GREENHOUSE GAS ASSESSMENT

FOR THE

SANTA MARGARITA QUARRY EXTENSION PROJECT

SAN LUIS OBISPO COUNTY, CA

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Appendix A: Climate Change & Greenhouse Gas Emissions – Summary of Existing Conditons & Regulatory Framework

Appendix B: Emissions Modeling

LIST OF COMMON TERMS & ACRONYMS

AB 32	The California Global Warming Solutions Act of 2006
ADT	Average Daily Traffic
CalEEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CCAR	California Climate Action Registry
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
GHG	Greenhouse Gases
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
$MTCO_2e$	Metric Tons Carbon Dioxide Equivalent
N_2O	Nitrous Oxide
SLOAPCD	San Luis Obispo County Air Pollution Control District
U.S. EPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled

INTRODUCTION

Hanson Aggregates Mid-Pacific is applying for a modification to an existing Conditional Use Permit and Reclamation Plan Amendment for an extension of the existing quarry operations near Santa Margarita, California in San Luis Obispo County. Under average annual production, there are 21 years of reserves remaining, and the proposed extension will add about 38 years of reserves. This report describes the existing setting related to climate change and an evaluation of greenhouse gas (GHG) emissions associated with current and future quarry operations.

EXISTING SETTING – SAN LUIS OBISPO COUNTY

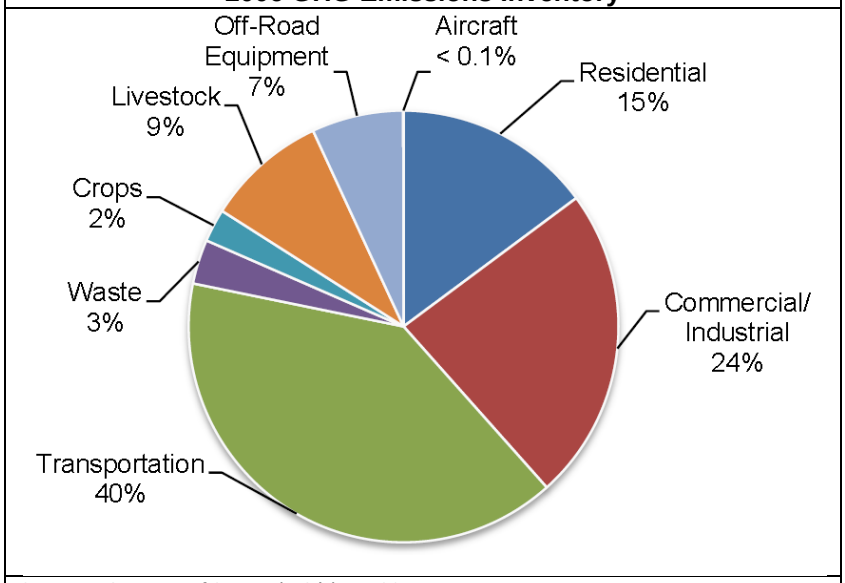
The following discussion provides a summary of existing GHG emissions within San Luis Obispo County, as well as, a summary of current guidance recommended by the San Luis Obispo County Air Pollution Control District (SLOAPCD) for the evaluation of GHG emissions. Please refer to **Appendix A** of this report for additional background information related to Climate Change, GHG emissions, and the applicable federal and state regulatory framework.

SAN LUIS OBISPO COUNTY ENERGYWISE PLAN

The County of San Luis Obispo's *Energywise Plan, Designing Energy and Climate Solutions for the Future* (Plan), was adopted in November 2011. The Plan outlines the County's approach to reducing GHG emissions through a number of goals, measures, and actions that provide a road map to achieving the County's GHG reduction target of 15 percent below baseline levels by 2020. The Plan includes an updated GHG inventory of municipal and community-wide emissions, including transportation, waste, agriculture, energy, and aircraft related activities. The Plan establishes a baseline (year 2006) GHG inventory, against which future changes in emissions can be measured, and provides an understanding of major sources of GHG emissions in the unincorporated county. The GHG emissions inventory for San Luis Obispo County is summarized in **Figure 1** (San Luis Obispo County 2011).

As depicted, on-road vehicles were the greatest contributor to the county's baseline emissions, constituting roughly 40 percent of total GHG emissions. Commercial/industrial energy use and residential energy use were the next largest contributors, constituting a combined total of 39 percent of the overall emissions inventory. In total, year 2006 GHG emissions from the unincorporated portions of the County were 917,700 MTCO2e (San Luis Obispo County 2011).

Figure 1
Unincorporated San Luis Obispo County
2006 GHG Emissions Inventory



Source: County of San Luis Obispo 2011

The objective of the County's Energywise Plan is to bridge the gap between the county's growth forecast and the state's recommended reduction target of 15 percent below 2006 baseline levels by 2020. This approach utilizes an adjustment applied to the baseline inventory, referred to as the business as usual forecast, which takes into account state and federal actions such as mandated fuel efficiency standards, renewable electricity standards, California's green building code, CALGreen, and federal vehicle efficiency standards, that would reduce projected future GHG emissions. Additional reduction measures and strategies are implemented to bridge any remaining gap identified to achieve the 15-percent reduction. To achieve this reduction target, the County's Plan incorporates various measures and strategies related to energy conservation, renewable energy, solid waste, land use and transportation, water conservation, and agriculture (San Luis Obispo County 2011).

