Attachment J

Air Quality Technical Analysis

ASHWORTH LEININGER GROUP

Air Quality Technical Analysis

Reclamation Plan Amendment and Conditional Use Permit

Permanente Quarry
Santa Clara County, California

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May 24, 2010

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Executive Summary

Lehigh Southwest Cement Company's (Lehigh) Permanente Quarry (Quarry) is a limestone and aggregate mining operation in the unincorporated foothills of western Santa Clara County, located approximately two miles west of the City of Cupertino. The proposed project is the County's approval of an amendment to the Quarry's current reclamation plan and a new Conditional Use Permit (CUP) for certain mining operations. The amendment would update the reclamation plan and associated reclamation requirements to include all areas disturbed by mining activities and lands scheduled to be disturbed by mining over approximately the next 20 years. The proposed CUP would allow mineral extraction in the area known as the South Quarry. South Quarry operations would include mining, material loading and handling, and transport. A more complete description of the proposed project is contained in Lehigh's Project Description and other materials provided to the County.

This air quality technical analysis is intended to support the County's evaluation of the proposed project under the California Environmental Quality Act (CEQA). The purpose of this air quality technical analysis is to properly characterize emissions of criteria air pollutants[1], toxic air contaminants (TAC)[2], and greenhouse gases (GHGs)[3] from existing operations and from the proposed project. These are then compared to determine the net emissions changes anticipated to result from the project. Once calculated, these net emission increases or decreases are compared to the CEQA significance thresholds proposed by the Bay Area Air Quality Management District (BAAQMD or District) staff for adoption by the BAAQMD Board of Directors in June 2010. With the exception of GHGs, the net emissions changes associated with the proposed project are below the proposed CEQA significance thresholds.

Table ES-1 provides a comparison of the expected annual net emissions changes from the proposed project to the proposed BAAQMD annual CEQA significance thresholds for criteria pollutants and GHG emissions (expressed in carbon dioxide equivalents or CO_2e).

Table ES-1. Criteria Pollutants and GHGs – Annual Net Emissions Change Analysis (tons/year)[4]

	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx	CO_2e
Annual Net Emissions Change[5]	(345.22)	(60.93)	129.59	(29.58)	3.50	3.59	21,819.86
Proposed BAAQMD CEQA Significance Threshold	15[6]	10[6]	Localized Impacts at intersections	10	10	N/A	10,000
Above Threshold? (Yes/No)	No	No	No	No	No	No	Yes

1 Criteria pollutants refer to the class of pollutants for which there are ambient air quality standards, or which are considered precursors to these standards. Criteria pollutants evaluated in this technical analysis include oxides of nitrogen (NOx), oxides of sulfur (SOx), reactive organic gases (ROG), particulate matter less than 10 microns diameter(PM_{10}), particulate matter less than 2.5 microns diameter ($PM_{2.5}$), and carbon monoxide (CO).

2 TACs are listed by the California Air Resources Control Board (ARB) under the state's air toxic control program (AB2588), see: http://www.arb.ca.gov/ab2588/ab2588.htm accessed February 1, 2010.

3 Only those GHGs associated with quarry operations are considered in this technical analysis: carbon dioxide (CO_2), methane (CH_4), and nitrogen oxide (N_2O).

4 Values presented in Table ES-1 are presented in short tons per year, except for GHG (CO_2e) which are presented in metric tons per year.

5 Negative values are expressed with parentheses.

6 The BAAQMD's proposed PM_{10} and $PM_{2.5}$ significance thresholds apply to exhaust emissions only. Baseline and proposed project emission totals reflect both exhaust and fugitive emissions.

Table ES-2 provides a comparison of the daily net emissions changes anticipated from the proposed project to the proposed daily CEQA significance thresholds for criteria pollutants and GHG emissions (expressed as CO_2e).

Table ES-2. Criteria Pollutants – Daily Net Significant Increase Analysis (pounds/day)

	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Daily Net Emissions Change[5]	(2,547.38)	(476.61)	1,272.20	(144.04)	19.67	36.21
Proposed BAAQMD CEQA Significance Threshold	82[6]	54[6]	Localized Impacts at intersections	54	54	N/A
Above Threshold? (Yes/No)	No	No	No	No	No	No

The proposed project is expected to have a significant net reduction in emissions of toxic air contaminants, principally diesel particulate matter. Therefore, the proposed project is anticipated to have no incremental cancer risk to exposed persons.

The proposed project is expected to result in a net greenhouse gas emissions increase of approximately 21,800 metric tons CO_2e. This net emission increase is 11,800 metric tons CO_2e above the proposed BAAQMD GHG threshold of 10,000 metric tons per year CO_2e for stationary sources.

Introduction

The Permanente Quarry (Quarry) is a limestone and aggregate mining operation in the unincorporated foothills of western Santa Clara County, located approximately two miles west of the City of Cupertino. The approximately 537 acre existing Quarry occupies a portion of a 3,510 acre property that is owned by Hanson Permanente Cement, Inc., and operated by Lehigh Southwest Cement Company (collectively, Lehigh).

The proposed project is the County's approval of an amendment to the Quarry's current reclamation plan. The amendment would update the reclamation plan, and associated reclamation requirements, to include all areas disturbed by mining activities and lands scheduled to be disturbed by mining over approximately the next 20 years. If approved, the amendment would incorporate 1,105 acres of Lehigh's property representing existing and proposed disturbance of land and various undisturbed buffer areas that will be affected by the project.

The project also includes the County's approval of a Conditional Use Permit for certain mining operations. The Conditional Use Permit would allow mineral extraction on approximately 117 acres. This area represents a portion of a planned 207 acre extraction area known as the South Quarry. Operations in the South Quarry would include mining, and material loading and hauling. Mined rock will be transported to existing facilities in other parts of the Quarry for processing. Areas covered by the Conditional Use Permit are covered by the proposed amendment, and would be reclaimed as described therein.

A more complete description of the proposed project is contained in Lehigh's Project Description and other materials provided to the County.

This air quality technical analysis is intended to support the analysis of the County's approval of the proposed project. The purpose of this air quality technical assessment is to properly characterize emissions of criteria air pollutants, toxic air contaminants (TAC), and greenhouse gases (GHG) from existing operations and from the proposed project. These estimated emissions are then compared to determine the net emissions that are estimated to result from the project.

This air quality technical analysis is organized as follows:

- Summary – Net Emissions Analysis. This section provides a summary of the net emissions change between the proposed project and the baseline, and compares these net emissions to CEQA significance thresholds, including those established or proposed by the BAAQMD for criteria pollutants and GHG emissions. This comparison is presented in Tables S1 through S5.

- Baseline Air Quality Emissions. This section describes the technical basis for estimating the baseline air quality emissions. The results of these calculations are presented in Tables 1 through 5.

- Proposed Project Air Quality Emissions. This section describes the technical basis for estimating project emissions. The results of these calculations are presented in Tables 6 through 10.

- Construction Emissions. This section describes how the emissions from the construction of the bridge spanning Permanente Creek are calculated. The results of these calculations are provided in Tables 11 through 15.

- Appendices A through D provide detailed documentation on the throughput, emission factors, and basis for all emission calculations contained in this analysis.

- Appendix E provides information on carbon sequestration associated with removal of on-site native vegetation and later restoration during site reclamation –*Vegetation Greenhouse Gas Inventory and Analysis Technical Report*, Forester's Co-Op, May 2010.

Summary – Net Emissions Analysis

Tables S-1 through S-5 compare baseline and proposed project emissions of criteria pollutants, TACs, and GHGs for the applicable averaging period for each class of compounds as required under CEQA (e.g., tons per year, pounds per day, etc.). By way of summary, the findings made by this technical analysis are:

- All criteria pollutant emissions from the proposed project are either below the existing baseline or below the applicable District significance thresholds (see Tables S-1 and S-2).

- TAC emissions associated with the project are below the baseline TAC emissions for all compounds other than hexavalent chromium, which is estimated to increase by 0.06 pounds/year. Accounting for relative cancer potency, emissions of carcinogens (including hexavalent chromium) associated with the project will also be below the baseline (see Tables S-3 and S-4).

- GHG emissions are expected to increase by 21,800 metric tons per year, which is above the proposed District significance threshold of 10,000 metric tons per year (expressed as carbon dioxide equivalents, or CO_2e).

As described in greater detail below, the baseline for the net emissions analysis considers the average annual emissions over a 10-year period from 2000-2009 (see Baseline Air Quality Emissions). Proposed project emissions are calculated for each of the five project phases (see Proposed Project Air Quality Emissions). The net emissions increase/decrease is then calculated by comparing the highest emissions for each pollutant for each averaging period during each project phase with the average emissions calculated for the baseline period. With the exception of annual carbon monoxide (CO), nitrogen oxide (NOx), and sulfur oxide (SOx) emissions, criteria, TAC and GHG emissions are highest during Phase 2 of the proposed project. Annual CO, NOx, and SOx emissions are the highest during Phase 3 of the proposed project.

The net emissions calculation does not consider emissions from certain ongoing activities within Lehigh's property that are independent of the proposed project. As described in greater detail in the Lehigh Project Description and the Proposed Project Air Quality Emissions section of this analysis, these activities include the continued operation of the primary and secondary crushers, rock plant and North Quarry production. The project would not affect the operation of these facilities. The project does provide for reclamation of these facilities, through the proposed amendment to the existing reclamation plan, and emissions associated with such reclamation activities are included in this analysis.

The net emissions calculation also does not consider emissions from the cement plant located adjacent to the Quarry. The cement plant is an industrial use which is separately permitted by the County of Santa Clara. Emissions from the cement plant have been quantified as part of the District's Title V Operating Permit renewal process, and previously reported to the BAAQMD.

[Note that impact on carbon sequestration associated with removal of on-site native vegetation and later restoration during site reclamation is provided in a separate report included as Appendix E – Vegetation Greenhouse Gas Inventory and Analysis Technical Report*, Forester's Co-Op, May 2010.]*

All calculations presented in this analysis are based on generally accepted public sources, each of which is specifically referenced and documented in the calculation spreadsheets provided in Appendices A through D. Actual and estimated throughput data were obtained from Lehigh, and are also referenced in the calculation spreadsheets. The calculations reflect the application of the following controls:

- For the baseline:
  - Watering of unpaved roads.

- For the proposed project:
  - Continued watering of unpaved roads;
  - Watering of active areas consistent with a dust mitigation plan to be submitted to the District;
  - Use of loaders and trucks powered by interim/final Tier 4 engines.

Table S-1. Comparison of Proposed Project to Baseline Emissions – Annual Criteria Pollutants (tons/year).

Activity	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Baseline						
Mining						
Drilling	2.06	2.06	--	--	--	--
Blasting	2.73	0.16	36.35	9.22	--	1.09
Bulldozing, Scraping & Grading	0.62	0.09	--	--	--	--
Material Handling	3.56	0.53	--	--	--	--
Dust Entrainment - Unpaved Roads	124.92	12.49	--	--	--	--
Wind Erosion - Unpaved Roads	11.70	1.75	--	--	--	--
Wind Erosion - Disturbed Mine Area	537.45	80.62	--	--	--	--
Subtotal - Mining:	683.04	97.71	36.35	9.22	--	1.09
Land Filling						
Material Handling	1.64	0.25	--	--	--	--
Dust Entrainment - Unpaved Roads	84.81	8.48	--	--	--	--
Wind Erosion - Unpaved Roads	7.26	1.09	--	--	--	--
Subtotal - Land Filling:	93.71	9.82	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.08	--
Fuel Dispensing	--	--	--	--	0.01	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.10	--
Combustion Sources						
Portable Diesel Welders	0.00	0.00	0.01	0.04	0.00	0.00
Portable Gasoline Welders	0.00	0.00	0.00	0.00	0.00	0.00
Off-road Diesel Equipment	13.07	13.07	35.30	233.54	10.11	0.10
On-road On-site Vehicles	0.01	0.01	0.78	0.11	0.06	0.00
On-road Off-site Vehicles	0.01	0.00	0.57	0.11	0.06	0.00
Dust Entrainment - Paved Roads	0.04	0.01	--	--	--	--
Subtotal - Combustion Sources:	13.13	13.09	36.65	233.80	10.24	0.10
Baseline Totals (tons/year):	**789.88**	**120.62**	**73.00**	**243.02**	**10.33**	**1.18**
Proposed Project						
Maximum Phase:	Phase 2	Phase 2	Phase 3	Phase 3	Phase 2	Phase 3
South Quarry						
Drilling	4.68	4.68	--	--	--	--
Blasting	8.10	0.47	151.99	38.57	--	4.54
Bulldozing, Scraping & Grading	1.36	0.20	--	--	--	--
Material Handling	8.33	1.25	--	--	--	--
Dust Entrainment - Unpaved Roads	94.59	9.46	--	--	--	--
Wind Erosion - Unpaved Roads	17.22	2.58	--	--	--	--
Wind Erosion - Active Areas	76.42	11.46	--	--	--	--
Subtotal - South Quarry:	210.69	30.11	151.99	38.57	--	4.54
Waste Rock Storage/Infill Areas						
Material Handling	5.42	0.81	--	--	--	--
Dust Entrainment - Unpaved Roads	129.80	12.98	--	--	--	--
Wind Erosion - Unpaved Roads	3.54	0.53	--	--	--	--
Wind Erosion - Active Areas	70.97	10.64	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	209.72	24.97	--	--	--	--

Table S-1. Comparison of Proposed Project to Baseline Emissions – Annual Criteria Pollutants (tons/year).

Activity	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Topsoil Storage Area						
Material Handling	0.10	0.02	--	--	--	--
Dust Entrainment - Unpaved Roads	17.52	1.75	--	--	--	--
Wind Erosion - Unpaved Roads	2.51	0.38	--	--	--	--
Wind Erosion - Active Areas	1.79	0.27	--	--	--	--
Subtotal - Topsoil Storage Area:	21.92	2.41	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.09	--
Fuel Dispensing	--	--	--	--	0.05	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.14	--
Combustion Sources						
Portable Diesel Welders	0.00	0.00	0.02	0.02	0.00	0.00
Off-road Diesel Equipment	2.16	2.16	49.36	174.67	13.55	0.23
On-road On-site Vehicles	0.02	0.01	0.72	0.08	0.08	0.00
On-road Off-site Vehicles	0.01	0.01	0.50	0.11	0.07	0.00
Dust Entrainment - Paved Roads	0.13	0.02	--	--	--	--
Subtotal - Combustion Sources:	2.32	2.20	50.60	174.87	13.69	0.24
Proposed Project Totals (tons/year):	**444.66**	**59.69**	**202.59**	**213.44**	**13.83**	**4.77**
Net Change (tons/year):	**(345.22)**	**(60.93)**	**129.59**	**(29.58)**	**3.50**	**3.59**
CEQA Significance Thresholds:						
BAAQMD (Proposed - tons/year)	15	10	see Note 1	10	10	N/A
Exceed Proposed BAAQMD Thresholds?	**No**	**No**	**N/A**	**No**	**No**	**N/A**

Note:
1. BAAQMD proposed CEQA significance thresholds for local CO are 9.0 ppm (8-hr average) and 20.0 ppm (1-hr average).

Table S-2. Comparison of Proposed Project to Baseline Emissions – Daily Criteria Pollutants (lbs/day).

Activity	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Baseline						
Mining						
Drilling	50.05	50.05	--	--	--	--
Blasting	66.36	3.83	882.22	223.85	--	26.33
Bulldozing, Scraping & Grading	4.31	0.65	--	--	--	--
Material Handling	3.56	0.53	--	--	--	--
Dust Entrainment - Unpaved Roads	873.56	87.36	--	--	--	--
Wind Erosion - Unpaved Roads	81.80	12.27	--	--	--	--
Wind Erosion - Disturbed Mine Area	3,758.41	563.76	--	--	--	--
Subtotal - Mining:	4,838.05	718.45	882.22	223.85	--	26.33
Land Filling						
Material Handling	11.47	1.72	--	--	--	--
Dust Entrainment - Unpaved Roads	593.04	59.30	--	--	--	--
Wind Erosion - Unpaved Roads	50.77	7.61	--	--	--	--
Subtotal - Land Filling:	655.28	68.64	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.65	--
Fuel Dispensing	--	--	--	--	0.12	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.77	--
Combustion Sources						
Portable Diesel Welders	0.13	0.13	0.38	1.78	0.14	0.12
Portable Gasoline Welders	0.00	0.00	0.04	0.06	0.12	0.00
Off-road Diesel Equipment	91.41	91.41	246.85	1,633.15	70.67	0.66
On-road On-site Vehicles	0.06	0.04	5.55	0.75	0.46	0.01
On-road Off-site Vehicles	0.06	0.04	4.07	1.13	0.46	0.00
Dust Entrainment - Paved Roads	0.32	0.05	--	--	--	--
Subtotal - Combustion Sources:	91.98	91.68	256.89	1,636.86	71.85	0.80
Baseline Totals (pounds/day):	**5,585.31**	**878.76**	**1,139.11**	**1,860.71**	**72.62**	**27.13**
Proposed Project						
Maximum Phase:	Phase 2	Phase 2	Phase 2	Phase 2	Phase 2	Phase 2
South Quarry						
Drilling	31.22	31.22	--	--	--	--
Blasting	127.49	7.36	2,067.95	524.70	--	61.73
Bulldozing, Scraping & Grading	9.04	1.36	--	--	--	--
Material Handling	55.54	8.33	--	--	--	--
Dust Entrainment - Unpaved Roads	630.58	63.06	--	--	--	--
Wind Erosion - Unpaved Roads	114.80	17.22	--	--	--	--
Wind Erosion - Active Areas	509.49	76.42	--	--	--	--
Subtotal - South Quarry:	1,478.15	204.96	2,067.95	524.70	--	61.73
Waste Rock Storage/Infill Areas						
Material Handling	36.12	5.42	--	--	--	--
Dust Entrainment - Unpaved Roads	865.32	86.53	--	--	--	--
Wind Erosion - Unpaved Roads	23.62	3.54	--	--	--	--
Wind Erosion - Active Areas	473.10	70.97	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	1,398.16	166.46	--	--	--	--

Table S-2. Comparison of Proposed Project to Baseline Emissions – Daily Criteria Pollutants (lbs/day).

Activity	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Topsoil Storage Area						
Material Handling	0.69	0.10	--	--	--	--
Dust Entrainment - Unpaved Roads	116.80	11.68	--	--	--	--
Wind Erosion - Unpaved Roads	16.72	2.51	--	--	--	--
Wind Erosion - Active Areas	11.91	1.79	--	--	--	--
Subtotal - Topsoil Storage Area:	146.12	16.08	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.58	--
Fuel Dispensing	--	--	--	--	0.35	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.93	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.13	0.12	0.02	0.00
Off-road Diesel Equipment	14.38	14.38	334.62	1,190.55	90.32	1.59
On-road On-site Vehicles	0.10	0.07	5.04	0.52	0.53	0.01
On-road Off-site Vehicles	0.09	0.06	3.58	0.77	0.48	0.01
Dust Entrainment - Paved Roads	0.92	0.14	--	--	--	--
Subtotal - Combustion Sources:	15.50	14.66	343.36	1,191.97	91.35	1.61
Proposed Project Totals (lbs/day):	**3,037.93**	**402.15**	**2,411.31**	**1,716.67**	**92.29**	**63.34**
Net change (pounds/day):	**(2,547.38)**	**(476.61)**	**1,272.20**	**(144.04)**	**19.67**	**36.21**
CEQA Significance Thresholds:						
BAAQMD (Proposed - pounds/day)	82	54	see Note 1	54	54	N/A
Exceed Proposed BAAQMD Thresholds?	**No**	**No**	**N/A**	**No**	**No**	**N/A**

Note:
1. BAAQMD proposed CEQA significance thresholds for local CO are 9.0 ppm (8-hr average) and 20.0 ppm (1-hr average).

Table S-3. Comparison of Proposed Project to Baseline Emissions – Annual Toxic Air Contaminants (pounds/yea

Activity	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hex Chromium	Total Crystalline Silica
Baseline																				
Mining																				
Drilling	--	0.01	0.01	3.22	0.00	0.01	0.10	0.03	0.06	0.01	0.00	0.01	0.09	0.01	0.01	0.01	0.08	0.10	0.00	15.31
Blasting	--	0.01	0.01	4.26	0.00	0.01	0.13	0.03	0.08	0.01	0.00	0.01	0.13	0.01	0.01	0.01	0.10	0.14	0.00	20.30
Bulldozing, Scraping & Gradinç	--	0.00	0.00	0.96	0.00	0.00	0.03	0.01	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.03	0.00	4.58
Material Handlinç	--	0.02	0.01	5.55	0.01	0.01	0.17	0.05	0.10	0.01	0.00	0.02	0.16	0.02	0.01	0.01	0.14	0.18	0.00	26.40
Dust Entrainment - Unpaved Roads	--	0.62	0.31	249.84	0.19	0.31	10.24	2.45	6.25	0.57	0.03	0.62	13.49	0.62	0.31	0.31	20.74	8.49	0.47	1,773.65
Wind Erosion - Unpaved Roads	--	0.06	0.03	23.40	0.02	0.03	0.96	0.23	0.58	0.05	0.00	0.06	1.26	0.06	0.03	0.03	1.94	0.80	0.04	166.09
Wind Erosion - Disturbed Mine Area	--	2.69	1.34	838.43	0.81	1.34	25.80	6.88	15.05	1.34	0.21	2.69	24.72	2.69	1.34	1.34	20.42	26.87	0.11	3,990.91
Subtotal - Mining	--	3.42	1.71	1,125.65	1.02	1.71	37.43	9.67	22.13	1.99	0.26	3.42	39.89	3.42	1.71	1.71	43.44	36.61	0.63	5,997.24
Land Filling																				
Material Handlinç	--	0.01	0.00	2.56	0.00	0.00	0.08	0.02	0.05	0.00	0.00	0.01	0.08	0.01	0.00	0.00	0.06	0.08	0.00	12.18
Dust Entrainment - Unpaved Roads	--	0.42	0.21	169.61	0.13	0.21	6.95	1.66	4.24	0.39	0.02	0.42	9.16	0.42	0.21	0.21	14.08	5.77	0.32	1,204.10
Wind Erosion - Unpaved Roads	--	0.04	0.02	14.52	0.01	0.02	0.60	0.14	0.36	0.03	0.00	0.04	0.78	0.04	0.02	0.02	1.21	0.49	0.03	103.07
Subtotal - Land Filling	--	0.47	0.23	186.69	0.14	0.23	7.63	1.83	4.65	0.43	0.03	0.47	10.02	0.47	0.23	0.23	15.35	6.34	0.35	1,319.35
Fuel Storage and Dispensinç																				
Diesel Storage & Dispensinç	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gasoline Storage & Dispensinç	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	6.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Portable Gasoline Welders	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	26,144.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	4.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources	26,154.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Baseline Totals (pounds/year)	**26,154.80**	**3.88**	**1.94**	**1,312.34**	**1.17**	**1.94**	**45.06**	**11.50**	**26.78**	**2.42**	**0.28**	**3.88**	**49.91**	**3.88**	**1.94**	**1.94**	**58.79**	**42.95**	**0.98**	**7,316.60**
Proposed Project - Maximum (Phase 2																				
South Quarry																				
Drilling	--	0.02	0.01	7.30	0.01	0.01	0.22	0.06	0.13	0.01	0.00	0.02	0.22	0.02	0.01	0.01	0.18	0.23	0.00	34.77
Blasting	--	0.04	0.02	12.63	0.01	0.02	0.39	0.10	0.23	0.02	0.00	0.04	0.37	0.04	0.02	0.02	0.31	0.40	0.00	60.11
Bulldozing, Scraping & Gradinç	--	0.01	0.00	2.12	0.00	0.00	0.07	0.02	0.04	0.00	0.00	0.01	0.06	0.01	0.00	0.00	0.05	0.07	0.00	10.07
Material Handlinç	--	0.04	0.02	13.00	0.01	0.02	0.40	0.11	0.23	0.02	0.00	0.04	0.38	0.04	0.02	0.02	0.32	0.42	0.00	61.86
Dust Entrainment - Unpaved Roads	--	0.47	0.24	189.17	0.14	0.24	7.76	1.85	4.73	0.44	0.03	0.47	10.22	0.47	0.24	0.24	15.70	6.43	0.36	1,342.99
Wind Erosion - Unpaved Roads	--	0.09	0.04	34.44	0.03	0.04	1.41	0.34	0.86	0.08	0.00	0.09	1.86	0.09	0.04	0.04	2.86	1.17	0.07	244.49
Wind Erosion - Active Areas	--	0.38	0.19	119.22	0.11	0.19	3.67	0.98	2.14	0.19	0.03	0.38	3.52	0.38	0.19	0.19	2.90	3.82	0.02	567.49
Subtotal - South Quarry	--	1.05	0.53	377.88	0.32	0.53	13.91	3.46	8.36	0.76	0.07	1.05	16.62	1.05	0.53	0.53	22.32	12.55	0.44	2,321.77
Waste Rock Storage/Infill Areas																				
Material Handlinç	--	0.03	0.01	8.45	0.01	0.01	0.26	0.07	0.15	0.01	0.00	0.03	0.25	0.03	0.01	0.01	0.21	0.27	0.00	40.23
Dust Entrainment - Unpaved Roads	--	0.65	0.32	259.59	0.19	0.32	10.64	2.54	6.49	0.60	0.04	0.65	14.02	0.65	0.32	0.32	21.55	8.83	0.49	1,842.92
Wind Erosion - Unpaved Roads	--	0.02	0.01	7.09	0.01	0.01	0.29	0.07	0.18	0.02	0.00	0.02	0.38	0.02	0.01	0.01	0.59	0.24	0.01	50.30
Wind Erosion - Active Areas	--	0.35	0.18	110.71	0.11	0.18	3.41	0.91	1.99	0.18	0.03	0.35	3.26	0.35	0.18	0.18	2.70	3.55	0.01	526.96
Subtotal - Waste Rock Storage/Infill	--	1.05	0.52	385.84	0.31	0.52	14.60	3.59	8.81	0.80	0.07	1.05	17.91	1.05	0.52	0.52	25.04	12.89	0.52	2,460.41
Topsoil Storage Area																				
Material Handlinç	--	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.77
Dust Entrainment - Unpaved Roads	--	0.09	0.04	35.04	0.03	0.04	1.44	0.34	0.88	0.08	0.00	0.09	1.89	0.09	0.04	0.04	2.91	1.19	0.07	248.76
Wind Erosion - Unpaved Roads	--	0.01	0.01	5.02	0.00	0.01	0.21	0.05	0.13	0.01	0.00	0.01	0.27	0.01	0.01	0.01	0.42	0.17	0.01	35.61
Wind Erosion - Active Areas	--	0.01	0.00	2.79	0.00	0.00	0.09	0.02	0.05	0.00	0.00	0.01	0.08	0.01	0.00	0.00	0.07	0.09	0.00	13.27
Subtotal - Topsoil Storage Area	--	0.11	0.05	43.01	0.03	0.05	1.73	0.42	1.05	0.10	0.01	0.11	2.25	0.11	0.05	0.05	3.40	1.46	0.08	298.40
Fuel Storage and Dispensinç																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensinç	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	2.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	4,313.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	4.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources	4,319.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Proposed Project Totals (pounds/year)	**4,319.95**	**2.21**	**1.11**	**806.72**	**0.66**	**1.11**	**30.25**	**7.47**	**18.22**	**1.66**	**0.15**	**2.21**	**36.79**	**2.21**	**1.11**	**1.11**	**50.75**	**26.89**	**1.04**	**5,080.59**
Net change (pounds/year)	**(21,834.85)**	**(1.67)**	**(0.84)**	**(505.62)**	**(0.50)**	**(0.84)**	**(14.81)**	**(4.03)**	**(8.56)**	**(0.76)**	**(0.14)**	**(1.67)**	**(13.12)**	**(1.67)**	**(0.84)**	**(0.84)**	**(8.04)**	**(16.06)**	**0.06**	**(2,236.01)**

Cancer Potency Weighted Net Emissions Change										**DPMeq**
Cancer Potency Factor (mg/kg-day)	1.10E+00	1.20E+01	8.40E+00	1.50E+01	4.20E-02	9.10E-01	5.10E+02			
Compared to Diesel PM	1.00	10.91	7.64	13.64	0.04	0.83	463.64			
Diesel PM Weighted Emissions	**(21,834.85)**	**(9.12)**	**(3.83)**	**(11.40)**	**(0.03)**	**(10.85)**	**29.90**			**(21,840.18)**

Note:

1. Methodology for calculating cancer potency weighted net emissions change based on the cancer potency weighted emissions analysis provided*Final Report: Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES III*, South Coast Air Quality Management District September 2008, Chapter 3 (Emissions Inventory Development), available at http://www.aqmd.gov/prdas/matesIII/matesIII.html. Cancer potency values derived from*echnical Support Document for Cancer Potency Factors*, California Office of Environmental Health Hazard Assessment May 2009, Appendix A, available at http://www.oehha.ca.gov/air/hot_spots/tsd052909.html. (Compounds for which there are no potency values are not includ

Table S-4. Comparison of Proposed Project to Baseline Emissions – Hourly Toxic Air Contaminants (pounds/hou

Activity	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hex Chromium	Total Crystalline Silica
Baseline																				
Mining																				
Drilling	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Blasting	--	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Bulldozing, Scraping & Grading	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Material Handling	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Dust Entrainment - Unpaved Roads	--	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39
Wind Erosion - Unpaved Roads	--	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
Wind Erosion - Disturbed Mine Area	--	0.00	0.00	0.18	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.87
Subtotal - Mining	--	0.00	0.00	0.30	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	1.57
Land Filling																				
Material Handling	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dust Entrainment - Unpaved Roads	--	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26
Wind Erosion - Unpaved Roads	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Subtotal - Land Filling	--	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
Fuel Storage and Dispensing																				
Diesel Storage & Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gasoline Storage & Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Portable Gasoline Welders	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	2.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources	2.49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Baseline Totals (pounds/hour)	**2.49**	**0.00**	**0.00**	**0.34**	**0.00**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.00**	**1.86**
Proposed Project - Maximum (Phase 2																				
South Quarry																				
Drilling	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Blasting	--	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Bulldozing, Scraping & Grading	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Material Handling	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Dust Entrainment - Unpaved Roads	--	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
Wind Erosion - Unpaved Roads	--	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Wind Erosion - Active Areas	--	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Subtotal - South Quarry	--	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.71
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Dust Entrainment - Unpaved Roads	--	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38
Wind Erosion - Unpaved Roads	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Wind Erosion - Active Areas	--	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
Subtotal - Waste Rock Storage/Infill	--	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.51
Topsoil Storage Area																				
Material Handling	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dust Entrainment - Unpaved Roads	--	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Wind Erosion - Unpaved Roads	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Wind Erosion - Active Areas	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal - Topsoil Storage Area	--	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	0.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources	0.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Proposed Project Totals (pounds/hour)	**0.90**	**0.00**	**0.00**	**0.22**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.00**	**1.28**
Net change (pounds/hour)	**(1.59)**	**(0.00)**	**(0.00)**	**(0.13)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**0.00**	**(0.58)**

Cancer Potency Weighted Net Emissions Change							**DPMeq**
Cancer Potency Factor (mg/kg-day)	1.10E+00	1.20E+01	8.40E+00	1.50E+01	4.20E-02	9.10E-01	5.10E+02	
Compared to Diesel PM	1.00	10.91	7.64	13.64	0.04	0.83	463.64	
Diesel PM Weighted Emissions	**(1.59)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**0.00**	**(1.60)**

Note:

1. Methodology for calculating cancer potency weighted net emissions change based on the cancer potency weighted emissions analysis provided*Final Report: Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES III)*, South Coast Air Quality Management District September 2008, Chapter 3 (Emissions Inventory Development), available at http://www.aqmd.gov/prdas/matesIII/matesIII.html. Cancer potency values derived fro*echnical Support Document for Cancer Potency Factors*, California Office of Environmental Health Hazard Assessmen May 2009, Appendix A, available at http://www.oehha.ca.gov/air/hot_spots/tsd052909.html. (Compounds for which there are no potency values are not includ

Table S-5. Comparison of Proposed Project to Baseline Emissions – Greenhouse Gases (metric tons/year).

Activity	CO_2	CH_4	N_2O	CO_2e
Baseline				
Mining				
Drilling	--	--	--	--
Blasting	163.84	--	--	163.84
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Disturbed Mine Area	--	--	--	--
Subtotal - Mining:	163.84	--	--	163.84
Land Filling				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Subtotal - Land Filling:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	1.52	0.00	0.00	1.54
Portable Gasoline Welders	0.06	0.00	0.00	0.06
Off-road Diesel Equipment	14,267.31	0.83	0.37	14,399.40
On-road On-site Vehicles	106.88	0.01	0.00	108.01
On-road Off-site Vehicles	52.94	0.00	0.00	53.57
Subtotal - Combustion Sources:	14,428.70	0.84	0.38	14,562.57
Indirect GHG Emissions				
Electricity Use	614.64	0.03	0.01	617.31
Baseline Totals (metric tons/year):	**15,207.18**	**0.86**	**0.38**	**15,343.72**
Proposed Project				
Maximum: Phase 2				
South Quarry				
Drilling	591.90	--	--	591.90
Blasting	--	--	--	--
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - South Quarry:	591.90	--	--	591.90

Table S-5. Comparison of Proposed Project to Baseline Emissions – Greenhouse Gases (metric tons/year).

Activity	CO_2	CH_4	N_2O	CO_2e
Waste Rock Storage/Infill Areas				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Topsoil Storage Area				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Topsoil Storage Area:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	5.93	0.00	0.00	5.99
Off-road Diesel Equipment	35,729.62	2.07	0.93	36,060.41
On-road On-site Vehicles	168.79	0.01	0.00	169.66
On-road Off-site Vehicles	131.68	0.00	0.00	132.40
Subtotal - Combustion Sources:	36,036.03	2.08	0.93	36,368.46
Indirect GHG Emissions				
Electricity Use	202.35	0.01	0.00	203.23
Proposed Project Totals (metric tons/yr):	**36,830.28**	**2.09**	**0.93**	**37,163.58**
Net change (metric tons/year):	**21,623.10**	**1.22**	**0.55**	**21,819.86**
CEQA Significance Threshold:				
BAAQMD (Proposed - metric tons/year)				10,000.00
Exceeds Proposed BAAQMD Threshold?				**Yes**

Baseline Air Quality Emissions

Under CEQA, a lead agency will ordinarily compare the potential environmental impacts associated with a proposed project with existing conditions to determine whether those impacts are significant. The existing conditions are usually referred to as a project's baseline. Generally, the baseline is established as the physical conditions existing at the time the environmental review process begins.

In this case, the proposed project involves an existing quarry operation. Such operations are characterized by fluctuating production and output, and air emissions, in response to continually changing market demands. An inventory that only considers conditions existing at the time that the environmental review commences will tend to over-report or under-report actual conditions. Accordingly, consistent with the Project Description, this baseline technical air quality assessment considers the ten-year period from January 1, 2000 to December 31, 2009, which is representative of the existing conditions at the Quarry because it includes periods of relatively high production as well as relatively low production, in response to changing market demands. Using data provided by Lehigh, Ashworth Leininger Group (ALG) prepared baseline estimates of criteria pollutant, TAC, and GHG emissions associated with Quarry operations for this ten-year baseline period. The following operations and activities are included in the baseline emissions estimates:

- Mining operations
- Material (waste rock) storage
- Associated mobile sources and portable equipment
- Indirect greenhouse gas emissions associated with electricity use

Consistent with the Project Description, emissions associated with operation of Lehigh's adjacent cement manufacturing facility are not included in the baseline analysis since the cement plant is a separately-permitted industrial use, and because the project will not affect the cement plant's use permit, operating permits or regulatory status. For reference, cement plant emissions of criteria pollutants and TACs are detailed in the *Comprehensive Emission Inventory Report (2008 CEIR) for Lehigh Southwest Cement Company's Cupertino Facility for 2008*, dated March 27, 2009, which has been submitted to the BAAQMD.

Emission factors used to quantify criteria pollutants, TACs and GHG emission estimates are based on data available from generally accepted public sources, specifically:

- U.S. Environmental Protection Agency, *Compilation of Air Pollutant Emission Factors* (Document No. AP-42).
- Mojave Desert Air Quality Management District, *Emissions Inventory Guidance – Mineral Handling and Processing Industries*, April 2000.
- South Coast Air Quality Management District, *Off-road Mobile Source Emission Factors*, October 2008.
- California Air Resources Board, *OFFROAD2007 (December 15, 2006 Release)* Emissions Model, for non-road vehicles and equipment.
- California Air Resources Board, *EMFAC2007, Version 2.3* Emissions Model, for on-road vehicles.
- California Climate Action Registry, *General Reporting Protocol, Version 3.1*, January 2009.
- Australian Greenhouse Office, *AGO Factors and Methods Workbook*, December 2006.

