissions from mobile equipment associated with the project.

Organics Processing Development Project EIR - Air Quality and Health Risk Assessments, Alameda County Waste Management Authority - Prepared the air quality section for an EIR of a proposed 600 ton per day green waste and food waste composting facility in Sunol, California proposed by the Alameda County Waste Management Authority. The air quality and health risk assessments included detailed emission estimates of criteria pollutant and toxic air contaminant emissions from facility operations (stationary and mobile equipment, as well as from the composting process), dispersion modeling of facility emissions, and evaluation of potential health risks from compost emissions, stationary and mobile onsite diesel fueled equipment, and from offsite diesel-fueled haul trucks accessing the compost facility.

CEQA Air Quality Analysis for a Concrete and Asphalt Recycling Facility and Maritime Support Services Project at the Former Oakland Army Base - Prepared an air quality analysis for a proposed facility that would crush and recycle concrete and asphalt materials from off-site sources. The project, located at the former Oakland Army Base, is associated with the City of Oakland's Central Gateway development area at the former army base. The air quality study was used for an Initial Study/Mitigated Negative Declaration (IS/MND), and included evaluation of air pollutant emissions from the proposed crushing and grinding operations and associated heavy duty truck traffic emissions for comparison to the Bay Area Air Quality Management District (BAAQMD) CEQA significance thresholds

Blue Rock Quarry Expansion Environmental Impact Report, Sonoma County, California - Prepared the air quality impact evaluation for an EIR of expansion of an existing quarry near Forestville, California. This included evaluation of existing air quality conditions in the project region, development of baseline and project emissions, and evaluation of potential impacts from on-site and off-site emission sources. Emissions sources associated with the proposed quarry expansion included fugitive dust from quarrying, emissions from on-site mobile equipment and vehicles, and emissions from heavy-duty diesel haul trucks traveling to and from the quarry. As part of the evaluation for the project an analysis of potential health risks from on-site and off-site diesel particulate matter emissions was conducted.

Air Quality Evaluation for a Material Processing and Transfer Station, Santa Clara - Prepared and evaluation of potential air quality impacts from relocation of GreenWaste Recovery Inc.'s green wastes and compostable materials processing operations from their existing materials processing and transfer station (MPTS) in San Jose, CA to a new MPTS in Santa Clara, CA. The new MPTS would handle up to 1,500 ton per day of material. Air quality impacts were evaluated for emissions from collection and transfer trucks hauling materials to and from the new MPTS and from processing the materials at the facility.

Lexington Quarry, Santa Clara County, CA - Prepared an air quality impact assessment for an EIR of the modification to an existing quarry's operations. The air quality study included evaluation of baseline and project criteria pollutant emissions from on-site mining activities and off-site emissions associated with quarry haul trucks, and evaluation of potential impacts associated with the quarry's emissions.

Barn II Quarry Environmental Assessment, Pacific Lumber Company - Prepared the air quality section of an Environmental Assessment for a proposed rock quarry in Humboldt County, California. The air quality analysis included estimation of on-site and off-site emissions from quarry operations and associated activities.

Air Quality Impact Study, OMYA, Inc., Limestone Quarry and Processing Plant - Prepared an air quality evaluation as part of a U.S. Forest Service Environmental Assessment (EA) for a limestone quarry expansion project in central Arizona. The air quality evaluation included preparation of Baseline/Existing Environment and Project Impacts sections for the EA. A detailed emissions inventory was developed as part of the project. Of particular concern were potential impacts associated with particulate matter emissions from quarry operations, as well as concern over potential visibility impacts at a nearby U.S. Forest Service Wilderness Area, also designated

as a Class I area. Air quality dispersion modeling and visibility modeling were conducted to assess impacts in the project vicinity and the Class I area.

Continuous Emissions Monitor Feasibility Study, Endako Mines, Thompson Creek Mining. Endako, Canada - Prepared a detailed feasibility study for installing a continuous emissions monitor for sulfur dioxide at a molybdenum roaster. The study included a survey of molybdenum roasters world-wide to identify the types of emission controls used for sulfur dioxide and particulate matter, as well as identifying the types of emission monitoring used at these facilities. The study also included budget level cost estimates for installing sulfur dioxide CEMs, as well as unique issues (i.e., an oily residue in the roaster flue gas) affecting any potential monitoring methods. Extractive, in-situ, and optical emission monitoring methods were evaluated.

Air Quality Study of Emergency Power Backup Systems, San Jose, California.- Prepared an air quality study and health risk evaluation for emergency power backup systems at a proposed data storage facility in San Jose, California. The proposed power backup system includes seven 3,000 megawatt diesel-fueled emergency generators and associated equipment. Emissions of criteria pollutants, and diesel particulate matter from the proposed facility were estimated and a health risk evaluation for diesel particulate emissions was conducted. Air quality dispersion modeling was used to evaluate air quality impacts and potential health risks from diesel particulate matter emissions from the facility.

Air Quality Permitting (PSD/NSR)/Modeling

PM_{10} Increment Modeling Analysis – Humboldt Bay Repowering Project, Eureka, California: Prepared an independent Class II Prevention of Significant Deterioration (PSD) PM_{10} increment analysis for the Humboldt Bay Repowering Project. This analysis was conducted for the North Coast Unified Air Quality Management District (NCUAQMD) in support of their evaluation of the Pacific Gas & Electric Company (PG&E) Application for Certification for the repowering project. Work included coordinating with the NCUAQMD in developing a PM_{10} emissions inventory, including emissions from existing and historical sources, and conducting detailed air quality dispersion modeling of regional PM_{10} emission sources.

Air Quality Permitting for a 115 Million Gallon per Year Ethanol Facility, E-85, Inc, Wallula, Washington - Prepared a Notice of Construction permit application for a proposed dry-mill ethanol facility located near Wallula, Washington. The facility would produce up to 115 million gallons per year of denatured alcohol using corn as the feedstock. The air quality analyses for the permit application included estimation of criteria and toxic air pollutant emissions from facility processes, evaluation of Best Available Control Technology (BACT) for emission sources at the facility, air quality dispersion modeling using the EPA's AERMOD dispersion model, and evaluation of potential impacts from the facility's toxic air pollutant emissions.

Air Quality Permitting for a Biogas Generation Facility, United Power Company, Boardman, Oregon – Prepared an air quality evaluation and permit application for a proposed 9.5 Megawatt biogas power generation facility. The project included production of biogas from manure at a large dairy farm in northeastern Oregon, and use of the biogas for power production from five IC engine-generators. Air quality permitting included evaluation of emissions, air quality modeling of potential impacts, and evaluation of emission controls to satisfy state and federal emission control technology requirements.

Power Generation Facility – 1,300 MW Combined-Cycle, Washington EFSEC Application and Air Quality Permitting, Newport Northwest LLC, Wallula, Washington - Prepared the air quality portions of an Application for Site Certification and PSD/NSR air quality permit application required by the Washington State Energy Facility Site Evaluation Council (EFSEC). The project was a major source subject to PSD requirements for all pollutants other than PM10. Extensive air quality modeling was required to assess local and regional air quality, as well as assessing potential long-range impacts in federal Class I areas of concern.

The project site was located within a PM_{10} nonattainment area and emission offsets were required and evaluated. Other air quality analyses included evaluation of cooling tower plume visibility, drift, and salt deposition; evaluation of Best Available Control Technology (BACT) for all pollutants other than PM10, and Lowest Achievable Emission Rate (LAER) for PM10; and assessment of potential toxic air pollutant impacts.

Air Quality Permitting for an Ammonia/Urea Plant, Btu Nitrogen Company, Wallula, Washington - Prepared a Notice of Construction application for the proposed Btu Nitrogen Plant near Wallula, Washington which included a 600 ton per day ammonia plant and 1,000 ton per day urea fertilizer plant. The facility was to be located in a PM10 nonattainment area. Air quality modeling was used to demonstrate compliance with PM10 requirements and air quality standards for criteria and toxic air pollutants. Additionally, Best Available Control Technology analyses were prepared for both criteria and toxic air pollutants.

Air Quality Permitting for Solar Combustion Turbine, Avista Corporation, Kettle Falls, Washington - Prepared a Notice of Construction application for the addition of a 6.9 MW Solar Taurus 70 combustion turbine-generator to the Kettle Falls Generating Station. Air quality dispersion modeling was conducted to assess impacts from the proposed new turbine as well as evaluating cumulative PSD increment consumption with the existing facility. Toxic air pollutant (TAP) emissions from the turbine also modeled and evaluated. A Best Available Control Technology (BACT) evaluation was prepared to evaluate CO and NOx emission controls for the turbine. Use of the Solar SoLoNOx system established as BACT for NOx and CO.

Power Generation Facility – 1,250 MW Combined-Cycle, PSD Air Quality Permitting, Kootenai Generation LLC, Rathdrum, Idaho. Managed the preparation of a PSD permit application for a proposed 1,250 MW gas-fired combined-cycle turbine power generation facility located in Rathdrum, Idaho. Evaluation of local and regional air quality impacts were assessed with the ISCST3 model and CTSCREEN model for impacts in complex terrain. Potential impacts on regional haze and acid deposition on distant federal Class I areas were evaluated with the CALPUFF modeling system. Other air quality evaluations required for the PSD permit application include evaluation of impacts from toxic air pollutants and evaluation of Best Available Control Technology (BACT).

Power Generation Facility Air Quality Permitting, Washington Water Power, Rathdrum, Idaho - Prepared air quality permit application for a 180-MW gas turbine peak power generation facility in northwestern Idaho for the Washington Water Power Company. Potential impacts in complex terrain were evaluated. Interacted with permitting agency and assisted client in public participation program associated with permitting the project. Additional work included working with client to identify Acid Rain Program monitoring and reporting requirements and evaluation of CEMS data acquisition and handling system (DAHS) performance.

Air Quality Permitting for Air Pollution Control Retrofit of a 66 MW Power Generation Facility, Avista Corporation, Spokane, Washington - Prepared a Notice of Construction air quality permit application for the addition of an oxidation catalyst for control of carbon monoxide emissions. Two existing 33 MW turbines were permitted as a synthetic minor and Avista desired to increase their hours of operation. This necessitated permitting the turbines as a major source. The permit application required evaluation of potential air quality impacts from criteria and toxic air pollutants. Additionally, a BACT evaluation was prepared which included identification of potential emission control technologies for nitrogen oxides and carbon monoxide, evaluation of feasibility, and an economic analysis to assess emission control cost effectiveness.

Best Available Control Technology (BACT) Evaluation for Solar Turbines, San Diego State University Cogeneration Project, San Diego, California - Prepared a BACT evaluation for two proposed Solar Mercury 50 combined-cycle, natural gas fired, combustion turbines at a new 12.4 MW cogeneration facility on the San Diego State University campus.

Diesel Generator Air Quality Permitting, Davenport Energy, LLC, Bend Oregon - Conducted an emissions analysis and prepared air quality permit applications for two 1,500 MW diesel-fueled generators that were to be used at a site for exploratory geothermal drilling.

Air Quality Permitting (Title V)

Air Operating Permit (Title V) Application and Compliance Monitoring Plans, Washington Water Power, Kettle Falls Generating Station, Washington - Prepared a Title V Air Operating Permit (AOP) application for a wood-waste fired power plant for Washington Water Power. Prior to the Title V permit application, several modifications to their existing permit were evaluated to address potential compliance issues. Modifications were to the facility's federal PSD permit, as well as its existing state permit were prepared, submitted and approved by the regulatory agencies. Tasks included estimation of emissions, air quality dispersion modeling, evaluation of applicable regulations, and preparation of permit applications. Once the AOP was issued, compliance monitoring plans were developed to track on-going compliance and reporting requirements.

Air Operating Permit (Title V) Application, Avista Corporation, Spokane, Washington - Prepared a Title V Operating Permit application for a 66 MW generating facility comprised of two 33 MW simple-cycle gas-fired turbines. Tasks included estimation of emissions, evaluation of applicable regulations, and preparation of permit applications.

Title V Operating Permit, Washington Water Power, Rathdrum Combustion Turbines - Managed and prepared a Title V Operating Permit application for a 190 MW power generating facility located in Idaho, and operated by the Washington Water Power Company. The facility consists of two 90 MW natural gas fired turbines that are intermittently operated. Tasks included estimation of emissions, evaluation of applicable regulations, and preparation of permit applications.

Diesel Particulate Matter Evaluations and Health Risk Assessments

Evaluation of Potential Health Risks from Diesel Vehicles, Various Locations, California - Conducted over 45 health risk evaluations for exposure to emissions of DPM at new residential and commercial developments proposing to locate near highways or major roadways. Emissions from diesel vehicles were estimated and DPM concentrations calculated using roadway dispersion modeling. Potential health risks were then calculated based on the modeled concentrations. These studies were prepared for use in EAs, EIRs, and in County General Plans.

Evaluation of Potential Health Risks from Port Operations, Port of Stockton, California - Conducted an updated Programmatic EIR dispersion modeling analysis and evaluated associated off-site receptor health risks from diesel particulate matter emissions generated by on-road, off-road, and marine-diesel engines associated with build-out of the Port of Stockton West Complex Development Plan. Emission sources included truck idling and maneuvering, heavy-duty yard equipment, rail, harborcraft, and ocean-going vessels. Also conducted project-level diesel and toxic air contaminant (TAC) modeling and risk analyses for Port of Stockton projects not addressed in the Port's Program EIR. TACs modeled included methyl bromide and TACs from natural gas combustion.

U.S. Gypsum, Port of Stockton, California - Conducted a third-party review of the air quality and health risk analyses for a proposed gypsum manufacturing facility to be located at the Port of Stockton, CA. The air quality and health risk analyses will be used in preparation of an EIR for the proposed gypsum facility. The review included evaluation of criteria and toxic air pollutant emissions and the air quality dispersion modeling used for the impact assessment and health risk assessment.

IC Engines Power Production, Moses Lake Generating Facility – Valley Electric/Sempra Energy, Moses Lake, Washington - Prepared air quality impact analyses for Notice of Construction and Title V Air Operating permit applications for 26 diesel and natural gas fueled engine generators at a power generation facility in eastern Washington. Criteria and toxic air pollutant emission inventories were developed and air quality dispersion modeling was conducted to assess potential impacts. The air quality analysis included evaluation of Best Available Control Technology for control of criteria pollutants, as well as for diesel particulate matter. Potential health effects associated with diesel particulate matter emissions from the facility were also evaluated. A Risk Management Plan (RMP) was also prepared for the facility.

Health Risk Assessments, Various Facilities - Managed, prepared, and reviewed numerous air toxics health risk assessments associated with the California AB 2588 Air Toxics "Hot Spots" Information and Assessment Act. Projects include a gasoline bulk loading terminal, municipal wastewater treatment plant (with sludge incineration), several cogeneration facilities, shipbuilding facilities, and an electronics manufacturing facility.