SAN LUIS OBISPO COUNTY AIR POLLUTION CONTROL DISTRICT

The San Luis Obispo County Air Pollution Control District (SLOAPCD) is a local public agency with the primary mission of realizing and preserving clean air for all county residents and businesses. Responsibilities of the SLOAPCD include, but are not limited to, preparing plans for the attainment of ambient air quality standards, adopting and enforcing rules and regulations concerning sources of air pollution, issuing permits for stationary sources of air pollution, inspecting stationary sources of air pollution and responding to citizen complaints, monitoring ambient air quality and meteorological conditions, and implementing programs and regulations required by federal and state regulatory requirements.

GHG Significance Thresholds

On March 28, 2012 the SLOAPCD's Board approved thresholds of significance for the evaluation of project-related increases of GHG emissions. The GHG significance thresholds are based on AB 32 GHG emission reduction goals, which take into consideration the emission reduction strategies outlined in ARB's Scoping Plan. The GHG significance thresholds include one qualitative threshold and two quantitative thresholds options for evaluation of operational GHG emissions. The qualitative threshold option is based on a consistency analysis in comparison to a Qualified Greenhouse Gas Reduction Strategy, or equitably similar adopted policies, ordinances and programs. If a project complies with a Qualified Greenhouse Gas Reduction Strategy that is specifically applicable to the project, then the project would be considered less than significant. The two quantitative threshold options include: 1) a bright-line threshold of 1,150 $MTCO_2e$/year; and 2) an efficiency threshold of 4.9 $MTCO_2e$/service population (residents+employees)/year. An additional GHG significance threshold of 10,000 $MTCO_2e$/year has been adopted for industrial stationary sources. The applicable GHG significance threshold to be used would depend on the type of project being proposed. Projects with GHG emissions that do not exceed the selected threshold would be considered to have a less-than-significant impact. The APCD's GHG emission thresholds are summarized in **Table 1**(SLOAPCD 2012).

Table 1
San Luis Obispo County APCD's Greenhouse Gas Thresholds of Significance

Project	Draft Threshold
Projects other than Stationary Sources	1. Compliance with Qualified GHG Reduction Strategy; or 2. 1,150 MT CO2e/year; or 3. 4.9 MT CO2e/SP/year (residents+employees)
Stationary Sources (Industrial)	10,000 MT CO2e/year
Construction	Amortized over the life of the project and added to operation

	GHG emissions
Thresholds were adopted by SLOAPCD's Board on March 28, 2012. *Source: SLOAPCD. February 15, 2012. Proposed GHG Thresholds and Supporting Evidence.*	

EMISSIONS ANALYSIS

GENERAL METHODOLOGY

As previously noted, Hanson Aggregates Mid-Pacific is applying for a modification to an existing Conditional Use Permit and Reclamation Plan Amendment for an extension of the existing quarry operations. Under average annual production, existing operations are projected to have approximately 21 years of reserves remaining, with an estimated project life through approximately year 2033. The current quarry operations, as entitled under the existing CUP, represent baseline conditions. Based on these same average-annual production rates, the proposed extension would add an additional approximately 38 years of reserves, beyond the anticipated depletion of the currently entitled reserves, which would extent the life of the project to approximately year 2071. The proposed project would not, however, result in an increase in annual production limits or any intensification of the existing operations beyond currently permitted levels. Therefore, in comparison to baseline conditions, the proposed project is not anticipated to result in increased emissions associated with onsite operations or offsite vehicle trips. However, the proposed project would include the use of a conveyor system, which would result in anticipated decreases in onsite emissions associated with the transport of mined material from the quarry pit to the processing area.

Major operational sources of GHG emissions associated with current baseline and proposed project operations include off-road equipment operations; on-road vehicle use associated with material transport, employee commute, and miscellaneous vehicle trips to and from the site; energy use, including use of electricity and propane; and material processing/crusher operations. GHG emissions associated with these primary emission sources were quantified using the CalEEMod computer program, version 2011.1.1, and emissions factors derived from the Climate Action Registry's *General Reporting Protocol* (2009), based on operational data provided by the project applicant. Modeling assumptions and output files are included in **Appendix B** of this report. Modeling assumptiions used for quantification of GHG emissions associated with these primary sources are summarized below.