Specific factors used to quantify emissions are referenced individually in each of the spreadsheets that are included in this technical assessment. In addition, ALG used TAC sampling analysis, operational, and other data from the *2008 CEIR*, which are also specifically referenced in the appendices (see Appendix A).

With respect to wind erosion, ALG updated the meteorological data utilized in the 2008 CEIR to reflect data collected at Lehigh's own meteorological station during 2008 and to prepare factors representative of topsoil wind erosion. An independent quality assurance audit conducted April 29, 2008, demonstrated that the station satisfied U.S. Environmental Protection Agency and BAAQMD quality assurance criteria for meteorological data. As a result of the update to the meteorological data, wind erosion emission factors associated with quarry operations, waste disposal/infill, and unpaved roads increased relative to those applied in the 2008 CEIR.

As previously mentioned, production and usage data were obtained from Lehigh. In general, data presented in internal production reports and annual reports sent to agencies (e.g., BAAQMD annual reports, SMARA reports filed with the County of Santa Clara, etc.) were averaged over a ten-year period (2000-2009). Summaries of criteria pollutant, TAC, and GHG emissions are presented in the following sections. Detailed tables documenting how emissions were calculated from each emission source category are presented in Appendix A.

Criteria Pollutant Emissions

Tables 1 and 2 present summaries of baseline annual and hourly criteria pollutant emissions (in tons per year and pounds per day, respectively) associated with operation of Lehigh's existing North Quarry.

Toxic Air Contaminant Emissions

Tables 3 and 4 present summaries of baseline annual and hourly TACs associated with operation of the existing North Quarry.

Greenhouse Gas Emissions

Table 5 presents a summary of baseline annual emissions, in metric tons per year, including direct GHG emissions associated with use of explosives, operation of combustion equipment at the facility and indirect emissions associated with electric power and water use. Metric tons are used as this is consistent with AB32 and other GHG initiatives, which express emissions data in metric tons of carbon dioxide equivalent (CO_2e). Other pollutants (i.e., TACs and criteria pollutants) are expressed in pounds and tons.

Emission Sources and Activities

Emissions are calculated for each specific emission source within an applicable area of the facility. Following is a summary of emission sources and activities included in the baseline emissions technical analysis:

- Mining – This category encompasses the following emission sources associated with operation of the existing North Quarry:
    - Drilling of charge holes to allow placement of explosives for blasting
    - Blasting to fracture and loosen ore, overburden and substrate through the use of explosives

- Bulldozing, scraping and grading of overburden, waste material, and limestone using heavy equipment such as bulldozers, graders, and scrapers. Note that this does not include the loading and dumping of materials into transport trucks.
- Material handling, including loading and dumping of materials into transport trucks
- Dust entrainment due to vehicular travel on unpaved roads
- Wind erosion associated with actively disturbed unpaved areas, including unpaved roads and actively disturbed mine areas within the existing Quarry. (Note that all non-road disturbed areas are allocated to the existing Quarry.) The wind erosion emission calculation procedure outlined in AP-42 Section 13.2.5 (Industrial Wind Erosion) is based on research conducted at coal mining and storage facilities. The calculation procedure is sensitive to the threshold friction velocity of the material stored[7]. ALG selected a threshold friction velocity value (0.62 meters per second) for scraper tracks on a lightly crusted coal pile as a reasonable worst case assumption, given the range of values presented in AP-42 Section 13.2.5 (from 0.54 meters per second[8] to 1.33 meters per second[9]). This methodology is also consistent with the technical approach used in the CEIR.

- Land Filling – This category encompasses the following emission sources associated with landfilling activities within the facility's waste rock storage areas:
  - Material handling, including loading and dumping of waste materials
  - Bulldozing, scraping and grading of waste material using heavy equipment such as bulldozers, graders, and scrapers
  - Dust entrainment dust due to vehicular travel on unpaved roads
  - Wind erosion associated with actively disturbed unpaved roads

- Fuel Storage and Dispensing – This category reflects that portion of emissions associated with operation of diesel and gasoline storage tanks attributable to operation of the existing North Quarry

- Combustion Sources – This category encompasses operation of the following equipment in conjunction with operation of the existing North Quarry:
  - Portable Internal Combustion Engines (ICEs, i.e., diesel- and gasoline-fueled welders)
  - Off-road diesel equipment (bore/drill rigs, crawler-tractors, excavators, graders, off-highway trucks, rubber-tired dozers, rubber-tired loaders, water trucks, and portable light towers)
  - On-road, on-site vehicles (work trucks)
  - On-road, off-site vehicles (fuel transport trucks and employee commute vehicles)

Toxic Air Contaminant Emissions

- Particulate Matter Sources – Toxic air contaminant emissions associated with dust entrainment from unpaved roads; wind erosion; drilling and blasting; material handling; bulldozing, and scraping and grading were based on analytical results from sampling

[7] Essentially, when observed wind velocity at a site is greater than the threshold friction velocity for a given material, wind erosion of that material is expected. When the observed wind velocity is less than or equal to the threshold friction velocity wind erosion is not expected. Generally speaking, a lower threshold wind velocity will result in greater wind erosion, while a higher threshold wind velocity will result in less wind erosion.

[8] For fine coal dust on a concrete pad at an eastern power plant.

[9] For scoria (roadbed material) at a western surface coal mine.

conducted at the Permanente facility in November 2008. These data are documented in the *2008 CEIR*, previously cited. Notably, emission estimates of naturally occurring asbestos were not prepared, as prior studies at the site, which were required by the BAAQMD and the ARB, concluded that the Quarry operations are an insignificant source of asbestos emissions. (See *Permanente Limestone & Aggregate Quarry, Cupertino, Santa Clara County, California, Geologic Review – Naturally Occurring Asbestos*, Geocon Consultants, Inc., December 11, 2007.)

- Combustion & Fuel Sources – To quantify toxic air contaminant emissions for diesel-fueled vehicles and equipment (off-road diesel equipment, portable ICEs, and on-road vehicles), ALG quantified the exhaust diesel particulate matter. This is consistent with the ARB toxic air contaminant program for diesel fueled equipment (e.g., off-road diesel, on-road heavy duty diesel, and portable diesel greater than 50 HP). Given the small contribution of reactive organic gases from gasoline-fueled vehicles and equipment (less than 0.2 tons per year), ALG determined that gasoline fueled vehicles and equipment would have a minimal contribution to the facility's baseline TAC emissions. This is because TAC emissions constitute a very small portion of total reactive organic gas emissions, which by itself is insignificant.

Greenhouse Gas Emissions

- Direct GHG Sources – This category includes combustion equipment operated on-site, specifically both on-road and off-road equipment. Emission estimates are provided for CO_2, CH_4, and NO_2, and expressed as CO_2e, consistent with ARB GHG emission estimating protocols.

- Indirect GHG Sources – This category includes indirect, off-site, remote sources of GHG emissions associated with use of electricity for quarry dewatering and quarry office operations.

Table 1. Baseline Criteria Pollutants - Annual Emissions (tons/year).

Activity	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Mining						
Drilling	2.06	2.06	--	--	--	--
Blasting	2.73	0.16	36.35	9.22	--	1.09
Bulldozing, Scraping & Grading	0.62	0.09	--	--	--	--
Material Handling	3.56	0.53	--	--	--	--
Dust Entrainment - Unpaved Roads	124.92	12.49	--	--	--	--
Wind Erosion - Unpaved Roads	11.70	1.75	--	--	--	--
Wind Erosion - Disturbed Mine Area	537.45	80.62	--	--	--	--
Land Filling						
Material Handling	1.64	0.25	--	--	--	--
Dust Entrainment - Unpaved Roads	84.81	8.48	--	--	--	--
Wind Erosion - Unpaved Roads	7.26	1.09	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.08	--
Fuel Dispensing	--	--	--	--	0.01	--
Combustion Sources						
Portable Diesel Welders	0.00	0.00	0.01	0.04	0.00	0.00
Portable Gasoline Welders	0.00	0.00	0.00	0.00	0.00	0.00
Off-road Diesel Equipment	13.07	13.07	35.30	233.54	10.11	0.10
On-road On-site Vehicles	0.01	0.01	0.78	0.11	0.06	0.00
On-road Off-site Vehicles	0.01	0.00	0.57	0.11	0.06	0.00
Dust Entrainment - Paved Roads	0.04	0.01	--	--	--	--
Totals (tons/year):	789.88	120.62	73.00	243.02	10.33	1.18

Table 2. Baseline Criteria Pollutants - Daily Emissions (pounds/day).

Activity	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Mining						
Drilling	50.05	50.05	--	--	--	--
Blasting	66.36	3.83	882.22	223.85	--	26.33
Bulldozing, Scraping & Grading	4.31	0.65	--	--	--	--
Material Handling	3.56	0.53	--	--	--	--
Dust Entrainment - Unpaved Roads	873.56	87.36	--	--	--	--
Wind Erosion - Unpaved Roads	81.80	12.27	--	--	--	--
Wind Erosion - Disturbed Mine Area	3,758.41	563.76	--	--	--	--
Land Filling						
Material Handling	11.47	1.72	--	--	--	--
Dust Entrainment - Unpaved Roads	593.04	59.30	--	--	--	--
Wind Erosion - Unpaved Roads	50.77	7.61	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.65	--
Fuel Dispensing	--	--	--	--	0.12	--
Combustion Sources						
Portable Diesel Welders	0.13	0.13	0.38	1.78	0.14	0.12
Portable Gasoline Welders	0.00	0.00	0.04	0.06	0.12	0.00
Off-road Diesel Equipment	91.41	91.41	246.85	1,633.15	70.67	0.66
On-road On-site Vehicles	0.06	0.04	5.55	0.75	0.46	0.01
On-road Off-site Vehicles	0.06	0.04	4.07	1.13	0.46	0.00
Dust Entrainment - Paved Roads	0.32	0.05	--	--	--	--
Totals (pounds/day):	5,585.31	878.76	1,139.11	1,860.71	72.62	27.13

Table 3. Baseline Toxic Air Contaminants - Annual Emissions (pounds/year).

Activity	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hex Chromium	Total Crystalline Silica
Mining																				
Drilling	--	0.01	0.01	3.22	0.00	0.01	0.10	0.03	0.06	0.01	0.00	0.01	0.09	0.01	0.01	0.01	0.08	0.10	0.00	15.31
Blasting	--	0.01	0.01	4.26	0.00	0.01	0.13	0.03	0.08	0.01	0.00	0.01	0.13	0.01	0.01	0.01	0.10	0.14	0.00	20.30
Bulldozing, Scraping & Grading	--	0.00	0.00	0.96	0.00	0.00	0.03	0.01	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.03	0.00	4.58
Material Handling	--	0.02	0.01	5.55	0.01	0.01	0.17	0.05	0.10	0.01	0.00	0.02	0.16	0.02	0.01	0.01	0.14	0.18	0.00	26.40
Dust Entrainment - Unpaved Roads	--	0.62	0.31	249.84	0.19	0.31	10.24	2.45	6.25	0.57	0.03	0.62	13.49	0.62	0.31	0.31	20.74	8.49	0.47	1,773.65
Wind Erosion - Unpaved Roads	--	0.06	0.03	23.40	0.02	0.03	0.96	0.23	0.58	0.05	0.00	0.06	1.26	0.06	0.03	0.03	1.94	0.80	0.04	166.09
Wind Erosion - Disturbed Mine Area	--	2.69	1.34	838.43	0.81	1.34	25.80	6.88	15.05	1.34	0.21	2.69	24.72	2.69	1.34	1.34	20.42	26.87	0.11	3,990.91
Land Filling																				
Material Handling	--	0.01	0.00	2.56	0.00	0.00	0.08	0.02	0.05	0.00	0.00	0.01	0.08	0.01	0.00	0.00	0.06	0.08	0.00	12.18
Dust Entrainment - Unpaved Roads	--	0.42	0.21	169.61	0.13	0.21	6.95	1.66	4.24	0.39	0.02	0.42	9.16	0.42	0.21	0.21	14.08	5.77	0.32	1,204.10
Wind Erosion - Unpaved Roads	--	0.04	0.02	14.52	0.01	0.02	0.60	0.14	0.36	0.03	0.00	0.04	0.78	0.04	0.02	0.02	1.21	0.49	0.03	103.07
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	6.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Portable Gasoline Welders	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	26,144.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	4.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (pounds/year):	26,154.80	3.88	1.94	1,312.34	1.17	1.94	45.06	11.50	26.78	2.42	0.28	3.88	49.91	3.88	1.94	1.94	58.79	42.95	0.98	7,316.60

Table 4. Baseline Toxic Air Contaminants - Hourly Emissions (pounds/hour).

Activity	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hex Chromium	Total Crystalline Silica
Mining																				
Drilling	--	1.56E-05	7.82E-06	4.88E-03	4.69E-06	7.82E-06	1.50E-04	4.00E-05	8.76E-05	7.82E-06	1.25E-06	1.56E-05	1.44E-04	1.56E-05	7.82E-06	7.82E-06	1.19E-04	1.56E-04	6.26E-07	2.32E-02
Blasting	--	1.66E-04	8.29E-05	5.18E-02	4.98E-05	8.29E-05	1.59E-03	4.25E-04	9.29E-04	8.29E-05	1.33E-05	1.66E-04	1.53E-03	1.66E-04	8.29E-05	8.29E-05	1.26E-03	1.66E-03	6.64E-06	2.46E-01
Bulldozing, Scraping & Grading	--	6.74E-07	3.37E-07	2.10E-04	2.02E-07	3.37E-07	6.47E-06	1.73E-06	3.77E-06	3.37E-07	5.39E-08	6.74E-07	6.20E-06	6.74E-07	3.37E-07	3.37E-07	5.12E-06	6.74E-06	2.70E-08	1.00E-03
Material Handling	--	3.88E-06	1.94E-06	1.21E-03	1.17E-06	1.94E-06	3.73E-05	9.94E-06	2.18E-05	1.94E-06	3.11E-07	3.88E-06	3.57E-05	3.88E-06	1.94E-06	1.94E-06	2.95E-05	3.88E-05	1.55E-07	5.77E-03
Dust Entrainment - Unpaved Roads	--	1.36E-04	6.82E-05	5.46E-02	4.09E-05	6.82E-05	2.24E-03	5.35E-04	1.36E-03	1.26E-04	7.64E-06	1.36E-04	2.95E-03	1.36E-04	6.82E-05	6.82E-05	4.53E-03	1.86E-03	1.04E-04	3.88E-01
Wind Erosion - Unpaved Roads	--	1.28E-05	6.39E-06	5.11E-03	3.83E-06	6.39E-06	2.10E-04	5.01E-05	1.28E-04	1.18E-05	7.16E-07	1.28E-05	2.76E-04	1.28E-05	6.39E-06	6.39E-06	4.24E-04	1.74E-04	9.71E-06	3.63E-02
Wind Erosion - Disturbed Mine Area	--	5.87E-04	2.94E-04	1.83E-01	1.76E-04	2.94E-04	5.64E-03	1.50E-03	3.29E-03	2.94E-04	4.70E-05	5.87E-04	5.40E-03	5.87E-04	2.94E-04	2.94E-04	4.46E-03	5.87E-03	2.35E-05	8.72E-01
Land Filling																				
Material Handling	--	1.79E-06	8.96E-07	5.59E-04	5.38E-07	8.96E-07	1.72E-05	4.59E-06	1.00E-05	8.96E-07	1.43E-07	1.79E-06	1.65E-05	1.79E-06	8.96E-07	8.96E-07	1.36E-05	1.79E-05	7.17E-08	2.66E-03
Dust Entrainment - Unpaved Roads	--	9.27E-05	4.63E-05	3.71E-02	2.78E-05	4.63E-05	1.52E-03	3.63E-04	9.27E-04	8.52E-05	5.19E-06	9.27E-05	2.00E-03	9.27E-05	4.63E-05	4.63E-05	3.08E-03	1.26E-03	7.04E-05	2.63E-01
Wind Erosion - Unpaved Roads	--	7.93E-06	3.97E-06	3.17E-03	2.38E-06	3.97E-06	1.30E-04	3.11E-05	7.93E-05	7.30E-06	4.44E-07	7.93E-06	1.71E-04	7.93E-06	3.97E-06	3.97E-06	2.63E-04	1.08E-04	6.03E-06	2.25E-02
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Portable Gasoline Welders	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	2.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (pounds/hour):	2.49	0.00	0.00	0.34	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	1.86

Table 5. Baseline Greenhouse Gases - Annual Emissions (metric tons/year).

Activity	CO_2	CH_4	N_2O	CO_2e
Mining				
Drilling	--	--	--	--
Blasting	163.84	--	--	163.84
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Disturbed Mine Area	--	--	--	--
Land Filling				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Combustion Sources				
Portable Diesel Welders	1.52	0.00	0.00	1.54
Portable Gasoline Welders	0.06	0.00	0.00	0.06
Off-road Diesel Equipment	14,267.31	0.83	0.37	14,399.40
On-road On-site Vehicles	106.88	0.01	0.00	108.01
On-road Off-site Vehicles	52.94	0.00	0.00	53.57
Indirect GHG Emissions				
Electricity Use	614.64	0.03	0.01	617.31
Totals (metric tons/year):	15,207.18	0.86	0.38	15,343.72

Proposed Project Air Quality Emissions

As described in greater detail in the Project Description, the project will be developed in five phases. To evaluate the proposed project's impact on air quality, ALG prepared estimates of anticipated criteria pollutant emissions, TACs, and GHGs associated with each of these five phases. The following activities are included in the proposed project emission estimates for each phase:

- Operation of the proposed South Quarry
- Operation of overburden rock storage and infill areas associated with South Quarry
- Operation of the Topsoil Storage Area associated with South Quarry
- Mobile sources and portable equipment associated with South Quarry
- Indirect greenhouse gas emissions associated with electricity and water use
- Reclamation of North Quarry, South Quarry, waste rock storage and infill areas, Topsoil Storage Area, and other disturbed areas in the project area

Consistent with the Project Description, emissions associated with the following activities are not included in this air quality analysis:

- Continued operation of the adjacent cement manufacturing facility,
- Continued operation of Lehigh's North Quarry and rock plant,
- Construction of the Permanente Creek Bridge, which is discussed separately

As discussed above, the cement plant is not included since the facility is a separately-permitted industrial use and is not considered part of this project, and is not be affected by the proposed amendment to the 1985 reclamation plan or the proposed CUP. Similarly, continued operation of the North Quarry and the rock plant are also not considered part of the proposed project because the project will not affect the operation of these facilities.

The emission factors applied for the project analysis are from the same sources as applied in the baseline analysis and derive from the same generally accepted and publicly available sources. For a list of specific references, see the Baseline Air Quality Emissions section, above. Specific factors used to quantify emissions are referenced individually in each of the spreadsheets included in this technical assessment. Consistent with the baseline analysis, ALG used TAC sampling analysis, operational, and other data from the 2008 CEIR[10], which are also specifically referenced in the appendices.

In calculating emissions from off-highway vehicles/equipment and on-road vehicles, ALG assumed that the peak year of operations under Phase 1 (specifically Year 5 of Phase 1) of the proposed project would occur by 2020. Furthermore, ALG assumed 2020 combustion-related emission factors to be representative of all project phases. With respect to wind erosion, all wind data were managed consistent with the baseline analysis, and relies on on-site meteorological data.

ALG prepared estimates of criteria pollutant, TAC, and GHG emissions for each of the five project phases based on the maximum level of annual activity expected to occur during each phase. Emission estimates for each of the five phases are based on the following activity data provided by Lehigh:

[10] *Comprehensive Emission Inventory Report (CEIR) for Lehigh Southwest Cement Company's Cupertino Facility for 2008* (2008 CEIR), prepared for Lehigh Southwest Cement Company, March 2009.

- Maximum anticipated annual production levels from the South Quarry
- Drilling and blasting necessary to support maximum anticipated production
- Estimated acres of actively disturbed areas (i.e., South Quarry, waste storage/infill areas and Topsoil Storage Area) for each year
- Limestone/rock/topsoil on-site haul distances for each year
- Annual hours of activity of off-road diesel-fired equipment, by equipment type, to support maximum anticipated production
- Anticipated number of employees to support maximum anticipated production

These production and activity data are summarized in Appendix C. The emission estimates for each of the multi-year phases are conservative. This is because ALG calculated the maximum emissions for a given activity and summed the maximum activity totals for a given phase. It is recognized that within a given multi-year phase, maximum emissions for individual activities could occur in different years. It is also noted that initially during development of the South Quarry in Phase 1, extractive operations will be continuing at the North Quarry.[11]

Criteria Pollutant Emissions. Tables 6 and 7 present summaries of annual and hourly criteria pollutant emissions (in tons per year and pounds per day, respectively) anticipated from operation of Lehigh's proposed project.

Toxic Air Contaminant Emissions. Tables 8 and 9 present summaries of annual and hourly TACs (in pounds per year and pounds per hour, respectively) anticipated from operation of Lehigh's proposed project.

Greenhouse Gas Emissions. Table 10 presents a summary of annual GHG emissions (in metric tons per year) anticipated from operation of Lehigh's proposed project, and are calculated and presented consistent with the baseline analysis.

Appendix B documents each emission calculation by process/pollutant; Appendix C provides the supporting documentation (activity data and emission factors) that are relied upon to perform these calculations.

Proposed Project Emission Sources and Activities

Emissions are calculated for each specific emission source associated with proposed project components. Following is a summary of emission sources and activities included in the proposed project air quality emissions analysis:

- South Quarry – This category encompasses the following emission sources associated with operation and reclamation of the proposed South Quarry:
  - Drilling of charge holes to allow placement of explosives for blasting
  - Blasting to fracture and loosen ore, overburden and substrate through the use of explosives
  - Bulldozing, scraping, and grading of topsoil, overburden, limestone, and waste material. Since more than 90% of all bulldozing, scraping, and grading is

[11] Based on information provided by Lehigh, South Quarry production of limestone for cement manufacturing is expected to commence during the third year of Phase 1 and be at 25% of maximum during Years 3 and 4 and at 50% of maximum in Year 5 of South Quarry operation. South Quarry production of limestone for aggregate purposes is expected to be 90% of maximum during Years 3 through 5.

expected to occur in the South Quarry, ALG allocated all of this activity to the South Quarry.
  - Loading and dumping of materials into and from transport trucks (referred to as material handling)
  - Dust entrainment due to vehicle travel on unpaved roads in the vicinity of the South Quarry
  - Wind erosion associated with actively disturbed unpaved areas, including unpaved roads in the vicinity of the proposed South Quarry and active quarry operating, topsoil removal, and reclamation areas within the South Quarry. The wind erosion emission calculation procedure outlined in AP-42 Section 13.2.5 (Industrial Wind Erosion) is based on research conducted at coal mining and storage facilities. The calculation procedure is sensitive to the threshold friction velocity of the material stored[12]. For active quarry operating areas, ALG selected a threshold friction velocity value for scraper tracks on a lightly crusted coal pile (0.62 meters per second) as a reasonable worst case assumption, given the range of values presented in AP-42 Section 13.2.5 (from 0.54 meters per second[13] to 1.33 meters per second[14]). This methodology is also consistent with the technical approach used in the CEIR, although ALG has used wind data from the onsite meteorological station. For active topsoil removal and reclamation areas, ALG applied the AP-42 threshold friction velocity value for overburden (1.02 meters per second).

- Waste Rock Storage/Infill Areas – This category encompasses the following emission sources associated with operation and reclamation of the Central Material Storage Area (CMSA) and North Quarry Infill area:
  - Material handling associated with waste rock from the South Quarry and reclamation of the CMSA and North Quarry Infill area
  - Associated dust entrainment due to vehicle travel on unpaved roads in the vicinity of the CMSA and North Quarry Infill areas associated with transporting waste rock from the South Quarry
  - Wind erosion associated with actively disturbed unpaved areas, including unpaved roads in the vicinity of waste rock storage/infill areas, active waste rock storage/infill areas, and active reclamation areas within the CMSA and North Quarry Infill area

- Topsoil Storage Area – This category encompasses the following emission sources associated with operation and reclamation of the Topsoil Storage Area:
  - Material handling
  - Dust entrainment due to vehicle travel on unpaved roads in the vicinity of the Topsoil Storage Area
  - Wind erosion associated with actively disturbed unpaved areas, including unpaved roads in the vicinity of the Topsoil Storage Area and active topsoil removal, operating, and reclamation areas

[12] Briefly, when observed wind velocity at a site is greater than the threshold friction velocity for a given material, wind erosion of that material is expected. When the observed wind velocity is less than or equal to the threshold friction velocity wind erosion is not expected. Generally, a lower threshold wind velocity will result in greater wind erosion, while a higher threshold wind velocity will result in less wind erosion.

[13] For fine coal dust on a concrete pad at an eastern power plant.

[14] For scoria (roadbed material) at a western surface coal mine.

- Fuel Storage and Dispensing – This category reflects the portion of emissions associated with operation of diesel and gasoline storage tanks attributable to operation of the proposed project.

- Combustion Sources – This category encompasses operation of the following equipment in conjunction with operation of Lehigh's proposed project:
    - Portable diesel-fueled welders
    - Off-road diesel equipment (bore/drill rigs, rubber-tired loaders, off-highway trucks, crawler-tractors, rubber-tired dozers, graders, water trucks, excavators, hydroseeders, and portable light towers)
    - On-road, on-site vehicles (work trucks)
    - On-road, off-site vehicles (fuel transport trucks and employee commute vehicles)

- Reclamation Activities – These activities encompass reclamation of the North Quarry, South Quarry, waste rock storage and infill areas, Topsoil Storage Area, and other disturbed areas as identified in the proposed project. Emissions associated with reclamation activities are included within the emission calculations for material handling, dust entrainment, wind erosion, and combustion sources for each of the different project areas. Activities related to reclamation include:
    - Material handling associated with moving topsoil from the Topsoil Storage Area to each of the areas to be reclaimed, and moving topsoil within an area as part of concurrent reclamation activities (primarily within the South Quarry)
    - Dust entrainment due to vehicle travel on unpaved roads associated with transporting topsoil from the Topsoil Storage Area
    - Wind erosion associated with active reclamation within each of the areas to be reclaimed
    - Combustion equipment operation due to topsoil transport for each of the reclamation areas, topsoil handling, topsoil mixing with the waste rock or other subsurface materials, and hydroseeding activities.

Proposed Project Toxic Air Contaminant Emissions

- Particulate Matter Sources – Toxic air contaminant emissions associated with drilling and blasting; bulldozing, scraping and grading; material handling; dust entrainment from unpaved roads; and wind erosion are based on analytical results from sampling conducted at the Permanente facility in November 2008. These data are documented in the *2008 CEIR*, previously cited. Consistent with the baseline analysis, emission estimates of naturally occurring asbestos were not prepared, as prior studies at the site, which were required by the BAAQMD and the ARB, concluded that the Quarry operations are an insignificant source of asbestos emissions. (See *Permanente Limestone & Aggregate Quarry, Cupertino, Santa Clara County, California, Geologic Review – Naturally Occurring Asbestos*, Geocon Consultants, Inc., December 11, 2007.)

- Combustion & Fuel Sources – To quantify toxic air contaminant emissions for diesel-fueled vehicles and equipment (off-road diesel equipment, portable ICE, and on-road vehicles), ALG quantified exhaust diesel particulate matter emissions. This calculation is consistent with the methodology used to calculate baseline emissions.

Proposed Project Greenhouse Gas Emissions

- Direct GHG Sources – This category includes emissions from combustion equipment operated on-site, specifically both on-road and off-road equipment. Emission estimates are provided for CO_2, CH_4, and N_2O, consistent with ARB GHG emission estimating protocols.

- Indirect GHG Sources – This category includes indirect, off-site, remote sources of GHG emissions associated with anticipated use of electricity for quarry dewatering, purchased water, and quarry office operations.

Table 6. Proposed Project Criteria Pollutants - Annual Emissions (tons/year).

Phase	Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
	South Quarry	112.48	16.67	104.43	26.50	--	3.12
	Waste Rock Storage/Infill Areas	152.33	16.91	--	--	--	--
1	Topsoil Storage Area	17.22	1.97	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.12	--
	Combustion Sources	1.58	1.46	34.61	115.82	9.10	0.16
	Total - Phase 1	283.60	37.00	139.04	142.32	9.22	3.28
	South Quarry	210.69	30.11	131.31	33.32	--	3.92
	Waste Rock Storage/Infill Areas	209.72	24.97	--	--	--	--
2	Topsoil Storage Area	21.92	2.41	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.14	--
	Combustion Sources	2.32	2.20	51.47	178.80	13.69	0.24
	Total - Phase 2	444.66	59.69	182.79	212.12	13.83	4.16
	South Quarry	181.07	26.65	151.99	38.57	--	4.54
	Waste Rock Storage/Infill Areas	170.88	19.15	--	--	--	--
3	Topsoil Storage Area	13.68	1.50	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.13	--
	Combustion Sources	2.27	2.15	50.60	174.87	13.40	0.24
	Total - Phase 3	367.90	49.44	202.59	213.44	13.53	4.77
	South Quarry	153.37	23.17	130.02	32.99	--	3.88
	Waste Rock Storage/Infill Areas	159.13	18.62	--	--	--	--
4	Topsoil Storage Area	8.96	1.02	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.12	--
	Combustion Sources	1.85	1.74	41.09	140.64	10.83	0.19
	Total - Phase 4	323.31	44.55	171.11	173.64	10.96	4.07
	South Quarry	171.76	25.62	124.42	31.57	--	3.71
	Waste Rock Storage/Infill Areas	163.18	20.70	--	--	--	--
5	Topsoil Storage Area	16.33	1.84	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.12	--
	Combustion Sources	1.83	1.73	40.79	139.93	10.78	0.19
	Total - Phase 5	353.10	49.89	165.21	171.50	10.90	3.90

Table 7. Proposed Project Criteria Pollutants - Daily Emissions (pounds/day).

Phase	Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
	South Quarry	770.66	112.32	1,033.97	262.35	--	30.86
	Waste Rock Storage/Infill Areas	1,015.53	112.71	--	--	--	--
1	Topsoil Storage Area	114.77	13.12	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.78	--
	Combustion Sources	10.57	9.73	230.91	772.12	60.74	1.07
	Total - Phase 1	1,911.53	247.88	1,264.88	1,034.47	61.51	31.94
	South Quarry	1,478.15	204.96	2,067.95	524.70	--	61.73
	Waste Rock Storage/Infill Areas	1,398.16	166.46	--	--	--	--
2	Topsoil Storage Area	146.12	16.08	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.93	--
	Combustion Sources	15.50	14.66	343.36	1,191.97	91.35	1.61
	Total - Phase 2	3,037.93	402.15	2,411.31	1,716.67	92.29	63.34
	South Quarry	1,272.14	181.41	2,067.95	524.70	--	61.73
	Waste Rock Storage/Infill Areas	1,139.23	127.63	--	--	--	--
3	Topsoil Storage Area	91.21	9.97	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.88	--
	Combustion Sources	15.17	14.37	337.52	1,165.82	89.41	1.58
	Total - Phase 3	2,517.75	333.39	2,405.47	1,690.52	90.29	63.31
	South Quarry	1,096.54	158.72	2,067.95	524.70	--	61.73
	Waste Rock Storage/Infill Areas	1,060.89	124.14	--	--	--	--
4	Topsoil Storage Area	59.70	6.81	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.82	--
	Combustion Sources	12.36	11.63	274.13	937.62	72.28	1.28
	Total - Phase 4	2,229.50	301.29	2,342.07	1,462.33	73.10	63.01
	South Quarry	1,157.67	171.52	1,033.97	262.35	--	30.86
	Waste Rock Storage/Infill Areas	1,087.89	138.02	--	--	--	--
5	Topsoil Storage Area	108.85	12.23	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.79	--
	Combustion Sources	12.24	11.55	272.08	932.89	71.93	1.27
	Total - Phase 5	2,366.64	333.33	1,306.06	1,195.24	72.73	32.14

Table 8. Proposed Project Toxic Air Contaminants - Annual Emissions (pounds/year).

Phase	Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	South Quarry	--	0.56	0.28	202.43	0.17	0.28	7.48	1.86	4.50	0.41	0.04	0.56	8.97	0.56	0.28	0.28	12.12	6.73	0.24	1,250.34
	Waste Rock Storage/Infill Areas	--	0.76	0.38	290.60	0.23	0.38	11.40	2.77	6.91	0.63	0.05	0.76	14.47	0.76	0.38	0.38	21.20	9.78	0.46	1,946.42
1	Topsoil Storage Area	--	0.09	0.04	33.37	0.03	0.04	1.33	0.32	0.81	0.07	0.01	0.09	1.71	0.09	0.04	0.04	2.55	1.13	0.06	228.04
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	2,844.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 1	2,844.33	1.41	0.71	526.40	0.42	0.71	20.22	4.95	12.22	1.12	0.09	1.41	25.15	1.41	0.71	0.71	35.86	17.64	0.76	3,424.80
	South Quarry	--	1.05	0.53	377.88	0.32	0.53	13.91	3.46	8.36	0.76	0.07	1.05	16.62	1.05	0.53	0.53	22.32	12.55	0.44	2,321.77
	Waste Rock Storage/Infill Areas	--	1.05	0.52	385.84	0.31	0.52	14.60	3.59	8.81	0.80	0.07	1.05	17.91	1.05	0.52	0.52	25.04	12.89	0.52	2,460.41
2	Topsoil Storage Area	--	0.11	0.05	43.01	0.03	0.05	1.73	0.42	1.05	0.10	0.01	0.11	2.25	0.11	0.05	0.05	3.40	1.46	0.08	298.40
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	4,319.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 2	4,319.95	2.21	1.11	806.72	0.66	1.11	30.25	7.47	18.22	1.66	0.15	2.21	36.79	2.21	1.11	1.11	50.75	26.89	1.04	5,080.59
	South Quarry	--	0.91	0.45	326.72	0.27	0.45	12.11	3.00	7.28	0.66	0.06	0.91	14.57	0.91	0.45	0.45	19.76	10.86	0.40	2,025.79
	Waste Rock Storage/Infill Areas	--	0.85	0.43	324.12	0.26	0.43	12.65	3.08	7.66	0.70	0.05	0.85	15.97	0.85	0.43	0.43	23.23	10.90	0.50	2,154.59
3	Topsoil Storage Area	--	0.07	0.03	27.34	0.02	0.03	1.12	0.27	0.68	0.06	0.00	0.07	1.47	0.07	0.03	0.03	2.27	0.93	0.05	193.94
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	4,236.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 3	4,236.50	1.83	0.91	678.18	0.55	0.91	25.88	6.35	15.63	1.43	0.12	1.83	32.01	1.83	0.91	0.91	45.25	22.69	0.96	4,374.32
	South Quarry	--	0.77	0.38	272.53	0.23	0.38	9.93	2.48	5.96	0.54	0.05	0.77	11.74	0.77	0.38	0.38	15.51	9.03	0.30	1,650.98
	Waste Rock Storage/Infill Areas	--	0.80	0.40	295.00	0.24	0.40	11.25	2.76	6.79	0.62	0.05	0.80	13.91	0.80	0.40	0.40	19.65	9.87	0.41	1,901.27
4	Topsoil Storage Area	--	0.04	0.02	17.90	0.01	0.02	0.73	0.18	0.45	0.04	0.00	0.04	0.97	0.04	0.02	0.02	1.48	0.61	0.03	127.06
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	3,420.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 4	3,420.43	1.61	0.80	585.43	0.48	0.80	21.92	5.41	13.20	1.20	0.11	1.61	26.62	1.61	0.80	0.80	36.64	19.51	0.75	3,679.32
	South Quarry	--	0.86	0.43	300.06	0.26	0.43	10.73	2.69	6.42	0.58	0.06	0.86	12.43	0.86	0.43	0.43	15.87	9.90	0.30	1,769.80
	Waste Rock Storage/Infill Areas	--	0.82	0.41	288.33	0.24	0.41	10.44	2.61	6.26	0.57	0.06	0.82	12.26	0.82	0.41	0.41	16.02	9.54	0.31	1,731.47
5	Topsoil Storage Area	--	0.08	0.04	31.98	0.02	0.04	1.29	0.31	0.78	0.07	0.00	0.08	1.67	0.08	0.04	0.04	2.51	1.08	0.06	221.38
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	3,402.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 5	3,402.29	1.76	0.88	620.37	0.53	0.88	22.45	5.61	13.45	1.22	0.12	1.76	26.36	1.76	0.88	0.88	34.41	20.52	0.66	3,722.65

Table 9. Proposed Project Toxic Air Contaminants - Hourly Emissions (pounds/hour).

