MOODY FLATS QUARRY PROJECT

AIR QUALITY

DECEMBER | 2009

REVISED FEBRUARY 2011

Lead Agency

Shasta County, Department of Resource Management – Planning Division

Applicant/Operator

Moody Flats Quarry, LLC

BENCHMARK RESOURCES

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AIR QUALITY

This section discusses regional air quality in the vicinity of the Project site and identifies the sources and quantities of air pollutant emissions expected from the Project. The air quality impacts are assessed in relation to federal and state ambient air quality standards as well as thresholds of significance adopted by the Shasta County Air Quality Management District (SCAQMD). An Air Quality Impact Analysis has been prepared and included as Appendix F. The Air Quality Impact Assessment examines emissions of criteria pollutants associated with Project activities for two assessment scenarios and provides estimates of the maximum daily and annual emissions. Criteria pollutants evaluated include carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter (PM_{10}/$PM_{2.5}$), and reactive organic gases (ROG). The assessment also provides the estimated air emissions from the Project, the resulting ambient air exposure point concentrations that sensitive human receptors could be exposed to, and potential associated human health effects.

1.0 METHODOLOGY AND TERMINOLOGY

The Air Quality Impact Assessment provides quantitative air quality impact information for two separate operating scenarios:

1. **Scenario 1:** Initially, the Project is expected to operate such that maximum aggregate production is 1 million tons per year (1MM tpy), mined material is transported to the aggregate processing area by off-road haul trucks, electrical power to the site is provided by a diesel generator, and the access road to the site is unpaved; or
2. **Scenario 2:** Within approximately five to ten years, the facility is expected to operate such that maximum aggregate production is two million tons per year

(2MM tpy), mined material is transported to the aggregate processing area by electric-powered conveyors, electrical power lines are brought to the site, and the access road to the site is paved.

Sources of on-site emissions estimated in the Air Quality Impact Assessment include:

- **Off-Road Diesel Engines:** excavators, front-end loaders, haul trucks, drills, a generator, and other miscellaneous equipment with diesel engines;
- **On-Road Diesel Engines:** customer trucks, ready-mix trucks, and asphalt concrete trucks, and vendor trucks bringing material and supplies to the site;
- **Fugitive Dust:** material handling fugitive dust from aggregate processing operations and loading/unloading material and mobile source movement of trucks over paved and unpaved surfaces;
- **Plant Facilities:** the Project proposes installation of an asphalt batch plant, ready-mix plant, and recycled material plant; and
- **Locomotive Emissions:** emissions associated with rail car travel to/ from the site for transport of aggregate material off-site.

URBEMIS (version 9.2.4), a computer model developed for the California Air Resource Board (CARB) to estimate maximum daily emissions for various types of land development projects in California, was used to estimate on-site emissions from off-road mobile equipment and aggregate processing plant equipment sources. URBEMIS output and calculations of emissions are presented in Appendix F.

Emission factors used in calculating emissions are based on U.S. EPA's Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, also referred to as AP-42 (U.S. EPA 1995), and other emission factors and assumptions approved or provided by SCAQMD, except where noted. Tailpipe emissions from on-site and off-site mobile vehicle travel were determined from the CARB motor emission inventory program, EMFAC2007.

Maximum exposure point concentrations in ambient air (i.e. outside of the Project site property boundary) were estimated for PM_{10}, $PM_{2.5}$, and NO_2. These are the criteria pollutants emitted from the Project in the largest estimated quantities relative to their associated ambient air quality standards (AAQS). The AAQS for CO is significantly less stringent than for other criteria pollutants, and SO_2 and ROG emissions estimates are relatively low, so off-site concentrations of these criteria pollutants were not estimated. In addition, ambient concentrations of DPM and other TACs were estimated and used in the CARB Hotspots Analysis Reporting Program (HARP) to assess potential human

health effects. The U.S. EPA AERMOD dispersion model (version 09292) was used to estimate maximum ambient air concentrations of pollutants emitted from project activities. Two types of model runs were conducted:

1. Model runs for evaluating AAQS which included source-specific emission rates appropriate for the AAQS averaging time. Model results were then directly comparable to the AAQS (except for those AAQS with statistical formats, in which case the appropriate statistics were performed on the model results).
2. Model runs for the HARP On-Ramp software with unit emission rates set up in accordance with guidance provided with the software. The AERMOD output files were then read by the On-Ramp software and combined with TAC emission rates from a separate file.

2.0 EXISTING CONDITIONS

Shasta County (County) is situated where the Central Valley of California meets the convergence of the Klamath and Coastal Mountain Ranges to the northwest and west, and the Cascade Mountain Range to the northeast and east. The County encompasses the northernmost portion of the Sacramento Valley and the surrounding mountainous areas, approximately 160 miles northwest of Sacramento. The area has a moderate year-round climate where the average daily temperature remains above freezing. The average high temperature ranges from 53°F in January and December to 95°F in July. The average low temperature ranges from 39°F in January to 68°F in July. The seasonal temperature variations, however, can be much larger. For example, the record high temperature is 115°F (in 1981), whereas the record low temperature is 7°F (in 1985).