While at Humboldt State University, Mr. Popenuck taught a variety of engineering courses including Fluid Mechanics, Applied Hydraulics, Heat and Mass Transfer, Air Quality, and computer programming.

PUBLICATIONS

Koehler, J. and Popenuck, W. W., Competing Air Quality and Waste Management Goals with Permitting Composting Facilities in California, presented at the 103rd Annual Conference of the Air and Waste Management Association, Calgary, Canada, June 2010.

Popenuck, W.W., Comparison of a Turbulent Shear Flow Model with the Project Prairie Grass Diffusion Data, presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, CO, June 1993.

Popenuck, W.W. and R.D. Bornstein, A Review of the Development and Application of the Meteorological Preprocessor Programs to the U.S. EPA Air Quality Models, presented at The Workshop for the Development and Application of Air Quality Models, Taipei, Taiwan, May 1991.

Steiner, W.E., J.L.M. Koehler, and W.W. Popenuck, Guadalupe Corridor Transportation Project Asbestos Health Risk Assessment, presented at the Third International Symposium on Highway Pollution, Commission of the European Community, Munich, West Germany, September 1989.

Popenuck, W.W. and J.L.M. Koehler, Current Practices in Air Pollution Dispersion Modeling in the United States, presented at the conference on The Application of U.S. Water and Air Pollution Control Technology in Korea, Seoul, South Korea, March 1989.

J.D. Dean, K.A. Voos, R.W. Schanz, and W.W. Popenuck, Terrestrial Ecosystem Exposure Assessment Model (TEEAM), U.S. Environmental Research Laboratory, Office of Research and Development, Athens, GA, 1988 (EPA/600/03-88/038).

A-1. Offroad Fuel Use (Revised)

Peak Year Mining

Equipment Type	Equip. Qty.	Rating BHP	Load factor	Daily hours	Annual days	Annual hours	Hourly gals	Daily gals	Annual gals
Mining Operation									
Scraper (stripping spread)	1	450	56%	2	212	424	13	26	5,449
Scraper / Loader (mining)	2	450	56%	7	212	2,968	26	180	76,289
Dragline (mining)	1	550	56%	8	212	1,696	16	126	26,641
Reclamation Operation (nonsimultaneous with mining)									
Bulldozer	1	360	56%	8	42	336	10	82	3,455
Motor Grader	1	180	56%	8	42	336	5	41	1,727
Processing Operation									
Front-End Loader #1	1	500	56%	8	212	1,696	14	114	24,219
Front-End Loader #2	1	500	56%	8	254	2,032	14	114	29,017
Maintenance & Storage									
Motor Grader	1	180	56%	2	212	424	5	10	2,180
Tractor / Backhoe	1	80	56%	2	212	424	2	5	969
Totals, 1000 gallons (mgal)							**0.090**	**0.575**	**169.946**

Project Activity	Hourly gal/hr	Daily gal/day	Annual gal/yr
Mining Operation	54	331	108,379
Reclamation Operation	15	123	5,182
Processing Operation	29	228	53,236
Maintenance & Storage	7	15	3,148
Totals (rounded)	**90**	**570**	**170,000**

Notes:
Equipment list and operational times per Granite Construction Company, May 2009, updated November 2009
Hours and days estimated based on plant production of 700 tons/hour (5,600 tons/day) & 1,200,000 tons/year mined
Approximately 212 days of plant operation
Facility open 254 days/yr
Average Load Factor = 56% (SCAQMD CEQA Guidelines Table A9-8-D)
BSFC = (7,000 BTU/BHP-hr) / (137,030 BTU/gal) = 0.051 gal/BHP-hr (AP-42 Table 3.3-1)
Fuel Rate, gal/hr = QTY * BHP * LF * BSFC
Max hourly & max daily excludes reclamation activity (not simultaneous with mining)

A-2 Offroad Emissions (Revised)

Peak Year Mining

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	Diesel Engine, Nonroad Tiers	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	
TOTAL PROCESS RATE	169.946	mgal/yr
DAILY MAX PROCESS RATE	0.575	mgal/day
HOURLY MAX PROCESS RATE	0.090	mgal/hr
DAILY MAX SCHEDULE	8	hrs/day
HEAT RATE	7000	BTU/bhp-hr

EMITTENT	FACTOR lb/mgal	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Oxides of Nitrogen (as NO_2)	181.3	30,811	15.41	104.2	16.36
Hydrocarbons (ROC as CH_4)	25.9	4,402	2.20	14.9	2.34
Carbon Monoxide (CO)	164.0	27,871	13.94	94.2	14.80
Particulates (as PM_{10})	8.6	1,462	0.73	4.9	0.78
Sulfur Dioxide (SO_2)	0.2	34	0.02	0.1	0.02
Diesel Particulate Matter (DPM)	8.6	1,462	0.73	4.9	0.78
Fugitive Dust (as PM_{10})		13,802	6.90	62.7	7.83

Notes:
Composite emission factors per Nonroad Tiered Factors (A-12.)

A-3. Fugitive Dust (Revised)

Peak Year Mining

Table 4.4-8 Estimated Mining Fugitive Dust Emissions

Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	acres	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Mining or Reclamation Operation	5.00	212	51.0	6.1	255	54,060	31	6,487	88%
Processing Operation	2.00	254	51.0	6.1	102	25,908	12	3,109	88%
Maintenance & Storage	0.50	212	51.0	6.1	26	5,406	3	649	88%
Totals	**7.50**				**383**	**85,374**	**46**	**10,245**	**88%**

Sources: USEPA 2006, BAAQMD 1999, YSAQMD 2007

Table 4.4-9 Estimated Processing Fugitive Dust Emissions

Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	tons	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Screening (4)	2,250	212	0.00870	0.00074	78	16,600	7	1,412	91%
Primary & Secondary Crushing (2)	1,200	212	0.00240	0.00054	6	1,221	1	275	78%
Fines Crushing (1)	2,400	212	0.01500	0.00120	36	7,632	3	611	92%
Conveyor Transfer Points (69)	1,872	212	0.00110	0.000046	142	30,122	6	1,260	96%
Totals					**262**	**55,575**	**17**	**3,557**	**94%**

Source: USEPA 2004

Mining & Processing Totals					645	140,949	63	13,802	90%

Table 4.4-10 Estimated Truck Traffic Fugitive Dust Emissions

Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	tons	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Onsite Only Trucks					31	7,925	4	951	88%
Offsite Trucks When Onsite					82	20,899	10	2,508	88%
Totals					**113**	**28,824**	**14**	**3,459**	**88%**

Source: USEPA 2006, YSAQMD 2007

Notes:

Fugitive dust (as PM10) 51 lb/acre-day unmitigated, BAAQMD CEQA Guidelines, Section 3.3

BAAQMD Ref: AP-42 Chapter 13.2.3 "Heavy Construction Operations"

Mitigation Ref: AP-42 Chapter 13.2.2 "Unpaved Roads", Figure 13.2.2-2

Processing Ref: AP-42 Chapter 11.19.2

Yolo-Solano AQMD

Handbook for Assessing and Mitigating Air Quality Impacts, Table 5

A-4 Onsite Truck Trip (Revised)

Peak Year Mining

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	MD Truck Trips	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	

	miles	trips (hrs)
TOTAL PROCESS RATE	30480	6096
DAILY AVG PROCESS RATE	120	24
HOURLY MAX PROCESS RATE	25	5

EMITTENT	FACTOR lb/mi	FACTOR lb/trip	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Oxides of Nitrogen (as NO_2)	0.00631	0.0023	206	0.10	0.81	0.17
Hydrocarbons (ROC as CH_4)	0.00029	0.0004	11	0.01	0.04	0.01
Carbon Monoxide (CO)	0.00231	0.0054	104	0.05	0.41	0.08
Particulates (as PM_{10})	0.00019	0.00002	6	0.00	0.02	0.00
Sulfur Dioxide (SO_2)	0.00002	0.0000	1	0.00	0.00	0.00
Diesel Particulate Matter (DPM)	0.00019	0.00002	6	0.00	0.02	0.00
Fugitive Dust (as PM_{10})	0.03120		951	0.48	3.74	0.78

Notes:
California Climate Action Registry (CCAR), 2009
Onroad N_2O & CH4 per CCAR Table C-4
EMFAC 2007 for YSAQMD for MD trucks
AP-42 Section 13.2.2 Unpaved Roads, Equation 1b, 88% controlled (watering)
100% of travel on dirt roads @ 5 mph
Service Trucks: 4 ea * 4 hrs/day * 5 mph
Water Trucks: 1 ea * 8 hrs/day * 5 mph
Hourly: 5 ea * 5 mph
Plant open 254 days/yr

A-5 Offsite Trucks (Revised)

Peak Year Mining

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	HHD Truck Trips	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	

	miles	trips (count)	
TOTAL PROCESS RATE	2849880	47498	per year RT
DAILY AVG PROCESS RATE	11220	187	per day RT
HOURLY MAX PROCESS RATE	701	23	per hour OW

EMITTENT	FACTOR lb/mi	FACTOR lb/trip	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Oxides of Nitrogen (as NO_2)	0.02436	0.07467	72,973	36.49	287.30	18.83
Hydrocarbons (ROC as CH_4)	0.00201	0.00622	6,013	3.01	23.67	1.55
Carbon Monoxide (CO)	0.00888	0.48914	48,554	24.28	191.16	17.66
Particulates (as PM_{10})	0.00106	0.00002	3,017	1.51	11.88	0.74
Sulfur Dioxide (SO_2)	0.00003	0.00000	88	0.04	0.35	0.02
Diesel Particulate Matter (DPM)	0.00091	0.00002	2,596	1.30	10.22	0.64
Fugitive Dust (as PM_{10})	0.05280		2,508	1.25	9.87	1.23

Notes:
California Climate Action Registry (CCAR), 2009
Onroad N_2O & CH4 per CCAR Table C-4
EMFAC 2007 for YSAQMD for HHD trucks
AP-42 Section 13.2.2 Unpaved Roads, Equation 1b, 88% controlled (watering)
60 miles roundtrip distance
1 mile of travel on dirt roads @ 15 mph for onsite portion
1,044,000/254 = 4,110 tons/day sold (average)
22 tons/truckload
4,110/22 = 187 trucks/day
Shipping 254 days/yr

A-6 Emissions Summary (Revised)

Peak Year Mining

Table 4.4-4 Estimated Onsite Operational Emissions			
Project Emissions	**Onsite Equipment & Trucks**		
	tons/yr	**lb/day**	**lb/hr**
Oxides of Nitrogen (as NO_2)	15.5	105.0	16.5
Hydrocarbons (ROC as CH_4)	2.2	14.9	2.3
Carbon Monoxide (CO)	14.0	94.6	14.9
Particulates (as PM_{10})	0.7	5.0	0.8
Sulfur Dioxide (SO_2)	0.0	0.1	0.0
Diesel Particulate Matter (DPM)	0.7	5.0	0.8
Fugitive Dust (as PM_{10})	7.4	66.4	8.6

Sources: USEPA 2006, USEPA 2009a, SCAQMD 2008

Table 4.4-5 Estimated Offsite Operational Emissions			
Project Emissions	**Offsite Trucks**		
	tons/yr	**lb/day**	**lb/hr**
Oxides of Nitrogen (as NO_2)	36.5	287.3	18.8
Hydrocarbons (ROC as CH_4)	3.0	23.7	1.6
Carbon Monoxide (CO)	24.3	191.2	17.7
Particulates (as PM_{10})	1.5	11.9	0.7
Sulfur Dioxide (SO_2)	0.0	0.3	0.0
Diesel Particulate Matter (DPM)	1.3	10.2	0.6
Fugitive Dust (as PM_{10})	1.3	9.9	1.2

Sources: USEPA 2006, USEPA 2009a, CARB 2006

Table 4.4-6 Estimated Total Operational Emissions			
Project Emissions	**Combined Total**		
	tons/yr	**lb/day**	**lb/hr**
Oxides of Nitrogen (as NO_2)	**52.0**	392.3	35.4
Hydrocarbons (ROC as CH_4)	5.2	38.6	3.9
Carbon Monoxide (CO)	38.3	285.8	32.6
Particulates (as PM_{10})	2.2	**16.8**	1.5
Sulfur Dioxide (SO_2)	0.1	0.5	0.0
Diesel Particulate Matter (DPM)	2.0	15.2	1.4
Fugitive Dust (as PM_{10})	8.6	**76.3**	9.8

Sources: USEPA 2006, USEPA 2009a, CARB 2006

Significance Criteria	**Total Project**	
	tons/yr	**lb/day**
Oxides of Nitrogen (as NO_2)	10	n/a
Hydrocarbons (ROC as CH_4)	10	n/a
Particulates (as PM_{10})	n/a	80
Carbon Monoxide (CO)	Violation of CAAQS for CO	
TAC Cancer (MEI)	Probability => 10 in 1,000,000	
TAC Noncancer (MEI)	Hazard Index => 1	

Reference:

Yolo-Solano AQMD

Handbook for Assessing and Mitigating Air Quality Impacts, Table 1

A-7. Modeling Input (Revised)

Peak Year Mining

Pollutant	Onsite Operations	
	Hourly	Hourly
	lbs/hr	g/sec
Nitrogen Oxides (as NO_2)	16.53	2.083
Sulfur Dioxide (SO_2)	0.02	0.002
Carbon Monoxide (CO)	14.89	1.876
Particulates (as PM_{10})	0.78	0.098
Particulates (as $PM_{2.5}$)*	0.77	0.097
Diesel Particulate Matter (DPM)	0.78	0.098
Fugitive Dust (as PM_{10})	8.61	1.085

Release Parameter	Units	Operations	DPM SR1	DPM SR2	Area Source
Fuel Usage	gal/hr	90	90	90	
Higher Heating Value	BTU/gal	137,030	137,030	137,030	
Heat Input	mmBTU/hr	12.4	12.4	12.4	
Fw Factor	wscf/mmBTU	10,320	10,320	10,320	
Release Flowrate	wscf/hr	452,100	452,100	452,100	
Release Flowrate	wacf/sec	300	300	300	
Release Flowrate	wacm/sec	8.5	8.5	8.5	
Unit Emission Rate	g/sec (g/m^2-sec)	1.0	1.0	1.0	2.38E-05
Release Height	meters	2.5	2.5	2.5	0
Release Diameter (side)	meters	0.490	0.490	0.490	174
Release Velocity	meters/sec	45.0	45.0	45.0	
Release Temperature	degrees K	700	700	700	
Ambient Temperature	degrees K	293	293	293	
Receptor Height	meters	1.6	1.6	1.6	1.6
Receptor Distance	meters	15 - 2000	15 - 2000	15 - 2000	15 - 2000
Terrain Type	Simple/Complex	Simple	Simple	Simple	Simple
Dispersion Coefficient	Urban/Rural	Rural	Rural	Rural	Rural
Stability Class	A - F	D	D	D	D
Wind Speed	m/s	3.5	3.5	3.5	3.5
Distance to Receptor	meters	923	2400	5600	133
Stability Class	A - F	D	D	D	D
Ambient Concentration	ug/m^3	13.47	7.13	2.55	244.40