Phase	Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	South Quarry	--	3.76E-04	1.88E-04	1.29E-01	1.13E-04	1.88E-04	4.48E-03	1.14E-03	2.67E-03	2.42E-04	2.70E-05	3.76E-04	5.05E-03	3.76E-04	1.88E-04	1.88E-04	6.13E-03	4.22E-03	1.07E-04	7.32E-01
	Waste Rock Storage/Infill Areas	--	3.17E-04	1.59E-04	1.21E-01	9.52E-05	1.59E-04	4.75E-03	1.15E-03	2.88E-03	2.64E-04	1.94E-05	3.17E-04	6.03E-03	3.17E-04	1.59E-04	1.59E-04	8.83E-03	4.08E-03	1.93E-04	8.11E-01
1	Topsoil Storage Area	--	3.59E-05	1.79E-05	1.39E-02	1.08E-05	1.79E-05	5.54E-04	1.34E-04	3.36E-04	3.09E-05	2.13E-06	3.59E-05	7.12E-04	3.59E-05	1.79E-05	1.79E-05	1.06E-03	4.70E-04	2.36E-05	9.50E-02
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	1.19E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 1	1.19E+00	7.30E-04	3.65E-04	2.64E-01	2.19E-04	3.65E-04	9.79E-03	2.42E-03	5.89E-03	5.37E-04	4.85E-05	7.30E-04	1.18E-02	7.30E-04	3.65E-04	3.65E-04	1.60E-02	8.77E-03	3.24E-04	1.64E+00
	South Quarry	--	3.70E-04	1.85E-04	1.26E-01	1.11E-04	1.85E-04	4.35E-03	1.11E-03	2.59E-03	2.34E-04	2.68E-05	3.70E-04	4.85E-03	3.70E-04	1.85E-04	1.85E-04	5.80E-03	4.12E-03	9.87E-05	7.08E-01
	Waste Rock Storage/Infill Areas	--	2.18E-04	1.09E-04	8.04E-02	6.55E-05	1.09E-04	3.04E-03	7.48E-04	1.83E-03	1.68E-04	1.41E-05	2.18E-04	3.73E-03	2.18E-04	1.09E-04	1.09E-04	5.22E-03	2.68E-03	1.09E-04	5.13E-01
2	Topsoil Storage Area	--	2.28E-05	1.14E-05	8.96E-03	6.85E-06	1.14E-05	3.61E-04	8.68E-05	2.20E-04	2.02E-05	1.33E-06	2.28E-05	4.69E-04	2.28E-05	1.14E-05	1.14E-05	7.08E-04	3.03E-04	1.59E-05	6.22E-02
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	9.00E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 2	9.00E-01	6.12E-04	3.06E-04	2.15E-01	1.84E-04	3.06E-04	7.75E-03	1.94E-03	4.64E-03	4.22E-04	4.23E-05	6.12E-04	9.05E-03	6.12E-04	3.06E-04	3.06E-04	1.17E-02	7.11E-03	2.23E-04	1.28E+00
	South Quarry	--	3.38E-04	1.69E-04	1.15E-01	1.01E-04	1.69E-04	3.96E-03	1.01E-03	2.36E-03	2.13E-04	2.45E-05	3.38E-04	4.41E-03	3.38E-04	1.69E-04	1.69E-04	5.25E-03	3.76E-03	8.90E-05	6.44E-01
	Waste Rock Storage/Infill Areas	--	1.78E-04	8.90E-05	6.75E-02	5.34E-05	8.90E-05	2.64E-03	6.41E-04	1.60E-03	1.46E-04	1.10E-05	1.78E-04	3.33E-03	1.78E-04	8.90E-05	8.90E-05	4.84E-03	2.27E-03	1.05E-04	4.49E-01
3	Topsoil Storage Area	--	1.43E-05	7.13E-06	5.70E-03	4.28E-06	7.13E-06	2.33E-04	5.58E-05	1.42E-04	1.31E-05	7.99E-07	1.43E-05	3.07E-04	1.43E-05	7.13E-06	7.13E-06	4.72E-04	1.94E-04	1.08E-05	4.04E-02
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	8.83E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 3	8.83E-01	5.30E-04	2.65E-04	1.88E-01	1.59E-04	2.65E-04	6.83E-03	1.71E-03	4.09E-03	3.72E-04	3.63E-05	5.30E-04	8.04E-03	5.30E-04	2.65E-04	2.65E-04	1.06E-02	6.22E-03	2.05E-04	1.13E+00
	South Quarry	--	3.11E-04	1.55E-04	1.04E-01	9.32E-05	1.55E-04	3.52E-03	9.03E-04	2.09E-03	1.88E-04	2.30E-05	3.11E-04	3.84E-03	3.11E-04	1.55E-04	1.55E-04	4.38E-03	3.39E-03	6.91E-05	5.68E-01
	Waste Rock Storage/Infill Areas	--	1.66E-04	8.29E-05	6.15E-02	4.97E-05	8.29E-05	2.34E-03	5.75E-04	1.42E-03	1.29E-04	1.06E-05	1.66E-04	2.90E-03	1.66E-04	8.29E-05	8.29E-05	4.09E-03	2.06E-03	8.63E-05	3.96E-01
4	Topsoil Storage Area	--	9.33E-06	4.66E-06	3.73E-03	2.80E-06	4.66E-06	1.53E-04	3.65E-05	9.32E-05	8.58E-06	5.23E-07	9.33E-06	2.01E-04	9.33E-06	4.66E-06	4.66E-06	3.09E-04	1.27E-04	7.08E-06	2.65E-02
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	7.13E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 4	7.13E-01	4.86E-04	2.43E-04	1.69E-01	1.46E-04	2.43E-04	6.02E-03	1.51E-03	3.60E-03	3.26E-04	3.41E-05	4.86E-04	6.93E-03	4.86E-04	2.43E-04	2.43E-04	8.78E-03	5.57E-03	1.63E-04	9.91E-01
	South Quarry	--	3.30E-04	1.65E-04	1.10E-01	9.91E-05	1.65E-04	3.69E-03	9.49E-04	2.18E-03	1.97E-04	2.46E-05	3.30E-04	3.98E-03	3.30E-04	1.65E-04	1.65E-04	4.46E-03	3.58E-03	6.80E-05	5.94E-01
	Waste Rock Storage/Infill Areas	--	1.70E-04	8.50E-05	6.01E-02	5.10E-05	8.50E-05	2.18E-03	5.44E-04	1.30E-03	1.19E-04	1.17E-05	1.70E-04	2.56E-03	1.70E-04	8.50E-05	8.50E-05	3.34E-03	1.99E-03	6.44E-05	3.61E-01
5	Topsoil Storage Area	--	1.70E-05	8.50E-06	6.66E-03	5.10E-06	8.50E-06	2.68E-04	6.45E-05	1.63E-04	1.50E-05	9.91E-07	1.70E-05	3.47E-04	1.70E-05	8.50E-06	8.50E-06	5.24E-04	2.26E-04	1.18E-05	4.61E-02
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	7.09E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 5	7.09E-01	5.17E-04	2.59E-04	1.76E-01	1.55E-04	2.59E-04	6.13E-03	1.56E-03	3.65E-03	3.31E-04	3.73E-05	5.17E-04	6.88E-03	5.17E-04	2.59E-04	2.59E-04	8.32E-03	5.79E-03	1.44E-04	1.00E+00

Table 10. Proposed Project Greenhouse Gases - Annual Emissions (metric tons/year).

Phase	Component	CO_2	CH_4	N_2O	CO_2e
1	South Quarry	470.72	--	--	470.72
	Waste Rock Storage/Infill Areas	--	--	--	--
	Topsoil Storage Area	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--
	Combustion Sources	23,783.52	1.37	0.61	24,002.59
	Indirect GHG Emissions	614.64	0.03	0.01	617.31
	Total - Phase 1	24,868.89	1.40	0.62	25,090.62
2	South Quarry	591.90	--	--	591.90
	Waste Rock Storage/Infill Areas	--	--	--	--
	Topsoil Storage Area	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--
	Combustion Sources	36,036.03	2.08	0.93	36,368.46
	Indirect GHG Emissions	202.35	0.01	0.00	203.23
	Total - Phase 2	36,830.28	2.09	0.93	37,163.58
3	South Quarry	685.11	--	--	685.11
	Waste Rock Storage/Infill Areas	--	--	--	--
	Topsoil Storage Area	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--
	Combustion Sources	35,332.24	2.04	0.91	35,658.20
	Indirect GHG Emissions	194.97	0.01	0.00	195.82
	Total - Phase 3	36,212.32	2.05	0.92	36,539.12
4	South Quarry	586.07	--	--	586.07
	Waste Rock Storage/Infill Areas	--	--	--	--
	Topsoil Storage Area	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--
	Combustion Sources	28,540.28	1.65	0.74	28,803.46
	Indirect GHG Emissions	170.71	0.01	0.00	171.45
	Total - Phase 4	29,297.06	1.65	0.74	29,560.98
5	South Quarry	560.83	--	--	560.83
	Waste Rock Storage/Infill Areas	--	--	--	--
	Topsoil Storage Area	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--
	Combustion Sources	28,366.82	1.64	0.73	28,628.49
	Indirect GHG Emissions	614.64	0.03	0.01	617.31
	Total - Phase 5	29,542.28	1.66	0.74	29,806.62

Permanente Creek Bridge Construction Air Quality Emissions

Prior to initiation of operational activities associated with the proposed project, Lehigh anticipates constructing a bridge across Permanente Creek to allow access to and from the proposed South Quarry. Based on information provided by Lehigh, ALG estimates that construction of the Permanente Creek bridge will take approximately 16 weeks, including excavation, installation of piles, concrete work, installation of the arch culvert, construction of MSE (mechanically stabilized earth) walls, and fill.

Estimated emissions anticipated from construction of the Permanente Creek Bridge are presented in the following tables:

- Criteria pollutant emissions. Annual and daily criteria pollutant emissions are summarized in Tables 11 (tons for the entire construction period) and 12 (pounds per day)

- Toxic air contaminant emissions. Annual and hourly TAC emissions are summarized in Tables 13 (pounds for the entire construction period) and 14 (pounds per hour)

- Greenhouse gas emissions. Annual GHG emissions are summarized in Table 15 (metric tons per year for the entire construction period)

Detailed tables detailing bridge construction emission calculations and supporting documentation are presented in Appendix D.

Table 11. Permanente Creek Bridge Construction - Total Criteria Pollutant Emissions (tons).

Phase	Emission Source	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Excavation	Bulldozing, Scraping & Grading	0.01	0.00	--	--	--	--
(Weeks 1-3)	Material Handling	0.01	0.00	--	--	--	--
	Dust Entrainment - Unpaved Roads	0.03	0.00	--	--	--	--
	Wind Erosion - Active Areas	0.09	0.01	--	--	--	--
	Combustion Sources	0.01	0.01	0.07	0.30	0.02	0.00
	Subtotal - Excavation	0.15	0.03	0.07	0.30	0.02	0.00
Piles	Bulldozing, Scraping & Grading	--	--	--	--	--	--
(Weeks 4-8)	Material Handling	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	0.06	0.01	--	--	--	--
	Wind Erosion - Active Areas	0.03	0.00	--	--	--	--
	Combustion Sources	0.01	0.01	0.08	0.31	0.01	0.00
	Subtotal - Piles	0.09	0.02	0.08	0.31	0.01	0.00
Concrete Work	Bulldozing, Scraping & Grading	--	--	--	--	--	--
(Weeks 9-11)	Material Handling	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	0.06	0.01	--	--	--	--
	Wind Erosion - Active Areas	0.02	0.00	--	--	--	--
	Combustion Sources	0.00	0.00	0.03	0.06	0.01	0.00
	Subtotal - Concrete Work	0.08	0.01	0.03	0.06	0.01	0.00
Arch Culvert	Bulldozing, Scraping & Grading	--	--	--	--	--	--
(Week 12)	Material Handling	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	0.01	0.00	--	--	--	--
	Wind Erosion - Active Areas	0.01	0.00	--	--	--	--
	Combustion Sources	0.00	0.00	0.01	0.03	0.00	0.00
	Subtotal - Arch Culvert	0.02	0.00	0.01	0.03	0.00	0.00
MSE Walls	Bulldozing, Scraping & Grading	--	--	--	--	--	--
(Week 13)	Material Handling	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	0.02	0.00	--	--	--	--
	Wind Erosion - Active Areas	0.01	0.00	--	--	--	--
	Combustion Sources	0.00	0.00	0.01	0.02	0.00	0.00
	Subtotal - MSE Walls	0.02	0.00	0.01	0.02	0.00	0.00
Fill	Bulldozing, Scraping & Grading	0.00	0.00	--	--	--	--
(Weeks 14-16)	Material Handling	0.01	0.00	--	--	--	--
	Dust Entrainment - Unpaved Roads	0.03	0.00	--	--	--	--
	Wind Erosion - Active Areas	0.09	0.01	--	--	--	--
	Combustion Sources	0.01	0.01	0.05	0.23	0.02	0.00
	Subtotal - Fill	0.14	0.02	0.05	0.23	0.02	0.00
Total Criteria Pollutant Emissions (tons):		0.50	0.09	0.23	0.94	0.06	0.00

Table 12. Permanente Creek Bridge Construction - Daily Criteria Pollutant Emissions (pounds/day).

Phase	Emission Source	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Excavation	Bulldozing, Scraping & Grading	0.71	0.11	--	--	--	--
(Weeks 1-3)	Material Handling	1.38	0.21	--	--	--	--
	Dust Entrainment - Unpaved Roads	4.54	0.45	--	--	--	--
	Wind Erosion - Active Areas	11.77	1.76	--	--	--	--
	Combustion Sources	1.04	1.04	8.69	40.10	2.57	0.03
	Subtotal - Excavation	19.44	3.57	8.69	40.10	2.57	0.03
Piles	Bulldozing, Scraping & Grading	--	--	--	--	--	--
(Weeks 4-8)	Material Handling	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	4.54	0.45	--	--	--	--
	Wind Erosion - Active Areas	2.35	0.35	--	--	--	--
	Combustion Sources	0.62	0.62	6.29	24.43	1.07	0.03
	Subtotal - Piles	7.51	1.42	6.29	24.43	1.07	0.03
Concrete Work	Bulldozing, Scraping & Grading	--	--	--	--	--	--
(Weeks 9-11)	Material Handling	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	7.75	0.77	--	--	--	--
	Wind Erosion - Active Areas	2.35	0.35	--	--	--	--
	Combustion Sources	0.33	0.26	3.39	7.79	0.69	0.02
	Subtotal - Concrete Work	10.43	1.39	3.39	7.79	0.69	0.02
Arch Culvert	Bulldozing, Scraping & Grading	--	--	--	--	--	--
(Week 12)	Material Handling	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	4.72	0.47	--	--	--	--
	Wind Erosion - Active Areas	2.35	0.35	--	--	--	--
	Combustion Sources	0.30	0.29	2.64	10.95	0.68	0.01
	Subtotal - Arch Culvert	7.37	1.11	2.64	10.95	0.68	0.01
MSE Walls	Bulldozing, Scraping & Grading	--	--	--	--	--	--
(Week 13)	Material Handling	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	7.08	0.71	--	--	--	--
	Wind Erosion - Active Areas	2.35	0.35	--	--	--	--
	Combustion Sources	0.26	0.21	2.79	6.19	0.56	0.02
	Subtotal - MSE Walls	9.69	1.27	2.79	6.19	0.56	0.02
Fill	Bulldozing, Scraping & Grading	0.56	0.08	--	--	--	--
(Weeks 14-16)	Material Handling	1.08	0.16	--	--	--	--
	Dust Entrainment - Unpaved Roads	4.54	0.45	--	--	--	--
	Wind Erosion - Active Areas	11.77	1.76	--	--	--	--
	Combustion Sources	0.82	0.81	6.92	31.32	2.03	0.03
	Subtotal - Fill	18.76	3.28	6.92	31.32	2.03	0.03
Maximum Daily Emissions (pounds/day):		19.44	3.57	8.69	40.10	2.57	0.03

Table 13. Permanente Creek Bridge Construction - Total Toxic Air Contaminant Emissions (pounds).

Phase	Emission Source	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Excavation	Bulldozing, Scraping & Grading	--	2.67E-05	1.34E-05	8.34E-03	8.02E-06	1.34E-05	2.57E-04	6.84E-05	1.50E-04	1.39E-05	2.14E-06	2.67E-05	2.46E-04	2.67E-05	1.39E-05	1.39E-05	2.03E-04	2.67E-04	1.07E-06	3.97E-02
(Weeks 1-3)	Material Handling	--	5.18E-05	2.59E-05	1.62E-02	1.56E-05	2.59E-05	4.98E-04	1.33E-04	2.90E-04	2.70E-05	4.15E-06	5.18E-05	4.77E-04	5.18E-05	2.70E-05	2.70E-05	3.94E-04	5.18E-04	2.07E-06	7.70E-02
	Dust Entrainment - Unpaved Roads	--	1.70E-04	8.51E-05	6.81E-02	5.11E-05	8.51E-05	2.79E-03	6.67E-04	1.70E-03	1.57E-04	9.53E-06	1.70E-04	3.68E-03	1.70E-04	8.51E-05	8.51E-05	5.65E-03	2.31E-03	1.29E-04	4.83E-01
	Wind Erosion - Active Areas	--	4.41E-04	2.21E-04	1.38E-01	1.32E-04	2.21E-04	4.24E-03	1.13E-03	2.47E-03	2.29E-04	3.53E-05	4.41E-04	4.06E-03	4.41E-04	2.29E-04	2.29E-04	3.35E-03	4.41E-03	1.76E-05	6.55E-01
	Combustion Sources	15.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Excavation	15.51	6.90E-04	3.45E-04	2.30E-01	2.07E-04	3.45E-04	7.78E-03	2.00E-03	4.61E-03	4.27E-04	5.11E-05	6.90E-04	8.46E-03	6.90E-04	3.55E-04	3.55E-04	9.60E-03	7.51E-03	1.50E-04	1.26E+00
Piles	Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(Weeks 4-8)	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	2.84E-04	1.42E-04	1.13E-01	8.51E-05	1.42E-04	4.65E-03	1.11E-03	2.84E-03	2.61E-04	1.59E-05	2.84E-04	6.13E-03	2.84E-04	1.42E-04	1.42E-04	9.42E-03	3.86E-03	2.16E-04	8.05E-01
	Wind Erosion - Active Areas	--	1.47E-04	7.35E-05	4.59E-02	4.41E-05	7.35E-05	1.41E-03	3.77E-04	8.24E-04	7.65E-05	1.18E-05	1.47E-04	1.35E-03	1.47E-04	7.65E-05	7.65E-05	1.12E-03	1.47E-03	5.88E-06	2.18E-01
	Combustion Sources	15.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Piles	15.24	4.31E-04	2.15E-04	1.59E-01	1.29E-04	2.15E-04	6.06E-03	1.49E-03	3.66E-03	3.37E-04	2.77E-05	4.31E-04	7.48E-03	4.31E-04	2.18E-04	2.18E-04	1.05E-02	5.33E-03	2.21E-04	1.02E+00
Concrete Work	Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(Weeks 9-11)	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	2.90E-04	1.45E-04	1.16E-01	8.71E-05	1.45E-04	4.76E-03	1.14E-03	2.90E-03	2.67E-04	1.63E-05	2.90E-04	6.27E-03	2.90E-04	1.45E-04	1.45E-04	9.64E-03	3.95E-03	2.21E-04	8.25E-01
	Wind Erosion - Active Areas	--	8.82E-05	4.41E-05	2.75E-02	2.65E-05	4.41E-05	8.47E-04	2.26E-04	4.94E-04	4.59E-05	7.06E-06	8.82E-05	8.12E-04	8.82E-05	4.59E-05	4.59E-05	6.71E-04	8.82E-04	3.53E-06	1.31E-01
	Combustion Sources	3.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Concrete Work	3.72	3.79E-04	1.89E-04	1.44E-01	1.14E-04	1.89E-04	5.61E-03	1.36E-03	3.40E-03	3.13E-04	2.33E-05	3.79E-04	7.09E-03	3.79E-04	1.91E-04	1.91E-04	1.03E-02	4.83E-03	2.24E-04	9.56E-01
Arch Culvert	Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(Week 12)	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	5.90E-05	2.95E-05	2.36E-02	1.77E-05	2.95E-05	9.68E-04	2.31E-04	5.90E-04	5.43E-05	3.30E-06	5.90E-05	1.27E-03	5.90E-05	2.95E-05	2.95E-05	1.96E-03	8.02E-04	4.48E-05	1.68E-01
	Wind Erosion - Active Areas	--	2.94E-05	1.47E-05	9.18E-03	8.82E-06	1.47E-05	2.82E-04	7.53E-05	1.65E-04	1.53E-05	2.35E-06	2.94E-05	2.71E-04	2.94E-05	1.53E-05	1.53E-05	2.24E-04	2.94E-04	1.18E-06	4.37E-02
	Combustion Sources	1.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Arch Culvert	1.42	8.84E-05	4.42E-05	3.28E-02	2.65E-05	4.42E-05	1.25E-03	3.07E-04	7.55E-04	6.96E-05	5.66E-06	8.84E-05	1.55E-03	8.84E-05	4.48E-05	4.48E-05	2.18E-03	1.10E-03	4.60E-05	2.11E-01
MSE Walls	Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(Week 13)	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	8.85E-05	4.42E-05	3.54E-02	2.65E-05	4.42E-05	1.45E-03	3.47E-04	8.85E-04	8.14E-05	4.96E-06	8.85E-05	1.91E-03	8.85E-05	4.42E-05	4.42E-05	2.94E-03	1.20E-03	6.73E-05	2.51E-01
	Wind Erosion - Active Areas	--	2.94E-05	1.47E-05	9.18E-03	8.82E-06	1.47E-05	2.82E-04	7.53E-05	1.65E-04	1.53E-05	2.35E-06	2.94E-05	2.71E-04	2.94E-05	1.53E-05	1.53E-05	2.24E-04	2.94E-04	1.18E-06	4.37E-02
	Combustion Sources	0.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - MSE Walls	0.98	1.18E-04	5.90E-05	4.46E-02	3.54E-05	5.90E-05	1.73E-03	4.22E-04	1.05E-03	9.67E-05	7.31E-06	1.18E-04	2.18E-03	1.18E-04	5.95E-05	5.95E-05	3.16E-03	1.50E-03	6.84E-05	2.95E-01
Fill	Bulldozing, Scraping & Grading	--	2.11E-05	1.06E-05	6.59E-03	6.34E-06	1.06E-05	2.03E-04	5.41E-05	1.18E-04	1.10E-05	1.69E-06	2.11E-05	1.94E-04	2.11E-05	1.10E-05	1.10E-05	1.61E-04	2.11E-04	8.45E-07	3.14E-02
(Weeks 14-16)	Material Handling	--	4.03E-05	2.02E-05	1.26E-02	1.21E-05	2.02E-05	3.87E-04	1.03E-04	2.26E-04	2.10E-05	3.23E-06	4.03E-05	3.71E-04	4.03E-05	2.10E-05	2.10E-05	3.06E-04	4.03E-04	1.61E-06	5.99E-02
	Dust Entrainment - Unpaved Roads	--	1.70E-04	8.51E-05	6.81E-02	5.11E-05	8.51E-05	2.79E-03	6.67E-04	1.70E-03	1.57E-04	9.53E-06	1.70E-04	3.68E-03	1.70E-04	8.51E-05	8.51E-05	5.65E-03	2.31E-03	1.29E-04	4.83E-01
	Wind Erosion - Active Areas	--	4.41E-04	2.21E-04	1.38E-01	1.32E-04	2.21E-04	4.24E-03	1.13E-03	2.47E-03	2.29E-04	3.53E-05	4.41E-04	4.06E-03	4.41E-04	2.29E-04	2.29E-04	3.35E-03	4.41E-03	1.76E-05	6.55E-01
	Combustion Sources	12.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Fill	12.11	6.73E-04	3.36E-04	2.25E-01	2.02E-04	3.36E-04	7.62E-03	1.95E-03	4.52E-03	4.18E-04	4.97E-05	6.73E-04	8.30E-03	6.73E-04	3.47E-04	3.47E-04	9.47E-03	7.34E-03	1.49E-04	1.23E+00
Total TAC Emissions (pounds):		48.97	2.38E-03	1.19E-03	8.36E-01	7.14E-04	1.19E-03	3.01E-02	7.53E-03	1.80E-02	1.66E-03	1.65E-04	2.38E-03	3.51E-02	2.38E-03	1.22E-03	1.22E-03	4.53E-02	2.76E-02	8.60E-04	4.97E+00

Table 14. Permanente Creek Bridge Construction - Hourly Toxic Air Contaminant Emissions (pounds/hour).

Phase	Emission Source	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Excavation	Bulldozing, Scraping & Grading	--	2.23E-07	1.11E-07	6.95E-05	6.68E-08	1.11E-07	2.14E-06	5.70E-07	1.25E-06	1.11E-07	1.78E-08	2.23E-07	2.05E-06	2.23E-07	1.11E-07	1.11E-07	1.69E-06	2.23E-06	8.91E-09	3.31E-04
(Weeks 1-3)	Material Handling	--	4.32E-07	2.16E-07	1.35E-04	1.30E-07	2.16E-07	4.15E-06	1.11E-06	2.42E-06	2.16E-07	3.46E-08	4.32E-07	3.97E-06	4.32E-07	2.16E-07	2.16E-07	3.28E-06	4.32E-06	1.73E-08	6.42E-04
	Dust Entrainment - Unpaved Roads	--	1.42E-06	7.09E-07	5.67E-04	4.25E-07	7.09E-07	2.33E-05	5.56E-06	1.42E-05	1.30E-06	7.94E-08	1.42E-06	3.06E-05	1.42E-06	7.09E-07	7.09E-07	4.71E-05	1.93E-05	1.08E-06	4.03E-03
	Wind Erosion - Active Areas	--	3.68E-06	1.84E-06	1.15E-03	1.10E-06	1.84E-06	3.53E-05	9.41E-06	2.06E-05	1.84E-06	2.94E-07	3.68E-06	3.38E-05	3.68E-06	1.84E-06	1.84E-06	2.79E-05	3.68E-05	1.47E-07	5.46E-03
	Combustion Sources	0.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Excavation	0.13	5.75E-06	2.88E-06	1.92E-03	1.73E-06	2.88E-06	6.48E-05	1.66E-05	3.84E-05	3.47E-06	4.26E-07	5.75E-06	7.05E-05	5.75E-06	2.88E-06	2.88E-06	8.00E-05	6.26E-05	1.25E-06	1.05E-02
Piles	Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(Weeks 4-8)	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	1.42E-06	7.09E-07	5.67E-04	4.25E-07	7.09E-07	2.33E-05	5.56E-06	1.42E-05	1.30E-06	7.94E-08	1.42E-06	3.06E-05	1.42E-06	7.09E-07	7.09E-07	4.71E-05	1.93E-05	1.08E-06	4.03E-03
	Wind Erosion - Active Areas	--	7.35E-07	3.68E-07	2.29E-04	2.21E-07	3.68E-07	7.06E-06	1.88E-06	4.12E-06	3.68E-07	5.88E-08	7.35E-07	6.77E-06	7.35E-07	3.68E-07	3.68E-07	5.59E-06	7.35E-06	2.94E-08	1.09E-03
	Combustion Sources	0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Piles	0.08	2.15E-06	1.08E-06	7.97E-04	6.46E-07	1.08E-06	3.03E-05	7.44E-06	1.83E-05	1.67E-06	1.38E-07	2.15E-06	3.74E-05	2.15E-06	1.08E-06	1.08E-06	5.27E-05	2.66E-05	1.11E-06	5.12E-03
Concrete Work	Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(Weeks 9-11)	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	2.42E-06	1.21E-06	9.68E-04	7.26E-07	1.21E-06	3.97E-05	9.49E-06	2.42E-05	2.23E-06	1.36E-07	2.42E-06	5.23E-05	2.42E-06	1.21E-06	1.21E-06	8.04E-05	3.29E-05	1.84E-06	6.87E-03
	Wind Erosion - Active Areas	--	7.35E-07	3.68E-07	2.29E-04	2.21E-07	3.68E-07	7.06E-06	1.88E-06	4.12E-06	3.68E-07	5.88E-08	7.35E-07	6.77E-06	7.35E-07	3.68E-07	3.68E-07	5.59E-06	7.35E-06	2.94E-08	1.09E-03
	Combustion Sources	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Concrete Work	0.03	3.16E-06	1.58E-06	1.20E-03	9.47E-07	1.58E-06	4.68E-05	1.14E-05	2.83E-05	2.59E-06	1.94E-07	3.16E-06	5.90E-05	3.16E-06	1.58E-06	1.58E-06	8.59E-05	4.03E-05	1.87E-06	7.97E-03
Arch Culvert	Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(Week 12)	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	1.47E-06	7.37E-07	5.90E-04	4.42E-07	7.37E-07	2.42E-05	5.78E-06	1.47E-05	1.36E-06	8.26E-08	1.47E-06	3.19E-05	1.47E-06	7.37E-07	7.37E-07	4.90E-05	2.01E-05	1.12E-06	4.19E-03
	Wind Erosion - Active Areas	--	7.35E-07	3.68E-07	2.29E-04	2.21E-07	3.68E-07	7.06E-06	1.88E-06	4.12E-06	3.68E-07	5.88E-08	7.35E-07	6.77E-06	7.35E-07	3.68E-07	3.68E-07	5.59E-06	7.35E-06	2.94E-08	1.09E-03
	Combustion Sources	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Arch Culvert	0.04	2.21E-06	1.11E-06	8.19E-04	6.63E-07	1.11E-06	3.12E-05	7.66E-06	1.89E-05	1.72E-06	1.41E-07	2.21E-06	3.86E-05	2.21E-06	1.11E-06	1.11E-06	5.46E-05	2.74E-05	1.15E-06	5.28E-03
MSE Walls	Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(Week 13)	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	2.21E-06	1.11E-06	8.85E-04	6.64E-07	1.11E-06	3.63E-05	8.67E-06	2.21E-05	2.04E-06	1.24E-07	2.21E-06	4.78E-05	2.21E-06	1.11E-06	1.11E-06	7.35E-05	3.01E-05	1.68E-06	6.28E-03
	Wind Erosion - Active Areas	--	7.35E-07	3.68E-07	2.29E-04	2.21E-07	3.68E-07	7.06E-06	1.88E-06	4.12E-06	3.68E-07	5.88E-08	7.35E-07	6.77E-06	7.35E-07	3.68E-07	3.68E-07	5.59E-06	7.35E-06	2.94E-08	1.09E-03
	Combustion Sources	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - MSE Walls	0.02	2.95E-06	1.47E-06	1.11E-03	8.84E-07	1.47E-06	4.33E-05	1.06E-05	2.62E-05	2.40E-06	1.83E-07	2.95E-06	5.46E-05	2.95E-06	1.47E-06	1.47E-06	7.90E-05	3.74E-05	1.71E-06	7.37E-03
Fill	Bulldozing, Scraping & Grading	--	1.76E-07	8.81E-08	5.50E-05	5.28E-08	8.81E-08	1.69E-06	4.51E-07	9.86E-07	8.81E-08	1.41E-08	1.76E-07	1.62E-06	1.76E-07	8.81E-08	8.81E-08	1.34E-06	1.76E-06	7.05E-09	2.62E-04
(Weeks 14-16)	Material Handling	--	3.36E-07	1.68E-07	1.05E-04	1.01E-07	1.68E-07	3.23E-06	8.60E-07	1.88E-06	1.68E-07	2.69E-08	3.36E-07	3.09E-06	3.36E-07	1.68E-07	1.68E-07	2.55E-06	3.36E-06	1.34E-08	4.99E-04
	Dust Entrainment - Unpaved Roads	--	1.42E-06	7.09E-07	5.67E-04	4.25E-07	7.09E-07	2.33E-05	5.56E-06	1.42E-05	1.30E-06	7.94E-08	1.42E-06	3.06E-05	1.42E-06	7.09E-07	7.09E-07	4.71E-05	1.93E-05	1.08E-06	4.03E-03
	Wind Erosion - Active Areas	--	3.68E-06	1.84E-06	1.15E-03	1.10E-06	1.84E-06	3.53E-05	9.41E-06	2.06E-05	1.84E-06	2.94E-07	3.68E-06	3.38E-05	3.68E-06	1.84E-06	1.84E-06	2.79E-05	3.68E-05	1.47E-07	5.46E-03
	Combustion Sources	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Fill	0.10	5.61E-06	2.80E-06	1.87E-03	1.68E-06	2.80E-06	6.35E-05	1.63E-05	3.76E-05	3.40E-06	4.15E-07	5.61E-06	6.92E-05	5.61E-06	2.80E-06	2.80E-06	7.89E-05	6.12E-05	1.25E-06	1.02E-02
Maximum Hourly TAC Emissions (pounds/hour):		0.13	5.75E-06	2.88E-06	1.92E-03	1.73E-06	2.88E-06	6.48E-05	1.66E-05	3.84E-05	3.47E-06	4.26E-07	5.75E-06	7.05E-05	5.75E-06	2.88E-06	2.88E-06	8.59E-05	6.26E-05	1.87E-06	1.05E-02

Table 15. Permanente Creek Bridge Construction - Total Greenhouse Gas Emissions (metric tons).

Phase	Emission Source	CO_2	CH_4	N_2O	CO_2e
Excavation	Bulldozing, Scraping & Grading	--	--	--	--
(Weeks 1-3)	Material Handling	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	--	--	--
	Wind Erosion - Active Areas	--	--	--	--
	Combustion Sources	48.92	0.00	0.00	49.37
	Subtotal - Excavation	48.92	0.00	0.00	49.37
Piles	Bulldozing, Scraping & Grading	--	--	--	--
(Weeks 4-8)	Material Handling	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	--	--	--
	Wind Erosion - Active Areas	--	--	--	--
	Combustion Sources	48.55	0.00	0.00	48.99
	Subtotal - Piles	48.55	0.00	0.00	48.99
Concrete Work	Bulldozing, Scraping & Grading	--	--	--	--
(Weeks 9-11)	Material Handling	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	--	--	--
	Wind Erosion - Active Areas	--	--	--	--
	Combustion Sources	14.57	0.00	0.00	14.72
	Subtotal - Concrete Work	14.57	0.00	0.00	14.72
Arch Culvert	Bulldozing, Scraping & Grading	--	--	--	--
(Week 12)	Material Handling	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	--	--	--
	Wind Erosion - Active Areas	--	--	--	--
	Combustion Sources	4.69	0.00	0.00	4.73
	Subtotal - Arch Culvert	4.69	0.00	0.00	4.73
MSE Walls	Bulldozing, Scraping & Grading	--	--	--	--
(Week 13)	Material Handling	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	--	--	--
	Wind Erosion - Active Areas	--	--	--	--
	Combustion Sources	3.90	0.00	0.00	3.94
	Subtotal - MSE Walls	3.90	0.00	0.00	3.94
Fill	Bulldozing, Scraping & Grading	--	--	--	--
(Weeks 14-16)	Material Handling	--	--	--	--
	Dust Entrainment - Unpaved Roads	--	--	--	--
	Wind Erosion - Active Areas	--	--	--	--
	Combustion Sources	38.34	0.00	0.00	38.70
	Subtotal - Fill	38.34	0.00	0.00	38.70
Total Greenhouse Gas Emissions (metric tons):		158.96	0.01	0.00	160.44

Appendix A

Baseline Emission Calculations

Baseline Emission Calculations Appendices.

Appendix	Activity
	Mining
A-1	Drilling
A-1, A-2	Blasting
A-3	Bulldozing, Scraping & Grading
A-3	Material Handling
A-4	Dust Entrainment – Unpaved Roads
A-4	Wind Erosion – Unpaved Roads
A-4	Wind Erosion – Disturbed Mine Area
A-5	Mining TAC Emissions
	Land Filling
A-6	Material Handling
A-7	Dust Entrainment – Unpaved Roads
A-7	Wind Erosion – Unpaved Roads
A-8	Land Filling TAC Emissions
	Fuel Storage and Dispensing
A-9	Fuel Storage
A-10	Fuel Dispensing
	Combustion Sources
A-11	Portable Diesel Welders
A-12	Portable Gasoline Welders
A-13	Off-road Diesel Equipment
A-14	On-road On-site Vehicles
A-15	On-road Off-site Vehicles
A-16	On-road Dust Entrainment
	Indirect Greenhouse Gas Sources
A-17	Electrical Power Use
	Wind Erosion Factors
A-18	Wind Erosion – Unpaved Roads and Disturbed Mine Areas

Particulate Matter Emissions from Drilling and Blasting.