The Sacramento Valley portion of the air basin forms a bowl, bounded on the west by the Coast Ranges, on the north by the Cascade Range, and on the east by the Sierra Nevada. These mountain ranges reach heights exceeding 6,000 feet above sea level. During summer, the wide, flat expanse of the Sacramento Valley provides an ideal environment for the formation of photochemical smog. Moreover, the prevailing winds in the Sacramento Valley blow from south to north, driven by the marine air traveling through the Carquinez Strait. These winds can transport pollutants from the broader Sacramento area and from the San Francisco Bay Area to the Northern Sacramento Valley Air Basin. The mountain ranges that surround the Northern Sacramento Valley Air Basin (NSVAB) provide a physical barrier to continued movement of the air mass, significantly hindering the dispersal of pollutants.

The County is within the NSVAB, which comprises Butte, Colusa, Glenn, Shasta, Sutter, Tehama, and Yuba Counties. The Shasta County Air Quality Management District (SCAQMD) has jurisdiction over air quality issues throughout the County.

3.0 REGULATORY SETTING

3.1 Federal

Regulation of air quality in California is achieved through both federal and State ambient air quality standards and emission limits for individual sources of air pollutant emissions. The federal Clean Air Act (CAA; 1970) and Clean Air Act Amendments (CAAA; as amended in 1977 and 1990) require the U.S. EPA to establish NAAQS to protect public health and welfare. NAAQS are established for "criteria" pollutants including ozone, CO, NO_2, sulfur dioxide (SO_2), PM_{10}, $PM_{2.5}$, and lead. Two types of NAAQS have been established: primary standards, which protect public health, and secondary standards, which protect the public welfare from non-health-related adverse effects such as visibility reduction. These standards are presented in Table 1, Federal and California Ambient Air Quality Standards.

The primary standards are set to protect the elderly, very young, and chronically sensitive portions of the population and include a reasonable margin of safety to protect against potential hazards that research has not yet identified.

In addition to setting standards, U.S. EPA oversees state and local actions, and implements programs for toxic air pollutants, heavy-duty trucks, locomotives, ships, aircraft, off-road diesel equipment, and some types of industrial equipment.

The CAA required each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The CAAA added requirements for states containing areas that violate the NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them. The U.S. EPA has responsibility to review all state SIPs to determine if they conform to the mandates of the CAAA and will achieve air quality goals when implemented. If the U.S. EPA determines a SIP to be inadequate, it may prepare a Federal Implementation Plan (FIP) for the nonattainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated timeframes can result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

TABLE 1
FEDERAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]			Pollutant Health and Atmospheric Effects	Major Pollutant Sources
		Concentration[3]	*Method*[4]	*Primary*[3,5]	*Secondary*[3,6]	*Method*[7]		
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	-	Same as Primary Standard	Ultraviolet Photometry	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue. Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Formed when reactive organic gases and nitrogen oxides react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial/industrial mobile equipment. Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 Hour	0.070 ppm (137 µg/m³)		0.75 ppm (157 µg/m³)				
Respirable Particulate Matter (PM_{10})	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; also, formed from photochemical reactions of other pollutants, including nitrogen oxides, sulfur oxides, and organics.
	Annual Arithmetic Mean	20 µg/m³		—				
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard		35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis	—	—
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	15 µg/m³				
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)	Classified as a chemical asphyxiate, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Motor vehicles, petroleum-refining operations, industrial sources, aircraft, ships, and railroads.
	1 Hour	20.0 ppm (23mg/m³)		35 ppm (40mg/m³)				
	8 Hour (Lake Tahoe)	6 ppm (7mg/m³)		—	—	—		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)	Gas Phase Chemi-luminescence	0.053 ppm (470 µg/m³	Same as Primary Standard	Gas Phase Chemi-luminescence	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	1 Hour	0.18 (339 µg/m³)		—				
Sulphur Dioxide (SO_2)	24 Hour	0.04 ppm (105 µg/m³)	Ultraviolet Fluorescence	0.14 ppm (365 µg/m³	—	Spectrophotometry (Pararosaniline Method)	May irritate eyes and respiratory tract, decreases in lung capacity, cancer, and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	3 Hour	—		—	0.5 ppm (1300 µg/m³			
	1 Hour	0.25 ppm (655 µg/m³		—	—	—		

TABLE 1
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Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]			Pollutant Health and Atmospheric Effects	Major Pollutant Sources
		Concentration[3]	*Method*[4]	*Primary*[3,5]	*Secondary*[3,6]	*Method*[7]		
Lead[8]	30 Day Average	1.5 µg/m³	Atomic Absorption	—	—	—	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing and recycling facilities. Past source: combustion of leaded gasoline.
	Calendar Quarter	—		1.5 µg/m³	Same as Primary Standard	High Volume Sampler and Atomic Absorption		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 kilometer—visibility of ten miles or more (0.07—30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		**No Federal Standards**			—	—
Sulfates	24 Hour	25 µg/m³	Ion Chromatography					
Vinyl Chloride[8]	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence					

Footnotes:

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM$_{10}$, PM$_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM$_{10}$, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 (µg/m3) is equal to or less than one. For PM$_{2.5}$, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25 °C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
8. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants

3.2 State

CARB is the State regulatory agency with authority to set air quality standards, monitor air quality, conduct research, and set and enforce emission standards for motor vehicles, fuels, and consumer products. CARB oversees and assists local air quality districts, which regulate most non-vehicle sources of air pollution, including stationary source emissions. The California CAA of 1988 (CCAA) also established California Ambient Air Quality Standards (CAAQS) for criteria pollutants and additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles (see Table 1).