Notes:

* 99% of PM_{10} for combustion sources, Appendix III, SCAQMD 2003 AQMP, Annual Average Emission Inventory

Operation 8 hour day is "worst case" impact scenario for combustion emissions & fugitive dust

Due to commutative properties using BAAQMD emission factor, fugitive dust impact is same for all spreads

Average wind speed for Sacramento = 7.8 mph = 3.5 m/s

http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/avgwind.html

Fugitive dust (as PM_{10}) 51 lb/acre-day unmitigated, BAAQMD CEQA Guidelines, Section 3.3

Fugitive dust (as PM_{10}) 6.12 lb/acre-day mitigated 88%

BAAQMD Ref: AP-42 Chapter 13.2.3 "Heavy Construction Operations"

Mitigation Ref: AP-42 Chapter 13.2.2 "Unpaved Roads", Figure 13.2.2-2

Soil moisture ratio = 4 (for 88% reduction)

A-8. Modeling Results (Revised)

Peak Year Mining

Pollutant	Onsite Operations							
	Receptor	Stability	Unit Rate	Hourly	3-hour	8-hour	24-hour	Annual
	meters	Class	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3
Nitrogen Dioxide (as NO_2)*	923	D	13.47	11.8	10.6	8.2	1.57	0.66
Sulfur Dioxide (SO_2)	923	D	13.47	0.0	0.0	0.0	0.00	0.00
Carbon Monoxide (CO)	923	D	13.47	25.3	22.7	17.7	3.37	1.41
Particulates (as PM_{10})	923	D	13.47	1.3	1.2	0.9	0.18	0.07
Particulates (as $PM_{2.5}$)	923	D	13.47	1.3	1.2	0.9	0.17	0.07
Fugitive Dust (as PM_{10})	133	D		244.40	220.0	171.1	32.59	13.61
Diesel Particulate Matter (DPM)	2400	D	7.13	0.7	0.6	0.5	0.09	0.04
Diesel Particulate Matter (DPM)	5600	D	2.55	0.3	0.2	0.2	0.03	0.01

Averaging Period	EPA Factor	Adjusted Factor	Reasons & Remarks
3 hours	0.9	0.9	
8 hours	0.7	0.7	
24 hours	0.4	0.133	8 hours
Annual	0.08	0.0557	254 days
LST Ratio (SCAQMD)*		0.42	925 m

Reference:
Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (Revised)
EPA-454/R-92-019, pages 4-16.
24-hour and annual factors corrected for actual operating times and periods:
* NO_2 to NO_X ratio per Figure 2-5, SCAQMD Localized Significance Threshold Methodology, June 2003

Diesel Particulate Preliminary Screening Health Risk Assessment

Pollutant	Annual	URV	Activity	Ann. MEI	Cancer
	ug/m^3	(ug/m^3)$^{-1}$	days	Correction	Risk
Diesel Particulate Matter (DPM)	0.04	3.00E-04	254	0.2982	3.5E-06
Diesel Particulate Matter (DPM)	0.01	3.00E-04	254	0.2982	1.2E-06

Reference:
Technical Support Document for Describing Available Cancer Potency Factors
California Environmental Protection Agency
Office of Environmental Health Hazard Assessment
Air Toxicology and Epidemiology Section
May 2005
Annual MEI correction = 254 days/yr for 30 years (permitted)

A-9. NAAQS Analysis (Revised)

Peak Year Mining

Table 4.4-7 Estimated Operational Ambient Air Quality Impacts								
Criteria Pollutant	Averaging Period	Modeled	Back-ground	Total	California Standard		Federal Standard	
		ug/m^3	ug/m^3	ug/m^3	ug/m^3	status	ug/m^3	status
Nitrogen Dioxide (NO_2)	1-hour max	11.8	94	106	338	Under	---	Under
	Annual avg	0.7	19	20	56	Under	100	Under
Sulfur Dioxide (SO_2)	1-hour max	0.0	59	59	655	Under	---	Under
	3-hour	0.0	53	53	---	Under	1309	Under
	24-hour	0.0	24	24	105	Under	367	Under
	Annual avg	0.0	7	7	---	Under	79	Under
Carbon Monoxide (CO)	1-hour max	25.3	1,946	1,971	22,898	Under	40,071	Under
	8-hour	17.7	1,488	1,506	10,304	Under	10,304	Under
Particulates (as PM_{10})	24-hour	0.18	171.0	171.2	50	Exceed	150	Exceed
	Annual avg	0.07	35.2	35.3	20	Exceed	---	Under
Particulates (as $PM_{2.5}$)	24-hour	0.17	69.0	69.2	---	Under	35	Exceed
	Annual avg	0.07	10.4	10.5	12	Under	15	Under
Fugitive Dust (as PM_{10})	24-hour	32.59	171.0	203.6	50	Exceed	150	Exceed
	Annual avg	13.61	35.2	48.8	20	Exceed	---	Under

Sources: USEPA 2006, USEPA 2009a, SCAQMD 2008, CARB 2009, BAAQMD 2008

Maximums	Period	ppm	ug/m^3	Data	2007	2006	2005	2004	2003	2002
Nitrogen Dioxide (NO_2)	1-hour max	0.050	94	ppb	48	44	38	30	50	40
	Annual avg	0.010	19	ppb	8	8	7	8	9	10
Sulfur Dioxide (SO_2)	1-hour max	0.023	59	ppb	13	18	15	15	15	23
	3-hour	0.020	53	ppb	11	16	14	14	14	20
	24-hour	0.009	24	ppb	5	7	6	6	6	9
	Annual avg	0.003	7	ppb	1.5	2.1	2.0	1.6	2.2	2.5
Carbon Monoxide (CO)	1-hour max	1.7	1,946	ppm	1.1	1.3	1.1	1.2	1 6	1.7
	8-hour	1.3	1,488	ppm	0.8	1.0	0.9	0.9	0.9	1.3
Particulates (as PM_{10})	24-hour	n/a	171.0	ug/m_3	119.0	78.0	60.0	171.0	55.0	86.0
	Annual avg	n/a	35.2	ug/m_3	25.4	25.8	24.2	35.2		27.3
Particulates (as $PM_{2.5}$)	24-hour	n/a	69.0	ug/m_3	42.0	44.0	35.0	36.0	31.0	69.0
	Annual avg	n/a	10.4	ug/m_3		9.3		10.4	8.4	

Reference:
CARB ADAM for 2002-07 (Woodland for PM10, PM2.5)
BAAQMD - Bay Area Air Pollution Summaries 2002-07 (Bethel Island for NOX, SOX ,CO)
http://www.baaqmd.gov/pio/aq_summaries/index.htm
input values in blue are estimated, blanks are insufficient data

Averaging Period	EPA Factor
3 hours	0.9
8 hours	0.7
24 hours	0.4
Annual	0.08

Reference:
Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (Revised)
EPA-454/R-92-019, pages 4-16.

A-10. Cumulative Analyses

Table 5.1.1 Summary of Tonnages Analyzed in OCMP								
Mining Operations	Annual Permitted		20% Exceedence		Maximum Annual*		Project Lifetime	
	tons mined	tons sold	tons mined	tons sold	tons mined	tons sold	mmt mined	mmt sold
CEMEX	1,204,819	1,000,000	240,964	200,000	1,445,783	1,200,000	32.17	26.70
Granite Capay	1,075,269	1,000,000	215,054	200,000	1,290,323	1,200,000	32.26	30.00
Granite Woodland (for surrender)	420,000	370,000			420,000	370,000		
Maintenance Mining	200,000	180,000			200,000	180,000	11.00	9.90
Schwarzgruber	110,000	100,000			110,000	100,000	1.14	1.08
Syar	1,111,111	1,000,000	222,222	200,000	1,333,333	1,200,000	33.33	30.00
Teichert Esparto	1,176,471	1,000,000			1,176,471	1,000,000	25.88	22.00
Teichert Woodland	1,176,471	1,000,000	235,294	200,000	1,411,765	1,200,000	17.88	15.20
Unallocated	505,859	500,000			505,859	500,000		
Totals	**6,980,000**	**6,150,000**	**913,534**	**800,000**	**7,893,534**	**6,950,000**	**153.66**	**134.88**

** Maximum Annual = Annual Permitted + 20% Exceedence*

Table 5.2 Additional Allocation Needed for Granite Esparto		
Line Item	Annual Quantities	
	tons mined	tons sold
New Granite Esparto Request	1,000,000	870,000
Less Granite Woodland Surrender	(420,000)	(370,000)
Less Unallocated	(505,859)	(500,000)
Additional Allocation Needed*	**74,141**	**0**
20% Maximum Exceedence	200,000	174,000
Maximum Allocation Needed	274,141	174,000
Maximum Annual**	**1,200,000**	**1,044,000**
30-Year Lifetime (million tons)	**30.0**	**26.1**

** Tonnage requested in excess of available allocation*

*** Maximum Annual = Annual Permitted + 20% Exceedence*

A-10. Cumulative Analyses

Table 5.3 Cumulative Analysis of OCMP EIR Assessment Totals						
Line Item	Annual Permitted		20% Exceedence		Maximum Annual**	
	tons mined	tons sold	tons mined	tons sold	tons mined	tons sold
Other Commercial Permits*	5,854,141	5,100,000	913,534	800,000	6,767,675	5,900,000
Maintenance Mining	200,000	180,000	n/a	n/a	200,000	180,000
Subtotal*	**6,054,141**	**5,280,000**	**913,534**	**800,000**	**6,967,675**	**6,080,000**
Add Granite Esparto Request	1,000,000	870,000	200,000	174,000	1,200,000	1,044,000
All Permits & County Total	**7,054,141**	**6,150,000**	**1,113,534**	**974,000**	**8,167,675**	**7,124,000**
OCMP EIR Assessment	8,589,955	7,538,300			8,589,955	7,538,300
Assessment Balance***	1,535,814	1,388,300			422,280	414,300
Less Allocation Needed****	(74,141)	0			(74,141)	0
Final Assessment Balance***	**1,461,673**	**1,388,300**			**348,139**	**414,300**

** CEMEX, Granite Capay, Schwarzgruber, Syar, Teichert Esparto, Teichert Woodland*

** also assumes Granite Woodland permit surrendered*

*** assumes all eligible mines (100% worst case) would exceed permitted allocations by 20% in any given year*

**** Assessment Balance = OCMP EIR Assessment - Permits & Maintenance Mining Subtotal*

***** represents tonnage requested by project that is in excess of available allocation*

****** excess tonnage, beyond allocations, for which CEQA clearance is provided in the CCAP EIRs*

Table 5.4 Cumulative Tonnages Analyzed in OCMP with Granite Esparto Added							
Mining Operations	Annual Permitted		Project Lifetime				
	tons mined	tons sold	mmt mined	mmt sold	start date	years	end date*
CEMEX	1,204,819	1,000,000	32.17	26.70	1997	27	2024
Granite Capay	1,075,269	1,000,000	32.26	30.00	1997	30	2027
Granite Esparto (per request)	1,000,000	870,000	30.00	26.10	2010	30	2040
County Maintenance	200,000	180,000	11.00	9.90	1997	55	2052
Schwarzgruber	110,000	100,000	1.14	1.08	1997	10	2007
Syar	1,111,111	1,000,000	33.33	30.00	1997	30	2027
Teichert Esparto	1,176,471	1,000,000	25.88	22.00	1997	22	2019
Teichert Woodland	1,176,471	1,000,000	17.88	15.20	1997	15	2012
All Permits & County Total	**7,054,141**	**6,150,000**	**183.66**	**160.98**			

** earliest end date at permitted rates, actual end date may be later, up to January 1, 2027 for commercial operations*

Allocation Increase (checksum)	74,141	0

A-10. Cumulative Analyses

Table 5.5 Estimated Projected Cumulative Criteria Emissions Through 2026							
Project Emissions	Factor*	Granite	Others**	Combined	Excess***	Cumulative	Excess
	lbs/ton	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	percent
Oxides of Nitrogen (as NO_2)	0.1040	52.0	304	356	58	414	16%
Hydrocarbons (ROC as CH_4)	0.0104	5.2	31	36	6	42	16%
Carbon Monoxide (CO)	0.0765	38.3	224	262	43	305	16%
Particulates (as PM_{10})	0.0045	2.2	13	15	2	18	16%
Sulfur Dioxide (SO_2)	0.0001	0.1	0.4	0.4	0	0.5	16%
Diesel Particulate Matter (DPM)	0.0041	2.0	12	14	2	16	16%
Fugitive Dust (as PM_{10})	0.0173	8.6	51	59	10	69	16%

** lbs pollutant / ton mined; for 1 million tons mined per year by Granite Esparto as typical*

*** CEMEX, Granite Capay, Schwarzgruber, Syar, Teichert Esparto, Teichert Woodland*

**** assumes all eligible mines (100% worst case) would exceed permitted allocations by 20% in any given year*

A-11. Ambient Air Standards

Species Name	Averaging Time	California Standards		Federal Standards	
		ppmv	ug/m^3	ppmv	ug/m^3
Ozone (O_3)	1-hour	0.09	177	--	--
	8-hour	0.07	137	0.075	147
Nitrogen Dioxide (NO_2)	1-hour	0.18	338	--	--
	Annual	0.03	56	0.053	100
Sulfur Dioxide (SO_2)	1-hour	0.25	655	--	--
	3-hour (secondary)	--	--	0.50	1,309
	24-hour	0.04	105	0.14	367
	Annual	--	--	0.03	79
Carbon Monoxide (CO)	1-hour	20	22,898	35	40,071
	8-hour	9	10,304	9	10,304
	Lake Tahoe (8-hr)	6	6,869	--	--
Particulates (as PM_{10})	24-hour	--	50	--	150
	Annual	--	20	--	--
Particulates (as $PM_{2.5}$)	24-hour	--	--	--	35
	Annual	--	12	--	15
Lead (Pb)	30-day	--	1.5	--	--
	90-day	--	--	--	1.5
Sulfates (as SO_4)	24-hour	--	25	none	none
Hydrogen Sulfide (H_2S)	1-hour	0.03	42	none	none
Vinyl Chloride (C_2H_3Cl)	24-hour	0.01	26	none	none
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per km; visibility of 10 miles or more (0.07 to 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70%.		none	none

Notes:

Standard Temperature 25 deg C

Standard Molar Volume 24.465 liter/g-mole

For gases, ug/m^3 calculated from ppmv based on molecular weight and standard conditions (not rounded)

Reference:

California Air Resources Board, 2008

A-12 Nonroad Factors (Revised)