Activity	EF Reference	PM_{10} EF	$PM_{2.5}$ EF	Units	Input[1]		Control Efficiency[2]	PM_{10} Emissions			$PM_{2.5}$ Emissions		
								(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
Drilling	MDAQMD Guidance, VI.A	6.80E-01	6.80E-01	lb/hole	6,065	holes/yr	0%	2.06	50.05	6.26	2.06	50.05	6.26
Blasting	MDAQMD Guidance, VI.B	6.64E+01	3.83E+00	lb/blast	82	blast/yr		2.73	66.36	66.36	0.16	3.83	3.83
Totals:								4.80	116.41	72.61	2.22	53.88	10.08

Conversion Factors:

2,000 lb = 1 ton

43,560 square feet = 1 acre

Notes:

1) Inputs based on quarry blasting records for 2000-2009.
2) Assumed control: none.
3) Average operating schedule (2000-2009):
   8 hours/day
   82 days/year
4) Blasting assumes:
   1 blast/day
   1 blast/hour

Data Input	Data Reference	Symbol	Value	Unit
Area Shifted per Blast	Lehigh Data	A	4,023	ft^2
Particle size multiplier for PM10	MDAQMD Guidance	k	0.52	--
Particle size multiplier for PM2.5	MDAQMD Guidance	k	0.03	--
Blasting Emission Factor	*MDAQMD Guidance, VI.B*	*Ef*	*Calculated*	*lb/blast*

$$Ef = k * 0.0005 * A^{1.5}$$

Notes:

1. AP-42 Chapter 11.19.2, Crushed Stone Processing and Pulverized Mineral Processing, indicates that AP-42 Chapter 11.9, Western Surface Coal Mining, should not be used to estimate particulate matter emissions from blasting in stone quarries. Therefore, the approach outlined in *Emissions Inventory Guidance Mineral Handling and Processing Industries*, Mojave Desert Air Quality Management District, April 2000 (MDAQMD Guidance), sections VI.A and VI.B, was used instead.

Other Criteria Pollutant and Greenhouse Gas Emissions from Blasting Explosives.

Activity	Emission Factor Reference	Emission Factors				Explosives Used[3]	Control Efficiency[4]	CO Emissions[5,6]		NOx Emissions[5,6]		SOx Emissions[5,6]		CO_2 Emissions[5,6]	
		CO	NOx	SOx	CO_2			(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(tonne/yr)	(lb/day)
Blasting - ANFO	AP-42 Chap. 13.3 (CO, NOx, SOx)AGO Factors & Methods Sec. 2.3 (CO_2)[1]	67.00 lb/ton	17.00 lb/ton	2.00 lb/ton	0.151 tonne/ton	1,085 tons/yr	0%	36.35	882.22	9.22	223.85	1.09	26.33	163.84	4,383.45

Notes:

1. Sources for emission factors associated with use of ANFO (ammonium nitrate/fuel oil):
   - CO, NOx, and SOx: U.S. AP-42 Chapter 13.3 (Explosives Detonation)
   - CO_2: *AGO Factors and Methods Workbook for Use in Australian Greenhouse Emissions Reporting*, Australian Greenhouse Office, December 2006, Section 2.3 (Explosives).
2. CO_2 emission factor reported as 0.167 tonne CO_2/tonne ANFO, equivalent to 0.151 tonne CO_2/ton ANFO, assuming 1 tonne/1,000 kg, 0.45359 kg/lb, and 2,000 lbs/short ton, or ton.
3. Based on quarry blasting records for 2000-2009.
4. Assumed control: none.
5. Average operating schedule (2000-2009):
   82 days/year
   1 blast/day
6. Conversion factors:
   2,000 lb = 1 ton
   1,000 kg = 1 tonne
   0.45359 kg = 1 pound

Activity	EF Reference	PM_{10} EF	$PM_{2.5}$ EF	Units	Throughput[1]		Control Efficiency[2]	PM_{10} Emissions			$PM_{2.5}$ Emissions		
								(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
Material Handling	AP-42 13.2.4.3, MDAQMD	1.15E-03	1.73E-04	lb/ton	6,171,668	ton/yr	0%	3.56	24.86	1.55	0.53	3.73	0.23
Bulldozing, Scraping & Grading (BSG)	MDAQMD Guidance VI.D	1.24E-01	1.86E-02	lb/hr	9,923	hr/yr		0.62	4.31	0.27	0.09	0.65	0.04
Total								4.17	29.17	1.82	0.63	4.38	0.27

Conversion Factors:

2,000 lb = 1 ton
43,560 ft^2 = 1 acre

Notes:
1) Throughputs based on quarry production records for 2000-2009.
2) Assumed control: none.
3) Average operating schedule (2000-2009):
16 hrs/day
286 days/year

Emission Factor (EF) Equations:

Data Input	Data Reference	Symbol	Value	Unit
Moisture Content, Limestone Products	AP-42 13.2.4-1	M	2.1	%
Silt Content, Limestone	MDAQMD Guidance (Stockpile Table 2)	s	0.5	%
Mean wind speed	Mean 2008 wind speed for Lehigh Station	U	5.27	mph
Particle size multiplier for PM_{10}	MDAQMD Guidance, Secs. VI.D, VI.E	k	0.36	--
Particle size multiplier for $PM_{2.5}$	WRAP AP-42 Fug. Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Handling Emission Factor	*AP-42 13.2.4.3, Eqn 1, MDAQMD Guidance Sec. VI.E*	*Ef*	*Calculated*	*lb/ton*
BSG Emission Factor	*MDAQMD Guidance, VI.D*	*Ef*	*Calculated*	*lb/hr*

$$E_f = k \times 0.0032 \times \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

$$E_f = 2.76 \times k \times \frac{s^{1.5}}{M^{1.4}}$$

Notes:
1) Source: *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors* (prepared for Western Governors' Association Western Regional Air Partnership (WRAP)), Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42).

Activity	EF Reference	PM_{10} EF	$PM_{2.5}$ EF	Units	Throughput		Control Efficiency[4]	PM_{10} Emissions[5] (ton/yr)	PM_{10} Emissions[5] (lb/day)	PM_{10} Emissions[5] (lb/hr)	$PM_{2.5}$ Emissions[5] (ton/yr)	$PM_{2.5}$ Emissions[5] (lb/day)	$PM_{2.5}$ Emissions[5] (lb/hr)
Dust Entrainment - Unpaved Roads	AP-42 13.2.2	2.03E+00	2.03E-01	lb/VMT	491,118	miles/yr[1]	75%	124.92	873.56	54.60	12.49	87.36	5.46
Wind Erosion - Unpaved Roads	AP-42 13.2.5	1.40E+00	2.11E-01	ton/acre	33	acres/yr[2]	75%	11.70	81.80	5.11	1.75	12.27	0.77
Wind Erosion - Disturbed Mine Area	AP-42 13.2.5	1.40E+00	2.11E-01	ton/acre	383	acres/yr[3]	0%	537.45	3,758.41	234.90	80.62	563.76	35.24

Conversion Factors:

2,000 lb = 1 ton 453.59 g = 1 lb
43,560 ft^2 = 1 acre 4,047 m^2 = 1 acre

Notes:
1) Throughputs based on 2000-2009 average road data (from annual topography maps) and average production rates.
2) Acreage based on average road data from annual topography maps.
3) Acreage based on 2000-2009 average reported disturbed areas under reporting requirements SMARA. Note, SMARA reports combine disturbed areas from both the quarry and the material storage areas.
4) Assumed control: 75% control associated with watering of unpaved roads; no control assumed for active areas.
5) Average operating schedule (2000-2009):
16 hrs/day
286 days/yr

Emission Factor (EF) Equations:

Unpaved Roads

Data Input	Data Reference	Symbol	Value	Unit
Surface Silt Content	2008 CEIR, Table B-8	s	2.7	%
Average Vehicle Weight	Caterpillar Handbook, 2009 & http://autos.yahoo.com	W	116.7	tons
Particle size multiplier for PM10	AP-42 13.2.2-2	k	1.5	lb/VMT
Particle size multiplier for PM2.5	AP-42 13.2.2-2	k	0.15	lb/VMT
Empirical Constants	AP-42 13.2.2-2	a	0.9	--
	AP-42 13.2.2-2	b	0.45	--
Unpaved Road Emission Factor	*AP-42 13.2.2, Eqn 1a*	E_f	*Calculated*	*lb/VMT*

Eqn 1a $$E_f = k\left(\frac{s}{12}\right)^a\left(\frac{W}{3}\right)^b$$

Wind Erosion

Data Input	Data Reference	Symbol	Value	Unit
Erosion Potential per disturbance	AP-42 13.2.5, Eqn 3	P_i	Calculated	g/m^2
Friction Velocity per disturbance	AP-42 13.2.5, Eqn 4	u*	Calculated	m/s
Threshold Friction Velocity (Roads/Disturbed Mine Area):	AP-42 Table 13.2.5-2 (scraper tracks on coal pile)	u^*_t	0.62	m/s
Fastest mile wind speed per disturbance at 10 meters	Daily maximum wind gust data from Lehigh Permanente Meteorological Station for 2008	u^+_{10}	Varies	m/s
Disturbances	Lehigh Permanente wind gust data	N	262 (M-F)	--
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	0.5	--
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.075	--
Wind Erosion Emission Factor	*AP-42 13.2.5, Eqn 2*	*Ef*	*Calculated*	*g/(m²-yr)*

Eqn 3 $$P = 58(u^* - u_t)^2 + 25(u^* - u_t)$$

Eqn 4 $$u^* = 0.053u_{10}$$

Eqn 2 $$E_f = k\sum_{i=1}^{N} P_i$$

Baseline Activity Data[1]

Trip Type	Trips/Year	1-Way Trip Distance (mi/trip)	Ann. Miles Traveled	Average Vehicle Weight (tons)	Annual Ton-Miles[2]	Notes
Quarry Limestone Transport	48,422	3.4	332,832	170.8	56,831,072	(Calculations reflect two-way trips)
Quarry In-Plant Vehicles	--	--	158,286	3.0	474,858	
Total Fleet			491,118	116.7	57,305,930	

Notes:
1. Based on production, road length, and equipment data provided by Lehigh Southwest Cement Company, January 2010.
2. Annual ton-miles used only to calculate average vehicle weight.

Annual Emissions (pounds/year)

	TAC EF	TAC EF		Dust Entrainment	Wind Erosion		Drilling	Blasting	Material	BSG	Total TAC
	Overbuden	Roads		Unpaved Roads	Unpaved Roads	Disturbed Area			Handling		Emissions
TAC[1]	(mg/kg)	(mg/kg)	PM10 (tpy)	1.25E+02	1.17E+01	5.37E+02	2.06E+00	2.73E+00	3.56E+00	6.17E-01	(lb/yr)
Antimony	2.5	2.5		6.25E-01	5.85E-02	2.69E+00	1.03E-02	1.37E-02	1.78E-02	3.08E-03	3.42E+00
Arsenic	1.25	1.25		3.12E-01	2.92E-02	1.34E+00	5.16E-03	6.83E-03	8.89E-03	1.54E-03	1.71E+00
Barium	780	1000		2.50E+02	2.34E+01	8.38E+02	3.22E+00	4.26E+00	5.55E+00	9.62E-01	1.13E+03
Beryllium	0.75	0.75		1.87E-01	1.75E-02	8.06E-01	3.09E-03	4.10E-03	5.33E-03	9.25E-04	1.02E+00
Cadmium	1.25	1.25		3.12E-01	2.92E-02	1.34E+00	5.16E-03	6.83E-03	8.89E-03	1.54E-03	1.71E+00
Chromium	24	41		1.02E+01	9.59E-01	2.58E+01	9.90E-02	1.31E-01	1.71E-01	2.96E-02	3.74E+01
Cobalt	6.4	9.8		2.45E+00	2.29E-01	6.88E+00	2.64E-02	3.50E-02	4.55E-02	7.90E-03	9.67E+00
Copper	14	25		6.25E+00	5.85E-01	1.50E+01	5.77E-02	7.65E-02	9.95E-02	1.73E-02	2.21E+01
Lead	1.25	2.3		5.75E-01	5.38E-02	1.34E+00	5.16E-03	6.83E-03	8.89E-03	1.54E-03	1.99E+00
Mercury	0.2	0.14		3.50E-02	3.28E-03	2.15E-01	8.25E-04	1.09E-03	1.42E-03	2.47E-04	2.57E-01
Molybdenum	2.5	2.5		6.25E-01	5.85E-02	2.69E+00	1.03E-02	1.37E-02	1.78E-02	3.08E-03	3.42E+00
Nickel	23	54		1.35E+01	1.26E+00	2.47E+01	9.49E-02	1.26E-01	1.64E-01	2.84E-02	3.99E+01
Selenium	2.5	2.5		6.25E-01	5.85E-02	2.69E+00	1.03E-02	1.37E-02	1.78E-02	3.08E-03	3.42E+00
Silver	1.25	1.25		3.12E-01	2.92E-02	1.34E+00	5.16E-03	6.83E-03	8.89E-03	1.54E-03	1.71E+00
Thallium	1.25	1.25		3.12E-01	2.92E-02	1.34E+00	5.16E-03	6.83E-03	8.89E-03	1.54E-03	1.71E+00
Vanadium	19	83		2.07E+01	1.94E+00	2.04E+01	7.84E-02	1.04E-01	1.35E-01	2.34E-02	4.34E+01
Zinc	25	34		8.49E+00	7.95E-01	2.69E+01	1.03E-01	1.37E-01	1.78E-01	3.08E-02	3.66E+01
Hex Chromium	0.1	1.9		4.75E-01	4.45E-02	1.07E-01	4.12E-04	5.47E-04	7.11E-04	1.23E-04	6.28E-01
Total Crystalline Silica	3712.8	7099.2		1.77E+03	1.66E+02	3.99E+03	1.53E+01	2.03E+01	2.64E+01	4.58E+00	6.00E+03

Hourly Emissions (pounds/hour)

	TAC EF	TAC EF		Dust Entrainment	Wind Erosion		Drilling	Blasting	Material	BSG	Total TAC
	Overbuden	Roads		Unpaved Roads	Unpaved Roads	Disturbed Area			Handling		Emissions
TAC[1]	(mg/kg)	(mg/kg)	PM10 (lb/hr)	5.46E+01	5.11E+00	2.35E+02	6.26E+00	6.64E+01	1.55E+00	2.70E-01	(lb/hr)
Antimony	2.5	2.5		1.36E-04	1.28E-05	5.87E-04	1.56E-05	1.66E-04	3.88E-06	6.74E-07	9.23E-04
Arsenic	1.25	1.25		6.82E-05	6.39E-06	2.94E-04	7.82E-06	8.29E-05	1.94E-06	3.37E-07	4.61E-04
Barium	780	1000		5.46E-02	5.11E-03	1.83E-01	4.88E-03	5.18E-02	1.21E-03	2.10E-04	3.01E-01
Beryllium	0.75	0.75		4.09E-05	3.83E-06	1.76E-04	4.69E-06	4.98E-05	1.17E-06	2.02E-07	2.77E-04
Cadmium	1.25	1.25		6.82E-05	6.39E-06	2.94E-04	7.82E-06	8.29E-05	1.94E-06	3.37E-07	4.61E-04
Chromium	24	41		2.24E-03	2.10E-04	5.64E-03	1.50E-04	1.59E-03	3.73E-05	6.47E-06	9.87E-03
Cobalt	6.4	9.8		5.35E-04	5.01E-05	1.50E-03	4.00E-05	4.25E-04	9.94E-06	1.73E-06	2.56E-03
Copper	14	25		1.36E-03	1.28E-04	3.29E-03	8.76E-05	9.29E-04	2.18E-05	3.77E-06	5.82E-03
Lead	1.25	2.3		1.26E-04	1.18E-05	2.94E-04	7.82E-06	8.29E-05	1.94E-06	3.37E-07	5.24E-04
Mercury	0.2	0.14		7.64E-06	7.16E-07	4.70E-05	1.25E-06	1.33E-05	3.11E-07	5.39E-08	7.02E-05
Molybdenum	2.5	2.5		1.36E-04	1.28E-05	5.87E-04	1.56E-05	1.66E-04	3.88E-06	6.74E-07	9.23E-04
Nickel	23	54		2.95E-03	2.76E-04	5.40E-03	1.44E-04	1.53E-03	3.57E-05	6.20E-06	1.03E-02
Selenium	2.5	2.5		1.36E-04	1.28E-05	5.87E-04	1.56E-05	1.66E-04	3.88E-06	6.74E-07	9.23E-04
Silver	1.25	1.25		6.82E-05	6.39E-06	2.94E-04	7.82E-06	8.29E-05	1.94E-06	3.37E-07	4.61E-04
Thallium	1.25	1.25		6.82E-05	6.39E-06	2.94E-04	7.82E-06	8.29E-05	1.94E-06	3.37E-07	4.61E-04
Vanadium	19	83		4.53E-03	4.24E-04	4.46E-03	1.19E-04	1.26E-03	2.95E-05	5.12E-06	1.08E-02
Zinc	25	34		1.86E-03	1.74E-04	5.87E-03	1.56E-04	1.66E-03	3.88E-05	6.74E-06	9.76E-03
Hex Chromium	0.1	1.9		1.04E-04	9.71E-06	2.35E-05	6.26E-07	6.64E-06	1.55E-07	2.70E-08	1.44E-04
Total Crystalline Silica	3712.8	7099.2		3.88E-01	3.63E-02	8.72E-01	2.32E-02	2.46E-01	5.77E-03	1.00E-03	1.57E+00

Notes:

1. TAC emission factors obtained from sampling performed 11/20/2008 analyzed via EPA Methods 3060/7199 and 6020/7471A. Note, non-detect (ND) results were assumed to be 1/2 the detection limit. See Tables 5A and D-1 of the 2008 CEIR.
2. Conversion factors:

453.59 g/lb	1000 mg/g
907.18 kg/ton	2000 lb/ton

Activity	EF Reference	PM_{10} EF	$PM_{2.5}$ EF	Units	Throughput[1]		Control Efficiency[2]	PM_{10} Emissions			$PM_{2.5}$ Emissions		
								(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
Material Handling	AP-42 13.2.4.3, MDAQMD	1.15E-03	1.73E-04	lb/ton	2,848,484	ton/yr	0%	1.64E+00	1.15E+01	7.17E-01	2.46E-01	1.72E+00	1.08E-01

Conversion Factors:

2,000 lb = 1 ton

43,560 ft^2 = 1 acre

Notes:

1) Throughputs based on quarry production records for 2007.
2) Assumed control: none.
3) Average operating schedule (2000-2009):
   16 hrs/day
   286 days/year

Emission Factor (EF) Equations:

Data Input	Data Reference	Symbol	Value	Unit
Moisture Content, Limestone Products	AP-42 13.2.4-1	M	2.1	%
Silt Content, Limestone	MDAQMD Guidance (Stockpile Table 2)	s	0.5	%
Mean wind speed	2008 wind speed for Lehigh Station	U	5.27	mph
Particle size multiplier for PM_{10}	MDAQMD Guidance, Secs. VI.D, VI.E	k	0.36	--
Particle size multiplier for $PM_{2.5}$	WRAP AP-42 Fug. Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Handling Emission Factor	*AP-42 13.2.4.3, Eqn 1, MDAQMD Guidance Sec. VI.E*	*Ef*	*Calculated*	*lb/ton*

$$E_f = k \times 0.0032 \times \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Notes:

1) Source: *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors* (prepared for Western Governors' Association Western Regional Air Partnership (WRAP)), Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42).

Activity	EF Reference	PM_{10} EF	$PM_{2.5}$ EF	Units	Throughput		Control Efficiency[3]	PM_{10} Emissions [4]			$PM_{2.5}$ Emissions [4]		
								(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
Dust Entrainment - Unpaved Roads	AP-42 13.2.2	2.32E+00	2.32E-01	lb/VMT	292,840	miles/yr[1]	75%	84.81	593.04	37.07	8.48	59.30	3.71
Wind Erosion - Unpaved Roads	AP-42 13.2.5	1.40E+00	2.11E-01	ton/acre	21	acres/yr[2]		7.26	50.77	3.17	1.09	7.61	0.48

Conversion Factors:

2,000 lb = 1 ton 453.59 g = 1 lb
43,560 ft^2 = 1 acre 4,047 m^2 = 1 acre

Notes:
1) Throughputs based on 2000-2009 average road data (from annual topography maps) and average production rates.
2) Acreage based on average road data from annual topography maps.
3) Assumed control: 75% control associated with watering of unpaved roads.
4) Average operating schedule (2000-2009):
16 hrs/day
286 days/yr

Emission Factor (EF) Equations:

Unpaved Roads:

Data Input	Data Reference	Symbol	Value	Unit
Surface Silt Content	2008 CEIR, Table-8	s	2.7	%
Average Vehicle Weight	Caterpillar Handbook, 2009	W	155.7	tons
Particle size multiplier for PM_{10}	AP-42 13.2.2-2	k	1.5	lb/VMT
Particle size multiplier for $PM_{2.5}$	AP-42 13.2.2-2	k	0.15	lb/VMT
Empirical Constants	AP-42 13.2.2-2	a	0.9	--
	AP-42 13.2.2-2	b	0.45	--
Unpaved Road Emission Factor	*AP-42 13.2.2, Eqn 1a*	E_f	*Calculated*	*lb/VMT*

Eqn 1a $$E_f = k\left(\frac{s}{12}\right)^a\left(\frac{W}{3}\right)^b$$

Wind Erosion:

Data Input	Data Reference	Symbol	Value	Unit
Erosion Potential per disturbance	AP-42 13.2.5, Eqn 3	P_i	Calculated	g/m^2
Friction Velocity per disturbance	AP-42 13.2.5, Eqn 4	u*	Calculated	m/s
Threshold Friction Velocity (Roads):	CEIR Table B-4 (AP-42 Table 13.2.5-2, uncrusted coal pile)	u^*_t	0.62	m/s
Fastest mile wind speed per disturbance at 10 meters	Daily maximum wind gust data from Lehigh Permanente Meteorological Station for 2008	u^+_{10}	Varies	m/s
Disturbances	Lehigh Permanente wind gust data	N	262 (M-F)	--
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	0.5	--
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.075	--
Wind Erosion Emission Factor	*AP-42 13.2.5, Eqn 2*	*Ef*	*Calculated*	*g/(m^2-yr)*

Eqn 3 $$P = 58(u^* - u_t)^2 + 25(u^* - u_t)$$

Eqn 4 $$u^* = 0.053u_{10}$$

Eqn 2 $$E_f = k\sum_{i=1}^{N} P_i$$

Baseline Activity Data[1]

Trip Type	Trips/Year	1-Way Trip Distance (mi/trip)	Ann. Miles Traveled	Average Vehicle Weight (tons)	Annual Ton-Miles[2]	Notes
Waste Rock Transport	22,648	5.6	252,278	170.8	43,076,527	(Calculations reflect two-way trips)
Disposal of Rock Plant Fines	6,325	3.2	40,562	61.8	2,504,841	(Calculations reflect two-way trips)
Total Fleet			292,840	155.7	45,581,369	

Notes:
1. Based on production, road length, and equipment data provided by Lehigh Southwest Cement Company, January 2010.
2. Annual ton-miles used only to calculate average vehicle weight.

Annual Emissions (pounds/year)

TAC[1]	TAC EF Overbuden (mg/kg)	TAC EF Roads (mg/kg)		Dust Entrainment Unpaved Roads	Wind Erosion Unpaved Roads	Material Handling	Total TAC Emissions (lb/yr)
			PM10 (tpy)	8.48E+01	7.26E+00	1.64E+00	
Antimony	2.5	2.5		4.24E-01	3.63E-02	8.20E-03	4.69E-01
Arsenic	1.25	1.25		2.12E-01	1.81E-02	4.10E-03	2.34E-01
Barium	780	1000		1.70E+02	1.45E+01	2.56E+00	1.87E+02
Beryllium	0.75	0.75		1.27E-01	1.09E-02	2.46E-03	1.41E-01
Cadmium	1.25	1.25		2.12E-01	1.81E-02	4.10E-03	2.34E-01
Chromium	24	41		6.95E+00	5.95E-01	7.88E-02	7.63E+00
Cobalt	6.4	9.8		1.66E+00	1.42E-01	2.10E-02	1.83E+00
Copper	14	25		4.24E+00	3.63E-01	4.59E-02	4.65E+00
Lead	1.25	2.3		3.90E-01	3.34E-02	4.10E-03	4.28E-01
Mercury	0.2	0.14		2.37E-02	2.03E-03	6.56E-04	2.64E-02
Molybdenum	2.5	2.5		4.24E-01	3.63E-02	8.20E-03	4.69E-01
Nickel	23	54		9.16E+00	7.84E-01	7.55E-02	1.00E+01
Selenium	2.5	2.5		4.24E-01	3.63E-02	8.20E-03	4.69E-01
Silver	1.25	1.25		2.12E-01	1.81E-02	4.10E-03	2.34E-01
Thallium	1.25	1.25		2.12E-01	1.81E-02	4.10E-03	2.34E-01
Vanadium	19	83		1.41E+01	1.21E+00	6.24E-02	1.53E+01
Zinc	25	34		5.77E+00	4.94E-01	8.20E-02	6.34E+00
Hex Chromium	0.1	1.9		3.22E-01	2.76E-02	3.28E-04	3.50E-01
Total Crystalline Silica	3712.8	7099.2		1.20E+03	1.03E+02	1.22E+01	1.32E+03

Hourly Emissions (pounds/hour)

TAC[1]	TAC EF Overbuden (mg/kg)	TAC EF Roads (mg/kg)		Dust Entrainment Unpaved Roads	Wind Erosion Unpaved Roads	Material Handling	Total TAC Emissions (lb/hr)
			PM10 (lb/hr)	3.71E+01	3.17E+00	7.17E-01	
Antimony	2.5	2.5		9.27E-05	7.93E-06	1.79E-06	1.02E-04
Arsenic	1.25	1.25		4.63E-05	3.97E-06	8.96E-07	5.12E-05
Barium	780	1000		3.71E-02	3.17E-03	5.59E-04	4.08E-02
Beryllium	0.75	0.75		2.78E-05	2.38E-06	5.38E-07	3.07E-05
Cadmium	1.25	1.25		4.63E-05	3.97E-06	8.96E-07	5.12E-05
Chromium	24	41		1.52E-03	1.30E-04	1.72E-05	1.67E-03
Cobalt	6.4	9.8		3.63E-04	3.11E-05	4.59E-06	3.99E-04
Copper	14	25		9.27E-04	7.93E-05	1.00E-05	1.02E-03
Lead	1.25	2.3		8.52E-05	7.30E-06	8.96E-07	9.34E-05
Mercury	0.2	0.14		5.19E-06	4.44E-07	1.43E-07	5.78E-06
Molybdenum	2.5	2.5		9.27E-05	7.93E-06	1.79E-06	1.02E-04
Nickel	23	54		2.00E-03	1.71E-04	1.65E-05	2.19E-03
Selenium	2.5	2.5		9.27E-05	7.93E-06	1.79E-06	1.02E-04
Silver	1.25	1.25		4.63E-05	3.97E-06	8.96E-07	5.12E-05
Thallium	1.25	1.25		4.63E-05	3.97E-06	8.96E-07	5.12E-05
Vanadium	19	83		3.08E-03	2.63E-04	1.36E-05	3.35E-03
Zinc	25	34		1.26E-03	1.08E-04	1.79E-05	1.39E-03
Hex Chromium	0.1	1.9		7.04E-05	6.03E-06	7.17E-08	7.65E-05
Total Crystalline Silica	3712.8	7099.2		2.63E-01	2.25E-02	2.66E-03	2.88E-01

Notes:

1. TAC emission factors obtained from sampling performed 11/20/2008 analyzed via EPA Methods 3060/7199 and 6020/7471A. Note, non-detect (ND) results were assumed to be 1/2 the detection limit. See Tables 5A and D-1 of the 2008 CEIR.
2. Conversion factors:

453.59 g/lb	1000 mg/g
907.18 kg/ton	2000 lb/ton

Criteria Emissions:

Activity	Emission Reference	Throughput[1]	Working Loss	Breathing Loss	Total ROG Emissions		
			(lb/yr)	(lb/yr)	(ton/yr)	(lb/day)	(lb/hr)
Diesel Storage - AST	US EPA TANKs 4.0.9d	430,546 gal/yr	10.19	5.58	0.008	6.31E-02	1.58E-02
Diesel Storage - UST	US EPA TANKs 4.0.9d	430,546 gal/yr	8.00	0.00	0.004	3.20E-02	8.00E-03
Gasoline Storage - UST	US EPA TANKs 4.0.9d	12,869 gal/yr	139.22	0.00	0.070	5.57E-01	1.39E-01
Total					0.081	0.652	0.163

Toxic Air Contaminant (TAC) Emissions:

Activity	Emission Reference	Hexane (-n)		Benzene		Toluene		Ethylbenzene		Xylene (-m)		1,2,4-Trimethylbenzene	
		(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)
Diesel Storage - AST	US EPA TANKs 4.0.9d	0.01	0.00	0.03	0.00	0.36	0.00	0.05	0.00	0.92	0.00	0.73	0.00
Diesel Storage - UST	US EPA TANKs 4.0.9d	0.00	0.00	0.02	0.00	0.19	0.00	0.02	0.00	0.46	0.00	0.37	0.00
Gasoline Storage - UST	US EPA TANKs 4.0.9d	0.72	0.00	0.80	0.00	0.88	0.00	0.06	0.00	0.24	0.00	0.02	0.00
Total		0.73	0.00	0.85	0.00	1.43	0.00	0.13	0.00	1.62	0.00	1.12	0.00

Conversion Factors:

2,000 lb = 1 ton

Notes:

1) Quarry fuel use throughputs based on fuel purchase records for 2000-2009.
2) Both criteria and TAC emissions were calculated using the US EPA TANKS Model (v 4.0.9d).
3) Average operating schedule (2000-2009):
   4 hrs/day
   250 days/year

Emission Calculation Data Inputs:

Data Input	Diesel - AST	Diesel - UST	Gasoline - UST	Unit
Capacity	12,000	10,000	10,000	gal
Length	34	25	25	ft
Diameter	8.33	8.33	8.33	ft
Condition	Good	NA	NA	--

Criteria Emissions:

Activity	EF Reference	ROG EF	Unit	Throughput[1]	Total ROG Emissions (ton/yr)	(lb/day)	(lb/hr)
Diesel Dispensing	SCAQMD [2]	0.000028	lb/gal	861,093 gal/yr	0.012	9.64E-02	2.41E-02
Gasoline Dispensing	ARB [3]	0.00038	lb/gal	12,869 gal/yr	0.002	1.96E-02	4.89E-03
Total					0.015	0.116	0.029

Toxic Air Contaminant (TAC) Emissions:

Activity	EF Reference	Hexane (-n)		Benzene		Toluene		Ethylbenzene		Xylene (-m)		1,2,4-Trimethylbenzene	
		(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)
Diesel Dispensing	US EPA TANKs 4.0.9d	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.07	0.00	0.24	0.00
Gasoline Dispensing	US EPA TANKs 4.0.9d	0.05	0.00	0.09	0.00	0.34	0.00	0.07	0.00	0.34	0.00	0.12	0.00
Total		0.05	0.00	0.09	0.00	0.35	0.00	0.07	0.00	0.41	0.00	0.36	0.00

Conversion Factors:

2,000 lb = 1 ton

Notes:

1) Quarry fuel use throughputs based on fuel purchase records for 2000-2009.
2) Diesel EF (0.028 lb/1,000 gallons) based on SCAQMD AER "Supplemental Instructions for Liquid Organic Storage Tanks and References" June 2005.
3) Gasoline EF (0.38 pounds/1,000 gallons) based on ARB "Vapor Recovery Certification Procedure CP - 201 Amended: May 25, 2006.
4) Average operating schedule (2000-2009):

4 hrs/day
250 days/year

TAC Emission Factors from TANKS[1]:

Parameter	Diesel Fractions	Gasoline Fractions
Hexane (-n)	0.0000	0.0100
Benzene	0.0000	0.0180
Toluene	0.0003	0.0700
Ethylbenzene	0.0001	0.0140
Xylene (-m)	0.0029	0.0700
1,2,4-Trimethylbenzene	0.0100	0.0250

Notes:

1) TAC fractions were obtained from the US EPA TANKS Model (v 4.0.9d) emission speciation profiles.

Criteria and Greenhouse Gas Emissions from Diesel-Fueled Welders

	CO	NOx	ROG	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Emission Factors (lb/hp-hr)[1,2]	6.68E-03	3.10E-02	2.51E-03	2.05E-03	2.20E-03	2.20E-03	1.21E+00	7.05E-05	3.09E-05	--
Annual Emissions (tons/year, except GHGs expressed in tonnes/year)	0.01	0.04	0.00	0.00	0.00	0.00	1.52	0.00	0.00	1.54
Daily Emissions (lbs/day)	0.38	1.78	0.14	0.12	0.13	0.13	69.49	0.00	0.00	70.13
Hourly Emissions (lbs/hour)	0.13	0.59	0.05	0.04	0.04	0.04	23.16	0.00	0.00	23.38

Toxic Air Contaminant Emissions from Diesel-Fueled Welders

	Diesel PM	1,3-Butadiene	Acetalde-hyde	Acrolein	Benzene	Formal-dehyde	PAHs	Propylene	Toluene	Xylenes
Emission Factors (lb/MMBtu)[1]	--	3.91E-05	7.67E-04	9.25E-05	9.33E-04	1.18E-03	1.68E-04	2.58E-03	4.09E-04	2.85E-04
(lb/hp-hr)	2.20E-03	2.74E-07	5.37E-06	6.48E-07	6.53E-06	8.26E-06	1.18E-06	1.81E-05	2.86E-06	2.00E-06
Annual Emissions (lbs/year)	6.11	0.00	0.01	0.00	0.02	0.02	0.00	0.05	0.01	0.01
Daily Emissions (lbs/day)	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hourly Emissions (lbs/hour)	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:

1. Criteria and TAC emission factors are based on AP-42, Chapter 3.3, Gasoline and Diesel Industrial Engines, Table 3.3-1.
2. GHG emission factors are derived from IPCC inventory guidelines and California Climate Action Registry, General Reporting Protocol Version 3.1.
3. Assume ROG = TOC
4. Conversion factors:
   - 453.59 grams/pound
   - 2,000 pounds/ton
   - 1,000,000 grams/tonne
   - 7,000 Btu/hp-hr
   - 1,000,000 Btu/MMBtu

Diesel-Fueled Welder Annual, Daily, and Hourly Operating Parameters

Facility	Average HP Rating	Load Factor	Operating Hours/Yr	Operating Hours/Day
Quarry	42.6	0.45	145	3

Notes:

1. Operating hours/day assumes all welding operations occur on one day per week, utilizing provided allocation of usage within facility.
2. Based on the diesel-fueled welding inventory, the average size of welders used within the quarry are reflected above.

Diesel-Fueled Welder Inventory

Brand	Model	Hp	Fuel	Department	% Time Used at Quarry 2000 - 2009	Total Hours/ Year	Hours Allocated To Quarry
Miller	Bobcat 250D	18.8	Diesel	Maintenance	1%	90	0.9
Miller	Big Blue 600 D	61	Diesel	Garage	65%	90	58.5
Miller	Bobcat 225D	16	Diesel	Garage	60%	90	54
Miller	Bobcat 225D	16	Diesel	Maintenance	5%	90	4.5
Lincoln	SAM 400	63	Diesel	Maintenance	5%	90	4.5
Miller	Big Blue 502 D	41.5	Diesel	Maintenance	5%	90	4.5
Miller	Big Blue 600 D	61	Diesel	Maintenance	5%	90	4.5
Lincoln	Commander 400	44.2	Diesel	Maintenance	5%	90	4.5
Lincoln	SAM 650	93	Diesel	Maintenance	5%	90	4.5
Lincoln	SAM 400	63	Diesel	Maintenance	5%	90	4.5
Totals:						900	144.9

Source: Inventory provided by Lehigh Southwest Cement Company, January 13, 2010. Assume facility-wide diesel welding operations 16-20 hours/week (18 hours/week on average). Assume operation an average of 50 weeks/year (300 work days, assuming 6-day work week).