Whereas CARB has primary responsibility and produces a major part of the SIP for pollution sources that are statewide in scope, it relies on the local air districts to provide additional strategies for sources under their jurisdiction. CARB combines its data with all local district data and submits the completed SIP to the EPA. The SIP consists of the emissions standards for vehicular sources and consumer products set by CARB, and attainment plans adopted by Air Pollution Control Districts (APCDs) and Air Quality Management Districts (AQMDs) and approved by CARB.

The California Health and Safety Code (CH&SC) [§39608] requires CARB to "identify" and "classify" each air basin in the state on a pollutant-by-pollutant basis. Subsequently, CARB has designated areas in California as nonattainment based on violations of the CAAQS. Designations and classifications specific to Shasta County are presented in Table 2, Attainment Status for Shasta County.

TABLE 2
ATTAINMENT STATUS FOR SHASTA COUNTY

	Attainment Status	
Parameter	***California Standard***	***Federal Standard***
Ozone	1- Hour: Moderate Nonattainment 8 hour: Nonattainment	8 Hour: Unclassified/ Attainment
Carbon Monoxide	Unclassified	Unclassified/ Attainment
Nitrogen Dioxide	Attainment	Unclassified/ Attainment
Sulfur Dioxide	Attainment	Unclassified
Lead	Attainment	
Visibility Reducing Particles	Unclassified	
Particulate Matter (10 Micron)	Nonattainment	Unclassified

Parameter	Attainment Status	
	California Standard	*Federal Standard*
Particulate Matter (2.5 Micron)	Unclassified	Unclassified/ Attainment
Sulfates	Attainment	
Hydrogen Sulfide	Unclassified	

Areas in the state were also classified based on severity of air pollution problems. For each nonattainment class, the CCAA specifies air quality management strategies that must be adopted. For all nonattainment categories, attainment plans are required to demonstrate a 5 percent-per-year reduction in the emissions of nonattainment air pollutants or their precursors, averaged every consecutive three-year period, unless an approved alternative measure of progress is developed. In addition, air districts in violation of CAAQS are required to prepare an Air Quality Attainment Plan (AQAP) that lays out a program to attain and maintain the CCAA mandates.

3.3 Local

3.3.1 Shasta County AQMD

State law requires CARB to divide the state into separate air basins that each have similar geographical and meteorological conditions [CH&SC §39606(a)]. Originally, air pollution was regulated separately by individual county air districts. Although some air districts have combined into regional agencies, Shasta County Air Quality Management District maintains jurisdiction over an area coterminous with the Shasta County boundaries.

Air districts have the primary responsibility for control of air pollution from all sources other than emissions directly from motor vehicles, which are the responsibility of CARB and the EPA. Air districts adopt and enforce rules and regulations to achieve state and federal ambient air quality standards and enforce applicable state and federal law.

3.3.2 Shasta County General Plan

The Shasta County General Plan contains the following policies pertaining to air quality. For an assessment of the Project's consistency with these policies, see Part 2: Environmental Assessments, Land Use.

AQ-1e: The County shall require new air pollution point sources such as, but not limited to, industrial, manufacturing, and processing facilities to be located an adequate distance from residential areas and other sensitive receptors.

AQ-2b: The County will work to accurately determine and fairly mitigate the local and regional air quality impacts of projects proposed in the unincorporated portions of Shasta County.

AQ-2c: Land use decisions, where feasible, should contribute to the improvement of air quality. New projects shall be required to reduce their respective air quality impacts to below levels of significance, or proceed as indicated in Policy AQ-2e.

AQ-2e: Shasta County will cooperate with the AQMD in assuring that new projects with stationary sources of emissions of non-attainment pollutants or precursors that exceed 25 tons per year shall provide appropriate emission offsets. A comparable program which offsets indirect emissions of pollutants exceeding 25 tpy from development projects shall also be utilized to mitigate air pollution impacts. An EIR will be required for all projects that have unmitigated emissions of non-attainment pollutants exceeding 25 tons per year.

AQ-2f: Shasta County shall require appropriate Standard Mitigation Measures and Best Available Mitigation Measures on all discretionary land use applications as recommended by the AQMD in order to mitigate both direct and indirect emissions of non-attainment pollutants.

AQ-2g: Significance thresholds as proposed by the AQMD for emissions shall be utilized when appropriate for: (1) Reactive Organic Gases (ROG) and Oxides of Nitrogen (NO_x), both of which are precursors of ozone, and (2) inhalable particulate matter (PM_{10}) in determining mitigation of air quality impacts.

AQ-2j: The County shall work toward measures to reduce particulate emissions from construction, grading, excavation, and demolition to the maximum extent feasible.

AQ-4b: The County's development standards shall require the paving of roads as a part of new development permits to the extent necessary to meet access and air quality objectives. These requirements shall be designed to help mitigate potentially significant adverse air quality impacts created by particulate emissions on both an individual and cumulative basis.