OFF-ROAD EQUIPMENT

The CalEEMod computer program was used for quantification of emissions associated with off-road equipment operations. Emissions modeling was conducted based on default parameters contained in the CalEEMod computer program for San Luis Obispo County. Off-road equipment information, including horsepower rating, model year, and emissions tier, were based on data obtained from the project applicant. Load factors associated with off-road equipment were updated based on information obtained from the *Carl Moyer Program Guidelines* (2011). The off-road equipment inventory for baseline and proposed project conditions is summarized in **Table 2**. However, as noted earlier in this report, the proposed project also includes the use of a conveyor system to transport material from the pit to the processing plant. As active mining in the proposed expansion area moves further away from the processing area, a conveyor would be constructed to transport mined material from the quarry pit to the processing area. The conveyor system would reduce the need for off-road trucks to haul material from the pit to the processing plant by approximately 90 percent (Galford, 2012).

Table 2 Off-Road Equipment				
Equipment Type	Number of Equipment	Average Hours of Use/Equipment/Day	HP	Tier
Skid Steer Loader	1	1	57	2
Off-Highway Truck	2	8	710	2
Rubber Tired Front-End Loader	1	8	300	1
Crawler Tractor	1	6	405	1
Rubber Tiered Loader	1	8	300	1
Rubber Tiered Loader	1	8	430	1
Excavator	1	1	185	0
Motor Grader	1	1	150	0
Source: (Sanford 2012)				

ON-ROAD VEHICLES

The CalEEMod computer program was used for quantification of emissions associated with on-road vehicle use. Emissions associated with on-road vehicle use included employee vehicle commute trips, miscellaneous vehicle trips, and heavy-duty haul truck trips associated with material transport. Vehicle trips and distances of travel for baseline conditions are summarized in **Table 3.**

Table 3 On-Road Vehicles		
Vehicle Type	Average-Daily Trips	Average Trip Distance (miles)
Employee Commute	30	13
Miscellaneous	20	13
Material Haul Truck	178	15
Total ADT:	228	
Source: REC 2012		

Because the proposed project is not proposing an increase in production rates or intensification of onsite activities, these trip estimates would also apply to the proposed project. As indicated, project operations currently generate a total of approximately 228 vehicles/day (REC 2012). Average trip distances for employee and miscellaneous vehicle trips were based on the model default for San Luis Obispo County (i.e.,13 miles/trip). The trip distance for on-road material transport was based on an average trip distance of 15 miles, based on the calculated average distance from the project site to the nearby communities of Paso Robles, Atascadero, Templeton, Santa Margarita, and San Luis Obispo.

ENERGY USE

Emissions associated with energy use included electricity and propane use. Electricity use includes all onsite electrical sources, including water conveyance. Emissions were quantified based on annual baseline usage rates of 644,720 kWh of electricity and 20,000 gallons of propane, provided by the project applicant (Sanford 2012). Because the proposed project is not proposing an increase in production rates or intensification of onsite activities, these same energy usage rates were also applied to the proposed project. Emission factors for electricity use were

based on Pacific Gas & Electric energy intensity factors derived from the CalEEMod, version 2011.1.1, computer program for San Luis Obispo County. Emission factors for propane use were derived from the California Climate Action Registry's *General Reporting Protocol* (CCAR 2009).

MATERIAL PROCESSING

Material processing emissions includes the operation of a power generator (genset) for powering onsite material processing equipment (e.g., material crusher). Emissons modeling assumes an estimated annual diesel fuel use of 41,600 gallons for the genset (Sanford 2012). Because the proposed project is not proposing an increase in production rates or intensification of onsite activities, this estimate of fuel use would also apply to the proposed project. Emission factors used for emissions quantification were derived from the California Climate Action Registry's General Reporting Protocol (CCAR 2009).

CARBON SEQUESTRATION

Emissions associated with the removal of vegetative cover and reclamation of the proposed quarry expansion area were quantified using the CalEEMod computer program. CalEEMod calculates GHG emissions from vegetation activities according to the IPCC protocol for vegetation, which assumes an active growing period of 20 years for trees. This method is also similar to the CAR Forest Protocol and the Center for Urban Forest Research Tree Carbon Calculator (SCAQMD 2011). Initial land clearing assumes the removal of approximately 27.3 acres of scrub land and approximately 11 acres of woodland, totaling approximately 762 trees, based on the *Oak Woodland Assessment Report* prepared for this project (Riggs 2012).

OPERATIONAL GREENHOUSE GAS EMISSIONS

GHG emissions were quantified for current and future operations. Carbon sequestration emissions associated with future reclamation of the proposed quarry expansion area were also quantified. Operational GHG emissions are summarized in **Table 4**.

CURRENT OPERATIONS

As depicted in **Table 4**, GHG emissions associated with current operations total approximately 3,455 $MTCO_2e$/year. As depicted, a majority of the GHG emissions are associated with off-road equipment operation and offsite material transport, which constitute a total of approximately 75 percent of current operational GHG emissions. Of this total, the onsite hauling of material by truck from the mine pit to the processing area totals approximately 641 $MTCO_2e$/year, roughly 19 percent of total operational GHG emissions. The remaining approximately 25 percent of total operational GHG emissions are associated with electrical energy use, propane use, fuel use associated with the crusher plant, as well as, employee and miscellaneous vehicle trips to and from the site.