Emissions from Gasoline-Fueled Welders

	CO	NOx	ROG	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Emission Factors (lb/hp-hr)[1,2]	6.96E-03	1.10E-02	2.16E-02	5.91E-04	7.21E-04	7.21E-04	1.64E+00	8.82E-05	3.97E-05	--
Annual Emissions (tons/year, except GHGs expressed in tonnes/year)	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Daily Emissions (lbs/day)	0.04	0.06	0.12	0.00	0.00	0.00	9.30	0.00	0.00	9.38
Hourly Emissions (lbs/hour)	0.04	0.06	0.12	0.00	0.00	0.00	9.30	0.00	0.00	9.38

Toxic Air Contaminant Emissions from Gasoline-Fueled Welders

	1,3-Buta-diene	Benzene	Formal-dehyde	Nickel	PAHs
Emission Factors (lb/1,000 gal)[3]	0.9183	3.8061	3.4520	0.0033	0.1438
(lb/hp-hr)	4.94E-05	2.05E-04	1.86E-04	1.78E-07	7.74E-06
Annual Emissions (lbs/year)	0.00	0.02	0.01	0.00	0.00
Daily Emissions (lbs/day)	0.00	0.00	0.00	0.00	0.00
Hourly Emissions (lbs/hour)	0.00	0.00	0.00	0.00	0.00

Notes:

1. Criteria emission factors are based on AP-42, Chapter 3.3, Gasoline and Diesel Industrial Engines, Table 3.3-1.
2. GHG emission factors are derived from IPCC inventory guidelines and California Climate Action Registry, General Reporting Protocol Version 3.1.
3. Emission factors are based on South Coast AQMD's Default Toxic Emission Factors for Gasoline Combustion, Annual Emission Reporting System, available at http://www.aqmd.gov/webappl/Help/AER/index.html.
4. Assume ROG = TOC
5. Conversion factors:
   453.59 grams/pound
   2,000 pounds/ton
   1,000,000 grams/tonne
   130,000.00 Btu/gallon (Gasoline)
   7,000 Btu/hp-hr

Gasoline-Fueled Welder Annual, Daily, and Hourly Operating Parameters

Facility	Average HP Rating	Load Factor	Operating Hours/Yr	Operating Hours/Day
Quarry	12.6	0.45	14	1

Notes:

1. Operating hours/day assumes all welding operations occur on one day per week, utilizing provided allocation of usage within facility.
2. Based on the gasoline-fueled welding inventory, the average size of welders used within the quarry are reflected above.

Diesel-Fueled Welder Inventory

Brand	Model	HP	Fuel	Department	% Time Used at Quarry 2000 - 2009	Total Hours/ Year	Hours Allocated To Quarry
Miller	Blue Star 6000	13	Gas	Maintenance	5%	75	3.8
Miller	Blue Star 185	12.75	Gas	Maintenance	0%	75	0.0
Miller	Blue Star 185	12.75	Gas	Maintenance	5%	75	3.8
Miller	Blue Star 6000	13	Gas	Maintenance	5%	75	3.8
Miller	Blue Fire 180	13	Gas	Maintenance	0%	75	0.0
Lincoln	Power Arc 5000	11	Gas	Yard	3%	75	2.3
Totals:						450	13.5

Source: Inventory provided by Lehigh Southwest Cement Company, January 13, 2010. Assume facility-wide gasoline welding operations 8-10 hours/week (9 hours/week on average). Assume operation an average of 50 weeks/year (300 work days, assuming 6-day work week).

Type	Usage	Usage	NOx Emissions		PM_{10} Emissions			$PM_{2.5}$ Emissions		ROG Emissions		CO Emissions		SOx Emissions		CO_2 Emissions		CH_4 Emissions		N_2O Emissions		CO_2e Emissions	
	(hr/yr)	(hr/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(tonnes/yr)	(lb/day)	(tonne/yr)	(lb/day)	(tonne/yr)	(lb/day)	(tonnes/yr)	(lb/day)
Bore/Drill Rigs	2,573	9	7.35	51.43	0.42	2.93	0.33	0.42	2.93	0.21	1.44	0.76	5.29	0.00	0.03	491.5	3,788.9	0.03	0.2	0.01	0.1	496	3,824.0
Crawler Tractors	7,732	27	19.93	139.37	1.10	7.69	0.28	1.10	7.69	1.34	9.34	5.64	39.43	0.01	0.08	1,552.4	11,966.8	0.09	0.7	0.04	0.3	1,567	12,077.6
Excavators	223	1	0.37	2.62	0.02	0.14	0.18	0.02	0.14	0.01	0.08	0.04	0.27	0.00	0.00	20.9	161.4	0.00	0.0	0.00	0.0	21	162.9
Graders	1,227	4	2.84	19.83	0.18	1.24	0.29	0.18	1.24	0.08	0.59	0.24	1.66	0.00	0.01	112.9	870.5	0.01	0.1	0.00	0.0	114	878.6
Off-Highway Trucks	26,725	93	166.38	1,163.52	9.34	65.32	0.70	9.34	65.32	6.78	47.39	22.32	156.08	0.06	0.44	9,621.6	74,168.6	0.56	4.3	0.25	1.9	9,711	74,855.2
Rubber Tired Dozers	964	3	1.76	12.29	0.10	0.68	0.20	0.10	0.68	0.09	0.66	0.47	3.26	0.00	0.00	98.3	757.5	0.01	0.0	0.00	0.0	99	764.5
Rubber Tired Loaders	9,559	33	33.96	237.47	1.86	13.03	0.39	1.86	13.03	1.49	10.39	5.48	38.33	0.01	0.10	2,197.5	16,939.8	0.13	1.0	0.06	0.4	2,218	17,096.6
Water Trucks	2,205	8	0.85	5.92	0.05	0.34	0.04	0.05	0.34	0.10	0.71	0.31	2.19	0.00	0.01	162.1	1,249.6	0.01	0.1	0.00	0.0	164	1,261.1
Light Towers (Gener.)	2,288	8	0.10	0.69	0.01	0.04	0.01	0.01	0.04	0.01	0.07	0.05	0.33	0.00	0.00	9.9	76.6	0.00	0.0	0.00	0.0	10	77.3
Total	53,495		233.54	1,633.15	13.07	91.41	2.42	13.07	91.41	10.11	70.67	35.30	246.85	0.10	0.66	14,267.3	109,979.7	0.8	6.4	0.4	2.9	14,399.4	110,997.9

Type	Avg HP	Tier	ARB Load factor[1]	NOx EF [2]		PM_{10} EF [2]		$PM_{2.5}$		ROG[3]		CO[3]		SOx[3]		CO_2[4]		CH_4[4]		N_2O[4]	
				(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)	(g/bhp-hr)	(lb/hr)
Bore/Drill Rigs	464	T0,T1	75%	7.45	5.72	0.42	0.33	0.42	0.33	0.21	0.16	0.77	0.59	0.00	0.00	548.6	421.2	0.03	0.02	0.01	0.01
Crawler Tractors	572	T0, T1, T2	64%	6.39	5.16	0.35	0.28	0.35	0.28	0.43	0.35	1.81	1.46	0.00	0.00	548.6	442.7	0.03	0.03	0.01	0.01
Excavators	300	T0	57%	8.90	3.36	0.49	0.18	0.49	0.18	0.29	0.11	0.91	0.34	0.00	0.00	548.6	206.8	0.03	0.01	0.01	0.01
Graders	275	T0	61%	12.50	4.62	0.78	0.29	0.78	0.29	0.37	0.14	1.05	0.39	0.00	0.00	548.6	202.9	0.03	0.01	0.01	0.01
Off-Highway Trucks	1151	T0, T1, T2	57%	8.61	12.45	0.48	0.70	0.48	0.70	0.35	0.51	1.15	1.67	0.00	0.00	548.6	793.7	0.03	0.05	0.01	0.02
Rubber Tired Dozers	315	T0	59%	8.90	3.65	0.49	0.20	0.49	0.20	0.48	0.19	2.36	0.97	0.00	0.00	548.6	224.8	0.03	0.01	0.01	0.01
Rubber Tired Loaders	776	T0, T1, T2	54%	7.69	7.11	0.42	0.39	0.42	0.39	0.34	0.31	1.24	1.15	0.00	0.00	548.6	506.9	0.03	0.03	0.01	0.01
Water Trucks	670	T2	20%	2.60	0.77	0.15	0.04	0.15	0.04	0.31	0.09	0.96	0.28	0.00	0.00	548.6	162.1	0.03	0.01	0.01	0.00
Light Towers (Gener.)	11	--	74%	4.93	0.09	0.30	0.01	0.30	0.01	0.48	0.01	2.34	0.04	0.00	0.00	548.6	9.6	0.03	0.00	0.01	0.00

Assumptions:

100% PM_{10}/ PM fraction

100% $PM_{2.5}$/ PM_{10} fraction

PM fraction per AP-42 Chapter 3.3, Gasoline and Diesel Industrial Engines, Table 3.3-1

Notes:

1) ARB Load Factors

Equipment Type	Load Factor
Bore/Drill Rigs	75%
Crawler Tractors	64%
Excavators	57%
Graders	61%
Light Towers (Gener.)	74%
Off-Highway Trucks	57%
Rubber Tired Dozers	59%
Rubber Tired Loaders	54%
Water Trucks	20%

Reference: OFFROAD2007, "equip.csv" , Latest version (12/15/2006), http://www.arb.ca.gov/msei/offroad/offroad.htm

2) Off-road Diesel (ORD) Rule: NOx & PM Targets and Emission Rates (except for engines smaller than 25 HP)

Tier 0 Engine	
Tier 1 Engine	
Tier 2 Engine	
Tier 3 Engine	
Interim Tier 4	
Tier 4 Engine	

NO_x Emissions Factors by Horsepower and Year (g/bhp-hr)								
	Minimum Horsepower in Group							
	25	50	75	100	175	300	600	751
Year	Horsepower Groups							
Min HP	25	50	75	100	175	300	600	750
Max HP	49	74	99	174	299	599	749	9999
1900	7.2	14.8	14.8	15.9	15.9	15.2	15.2	15.2
1969	7.2	14.8	14.8	15.9	15.9	15.2	15.2	15.2
1970	7.2	14.8	14.8	14.8	14.8	14.1	14.1	14.1
1972	7.2	14.8	14.8	13.6	13.6	13.0	13.0	13.0
1980	7.2	14.8	14.8	12.5	12.5	11.9	11.9	11.9
1988	7.1	9.9	9.9	9.3	9.3	8.9	8.9	8.9
1989	7.1	9.9	9.9	9.3	9.3	8.9	8.9	8.9
1996	7.1	9.9	9.9	9.3	6.9	6.9	6.9	8.9
1997	7.1	9.9	9.9	6.9	6.9	6.9	6.9	8.9
1998	7.1	6.9	6.9	6.9	6.9	6.9	6.9	8.9
1999	6.2	6.9	6.9	6.9	6.9	6.9	6.9	8.9
2000	6.2	6.9	6.9	6.9	6.9	6.9	6.9	6.9
2001	6.2	6.9	6.9	6.9	6.9	4.2	6.9	6.9
2002	6.2	6.9	6.9	6.9	6.9	4.2	4.2	6.9
2003	6.2	6.9	6.9	4.3	4.3	4.2	4.2	6.9
2004	4.9	4.9	4.9	4.3	4.3	4.2	4.2	6.9
2005	4.9	4.9	4.9	4.3	4.3	4.2	4.2	6.9
2006	4.9	4.9	4.9	4.3	2.6	2.6	2.6	4.2
2007	4.9	4.9	4.9	2.6	2.6	2.6	2.6	4.2
2008	4.9	3.0	3.0	2.6	2.6	2.6	2.6	4.2
2009	4.9	3.0	3.0	2.6	2.6	2.6	2.6	4.2
2010	4.9	3.0	3.0	2.6	2.6	2.6	2.6	4.2
2011	4.9	3.0	3.0	2.6	1.5	1.5	1.5	2.6
2012	4.9	3.0	2.5	2.5	1.5	1.5	1.5	2.6
2013	3.0	3.0	2.5	2.5	1.5	1.5	1.5	2.6
2014	3.0	3.0	2.5	2.5	0.3	0.3	0.3	2.6
2015	3.0	3.0	0.3	0.3	0.3	0.3	0.3	2.6
2016	3.0	3.0	0.3	0.3	0.3	0.3	0.3	2.6
2017	3.0	3.0	0.3	0.3	0.3	0.3	0.3	2.6
2018	3.0	3.0	0.3	0.3	0.3	0.3	0.3	2.6
2019	3.0	3.0	0.3	0.3	0.3	0.3	0.3	2.6
2020	3.0	3.0	0.3	0.3	0.3	0.3	0.3	2.6

PM Emissions Factors by Horsepower and Year (g/bhp-hr)								
	Minimum Horsepower in Group							
	25	50	75	100	175	300	600	751
Year	Horsepower Groups							
Min HP	25	50	75	100	175	300	600	750
Max HP	49	74	99	174	299	599	749	9999
1900	0.950	1.200	1.200	1.100	1.100	0.950	0.950	0.950
1969	0.950	1.200	1.200	1.100	1.100	0.950	0.950	0.950
1970	0.950	1.200	1.200	0.940	0.940	0.810	0.810	0.810
1972	0.950	1.200	1.200	0.780	0.780	0.680	0.680	0.680
1988	0.950	0.980	0.980	0.540	0.540	0.490	0.490	0.490
1989	0.950	0.980	0.980	0.540	0.540	0.490	0.490	0.490
1996	0.950	0.980	0.980	0.540	0.40	0.40	0.40	0.500
1997	0.950	0.980	0.980	0.600	0.40	0.40	0.40	0.500
1998	0.950	1.090	1.090	0.600	0.40	0.40	0.40	0.500
1999	0.60	1.090	1.090	0.600	0.40	0.40	0.40	0.500
2000	0.60	1.090	1.090	0.600	0.40	0.40	0.40	0.40
2001	0.60	1.090	1.090	0.600	0.40	0.15	0.40	0.40
2002	0.60	1.090	1.090	0.600	0.40	0.15	0.15	0.40
2003	0.60	1.090	1.090	0.22	0.15	0.15	0.15	0.40
2004	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.40
2005	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.40
2006	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.15
2007	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.15
2008	0.22	0.22	0.30	0.22	0.15	0.15	0.15	0.15
2009	0.22	0.22	0.30	0.22	0.15	0.15	0.15	0.15
2010	0.22	0.22	0.30	0.22	0.15	0.15	0.15	0.15
2011	0.22	0.22	0.30	0.22	0.015	0.015	0.015	0.07
2012	0.22	0.22	0.015	0.015	0.015	0.015	0.015	0.07
2013	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.07
2014	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.07
2015	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03
2016	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03
2017	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03
2018	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03
2019	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03
2020	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03

Reference: http://www.arb.ca.gov/msei/offroad/offroad.htm

3) Factors for ROG, CO, SOx, and engines smaller than 25 HP based on South Coast Air Quality Management District, *Off-road Mobile Source Emission Factors*, October 2008 (available at http://www.aqmd.gov/CEQA/handbook/offroad/offroad.html), and data from the California Air Resources Board's OFFROAD2007 model.

4) GHG Emission Factors for Off-Road Diesel Vehicles

Units	CO_2	CH_4	N_2O	CO_2e
g/gallon[1,2]	10,150	0.58	0.26	[5]
g/bhp-hr[3,4]	548.6	0.032	0.014	[5]

Notes:

1. CO_2 factor in grams/gallon is from California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.3 (Carbon Dioxide Emission Factors for Transport Fuels), available at http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html. Table C.3 provides a factor of 10.15 kg CO2/gallon, or 10,150 g CO2/gallon.
2. CH_4 and N_2O factors in grams/gallon is from California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.6 (Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles.
3. According to the notes to Table C.3, CO_2 emission factors are derived using the carbon content of each fuel type and the molar mass ratio of carbon dioxide to carbon of 44/12. Furthermore, the factors assume 100% oxidation, consistent with IPCC inventory guidelines. To calculate CO_2 emission rates in grams/brake horsepower-hour, the following equation was employed: CO_2 = (19.95 kg C/MMBtu) * (44g CO2/12g C) * 7,500 Btu/bhp-hr * 1,000 g/kg * 1 MMBtu/1,000,000 Btu. Source for the brake specific fuel combustion factor of 7,500 Btu/bhp-hr: Santa Barbara County Air Pollution Control District, Piston IC Engine Technical Reference Document (November 1, 2002), Table 6 (Default Engine Specifications), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.
4. To convert CH_4 and N_2O factors in g/gallon to g/bhp, the following equations were employed
   CH_4 = 0.58 g CH_4/gallon * (1 gallon/137,000 Btu) * 7,500 Btu/bhp-hr 0.032 g CH_4/bhp-hr, and
   N_2O = 0.26 g N_2O/gallon * (1 gallon/137,000 Btu) * 7,500 Btu/bhp-hr = 0.014 g N_2O/bhp-hr.
   Source for the brake specific fuel combustion factor of 7,500 Btu/bhp-hr: SBCAPCD (op cit.) Source for the higher heating value for diesel: SBCAPCD (op cit.), Table 5 (Default Fuel Properties).
5. CO_2 equivalent emissions (CO_2e) calculated based on the global warming potentials in the IPCC's Second Assessment Report (SAR, 1996), as presented in the CCAR General Reporting Protocol (op cit.), Table C.1. CO_2e = 1 * CO_2, 21 * CH_4, and 310 * N_2O.

Estimated Annual Baseline Emissions (2009 Emission Factors - Other Than Entrained Road Dust) (tons/year except for GHGs, which are in metric tons/year)

Trip Type	CO (tons/yr)	NOx (tons/yr)	ROG (tons/yr)	SOx (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)	Diesel PM (tons/yr)	CO_2 (MT/yr)	CH_4 (MT/yr)	N_2O (MT/yr)	CO_2e[1] (MT/yr)
On-road Vehicles - Quarry	0.78	0.11	0.06	0.00	0.01	0.01	0.00	106.88	0.01	0.00	108.01

Estimated Daily Baseline Emissions (2009 Emission Factors - Other Than Entrained Road Dust) (pounds/day)

Trip Type	CO (lb/day)	NOx (lb/day)	ROG (lb/day)	SOx (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)	Diesel PM (lb/day)	CO_2 (lb/day)	CH_4 (lb/day)	N_2O (lb/day)	CO_2e (lb/day)
On-road Vehicles - Quarry	5.55	0.75	0.46	0.01	0.06	0.04	0.00	823.19	0.06	0.02	831.94

Estimated Hourly Baseline Emissions (2009 Emission Factors - Other Than Entrained Road Dust) (pounds/hour)

Trip Type	CO (lb/hr)	NOx (lb/hr)	ROG (lb/hr)	SOx (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	Diesel PM (lb/hr)	CO_2 (lb/hr)	CH_4 (lb/hr)	N_2O (lb/hr)	CO_2e (lb/hr)
On-road Vehicles - Quarry	0.35	0.05	0.03	0.00	0.00	0.00	0.00	52.10	0.00	0.00	52.65

Emission Factors for 2009 - Santa Clara County - Other Than Entrained Road Dust (pounds/mile)

Vehicle Type		CO	NOx	ROG	SOx	PM_{10}	$PM_{2.5}$	Diesel PM	CO_2	CH_4	N_2O
Medium Duty Vehicles (MDV)[2]	Annual Average[3]	0.00980903	0.00138728	0.00080547	0.00001445	0.00010198	0.00006882	0.00000036	1.48859043	0.00010601	0.00004384
	Peak Day[4]	0.01003994	0.00135024	0.00082488	0.00001576	0.00010198	0.00006882	0.00000036	1.48859043	0.00010601	0.00004384

Baseline Activity Data

Component	Gallons/ Year[5]	Miles/ Year[6]	Subtract Pers. Use[7]	Oper. Days/Yr[8]	Oper. Hrs/Day[9]	On-site Use Mi./Year	Mi./Day	Mi./Hour
Average 2000 - 2009 Gasoline Use Allocated To:								
Quarry	12,869	193,032	-34,746	286	16	158,286	553	35

Notes:

1. CO_2 equivalent emissions (CO_2e) calculated based on the global warming potentials in the IPCC's Second Assessment Report (SAR, 1996), as presented in the California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.1. CO_2e = 1 * CO_2, 21 * CH_4, and 310 * N_2O.
2. On-road on-site work vehicle fleet consists of 24 half-ton and larger pickup trucks and sports utility vehicles (Lehigh Southwest Cement Company, January 12, 2010). Since vehicles of this size can range from 5,500 to 6,600 pounds curb weight (source: Yahoo! Autos, http://autos.yahoo.com, January 5, 2010), medium duty vehicle (5,751 to 8,500 pounds) emission factors from CARB's EMFAC2007 on-road emissions model for Santa Clara County were used.
3. Source: On-road Motor Vehicle Emission Factors from EMFAC2007 for Santa Clara County, Annual Emission Factors for Medium Duty Vehicles.
4. Source: On-road Motor Vehicle Emission Factors from EMFAC2007 for Santa Clara County, Daily/Hourly Emission Factors for Medium Duty Vehicles.
5. Source: Lehigh Southwest Cement Company, Gasoline and Diesel Fuel Consumption (2000 - 2009), January 12, 2010, as summarized in On-road Off-site Motor Vehicles: Baseline Activity Data, Baseline Fuel Use Activity Data.
6. Assumes an average vehicle fuel efficiency of 15 miles/gallon. Source: U.S. Department of Energy and U.S. Environmental Protection Agency, Fuel Economy Guide, for 2005 two- and four-wheel drive Ford F150 pickups (8 cylinder, 5.4 liter engine) and 2005 two- and four-wheel drive Ford Explorer Sports Utility Vehicles (8 cylinder, 4.6 liter engine).
7. Source: assumes 25% personal use for 2000 - 2004, 15% personal use for 2005 - 2007, and 5% personal use for 2008 and 2009 (10-year average of 18% personal use). Personal use estimates provided by Lehigh Southwest Cement Company, January 12, 2010.
8. Source for quarry operating hours: Lehigh Southwest Cement Company, Equipment Availability Data, December 21, 2009 (2000-2008) and January 8, 2010 (2010).
9. Assumed operating hours/day: Quarry - 16 hours/day (two shifts/day).

Estimated Annual Baseline Emissions (2009 Emission Factors - Other Than Entrained Road Dust) (tons/year except for GHGs, which are in metric tons/year)

Trip Type	Vehicle Type	CO (tons/yr)	NOx (tons/yr)	ROG (tons/yr)	SOx (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)	Diesel PM (tons/yr)	CO_2 (MT/yr)	CH_4 (MT/yr)	N_2O (MT/yr)	CO_2e[1] (MT/yr)
Quarry Fuel Transport	HHDT-Dsl	0.02	0.05	0.00	0.00	0.00	0.00	0.00	5.55	0.00	0.00	5.61
Employee Commute	Passenger	0.55	0.05	0.06	0.00	0.00	0.00	0.00	47.38	0.00	0.00	47.95
Total - All Trip Types:		0.57	0.11	0.06	0.00	0.01	0.00	0.00	52.94	0.00	0.00	53.57

Estimated Daily Baseline Emissions (2009 Emission Factors - Other Than Entrained Road Dust) (pounds/day)

Trip Type	Vehicle Type	CO (lb/day)	NOx (lb/day)	ROG (lb/day)	SOx (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)	Diesel PM (lb/day)	CO_2 (lb/day)	CH_4 (lb/day)	N_2O (lb/day)	CO_2e (lb/day)
Quarry Fuel Transport	HHDT-Dsl	0.21	0.75	0.05	0.00	0.03	0.03	0.03	83.87	0.00	0.00	84.77
Employee Commute	Passenger	3.86	0.38	0.40	0.00	0.03	0.02	0.00	365.25	0.03	0.01	369.66
Total - All Trip Types:		4.07	1.13	0.46	0.00	0.06	0.04	0.03	449.11	0.04	0.01	454.43

Estimated Hourly Baseline Emissions (2009 Emission Factors - Other Than Entrained Road Dust) (pounds/hour)

Trip Type	Vehicle Type	CO (lb/hr)	NOx (lb/hr)	ROG (lb/hr)	SOx (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	Diesel PM (lb/hr)	CO_2 (lb/hr)	CH_4 (lb/hr)	N_2O (lb/hr)	CO_2e (lb/hr)
Quarry Fuel Transport	HHDT-Dsl	0.21	0.75	0.05	0.00	0.03	0.03	0.03	83.87	0.00	0.00	84.77
Employee Commute	Passenger	1.93	0.19	0.20	0.00	0.02	0.01	0.00	182.62	0.02	0.01	184.83
Total - All Trip Types:		2.14	0.94	0.25	0.00	0.05	0.04	0.03	266.49	0.02	0.01	269.60

Emission Factors for 2009 - Santa Clara County - Other Than Entrained Road Dust (pounds/mile)

Vehicle Type	Averaging Period	CO	NOx	ROG	SOx	PM_{10}	$PM_{2.5}$	Diesel PM	CO_2	CH_4	N_2O
Heavy-heavy Duty Truck - Diesel (HHDT-DSL)[2]	Annual Average	0.01065801	0.03753273	0.00261424	0.00004003	0.00150900	0.00130453	0.00136742	4.19331727	0.00012143	0.00013795
Passenger Vehicles[3]		0.01060257	0.00103934	0.00110763	0.00000981	0.00008373	0.00005181	0.00000089	1.00393339	0.00009561	0.00003265
Heavy-heavy Duty Truck - Diesel (HHDT-DSL)[4]	Peak Day	0.01103759	0.03838841	0.00259202	0.00004013	0.00151759	0.00131243	0.00136742	4.19331727	0.00012143	0.00013795
Passenger Vehicles[5]		0.01089196	0.00100948	0.00118739	0.00001067	0.00008373	0.00005181	0.00000089	1.00393339	0.00009561	0.00003265

Baseline Activity Data

Trip Type	Trips/Year	Trips/Day	Trips/Hour	Trip Distance	Notes
Quarry Fuel Transpor[6]	146	1	1	10	(one-way - two-way trips reflected in calculations)
Employee Commute[7]	10,296	36	36	5.053	(one-way - two-way trips reflected in annual/daily calculations; one-way trips reflected in hourly calculations)

Notes:

1. CO_2 equivalent emissions (CO_2e) calculated based on the global warming potentials in the IPCC's Second Assessment Report (SAR, 1996), as presented in the California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.1. CO_2e = 1 * CO_2, 21 * CH_4, and 310 * N_2O.
2. Source: On-road Motor Vehicle Emission Factors from EMFAC2007 for Santa Clara County, Annual Emission Factors for Heavy-Heavy Duty Diesel Trucks.
3. Source: On-road Motor Vehicle Emission Factors from EMFAC2007 for Santa Clara County, Annual Emission Factors for Passenger Vehicles.
4. Source: On-road Motor Vehicle Emission Factors from EMFAC2007 for Santa Clara County, Daily/Hourly Emission Factors for Heavy-Heavy Duty Diesel Trucks.
5. Source: On-road Motor Vehicle Emission Factors from EMFAC2007 for Santa Clara County, Daily/Hourly Emission Factors for Passenger Vehicles.
6. Source: On-road Off-site Motor Vehicles: Baseline Activity Data, Baseline Fuel Use Activity Data. Since the total trips per year associated with fuel transport is 192 trips/year, it is assumed that a 1 trip/day and 1 trip/hour are associated with quarry fuel transport (since it is estimated that 146 trips/year are associated with quarry fuel transport).
7. Source: On-road Off-site Motor Vehicles: Baseline Activity Data, Baseline Sales, Truck, and Operating Days. Annual employee commute trips/year calculated by multiplying the average employee count for each facility by the average annual operating days for each facility. Daily trips assume 1 two-way trip/day per employee, and hourly trips assume 1 one-way trip/employee.

Estimated Annual Baseline Entrained Road Dust Emissions[1]

Trip Type	Annual Emissions (tons/year)			Daily Emissions (pounds/day)			Hourly Emissions (pounds/hour)		
	Veh. Miles Traveled	PM_{10}	$PM_{2.5}$	Veh. Miles Traveled	PM_{10}	$PM_{2.5}$	Veh. Miles Traveled	PM_{10}	$PM_{2.5}$
Quarry Fuel Transport	2,920			20			20		
Employee Commute	104,051			364			182		
Fleet Average:	106,971	0.04	0.01	384	0.32	0.05	202	0.17	0.03

AP-42 provides the following equation to estimate entrained paved road dust emissions[2]:

$$E = k\left(\frac{sL}{2}\right)^{0.65}\left(\frac{W}{3}\right)^{1.5} - C$$

where: E = particulate emission factor (grams/vehicle miles traveled, or g/VMT),
k = particle size multiplier for particle size range and units of interest
sL = road surface silt loading (grams per square meter, or g/m^2),
W = average weight (tons) of the vehicles traveling the road, and
C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lb/VMT for TSP and PM_{10}).

For long-term emissions (annual, seasonal, or monthly) AP-42 suggests that a precipitation correction factor can be applied as follows[3]:

$$E_{ext} = \left[k\left(\frac{sL}{2}\right)^{0.65}\left(\frac{W}{3}\right)^{1.5} - C\right]\left(1 - \frac{P}{4N}\right)$$

where: E_{ext} = annual or other long-term particulate emission factor (grams/vehicle miles traveled, or g/VMT),
P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period, and
N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly).

Emission Factors

Road Type	PM_{10} k factor[4] (lb/VMT)	sL[5] (g/m^2)	W[6] (tons)	C (lb/VMT)	P[7]	N	$PM_{2.5}/PM_{10}$ Ratio[8]	VMT Fraction by Road Type[9]	PM_{10} Factors (lb/VMT)		$PM_{2.5}$ Factors (lb/VMT)	
									Daily & Hourly	Annual	Daily & Hourly	Annual
Freeway	0.016	0.02	3.1	0.00047	62	365	15%	0.471	0.000	0.000	0.0001	0.0001
Major	0.016	0.035	3.1	0.00047	62	365	15%	0.407	0.001	0.001	0.0001	0.0001
Collector	0.016	0.035	3.1	0.00047	62	365	15%	0.055	0.001	0.001	0.0001	0.0001
Local	0.016	0.32	3.1	0.00047	62	365	15%	0.067	0.005	0.004	0.0007	0.0007
Composite Emission Factors (assuming Santa Clara County VMT fractions by road type)								1.000	0.0008	0.0008	0.0001	0.0001

Baseline Activity Data[10]

Trip Type	Trips/Year	1-Way Trip Distance (mi/trip)	Ann. Miles Traveled	Av. Veh. Weight (tons)[11]	Annual Ton-Miles[12]	Trips/Day	Trips/Hour	Notes
Quarry Fuel Transport	146	10	2,920	27.5	80,300	1	1	(Calculations reflect two-way trips)
Employee Commute	10,296	5.053	104,051	2.4	249,723	36	36	(Annual/daily calculations reflect two-way trips; hourly calculations reflect one-way trips)
Total Fleet			106,971	3.1	330,023			

Notes:

1. Per U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors (AP-42), Volume 1: Stationary Point and Area Sources, Section 13.2.1 (Paved Roads), updated November 2003, (available at http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf) emissions calculated for the fleet average only, not individual trip or weight classes.
2. Source: AP-42 (op cit.), Section 13.2.1 (Paved Roads), equation (1).
3. Source: AP-42 (op cit.), Section 13.2.1 (Paved Roads), equation (2).
4. AP-42 (op. cit.), Section 13.2.1 (Paved Roads), provides a value for k of 0.016 lb/VMT for PM_{10}.
5. Source: California Air Resources Board, Entrained Dust from Paved Road Travel: Emission Estimation Methodology Background Document, July 2, 1997, Table 3 (California Default Paved Road Silt Loading Values) - silt loading for local and collector road types, available at www.arb.ca.gov/ei/areasrc/arbmiscprocpaverddst.htm.
6. Average vehicle weight (W) for on-road offsite fleet derived under "Baseline Activity Data" table.
7. Number of days with precipitation at least 0.254 mm (0.01 in) from the University of Utah at http://www.met.utah.edu/jhorel/html/wx/climate/daysrain.html, data for San Francisco Airport (62 days/year).
8. The California Air Resources Board's "Almanac Emission Projection Data by EIC", 2009 (available at http://www.arb.ca.gov/ei/emissiondata.htm - Areawide Sources - Paved Road Dust), assumes a $PM_{2.5}/PM_{10}$ ratio of 15%.
9. Source: California Air Resources Board, Emissions Inventory Methodology Section 7.9: Entrained Paved Road Dust-Paved Road Travel, July 1997, Table 2 (1993 Roadway Travel Fractions and VMT Estimates for California Entrained Paved Road Dust Emission Estimates).
10. Source for data other than average vehicle weight data: see On-road Off-site Motor Vehicles - Emissions Other Than Entrained Road Dust.
11. Fuel transport trucks assumed to be 40 tons loaded and 15 tons unloaded (average weight of 27.5 tons). Source for average employee commute vehicle weight: California Air Resources Board, Emissions Inventory Methodology Section 7.9 (op cit.), Table 3 (Silt Loadings and Emission Factors for California Entrained Paved Road Dust Estimates), average vehicle weight for Santa Clara County (2.4 tons).
12. Used to calculate average vehicle weight for total fleet.

Use	Electric Power Use Metric	Baseline Annual Use Metric	Baseline Annual Electric Power Use (kW-hr)	GHG Emission Factors (lb/MW-hr)[5]			Indirect GHG Emissions (MT/yr)[6]			
				CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2e[7]
Quarry Lighting[1]	(Provided by portable light towers)		0							
Quarry Dewatering[2]	6,720 hours/year	274.6 kilowatts (kW)	1,845,043							
Purchased Water (Dust Suppression)[3]	0 million gal/yr	3,500 kW-hr/million gal	0							
Quarry Office[4]	1,800 square feet	14.6 kW-hr/sq ft-yr	26,280							
Total Quarry Electric Power Use			1,871,323	724.12	0.0302	0.0081	614.64	0.03	0.01	617.31

Notes:

1. Quarry lighting provided by diesel-fueled portable light towers - see off-road diesel equipment emission calculations.
2. Quarry dewatering system, powered by two 300 HP electric powered motors, is rated at 2,000 gallons per minute (gpm) but typically runs at 1,860 gpm. Each motor draws on average 33 amps at 4,160 volts. The dewatering system operates on average 24 hours/day, 7 days/week, 40 weeks/year. Source: Lehigh Southwest Cement Company, May 10, 2010.
3. For the baseline period, water used for dust suppression is drawn from the quarry dewatering system; no purchased water is used. The water-energy proxy value of 3,500 kW-hr per million gallons is derived from *Refining Estimates of Water-Related Energy Use in California* (Report No. CEC-500-2006-118), California Energy Commission, December 2006, page 2 (Northern California outdoor uses).
4. The quarry office measures 30 feet by 60 feet. The Electricity Energy Intensity (EEI) value of 14.6 kW-hr/square foot-year is derived from *the 2003 Commercial Buildings Energy Consumption Survey (CBECS): 2003 Detailed Tables*, U.S. Department of Energy - Energy Information Agency, Table C19 (Electricity Consumption and Conditional Energy Intensity by Census Division for Non-Mall Buildings, Part 3), data for office buildings, Pacific Census Division, available at http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/detailed_tables_2003.html.
5. Source: California Climate Change Registry, *General Reporting Protocol: Reporting Entity-Wide Greenhouse Gas Emissions* (version 3.1), January 2009, p. 95 (Table C.2 - Carbon Dioxide, Methane, and Nitrous Oxide Electricity Emission Factors by eGRID Subregion, data for Western Electricity Coordinating Council (WECC) California (CAMX) Subregion.
6. Conversion factors:
   1,000 kW-hr/MW-hr
   0.45359 kilograms/pound
   1,000 kilograms/metric ton (MT)
7. Assumes global warming potentials (GWP) of 21g CO_2e/g CH_4, and 310 g CO_2e/g N_2O. Source: California Climate Change Registry, *General Reporting Protocol*, (op cit.), p. 94 (Table C.1 - Comparison of GWPs from the IPCC's Second and Third Assessment Reports), data from the Second Assessment Report (SAR), 1996.