4.0 THRESHOLDS OF SIGNIFICANCE

The criteria used to determine the significance of air quality impacts are based on Appendix G of the CEQA Guidelines and the SCAQMD *Protocol for Review, Land Use Permitting Activities, Procedures for Implementing the California Environmental Quality Act* (SCAQMD, November 2003).

Pursuant to Appendix G of the CEQA Guidelines, the Project would result in a significant impact if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;

- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

The SCAQMD has established thresholds of significance for criteria pollutants and other regulated pollutants. The SCAQMD has established two levels of emission thresholds for NO_x, ROG, PM_{10} that are used for this analysis to determine the appropriate level of required mitigation measures (see Table 3, Criteria Air Pollutant Emissions Thresholds of Significance). If Level A thresholds are exceeded by a project, then standard mitigation measures (SMMs) are required. If Level B thresholds are exceeded by a project, then best available mitigation measures (BAMMs) are required.

TABLE 3
CRITERIA AIR POLLUTANT EMISSIONS THRESHOLDS OF SIGNIFICANCE

Level	ROG	NOx	PM_{10}
Indirect Source Level A	25 lb/day	25 lb/day	80 lb/day
Indirect Source Level B	137 lb/day	137 lb/day	137 lb/day
Direct Source	25 tons/year	25 tons/year	25 tons/year

Significance thresholds obtained from the Shasta County "Procedures for Implementing the California Environmental Quality Act" document, November 2003.

SCAQMD has established thresholds for human health risk that are used for this analysis (see Table 4, Human Health Risk Thresholds of Significance).

For the purposes of this air quality analysis, actions that would create pollutant concentrations that would exceed federal or state ambient air quality standards for criteria pollutants are considered significant impacts. Additionally, actions that would result in criteria air pollutant emissions in excess of significance thresholds established by the SCAQMD are considered significant impacts.

TABLE 4
HUMAN HEALTH RISK THRESHOLDS OF SIGNIFICANCE

Factor	Threshold
Lifetime Excess Cancer Risk (LECR)	10 in 1 million or greater
Chronic Non-Cancer Hazard (Chronic HI)	1.0 or greater
Acute Non-Cancer Hazard	1.0 or greater

Source: Golder, 2011.

5.0 ENVIRONMENTAL IMPACTS, MITIGATION MEASURES, AND SIGNIFICANCE DETERMINATIONS

Impact AQ-1: Project Operations Would Result in Emissions of Criteria Air Pollutants Which Could Exceed SCAQMD Thresholds of Significance

The Project consists of a hard rock aggregate mine designed with the eventual capability of producing up to 2 million tons of aggregate per year. Aggregate produced may be used for production of ready-mix or asphalt concrete on-site, which would be sold to off-site customers, or it may be sold directly to customers and transported off-site by heavy duty truck or rail. The following is a summary of the various sources of emissions that would occur as a result of Project operations.

Off-Road Diesel Engines

Mobile off-road equipment associated with mining and aggregate plant activities will include excavators, front-end loaders, mine haul trucks (Scenario 1), drills, a generator (Scenario 1), and other miscellaneous equipment with diesel-fueled engines. These engines emit criteria pollutants such as CO, NO_x, SO_2, $PM_{10}/PM_{2.5}$, and ROG. The particulate matter emitted from diesel engines is also classified as DPM (a TAC). Because DPM is comprised of many individual pollutants, speciated emissions of individual TACs from diesel engine exhaust were not quantified.

On-Road Diesel Engines

Mobile on-road vehicles associated with the Project include customer trucks picking up aggregate, ready-mix concrete and asphalt concrete and

vendor trucks bringing raw materials to the site. These engines emit CO, NO_x, SO_2, $PM_{10}/PM_{2.5}$, and ROG, as well as DPM.

Fugitive Dust from Material Handling

Aggregate processing (crushing, screening) and loading/unloading of both mined material and final aggregate will result in the generation of fugitive dust particulate emissions. These emissions can be significantly reduced by the application of water to the materials being handled, as will be the case for the crushers and screens at the aggregate processing plant.

Fugitive Dust from Mobile Source Movement

The movement of both off-road and on-road vehicles over paved and unpaved surfaces results in the generation of fugitive dust emissions. These emissions will be higher when the paved/unpaved surface is dry and lower when the surface is wet (either due to the presence of surface water, precipitation, or manual application of water).

Asphalt Plant

An asphalt batch plant will be located on the plant site and is assumed to be typical of industry standards. Plant operations will involve drying and mixing of aggregate material with heated asphalt oil to manufacture asphaltic concrete. The plant is estimated to have a throughput of 200 tons per hour. The asphalt plant area will include aggregate stockpiles, asphalt oil storage tanks, conveyors, a natural gas-fired rotary dryer, natural gas storage tanks, a control room, and a bag house dust collection system. Asphaltic concrete manufactured at the site will be loaded onto trucks for transport off-site. Asphalt oil used in the manufacturing process would be delivered on-site as needed and stored in heated storage tanks. Air emissions will occur primarily from natural gas combustion associated with aggregate drying and asphalt cement heating (CO, NO_x, SO_2, ROG, and $PM_{10}/PM_{2.5}$), and dryer dust ($PM_{10}/PM_{2.5}$).