Table 4
Greenhouse Gas Emissions Summary

Source	$MTCO_2e$/Year	Percent of Total
Current Operations		
Material Processing	425	12.3
Electricity Use	189	5.5

Propane Use	116	3.4
Off-Road Equipment (with haul trucks)	1,314	38.0
Employee Commute	38	1.1
Miscellaneous On-Road Vehicle Trips	93	2.7
Material Hauling Trips	1,281	37.0
Total:	3,456	--
Proposed Project Operations		
Material Processing	425	15.1
Electricity Use	189	6.7
Propane Use	116	4.1
Off-Road Equipment (without haul trucks)	737	23.9
Employee Commute	38	1.4
Miscellaneous On-Road Vehicle Trips	93	3.3
Material Hauling Trips	1,281	45.5
Total:	2,879	--
Net Change Compared to Existing:	-577	--
Carbon Sequestration		
Sequestered Carbon - Existing Vegetative Cover	952	
Reclamation (1:1 Tree Replacement Ratio)	-952	
Reclamation (2:1 Tree Replacement Ratio)	-1,511	
Reclamation (4:1 Tree Replacement Ratio)	-2,630	

1. *Current operations include the use of off-road haul trucks to transport material from the quarry pit to the processing area.*
2. *Future operations assume that a conveyor would be used to transport material from the quarry pit to the processing area. Assumes that 90% of material would be transported by conveyor, 10% transported by truck (Galford, 2012).*
3. *Represents a one-time total net reduction calculated over an average 20-year tree life.*

MTCO2e=Metric Tons of CO2 Equivalent

PROPOSED PROJECT OPERATIONS

Implementation of the proposed project would not require the addition of new emission sources or changes in operational characteristics of emission sources. As a result, initial implementation of the proposed project would not be anticipated to result in increased GHG emissions. However, as active mining in the proposed expansion area moves further away from the processing area, a conveyor would be constructed to transport mined material from the quarry pit to the processing area. The addition of the conveyor system would reduce the need for off-road trucks to haul material from the pit to the processing plant. Although off-road trucks would still be utilized, a majority of the material quarried at the site would be transported over the conveyor system to the plant. Approximately 10 percent, or less, of quarried material would be hauled by off-road truck (Galford, 2012).

As depicted in **Table 4**, GHG emissions associated with future operations, with the use of the proposed conveyor system, would total approximately 2,879 $MTCO_2e$/year. In comparison to current operations, the use of the proposed conveyor system would result in reductions of GHG emissions of up to approximately 577 $MTCO_2e$/year. However, it is important to note that the emissions identified in **Table 4** are based on the current off-road equipment and on-road vehicle fleet. In compliance with CARB's Off-Road Diesel Vehicle Regulation, any future replacement of

off-road equipment would be required to meet increasingly more stringent emission standards, which would result in additional reductions of GHG emissions. Likewise, future emissions from on-road haul trucks would also be lower than current fleet emissions.

CARBON SEQUESTRATION

The accumulation of carbon in biomass slows with age and depends on various factors. For trees, an active growing period of 20 years is typically assumed. Actual active growing periods are subject to, among other things, species, climate regime, and planting density.

Based on the *Oak Woodland Assessment Report* prepared for this project, initial land clearing of the proposed expansion area would result in the removal of approximately 27.3 acres of scrub land and approximately 11 acres of woodland, totaling approximately 762 trees (Riggs 2012). The eventual replacement of trees, as part of final site reclamation, would result in additional years of carbon sequestration. However, assuming that the site would be reclaimed with vegetative cover roughly equivalent to the existing cover (i.e., 27.3 acres of scrub land and 762 trees), this additional carbon sequestration would be offset by the potential net release of carbon from the initial removal of the existing vegetative cover. However, in the event that trees are replaced at a ratio that exceeds the existing number of trees, the proposed project would result in a net increase of sequestered CO_2. Example increases in sequestration, depending on the tree-replacement ratio applied, are depicted in **Table 4**. Assuming that site reclamation were to include tree-replacement ratios ranging from 2:1 to 4:1 and assuming an average tree life of 20 years, the estimated CO_2 sequestered would range from approximately 1,511 to 2,630 $MTCO_2e$. Based on these same assumptions, the average-annual reduction of GHG emissions offset by carbon sequestration would be approximately 75 and 132 $MTCO_2e$/year. Net increases in sequestered CO_2 would further offset a portion of project-generated emissions, which would result in additional reductions in project-generated GHG emissions, in comparison to existing conditions.