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	Diesel Engine, Nonroad Tiers	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	
TOTAL PROCESS RATE	n/a	mgal/yr
MAXIMUM PROCESS RATE	n/a	mgal/day
MAXIMUM PROCESS RATE	n/a	mgal/hr
MAXIMUM DAILY SCHEDULE	n/a	hrs/day
HEAT RATE	7000	BTU/bhp-hr

EMITTENT	Precontrol	Tier 1 (96)	Tier 2 (01)	Tier 3 (06)	Composite	Gasoline
	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr
Oxides of Nitrogen (as NO_2)	14.0	6.9	4.2	2.6	4.2	5.2
Hydrocarbons (ROC as CH_4)	1.1	1.0	0.6	0.4	0.6	9.1
Carbon Monoxide (CO)	3.0	8.5	2.6	2.6	3.8	199.1
Particulates (as PM_{10})	1.0	0.40	0.15	0.15	0.20	0.32
Sulfur Dioxide (SO_2)	0.005	0.005	0.005	0.005	0.005	0.005
Carbon Dioxide (GHG - CO_2)	518	518	518	518	518	498
Nitrous Oxide (GHG - N_2O)	0.013	0.013	0.013	0.013	0.013	0.011
Methane (GHG - CH_4)	0.030	0.030	0.030	0.030	0.030	0.026
Diesel Particulate Matter (DPM)	1.00	0.40	0.15	0.15	0.20	0.32

EMITTENT	Precontrol	Tier 1 (96)	Tier 2 (01)	Tier 3 (06)	Composite	Gasoline
	lb/mgal	lb/mgal	lb/mgal	lb/mgal	lb/mgal	lb/mgal
Oxides of Nitrogen (as NO_2)	604.2	297.8	181.3	112.2	181.3	202.8
Hydrocarbons (ROC as CH_4)	47.5	43.2	25.9	17.3	25.9	354.9
Carbon Monoxide (CO)	129.5	366.8	112.2	112.2	164.0	7,764.9
Particulates (as PM_{10})	43.2	17.3	6.5	6.5	8.6	12.5
Sulfur Dioxide (SO_2)	0.2	0.2	0.2	0.2	0.2	0.2
Carbon Dioxide (GHG - CO_2)	22,377	22,377	22,377	22,377	22,377	19,423
Nitrous Oxide (GHG - N_2O)	0.6	0.6	0.6	0.6	0.6	0.5
Methane (GHG - CH_4)	1.3	1.3	1.3	1.3	1.3	1.1
Diesel Particulate Matter (DPM)	43.2	17.3	6.5	6.5	8.6	12.5

Notes:

Nonroad Tier 1, 2, 3 per 40 CFR 89.112 & 13 CCR 2423

Precontrol NO_X, ROC, CO, PM_{10} per AP-42 Table 3.3-1

Default heat rate = 7,000 BTU/BHP-hr (AP-42 Table 3.3-1)

SO_2 = 0.005 g/bhp-hr (15 ppmw S, 19300 BTU/lb, 7.1 lb/gal)

CO_2 = 10.15 kg/gal diesel, 8.81 kg/gal gasoline (Table C.3, CCAR 2009)

N_2O = 0.26 g/gal diesel, 0.22 g/gal gasoline (Table C.6, CCAR 2009)

CH_4 = 0.58 g/gal diesel, 0.50 g/gal gasoline (Table C.6, CCAR 2009)

Gasoline = 20,300 BTU/lb, 6.1 lb/gal (AP-42 Table 3.3-1)

Diesel = 19,300 BTU/lb, 7.1 lb/gal (AP-42 Table 3.3-1)

2010+ estimated engine age profile

0% Precontrol (uncontrolled)

20% Tier 1

45% Tier 2

35% Tier 3

CCAR - California Climate Action Registry, General Reporting Protocol, 2009

A-13. Onroad Factors (Revised)

YSAQMD Fleet Average Emission Factors

A-13. Onroad Factors (Revised)

Air Basin	YSAQMD

EMITTENT	LD		MD		HHD	
	Running (g/mi)	per Trip (g/trip)	Running (g/mi)	per Trip (g/trip)	Running (g/mi)	per Trip (g/trip)
Oxides of Nitrogen (as NO_2)	0.14	0.32	2.86	1.04	11.05	33.87
Hydrocarbons (ROC as CH_4)	0.05	0.34	0.13	0.20	0.91	2.82
Carbon Monoxide (CO)	1.28	3.78	1.05	2.46	4.03	221.87
Particulates (as PM_{10})	0.036	0.009	0.09	0.01	0.48	0.01
Sulfur Dioxide (SO_2)	0.004	0.00	0.01	0.00	0.01	0.00
Carbon Dioxide (GHG - CO_2)	405.90	79.60	1039.36	32.66	1816.00	1411.14
Nitrous Oxide (GHG - N_2O)	0.0101	-	0.0048	-	0.0048	-
Methane (GHG - CH_4)	0.0157	-	0.0051	-	0.0051	-
Diesel Particulate Matter (DPM)	0.015	0.009	0.087	0.01	0.41	0.01

EMITTENT	LD		MD		HHD	
	Running (lb/mi)	per Trip (lb/trip)	Running (lb/mi)	per Trip (lb/trip)	Running (lb/mi)	per Trip (lb/trip)
Oxides of Nitrogen (as NO_2)	0.00031	0.0007	0.0063	0.0023	0.0244	0.0747
Hydrocarbons (ROC as CH_4)	0.00011	0.0007	0.0003	0.0004	0.0020	0.0062
Carbon Monoxide (CO)	0.00282	0.0083	0.0023	0.0054	0.0089	0.4891
Particulates (as PM_{10})	0.00008	1.98E-05	0.00019	0.0000	0.00106	2.205E-05
Sulfur Dioxide (SO_2)	0.00001	0.0000	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (GHG - CO_2)	0.89486	0.1755	2.2914	0.0720	4.0036	3.1110
Nitrous Oxide (GHG - N_2O)	0.00002	-	0.00001	-	0.000011	-
Methane (GHG - CH_4)	0.00003	-	0.00001	-	0.00001	-
Diesel Particulate Matter (DPM)	0.00003	1.98E-05	0.00019	2.2E-05	0.00091	2.205E-05

Notes:
EMFAC 2007 for YSAQMD project year 2012
PM_{10} includes tire & brake wear
Onroad N_2O & CH4 per CCAR Table C-4
LD = Light Duty vehicles
MD = Medium Duty Trucks
HHD = Heavy Heavy-Duty trucks

A-1. Offroad Fuel Use (Revised)

Peak Year Mining

Equipment Type	Equip. Qty.	Rating BHP	Load factor	Daily hours	Annual days	Annual hours	Hourly gals	Daily gals	Annual gals
Mining Operation									
Scraper (stripping spread)	1	450	56%	2	212	424	13	26	5,449
Scraper / Loader (mining)	2	450	56%	7	212	2,968	26	180	76,289
Dragline (mining)	1	550	56%	8	212	1,696	16	126	26,641
Reclamation Operation (nonsimultaneous with mining)									
Bulldozer	1	360	56%	8	42	336	10	82	3,455
Motor Grader	1	180	56%	8	42	336	5	41	1,727
Processing Operation									
Front-End Loader #1	1	500	56%	8	212	1,696	14	114	24,219
Front-End Loader #2	1	500	56%	8	254	2,032	14	114	29,017
Maintenance & Storage									
Motor Grader	1	180	56%	2	212	424	5	10	2,180
Tractor / Backhoe	1	80	56%	2	212	424	2	5	969
Totals, 1000 gallons (mgal)							0.090	0.575	169.946

Project Activity	Hourly gal/hr	Daily gal/day	Annual gal/yr
Mining Operation	54	331	108,379
Reclamation Operation	15	123	5,182
Processing Operation	29	228	53,236
Maintenance & Storage	7	15	3,148
Totals (rounded)	**90**	**570**	**170,000**

Notes:
Equipment list and operational times per Granite Construction Company, May 2009, updated November 2009
Hours and days estimated based on plant production of 700 tons/hour (5,600 tons/day) & 1,200,000 tons/year mined
Approximately 212 days of plant operation
Facility open 254 days/yr
Average Load Factor = 56% (SCAQMD CEQA Guidelines Table A9-8-D)
BSFC = (7,000 BTU/BHP-hr) / (137,030 BTU/gal) = 0.051 gal/BHP-hr (AP-42 Table 3.3-1)
Fuel Rate, gal/hr = QTY * BHP * LF * BSFC
Max hourly & max daily excludes reclamation activity (not simultaneous with mining)

A-2 Offroad Emissions (Revised)

Peak Year Mining

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	Diesel Engine, Nonroad Tiers	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	
TOTAL PROCESS RATE	169.946	mgal/yr
DAILY MAX PROCESS RATE	0.575	mgal/day
HOURLY MAX PROCESS RATE	0.090	mgal/hr
DAILY MAX SCHEDULE	8	hrs/day
HEAT RATE	7000	BTU/bhp-hr

EMITTENT	FACTOR lb/mgal	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Oxides of Nitrogen (as NO_2)	181.3	30,811	15.41	104.2	16.36
Hydrocarbons (ROC as CH_4)	25.9	4,402	2.20	14.9	2.34
Carbon Monoxide (CO)	164.0	27,871	13.94	94.2	14.80
Particulates (as PM_{10})	8.6	1,462	0.73	4.9	0.78
Sulfur Dioxide (SO_2)	0.2	34	0.02	0.1	0.02
Diesel Particulate Matter (DPM)	8.6	1,462	0.73	4.9	0.78
Fugitive Dust (as PM_{10})		13,802	6.90	62.7	7.83

Notes:
Composite emission factors per Nonroad Tiered Factors (A-12.)

A-3. Fugitive Dust (Revised)

Peak Year Mining

Table 4.4-8 Estimated Mining Fugitive Dust Emissions									
Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	acres	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Mining or Reclamation Operation	5.00	212	51.0	6.1	255	54,060	31	6,487	88%
Processing Operation	2.00	254	51.0	6.1	102	25,908	12	3,109	88%
Maintenance & Storage	0.50	212	51.0	6.1	26	5,406	3	649	88%
Totals	**7.50**				**383**	**85,374**	**46**	**10,245**	**88%**

Sources: USEPA 2006, BAAQMD 1999, YSAQMD 2007

Table 4.4-9 Estimated Processing Fugitive Dust Emissions									
Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	tons	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Screening (4)	2,250	212	0.00870	0.00074	78	16,600	7	1,412	91%
Primary & Secondary Crushing (2)	1,200	212	0.00240	0.00054	6	1,221	1	275	78%
Fines Crushing (1)	2,400	212	0.01500	0.00120	36	7,632	3	611	92%
Conveyor Transfer Points (69)	1,872	212	0.00110	0.000046	142	30,122	6	1,260	96%
Totals					**262**	**55,575**	**17**	**3,557**	**94%**

Source: USEPA 2004

Mining & Processing Totals					645	140,949	63	13,802	90%

Table 4.4-10 Estimated Truck Traffic Fugitive Dust Emissions									
Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	tons	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Onsite Only Trucks					31	7,925	4	951	88%
Offsite Trucks When Onsite					82	20,899	10	2,508	88%
Totals					**113**	**28,824**	**14**	**3,459**	**88%**

Source: USEPA 2006, YSAQMD 2007

Notes:
Fugitive dust (as PM10) 51 lb/acre-day unmitigated, BAAQMD CEQA Guidelines, Section 3.3
BAAQMD Ref: AP-42 Chapter 13.2.3 "Heavy Construction Operations"
Mitigation Ref: AP-42 Chapter 13.2.2 "Unpaved Roads", Figure 13.2.2-2
Processing Ref: AP-42 Chapter 11.19.2
Yolo-Solano AQMD
Handbook for Assessing and Mitigating Air Quality Impacts, Table 5

A-4 Onsite Truck Trip (Revised)

Peak Year Mining

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	MD Truck Trips	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	

	miles	trips (hrs)
TOTAL PROCESS RATE	30480	6096
DAILY AVG PROCESS RATE	120	24
HOURLY MAX PROCESS RATE	25	5

EMITTENT	FACTOR lb/mi	FACTOR lb/trip	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Oxides of Nitrogen (as NO_2)	0.00631	0.0023	206	0.10	0.81	0.17
Hydrocarbons (ROC as CH_4)	0.00029	0.0004	11	0.01	0.04	0.01
Carbon Monoxide (CO)	0.00231	0.0054	104	0.05	0.41	0.08
Particulates (as PM_{10})	0.00019	0.00002	6	0.00	0.02	0.00
Sulfur Dioxide (SO_2)	0.00002	0.0000	1	0.00	0.00	0.00
Diesel Particulate Matter (DPM)	0.00019	0.00002	6	0.00	0.02	0.00
Fugitive Dust (as PM_{10})	0.03120		951	0.48	3.74	0.78

Notes:
California Climate Action Registry (CCAR), 2009
Onroad N_2O & CH4 per CCAR Table C-4
EMFAC 2007 for YSAQMD for MD trucks
AP-42 Section 13.2.2 Unpaved Roads, Equation 1b, 88% controlled (watering)
100% of travel on dirt roads @ 5 mph
Service Trucks: 4 ea * 4 hrs/day * 5 mph
Water Trucks: 1 ea * 8 hrs/day * 5 mph
Hourly: 5 ea * 5 mph
Plant open 254 days/yr

A-5 Offsite Trucks (Revised)

Peak Year Mining

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	HHD Truck Trips	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	

	miles	trips (count)	
TOTAL PROCESS RATE	2849880	47498	per year RT
DAILY AVG PROCESS RATE	11220	187	per day RT
HOURLY MAX PROCESS RATE	701	23	per hour OW

EMITTENT	FACTOR lb/mi	FACTOR lb/trip	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Oxides of Nitrogen (as NO_2)	0.02436	0.07467	72,973	36.49	287.30	18.83
Hydrocarbons (ROC as CH_4)	0.00201	0.00622	6,013	3.01	23.67	1.55
Carbon Monoxide (CO)	0.00888	0.48914	48,554	24.28	191.16	17.66
Particulates (as PM_{10})	0.00106	0.00002	3,017	1.51	11.88	0.74
Sulfur Dioxide (SO_2)	0.00003	0.00000	88	0.04	0.35	0.02
Diesel Particulate Matter (DPM)	0.00091	0.00002	2,596	1.30	10.22	0.64
Fugitive Dust (as PM_{10})	0.05280		2,508	1.25	9.87	1.23

Notes:
California Climate Action Registry (CCAR), 2009
Onroad N_2O & CH4 per CCAR Table C-4
EMFAC 2007 for YSAQMD for HHD trucks
AP-42 Section 13.2.2 Unpaved Roads, Equation 1b, 88% controlled (watering)
60 miles roundtrip distance
1 mile of travel on dirt roads @ 15 mph for onsite portion
1,044,000/254 = 4,110 tons/day sold (average)
22 tons/truckload
4,110/22 = 187 trucks/day
Shipping 254 days/yr

A-6 Emissions Summary (Revised)