Ready-Mix Plant

A ready-mix plant will also be located on the plant site. Typical ready-mix operations involve mixing of processed rock and sand with cement and water to manufacture ready-mix concrete. The plant is estimated to have a

throughput of 200 tons per hour. The ready-mix plant would include concrete aggregate stockpiles, mixer, cement silos, dust collection systems, a control room, and conveyors. Manufactured ready-mix concrete will be loaded into concrete-mixer trucks and transported off-site. Cement will be delivered on-site in enclosed container trucks as needed and stored in silos. Air emissions will occur primarily from handling and mixing of dry ready-mix concrete ingredients (PM_{10}/$PM_{2.5}$).

Recycling Plant

Recycled asphalt and/or concrete will be processed in a recycling plant crusher and re-used in the asphalt and/or ready-mix plants. Processing (crushing) of recycled material will occur in conjunction with aggregate processing and will generate small quantities of fugitive dust.

Train Locomotive Emissions

The sale of construction aggregate materials is expected to occur within the local Redding market as well as regional markets. The local market will be serviced by aggregate haul trucks while the regional market will be serviced by rail. Rail transportation of finished products will generate criteria pollutants and DPM emissions both on-site and off-site. Emissions from on-site locomotive exhaust are assessed but off site emissions (from the time the aggregate train leaves the site) are not analyzed as these emissions are assumed to be part of the rail authority's existing locomotive traffic inventory and would occur with or without the Project.

Miscellaneous Sources

On-site and off-site vehicle travel associated with worker commuting will generate passenger vehicle tailpipe emissions (CO, NO_x, SO_2, ROG, PM_{10} and $PM_{2.5}$). Other minor sources of air pollutant emissions would include on-site fuel delivery and storage, and use of maintenance fluids containing ROG.

This assessment provides quantitative air quality impact information for the following two operating scenarios.

Scenario 1: Initially, the facility is expected to operate such that maximum aggregate production is one million tons per year (1MM tpy),

mined material is transported to the aggregate processing area by off-road haul trucks, electrical power to the site is provided by a diesel generator, and the access road to the site is unpaved.

Scenario 2: Within approximately five years, the facility is expected to operate such that maximum aggregate production is two million tons per year (2MM tpy), mined material is transported to the aggregate processing area by electric-powered conveyors, electrical power lines are brought to the site, and the access road to the site is paved.

Construction emissions would occur during initial site preparation and periodic modification and expansion of facilities. Construction-related air pollutant emissions would be associated with ground disturbance, equipment and vehicle emissions. Because construction activities would utilize equipment similar to that already on-site for Project operations, new and/or additional equipment would not be brought on-site to complete construction tasks. Instead, the same equipment would be move on-site based on the current task and operating hours would remain similar whether or not the mobile equipment was used for construction and/or Project operations.

Modeling of air pollutant emissions under both scenarios included the following assumptions pertaining to measures that would be implemented to reduce fugitive dust emissions:

- Traveled, unpaved surfaces will be watered up to three times per day during dry conditions;
- Paved access roads will be swept with sufficient frequency to achieve a fugitive dust control efficiency of 90 percent; and
- Vehicle speeds on unpaved roads will not exceed 15 mph.

Emissions Summary

Maximum estimated Project-wide criteria pollutant emissions under Scenarios 1 and 2 are presented in Table 5, Criteria Pollutant Emissions Summary for Operations Producing 1 Million Tons Per Year, and Table 6, Criteria Pollutant Emissions Summary for Operations Producing 2 Million Tons Per Year, respectively.

As shown in Tables 5 and 6, indirect Project emissions under Scenario 1 and 2 are predicted to exceed the Level A thresholds for ROG. In addition, indirect Project emissions are predicted to exceed the Level A and B thresholds for NO_x. Other indirect emissions and direct emission sources under Scenarios 1 and 2 would be under the SCAQMD thresholds.

As a result of the predicted ROG emissions in excess of the Level A threshold, the Project will be required to implement SCAQMD standard mitigation measures for reducing ROG emissions. As a result of the predicted NO_x emissions in excess of the Level B threshold, the Project will be required to implement best available mitigation measures for reducing NO_x emissions.