CONCLUSION

Implementation of the proposed project would not require the addition of new emission sources or changes in operational characteristics that would result in increased annual GHG emissions. Based on the analysis conducted, initial implementation of the proposed project would not result in increased annual GHG emissions. As the active mining in the proposed expansion area moves further away from the central plant, a conveyor would be constructed to transport mined material from the quarry pit to the processing plant. When compared to current operations, the addition of the proposed conveyor system would reduce operational GHG emissions by approximately 577 $MTCO_2e$/year, resulting in a net reduction in annual emissions. In addition, assuming that the number of trees required to be planted during final reclamation would be higher than the existing number of trees to be removed, the project would result in a one-time net increase in carbon sequestration. Any future replacement of off-road equipment with newer, lower-emission equipment would result in further reductions of GHG emissions.

Given that the proposed project would not result in changes in onsite or offsite operational activities or an increased intensity of use, and given the fairly linear relationship between activity operations and emissions generated, the proposed project would not be anticipated to result in a significant increase in annual emissions of GHGs**.** For this same reason, significant increases in

daily or annual emissions of other air pollutants (not analyzed in this report) would, likewise, not be anticipated to occur.

This analysis is based on a comparison of project-generated annual GHG emissions to current operations, which are considered baseline conditions. Baseline conditions are defined as the physical environmental conditions in the vicinity of the proposed project, as they exist at the time the environmental analysis is commenced (14 CCR §15125(a).) Therefore, current operations, as identified in this analysis, are considered a reasonable representation of baseline conditions from which impact significance can be determined. This approach is consistent with current CEQA guidance as well as the applicable SLOAPCD's adopted GHG significance thresholds.

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APPENDIX A
CLIMATE CHANGE & GREENHOUSE GAS EMISSIONS
SUMMARY OF EXISTING CONDITIONS & REGULATORY FRAMEWORK

CLIMATE CHANGE

The earth's climate has been warming for the past century. It is believed that this warming trend is related to the release of certain gases into the atmosphere. Greenhouse gases (GHG) absorb infrared energy that would otherwise escape from the earth. As the infrared energy is absorbed, the air surrounding the earth is heated. An overall warming trend has been recorded since the late 19th century, with the most rapid warming occurring over the past two decades. The 10 warmest years of the last century all occurred within the last 15 years. It appears that the decade of the 1990s was the warmest in human history. Human activities have been attributed to an increase in the atmospheric abundance of greenhouse gases. The following is a brief description of the most commonly recognized GHGs.

GREENHOUSE GASES

- *Carbon dioxide (CO_2)* is an odorless, colorless natural greenhouse gas. CO_2 is emitted from natural and anthropogenic sources. Natural sources include the following: decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic out gassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.

- *Methane (CH_4)* is a flammable greenhouse gas. A natural source of methane is from the anaerobic decay of organic matter. Geological deposits, known as natural gas fields, also contain methane, which is extracted for fuel. Other sources are from landfills, fermentation of manure, and ruminants such as cattle.

- *Nitrous oxide (N_20)*, also known as laughing gas, is a colorless greenhouse gas. Nitrous oxide is produced by microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load.

- *Water vapor* is the most abundant, important, and variable greenhouse gas. It is not considered a pollutant; in the atmosphere, it maintains a climate necessary for life.

- *Ozone* is known as a photochemical pollutant and is a greenhouse gas; however, unlike other greenhouse gases, ozone in the troposphere is relatively short-lived and, therefore, is not global in nature. Ozone is not emitted directly into the atmosphere but is formed by a complex series of chemical reactions between volatile organic compounds, nitrogen oxides, and sunlight.

- *Aerosols* are suspensions of particulate matter in a gas emitted into the air through burning biomass (plant material) and fossil fuels. Aerosols can warm the atmosphere by absorbing and emitting heat and can cool the atmosphere by reflecting light.

- *Hydrofluorocarbons (HFCs)* are synthetic chemicals that are used as a substitute for CFCs. Of all the greenhouse gases, HFCs are one of three groups (the other two are perfluorocarbons and sulfur hexafluoride) with the highest global warming potential. The global warming potential is the potential of a gas to contribute to global warming; it is based on a reference scale with carbon dioxide at one. HFCs are human-made for applications such as air conditioners and refrigerants.

- *Chlorofluorocarbons (CFCs)* are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). CFCs were first synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents.

CFCs destroy stratospheric ozone; therefore, their production was stopped as required by the Montreal Protocol in 1987. The project would not emit CFCs.

- *Perfluorocarbons (PFCs)* have stable molecular structures and do not break down through the chemical processes in the lower atmosphere; therefore, PFCs have long atmospheric lifetimes, between 10,000 and 50,000 years. The two main sources of PFCs are primary aluminum production and semiconductor manufacture. The project would not emit PFCs.

- *Sulfur hexafluoride (SF6)* is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It has the highest global warming potential of any gas evaluated. Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection. The project would not emit SF6.

EFFECTS OF CLIMATE CHANGE

There are uncertainties as to exactly what the climate changes will be in various local areas of the earth, and what the effects of clouds will be in determining the rate at which the mean temperature will increase. There are also uncertainties associated with the magnitude and timing of other consequences of a warmer planet: sea level rise, spread of certain diseases out of their usual geographic range, the effect on agricultural production, water supply, sustainability of ecosystems, increased strength and frequency of storms, extreme heat events, air pollution episodes, and the consequence of these effects on the economy.