Peak Year Mining

Table 4.4-4 Estimated Onsite Operational Emissions			
Project Emissions	**Onsite Equipment & Trucks**		
	tons/yr	**lb/day**	**lb/hr**
Oxides of Nitrogen (as NO_2)	15.5	105.0	16.5
Hydrocarbons (ROC as CH_4)	2.2	14.9	2.3
Carbon Monoxide (CO)	14.0	94.6	14.9
Particulates (as PM_{10})	0.7	5.0	0.8
Sulfur Dioxide (SO_2)	0.0	0.1	0.0
Diesel Particulate Matter (DPM)	0.7	5.0	0.8
Fugitive Dust (as PM_{10})	7.4	66.4	8.6

Sources: USEPA 2006, USEPA 2009a, SCAQMD 2008

Table 4.4-5 Estimated Offsite Operational Emissions			
Project Emissions	**Offsite Trucks**		
	tons/yr	**lb/day**	**lb/hr**
Oxides of Nitrogen (as NO_2)	36.5	287.3	18.8
Hydrocarbons (ROC as CH_4)	3.0	23.7	1.6
Carbon Monoxide (CO)	24.3	191.2	17.7
Particulates (as PM_{10})	1.5	11.9	0.7
Sulfur Dioxide (SO_2)	0.0	0.3	0.0
Diesel Particulate Matter (DPM)	1.3	10.2	0.6
Fugitive Dust (as PM_{10})	1.3	9.9	1.2

Sources: USEPA 2006, USEPA 2009a, CARB 2006

Table 4.4-6 Estimated Total Operational Emissions			
Project Emissions	**Combined Total**		
	tons/yr	**lb/day**	**lb/hr**
Oxides of Nitrogen (as NO_2)	**52.0**	392.3	35.4
Hydrocarbons (ROC as CH_4)	5.2	38.6	3.9
Carbon Monoxide (CO)	38.3	285.8	32.6
Particulates (as PM_{10})	2.2	**16.8**	1.5
Sulfur Dioxide (SO_2)	0.1	0.5	0.0
Diesel Particulate Matter (DPM)	2.0	15.2	1.4
Fugitive Dust (as PM_{10})	8.6	**76.3**	9.8

Sources: USEPA 2006, USEPA 2009a, CARB 2006

Significance Criteria	**Total Project**	
	tons/yr	**lb/day**
Oxides of Nitrogen (as NO_2)	10	n/a
Hydrocarbons (ROC as CH_4)	10	n/a
Particulates (as PM_{10})	n/a	80
Carbon Monoxide (CO)	Violation of CAAQS for CO	
TAC Cancer (MEI)	Probability => 10 in 1,000,000	
TAC Noncancer (MEI)	Hazard Index => 1	

Reference:

Yolo-Solano AQMD

Handbook for Assessing and Mitigating Air Quality Impacts, Table 1

A-7. Modeling Input (Revised)

Peak Year Mining

Pollutant	Onsite Operations	
	Hourly lbs/hr	Hourly g/sec
Nitrogen Oxides (as NO_2)	16.53	2.083
Sulfur Dioxide (SO_2)	0.02	0.002
Carbon Monoxide (CO)	14.89	1.876
Particulates (as PM_{10})	0.78	0.098
Particulates (as $PM_{2.5}$)*	0.77	0.097
Diesel Particulate Matter (DPM)	0.78	0.098
Fugitive Dust (as PM_{10})	8.61	1.085

Release Parameter	Units	Operations	DPM SR1	DPM SR2	Area Source
Fuel Usage	gal/hr	90	90	90	
Higher Heating Value	BTU/gal	137,030	137,030	137,030	
Heat Input	mmBTU/hr	12.4	12.4	12.4	
Fw Factor	wscf/mmBTU	10,320	10,320	10,320	
Release Flowrate	wscf/hr	452,100	452,100	452,100	
Release Flowrate	wacf/sec	300	300	300	
Release Flowrate	wacm/sec	8.5	8.5	8.5	
Unit Emission Rate	g/sec (g/m^2-sec)	1.0	1.0	1.0	2.38E-05
Release Height	meters	2.5	2.5	2.5	0
Release Diameter (side)	meters	0.490	0.490	0.490	174
Release Velocity	meters/sec	45.0	45.0	45.0	
Release Temperature	degrees K	700	700	700	
Ambient Temperature	degrees K	293	293	293	
Receptor Height	meters	1.6	1.6	1.6	1.6
Receptor Distance	meters	15 - 2000	15 - 2000	15 - 2000	15 - 2000
Terrain Type	Simple/Complex	Simple	Simple	Simple	Simple
Dispersion Coefficient	Urban/Rural	Rural	Rural	Rural	Rural
Stability Class	A - F	D	D	D	D
Wind Speed	m/s	3.5	3.5	3.5	3.5
Distance to Receptor	meters	923	2400	5600	133
Stability Class	A - F	D	D	D	D
Ambient Concentration	ug/m^3	13.47	7.13	2.55	244.40

Notes:

* 99% of PM_{10} for combustion sources, Appendix III, SCAQMD 2003 AQMP, Annual Average Emission Inventory

Operation 8 hour day is "worst case" impact scenario for combustion emissions & fugitive dust

Due to commutative properties using BAAQMD emission factor, fugitive dust impact is same for all spreads

Average wind speed for Sacramento = 7.8 mph = 3.5 m/s

http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/avgwind.html

Fugitive dust (as PM_{10}) 51 lb/acre-day unmitigated, BAAQMD CEQA Guidelines, Section 3.3

Fugitive dust (as PM_{10}) 6.12 lb/acre-day mitigated 88%

BAAQMD Ref: AP-42 Chapter 13.2.3 "Heavy Construction Operations"

Mitigation Ref: AP-42 Chapter 13.2.2 "Unpaved Roads", Figure 13.2.2-2

Soil moisture ratio = 4 (for 88% reduction)

A-8. Modeling Results (Revised)

Peak Year Mining

Pollutant	Onsite Operations							
	Receptor	Stability	Unit Rate	Hourly	3-hour	8-hour	24-hour	Annual
	meters	Class	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3
Nitrogen Dioxide (as NO_2)*	923	D	13.47	11.8	10.6	8.2	1.57	0.66
Sulfur Dioxide (SO_2)	923	D	13.47	0.0	0.0	0.0	0.00	0.00
Carbon Monoxide (CO)	923	D	13.47	25.3	22.7	17.7	3.37	1.41
Particulates (as PM_{10})	923	D	13.47	1.3	1.2	0.9	0.18	0.07
Particulates (as $PM_{2.5}$)	923	D	13.47	1.3	1.2	0.9	0.17	0.07
Fugitive Dust (as PM_{10})	133	D		244.40	220.0	171.1	32.59	13.61
Diesel Particulate Matter (DPM)	2400	D	7.13	0.7	0.6	0.5	0.09	0.04
Diesel Particulate Matter (DPM)	5600	D	2.55	0.3	0.2	0.2	0.03	0.01

Averaging Period	EPA Factor	Adjusted Factor	Reasons & Remarks
3 hours	0.9	0.9	
8 hours	0.7	0.7	
24 hours	0.4	0.133	8 hours
Annual	0.08	0.0557	254 days
LST Ratio (SCAQMD)*		0.42	925 m

Reference:
Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (Revised)
EPA-454/R-92-019, pages 4-16.
24-hour and annual factors corrected for actual operating times and periods:
* NO_2 to NO_X ratio per Figure 2-5, SCAQMD Localized Significance Threshold Methodology, June 2003

Diesel Particulate Preliminary Screening Health Risk Assessment

Pollutant	Annual	URV	Activity	Ann. MEI	Cancer
	ug/m^3	(ug/m^3)$^{-1}$	days	Correction	Risk
Diesel Particulate Matter (DPM)	0.04	3.00E-04	254	0.2982	3.5E-06
Diesel Particulate Matter (DPM)	0.01	3.00E-04	254	0.2982	1.2E-06

Reference:
Technical Support Document for Describing Available Cancer Potency Factors
California Environmental Protection Agency
Office of Environmental Health Hazard Assessment
Air Toxicology and Epidemiology Section
May 2005
Annual MEI correction = 254 days/yr for 30 years (permitted)

A-9. NAAQS Analysis (Revised)

Peak Year Mining

Table 4.4-7 Estimated Operational Ambient Air Quality Impacts

Criteria Pollutant	Averaging Period	Modeled	Back-ground	Total	California Standard		Federal Standard	
		ug/m^3	ug/m^3	ug/m^3	ug/m^3	status	ug/m^3	status
Nitrogen Dioxide (NO_2)	1-hour max	11.8	94	106	338	Under	---	Under
	Annual avg	0.7	19	20	56	Under	100	Under
Sulfur Dioxide (SO_2)	1-hour max	0.0	59	59	655	Under	---	Under
	3-hour	0.0	53	53	---	Under	1309	Under
	24-hour	0.0	24	24	105	Under	367	Under
	Annual avg	0.0	7	7	---	Under	79	Under
Carbon Monoxide (CO)	1-hour max	25.3	1,946	1,971	22,898	Under	40,071	Under
	8-hour	17.7	1,488	1,506	10,304	Under	10,304	Under
Particulates (as PM_{10})	24-hour	0.18	171.0	171.2	50	Exceed	150	Exceed
	Annual avg	0.07	35.2	35.3	20	Exceed	---	Under
Particulates (as $PM_{2.5}$)	24-hour	0.17	69.0	69.2	---	Under	35	Exceed
	Annual avg	0.07	10.4	10.5	12	Under	15	Under
Fugitive Dust (as PM_{10})	24-hour	32.59	171.0	203.6	50	Exceed	150	Exceed
	Annual avg	13.61	35.2	48.8	20	Exceed	---	Under

Sources: USEPA 2006, USEPA 2009a, SCAQMD 2008, CARB 2009, BAAQMD 2008

Maximums	Period	ppm	ug/m^3	Data	2007	2006	2005	2004	2003	2002
Nitrogen Dioxide (NO_2)	1-hour max	0.050	94	ppb	48	44	38	30	50	40
	Annual avg	0.010	19	ppb	8	8	7	8	9	10
Sulfur Dioxide (SO_2)	1-hour max	0.023	59	ppb	13	18	15	15	15	23
	3-hour	0.020	53	ppb	11	16	14	14	14	20
	24-hour	0.009	24	ppb	5	7	6	6	6	9
	Annual avg	0.003	7	ppb	1.5	2.1	2.0	1.6	2.2	2.5
Carbon Monoxide (CO)	1-hour max	1.7	1,946	ppm	1.1	1.3	1.1	1.2	1.6	1.7
	8-hour	1.3	1,488	ppm	0.8	1.0	0.9	0.9	0.9	1.3
Particulates (as PM_{10})	24-hour	n/a	171.0	ug/m$_3$	119.0	78.0	60.0	171.0	55.0	86.0
	Annual avg	n/a	35.2	ug/m$_3$	25.4	25.8	24.2	35.2		27.3
Particulates (as $PM_{2.5}$)	24-hour	n/a	69.0	ug/m$_3$	42.0	44.0	35.0	36.0	31.0	69.0
	Annual avg	n/a	10.4	ug/m$_3$		9.3		10.4	8.4	

Reference:
CARB ADAM for 2002-07 (Woodland for PM10, PM2.5)
BAAQMD - Bay Area Air Pollution Summaries 2002-07 (Bethel Island for NOX, SOX ,CO)
http://www.baaqmd.gov/pio/aq_summaries/index.htm
input values in blue are estimated, blanks are insufficient data

Averaging Period	EPA Factor
3 hours	0.9
8 hours	0.7
24 hours	0.4
Annual	0.08

Reference:
Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (Revised)
EPA-454/R-92-019, pages 4-16.

A-10. Cumulative Analyses

Table 5.1.1 Summary of Tonnages Analyzed in OCMP								
Mining Operations	Annual Permitted		20% Exceedence		Maximum Annual*		Project Lifetime	
	tons mined	tons sold	tons mined	tons sold	tons mined	tons sold	mmt mined	mmt sold
CEMEX	1,204,819	1,000,000	240,964	200,000	1,445,783	1,200,000	32.17	26.70
Granite Capay	1,075,269	1,000,000	215,054	200,000	1,290,323	1,200,000	32.26	30.00
Granite Woodland (for surrender)	420,000	370,000			420,000	370,000		
Maintenance Mining	200,000	180,000			200,000	180,000	11.00	9.90
Schwarzgruber	110,000	100,000			110,000	100,000	1.14	1.08
Syar	1,111,111	1,000,000	222,222	200,000	1,333,333	1,200,000	33.33	30.00
Teichert Esparto	1,176,471	1,000,000			1,176,471	1,000,000	25.88	22.00
Teichert Woodland	1,176,471	1,000,000	235,294	200,000	1,411,765	1,200,000	17.88	15.20
Unallocated	505,859	500,000			505,859	500,000		
Totals	**6,980,000**	**6,150,000**	**913,534**	**800,000**	**7,893,534**	**6,950,000**	**153.66**	**134.88**

** Maximum Annual = Annual Permitted + 20% Exceedence*

Table 5.2 Additional Allocation Needed for Granite Esparto		
Line Item	Annual Quantities	
	tons mined	tons sold
New Granite Esparto Request	1,000,000	870,000
Less Granite Woodland Surrender	(420,000)	(370,000)
Less Unallocated	(505,859)	(500,000)
Additional Allocation Needed*	**74,141**	**0**
20% Maximum Exceedence	200,000	174,000
Maximum Allocation Needed	274,141	174,000
Maximum Annual**	**1,200,000**	**1,044,000**
30-Year Lifetime (million tons)	**30.0**	**26.1**

** Tonnage requested in excess of available allocation*

*** Maximum Annual = Annual Permitted + 20% Exceedence*

A-10. Cumulative Analyses

Table 5.3 Cumulative Analysis of OCMP EIR Assessment Totals						
Line Item	Annual Permitted		20% Exceedence		Maximum Annual**	
	tons mined	tons sold	tons mined	tons sold	tons mined	tons sold
Other Commercial Permits*	5,854,141	5,100,000	913,534	800,000	6,767,675	5,900,000
Maintenance Mining	200,000	180,000	n/a	n/a	200,000	180,000
Subtotal*	**6,054,141**	**5,280,000**	**913,534**	**800,000**	**6,967,675**	**6,080,000**
Add Granite Esparto Request	1,000,000	870,000	200,000	174,000	1,200,000	1,044,000
All Permits & County Total	**7,054,141**	**6,150,000**	**1,113,534**	**974,000**	**8,167,675**	**7,124,000**
OCMP EIR Assessment	8,589,955	7,538,300			8,589,955	7,538,300
Assessment Balance***	1,535,814	1,388,300			422,280	414,300
Less Allocation Needed****	(74,141)	0			(74,141)	0
Final Assessment Balance***	**1,461,673**	**1,388,300**			**348,139**	**414,300**