TABLE 5
CRITERIA POLLUTANT EMISSIONS SUMMARY FOR OPERATIONS PRODUCING 1 MILLION TONS PER YEAR

Emissions Source	ROG		NO_x		CO		SO_2		PM_{10}		$PM_{2.5}$	
	lbs/day	*tpy*	*lbs/day*	*tpy*	*lbs/day*	*tpy*	*lbs/day*	*tpy*	*lbs/day*	*tpy*	*lbs/day*	*tpy*
On-Site	*39.3*	*1.23*	*292*	*14.2*	*600*	*16.5*	*11.4*	*0.26*	*959*	*22.7*	*119*	*2.86*
Off-Site	*21.5*	*0.45*	*315*	*6.59*	*91.1*	*1.88*	*0.33*	*0.007*	*13.3*	*0.28*	*11.5*	*0.24*
Total	60.8	1.68	607	20.8	692	18.4	11.7	0.27	972	23.0	130	3.10
Indirect Sources	**42**	**1.0**	**401**	**8.6**	**128**	**2.7**	**0.5**	**0.014**	**18**	**0.37**	**15**	**0.33**
Level A Threshold	*25*	*NA*	*25*	*NA*	*500*	*NA*	*80*	*NA*	*80*	*NA*	*NA*	*NA*
Level B Threshold	*137*	*NA*	*137*	*NA*	*NA*	*NA*	*NA*	*NA*	*137*	*NA*	*NA*	*NA*
Direct Source Emissions	**14**	**0.30**	**207**	**13**	**500**	**11**	**11**	**0.25**	**954**	**23**	**115**	**2.8**
Direct Source Threshold	*NA*	*25*	*NA*	*25*	*NA*	*NA*	*NA*	*NA*	*NA*	*25*	*NA*	*NA*

Source: Golder, 2011.

Notes:

1. Significance thresholds obtained from the Shasta County "Procedures for Implementing the California Environmental Quality Act" document, November 2003.
2. Indirect sources are the sum of on-road vehicle emissions (including off-site, on-site, and idling emissions) and locomotive emissions.
3. Direct sources are the sum of stationary source emissions (blasting, aggregate plant, asphalt plant, concrete plant, recycle plant, diesel generator, and all fugitive dust emissions).

TABLE 6
CRITERIA POLLUTANT EMISSIONS SUMMARY FOR OPERATIONS PRODUCING 2 MILLION TONS PER YEAR

Emissions Source	ROG		NO_x		CO		SO_2		PM_{10}		$PM_{2.5}$	
	lbs/day	*tpy*	*lbs/day*	*tpy*	*lbs/day*	*tpy*	*lbs/day*	*tpy*	*lbs/day*	*tpy*	*lbs/day*	*tpy*
On-Site	*36.4*	*1.66*	*172*	*8.21*	*566*	*26.5*	*11.5*	*0.52*	*222*	*9.96*	*51.3*	*2.33*
Off-Site	*16.1*	*0.67*	*203*	*8.48*	*69.2*	*2.84*	*0.36*	*0.015*	*9.31*	*0.39*	*7.9*	*0.33*
Total	52.5	2.34	375	16.7	635	29.3	11.9	0.53	231	10.4	59	2.66
Indirect Sources	**36**	**1.6**	**263**	**11.1**	**95**	**3.9**	**0.6**	**0.028**	**12**	**0.49**	**10**	**0.42**
Level A Threshold	*25*	*NA*	*25*	*NA*	*500*	*NA*	*80*	*NA*	*80*	*NA*	*NA*	*NA*
Level B Threshold	*137*	*NA*	*137*	*NA*	*NA*	*NA*	*NA*	*NA*	*137*	*NA*	*NA*	*NA*
Direct Source Emissions	**14**	**0.47**	**97**	**4**	**495**	**21**	**11**	**0.51**	**219**	**10**	**49**	**2.2**
Direct Source Threshold	*NA*	*25*	*NA*	*25*	*NA*	*NA*	*NA*	*NA*	*NA*	*25*	*NA*	*NA*

Source: Golder, 2011.

Notes:

1. Significance thresholds obtained from the Shasta County "Procedures for Implementing the California Environmental Quality Act" document, November 2003.
2. Indirect sources are the sum of on-road vehicle emissions (including off-site, on-site, and idling emissions) and locomotive emissions.
3. Direct sources are the sum of stationary source emissions (blasting, aggregate plant, asphalt plant, concrete plant, recycle plant, diesel generator, and all fugitive dust emissions).

Level of Significance Before Mitigation: Significant (Scenario 1 Indirect ROG Emissions; Scenario 1 and 2 Indirect NO_x emissions)

Mitigation Measures: Mitigation Measure AQ-1

Prior to the commencement of surface disturbing activities, the Project Operator shall prepare a ROG and NO_x emissions reduction plan that meets the requirements of the SCAQMD. The emissions reduction plan shall be submitted to the SCAQMD for review and approval prior to commencement of surface disturbing activities. The emissions reduction plan should include all feasible Reasonably Available Control Measures (RACMs) and Best Available Control Technologies recommended in SCAQMD guidance documents applicable to large surface disturbing activities.

Level of Significance Before Mitigation: Significant and Unavoidable

Impact AQ-2: The Project Could Contribute to Exceedance of Established Ambient Air Quality Standards

Project-related air pollutant emissions would create a potential for exceeding established federal and State Ambient Air Quality Standards (AAQS). Maximum exposure point concentrations in ambient air (i.e. outside of the Project site property boundary) were estimated for PM_{10}, $PM_{2.5}$, and NO_2. These are the criteria pollutants emitted from the project in the largest estimated quantities relative to their associated ambient air quality standards (AAQS). The AAQS for CO is significantly less stringent than for other criteria pollutants, and SO_2 and ROG emissions estimates are relatively low, so off-site concentrations of these criteria pollutants were not estimated. Exposure point concentrations were assessed for the Project activity emissions discussed in Impact AQ-1, above. For purposes of this evaluation, the maximum modeled emissions were compared to applicable State or Federal AAQS. Existing background concentrations of these pollutants are not added to the modeled results.