Emissions of GHGs contributing to global climate change are largely attributable to human activities associated with industrial/manufacturing, utility, transportation, residential, and agricultural sectors. About three-quarters of human emissions of CO_2 to the global atmosphere during the past 20 years are due to fossil fuel burning. Atmospheric concentrations of CO_2, CH_4, and N_2O have increased 31 percent, 151 percent, and 17 percent respectively since the year 1750. GHG emissions are typically expressed in carbon dioxide-equivalents (CO_2e), based on the GHG's Global Warming Potential (GWP). The GWP is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, one ton of CH_4 has the same contribution to the greenhouse effect as approximately 21 tons of CO_2. Therefore, CH_4 is a much more potent GHG than CO_2.

Worldwide, California is ranked as the 12th largest emitter of GHGs (CEC 2008). Based on the most recent GHG emissions inventory, California's gross annual emissions of GHGs in 2004 totaled approximately 500 million metric tons (MMT) of CO_2e. Most of California's emissions, approximately 81 percent, consist of carbon dioxide produced from fossil fuel combustion (CEC 2006, 2007). The transportation sector is the single largest category of California's GHG emissions, accounting for approximately 39 percent of the state's total GHG emissions, followed by electricity consumption (from both in-state and out-of-state providers), which accounts for a total of roughly 28 percent of the state's total GHG emissions. The contribution from each of the various other use sectors contribute roughly 6 to 10 percent each to the total GHG emissions inventory (CEC 2008).

According to the Intergovernmental Panel on Climate Change's Working Group II report: Climate Change 2007: Impacts, Adaptation and Vulnerability (2007), climate change impacts to North America may include (IPCC 2007):

- Diminishing snowpack
- Increasing evaporation
- Exacerbate shoreline erosion

- Exacerbate inundation from sea level rising
- Increased risk and frequency of wildfire
- Increased risk of insect outbreaks
- Increased experiences of heat waves
- Rearrangement of ecosystems as species and ecosystems shift northward and to higher elevations

For California, climate change has the potential to incur/exacerbate the following environmental impacts:

Air Pollution

- Increased frequency, duration, and intensity of conditions conducive to air pollution formation (particularly ozone)

Water Resources

- Reduced precipitation
- Changes to precipitation and runoff patterns
- Reduced snowfall (precipitation occurring as rain instead of snow)
- Earlier snowmelt
- Decreased snowpack
- Increased agricultural demand for water

Agricultural Impacts

- Increased growing season
- Increased growth rates of weeds, insect pests and pathogens

Coastal Impacts

- Inundation by sea level rise

Forests and Natural Landscapes Impacts

- Increased incidents and severity of wildfire events
- Expansion of the range and increased frequency of pest outbreaks

REGULATORY FRAMEWORK & GUIDANCE

FEDERAL

International and federal legislation has been enacted to deal with global climate change issues. The Montreal Protocol was originally signed in 1987 and substantially amended in 1990 and 1992. The Montreal Protocol governs compounds that deplete ozone in the stratosphere, chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform. The Protocol provided that these compounds were to be phased out by 2000 (2005 for methyl chloroform).

In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change to assess "the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation."

On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change. Under the Convention, governments do the following: gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

A particularly notable result of the United Nations Framework Convention on Climate Change efforts was a treaty known as the Kyoto Protocol. When countries sign the treaty, they demonstrate their commitment to reduce their emissions of GHGs or engage in emissions trading. More than 160 countries, representing 55 percent of global emissions—are currently participating in the protocol. In 1998, United States Vice President Al Gore symbolically signed the Protocol; however, in order for the Protocol to be formally ratified, it must be ratified by the United States Senate. The Senate has not ratified the Protocol and, furthermore, in anticipation of the Protocol, approved a nonbonding "Sense of the Senate" resolution in July 1997 by a margin of 95-0 that expressed opposition to the treaty's provisions, most notably the disparity in GHG emissions reduction obligations between industrialized nations and developing nations. In 2001, President George W. Bush indicated that he would not submit the treaty for ratification, which effectively tabled the Protocol indefinitely.

In October 1993, President Bill Clinton announced his Climate Change Action Plan, which had a goal to return GHG emissions to 1990 levels by the year 2000. This was to be accomplished through 50 initiatives that relied on innovative voluntary partnerships between the private sector and government aimed at producing cost-effective reductions in GHG emissions.

Massachusetts v. United States Environmental Protection Agency (U.S. EPA) (Supreme Court Case 05-1120) was argued before the United States Supreme Court on November 29, 2006, in which it was petitioned that the US EPA regulate four GHGs, including carbon dioxide, under Section 202(a)(1) of the Clean Air Act. A decision was made on April 2, 2007, in which the Court held that petitioners have a standing to challenge the U.S. EPA and that the U.S. EPA has statutory authority to regulate emissions of GHGs from new motor vehicles.