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
1/1/2008	1	12.5	5.588	5.588	0.296	0.000		0.000
1/2/2008	2	19.5	8.717	8.717	0.462	0.000		0.000
1/3/2008	3	45.5	20.340	20.340	1.078	23.619		23.619
1/4/2008	4	67.6	30.220	30.220	1.602	80.433		80.433
1/5/2008	5	33.9	15.155	15.155	0.803	6.526		0.000
1/6/2008	6	17.8	7.957	7.957	0.422	0.000		0.000
1/7/2008	7	13	5.812	5.812	0.308	0.000		0.000
1/8/2008	8	43.1	19.267	19.267	1.021	19.364		19.364
1/9/2008	9	10.4	4.649	4.649	0.246	0.000		0.000
1/10/2008	10	12.7	5.677	5.677	0.301	0.000		0.000
1/11/2008	11	12.3	5.499	5.499	0.291	0.000		0.000
1/12/2008	12	14	6.259	6.259	0.332	0.000		0.000
1/13/2008	13	18.5	8.270	8.270	0.438	0.000		0.000
1/14/2008	14	10.8	4.828	4.828	0.256	0.000		0.000
1/15/2008	15	14	6.259	6.259	0.332	0.000		0.000
1/16/2008	16	28.6	12.785	12.785	0.678	1.633		1.633
1/17/2008	17	25.8	11.534	11.534	0.611	0.000		0.000
1/18/2008	18	16.5	7.376	7.376	0.391	0.000		0.000
1/19/2008	19	11.5	5.141	5.141	0.272	0.000		0.000
1/20/2008	20	24	10.729	10.729	0.569	0.000		0.000
1/21/2008	21	16.3	7.287	7.287	0.386	0.000		0.000
1/22/2008	22	14.2	6.348	6.348	0.336	0.000		0.000
1/23/2008	23	11.4	5.096	5.096	0.270	0.000		0.000
1/24/2008	24	25.2	11.265	11.265	0.597	0.000		0.000
1/25/2008	25	31.1	13.903	13.903	0.737	3.713		3.713
1/26/2008	26	27.1	12.115	12.115	0.642	0.580		0.000
1/27/2008	27	55	24.587	24.587	1.303	44.144		0.000
1/28/2008	28	22.5	10.058	10.058	0.533	0.000		0.000
1/29/2008	29	25.6	11.444	11.444	0.607	0.000		0.000
1/30/2008	30	19.4	8.673	8.673	0.460	0.000		0.000
1/31/2008	31	30	13.411	13.411	0.711	2.748		2.748
2/1/2008	32	15.8	7.063	7.063	0.374	0.000		0.000
2/2/2008	33	36.7	16.406	16.406	0.870	9.850		0.000
2/3/2008	34	32.8	14.663	14.663	0.777	5.360		0.000
2/4/2008	35	27.6	12.338	12.338	0.654	0.915		0.915
2/5/2008	36	19.4	8.673	8.673	0.460	0.000		0.000
2/6/2008	37	15	6.706	6.706	0.355	0.000		0.000
2/7/2008	38	15.4	6.884	6.884	0.365	0.000		0.000
2/8/2008	39	15.1	6.750	6.750	0.358	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
2/9/2008	40	15.9	7.108	7.108	0.377	0.000		0.000
2/10/2008	41	14.2	6.348	6.348	0.336	0.000		0.000
2/11/2008	42	15.4	6.884	6.884	0.365	0.000		0.000
2/12/2008	43	13.3	5.946	5.946	0.315	0.000		0.000
2/13/2008	44	34.3	15.333	15.333	0.813	6.970		6.970
2/14/2008	45	29.9	13.366	13.366	0.708	2.664		2.664
2/15/2008	46	15.2	6.795	6.795	0.360	0.000		0.000
2/16/2008	47	12.2	5.454	5.454	0.289	0.000		0.000
2/17/2008	48	11.4	5.096	5.096	0.270	0.000		0.000
2/18/2008	49	11.2	5.007	5.007	0.265	0.000		0.000
2/19/2008	50	13.9	6.214	6.214	0.329	0.000		0.000
2/20/2008	51	17.2	7.689	7.689	0.408	0.000		0.000
2/21/2008	52	33.2	14.842	14.842	0.787	5.775		5.775
2/22/2008	53	16.1	7.197	7.197	0.381	0.000		0.000
2/23/2008	54	37.9	16.943	16.943	0.898	11.431		0.000
2/24/2008	55	47.1	21.056	21.056	1.116	26.664		0.000
2/25/2008	56	13	5.812	5.812	0.308	0.000		0.000
2/26/2008	57	12.7	5.677	5.677	0.301	0.000		0.000
2/27/2008	58	14	6.259	6.259	0.332	0.000		0.000
2/28/2008	59	14.2	6.348	6.348	0.336	0.000		0.000
2/29/2008	60	19.1	8.538	8.538	0.453	0.000		0.000
3/1/2008	61	29	12.964	12.964	0.687	1.939		0.000
3/2/2008	62	30.7	13.724	13.724	0.727	3.353		0.000
3/3/2008	63	14.6	6.527	6.527	0.346	0.000		0.000
3/4/2008	64	17.4	7.778	7.778	0.412	0.000		0.000
3/5/2008	65	13	5.812	5.812	0.308	0.000		0.000
3/6/2008	66	15.4	6.884	6.884	0.365	0.000		0.000
3/7/2008	67	17.6	7.868	7.868	0.417	0.000		0.000
3/8/2008	68	20.1	8.986	8.986	0.476	0.000		0.000
3/9/2008	69	13	5.812	5.812	0.308	0.000		0.000
3/10/2008	70	17.5	7.823	7.823	0.415	0.000		0.000
3/11/2008	71	98.2	43.899	43.899	2.327	211.603		211.603
3/12/2008	72	15.8	7.063	7.063	0.374	0.000		0.000
3/13/2008	73	25.9	11.578	11.578	0.614	0.000		0.000
3/14/2008	74	20.7	9.254	9.254	0.490	0.000		0.000
3/15/2008	75	29.3	13.098	13.098	0.694	2.175		0.000
3/16/2008	76	31.4	14.037	14.037	0.744	3.990		0.000
3/17/2008	77	24.3	10.863	10.863	0.576	0.000		0.000
3/18/2008	78	15.6	6.974	6.974	0.370	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
3/19/2008	79	16.9	7.555	7.555	0.400	0.000		0.000
3/20/2008	80	20.5	9.164	9.164	0.486	0.000		0.000
3/21/2008	81	20.1	8.986	8.986	0.476	0.000		0.000
3/22/2008	82	15.3	6.840	6.840	0.363	0.000		0.000
3/23/2008	83	17.2	7.689	7.689	0.408	0.000		0.000
3/24/2008	84	20.6	9.209	9.209	0.488	0.000		0.000
3/25/2008	85	18.6	8.315	8.315	0.441	0.000		0.000
3/26/2008	86	23.9	10.684	10.684	0.566	0.000		0.000
3/27/2008	87	25.2	11.265	11.265	0.597	0.000		0.000
3/28/2008	88	19.2	8.583	8.583	0.455	0.000		0.000
3/29/2008	89	28.5	12.741	12.741	0.675	1.558		0.000
3/30/2008	90	38.1	17.032	17.032	0.903	11.703		0.000
3/31/2008	91	14.3	6.393	6.393	0.339	0.000		0.000
4/1/2008	92	18.9	8.449	8.449	0.448	0.000		0.000
4/2/2008	93	12.3	5.499	5.499	0.291	0.000		0.000
4/3/2008	94	16.5	7.376	7.376	0.391	0.000		0.000
4/4/2008	95	20.8	9.298	9.298	0.493	0.000		0.000
4/5/2008	96	17.9	8.002	8.002	0.424	0.000		0.000
4/6/2008	97	22.8	10.193	10.193	0.540	0.000		0.000
4/7/2008	98	20.8	9.298	9.298	0.493	0.000		0.000
4/8/2008	99	23.6	10.550	10.550	0.559	0.000		0.000
4/9/2008	100	19.1	8.538	8.538	0.453	0.000		0.000
4/10/2008	101	16.8	7.510	7.510	0.398	0.000		0.000
4/11/2008	102	18.1	8.091	8.091	0.429	0.000		0.000
4/12/2008	103	13.8	6.169	6.169	0.327	0.000		0.000
4/13/2008	104	17.2	7.689	7.689	0.408	0.000		0.000
4/14/2008	105	26.6	11.891	11.891	0.630	0.262		0.262
4/15/2008	106	25.9	11.578	11.578	0.614	0.000		0.000
4/16/2008	107	17.6	7.868	7.868	0.417	0.000		0.000
4/17/2008	108	15.3	6.840	6.840	0.363	0.000		0.000
4/18/2008	109	16	7.153	7.153	0.379	0.000		0.000
4/19/2008	110	31.2	13.948	13.948	0.739	3.805		0.000
4/20/2008	111	20.2	9.030	9.030	0.479	0.000		0.000
4/21/2008	112	22.6	10.103	10.103	0.535	0.000		0.000
4/22/2008	113	22	9.835	9.835	0.521	0.000		0.000
4/23/2008	114	20.8	9.298	9.298	0.493	0.000		0.000
4/24/2008	115	17.1	7.644	7.644	0.405	0.000		0.000
4/25/2008	116	18.9	8.449	8.449	0.448	0.000		0.000
4/26/2008	117	18.8	8.404	8.404	0.445	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
4/27/2008	118	21.2	9.477	9.477	0.502	0.000		0.000
4/28/2008	119	17.3	7.734	7.734	0.410	0.000		0.000
4/29/2008	120	72.2	32.276	32.276	1.711	96.257		96.257
4/30/2008	121	22.9	10.237	10.237	0.543	0.000		0.000
5/1/2008	122	18.4	8.226	8.226	0.436	0.000		0.000
5/2/2008	123	14.6	6.527	6.527	0.346	0.000		0.000
5/3/2008	124	19.2	8.583	8.583	0.455	0.000		0.000
5/4/2008	125	26.5	11.847	11.847	0.628	0.200		0.000
5/5/2008	126	16.3	7.287	7.287	0.386	0.000		0.000
5/6/2008	127	15.5	6.929	6.929	0.367	0.000		0.000
5/7/2008	128	26.8	11.981	11.981	0.635	0.387		0.387
5/8/2008	129	16.5	7.376	7.376	0.391	0.000		0.000
5/9/2008	130	15.8	7.063	7.063	0.374	0.000		0.000
5/10/2008	131	14.7	6.571	6.571	0.348	0.000		0.000
5/11/2008	132	20.3	9.075	9.075	0.481	0.000		0.000
5/12/2008	133	23.9	10.684	10.684	0.566	0.000		0.000
5/13/2008	134	20.4	9.120	9.120	0.483	0.000		0.000
5/14/2008	135	17.4	7.778	7.778	0.412	0.000		0.000
5/15/2008	136	17.8	7.957	7.957	0.422	0.000		0.000
5/16/2008	137	17.9	8.002	8.002	0.424	0.000		0.000
5/17/2008	138	15.2	6.795	6.795	0.360	0.000		0.000
5/18/2008	139	14.7	6.571	6.571	0.348	0.000		0.000
5/19/2008	140	14	6.259	6.259	0.332	0.000		0.000
5/20/2008	141	34.3	15.333	15.333	0.813	6.970		6.970
5/21/2008	142	26.9	12.025	12.025	0.637	0.451		0.451
5/22/2008	143	36	16.093	16.093	0.853	8.971		8.971
5/23/2008	144	30.1	13.456	13.456	0.713	2.832		2.832
5/24/2008	145	24.2	10.818	10.818	0.573	0.000		0.000
5/25/2008	146	27	12.070	12.070	0.640	0.515		0.000
5/26/2008	147	21.5	9.611	9.611	0.509	0.000		0.000
5/27/2008	148	27.1	12.115	12.115	0.642	0.580		0.580
5/28/2008	149	25.7	11.489	11.489	0.609	0.000		0.000
5/29/2008	150	28.9	12.919	12.919	0.685	1.861		1.861
5/30/2008	151	17.2	7.689	7.689	0.408	0.000		0.000
5/31/2008	152	17.6	7.868	7.868	0.417	0.000		0.000
6/1/2008	153	24.7	11.042	11.042	0.585	0.000		0.000
6/2/2008	154	17.6	7.868	7.868	0.417	0.000		0.000
6/3/2008	155	23.2	10.371	10.371	0.550	0.000		0.000
6/4/2008	156	26.1	11.668	11.668	0.618	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
6/5/2008	157	21.4	9.567	9.567	0.507	0.000		0.000
6/6/2008	158	22.6	10.103	10.103	0.535	0.000		0.000
6/7/2008	159	18.6	8.315	8.315	0.441	0.000		0.000
6/8/2008	160	19.1	8.538	8.538	0.453	0.000		0.000
6/9/2008	161	17.6	7.868	7.868	0.417	0.000		0.000
6/10/2008	162	22.6	10.103	10.103	0.535	0.000		0.000
6/11/2008	163	21.7	9.701	9.701	0.514	0.000		0.000
6/12/2008	164	19.9	8.896	8.896	0.471	0.000		0.000
6/13/2008	165	14.6	6.527	6.527	0.346	0.000		0.000
6/14/2008	166	13.9	6.214	6.214	0.329	0.000		0.000
6/15/2008	167	14.9	6.661	6.661	0.353	0.000		0.000
6/16/2008	168	12.9	5.767	5.767	0.306	0.000		0.000
6/17/2008	169	22.5	10.058	10.058	0.533	0.000		0.000
6/18/2008	170	16.6	7.421	7.421	0.393	0.000		0.000
6/19/2008	171	20.2	9.030	9.030	0.479	0.000		0.000
6/20/2008	172	17.4	7.778	7.778	0.412	0.000		0.000
6/21/2008	173	23.9	10.684	10.684	0.566	0.000		0.000
6/22/2008	174	15.6	6.974	6.974	0.370	0.000		0.000
6/23/2008	175	15.2	6.795	6.795	0.360	0.000		0.000
6/24/2008	176	15.5	6.929	6.929	0.367	0.000		0.000
6/25/2008	177	14.7	6.571	6.571	0.348	0.000		0.000
6/26/2008	178	12.6	5.633	5.633	0.299	0.000		0.000
6/27/2008	179	16.2	7.242	7.242	0.384	0.000		0.000
6/28/2008	180	15.4	6.884	6.884	0.365	0.000		0.000
6/29/2008	181	16.8	7.510	7.510	0.398	0.000		0.000
6/30/2008	182	15.1	6.750	6.750	0.358	0.000		0.000
7/1/2008	183	13.7	6.124	6.124	0.325	0.000		0.000
7/2/2008	184	14.9	6.661	6.661	0.353	0.000		0.000
7/3/2008	185	20.4	9.120	9.120	0.483	0.000		0.000
7/4/2008	186	17.7	7.913	7.913	0.419	0.000		0.000
7/5/2008	187	19.9	8.896	8.896	0.471	0.000		0.000
7/6/2008	188	13.7	6.124	6.124	0.325	0.000		0.000
7/7/2008	189	16.3	7.287	7.287	0.386	0.000		0.000
7/8/2008	190	15.4	6.884	6.884	0.365	0.000		0.000
7/9/2008	191	13.5	6.035	6.035	0.320	0.000		0.000
7/10/2008	192	13.9	6.214	6.214	0.329	0.000		0.000
7/11/2008	193	15.2	6.795	6.795	0.360	0.000		0.000
7/12/2008	194	16.3	7.287	7.287	0.386	0.000		0.000
7/13/2008	195	16.7	7.466	7.466	0.396	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
7/14/2008	196	16.2	7.242	7.242	0.384	0.000		0.000
7/15/2008	197	16.6	7.421	7.421	0.393	0.000		0.000
7/16/2008	198	13.8	6.169	6.169	0.327	0.000		0.000
7/17/2008	199	16.4	7.331	7.331	0.389	0.000		0.000
7/18/2008	200	12.7	5.677	5.677	0.301	0.000		0.000
7/19/2008	201	14	6.259	6.259	0.332	0.000		0.000
7/20/2008	202	16.4	7.331	7.331	0.389	0.000		0.000
7/21/2008	203	15.3	6.840	6.840	0.363	0.000		0.000
7/22/2008	204	14.9	6.661	6.661	0.353	0.000		0.000
7/23/2008	205	14.3	6.393	6.393	0.339	0.000		0.000
7/24/2008	206	15.3	6.840	6.840	0.363	0.000		0.000
7/25/2008	207	16.6	7.421	7.421	0.393	0.000		0.000
7/26/2008	208	19.6	8.762	8.762	0.464	0.000		0.000
7/27/2008	209	17.1	7.644	7.644	0.405	0.000		0.000
7/28/2008	210	15.9	7.108	7.108	0.377	0.000		0.000
7/29/2008	211	18	8.047	8.047	0.426	0.000		0.000
7/30/2008	212	15.7	7.019	7.019	0.372	0.000		0.000
7/31/2008	213	15.3	6.840	6.840	0.363	0.000		0.000
8/1/2008	214	15.1	6.750	6.750	0.358	0.000		0.000
8/2/2008	215	21.3	9.522	9.522	0.505	0.000		0.000
8/3/2008	216	14.8	6.616	6.616	0.351	0.000		0.000
8/4/2008	217	13.8	6.169	6.169	0.327	0.000		0.000
8/5/2008	218	12.4	5.543	5.543	0.294	0.000		0.000
8/6/2008	219	14.4	6.437	6.437	0.341	0.000		0.000
8/7/2008	220	15.1	6.750	6.750	0.358	0.000		0.000
8/8/2008	221	18.3	8.181	8.181	0.434	0.000		0.000
8/9/2008	222	16.6	7.421	7.421	0.393	0.000		0.000
8/10/2008	223	17.8	7.957	7.957	0.422	0.000		0.000
8/11/2008	224	15.3	6.840	6.840	0.363	0.000		0.000
8/12/2008	225	12.8	5.722	5.722	0.303	0.000		0.000
8/13/2008	226	13.5	6.035	6.035	0.320	0.000		0.000
8/14/2008	227	12.3	5.499	5.499	0.291	0.000		0.000
8/15/2008	228	12.7	5.677	5.677	0.301	0.000		0.000
8/16/2008	229	14.8	6.616	6.616	0.351	0.000		0.000
8/17/2008	230	15.2	6.795	6.795	0.360	0.000		0.000
8/18/2008	231	17.3	7.734	7.734	0.410	0.000		0.000
8/19/2008	232	20.6	9.209	9.209	0.488	0.000		0.000
8/20/2008	233	17.7	7.913	7.913	0.419	0.000		0.000
8/21/2008	234	17	7.600	7.600	0.403	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
8/22/2008	235	15.5	6.929	6.929	0.367	0.000		0.000
8/23/2008	236	15.2	6.795	6.795	0.360	0.000		0.000
8/24/2008	237	14	6.259	6.259	0.332	0.000		0.000
8/25/2008	238	17	7.600	7.600	0.403	0.000		0.000
8/26/2008	239	17	7.600	7.600	0.403	0.000		0.000
8/27/2008	240	18.6	8.315	8.315	0.441	0.000		0.000
8/28/2008	241	16.6	7.421	7.421	0.393	0.000		0.000
8/29/2008	242	13.8	6.169	6.169	0.327	0.000		0.000
8/30/2008	243	13.5	6.035	6.035	0.320	0.000		0.000
8/31/2008	244	15.7	7.019	7.019	0.372	0.000		0.000
9/1/2008	245	20.8	9.298	9.298	0.493	0.000		0.000
9/2/2008	246	17.9	8.002	8.002	0.424	0.000		0.000
9/3/2008	247	17.8	7.957	7.957	0.422	0.000		0.000
9/4/2008	248	16.1	7.197	7.197	0.381	0.000		0.000
9/5/2008	249	16.6	7.421	7.421	0.393	0.000		0.000
9/6/2008	250	15.9	7.108	7.108	0.377	0.000		0.000
9/7/2008	251	13.9	6.214	6.214	0.329	0.000		0.000
9/8/2008	252	15	6.706	6.706	0.355	0.000		0.000
9/9/2008	253	15.5	6.929	6.929	0.367	0.000		0.000
9/10/2008	254	16.4	7.331	7.331	0.389	0.000		0.000
9/11/2008	255	13.3	5.946	5.946	0.315	0.000		0.000
9/12/2008	256	13.1	5.856	5.856	0.310	0.000		0.000
9/13/2008	257	13	5.812	5.812	0.308	0.000		0.000
9/14/2008	258	12.6	5.633	5.633	0.299	0.000		0.000
9/15/2008	259	11.8	5.275	5.275	0.280	0.000		0.000
9/16/2008	260	14.8	6.616	6.616	0.351	0.000		0.000
9/17/2008	261	17.4	7.778	7.778	0.412	0.000		0.000
9/18/2008	262	18.9	8.449	8.449	0.448	0.000		0.000
9/19/2008	263	24.6	10.997	10.997	0.583	0.000		0.000
9/20/2008	264	19.3	8.628	8.628	0.457	0.000		0.000
9/21/2008	265	15.4	6.884	6.884	0.365	0.000		0.000
9/22/2008	266	19.8	8.851	8.851	0.469	0.000		0.000
9/23/2008	267	15.8	7.063	7.063	0.374	0.000		0.000
9/24/2008	268	15.9	7.108	7.108	0.377	0.000		0.000
9/25/2008	269	16.9	7.555	7.555	0.400	0.000		0.000
9/26/2008	270	16.6	7.421	7.421	0.393	0.000		0.000
9/27/2008	271	14.8	6.616	6.616	0.351	0.000		0.000
9/28/2008	272	12.6	5.633	5.633	0.299	0.000		0.000
9/29/2008	273	13.4	5.990	5.990	0.317	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
9/30/2008	274	12.3	5.499	5.499	0.291	0.000		0.000
10/1/2008	275	16.9	7.555	7.555	0.400	0.000		0.000
10/2/2008	276	19.4	8.673	8.673	0.460	0.000		0.000
10/3/2008	277	24.6	10.997	10.997	0.583	0.000		0.000
10/4/2008	278	20.9	9.343	9.343	0.495	0.000		0.000
10/5/2008	279	16.9	7.555	7.555	0.400	0.000		0.000
10/6/2008	280	14.4	6.437	6.437	0.341	0.000		0.000
10/7/2008	281	15.5	6.929	6.929	0.367	0.000		0.000
10/8/2008	282	16.7	7.466	7.466	0.396	0.000		0.000
10/9/2008	283	21.4	9.567	9.567	0.507	0.000		0.000
10/10/2008	284	32.9	14.708	14.708	0.780	5.463		5.463
10/11/2008	285	32.8	14.663	14.663	0.777	5.360		0.000
10/12/2008	286	22.9	10.237	10.237	0.543	0.000		0.000
10/13/2008	287	20.1	8.986	8.986	0.476	0.000		0.000
10/14/2008	288	17.1	7.644	7.644	0.405	0.000		0.000
10/15/2008	289	14.4	6.437	6.437	0.341	0.000		0.000
10/16/2008	290	18.5	8.270	8.270	0.438	0.000		0.000
10/17/2008	291	14.4	6.437	6.437	0.341	0.000		0.000
10/18/2008	292	14.8	6.616	6.616	0.351	0.000		0.000
10/19/2008	293	12.7	5.677	5.677	0.301	0.000		0.000
10/20/2008	294	14.7	6.571	6.571	0.348	0.000		0.000
10/21/2008	295	16.6	7.421	7.421	0.393	0.000		0.000
10/22/2008	296	23.7	10.595	10.595	0.562	0.000		0.000
10/23/2008	297	11.6	5.186	5.186	0.275	0.000		0.000
10/24/2008	298	14.2	6.348	6.348	0.336	0.000		0.000
10/25/2008	299	12.8	5.722	5.722	0.303	0.000		0.000
10/26/2008	300	10.8	4.828	4.828	0.256	0.000		0.000
10/27/2008	301	11.2	5.007	5.007	0.265	0.000		0.000
10/28/2008	302	9.9	4.426	4.426	0.235	0.000		0.000
10/29/2008	303	11.8	5.275	5.275	0.280	0.000		0.000
10/30/2008	304	73.1	32.679	32.679	1.732	99.515		99.515
10/31/2008	305	36.5	16.317	16.317	0.865	9.596		9.596
11/1/2008	306	39.5	17.658	17.658	0.936	13.684		0.000
11/2/2008	307	24.5	10.952	10.952	0.580	0.000		0.000
11/3/2008	308	34.9	15.602	15.602	0.827	7.655		7.655
11/4/2008	309	22.8	10.193	10.193	0.540	0.000		0.000
11/5/2008	310	16.4	7.331	7.331	0.389	0.000		0.000
11/6/2008	311	15.3	6.840	6.840	0.363	0.000		0.000
11/7/2008	312	16.4	7.331	7.331	0.389	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
11/8/2008	313	38	16.988	16.988	0.900	11.567		0.000
11/9/2008	314	32.6	14.574	14.574	0.772	5.157		0.000
11/10/2008	315	15.9	7.108	7.108	0.377	0.000		0.000
11/11/2008	316	11.6	5.186	5.186	0.275	0.000		0.000
11/12/2008	317	15.2	6.795	6.795	0.360	0.000		0.000
11/13/2008	318	21.2	9.477	9.477	0.502	0.000		0.000
11/14/2008	319	21.8	9.745	9.745	0.517	0.000		0.000
11/15/2008	320	15.7	7.019	7.019	0.372	0.000		0.000
11/16/2008	321	9.6	4.292	4.292	0.227	0.000		0.000
11/17/2008	322	11.1	4.962	4.962	0.263	0.000		0.000
11/18/2008	323	9.5	4.247	4.247	0.225	0.000		0.000
11/19/2008	324	13.4	5.990	5.990	0.317	0.000		0.000
11/20/2008	325	16.6	7.421	7.421	0.393	0.000		0.000
11/21/2008	326	22.5	10.058	10.058	0.533	0.000		0.000
11/22/2008	327	13.6	6.080	6.080	0.322	0.000		0.000
11/23/2008	328	11.8	5.275	5.275	0.280	0.000		0.000
11/24/2008	329	11.7	5.230	5.230	0.277	0.000		0.000
11/25/2008	330	13.4	5.990	5.990	0.317	0.000		0.000
11/26/2008	331	12.9	5.767	5.767	0.306	0.000		0.000
11/27/2008	332	13.5	6.035	6.035	0.320	0.000		0.000
11/28/2008	333	9.3	4.157	4.157	0.220	0.000		0.000
11/29/2008	334	23.4	10.461	10.461	0.554	0.000		0.000
11/30/2008	335	12.2	5.454	5.454	0.289	0.000		0.000
12/1/2008	336	10.5	4.694	4.694	0.249	0.000		0.000
12/2/2008	337	14.5	6.482	6.482	0.344	0.000		0.000
12/3/2008	338	15.2	6.795	6.795	0.360	0.000		0.000
12/4/2008	339	16.5	7.376	7.376	0.391	0.000		0.000
12/5/2008	340	12.3	5.499	5.499	0.291	0.000		0.000
12/6/2008	341	14.7	6.571	6.571	0.348	0.000		0.000
12/7/2008	342	12.2	5.454	5.454	0.289	0.000		0.000
12/8/2008	343	18.9	8.449	8.449	0.448	0.000		0.000
12/9/2008	344	17.3	7.734	7.734	0.410	0.000		0.000
12/10/2008	345	12.1	5.409	5.409	0.287	0.000		0.000
12/11/2008	346	16.1	7.197	7.197	0.381	0.000		0.000
12/12/2008	347	13.2	5.901	5.901	0.313	0.000		0.000
12/13/2008	348	30.5	13.635	13.635	0.723	3.177		0.000
12/14/2008	349	22.1	9.880	9.880	0.524	0.000		0.000
12/15/2008	350	26.8	11.981	11.981	0.635	0.387		0.387
12/16/2008	351	22	9.835	9.835	0.521	0.000		0.000

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
12/17/2008	352	23.5	10.505	10.505	0.557	0.000		0.000
12/18/2008	353	22	9.835	9.835	0.521	0.000		0.000
12/19/2008	354	21.9	9.790	9.790	0.519	0.000		0.000
12/20/2008	355	13.5	6.035	6.035	0.320	0.000		0.000
12/21/2008	356	23.5	10.505	10.505	0.557	0.000		0.000
12/22/2008	357	25.6	11.444	11.444	0.607	0.000		0.000
12/23/2008	358	16.5	7.376	7.376	0.391	0.000		0.000
12/24/2008	359	38.9	17.390	17.390	0.922	12.820		12.820
12/25/2008	360	40.8	18.239	18.239	0.967	15.638		15.638
12/26/2008	361	26.8	11.981	11.981	0.635	0.387		0.387
12/27/2008	362	12.2	5.454	5.454	0.289	0.000		0.000
12/28/2008	363	12.9	5.767	5.767	0.306	0.000		0.000
12/29/2008	364	18.4	8.226	8.226	0.436	0.000		0.000
12/30/2008	365	16.4	7.331	7.331	0.389	0.000		0.000
12/31/2008	366	10.6	4.739	4.739	0.251	0.000		0.000
					Sum:	802.213	g/m^2-yr	629.472
		Conversion Factors:	907,185 grams/ton		EF (TSP)=	3.58	ton/acre-yr	2.81
			4,047 m^2/acre		EF (PM_{10})=	1.79	ton/acre-yr	1.40
					EF ($PM_{2.5}$)=	0.27	ton/acre-yr	0.21
						(Every Day)		(Week Days)

Notes:

1. For u+ used max daily gust speed from 2008 met data. Anemometer height at 10m; no height correction to 10m required.
2. Threshold friction velocity (u*t) obtained from Table 13.2.5-2 AP-42 (Scraper tracks on coal pile): 0.62 m/s
3. Particle size multipliers (k) taken from AP-42 p. 13.2.5-3:

   $PM_{2.5}$ = 0.075

   PM_{10} = 0.5
4. The highest recorded wind gust from the Hanson meteorological station on 7/15/2008 is 98.2 mph at hour 9:00. This value appears inconsistent with the daily wind gust trends (< 20 mph for all other hours). In addition, there are a number of invalid parameters (e.g. temperature, RH) recorded for hours 9:00 and 10:00 that imply the tower could have been serviced or repaired during that peri Therefore, for the purposes of this analysis, the max wind gust for 7/15/2008 is 16.6 mph at hour 14:00.

Appendix B

Proposed Project Operation Emission Calculations

Proposed Project Operation Emission Calculations Appendices.

Appendix	Activity
	Phase Summaries
B-1	Annual Criteria Pollutant Emissions
B-2	Daily Criteria Pollutant Emissions
B-3	Annual Toxic Air Contaminant Emissions
B-4	Hourly Toxic Air Contaminant Emissions
B-5	Annual Greenhouse Gas Emissions
	South Quarry Operations
B-6	Drilling
B-6, B-7	Blasting
B-8	Bulldozing, Scraping & Grading
B-9	Material Handling
B-10	Dust Entrainment – Unpaved Roads
B-11	Wind Erosion – Unpaved Roads
B-11	Wind Erosion – Active Quarry Areas
B-12	Toxic Air Contaminants
	Waste Rock Storage/Infill Areas
B-13	Material Handling
B-14	Dust Entrainment – Unpaved Roads
B-15	Wind Erosion – Unpaved Roads
B-15	Wind Erosion – Active Storage/Infill Areas
B-16	Toxic Air Contaminants
	Topsoil Storage Area
B-17	Material Handling
B-18	Dust Entrainment – Unpaved Roads
B-19	Wind Erosion – Unpaved Roads
B-19	Wind Erosion – Active Topsoil Storage Areas
B-20	Toxic Air Contaminants
	Fuel Storage and Dispensing
B-21	Fuel Storage
B-22	Fuel Dispensing
	Combustion Sources
B-23	Portable Diesel Welders
B-24, B-29	Off-road Diesel Equipment
B-25, B-30	On-road On-site Motor Vehicles
B-26, B-30	On-road Off-site Motor Vehicles
B-27	Paved Road Dust Entrainment
	Indirect Greenhouse Gas Sources
B-28	Electrical Power Use

Proposed Project Phase 1 Criteria Pollutants - Annual Emissions (tons/yr).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	3.72	3.72	--	--	--	--
Blasting	6.44	0.37	104.43	26.50	--	3.12
Bulldozing, Scraping & Grading	1.22	0.18	--	--	--	--
Material Handling	6.51	0.98	--	--	--	--
Dust Entrainment - Unpaved Roads	55.49	5.55	--	--	--	--
Wind Erosion - Unpaved Roads	5.80	0.87	--	--	--	--
Wind Erosion - Active Areas	33.30	4.99	--	--	--	--
Subtotal - South Quarry:	112.48	16.67	104.43	26.50	--	3.12
Waste Rock Storage/Infill Areas						
Material Handling	4.65	0.70	--	--	--	--
Dust Entrainment - Unpaved Roads	118.85	11.88	--	--	--	--
Wind Erosion - Unpaved Roads	1.53	0.23	--	--	--	--
Wind Erosion - Active Areas	27.31	4.10	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	152.33	16.91	--	--	--	--
Topsoil Storage Area						
Material Handling	0.10	0.02	--	--	--	--
Dust Entrainment - Unpaved Roads	12.29	1.23	--	--	--	--
Wind Erosion - Unpaved Roads	2.51	0.38	--	--	--	--
Wind Erosion - Active Areas	2.32	0.35	--	--	--	--
Subtotal - Topsoil Storage Area:	17.22	1.97	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.08	--
Fuel Dispensing	--	--	--	--	0.04	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.12	--
Combustion Sources						
Portable Diesel Welders	0.00	0.00	0.02	0.01	0.00	0.00
Off-road Diesel Equipment	1.42	1.42	33.42	115.64	8.97	0.16
On-road On-site Vehicles	0.01	0.01	0.65	0.07	0.07	0.00
On-road Off-site Vehicles	0.01	0.01	0.52	0.10	0.07	0.00
Dust Entrainment - Paved Roads	0.13	0.02	--	--	--	--
Subtotal - Combustion Sources:	1.58	1.46	34.61	115.82	9.10	0.16
Totals (ton/yr):	283.60	37.00	139.04	142.32	9.22	3.28

Proposed Project Phase 2 Criteria Pollutants - Annual Emissions (tons/yr).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	4.68	4.68	--	--	--	--
Blasting	8.10	0.47	131.31	33.32	--	3.92
Bulldozing, Scraping & Grading	1.36	0.20	--	--	--	--
Material Handling	8.33	1.25	--	--	--	--
Dust Entrainment - Unpaved Roads	94.59	9.46	--	--	--	--
Wind Erosion - Unpaved Roads	17.22	2.58	--	--	--	--
Wind Erosion - Active Areas	76.42	11.46	--	--	--	--
Subtotal - South Quarry:	210.69	30.11	131.31	33.32	--	3.92
Waste Rock Storage/Infill Areas						
Material Handling	5.42	0.81	--	--	--	--
Dust Entrainment - Unpaved Roads	129.80	12.98	--	--	--	--
Wind Erosion - Unpaved Roads	3.54	0.53	--	--	--	--
Wind Erosion - Active Areas	70.97	10.64	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	209.72	24.97	--	--	--	--
Topsoil Storage Area						
Material Handling	0.10	0.02	--	--	--	--
Dust Entrainment - Unpaved Roads	17.52	1.75	--	--	--	--
Wind Erosion - Unpaved Roads	2.51	0.38	--	--	--	--
Wind Erosion - Active Areas	1.79	0.27	--	--	--	--
Subtotal - Topsoil Storage Area:	21.92	2.41	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.09	--
Fuel Dispensing	--	--	--	--	0.05	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.14	--
Combustion Sources						
Portable Diesel Welders	0.00	0.00	0.02	0.02	0.00	0.00
Off-road Diesel Equipment	2.16	2.16	50.19	178.58	13.55	0.24
On-road On-site Vehicles	0.02	0.01	0.74	0.08	0.08	0.00
On-road Off-site Vehicles	0.01	0.01	0.52	0.12	0.07	0.00
Dust Entrainment - Paved Roads	0.13	0.02	--	--	--	--
Subtotal - Combustion Sources:	2.32	2.20	51.47	178.80	13.69	0.24
Totals (ton/yr):	444.66	59.69	182.79	212.12	13.83	4.16

Proposed Project Phase 3 Criteria Pollutants - Annual Emissions (tons/yr).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	5.42	5.42	--	--	--	--
Blasting	9.37	0.54	151.99	38.57	--	4.54
Bulldozing, Scraping & Grading	1.36	0.20	--	--	--	--
Material Handling	9.42	1.41	--	--	--	--
Dust Entrainment - Unpaved Roads	85.05	8.51	--	--	--	--
Wind Erosion - Unpaved Roads	15.54	2.33	--	--	--	--
Wind Erosion - Active Areas	54.91	8.24	--	--	--	--
Subtotal - South Quarry:	181.07	26.65	151.99	38.57	--	4.54
Waste Rock Storage/Infill Areas						
Material Handling	6.68	1.00	--	--	--	--
Dust Entrainment - Unpaved Roads	129.75	12.97	--	--	--	--
Wind Erosion - Unpaved Roads	1.02	0.15	--	--	--	--
Wind Erosion - Active Areas	33.43	5.02	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	170.88	19.15	--	--	--	--
Topsoil Storage Area						
Material Handling	0.05	0.01	--	--	--	--
Dust Entrainment - Unpaved Roads	11.13	1.11	--	--	--	--
Wind Erosion - Unpaved Roads	2.51	0.38	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--	--	--
Subtotal - Topsoil Storage Area:	13.68	1.50	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.08	--
Fuel Dispensing	--	--	--	--	0.05	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.13	--
Combustion Sources						
Portable Diesel Welders	0.00	0.00	0.02	0.02	0.00	0.00
Off-road Diesel Equipment	2.11	2.11	49.36	174.67	13.26	0.23
On-road On-site Vehicles	0.01	0.01	0.72	0.08	0.07	0.00
On-road Off-site Vehicles	0.01	0.01	0.50	0.11	0.06	0.00
Dust Entrainment - Paved Roads	0.13	0.02	--	--	--	--
Subtotal - Combustion Sources:	2.27	2.15	50.60	174.87	13.40	0.24
Totals (ton/yr):	367.90	49.44	202.59	213.44	13.53	4.77