** CEMEX, Granite Capay, Schwarzgruber, Syar, Teichert Esparto, Teichert Woodland*

** also assumes Granite Woodland permit surrendered*

*** assumes all eligible mines (100% worst case) would exceed permitted allocations by 20% in any given year*

**** Assessment Balance = OCMP EIR Assessment - Permits & Maintenance Mining Subtotal*

***** represents tonnage requested by project that is in excess of available allocation*

****** excess tonnage, beyond allocations, for which CEQA clearance is provided in the CCAP EIRs*

Table 5.4 Cumulative Tonnages Analyzed in OCMP with Granite Esparto Added							
Mining Operations	Annual Permitted		Project Lifetime				
	tons mined	tons sold	mmt mined	mmt sold	start date	years	end date*
CEMEX	1,204,819	1,000,000	32.17	26.70	1997	27	2024
Granite Capay	1,075,269	1,000,000	32.26	30.00	1997	30	2027
Granite Esparto (per request)	1,000,000	870,000	30.00	26.10	2010	30	2040
County Maintenance	200,000	180,000	11.00	9.90	1997	55	2052
Schwarzgruber	110,000	100,000	1.14	1.08	1997	10	2007
Syar	1,111,111	1,000,000	33.33	30.00	1997	30	2027
Teichert Esparto	1,176,471	1,000,000	25.88	22.00	1997	22	2019
Teichert Woodland	1,176,471	1,000,000	17.88	15.20	1997	15	2012
All Permits & County Total	**7,054,141**	**6,150,000**	**183.66**	**160.98**			

** earliest end date at permitted rates, actual end date may be later, up to January 1, 2027 for commercial operations*

Allocation Increase (checksum)	74,141	0

A-10. Cumulative Analyses

Table 5.5 Estimated Projected Cumulative Criteria Emissions Through 2026							
Project Emissions	Factor*	Granite	Others**	Combined	Excess***	Cumulative	Excess
	lbs/ton	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	percent
Oxides of Nitrogen (as NO_2)	0.1040	52.0	304	356	58	414	16%
Hydrocarbons (ROC as CH_4)	0.0104	5.2	31	36	6	42	16%
Carbon Monoxide (CO)	0.0765	38.3	224	262	43	305	16%
Particulates (as PM_{10})	0.0045	2.2	13	15	2	18	16%
Sulfur Dioxide (SO_2)	0.0001	0.1	0.4	0.4	0	0.5	16%
Diesel Particulate Matter (DPM)	0.0041	2.0	12	14	2	16	16%
Fugitive Dust (as PM_{10})	0.0173	8.6	51	59	10	69	16%

** lbs pollutant / ton mined; for 1 million tons mined per year by Granite Esparto as typical*

*** CEMEX, Granite Capay, Schwarzgruber, Syar, Teichert Esparto, Teichert Woodland*

**** assumes all eligible mines (100% worst case) would exceed permitted allocations by 20% in any given year*

A-11. Ambient Air Standards

Species Name	Averaging Time	California Standards		Federal Standards	
		ppmv	ug/m^3	ppmv	ug/m^3
Ozone (O_3)	1-hour	0.09	177	---	---
	8-hour	0.07	137	0.075	147
Nitrogen Dioxide (NO_2)	1-hour	0.18	338	---	---
	Annual	0.03	56	0.053	100
Sulfur Dioxide (SO_2)	1-hour	0.25	655	---	---
	3-hour (secondary)	---	---	0.50	1,309
	24-hour	0.04	105	0.14	367
	Annual	---	---	0.03	79
Carbon Monoxide (CO)	1-hour	20	22,898	35	40,071
	8-hour	9	10,304	9	10,304
	Lake Tahoe (8-hr)	6	6,869	---	---
Particulates (as PM_{10})	24-hour	---	50	---	150
	Annual	---	20	---	---
Particulates (as $PM_{2.5}$)	24-hour	---	---	---	35
	Annual	---	12	---	15
Lead (Pb)	30-day	---	1.5	---	---
	90-day	---	---	---	1.5
Sulfates (as SO_4)	24-hour	---	25	none	none
Hydrogen Sulfide (H_2S)	1-hour	0.03	42	none	none
Vinyl Chloride (C_2H_3Cl)	24-hour	0.01	26	none	none
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per km; visibility of 10 miles or more (0.07 to 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70%.		none	none

Notes:

Standard Temperature 25 deg C

Standard Molar Volume 24.465 liter/g-mole

For gases, ug/m^3 calculated from ppmv based on molecular weight and standard conditions (not rounded)

Reference:

California Air Resources Board, 2008

A-12 Nonroad Factors (Revised)

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	Diesel Engine, Nonroad Tiers	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	
TOTAL PROCESS RATE	n/a	mgal/yr
MAXIMUM PROCESS RATE	n/a	mgal/day
MAXIMUM PROCESS RATE	n/a	mgal/hr
MAXIMUM DAILY SCHEDULE	n/a	hrs/day
HEAT RATE	7000	BTU/bhp-hr

EMITTENT	Precontrol	Tier 1 (96)	Tier 2 (01)	Tier 3 (06)	Composite	Gasoline
	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr
Oxides of Nitrogen (as NO_2)	14.0	6.9	4.2	2.6	4.2	5.2
Hydrocarbons (ROC as CH_4)	1.1	1.0	0.6	0.4	0.6	9.1
Carbon Monoxide (CO)	3.0	8.5	2.6	2.6	3.8	199.1
Particulates (as PM_{10})	1.0	0.40	0.15	0.15	0.20	0.32
Sulfur Dioxide (SO_2)	0.005	0.005	0.005	0.005	0.005	0.005
Carbon Dioxide (GHG - CO_2)	518	518	518	518	518	498
Nitrous Oxide (GHG - N_2O)	0.013	0.013	0.013	0.013	0.013	0.011
Methane (GHG - CH_4)	0.030	0.030	0.030	0.030	0.030	0.026
Diesel Particulate Matter (DPM)	1.00	0.40	0.15	0.15	0.20	0.32

EMITTENT	Precontrol	Tier 1 (96)	Tier 2 (01)	Tier 3 (06)	Composite	Gasoline
	lb/mgal	lb/mgal	lb/mgal	lb/mgal	lb/mgal	lb/mgal
Oxides of Nitrogen (as NO_2)	604.2	297.8	181.3	112.2	181.3	202.8
Hydrocarbons (ROC as CH_4)	47.5	43.2	25.9	17.3	25.9	354.9
Carbon Monoxide (CO)	129.5	366.8	112.2	112.2	164.0	7,764.9
Particulates (as PM_{10})	43.2	17.3	6.5	6.5	8.6	12.5
Sulfur Dioxide (SO_2)	0.2	0.2	0.2	0.2	0.2	0.2
Carbon Dioxide (GHG - CO_2)	22,377	22,377	22,377	22,377	22,377	19,423
Nitrous Oxide (GHG - N_2O)	0.6	0.6	0.6	0.6	0.6	0.5
Methane (GHG - CH_4)	1.3	1.3	1.3	1.3	1.3	1.1
Diesel Particulate Matter (DPM)	43.2	17.3	6.5	6.5	8.6	12.5

Notes:

Nonroad Tier 1, 2, 3 per 40 CFR 89.112 & 13 CCR 2423

Precontrol NO_X, ROC, CO, PM_{10} per AP-42 Table 3.3-1

Default heat rate = 7,000 BTU/BHP-hr (AP-42 Table 3.3-1)

SO_2 = 0.005 g/bhp-hr (15 ppmw S, 19300 BTU/lb, 7.1 lb/gal)

CO_2 = 10.15 kg/gal diesel, 8.81 kg/gal gasoline (Table C.3, CCAR 2009)

N_2O = 0.26 g/gal diesel, 0.22 g/gal gasoline (Table C.6, CCAR 2009)

CH_4 = 0.58 g/gal diesel, 0.50 g/gal gasoline (Table C.6, CCAR 2009)

Gasoline = 20,300 BTU/lb, 6.1 lb/gal (AP-42 Table 3.3-1)

Diesel = 19,300 BTU/lb, 7.1 lb/gal (AP-42 Table 3.3-1)

2010+ estimated engine age profile

0% Precontrol (uncontrolled)

20% Tier 1

45% Tier 2

35% Tier 3

CCAR - California Climate Action Registry, General Reporting Protocol, 2009

A-13. Onroad Factors (Revised)

YSAQMD Fleet Average Emission Factors

A-13. Onroad Factors (Revised)

Air Basin	YSAQMD

EMITTENT	LD		MD		HHD	
	Running (g/mi)	per Trip (g/trip)	Running (g/mi)	per Trip (g/trip)	Running (g/mi)	per Trip (g/trip)
Oxides of Nitrogen (as NO_2)	0.14	0.32	2.86	1.04	11.05	33.87
Hydrocarbons (ROC as CH_4)	0.05	0.34	0.13	0.20	0.91	2.82
Carbon Monoxide (CO)	1.28	3.78	1.05	2.46	4.03	221.87
Particulates (as PM_{10})	0.036	0.009	0.09	0.01	0.48	0.01
Sulfur Dioxide (SO_2)	0.004	0.00	0.01	0.00	0.01	0.00
Carbon Dioxide (GHG - CO_2)	405.90	79.60	1039.36	32.66	1816.00	1411.14
Nitrous Oxide (GHG - N_2O)	0.0101	-	0.0048	-	0.0048	-
Methane (GHG - CH_4)	0.0157	-	0.0051	-	0.0051	-
Diesel Particulate Matter (DPM)	0.015	0.009	0.087	0.01	0.41	0.01

EMITTENT	LD		MD		HHD	
	Running (lb/mi)	per Trip (lb/trip)	Running (lb/mi)	per Trip (lb/trip)	Running (lb/mi)	per Trip (lb/trip)
Oxides of Nitrogen (as NO_2)	0.00031	0.0007	0.0063	0.0023	0.0244	0.0747
Hydrocarbons (ROC as CH_4)	0.00011	0.0007	0.0003	0.0004	0.0020	0.0062
Carbon Monoxide (CO)	0.00282	0.0083	0.0023	0.0054	0.0089	0.4891
Particulates (as PM_{10})	0.00008	1.98E-05	0.00019	0.0000	0.00106	2.205E-05
Sulfur Dioxide (SO_2)	0.00001	0.0000	0.0000	0.0000	0.0000	0.0000
Carbon Dioxide (GHG - CO_2)	0.89486	0.1755	2.2914	0.0720	4.0036	3.1110
Nitrous Oxide (GHG - N_2O)	0.00002	-	0.00001	-	0.000011	-
Methane (GHG - CH_4)	0.00003	-	0.00001	-	0.00001	-
Diesel Particulate Matter (DPM)	0.00003	1.98E-05	0.00019	2.2E-05	0.00091	2.205E-05

Notes:
EMFAC 2007 for YSAQMD project year 2012
PM_{10} includes tire & brake wear
Onroad N_2O & CH4 per CCAR Table C-4
LD = Light Duty vehicles
MD = Medium Duty Trucks
HHD = Heavy Heavy-Duty trucks

A-1-GHG. Offroad Fuel Use

Normal Year Mining - GHG Emissions

Equipment Type	Equip. Qty.	Rating BHP	Load factor	Daily hours	Annual days	Annual hours	Hourly gals	Daily gals	Annual gals
Mining Operation									
Scraper (stripping spread)	1	450	56%	2	179	358	13	26	4,601
Scraper / Loader (mining)	2	450	56%	7	179	2,506	26	180	64,414
Dragline (mining)	1	550	56%	8	119	952	16	126	14,954
Reclamation Operation (nonsimultaneous with mining)									
Bulldozer	1	360	56%	8	42	336	10	82	3,455
Motor Grader	1	180	56%	8	42	336	5	41	1,727
Processing Operation									
Front-End Loader #1	1	500	56%	8	212	1,696	14	114	24,219
Front-End Loader #2	1	500	56%	8	254	2,032	14	114	29,017
Maintenance & Storage									
Motor Grader	1	180	56%	2	212	424	5	10	2,180
Tractor / Backhoe	1	80	56%	2	179	358	2	5	818
Totals, 1000 gallons (mgal)							**0.090**	**0.575**	**145.385**

Project Activity	Hourly gal/hr	Daily gal/day	Annual gal/yr
Mining Operation	54	331	83,969
Reclamation Operation	15	123	5,182
Processing Operation	29	228	53,236
Maintenance & Storage	7	15	2,998
Totals (rounded)	**90**	**570**	**145,000**

Notes:

Equipment list and operational times per Granite Construction Company, May 2009, updated November 2009

Hours and days estimated based on plant production of 700 tons/hour (5,600 tons/day) & 1,000,000 tons/year mined

Approximately 179 days of plant operation

Facility open 254 days/yr

Average Load Factor = 56% (SCAQMD CEQA Guidelines Table A9-8-D)

BSFC = (7,000 BTU/BHP-hr) / (137,030 BTU/gal) = 0.051 gal/BHP-hr (AP-42 Table 3.3-1)

Fuel Rate, gal/hr = QTY * BHP * LF * BSFC

Max hourly & max daily excludes reclamation activity (not simultaneous with mining)

A-2-GHG Offroad Emissions (Revised)

Normal Year Mining - GHG Emissions

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	Diesel Engine, Nonroad Tiers	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	
TOTAL PROCESS RATE	145.385	mgal/yr
DAILY MAX PROCESS RATE	0.575	mgal/day
HOURLY MAX PROCESS RATE	0.090	mgal/hr
DAILY MAX SCHEDULE	8	hrs/day
HEAT RATE	7000	BTU/bhp-hr

EMITTENT	FACTOR lb/mgal	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Carbon Dioxide (GHG - CO_2)	22,377	3,253,273	1,627	12,858	2,020
Nitrous Oxide (GHG - N_2O)	0.6	83	0.04	0.3	0.05
Methane (GHG - CH_4)	1.3	186	0.09	0.7	0.12

Notes:
Composite emission factors per Nonroad Tiered Factors (A-12.)