The U.S. EPA AERMOD dispersion model (version 09292) was used to estimate maximum ambient air concentrations of pollutants emitted from Project activities. Model runs for evaluating AAQS which included source-specific emission rates appropriate for the AAQS averaging time. Model results were then directly comparable to the AAQS (except for those AAQS with statistical formats, in which case the appropriate statistics were performed on the model results).

Maximum predicted 24-hour $PM_{2.5}$ concentrations for Scenario 2 are 36.6 μg/m3, and slightly exceed the associated federal AAQS (35 μg/m3). $PM_{2.5}$ concentrations above the AAQS occurred only within a very small area just south of the entrance to the Project site access road. The majority of these concentrations are due to estimated fugitive dust emissions from the paved access road.

Maximum predicted 24-hour PM_{10} concentrations for Scenario 1 are 485.1 μg/m3, and exceed the associated California AAQS (50 μg/m3). The predicted 24-hour PM_{10} concentrations, evaluated as the highest-sixth-high value for the purposes of comparing to the federal AAQS, is 366.6 μg/m3, and exceeds the federal standard. Concentrations above the California AAQS occurred over a fairly broad area to the south of the Project site, with the highest concentrations occurring just south of the entrance to the Project site access road. The majority of the concentrations in this area are due to estimated fugitive dust emissions

from the paved access road. Estimated fugitive emissions from the mine haul trucks also contributed to high predicted concentrations at locations further west along the southern boundary of the site.

The maximum predicted 24-hour PM_{10} concentrations for Scenario 2 are 87.5 μg/m3, much lower than Scenario 1, but still exceed the California AAQS as a result of impacts from estimated fugitive dust emissions from the paved access road near the entrance to the road. Maximum predicted annual average $PM_{2.5}$ and PM_{10} concentrations under Scenario 2 are less than the associated federal AAQS.

Maximum predicted one-hour and annual NO_2 concentrations are less than the associated AAQS. The highest predicted 1-hour NO_2 concentrations occurred only within a very small area just south of the entrance to the Project site access road. The majority of these concentrations are due to estimated on-road vehicle tailpipe emissions for vehicles entering and exiting the access road.

As a result of the predicted exceedance of PM_{10} and $PM_{2.5}$ AAQS, this impact is considered significant. The exccedances are due primarily as a result of fugitive dust emissions. As such, this environmental assessment includes Mitigation Measure AQ-2 which provides a list of fugitive dust emission reduction measures that could be considered for the Project. This assessment does not quantify the efficacy of these reduction measures and therefore does not determine whether their implementation would reduce this impact to less than significant.

Level of Significance Before Mitigation: Significant (PM_{10} and $PM_{2.5}$)

Mitigation Measures: Mitigation Measure AQ-2

- *The applicant will be responsible for ensuring that all adequate dust control measures are implemented in a timely and effective manner during all phases of project development and construction.*
- *All material excavated, stockpiled, or graded should be sufficiently watered to prevent fugitive dust from leaving property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering should occur at least twice daily with complete site coverage, preferably in the mid-morning and after work is completed each day.*

- *All areas (including unpaved roads) with vehicle traffic should be watered periodically or have dust palliatives applied for stabilization of dust emissions.*
- *All on-site vehicles should be limited to a speed of 15 miles per hour on unpaved roads.*
- *All land clearing, grading, earth moving, and excavation activities on a project will be suspended when winds are expected to exceed 35 miles per hour.*
- *All inactive portions of the development site should be seeded and watered until suitable grass cover is established.*
- *All trucks hauling dirt, sand, soil, or other loose material should be covered or should maintain at least 2 feet of freeboard (i.e., minimum vertical distance between top of the load and top of the trailer) in accordance with the requirements of California Vehicle Code Section 23114. This provision will be enforced by local law enforcement agencies.*
- *All material transported off site will be either sufficiently watered or securely covered to prevent a public nuisance.*
- *Paved streets adjacent to the development site should be swept or washed at the end of each day to remove excessive accumulations of silt and/or mud that may have accumulated as a result of activities on the development site.*
- *Adjacent paved streets will be swept (recommend water sweeper with reclaimed water) at the end of each day if substantial volumes of soil materials have been carried onto adjacent public paved roads from the project site.*
- *Require that all diesel engines be shut off when not in use to reduce emissions from idling.*

Level of Significance After Mitigation: Significant and Unavoidable

Impact AQ-3: Project Diesel Particulate Matter and Other Toxic Air Contaminant Emissions Could Create a Risk to Human Health.

Project activities would result in emissions of diesel particulate matter (DPM) and other toxic air contaminants (TACs) that would exposure humans to inhalation and associated health risks. To determine the exposure and health risk, the AERMOD model was used in conjunction with the Hotspots Analysis and Reporting Program (HARP) and HARP On-Ramp models to estimate maximum predicted cancer and non-cancer health effects to occupational workers not associated with the Project and nearby residents or other sensitive receptors. For the purposes of this analysis, the AERMOD model was executed

using unit emission rates for each source representation, in accordance with the HARP On-Ramp software guidance. Then predicted ambient concentrations for each source representation and estimated TAC emissions were input to the HARP model to estimate lifetime excess cancer risk (LECR), chronic hazard, and acute hazard at model receptor locations. The HARP model uses toxicity factors published by the California Office of Environmental Health and Assessment (OEHHA).