Proposed Project Phase 4 Criteria Pollutants - Annual Emissions (tons/yr).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	4.64	4.64	--	--	--	--
Blasting	8.02	0.46	130.02	32.99	--	3.88
Bulldozing, Scraping & Grading	1.18	0.18	--	--	--	--
Material Handling	8.05	1.21	--	--	--	--
Dust Entrainment - Unpaved Roads	60.80	6.08	--	--	--	--
Wind Erosion - Unpaved Roads	14.81	2.22	--	--	--	--
Wind Erosion - Active Areas	55.88	8.38	--	--	--	--
Subtotal - South Quarry:	153.37	23.17	130.02	32.99	--	3.88
Waste Rock Storage/Infill Areas						
Material Handling	5.33	0.80	--	--	--	--
Dust Entrainment - Unpaved Roads	104.99	10.50	--	--	--	--
Wind Erosion - Unpaved Roads	1.26	0.19	--	--	--	--
Wind Erosion - Active Areas	47.55	7.13	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	159.13	18.62	--	--	--	--
Topsoil Storage Area						
Material Handling	0.01	0.00	--	--	--	--
Dust Entrainment - Unpaved Roads	6.43	0.64	--	--	--	--
Wind Erosion - Unpaved Roads	2.51	0.38	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--	--	--
Subtotal - Topsoil Storage Area:	8.96	1.02	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.08	--
Fuel Dispensing	--	--	--	--	0.05	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.12	--
Combustion Sources						
Portable Diesel Welders	0.00	0.00	0.02	0.02	0.00	0.00
Off-road Diesel Equipment	1.71	1.71	39.97	140.46	10.71	0.19
On-road On-site Vehicles	0.01	0.01	0.65	0.07	0.07	0.00
On-road Off-site Vehicles	0.01	0.01	0.46	0.10	0.06	0.00
Dust Entrainment - Paved Roads	0.12	0.02	--	--	--	--
Subtotal - Combustion Sources:	1.85	1.74	41.09	140.64	10.83	0.19
Totals (ton/yr):	323.31	44.55	171.11	173.64	10.96	4.07

Proposed Project Phase 5 Criteria Pollutants - Annual Emissions (tons/yr).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	4.44	4.44	--	--	--	--
Blasting	7.67	0.44	124.42	31.57	--	3.71
Bulldozing, Scraping & Grading	1.19	0.18	--	--	--	--
Material Handling	7.74	1.16	--	--	--	--
Dust Entrainment - Unpaved Roads	64.16	6.42	--	--	--	--
Wind Erosion - Unpaved Roads	8.84	1.33	--	--	--	--
Wind Erosion - Active Areas	77.73	11.66	--	--	--	--
Subtotal - South Quarry:	171.76	25.62	124.42	31.57	--	3.71
Waste Rock Storage/Infill Areas						
Material Handling	5.00	0.75	--	--	--	--
Dust Entrainment - Unpaved Roads	75.48	7.55	--	--	--	--
Wind Erosion - Unpaved Roads	1.26	0.19	--	--	--	--
Wind Erosion - Active Areas	81.44	12.22	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	163.18	20.70	--	--	--	--
Topsoil Storage Area						
Material Handling	0.14	0.02	--	--	--	--
Dust Entrainment - Unpaved Roads	12.28	1.23	--	--	--	--
Wind Erosion - Unpaved Roads	2.51	0.38	--	--	--	--
Wind Erosion - Active Areas	1.40	0.21	--	--	--	--
Subtotal - Topsoil Storage Area:	16.33	1.84	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.07	--
Fuel Dispensing	--	--	--	--	0.05	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.12	--
Combustion Sources						
Portable Diesel Welders	0.00	0.00	0.02	0.02	0.00	0.00
Off-road Diesel Equipment	1.70	1.70	39.76	139.75	10.66	0.19
On-road On-site Vehicles	0.01	0.01	0.58	0.06	0.06	0.00
On-road Off-site Vehicles	0.01	0.01	0.43	0.10	0.05	0.00
Dust Entrainment - Paved Roads	0.11	0.02	--	--	--	--
Subtotal - Combustion Sources:	1.83	1.73	40.79	139.93	10.78	0.19
Totals (ton/yr):	353.10	49.89	165.21	171.50	10.90	3.90

Proposed Project Phase 1 Criteria Pollutants - Daily Emissions (pounds/day).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	24.82	24.82	--	--	--	--
Blasting	63.75	3.68	1,033.97	262.35	--	30.86
Bulldozing, Scraping & Grading	8.11	1.22	--	--	--	--
Material Handling	43.39	6.51	--	--	--	--
Dust Entrainment - Unpaved Roads	369.96	37.00	--	--	--	--
Wind Erosion - Unpaved Roads	38.67	5.80	--	--	--	--
Wind Erosion - Active Areas	221.97	33.30	--	--	--	--
Subtotal - South Quarry:	770.66	112.32	1,033.97	262.35	--	30.86
Waste Rock Storage/Infill Areas						
Material Handling	31.00	4.65	--	--	--	--
Dust Entrainment - Unpaved Roads	792.31	79.23	--	--	--	--
Wind Erosion - Unpaved Roads	10.19	1.53	--	--	--	--
Wind Erosion - Active Areas	182.04	27.31	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	1,015.53	112.71	--	--	--	--
Topsoil Storage Area						
Material Handling	0.69	0.10	--	--	--	--
Dust Entrainment - Unpaved Roads	81.92	8.19	--	--	--	--
Wind Erosion - Unpaved Roads	16.72	2.51	--	--	--	--
Wind Erosion - Active Areas	15.45	2.32	--	--	--	--
Subtotal - Topsoil Storage Area:	114.77	13.12	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.52	--
Fuel Dispensing	--	--	--	--	0.26	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.78	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.10	0.10	0.01	0.00
Off-road Diesel Equipment	9.46	9.46	222.82	770.91	59.78	1.05
On-road On-site Vehicles	0.09	0.06	4.43	0.46	0.47	0.01
On-road Off-site Vehicles	0.09	0.06	3.56	0.65	0.48	0.01
Dust Entrainment - Paved Roads	0.92	0.14	--	--	--	--
Subtotal - Combustion Sources:	10.57	9.73	230.91	772.12	60.74	1.07
Totals (pounds/day):	1,911.53	247.88	1,264.88	1,034.47	61.51	31.94

Proposed Project Phase 2 Criteria Pollutants - Daily Emissions (pounds/day).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	31.22	31.22	--	--	--	--
Blasting	127.49	7.36	2,067.95	524.70	--	61.73
Bulldozing, Scraping & Grading	9.04	1.36	--	--	--	--
Material Handling	55.54	8.33	--	--	--	--
Dust Entrainment - Unpaved Roads	630.58	63.06	--	--	--	--
Wind Erosion - Unpaved Roads	114.80	17.22	--	--	--	--
Wind Erosion - Active Areas	509.49	76.42	--	--	--	--
Subtotal - South Quarry:	1,478.15	204.96	2,067.95	524.70	--	61.73
Waste Rock Storage/Infill Areas						
Material Handling	36.12	5.42	--	--	--	--
Dust Entrainment - Unpaved Roads	865.32	86.53	--	--	--	--
Wind Erosion - Unpaved Roads	23.62	3.54	--	--	--	--
Wind Erosion - Active Areas	473.10	70.97	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	1,398.16	166.46	--	--	--	--
Topsoil Storage Area						
Material Handling	0.69	0.10	--	--	--	--
Dust Entrainment - Unpaved Roads	116.80	11.68	--	--	--	--
Wind Erosion - Unpaved Roads	16.72	2.51	--	--	--	--
Wind Erosion - Active Areas	11.91	1.79	--	--	--	--
Subtotal - Topsoil Storage Area:	146.12	16.08	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.58	--
Fuel Dispensing	--	--	--	--	0.35	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.93	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.13	0.12	0.02	0.00
Off-road Diesel Equipment	14.38	14.38	334.62	1,190.55	90.32	1.59
On-road On-site Vehicles	0.10	0.07	5.04	0.52	0.53	0.01
On-road Off-site Vehicles	0.09	0.06	3.58	0.77	0.48	0.01
Dust Entrainment - Paved Roads	0.92	0.14	--	--	--	--
Subtotal - Combustion Sources:	15.50	14.66	343.36	1,191.97	91.35	1.61
Totals (pounds/day):	3,037.93	402.15	2,411.31	1,716.67	92.29	63.34

Proposed Project Phase 3 Criteria Pollutants - Daily Emissions (pounds/day).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	36.13	36.13	--	--	--	--
Blasting	127.49	7.36	2,067.95	524.70	--	61.73
Bulldozing, Scraping & Grading	9.07	1.36	--	--	--	--
Material Handling	62.78	9.42	--	--	--	--
Dust Entrainment - Unpaved Roads	567.01	56.70	--	--	--	--
Wind Erosion - Unpaved Roads	103.57	15.54	--	--	--	--
Wind Erosion - Active Areas	366.10	54.91	--	--	--	--
Subtotal - South Quarry:	1,272.14	181.41	2,067.95	524.70	--	61.73
Waste Rock Storage/Infill Areas						
Material Handling	44.53	6.68	--	--	--	--
Dust Entrainment - Unpaved Roads	864.98	86.50	--	--	--	--
Wind Erosion - Unpaved Roads	6.82	1.02	--	--	--	--
Wind Erosion - Active Areas	222.89	33.43	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	1,139.23	127.63	--	--	--	--
Topsoil Storage Area						
Material Handling	0.32	0.05	--	--	--	--
Dust Entrainment - Unpaved Roads	74.17	7.42	--	--	--	--
Wind Erosion - Unpaved Roads	16.72	2.51	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--	--	--
Subtotal - Topsoil Storage Area:	91.21	9.97	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.57	--
Fuel Dispensing	--	--	--	--	0.31	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.88	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.15	0.14	0.02	0.00
Off-road Diesel Equipment	14.10	14.10	329.07	1,164.46	88.41	1.56
On-road On-site Vehicles	0.10	0.07	4.89	0.51	0.52	0.01
On-road Off-site Vehicles	0.09	0.06	3.42	0.72	0.46	0.01
Dust Entrainment - Paved Roads	0.88	0.13	--	--	--	--
Subtotal - Combustion Sources:	15.17	14.37	337.52	1,165.82	89.41	1.58
Totals (pounds/day):	2,517.75	333.39	2,405.47	1,690.52	90.29	63.31

Proposed Project Phase 4 Criteria Pollutants - Daily Emissions (pounds/day).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	30.91	30.91	--	--	--	--
Blasting	127.49	7.36	2,067.95	524.70	--	61.73
Bulldozing, Scraping & Grading	7.84	1.18	--	--	--	--
Material Handling	53.70	8.05	--	--	--	--
Dust Entrainment - Unpaved Roads	405.35	40.53	--	--	--	--
Wind Erosion - Unpaved Roads	98.72	14.81	--	--	--	--
Wind Erosion - Active Areas	372.53	55.88	--	--	--	--
Subtotal - South Quarry:	1,096.54	158.72	2,067.95	524.70	--	61.73
Waste Rock Storage/Infill Areas						
Material Handling	35.54	5.33	--	--	--	--
Dust Entrainment - Unpaved Roads	699.95	70.00	--	--	--	--
Wind Erosion - Unpaved Roads	8.38	1.26	--	--	--	--
Wind Erosion - Active Areas	317.03	47.55	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	1,060.89	124.14	--	--	--	--
Topsoil Storage Area						
Material Handling	0.08	0.01	--	--	--	--
Dust Entrainment - Unpaved Roads	42.90	4.29	--	--	--	--
Wind Erosion - Unpaved Roads	16.72	2.51	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--	--	--
Subtotal - Topsoil Storage Area:	59.70	6.81	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.52	--
Fuel Dispensing	--	--	--	--	0.30	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.82	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.13	0.12	0.02	0.00
Off-road Diesel Equipment	11.38	11.38	266.44	936.37	71.37	1.26
On-road On-site Vehicles	0.09	0.06	4.43	0.46	0.47	0.01
On-road Off-site Vehicles	0.08	0.05	3.13	0.68	0.42	0.01
Dust Entrainment - Paved Roads	0.81	0.12	--	--	--	--
Subtotal - Combustion Sources:	12.36	11.63	274.13	937.62	72.28	1.28
Totals (pounds/day):	2,229.50	301.29	2,342.07	1,462.33	73.10	63.01

Proposed Project Phase 5 Criteria Pollutants - Daily Emissions (pounds/day).

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
South Quarry						
Drilling	29.58	29.58	--	--	--	--
Blasting	63.75	3.68	1,033.97	262.35	--	30.86
Bulldozing, Scraping & Grading	7.94	1.19	--	--	--	--
Material Handling	51.60	7.74	--	--	--	--
Dust Entrainment - Unpaved Roads	427.71	42.77	--	--	--	--
Wind Erosion - Unpaved Roads	58.93	8.84	--	--	--	--
Wind Erosion - Active Areas	518.17	77.73	--	--	--	--
Subtotal - South Quarry:	1,157.67	171.52	1,033.97	262.35	--	30.86
Waste Rock Storage/Infill Areas						
Material Handling	33.34	5.00	--	--	--	--
Dust Entrainment - Unpaved Roads	503.22	50.32	--	--	--	--
Wind Erosion - Unpaved Roads	8.38	1.26	--	--	--	--
Wind Erosion - Active Areas	542.95	81.44	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	1,087.89	138.02	--	--	--	--
Topsoil Storage Area						
Material Handling	0.91	0.14	--	--	--	--
Dust Entrainment - Unpaved Roads	81.85	8.19	--	--	--	--
Wind Erosion - Unpaved Roads	16.72	2.51	--	--	--	--
Wind Erosion - Active Areas	9.36	1.40	--	--	--	--
Subtotal - Topsoil Storage Area:	108.85	12.23	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.48	--
Fuel Dispensing	--	--	--	--	0.31	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.79	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.12	0.11	0.02	0.00
Off-road Diesel Equipment	11.32	11.32	265.06	931.68	71.10	1.25
On-road On-site Vehicles	0.08	0.06	3.97	0.41	0.42	0.01
On-road Off-site Vehicles	0.08	0.05	2.93	0.68	0.40	0.01
Dust Entrainment - Paved Roads	0.75	0.11	--	--	--	--
Subtotal - Combustion Sources:	12.24	11.55	272.08	932.89	71.93	1.27
Totals (pounds/day):	2,366.64	333.33	1,306.06	1,195.24	72.73	32.14

Proposed Project Phase 1 Toxic Air Contaminants - Annual Emissions (lb/yr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	0.02	0.01	5.81	0.01	0.01	0.18	0.05	0.10	0.01	0.00	0.02	0.17	0.02	0.01	0.01	0.14	0.19	0.00	27.65
Blasting	--	0.03	0.02	10.04	0.01	0.02	0.31	0.08	0.18	0.02	0.00	0.03	0.30	0.03	0.02	0.02	0.24	0.32	0.00	47.81
Bulldozing, Scraping & Grading	--	0.01	0.00	1.90	0.00	0.00	0.06	0.02	0.03	0.00	0.00	0.01	0.06	0.01	0.00	0.00	0.05	0.06	0.00	9.03
Material Handling	--	0.03	0.02	10.15	0.01	0.02	0.31	0.08	0.18	0.02	0.00	0.03	0.30	0.03	0.02	0.02	0.25	0.33	0.00	48.33
Dust Entrainment - Unpaved Roads	--	0.28	0.14	110.99	0.08	0.14	4.55	1.09	2.77	0.26	0.02	0.28	5.99	0.28	0.14	0.14	9.21	3.77	0.21	787.93
Wind Erosion - Unpaved Roads	--	0.03	0.01	11.60	0.01	0.01	0.48	0.11	0.29	0.03	0.00	0.03	0.63	0.03	0.01	0.01	0.96	0.39	0.02	82.35
Wind Erosion - Active Areas	--	0.17	0.08	51.94	0.05	0.08	1.60	0.43	0.93	0.08	0.01	0.17	1.53	0.17	0.08	0.08	1.27	1.66	0.01	247.24
Subtotal - South Quarry:	--	0.56	0.28	202.43	0.17	0.28	7.48	1.86	4.50	0.41	0.04	0.56	8.97	0.56	0.28	0.28	12.12	6.73	0.24	1,250.34
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.02	0.01	7.25	0.01	0.01	0.22	0.06	0.13	0.01	0.00	0.02	0.21	0.02	0.01	0.01	0.18	0.23	0.00	34.52
Dust Entrainment - Unpaved Roads	--	0.59	0.30	237.69	0.18	0.30	9.75	2.33	5.94	0.55	0.03	0.59	12.84	0.59	0.30	0.30	19.73	8.08	0.45	1,687.44
Wind Erosion - Unpaved Roads	--	0.01	0.00	3.06	0.00	0.00	0.13	0.03	0.08	0.01	0.00	0.01	0.17	0.01	0.00	0.00	0.25	0.10	0.01	21.70
Wind Erosion - Active Areas	--	0.14	0.07	42.60	0.04	0.07	1.31	0.35	0.76	0.07	0.01	0.14	1.26	0.14	0.07	0.07	1.04	1.37	0.01	202.76
Subtotal - Waste Rock Storage/Infill:	--	0.76	0.38	290.60	0.23	0.38	11.40	2.77	6.91	0.63	0.05	0.76	14.47	0.76	0.38	0.38	21.20	9.78	0.46	1,946.42
Topsoil Storage Area																				
Material Handling	--	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.76
Dust Entrainment - Unpaved Roads	--	0.06	0.03	24.58	0.02	0.03	1.01	0.24	0.61	0.06	0.00	0.06	1.33	0.06	0.03	0.03	2.04	0.84	0.05	174.46
Wind Erosion - Unpaved Roads	--	0.01	0.01	5.02	0.00	0.01	0.21	0.05	0.13	0.01	0.00	0.01	0.27	0.01	0.01	0.01	0.42	0.17	0.01	35.61
Wind Erosion - Active Areas	--	0.01	0.01	3.62	0.00	0.01	0.11	0.03	0.06	0.01	0.00	0.01	0.11	0.01	0.01	0.01	0.09	0.12	0.00	17.21
Subtotal - Topsoil Storage Area:	--	0.09	0.04	33.37	0.03	0.04	1.33	0.32	0.81	0.07	0.01	0.09	1.71	0.09	0.04	0.04	2.55	1.13	0.06	228.04
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	1.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	2,839.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	3.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	2,844.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/yr):	2,844.33	1.41	0.71	526.40	0.42	0.71	20.22	4.95	12.22	1.12	0.09	1.41	25.15	1.41	0.71	0.71	35.86	17.64	0.76	3,424.80

Proposed Project Phase 2 Toxic Air Contaminants - Annual Emissions (lb/yr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	0.02	0.01	7.30	0.01	0.01	0.22	0.06	0.13	0.01	0.00	0.02	0.22	0.02	0.01	0.01	0.18	0.23	0.00	34.77
Blasting	--	0.04	0.02	12.63	0.01	0.02	0.39	0.10	0.23	0.02	0.00	0.04	0.37	0.04	0.02	0.02	0.31	0.40	0.00	60.11
Bulldozing, Scraping & Grading	--	0.01	0.00	2.12	0.00	0.00	0.07	0.02	0.04	0.00	0.00	0.01	0.06	0.01	0.00	0.00	0.05	0.07	0.00	10.07
Material Handling	--	0.04	0.02	13.00	0.01	0.02	0.40	0.11	0.23	0.02	0.00	0.04	0.38	0.04	0.02	0.02	0.32	0.42	0.00	61.86
Dust Entrainment - Unpaved Roads	--	0.47	0.24	189.17	0.14	0.24	7.76	1.85	4.73	0.44	0.03	0.47	10.22	0.47	0.24	0.24	15.70	6.43	0.36	1,342.99
Wind Erosion - Unpaved Roads	--	0.09	0.04	34.44	0.03	0.04	1.41	0.34	0.86	0.08	0.00	0.09	1.86	0.09	0.04	0.04	2.86	1.17	0.07	244.49
Wind Erosion - Active Areas	--	0.38	0.19	119.22	0.11	0.19	3.67	0.98	2.14	0.19	0.03	0.38	3.52	0.38	0.19	0.19	2.90	3.82	0.02	567.49
Subtotal - South Quarry:	--	1.05	0.53	377.88	0.32	0.53	13.91	3.46	8.36	0.76	0.07	1.05	16.62	1.05	0.53	0.53	22.32	12.55	0.44	2,321.77
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.03	0.01	8.45	0.01	0.01	0.26	0.07	0.15	0.01	0.00	0.03	0.25	0.03	0.01	0.01	0.21	0.27	0.00	40.23
Dust Entrainment - Unpaved Roads	--	0.65	0.32	259.59	0.19	0.32	10.64	2.54	6.49	0.60	0.04	0.65	14.02	0.65	0.32	0.32	21.55	8.83	0.49	1,842.92
Wind Erosion - Unpaved Roads	--	0.02	0.01	7.09	0.01	0.01	0.29	0.07	0.18	0.02	0.00	0.02	0.38	0.02	0.01	0.01	0.59	0.24	0.01	50.30
Wind Erosion - Active Areas	--	0.35	0.18	110.71	0.11	0.18	3.41	0.91	1.99	0.18	0.03	0.35	3.26	0.35	0.18	0.18	2.70	3.55	0.01	526.96
Subtotal - Waste Rock Storage/Infill:	--	1.05	0.52	385.84	0.31	0.52	14.60	3.59	8.81	0.80	0.07	1.05	17.91	1.05	0.52	0.52	25.04	12.89	0.52	2,460.41
Topsoil Storage Area																				
Material Handling	--	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.77
Dust Entrainment - Unpaved Roads	--	0.09	0.04	35.04	0.03	0.04	1.44	0.34	0.88	0.08	0.00	0.09	1.89	0.09	0.04	0.04	2.91	1.19	0.07	248.76
Wind Erosion - Unpaved Roads	--	0.01	0.01	5.02	0.00	0.01	0.21	0.05	0.13	0.01	0.00	0.01	0.27	0.01	0.01	0.01	0.42	0.17	0.01	35.61
Wind Erosion - Active Areas	--	0.01	0.00	2.79	0.00	0.00	0.09	0.02	0.05	0.00	0.00	0.01	0.08	0.01	0.00	0.00	0.07	0.09	0.00	13.27
Subtotal - Topsoil Storage Area:	--	0.11	0.05	43.01	0.03	0.05	1.73	0.42	1.05	0.10	0.01	0.11	2.25	0.11	0.05	0.05	3.40	1.46	0.08	298.40
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	2.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	4,313.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	4.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	4,319.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/yr):	4,319.95	2.21	1.11	806.72	0.66	1.11	30.25	7.47	18.22	1.66	0.15	2.21	36.79	2.21	1.11	1.11	50.75	26.89	1.04	5,080.59

Proposed Project Phase 3 Toxic Air Contaminants - Annual Emissions (lb/yr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	0.03	0.01	8.45	0.01	0.01	0.26	0.07	0.15	0.01	0.00	0.03	0.25	0.03	0.01	0.01	0.21	0.27	0.00	40.24
Blasting	--	0.05	0.02	14.62	0.01	0.02	0.45	0.12	0.26	0.02	0.00	0.05	0.43	0.05	0.02	0.02	0.36	0.47	0.00	69.58
Bulldozing, Scraping & Grading	--	0.01	0.00	2.12	0.00	0.00	0.07	0.02	0.04	0.00	0.00	0.01	0.06	0.01	0.00	0.00	0.05	0.07	0.00	10.10
Material Handling	--	0.05	0.02	14.69	0.01	0.02	0.45	0.12	0.26	0.02	0.00	0.05	0.43	0.05	0.02	0.02	0.36	0.47	0.00	69.92
Dust Entrainment - Unpaved Roads	--	0.43	0.21	170.10	0.13	0.21	6.97	1.67	4.25	0.39	0.02	0.43	9.19	0.43	0.21	0.21	14.12	5.78	0.32	1,207.59
Wind Erosion - Unpaved Roads	--	0.08	0.04	31.07	0.02	0.04	1.27	0.30	0.78	0.07	0.00	0.08	1.68	0.08	0.04	0.04	2.58	1.06	0.06	220.57
Wind Erosion - Active Areas	--	0.27	0.14	85.67	0.08	0.14	2.64	0.70	1.54	0.14	0.02	0.27	2.53	0.27	0.14	0.14	2.09	2.75	0.01	407.77
Subtotal - South Quarry:	--	0.91	0.45	326.72	0.27	0.45	12.11	3.00	7.28	0.66	0.06	0.91	14.57	0.91	0.45	0.45	19.76	10.86	0.40	2,025.79
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.03	0.02	10.42	0.01	0.02	0.32	0.09	0.19	0.02	0.00	0.03	0.31	0.03	0.02	0.02	0.25	0.33	0.00	49.60
Dust Entrainment - Unpaved Roads	--	0.65	0.32	259.49	0.19	0.32	10.64	2.54	6.49	0.60	0.04	0.65	14.01	0.65	0.32	0.32	21.54	8.82	0.49	1,842.20
Wind Erosion - Unpaved Roads	--	0.01	0.00	2.05	0.00	0.00	0.08	0.02	0.05	0.00	0.00	0.01	0.11	0.01	0.00	0.00	0.17	0.07	0.00	14.52
Wind Erosion - Active Areas	--	0.17	0.08	52.16	0.05	0.08	1.60	0.43	0.94	0.08	0.01	0.17	1.54	0.17	0.08	0.08	1.27	1.67	0.01	248.27
Subtotal - Waste Rock Storage/Infill:	--	0.85	0.43	324.12	0.26	0.43	12.65	3.08	7.66	0.70	0.05	0.85	15.97	0.85	0.43	0.43	23.23	10.90	0.50	2,154.59
Topsoil Storage Area																				
Material Handling	--	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Dust Entrainment - Unpaved Roads	--	0.06	0.03	22.25	0.02	0.03	0.91	0.22	0.56	0.05	0.00	0.06	1.20	0.06	0.03	0.03	1.85	0.76	0.04	157.97
Wind Erosion - Unpaved Roads	--	0.01	0.01	5.02	0.00	0.01	0.21	0.05	0.13	0.01	0.00	0.01	0.27	0.01	0.01	0.01	0.42	0.17	0.01	35.61
Wind Erosion - Active Areas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Topsoil Storage Area:	--	0.07	0.03	27.34	0.02	0.03	1.12	0.27	0.68	0.06	0.00	0.07	1.47	0.07	0.03	0.03	2.27	0.93	0.05	193.94
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	2.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	4,229.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	4.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	4,236.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/yr):	4,236.50	1.83	0.91	678.18	0.55	0.91	25.88	6.35	15.63	1.43	0.12	1.83	32.01	1.83	0.91	0.91	45.25	22.69	0.96	4,374.32

Proposed Project Phase 4 Toxic Air Contaminants - Annual Emissions (lb/yr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	0.02	0.01	7.23	0.01	0.01	0.22	0.06	0.13	0.01	0.00	0.02	0.21	0.02	0.01	0.01	0.18	0.23	0.00	34.43
Blasting	--	0.04	0.02	12.50	0.01	0.02	0.38	0.10	0.22	0.02	0.00	0.04	0.37	0.04	0.02	0.02	0.30	0.40	0.00	59.52
Bulldozing, Scraping & Grading	--	0.01	0.00	1.83	0.00	0.00	0.06	0.02	0.03	0.00	0.00	0.01	0.05	0.01	0.00	0.00	0.04	0.06	0.00	8.73
Material Handling	--	0.04	0.02	12.57	0.01	0.02	0.39	0.10	0.23	0.02	0.00	0.04	0.37	0.04	0.02	0.02	0.31	0.40	0.00	59.81
Dust Entrainment - Unpaved Roads	--	0.30	0.15	121.60	0.09	0.15	4.99	1.19	3.04	0.28	0.02	0.30	6.57	0.30	0.15	0.15	10.09	4.13	0.23	863.30
Wind Erosion - Unpaved Roads	--	0.07	0.04	29.62	0.02	0.04	1.21	0.29	0.74	0.07	0.00	0.07	1.60	0.07	0.04	0.04	2.46	1.01	0.06	210.25
Wind Erosion - Active Areas	--	0.28	0.14	87.17	0.08	0.14	2.68	0.72	1.56	0.14	0.02	0.28	2.57	0.28	0.14	0.14	2.12	2.79	0.01	414.94
Subtotal - South Quarry:	--	0.77	0.38	272.53	0.23	0.38	9.93	2.48	5.96	0.54	0.05	0.77	11.74	0.77	0.38	0.38	15.51	9.03	0.30	1,650.98
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.03	0.01	8.32	0.01	0.01	0.26	0.07	0.15	0.01	0.00	0.03	0.25	0.03	0.01	0.01	0.20	0.27	0.00	39.58
Dust Entrainment - Unpaved Roads	--	0.52	0.26	209.99	0.16	0.26	8.61	2.06	5.25	0.48	0.03	0.52	11.34	0.52	0.26	0.26	17.43	7.14	0.40	1,490.73
Wind Erosion - Unpaved Roads	--	0.01	0.00	2.51	0.00	0.00	0.10	0.02	0.06	0.01	0.00	0.01	0.14	0.01	0.00	0.00	0.21	0.09	0.00	17.85
Wind Erosion - Active Areas	--	0.24	0.12	74.18	0.07	0.12	2.28	0.61	1.33	0.12	0.02	0.24	2.19	0.24	0.12	0.12	1.81	2.38	0.01	353.12
Subtotal - Waste Rock Storage/Infill:	--	0.80	0.40	295.00	0.24	0.40	11.25	2.76	6.79	0.62	0.05	0.80	13.91	0.80	0.40	0.40	19.65	9.87	0.41	1,901.27
Topsoil Storage Area																				
Material Handling	--	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Dust Entrainment - Unpaved Roads	--	0.03	0.02	12.87	0.01	0.02	0.53	0.13	0.32	0.03	0.00	0.03	0.69	0.03	0.02	0.02	1.07	0.44	0.02	91.36
Wind Erosion - Unpaved Roads	--	0.01	0.01	5.02	0.00	0.01	0.21	0.05	0.13	0.01	0.00	0.01	0.27	0.01	0.01	0.01	0.42	0.17	0.01	35.61
Wind Erosion - Active Areas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Topsoil Storage Area:	--	0.04	0.02	17.90	0.01	0.02	0.73	0.18	0.45	0.04	0.00	0.04	0.97	0.04	0.02	0.02	1.48	0.61	0.03	127.06
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	2.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	3,414.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	3.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	3,420.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/yr):	3,420.43	1.61	0.80	585.43	0.48	0.80	21.92	5.41	13.20	1.20	0.11	1.61	26.62	1.61	0.80	0.80	36.64	19.51	0.75	3,679.32

Proposed Project Phase 5 Toxic Air Contaminants - Annual Emissions (lb/yr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	0.02	0.01	6.92	0.01	0.01	0.21	0.06	0.12	0.01	0.00	0.02	0.20	0.02	0.01	0.01	0.17	0.22	0.00	32.94
Blasting	--	0.04	0.02	11.97	0.01	0.02	0.37	0.10	0.21	0.02	0.00	0.04	0.35	0.04	0.02	0.02	0.29	0.38	0.00	56.96
Bulldozing, Scraping & Grading	--	0.01	0.00	1.86	0.00	0.00	0.06	0.02	0.03	0.00	0.00	0.01	0.05	0.01	0.00	0.00	0.05	0.06	0.00	8.85
Material Handling	--	0.04	0.02	12.07	0.01	0.02	0.37	0.10	0.22	0.02	0.00	0.04	0.36	0.04	0.02	0.02	0.29	0.39	0.00	57.47
Dust Entrainment - Unpaved Roads	--	0.32	0.16	128.31	0.10	0.16	5.26	1.26	3.21	0.30	0.02	0.32	6.93	0.32	0.16	0.16	10.65	4.36	0.24	910.91
Wind Erosion - Unpaved Roads	--	0.04	0.02	17.68	0.01	0.02	0.72	0.17	0.44	0.04	0.00	0.04	0.95	0.04	0.02	0.02	1.47	0.60	0.03	125.51
Wind Erosion - Active Areas	--	0.39	0.19	121.25	0.12	0.19	3.73	0.99	2.18	0.19	0.03	0.39	3.58	0.39	0.19	0.19	2.95	3.89	0.02	577.16
Subtotal - South Quarry:	--	0.86	0.43	300.06	0.26	0.43	10.73	2.69	6.42	0.58	0.06	0.86	12.43	0.86	0.43	0.43	15.87	9.90	0.30	1,769.80
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.03	0.01	7.80	0.01	0.01	0.24	0.06	0.14	0.01	0.00	0.03	0.23	0.03	0.01	0.01	0.19	0.25	0.00	37.14
Dust Entrainment - Unpaved Roads	--	0.38	0.19	150.96	0.11	0.19	6.19	1.48	3.77	0.35	0.02	0.38	8.15	0.38	0.19	0.19	12.53	5.13	0.29	1,071.73
Wind Erosion - Unpaved Roads	--	0.01	0.00	2.51	0.00	0.00	0.10	0.02	0.06	0.01	0.00	0.01	0.14	0.01	0.00	0.00	0.21	0.09	0.00	17.85
Wind Erosion - Active Areas	--	0.41	0.20	127.05	0.12	0.20	3.91	1.04	2.28	0.20	0.03	0.41	3.75	0.41	0.20	0.20	3.09	4.07	0.02	604.76
Subtotal - Waste Rock Storage/Infill:	--	0.82	0.41	288.33	0.24	0.41	10.44	2.61	6.26	0.57	0.06	0.82	12.26	0.82	0.41	0.41	16.02	9.54	0.31	1,731.47
Topsoil Storage Area																				
Material Handling	--	0.00	0.00	0.21	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	1.01
Dust Entrainment - Unpaved Roads	--	0.06	0.03	24.56	0.02	0.03	1.01	0.24	0.61	0.06	0.00	0.06	1.33	0.06	0.03	0.03	2.04	0.83	0.05	174.33
Wind Erosion - Unpaved Roads	--	0.01	0.01	5.02	0.00	0.01	0.21	0.05	0.13	0.01	0.00	0.01	0.27	0.01	0.01	0.01	0.42	0.17	0.01	35.61
Wind Erosion - Active Areas	--	0.01	0.00	2.19	0.00	0.00	0.07	0.02	0.04	0.00	0.00	0.01	0.06	0.01	0.00	0.00	0.05	0.07	0.00	10.43
Subtotal - Topsoil Storage Area:	--	0.08	0.04	31.98	0.02	0.04	1.29	0.31	0.78	0.07	0.00	0.08	1.67	0.08	0.04	0.04	2.51	1.08	0.06	221.38
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	2.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	3,396.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	4.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	3,402.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/yr):	3,402.29	1.76	0.88	620.37	0.53	0.88	22.45	5.61	13.45	1.22	0.12	1.76	26.36	1.76	0.88	0.88	34.41	20.52	0.66	3,722.65