STATE OF CALIFORNIA

Senate Bill 1771 - Greenhouse Gas Emission Reductions: Climate Change

Senate Bill 1771, chaptered in September of 2000, specified the creation of the non-profit organization, the California Climate Action Registry. The Registry helps various California entities establish GHG emissions baselines. Also, the Registry enables participating entities to voluntarily record their annual GHG emissions inventories.

A.B. 1493 – Reduction of GHGs from Passenger Vehicles/Light Duty Trucks

California Assembly Bill 1493 (Pavley), enacted on July 22, 2002, required the CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks. Regulations adopted by the CARB would apply to 2009 and later model year vehicles. The CARB estimates that the regulation would reduce climate change emissions from the light-duty passenger vehicle fleet by an estimated 18 percent in 2020 and by 27 percent in 2030.

Executive Order No. S-3-05

California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following GHG emission reduction targets:

1. By 2010, reduce GHG emissions to 2000 levels;
2. By 2020, reduce GHG emissions to 1990 levels; and
3. By 2050, reduce GHG emissions to 80 percent below 1990 levels.

Climate Action Team

To meet these targets, the Governor directed the Secretary of the California Environmental Protection Agency to lead a Climate Action Team made up of representatives from the

Business, Transportation and Housing Agency; the Department of Food and Agriculture; the Resources Agency; the Air Resources Board (CARB); the Energy Commission; and the Public Utilities Commission. The Climate Action Team's Report to the Governor in 2006 contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met.

Assembly Bill 32 - California Global Warming Solutions Act of 2006

In 2006, the California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006. AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emissions levels. AB 32 charges the CARB, the state agency charged with regulating statewide air quality, with implementation of the act. The regulatory steps laid out in AB 32 require CARB to begin developing discrete early actions to reduce GHGs while also preparing a scoping plan to identify how best to reach the 2020 limit. The reduction measures to meet the 2020 target are to be adopted by the start of 2011.

The Board identified nine discrete early action measures including regulations affecting landfills, motor vehicle fuels, refrigerants in cars, tire pressure, port operations and other sources in 2007 that included ship electrification at ports and reduction of high global warming potential (GWP) gases in consumer products. Regulatory development for the remaining measures is ongoing. In December 2007, the Board adopted a regulation requiring the largest industrial sources to report and verify their GHG emissions. The reporting regulation serves as a solid foundation to determine GHG emissions and track future changes in emission levels. In February 2008, the Board approved a policy statement encouraging voluntary early actions and establishing a procedure for project proponents to submit quantification methods to be evaluated by CARB. CARB, along with California's local air districts and the California Climate Action Registry (CCAR), is working to implement this program. In December 2008, a Scoping Plan was approved by CARB, which provides the outline for actions to reduce GHGs in California (CARB 2008).

Senate Bill 97 - CEQA: Greenhouse Gas Emissions

Senate Bill 97, signed in August 2007, acknowledges that climate change is an important environmental issue that requires analysis under CEQA. This bill directs the Governor's Office of Planning and Research (OPR) to prepare, develop, and transmit to the Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, by July 1, 2009. The Resources Agency is required to certify or adopt those guidelines by January 1, 2010. This bill also protected projects until January 1, 2010 that were funded by the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006, or the Disaster Preparedness and Flood Protection Bond Act of 2006 (Proposition 1B or 1E) from claims of inadequate analysis of GHG as a legitimate cause of action. Thus, this "protection" is highly limited to a handful of projects and for a short time period (CAPCOA 2008).

Governor's Office of Planning and Research

The Governor's Office of Planning and Research (OPR) published a technical advisory on CEQA and Climate Change, as required under SB 97, on June 19, 2008. The guidance did not include a suggested threshold, but stated that the OPR has asked CARB to "…recommend a method for setting thresholds which will encourage consistency and uniformity in the CEQA analysis of greenhouse gas emissions throughout the state." The OPR does recommend that CEQA analyses include the following components:

- Identify GHG emissions
- Determine significance
- Mitigate impacts

Executive Order S-01-07

Executive Order S-01-07 was enacted by the Governor on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. It also requires that a Low Carbon Fuel Standard for transportation fuels be established for California.

Western Climate Initiative

The Western Climate Initiative was signed on February 26, 2007 by five states: Washington, Oregon, Arizona, New Mexico, and California. British Columbia, Canada joined on April 20, 2007. Members of the Initiative plan on collaborating to identify, evaluate, and implement ways to reduce GHG emissions in the states collectively and to achieve related co-benefits. Members also plan to design a regional market-based multi-sector mechanism, such as a load-based cap and trade program, by August 2008. In addition, a multi-state registry will track, manage, and credit entities that reduce GHG emissions. The Initiative published its regional GHG reduction goals on August 22, 2007, which include a reduction of 15 percent below 2005 levels by 2020.