A-3-GHG Fugitive Dust (Revised)

Normal Year Mining - GHG Emissions

Table 4.4-8 Estimated Mining Fugitive Dust Emissions

Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	acres	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Mining or Reclamation Operation	5.00	179	51.0	6.1	255	45,645	31	5,477	88%
Processing Operation	2.00	254	51.0	6.1	102	25,908	12	3,109	88%
Maintenance & Storage	0.50	212	51.0	6.1	26	5,406	3	649	88%
Totals	**7.50**				**383**	**76,959**	**46**	**9,235**	**88%**

Sources: USEPA 2006, BAAQMD 1999, YSAQMD 2007

Table 4.4-9 Estimated Processing Fugitive Dust Emissions

Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	tons	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Screening (4)	2,250	179	0.00870	0.00074	78	14,016	7	1,192	91%
Primary & Secondary Crushing (2)	1,200	179	0.00240	0.00054	6	1,031	1	232	78%
Fines Crushing (1)	2,400	179	0.01500	0.00120	36	6,444	3	516	92%
Conveyor Transfer Points (69)	1,872	179	0.00110	0.000046	142	25,433	6	1,064	96%
Totals					**262**	**46,924**	**17**	**3,003**	**94%**

Source: USEPA 2004

Mining & Processing Totals					645	123,883	63	12,238	90%

Table 4.4-10 Estimated Truck Traffic Fugitive Dust Emissions

Activity	Daily	Schedule	Emission Factor		Uncontrolled		Controlled		Reduction
	tons	days	Uncontrol	Control	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Onsite Only Trucks					31	7,925	4	951	88%
Offsite Trucks When Onsite					69	17,435	8	2,092	88%
Totals					**100**	**25,359**	**12**	**3,043**	**88%**

Source: USEPA 2006, YSAQMD 2007

Notes:

Fugitive dust (as PM10) 51 lb/acre-day unmitigated, BAAQMD CEQA Guidelines, Section 3.3

BAAQMD Ref: AP-42 Chapter 13.2.3 "Heavy Construction Operations"

Mitigation Ref: AP-42 Chapter 13.2.2 "Unpaved Roads", Figure 13.2.2-2

Processing Ref: AP-42 Chapter 11.19.2

Yolo-Solano AQMD

Handbook for Assessing and Mitigating Air Quality Impacts, Table 5

A-4-GHG Onsite Truck Trip (Revised)

Normal Year Mining - GHG Emissions

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	MD Truck Trips	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	

	miles	trips (hrs)
TOTAL PROCESS RATE	30480	6096
DAILY AVG PROCESS RATE	120	24
HOURLY MAX PROCESS RATE	25	5

EMITTENT	FACTOR lb/mi	FACTOR lb/trip	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Carbon Dioxide (GHG - CO_2)	2.29141	0.0720	70,281	35	277	58
Nitrous Oxide (GHG - N_2O)	0.00001		0.3	0.00	0.00	0.00
Methane (GHG - CH_4)	0.00001		0.3	0.00	0.00	0.00

Notes:
Californai Climate Action Registry (CCAR), 2009
Onroad N_2O & CH4 per CCAR Table C-4
EMFAC 2007 for YSAQMDfor MD trucks
AP-42 Section 13.2.2 Unpaved Roads, Equation 1b, 88% controlled (watering)
100% of travel on dirt roads @ 5 mph
Service Trucks: 4 ea * 4 hrs/day * 5 mph
Water Trucks: 1 ea * 8 hrs/day * 5 mph
Hourly: 5 ea * 5 mph
Plant open 254 days/yr

A-5-GHG Offsite Trucks (Revised)

Normal Year Mining - GHG Emissions

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	HHD Truck Trips	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	

	miles	trips (count)	
TOTAL PROCESS RATE	2377440	39624	per year RT
DAILY AVG PROCESS RATE	9360	156	per day RT
HOURLY MAX PROCESS RATE	585	20	per hour OW

EMITTENT	FACTOR lb/mi	FACTOR lb/trip	ANNUAL lbs/yr	ANNUAL tons/yr	DAILY lbs/day	HOURLY lbs/hr
Carbon Dioxide (GHG - CO_2)	4.00362	3.11105	9,641,628	4,821	37,959	2,403
Nitrous Oxide (GHG - N_2O)	0.00001		25	0.01	0.10	0.01
Methane (GHG - CH_4)	0.00001		27	0.01	0.11	0.01

Notes:

Californai Climate Action Registry (CCAR), 2009

Onroad N_2O & CH4 per CCAR Table C-4

EMFAC 2007 for YSAQMD for HHD trucks

AP-42 Section 13.2.2 Unpaved Roads, Equation 1b, 88% controlled (watering)

60 miles roundtrip distance

1 mile of travel on dirt roads @ 15 mph for onsite portion

1,000,000/179 = 5,587 tons/day mined (average)

870,000/254 = 3,425 tons/day sold (average)

22 tons/truckload

3,425/22 = 156 trucks/day

Shipping 254 days/yr

A-6-GHG Emissions Summary (Revised)

Normal Year Mining - GHG Emissions

Estimated Direct Operational GHG Emissions		
Project Emissions	**Combined Total**	
	tons/yr	**tonnes/yr**
Carbon Dioxide (GHG - CO_2)	6,483	5,881
Nitrous Oxide (GHG - N_2O)	0.05	0.05
Methane (GHG - CH_4)	0.11	0.10
Carbon Dioxide Equivalents (CO_2 eqv)	**6,502**	**5,898**

Sources: USEPA 2006, USEPA 2009b, CARB 2006

Estimated Indirect Operational GHG Emissions		
Project Emissions	**Combined Total**	
	tons/yr	**tonnes/yr**
Carbon Dioxide (GHG - CO_2)	1,033	937
Nitrous Oxide (GHG - N_2O)	0.01	0.01
Methane (GHG - CH_4)	0.04	0.04
Carbon Dioxide Equivalents (CO_2 eqv)	**1,038**	**941**

Source: TCR 2008

Estimated Agricultural Fuel GHG Emissions		
Project Emissions	**Combined Total**	
	tons/yr	**tonnes/yr**
Carbon Dioxide (GHG - CO_2)	244	222
Nitrous Oxide (GHG - N_2O)	0.006	0.006
Methane (GHG - CH_4)	0.014	0.013
Carbon Dioxide Equivalents (CO_2 eqv)	**247**	**224**

Sources: USEPA 2006, USEPA 2009b

Estimated Agricultural Indirect GHG Emissions		
Project Uptake	**Combined Total**	
	tons/yr	**tonnes/yr**
Fertilizer Production (GHG - CO_2)	0.92	0.84
Pesticide Production (GHG - CO_2)	0.15	0.14
Carbon Dioxide Emissions (GHG - CO_2)	**1.08**	**0.98**

Source: *Using Ag Lands for Carbon Sequestration* , Purdue University, 2003

Estimated Agricultural Crop GHG Uptake (Sequestration)		
Project Uptake	**Combined Total**	
	tons/yr	**tonnes/yr**
Row Crops (GHG - CO_2)	59	54
Tree Crops (GHG - CO_2)	74	67
Fallow (GHG - CO_2)	0	0
Carbon Dioxide Uptake (GHG - CO_2)	**134**	**121**

Source: *Using Ag Lands for Carbon Sequestration* , Purdue University, 2003

A-6-GHG Emissions Summary (Revised)

Table 4.6-1 Estimated Net Project GHG Emissions		
Project Emissions	**Combined Total**	
	tons/yr	**tonnes/yr**
Carbon Dioxide (GHG - CO_2)	7,404	6,717
Nitrous Oxide (GHG - N_2O)	0.06	0.05
Methane (GHG - CH_4)	0.14	0.12
Carbon Dioxide Equivalents (CO_2 eqv)	**7,425**	**6,736**

Sources: USEPA 2006, USEPA 2009b, CARB 2006, TCR 2008, PU 2003

Notes:

Net Project = Direct OP + Indirect OP - Ag Fuel - Ag Chem + Ag Uptake

Loss of Ag fuel and chemicals is beneficial (no emissions = GHG decrease)

Loss of Ag land is detrimental (no uptake = GHG increase)

Ag uptake (sequestration) is CO_2 only

Table 4.6-2 Estimated Project GHG Balance by Category		
Project Emissions	**Combined Total**	
	tons/yr	**tonnes/yr**
Direct Operations (CO_2 eqv)	6,502	5,898
Indirect Operations (CO_2 eqv)	1,038	941
Agricultural Fuel Combustion (CO_2 eqv)	(247)	(224)
Agricultural Chemicals Production (CO_2 eqv)	(1)	(1)
Agricultural Crop Sequestration (CO_2 eqv)	134	121
Project Balance (CO_2 eqv)	**7,425**	**6,736**

Sources: USEPA 2006, USEPA 2009b, CARB 2006, TCR 2008, PU 2003

Notes:

Net Project = Direct OP + Indirect OP - Ag Fuel - Ag Chem + Ag Uptake

Loss of Ag fuel and chemicals is beneficial (no emissions = GHG decrease)

Loss of Ag land is detrimental (no uptake = GHG increase)

Ag uptake (sequestration) is CO_2 only

Notes:

tons – short tons (2,000 pounds)

tonnes – metric tons (1,000 kilograms or 2,204.6 pounds)

CARB 2006 - EMFAC2007 Onroad Mobile Source Model

USEPA AP-42 Table 3.1-1 for CO_2

USEPA GHG Table A-101 for CH_4 & N_2O

GWP 1 for CO_2, 21 for CH_4, 310 for N_2O (USEPA)

A-12-GHG Nonroad Factors (Revised)

Normal Year Mining - GHG Emissions

SIC	1442	Construction Sand and Gravel
PROCESS EQPT DESCRIPTION	Diesel Engine, Nonroad Tiers	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	
TOTAL PROCESS RATE	n/a	mgal/yr
MAXIMUM PROCESS RATE	n/a	mgal/day
MAXIMUM PROCESS RATE	n/a	mgal/hr
MAXIMUM DAILY SCHEDULE	n/a	hrs/day
HEAT RATE	7000	BTU/bhp-hr

EMITTENT	Precontrol	Tier 1 (96)	Tier 2 (01)	Tier 3 (06)	Composite	Gasoline
	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr	g/BHP-hr
Carbon Dioxide (GHG - CO_2)	518	518	518	518	518	498
Nitrous Oxide (GHG - N_2O)	0.013	0.013	0.013	0.013	0.013	0.011
Methane (GHG - CH_4)	0.030	0.030	0.030	0.030	0.030	0.026

EMITTENT	Precontrol	Tier 1 (96)	Tier 2 (01)	Tier 3 (06)	Composite	Gasoline
	lb/mgal	lb/mgal	lb/mgal	lb/mgal	lb/mgal	lb/mgal
Carbon Dioxide (GHG - CO_2)	22,377	22,377	22,377	22,377	22,377	19,423
Nitrous Oxide (GHG - N_2O)	0.6	0.6	0.6	0.6	0.6	0.5
Methane (GHG - CH_4)	1.3	1.3	1.3	1.3	1.3	1.1

Notes:

Nonroad Tier 1, 2, 3 per 40 CFR 89.112 & 13 CCR 2423

Precontrol NO_X, ROC, CO, PM_{10} per AP-42 Table 3.3-1

Default heat rate = 7,000 BTU/BHP-hr (AP-42 Table 3.3-1)

SO_2 = 0.005 g/bhp-hr (15 ppmw S, 19300 BTU/lb, 7.1 lb/gal)

CCAR - California Climate Action Registry, General Reporting Protocol, 2009

CO_2 = 10.15 kg/gal diesel, 8.81 kg/gal gasoline (Table C.3, CCAR 2009)

N_2O = 0.26 g/gal diesel, 0.22 g/gal gasoline (Table C.6, CCAR 2009)

CH_4 = 0.58 g/gal diesel, 0.50 g/gal gasoline (Table C.6, CCAR 2009)

Gasoline = 20,300 BTU/lb, 6.1 lb/gal (AP-42 Table 3.3-1)

Diesel = 19,300 BTU/lb, 7.1 lb/gal (AP-42 Table 3.3-1)

2010+ estimated engine age profile:

0% Precontrol (uncontrolled)

20% Tier 1

45% Tier 2

35% Tier 3

A-13-GHG Onroad Factors (Revised)

YSAQMD Fleet Average Emission Factors

A-13-GHG Onroad Factors

Air Basin	YSAQMD

EMITTENT	LD		MD		HHD	
	Running (g/mi)	per Trip (g/trip)	Running (g/mi)	per Trip (g/trip)	Running (g/mi)	per Trip (g/trip)
Carbon Dioxide (GHG - CO_2)	405.90	79.60	1039.36	32.66	1816.00	1411.14
Nitrous Oxide (GHG - N_2O)	0.0101	-	0.0048	-	0.0048	-
Methane (GHG - CH_4)	0.0157	-	0.0051	-	0.0051	-

EMITTENT	LD		MD		HHD	
	Running (lb/mi)	per Trip (lb/trip)	Running (lb/mi)	per Trip (lb/trip)	Running (lb/mi)	per Trip (lb/trip)
Carbon Dioxide (GHG - CO_2)	0.89486	0.1755	2.2914	0.0720	4.0036	3.1110
Nitrous Oxide (GHG - N_2O)	0.00002	-	0.00001	-	0.000011	-
Methane (GHG - CH_4)	0.00003	-	0.00001	-	0.00001	-

Notes:
EMFAC 2007 for YSAQMD project year 2012
PM_{10} includes tire & brake wear
Onroad N_2O & CH4 per CCAR Table C-4

A-14. Electric Power Usage

PG&E Billing Statement	Main Processing Plant	Dredge, Beltline & Crushers	Combined Facility
Month	KW-hr	KW-hr	KW-hr
Aug-09	48,000	0	48,000
Jul-09	57,600	0	57,600
Jun-09	33,600	14,400	48,000
May-09	189,600	24,000	213,600
Apr-09	189,600	153,600	343,200
Mar-09	192,000	81,600	273,600
Feb-09	33,600	14,850	48,450
Jan-09	27,900	13,950	41,850
Dec-08	29,700	4,800	34,500
Nov-08	53,558	9,600	63,158
Oct-08	95,242	52,800	148,042
Sep-08	201,600	81,600	283,200
Aug-08	249,600	100,800	350,400
Jul-08	230,400	115,200	345,600
Jun-08	237,382	182,400	419,782
May-08	218,618	148,800	367,418
Apr-08	168,000	86,400	254,400
Mar-08	48,000	14,400	62,400
Feb-08	52,800	14,400	67,200
Jan-08	28,800	6,212	35,012
Dec-07	28,800	8,188	36,988
Nov-07	105,600	62,400	168,000
Oct-07	187,200	139,200	326,400
Sep-07	259,200	220,800	480,000
Aug-07	240,000	172,800	412,800
Jul-07	230,400	139,200	369,600
Jun-07	196,800	129,600	326,400
May-07	240,000	187,200	427,200
Apr-07	278,400	254,400	532,800
Mar-07	249,600	187,200	436,800
Feb-07	249,600	173,744	423,344
Jan-07	187,200	157,456	344,656
Dec-06	144,000	76,800	220,800
Nov-06	4,800	28,800	33,600
Oct-06	216,000	0	216,000
Sep-06	225,600	0	225,600
Aug-06	283,200	28,800	312,000
Total for 37 months	5,712,000	3,086,400	8,798,400

3-Year Annual Average		
MW-hr/yr	MW-hr/yr	MW-hr/yr
1,853	1,001	2,854

A-15. Indirect GHG (Revised)

Estimated Indirect GHG Impacts Exclusively from Electric Power Consumption						
Project Application	Power Consumption	Carbon Dioxide	Methane	Nitrous Oxide	CO_2 Equivalents	
	MW-hr/yr	tons/yr	tons/yr	tons/yr	tons/yr	tonnes/yr
Electric Power Consumption (unmitigated)	2,854	1,033	4.3E-02	1.2E-02	1,038	941

Notes:

The Climate Registry General Reporting Protocol, Version 3.1, Table C.2, January 2009

eGrid 2007 Subregion CAMX (WECC California)

Carbon Dioxide, CO_2 = 724.12 lb/mw-hr (GWP = 1)

Methane, CH_4 = 0.0302 lb/mw-hr (GWP = 21)

Nitrous Oxide, N_2O = 0.0081 lb/mw-hr (GWP = 310)

U.S. EPA eGRID2007 Version 1.1 (2005 data)

Factors do not include emissions from transmission and distribution losses.