Lifetime Excess Cancer Risk

Cancer risks from DPM and TACs concentrations in air would occur primarily through the inhalation pathway. In addition, cancer risk from TACs was also assessed for the home grown produce (resident/sensitive receptor only), dermal, soil ingestion and mother's milk pathways. The HARP software was used to estimate LECR for each TAC for the exposure pathways identified above. LECR values resulting from exposures to different TACs through the various exposure pathways are generally additive.

The "Derived (OEHHA)" exposure assumptions (most conservative) were used to estimate cancer risk. In addition, although LECR is determined assuming 70 years of exposure and, in particular, DPM emissions from the on-road vehicle fleet will decline over that period (by at least 50% in accordance with the EMFAC model which accounts for replacement of older vehicles with newer, cleaner vehicles), these declines in emissions were not explicitly accounted for in the LECR estimates.

In addition, although Scenario 1 emissions resulted in slightly higher off-site exposure to TAC emissions relative to Scenario 2, when evaluating the 70 year exposure for determining LECR for Scenario 1, it was conservatively assumed that Scenario 1 emissions would occur for the entire 70 year period, which would not be the case if Scenario 2 is implemented within five to ten years as planned. As a result, the estimated LECR values reported in this assessment are considered to be over-estimates of any actual maximum cancer risk that might result from exposure to Project emissions.

The maximum estimated LECR values for off-site occupational workers and residents/sensitive receptors is 4.2-in-a-million (residents/sensitive receptors) for Scenario 1 and 3.7-in-a-million (residents/sensitive

receptors) for Scenario 2. The most significant contributor to the maximum LECR values in all cases was DPM emissions from on-road vehicles entering the Project site via the access road. According to guidance from the SCAQMD, LECR values less than 10-in-a-million are considered less than significant and the predicted LECR values are below this threshold.

Chronic Non-Cancer Hazard

Chronic non-cancer health effects from DPM and other TACs in air would occur through the inhalation pathway. In addition, chronic non-cancer health effects from TACS were also assessed for the home grown produce (resident/sensitive receptor only), dermal, soil ingestion and mother's milk pathways. Default exposure parameters for residents/sensitive receptors and occupational worker receptors were used.

The HARP software was used to estimate a hazard quotient for each TAC from the exposure pathways described above. Hazard quotients for different TACs affecting the same target organ are then added together, to produce an overall hazard index (HI) for that target organ. The maximum HI for all target organs assessed is then reported.

The maximum estimated chronic HI values for off-site occupational workers and residents/sensitive receptors is 0.01 (off-site workers) for Scenario 1 and 0.01 (same for off-site workers and residents/sensitive receptors) for Scenario 2. The most significant contributor to the maximum HI values in all cases was DPM emissions from on-road vehicles entering the Project site via the access road. According to guidance from the SCAQMD, chronic HI values less than 1.0 are considered less than significant and the predicted chronic HI values are below this threshold.

Acute Non-Cancer Hazard

Acute non-cancer health effects from TACs in air would occur through the inhalation pathway. No other acute exposure pathways are evaluated by the HARP model. Because acute exposures are assumed to generally occur over a single hour, there is no distinction between exposure parameters for occupational worker or residents/sensitive receptors. Default exposure

assumptions were assumed for all receptor locations outside of the Project site property boundary.

The HARP software was used to estimate a hazard quotient for each TAC from the inhalation exposure pathway. Hazard quotients for different TACs affecting the same target organ are then added together, to produce an overall HI for that target organ. The maximum HI for all target organs assessed was then reported. The maximum estimated acute HI values for all off-site receptors is 0.6 for both Scenarios 1 and 2. The most significant contributor to the maximum HI values in all cases is formaldehyde emissions from the asphalt plant. According to guidance from the SCAQMD, acute HI values less than 1.0 are considered less than significant and the predicted acute HI values are below this threshold.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

Impact AQ-4: Creation of Objectionable Odors

Typically odors are regarded as an annoyance rather than a health hazard. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; in fact, an odor that is offensive to one person may be perfectly acceptable to another. It is also important to note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult and at some point can no longer be detected by an individual.

The SCAQMD does not have a specific threshold used to measure the significance of odors. Other APCDs/AQMDs in California suggest odor thresholds based on the distance of the odor source from sensitive receptors and complaint records for a facility or similar facility.

Project facilities and/or equipment that may create objectionable odors include diesel exhaust from mobile construction equipment and the asphalt batch plant. The nearest sensitive receptor is a residence located over 1 mile to the east from where the asphalt batch plant and majority of mobile equipment would be operating. Furthermore, the Project wind rose graph reveals that the predominant winds originate from the north and move south virtually negating the possibility of Project odor impacts traveling to the eastern residences. In addition, the asphalt plant would have to obtain an ATC and PTO from the SCAQMD. As part of the permitting process, the Applicant would need to demonstrate to the satisfaction of the SCAQMD permitting staff that the plant would be equipped with BACT for controlling air emissions including those which may create an objectionable odor at area residences. As a result this impact is considered less than significant.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required