Senate Bill 375

Senate Bill 375 (SB375) became effective January 1, 2009. SB375 requires CARB to develop regional reduction targets for GHG emissions, and prompts the creation of regional plans to reduce emissions from vehicle use throughout the state. California's Metropolitan Planning Organizations (MPOs) have been tasked with creating "Sustainable Community Strategies" (SCS). The MPOs are required to develop the SCS through integrated land use and transportation planning and demonstrate an ability to attain the proposed reduction targets by 2020 and 2035.

APPENDIX B
EMISSIONS MODELING

GHG EMISSIONS SUMMARY

Current Operations	
Material Processing	425
Electricity Use	189
Propane Use	116
Off-road Equipment with Off-road Haul Trucks	1,314
Employee Commute	38
Miscellaneous On-road Vehicle Trips	93
Material Hauling Trips	1,281
Total:	3456
Future Operations	
Material Processing	425
Electricity Use	189
Propane Use	116
Off-road Equipment with Conveyor (90%) & Haul Trucks (10%)	737
Employee Commute	38
Miscellaneous On-road Vehicle Trips	93
Material Hauling Trips	1,281
Total:	2,879
Net Change Compared to Existing:	577
Carbon Sequestration	
Sequestered Carbon - Existing Cover	952
Reclamation (1:1 Tree Replacement Ratio)	-952
Reclamation (2:1 Tree Replacement Ratio)	-1,511
Reclamation (4:1 Tree Replacement Ratio)	-2,630

CRUSHER PLANT

	EMISSIONS FACTORS (kg/g)		
GALLONS/YR	CO2	CH4	N20
41600	10.15	0.0015	0.0001

Emission factors derived from California Climate Action Registry. January 2009. General Reporting Protocol. Version 3.1.

	METRIC TONS		
METRIC TONS/kg	CO2	CH4	N20
0.001	422.24	0.0624	0.00416

GWP			
CO2	CH4	N20	
1	21	310	CO2e
422.24	1.3104	1.2896	424.84

ENERGY USE

ELECTRICITY USE

Emission Factor (lbs/MWh)		
CO2	CH4	N2O
641.35	0.029	0.011

Emission Factors for PG&E, Climate Zone 4, derived from CalEEMod, Versiion 2011.1.1.

GWP		
CO2	CH4	N20
1	21	310

		Emissions (metric tons)			
kWh/Yr	MWh	CO2	CH4	N2O	CO2e
644720	644.72	187.56	0.18	1.00	188.73

PROPANE USE

Emission Factor (kg/gallon)		
CO2	CH4	N2O
5.74	0.0003	0.0001

Emission Factors for PG&E, Climate Zone 4, derived from CalEEMod, Versiion 2011.1.1.

GWP		
CO2	CH4	N20
1	21	310

		Emissions (metric tons)			
	MMBtu	CO2	CH4	N2O	CO2e
	20000	114.80	0.13	0.62	115.55

ON-ROAD EMPLOYEE & MISC VEHICLE TRIPS

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	92.99	92.99	0.00	0.00	93.03
Worker											0.00	37.67	37.67	0.00	0.00	37.74
Total											**0.00**	**130.66**	**130.66**	**0.00**	**0.00**	**130.77**

CalEEMod, v. 2011.1.1,

ON-ROAD MATERIAL HAUL TRUCKS

ESTIMATED AVERAGE TRIP DISTANCES FOR MATERIAL TRANSPORT

CITY	MILES
Santa Margarita	4
Atascadero	12
Templeton	17
Paso Robles	23
San Luis Obispo	19
Total:	75
Average Trip Distance:	15

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.00	0.00	0.00	0.00	0.00	0.00
Vendor											0.00	1,280.32	1,280.32	0.04	0.00	1,281.20
Worker											0.00	0.00	0.00	0.00	0.00	0.00
Total											**0.00**	**1,280.32**	**1,280.32**	**0.04**	**0.00**	**1,281.20**

CalEEMod, v. 2011.1.1,

OFF-ROAD EQUIPMENT (WITH OFF-ROAD HAUL TRUCKS)

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	1,311.61	1,311.61	0.10	0.00	1,313.70
Total											**0.00**	**1,311.61**	**1,311.61**	**0.10**	**0.00**	**1,313.70**

CalEEMod, v. 2011.1.1

OFF-ROAD EQUIPMENT (WITHOUT OFF-ROAD HAUL TRUCKS)

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.00	0.00	0.00	0.00	0.00	0.00
Off-Road											0.00	672.08	672.08	0.05	0.00	673.17
Total											**0.00**	**672.08**	**672.08**	**0.05**	**0.00**	**673.17**

CalEEMod, v. 2011.1.1

OFF-ROAD EQUIPMENT WITH CONVEYOR (HAUL TRUCKS USED FOR 10% OF MATERIAL TRANSPORT)

HAUL TRUCK EMISSONS-CURRENT OPERATIONS: 1,314-673=641 MTCO2e

DAILY USE REDUCED BY 90%: 641x0.10=64 MTCO2e

GHG EMISSIONS WITH CONVEYOR USE: 673+64=737 MTCO2e