A-16. Ag Fuel Usage

Diesel Fuel Consumption by Existing Agricultural Operations on Granite Esparto Site	
Hatanaka Farms Activity	**gal/yr**
Tractor Operations: Row Crops	5,623
Tractor Operations: Tree Crops	1,118
Deisel Water Pump: Tree Crops*	14,500
Stephens Farms Activity	**gal/yr**
Tractor / Pruning / Harvest Operations: Tree Crops**	600
Annual Total for Both Farms	**gal/yr**
All Operations	21,840
Annual Total, 1000 gallons (mgal)	21.84

* Onsite well furnishes water for offsite properties

** Combination of diesel and some gasoline (treat as all diesel)

A-17. Ag Emissions & Uptake (Revised)

SIC	016 & 017	Row Crops & Tree Crops
PROCESS EQPT DESCRIPTION	Diesel Engine, Nonroad Tiers	
FUEL TYPE/PROCESS INFO	California Ultra Low Sulfur Diesel, 15 ppmw S	
TOTAL PROCESS RATE	21,840	mgal/yr
DAILY MAX PROCESS RATE		n/a
HOURLY MAX PROCESS RATE		n/a
DAILY MAX SCHEDULE		n/a
HEAT RATE	7000	BTU/bhp-hr

EMITTENT	FACTOR lb/mgal	ANNUAL lbs/yr	ANNUAL tons/yr
Oxides of Nitrogen (as NO_2)	181.3	3,960	1.98
Hydrocarbons (ROC as CH_4)	25.9	566	0.28
Carbon Monoxide (CO)	164.0	3,582	1.79
Particulates (as PM_{10})	8.6	188	0.09
Sulfur Dioxide (SO_2)	0.2	4	0.00
Carbon Dioxide (GHG - CO_2)	22,377	488,722	244
Nitrous Oxide (GHG - N_2O)	0.6	12	0.01
Methane (GHG - CH_4)	1.3	28	0.01
Diesel Particulate Matter (DPM)	8.6	188	0.09
Fugitive Dust (as PM_{10})			

Notes:
Composite emission factors per Nonroad Tiered Factors

A-17. Ag Emissions & Uptake (Revised)

INDIRECT EMITTENT	FACTOR	QUANTITY	ANNUAL
	tons/acre-yr	acres	tons/yr
Fertilizer Production	0.006	154	0.92
Pesticide Production	0.001	154	0.15
Carbon Dioxide Emissions (GHG - CO_2)	**0.007**	**154**	**1.08**

UPTAKE (SEQUESTRATION)	FACTOR	QUANTITY	ANNUAL
	tons/acre-yr	acres	tons/yr
Row Crops (GHG - CO_2)			
Tomatoes (2003)	0.392	154	60
Sunflowers (2004)	0.392	154	60
Tomatoes (2005)	0.392	154	60
Tomatoes (2006)	0.392	154	60
Seed Onions (2007)	0.392	25	10
Sunflowers (2007)	0.392	95	37
Corn (2007)	0.392	19	7
Fallow Remainder (2007)	0	15	0
Wheat (2008)	0.392	154	60
Average for Row Crops	0.386	154	59
Tree Crops (GHG - CO_2)			
Almonds	0.766	46	35
Walnuts	0.766	51	39
Average for Tree Crops	0.766	97	74
Permanent Fallow (GHG - CO_2)			
Old Aggregate Plant Site	0	30	0
Carbon Dioxide Uptake (GHG - CO_2)	**0.476**	**281**	**134**

Annual Carbon Sequestration in Land, 1999 (tons/acre-yr)		
By Management System (uptake)	**tons C/acre**	**tons CO_2/acre**
Cropland	0.107	0.392
CRP/Grass Conversion	0.397	1.456
Trees/Wetland Conversion	0.209	0.766
Cultivation of Organic Soils	-3.52	-12.907
By Tillage System (uptake)	**tons C/acre**	**tons CO_2/acre**
Intensive Tillage	0.042	0.154
Moderate Tillage	0.169	0.620
No Tillage	0.223	0.818
Indirect Emissions	**lbs CO_2/acre**	**tons CO_2/acre**
Fertilizer Production	12	0.006
Pesticide Production	2	0.001

Source: *Using Ag Lands for Carbon Sequestration*, Purdue University, 2003

A-18. Dry Air Composition

Standard Composition of Dry Air						
Principal Gas	Chemical Symbol	MW	Concentration	Mole	Fraction	MW
		g/mole	ppmv	fraction	percent	g/mole
Nitrogen	N_2	28.014	780,805.00	0.78080500	78.080500	21.873471
Oxygen	O_2	31.998	209,450.00	0.20945000	20.945000	6.701981
Argon	Ar	39.948	9,340.00	0.00934000	0.934000	0.373114
Carbon Dioxide	CO_2	44.009	377.76	0.00037776	0.037776	0.016625
Neon	Ne	20.183	18.21	0.00001821	0.001821	0.000368
Helium	He	4.003	5.24	0.00000524	0.000524	0.000021
Methane	CH_4	16.043	1.75	0.00000175	0.000175	0.000028
Krypton	Kr	83.800	1.14	0.00000114	0.000114	0.000096
Hydrogen	H_2	2.016	0.50	0.00000050	0.000050	0.000001
Nitrous Oxide	N_2O	44.013	0.31	0.00000031	0.000031	0.000014
Xenon	Xe	31.300	0.09	0.00000009	0.000009	0.000003
Totals			**1,000,000.00**	**1.00000000**	**100.000**	**28.966**

Sources: UIG 2008, USEPA 2009, du Pont 1971, Jennings 1970

Notes:

MW = molecular weight, g/mole

ppmv = parts per million by volume (10^{-6})

References:

USEPA GHG Inventory 2009

Universal Industrial Gases, Inc., http://www.uigi.com/air.html

Condensed Laboratory Handbook, E.I. du Pont du Nemours & Co., Inc., Wilmington, DE, 1971

Environmental Engineering – Analysis and Practice, B. H. Jennings, International Textbook Company, 1970

Carbon dioxide varies with uptake by removal mechanisms, 365 (IPCC) to 380 ppmv (UIG)

A-19. GHG Effects

100-Year Global Warming Potentials of Greenhouse Gases		
Greenhouse Gas	Lifetime	GWP
	years	100-year
Carbon Dioxide (CO_2)	50-200	1
Methane (CH_4)	9-15	21
Nitrous Oxide (N_2O)	120	310
HFC-23	264	11,700
HFC-125	33	2,800
HFC-134a	15	1,300
HFC-143a	48	3,800
HFC-152a	2	140
HFC-227ea	37	2,900
HFC-236fa	209	6,300
HFC-4310mee	17	1,300
Fluoromethane (CF_4)	50,000	6,500
Fluoroethane (C_2F_6)	10,000	9,200
Fluorobutane (C_4F_{10})	2,600	7,000
Fluorohexane (C_6F_{14})	3,200	7,400
Sulfur Hexafluoride (SF_6)	3,200	23,900

Source: EPA 2009

A-19. GHG Effects

Ozone Depleting Substances			
Ozone Depleter	Direct	Net Effect	
	100-year	min	max
CFC-11	4,600	(600)	3,600
CFC-12	10,600	7,300	9,900
CFC-113	6,000	2,200	5,200
HCFC-22	1,700	1,400	1,700
HCFC-123	120	20	100
HCFC-124	620	480	590
HCFC-141b	700	(5)	570
HCFC-142b	2,400	1,900	2,300
Trichloromethane ($CHCl_3$)	140	(560)	0
Carbon Tetrachloride (CCl_4)	1,800	(3,900)	660
Methyl Bromide (CH_3Br)	5	(2,600)	(500)
Halon-1211	1,300	(24,000)	(3,600)
Halon-1301	6,900	(76,000)	(9,300)

Source: EPA 2009

Global Concentrations and Rates of Change					
Atmospheric Variable	CO_2	CH_4	N_2O	SF_6	CF_4
	ppmv	ppmv	ppmv	pptv	pptv
Pre-industrial atmospheric concentration (1750)	278	0.70	0.270	0	40
Atmospheric concentration in 1998	365	1.75	0.314	4.20	80
Percent increase from pre-industrial to 1998	31%	150%	16%	n/a	100%
Rate of concentration change (units/decade)	1.5	0.007	0.0008	0.24	1
Estimated atmospheric concentration in 2008	366.5	1.757	0.3148	4.44	81
Percent increase from 1998 to 2008	0.41%	0.40%	0.25%	5.71%	1.25%
Atmospheric Lifetime (years)	50-200	9-15	120	3200	>50,000

Source: EPA 2009

Notes:

ppmv = parts per million by volume (10^{-6})

pptv = parts per trillion by volume (10^{-12})

Rate of change for decade 1990 to 1999

Exhibit 4 – Revised DEIR Tables

Table 4.4-4 Estimated On-site Operational Emissions

Project Emissions	On-site Equipment & Trucks		
	tons/yr	lb/day	lb/hr
Oxides of Nitrogen (as NO_2)	15.5	105.0	16.5
Hydrocarbons (ROC as CH_4)	2.2	14.9	2.3
Carbon Monoxide (CO)	14.0	94.6	14.9
Particulates (as PM_{10})	0.7	5.0	0.8
Sulfur Dioxide (SO_2)	0.0	0.1	0.0
Diesel Particulate Matter (DPM)	0.7	5.0	0.8
Fugitive Dust (as PM_{10})	7.4	66.4	8.6

Source: USEPA 2006, USEPA 2009a, CARB 2006

Table 4.4-5 Estimated Off-site Operational Emissions

Project Emissions	Off-site Trucks		
	tons/yr	lb/day	lb/hr
Oxides of Nitrogen (as NO_2)	36.5	287.3	18.8
Hydrocarbons (ROC as CH_4)	3.0	23.7	1.6
Carbon Monoxide (CO)	24.3	191.2	17.7
Particulates (as PM_{10})	1.5	11.9	0.7
Sulfur Dioxide (SO_2)	0.0	0.3	0.0
Diesel Particulate Matter (DPM)	1.3	10.2	0.6
Fugitive Dust (as PM_{10})	1.3	9.9	1.2

Source: USEPA 2006, USEPA 2009a, CARB 2006

Table 4.4-6 Estimated Total Operational Emissions

Project Emissions	Combined Total		
	tons/yr	lb/day	lb/hr
Oxides of Nitrogen (as NO_2)	**52.0**	392.3	35.4
Hydrocarbons (ROC as CH_4)	5.2	38.6	3.9
Carbon Monoxide (CO)	38.3	285.8	32.6
Particulates (as PM_{10})	2.2	**16.8**	1.5
Sulfur Dioxide (SO_2)	0.1	0.5	0.0
Diesel Particulate Matter (DPM)	2.0	15.2	1.4
Fugitive Dust (as PM_{10})	8.6	**76.3**	9.8

Notes: Values in **bold face** indicate threshold exceedences.

Source: USEPA 2006, USEPA 2009a, CARB 2006

Table 4.4-8 Estimated Mining Fugitive Dust Emissions

Activity	Uncontrolled		Controlled		Reduction
	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Mining or Reclamation Operation	255	54,060	31	6,487	88%
Processing Operation	102	25,908	12	3,109	88%
Maintenance & Storage	26	5,406	3	649	88%
Totals	**383**	**85,374**	**46**	**10,245**	**88%**

Source: USEPA 2006, BAAQMD 1999, YSAQMD 2007

Table 4.4-9 Estimated Processing Fugitive Dust Emissions

Activity	Uncontrolled		Controlled		Reduction
	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
Screening (4)	78	16,600	7	1,412	91%
Primary & Secondary Crushing (2)	6	1,221	1	275	78%
Fines Crushing (1)	36	7,632	3	611	92%
Conveyor Transfer Points (69)	142	30,122	6	1,260	96%
Totals	**262**	**55,575**	**17**	**3,557**	**94%**

Source: USEPA 2006

Table 4.4-10 Estimated Truck Traffic Fugitive Dust Emissions

Activity	Uncontrolled		Controlled		Reduction
	lbs/day	lbs/yr	lbs/day	lbs/yr	percent
On-site Only Trucks	31	7,925	4	951	88%
Off-site Trucks When Onsite	82	20,899	10	2,508	88%
Totals	**113**	**28,824**	**14**	**3,459**	**88%**

Source: USEPA 2006, YSAQMD 2007

Table 4.6-1 Estimated Net Project GHG Emissions

Project Emissions	Combined Total	
	tons/yr	tonnes/yr
Carbon Dioxide (GHG – CO_2)	7,404	6,717
Nitrous Oxide (GHG – N_2O)	0.06	0.05
Methane (GHG – CH_4)	0.14	0.12
Carbon Dioxide Equivalents (CO_2 eqv)	**7,425**	**6,736**

Notes:

Ag = Agricultural

Net Project = Direct OP + Indirect OP - Ag Fuel - Ag Chem + Ag Uptake

Loss of Ag fuel and chemicals is beneficial (no emissions = GHG decrease)

Loss of Ag land is detrimental (no uptake = GHG increase)

Ag uptake (sequestration) is CO_2 only

Sources: USEPA 2006, USEPA 2009b, CARB 2006 2008, CCAR 2009, PU 2003

Table 4.6-2 Estimated Project GHG Balance by Category

Project Emissions	Combined Total	
	tons/yr	tonnes/yr
Direct Operations (CO_2 eqv)	6,502	5,898
Indirect Operations (CO_2 eqv)	1,038	941
Agricultural Fuel Combustion (CO_2 eqv)	(247)	(224)
Agricultural Chemicals Production (CO_2 eqv)	(1)	(1)
Agricultural Crop Sequestration (CO_2 eqv)	134	121
Project Balance (CO_2 eqv)	**7,425**	**6,736**

Notes:

Ag = Agricultural

Net Project = Direct OP + Indirect OP - Ag Fuel – Ag Chem + Ag Uptake

Loss of Ag fuel and chemicals is beneficial (no emissions = GHG decrease)

Loss of Ag land is detrimental (no uptake = GHG increase)

Ag uptake (sequestration) is CO_2 only

Sources: USEPA 2006, USEPA 2009b, CARB 2006, CCAR 2009, PU 2003