Proposed Project Phase 1 Toxic Air Contaminants - Hourly Emissions (lb/hr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	3.88E-06	1.94E-06	1.21E-03	1.16E-06	1.94E-06	3.72E-05	9.93E-06	2.17E-05	1.94E-06	3.10E-07	3.88E-06	3.57E-05	3.88E-06	1.94E-06	1.94E-06	2.95E-05	3.88E-05	1.55E-07	5.76E-03
Blasting	--	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
Bulldozing, Scraping & Grading	--	2.53E-06	1.27E-06	7.90E-04	7.60E-07	1.27E-06	2.43E-05	6.48E-06	1.42E-05	1.27E-06	2.03E-07	2.53E-06	2.33E-05	2.53E-06	1.27E-06	1.27E-06	1.92E-05	2.53E-05	1.01E-07	3.76E-03
Material Handling	--	1.36E-05	6.78E-06	4.23E-03	4.07E-06	6.78E-06	1.30E-04	3.47E-05	7.59E-05	6.78E-06	1.08E-06	1.36E-05	1.25E-04	1.36E-05	6.78E-06	6.78E-06	1.03E-04	1.36E-04	5.42E-07	2.01E-02
Dust Entrainment - Unpaved Roads	--	1.16E-04	5.78E-05	4.62E-02	3.47E-05	5.78E-05	1.90E-03	4.53E-04	1.16E-03	1.06E-04	6.47E-06	1.16E-04	2.50E-03	1.16E-04	5.78E-05	5.78E-05	3.84E-03	1.57E-03	8.79E-05	3.28E-01
Wind Erosion - Unpaved Roads	--	1.21E-05	6.04E-06	4.83E-03	3.63E-06	6.04E-06	1.98E-04	4.74E-05	1.21E-04	1.11E-05	6.77E-07	1.21E-05	2.61E-04	1.21E-05	6.04E-06	6.04E-06	4.01E-04	1.64E-04	9.18E-06	3.43E-02
Wind Erosion - Active Areas	--	6.94E-05	3.47E-05	2.16E-02	2.08E-05	3.47E-05	6.66E-04	1.78E-04	3.88E-04	3.47E-05	5.55E-06	6.94E-05	6.38E-04	6.94E-05	3.47E-05	3.47E-05	5.27E-04	6.94E-04	2.77E-06	1.03E-01
Subtotal - South Quarry:	--	3.76E-04	1.88E-04	1.29E-01	1.13E-04	1.88E-04	4.48E-03	1.14E-03	2.67E-03	2.42E-04	2.70E-05	3.76E-04	5.05E-03	3.76E-04	1.88E-04	1.88E-04	6.13E-03	4.22E-03	1.07E-04	7.32E-01
Waste Rock Storage/Infill Areas																				
Material Handling	--	9.69E-06	4.84E-06	3.02E-03	2.91E-06	4.84E-06	9.30E-05	2.48E-05	5.42E-05	4.84E-06	7.75E-07	9.69E-06	8.91E-05	9.69E-06	4.84E-06	4.84E-06	7.36E-05	9.69E-05	3.87E-07	1.44E-02
Dust Entrainment - Unpaved Roads	--	2.48E-04	1.24E-04	9.90E-02	7.43E-05	1.24E-04	4.06E-03	9.71E-04	2.48E-03	2.28E-04	1.39E-05	2.48E-04	5.35E-03	2.48E-04	1.24E-04	1.24E-04	8.22E-03	3.37E-03	1.88E-04	7.03E-01
Wind Erosion - Unpaved Roads	--	3.18E-06	1.59E-06	1.27E-03	9.55E-07	1.59E-06	5.22E-05	1.25E-05	3.18E-05	2.93E-06	1.78E-07	3.18E-06	6.88E-05	3.18E-06	1.59E-06	1.59E-06	1.06E-04	4.33E-05	2.42E-06	9.04E-03
Wind Erosion - Active Areas	--	5.69E-05	2.84E-05	1.77E-02	1.71E-05	2.84E-05	5.46E-04	1.46E-04	3.19E-04	2.84E-05	4.55E-06	5.69E-05	5.23E-04	5.69E-05	2.84E-05	2.84E-05	4.32E-04	5.69E-04	2.28E-06	8.45E-02
Subtotal - Waste Rock Storage/Infill:	--	3.17E-04	1.59E-04	1.21E-01	9.52E-05	1.59E-04	4.75E-03	1.15E-03	2.88E-03	2.64E-04	1.94E-05	3.17E-04	6.03E-03	3.17E-04	1.59E-04	1.59E-04	8.83E-03	4.08E-03	1.93E-04	8.11E-01
Topsoil Storage Area																				
Material Handling	--	2.14E-07	1.07E-07	6.69E-05	6.43E-08	1.07E-07	2.06E-06	5.49E-07	1.20E-06	1.07E-07	1.71E-08	2.14E-07	1.97E-06	2.14E-07	1.07E-07	1.07E-07	1.63E-06	2.14E-06	8.57E-09	3.18E-04
Dust Entrainment - Unpaved Roads	--	2.56E-05	1.28E-05	1.02E-02	7.68E-06	1.28E-05	4.20E-04	1.00E-04	2.56E-04	2.36E-05	1.43E-06	2.56E-05	5.53E-04	2.56E-05	1.28E-05	1.28E-05	8.50E-04	3.48E-04	1.95E-05	7.27E-02
Wind Erosion - Unpaved Roads	--	5.22E-06	2.61E-06	2.09E-03	1.57E-06	2.61E-06	8.57E-05	2.05E-05	5.22E-05	4.81E-06	2.93E-07	5.22E-06	1.13E-04	5.22E-06	2.61E-06	2.61E-06	1.73E-04	7.11E-05	3.97E-06	1.48E-02
Wind Erosion - Active Areas	--	4.83E-06	2.41E-06	1.51E-03	1.45E-06	2.41E-06	4.64E-05	1.24E-05	2.70E-05	2.41E-06	3.86E-07	4.83E-06	4.44E-05	4.83E-06	2.41E-06	2.41E-06	3.67E-05	4.83E-05	1.93E-07	7.17E-03
Subtotal - Topsoil Storage Area:	--	3.59E-05	1.79E-05	1.39E-02	1.08E-05	1.79E-05	5.54E-04	1.34E-04	3.36E-04	3.09E-05	2.13E-06	3.59E-05	7.12E-04	3.59E-05	1.79E-05	1.79E-05	1.06E-03	4.70E-04	2.36E-05	9.50E-02
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	7.89E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	1.18E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	1.16E-05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	1.38E-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	1.19E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/hr):	1.19E+00	7.30E-04	3.65E-04	2.64E-01	2.19E-04	3.65E-04	9.79E-03	2.42E-03	5.89E-03	5.37E-04	4.85E-05	7.30E-04	1.18E-02	7.30E-04	3.65E-04	3.65E-04	1.60E-02	8.77E-03	3.24E-04	1.64E+00

Proposed Project Phase 2 Toxic Air Contaminants - Hourly Emissions (lb/hr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	4.88E-06	2.44E-06	1.52E-03	1.46E-06	2.44E-06	4.68E-05	1.25E-05	2.73E-05	2.44E-06	3.90E-07	4.88E-06	4.49E-05	4.88E-06	2.44E-06	2.44E-06	3.71E-05	4.88E-05	1.95E-07	7.24E-03
Blasting	--	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
Bulldozing, Scraping & Grading	--	1.41E-06	7.06E-07	4.41E-04	4.24E-07	7.06E-07	1.36E-05	3.62E-06	7.91E-06	7.06E-07	1.13E-07	1.41E-06	1.30E-05	1.41E-06	7.06E-07	7.06E-07	1.07E-05	1.41E-05	5.65E-08	2.10E-03
Material Handling	--	8.68E-06	4.34E-06	2.71E-03	2.60E-06	4.34E-06	8.33E-05	2.22E-05	4.86E-05	4.34E-06	6.94E-07	8.68E-06	7.98E-05	8.68E-06	4.34E-06	4.34E-06	6.60E-05	8.68E-05	3.47E-07	1.29E-02
Dust Entrainment - Unpaved Roads	--	9.85E-05	4.93E-05	3.94E-02	2.96E-05	4.93E-05	1.62E-03	3.86E-04	9.85E-04	9.06E-05	5.52E-06	9.85E-05	2.13E-03	9.85E-05	4.93E-05	4.93E-05	3.27E-03	1.34E-03	7.49E-05	2.80E-01
Wind Erosion - Unpaved Roads	--	1.79E-05	8.97E-06	7.17E-03	5.38E-06	8.97E-06	2.94E-04	7.03E-05	1.79E-04	1.65E-05	1.00E-06	1.79E-05	3.87E-04	1.79E-05	8.97E-06	8.97E-06	5.96E-04	2.44E-04	1.36E-05	5.09E-02
Wind Erosion - Active Areas	--	7.96E-05	3.98E-05	2.48E-02	2.39E-05	3.98E-05	7.64E-04	2.04E-04	4.46E-04	3.98E-05	6.37E-06	7.96E-05	7.32E-04	7.96E-05	3.98E-05	3.98E-05	6.05E-04	7.96E-04	3.18E-06	1.18E-01
Subtotal - South Quarry:	--	3.70E-04	1.85E-04	1.26E-01	1.11E-04	1.85E-04	4.35E-03	1.11E-03	2.59E-03	2.34E-04	2.68E-05	3.70E-04	4.85E-03	3.70E-04	1.85E-04	1.85E-04	5.80E-03	4.12E-03	9.87E-05	7.08E-01
Waste Rock Storage/Infill Areas																				
Material Handling	--	5.64E-06	2.82E-06	1.76E-03	1.69E-06	2.82E-06	5.42E-05	1.44E-05	3.16E-05	2.82E-06	4.51E-07	5.64E-06	5.19E-05	5.64E-06	2.82E-06	2.82E-06	4.29E-05	5.64E-05	2.26E-07	8.38E-03
Dust Entrainment - Unpaved Roads	--	1.35E-04	6.76E-05	5.41E-02	4.06E-05	6.76E-05	2.22E-03	5.30E-04	1.35E-03	1.24E-04	7.57E-06	1.35E-04	2.92E-03	1.35E-04	6.76E-05	6.76E-05	4.49E-03	1.84E-03	1.03E-04	3.84E-01
Wind Erosion - Unpaved Roads	--	3.69E-06	1.85E-06	1.48E-03	1.11E-06	1.85E-06	6.05E-05	1.45E-05	3.69E-05	3.40E-06	2.07E-07	3.69E-06	7.97E-05	3.69E-06	1.85E-06	1.85E-06	1.23E-04	5.02E-05	2.80E-06	1.05E-02
Wind Erosion - Active Areas	--	7.39E-05	3.70E-05	2.31E-02	2.22E-05	3.70E-05	7.10E-04	1.89E-04	4.14E-04	3.70E-05	5.91E-06	7.39E-05	6.80E-04	7.39E-05	3.70E-05	3.70E-05	5.62E-04	7.39E-04	2.96E-06	1.10E-01
Subtotal - Waste Rock Storage/Infill:	--	2.18E-04	1.09E-04	8.04E-02	6.55E-05	1.09E-04	3.04E-03	7.48E-04	1.83E-03	1.68E-04	1.41E-05	2.18E-04	3.73E-03	2.18E-04	1.09E-04	1.09E-04	5.22E-03	2.68E-03	1.09E-04	5.13E-01
Topsoil Storage Area																				
Material Handling	--	1.08E-07	5.42E-08	3.38E-05	3.25E-08	5.42E-08	1.04E-06	2.78E-07	6.07E-07	5.42E-08	8.68E-09	1.08E-07	9.98E-07	1.08E-07	5.42E-08	5.42E-08	8.24E-07	1.08E-06	4.34E-09	1.61E-04
Dust Entrainment - Unpaved Roads	--	1.83E-05	9.13E-06	7.30E-03	5.48E-06	9.13E-06	2.99E-04	7.15E-05	1.83E-04	1.68E-05	1.02E-06	1.83E-05	3.94E-04	1.83E-05	9.13E-06	9.13E-06	6.06E-04	2.48E-04	1.39E-05	5.18E-02
Wind Erosion - Unpaved Roads	--	2.61E-06	1.31E-06	1.04E-03	7.84E-07	1.31E-06	4.28E-05	1.02E-05	2.61E-05	2.40E-06	1.46E-07	2.61E-06	5.64E-05	2.61E-06	1.31E-06	1.31E-06	8.67E-05	3.55E-05	1.99E-06	7.42E-03
Wind Erosion - Active Areas	--	1.86E-06	9.30E-07	5.81E-04	5.58E-07	9.30E-07	1.79E-05	4.76E-06	1.04E-05	9.30E-07	1.49E-07	1.86E-06	1.71E-05	1.86E-06	9.30E-07	9.30E-07	1.41E-05	1.86E-05	7.44E-08	2.76E-03
Subtotal - Topsoil Storage Area:	--	2.28E-05	1.14E-05	8.96E-03	6.85E-06	1.14E-05	3.61E-04	8.68E-05	2.20E-04	2.02E-05	1.33E-06	2.28E-05	4.69E-04	2.28E-05	1.14E-05	1.14E-05	7.08E-04	3.03E-04	1.59E-05	6.22E-02
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	4.91E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	8.99E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	6.59E-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	9.24E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	9.00E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/hr):	9.00E-01	6.12E-04	3.06E-04	2.15E-01	1.84E-04	3.06E-04	7.75E-03	1.94E-03	4.64E-03	4.22E-04	4.23E-05	6.12E-04	9.05E-03	6.12E-04	3.06E-04	3.06E-04	1.17E-02	7.11E-03	2.23E-04	1.28E+00

Proposed Project Phase 3 Toxic Air Contaminants - Hourly Emissions (lb/hr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	5.65E-06	2.82E-06	1.76E-03	1.69E-06	2.82E-06	5.42E-05	1.45E-05	3.16E-05	2.82E-06	4.52E-07	5.65E-06	5.19E-05	5.65E-06	2.82E-06	2.82E-06	4.29E-05	5.65E-05	2.26E-07	8.38E-03
Blasting	--	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
Bulldozing, Scraping & Grading	--	1.42E-06	7.08E-07	4.42E-04	4.25E-07	7.08E-07	1.36E-05	3.63E-06	7.93E-06	7.08E-07	1.13E-07	1.42E-06	1.30E-05	1.42E-06	7.08E-07	7.08E-07	1.08E-05	1.42E-05	5.67E-08	2.10E-03
Material Handling	--	9.81E-06	4.90E-06	3.06E-03	2.94E-06	4.90E-06	9.42E-05	2.51E-05	5.49E-05	4.90E-06	7.85E-07	9.81E-06	9.02E-05	9.81E-06	4.90E-06	4.90E-06	7.45E-05	9.81E-05	3.92E-07	1.46E-02
Dust Entrainment - Unpaved Roads	--	8.86E-05	4.43E-05	3.54E-02	2.66E-05	4.43E-05	1.45E-03	3.47E-04	8.86E-04	8.15E-05	4.96E-06	8.86E-05	1.91E-03	8.86E-05	4.43E-05	4.43E-05	2.94E-03	1.20E-03	6.73E-05	2.52E-01
Wind Erosion - Unpaved Roads	--	1.62E-05	8.09E-06	6.47E-03	4.85E-06	8.09E-06	2.65E-04	6.34E-05	1.62E-04	1.49E-05	9.06E-07	1.62E-05	3.50E-04	1.62E-05	8.09E-06	8.09E-06	5.37E-04	2.20E-04	1.23E-05	4.60E-02
Wind Erosion - Active Areas	--	5.72E-05	2.86E-05	1.78E-02	1.72E-05	2.86E-05	5.49E-04	1.46E-04	3.20E-04	2.86E-05	4.58E-06	5.72E-05	5.26E-04	5.72E-05	2.86E-05	2.86E-05	4.35E-04	5.72E-04	2.29E-06	8.50E-02
Subtotal - South Quarry:	--	3.38E-04	1.69E-04	1.15E-01	1.01E-04	1.69E-04	3.96E-03	1.01E-03	2.36E-03	2.13E-04	2.45E-05	3.38E-04	4.41E-03	3.38E-04	1.69E-04	1.69E-04	5.25E-03	3.76E-03	8.90E-05	6.44E-01
Waste Rock Storage/Infill Areas																				
Material Handling	--	6.96E-06	3.48E-06	2.17E-03	2.09E-06	3.48E-06	6.68E-05	1.78E-05	3.90E-05	3.48E-06	5.57E-07	6.96E-06	6.40E-05	6.96E-06	3.48E-06	3.48E-06	5.29E-05	6.96E-05	2.78E-07	1.03E-02
Dust Entrainment - Unpaved Roads	--	1.35E-04	6.76E-05	5.41E-02	4.05E-05	6.76E-05	2.22E-03	5.30E-04	1.35E-03	1.24E-04	7.57E-06	1.35E-04	2.92E-03	1.35E-04	6.76E-05	6.76E-05	4.49E-03	1.84E-03	1.03E-04	3.84E-01
Wind Erosion - Unpaved Roads	--	1.07E-06	5.33E-07	4.26E-04	3.20E-07	5.33E-07	1.75E-05	4.18E-06	1.07E-05	9.80E-07	5.97E-08	1.07E-06	2.30E-05	1.07E-06	5.33E-07	5.33E-07	3.54E-05	1.45E-05	8.10E-07	3.03E-03
Wind Erosion - Active Areas	--	3.48E-05	1.74E-05	1.09E-02	1.04E-05	1.74E-05	3.34E-04	8.92E-05	1.95E-04	1.74E-05	2.79E-06	3.48E-05	3.20E-04	3.48E-05	1.74E-05	1.74E-05	2.65E-04	3.48E-04	1.39E-06	5.17E-02
Subtotal - Waste Rock Storage/Infill:	--	1.78E-04	8.90E-05	6.75E-02	5.34E-05	8.90E-05	2.64E-03	6.41E-04	1.60E-03	1.46E-04	1.10E-05	1.78E-04	3.33E-03	1.78E-04	8.90E-05	8.90E-05	4.84E-03	2.27E-03	1.05E-04	4.49E-01
Topsoil Storage Area																				
Material Handling	--	5.03E-08	2.51E-08	1.57E-05	1.51E-08	2.51E-08	4.83E-07	1.29E-07	2.82E-07	2.51E-08	4.02E-09	5.03E-08	4.62E-07	5.03E-08	2.51E-08	2.51E-08	3.82E-07	5.03E-07	2.01E-09	7.47E-05
Dust Entrainment - Unpaved Roads	--	1.16E-05	5.79E-06	4.64E-03	3.48E-06	5.79E-06	1.90E-04	4.54E-05	1.16E-04	1.07E-05	6.49E-07	1.16E-05	2.50E-04	1.16E-05	5.79E-06	5.79E-06	3.85E-04	1.58E-04	8.81E-06	3.29E-02
Wind Erosion - Unpaved Roads	--	2.61E-06	1.31E-06	1.04E-03	7.84E-07	1.31E-06	4.28E-05	1.02E-05	2.61E-05	2.40E-06	1.46E-07	2.61E-06	5.64E-05	2.61E-06	1.31E-06	1.31E-06	8.67E-05	3.55E-05	1.99E-06	7.42E-03
Wind Erosion - Active Areas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Topsoil Storage Area:	--	1.43E-05	7.13E-06	5.70E-03	4.28E-06	7.13E-06	2.33E-04	5.58E-05	1.42E-04	1.31E-05	7.99E-07	1.43E-05	3.07E-04	1.43E-05	7.13E-06	7.13E-06	4.72E-04	1.94E-04	1.08E-05	4.04E-02
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	5.65E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	8.81E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	6.39E-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	8.37E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	8.83E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/hr):	8.83E-01	5.30E-04	2.65E-04	1.88E-01	1.59E-04	2.65E-04	6.83E-03	1.71E-03	4.09E-03	3.72E-04	3.63E-05	5.30E-04	8.04E-03	5.30E-04	2.65E-04	2.65E-04	1.06E-02	6.22E-03	2.05E-04	1.13E+00

Proposed Project Phase 4 Toxic Air Contaminants - Hourly Emissions (lb/hr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	4.83E-06	2.41E-06	1.51E-03	1.45E-06	2.41E-06	4.64E-05	1.24E-05	2.70E-05	2.41E-06	3.86E-07	4.83E-06	4.44E-05	4.83E-06	2.41E-06	2.41E-06	3.67E-05	4.83E-05	1.93E-07	7.17E-03
Blasting	--	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
Bulldozing, Scraping & Grading	--	1.22E-06	6.12E-07	3.82E-04	3.67E-07	6.12E-07	1.18E-05	3.14E-06	6.86E-06	6.12E-07	9.80E-08	1.22E-06	1.13E-05	1.22E-06	6.12E-07	6.12E-07	9.31E-06	1.22E-05	4.90E-08	1.82E-03
Material Handling	--	8.39E-06	4.20E-06	2.62E-03	2.52E-06	4.20E-06	8.05E-05	2.15E-05	4.70E-05	4.20E-06	6.71E-07	8.39E-06	7.72E-05	8.39E-06	4.20E-06	4.20E-06	6.38E-05	8.39E-05	3.36E-07	1.25E-02
Dust Entrainment - Unpaved Roads	--	6.33E-05	3.17E-05	2.53E-02	1.90E-05	3.17E-05	1.04E-03	2.48E-04	6.33E-04	5.83E-05	3.55E-06	6.33E-05	1.37E-03	6.33E-05	3.17E-05	3.17E-05	2.10E-03	8.61E-04	4.81E-05	1.80E-01
Wind Erosion - Unpaved Roads	--	1.54E-05	7.71E-06	6.17E-03	4.63E-06	7.71E-06	2.53E-04	6.05E-05	1.54E-04	1.42E-05	8.64E-07	1.54E-05	3.33E-04	1.54E-05	7.71E-06	7.71E-06	5.12E-04	2.10E-04	1.17E-05	4.38E-02
Wind Erosion - Active Areas	--	5.82E-05	2.91E-05	1.82E-02	1.75E-05	2.91E-05	5.59E-04	1.49E-04	3.26E-04	2.91E-05	4.66E-06	5.82E-05	5.36E-04	5.82E-05	2.91E-05	2.91E-05	4.42E-04	5.82E-04	2.33E-06	8.64E-02
Subtotal - South Quarry:	--	3.11E-04	1.55E-04	1.04E-01	9.32E-05	1.55E-04	3.52E-03	9.03E-04	2.09E-03	1.88E-04	2.30E-05	3.11E-04	3.84E-03	3.11E-04	1.55E-04	1.55E-04	4.38E-03	3.39E-03	6.91E-05	5.68E-01
Waste Rock Storage/Infill Areas																				
Material Handling	--	5.55E-06	2.78E-06	1.73E-03	1.67E-06	2.78E-06	5.33E-05	1.42E-05	3.11E-05	2.78E-06	4.44E-07	5.55E-06	5.11E-05	5.55E-06	2.78E-06	2.78E-06	4.22E-05	5.55E-05	2.22E-07	8.25E-03
Dust Entrainment - Unpaved Roads	--	1.09E-04	5.47E-05	4.37E-02	3.28E-05	5.47E-05	1.79E-03	4.29E-04	1.09E-03	1.01E-04	6.12E-06	1.09E-04	2.36E-03	1.09E-04	5.47E-05	5.47E-05	3.63E-03	1.49E-03	8.31E-05	3.11E-01
Wind Erosion - Unpaved Roads	--	1.31E-06	6.55E-07	5.24E-04	3.93E-07	6.55E-07	2.15E-05	5.13E-06	1.31E-05	1.20E-06	7.33E-08	1.31E-06	2.83E-05	1.31E-06	6.55E-07	6.55E-07	4.35E-05	1.78E-05	9.95E-07	3.72E-03
Wind Erosion - Active Areas	--	4.95E-05	2.48E-05	1.55E-02	1.49E-05	2.48E-05	4.76E-04	1.27E-04	2.77E-04	2.48E-05	3.96E-06	4.95E-05	4.56E-04	4.95E-05	2.48E-05	2.48E-05	3.76E-04	4.95E-04	1.98E-06	7.36E-02
Subtotal - Waste Rock Storage/Infill:	--	1.66E-04	8.29E-05	6.15E-02	4.97E-05	8.29E-05	2.34E-03	5.75E-04	1.42E-03	1.29E-04	1.06E-05	1.66E-04	2.90E-03	1.66E-04	8.29E-05	8.29E-05	4.09E-03	2.06E-03	8.63E-05	3.96E-01
Topsoil Storage Area																				
Material Handling	--	1.32E-08	6.61E-09	4.13E-06	3.97E-09	6.61E-09	1.27E-07	3.39E-08	7.41E-08	6.61E-09	1.06E-09	1.32E-08	1.22E-07	1.32E-08	6.61E-09	6.61E-09	1.01E-07	1.32E-07	5.29E-10	1.96E-05
Dust Entrainment - Unpaved Roads	--	6.70E-06	3.35E-06	2.68E-03	2.01E-06	3.35E-06	1.10E-04	2.63E-05	6.70E-05	6.17E-06	3.75E-07	6.70E-06	1.45E-04	6.70E-06	3.35E-06	3.35E-06	2.23E-04	9.12E-05	5.09E-06	1.90E-02
Wind Erosion - Unpaved Roads	--	2.61E-06	1.31E-06	1.04E-03	7.84E-07	1.31E-06	4.28E-05	1.02E-05	2.61E-05	2.40E-06	1.46E-07	2.61E-06	5.64E-05	2.61E-06	1.31E-06	1.31E-06	8.67E-05	3.55E-05	1.99E-06	7.42E-03
Wind Erosion - Active Areas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Topsoil Storage Area:	--	9.33E-06	4.66E-06	3.73E-03	2.80E-06	4.66E-06	1.53E-04	3.65E-05	9.32E-05	8.58E-06	5.23E-07	9.33E-06	2.01E-04	9.33E-06	4.66E-06	4.66E-06	3.09E-04	1.27E-04	7.08E-06	2.65E-02
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	4.86E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	7.11E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	5.79E-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	8.04E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	7.13E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/hr):	7.13E-01	4.86E-04	2.43E-04	1.69E-01	1.46E-04	2.43E-04	6.02E-03	1.51E-03	3.60E-03	3.26E-04	3.41E-05	4.86E-04	6.93E-03	4.86E-04	2.43E-04	2.43E-04	8.78E-03	5.57E-03	1.63E-04	9.91E-01

Proposed Project Phase 5 Toxic Air Contaminants - Hourly Emissions (lb/hr).

Component	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
South Quarry																				
Drilling	--	4.62E-06	2.31E-06	1.44E-03	1.39E-06	2.31E-06	4.44E-05	1.18E-05	2.59E-05	2.31E-06	3.70E-07	4.62E-06	4.25E-05	4.62E-06	2.31E-06	2.31E-06	3.51E-05	4.62E-05	1.85E-07	6.86E-03
Blasting	--	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
Bulldozing, Scraping & Grading	--	1.24E-06	6.21E-07	3.87E-04	3.72E-07	6.21E-07	1.19E-05	3.18E-06	6.95E-06	6.21E-07	9.93E-08	1.24E-06	1.14E-05	1.24E-06	6.21E-07	6.21E-07	9.43E-06	1.24E-05	4.96E-08	1.84E-03
Material Handling	--	8.06E-06	4.03E-06	2.52E-03	2.42E-06	4.03E-06	7.74E-05	2.06E-05	4.51E-05	4.03E-06	6.45E-07	8.06E-06	7.42E-05	8.06E-06	4.03E-06	4.03E-06	6.13E-05	8.06E-05	3.22E-07	1.20E-02
Dust Entrainment - Unpaved Roads	--	6.68E-05	3.34E-05	2.67E-02	2.00E-05	3.34E-05	1.10E-03	2.62E-04	6.68E-04	6.15E-05	3.74E-06	6.68E-05	1.44E-03	6.68E-05	3.34E-05	3.34E-05	2.22E-03	9.09E-04	5.08E-05	1.90E-01
Wind Erosion - Unpaved Roads	--	9.21E-06	4.60E-06	3.68E-03	2.76E-06	4.60E-06	1.51E-04	3.61E-05	9.21E-05	8.47E-06	5.16E-07	9.21E-06	1.99E-04	9.21E-06	4.60E-06	4.60E-06	3.06E-04	1.25E-04	7.00E-06	2.61E-02
Wind Erosion - Active Areas	--	8.10E-05	4.05E-05	2.53E-02	2.43E-05	4.05E-05	7.77E-04	2.07E-04	4.53E-04	4.05E-05	6.48E-06	8.10E-05	7.45E-04	8.10E-05	4.05E-05	4.05E-05	6.15E-04	8.10E-04	3.24E-06	1.20E-01
Subtotal - South Quarry:	--	3.30E-04	1.65E-04	1.10E-01	9.91E-05	1.65E-04	3.69E-03	9.49E-04	2.18E-03	1.97E-04	2.46E-05	3.30E-04	3.98E-03	3.30E-04	1.65E-04	1.65E-04	4.46E-03	3.58E-03	6.80E-05	5.94E-01
Waste Rock Storage/Infill Areas																				
Material Handling	--	5.21E-06	2.60E-06	1.63E-03	1.56E-06	2.60E-06	5.00E-05	1.33E-05	2.92E-05	2.60E-06	4.17E-07	5.21E-06	4.79E-05	5.21E-06	2.60E-06	2.60E-06	3.96E-05	5.21E-05	2.08E-07	7.74E-03
Dust Entrainment - Unpaved Roads	--	7.86E-05	3.93E-05	3.15E-02	2.36E-05	3.93E-05	1.29E-03	3.08E-04	7.86E-04	7.23E-05	4.40E-06	7.86E-05	1.70E-03	7.86E-05	3.93E-05	3.93E-05	2.61E-03	1.07E-03	5.98E-05	2.23E-01
Wind Erosion - Unpaved Roads	--	1.31E-06	6.55E-07	5.24E-04	3.93E-07	6.55E-07	2.15E-05	5.13E-06	1.31E-05	1.20E-06	7.33E-08	1.31E-06	2.83E-05	1.31E-06	6.55E-07	6.55E-07	4.35E-05	1.78E-05	9.95E-07	3.72E-03
Wind Erosion - Active Areas	--	8.48E-05	4.24E-05	2.65E-02	2.55E-05	4.24E-05	8.14E-04	2.17E-04	4.75E-04	4.24E-05	6.79E-06	8.48E-05	7.80E-04	8.48E-05	4.24E-05	4.24E-05	6.45E-04	8.48E-04	3.39E-06	1.26E-01
Subtotal - Waste Rock Storage/Infill:	--	1.70E-04	8.50E-05	6.01E-02	5.10E-05	8.50E-05	2.18E-03	5.44E-04	1.30E-03	1.19E-04	1.17E-05	1.70E-04	2.56E-03	1.70E-04	8.50E-05	8.50E-05	3.34E-03	1.99E-03	6.44E-05	3.61E-01
Topsoil Storage Area																				
Material Handling	--	1.42E-07	7.11E-08	4.44E-05	4.27E-08	7.11E-08	1.37E-06	3.64E-07	7.96E-07	7.11E-08	1.14E-08	1.42E-07	1.31E-06	1.42E-07	7.11E-08	7.11E-08	1.08E-06	1.42E-06	5.69E-09	2.11E-04
Dust Entrainment - Unpaved Roads	--	1.28E-05	6.39E-06	5.12E-03	3.84E-06	6.39E-06	2.10E-04	5.01E-05	1.28E-04	1.18E-05	7.16E-07	1.28E-05	2.76E-04	1.28E-05	6.39E-06	6.39E-06	4.25E-04	1.74E-04	9.72E-06	3.63E-02
Wind Erosion - Unpaved Roads	--	2.61E-06	1.31E-06	1.04E-03	7.84E-07	1.31E-06	4.28E-05	1.02E-05	2.61E-05	2.40E-06	1.46E-07	2.61E-06	5.64E-05	2.61E-06	1.31E-06	1.31E-06	8.67E-05	3.55E-05	1.99E-06	7.42E-03
Wind Erosion - Active Areas	--	1.46E-06	7.32E-07	4.57E-04	4.39E-07	7.32E-07	1.40E-05	3.75E-06	8.19E-06	7.32E-07	1.17E-07	1.46E-06	1.35E-05	1.46E-06	7.32E-07	7.32E-07	1.11E-05	1.46E-05	5.85E-08	2.17E-03
Subtotal - Topsoil Storage Area:	--	1.70E-05	8.50E-06	6.66E-03	5.10E-06	8.50E-06	2.68E-04	6.45E-05	1.63E-04	1.50E-05	9.91E-07	1.70E-05	3.47E-04	1.70E-05	8.50E-06	8.50E-06	5.24E-04	2.26E-04	1.18E-05	4.61E-02
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	4.66E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	7.07E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	5.19E-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	8.40E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	7.09E-01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/hr):	7.09E-01	5.17E-04	2.59E-04	1.76E-01	1.55E-04	2.59E-04	6.13E-03	1.56E-03	3.65E-03	3.31E-04	3.73E-05	5.17E-04	6.88E-03	5.17E-04	2.59E-04	2.59E-04	8.32E-03	5.79E-03	1.44E-04	1.00E+00

Proposed Project Phase 1 Greenhouse Gases - Annual Emissions (metric tons/yr).

Component	CO_2	CH_4	N_2O	CO_2e
South Quarry				
Drilling	470.72	--	--	470.72
Blasting	--	--	--	--
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - South Quarry:	470.72	--	--	470.72
Waste Rock Storage/Infill Areas				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Topsoil Storage Area				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Topsoil Storage Area:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	4.76	0.00	0.00	4.81
Off-road Diesel Equipment	23,503.33	1.36	0.61	23,720.93
On-road On-site Vehicles	148.33	0.01	0.00	149.10
On-road Off-site Vehicles	127.09	0.00	0.00	127.75
Subtotal - Combustion Sources:	23,783.52	1.37	0.61	24,002.59
Indirect GHG Emissions				
Electricity Use	614.64	0.03	0.01	617.31
Totals (metric tons/yr):	24,868.89	1.40	0.62	25,090.62

Proposed Project Phase 2 Greenhouse Gases - Annual Emissions (metric tons/yr).

Component	CO_2	CH_4	N_2O	CO_2e
South Quarry				
Drilling	591.90	--	--	591.90
Blasting	--	--	--	--
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - South Quarry:	591.90	--	--	591.90
Waste Rock Storage/Infill Areas				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Topsoil Storage Area				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Topsoil Storage Area:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	5.93	0.00	0.00	5.99
Off-road Diesel Equipment	35,729.62	2.07	0.93	36,060.41
On-road On-site Vehicles	168.79	0.01	0.00	169.66
On-road Off-site Vehicles	131.68	0.00	0.00	132.40
Subtotal - Combustion Sources:	36,036.03	2.08	0.93	36,368.46
Indirect GHG Emissions				
Electricity Use	202.35	0.01	0.00	203.23
Totals (metric tons/yr):	36,830.28	2.09	0.93	37,163.58

Proposed Project Phase 3 Greenhouse Gases - Annual Emissions (metric tons/yr).

Component	CO_2	CH_4	N_2O	CO_2e
South Quarry				
Drilling	685.11	--	--	685.11
Blasting	--	--	--	--
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - South Quarry:	685.11	--	--	685.11
Waste Rock Storage/Infill Areas				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Topsoil Storage Area				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Topsoil Storage Area:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	6.83	0.00	0.00	6.90
Off-road Diesel Equipment	35,036.72	2.03	0.91	35,361.09
On-road On-site Vehicles	163.68	0.01	0.00	164.52
On-road Off-site Vehicles	125.01	0.00	0.00	125.69
Subtotal - Combustion Sources:	35,332.24	2.04	0.91	35,658.20
Indirect GHG Emissions				
Electricity Use	194.97	0.01	0.00	195.82
Totals (metric tons/yr):	36,212.32	2.05	0.92	36,539.12

Proposed Project Phase 4 Greenhouse Gases - Annual Emissions (metric tons/yr).

Component	CO_2	CH_4	N_2O	CO_2e
South Quarry				
Drilling	586.07	--	--	586.07
Blasting	--	--	--	--
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - South Quarry:	586.07	--	--	586.07
Waste Rock Storage/Infill Areas				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Topsoil Storage Area				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Topsoil Storage Area:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	5.88	0.00	0.00	5.93
Off-road Diesel Equipment	28,270.97	1.64	0.73	28,532.70
On-road On-site Vehicles	148.33	0.01	0.00	149.10
On-road Off-site Vehicles	115.11	0.00	0.00	115.74
Subtotal - Combustion Sources:	28,540.28	1.65	0.74	28,803.46
Indirect GHG Emissions				
Electricity Use	170.71	0.01	0.00	171.45
Totals (metric tons/yr):	29,297.06	1.65	0.74	29,560.98

Proposed Project Phase 5 Greenhouse Gases - Annual Emissions (metric tons/yr).

Component	CO_2	CH_4	N_2O	CO_2e
South Quarry				
Drilling	560.83	--	--	560.83
Blasting	--	--	--	--
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - South Quarry:	560.83	--	--	560.83
Waste Rock Storage/Infill Areas				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Topsoil Storage Area				
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Topsoil Storage Area:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	5.63	0.00	0.00	5.69
Off-road Diesel Equipment	28,119.04	1.63	0.73	28,379.37
On-road On-site Vehicles	132.99	0.01	0.00	133.67
On-road Off-site Vehicles	109.15	0.00	0.00	109.76
Subtotal - Combustion Sources:	28,366.82	1.64	0.73	28,628.49
Indirect GHG Emissions				
Electricity Use	614.64	0.03	0.01	617.31
Totals (metric tons/yr):	29,542.28	1.66	0.74	29,806.62

Drilling and Blasting Particulate Matter Emissions

Drilling.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[1]	Control Efficiency[2]	PM_{10} Emissions[3,4] (ton/yr)	PM_{10} (lb/day)	PM_{10} (lb/hr)	$PM_{2.5}$ Emissions[3,4] (ton/yr)	$PM_{2.5}$ (lb/day)	$PM_{2.5}$ (lb/hr)
1	MDAQMD Guidance, VI.A	0.68 lb/hole	0.68 lb/hole	10,952 holes/yr	0%	3.72	24.82	1.55	3.72	24.82	3.10
2				13,771 holes/yr		4.68	31.22	1.95	4.68	31.22	1.95
3				15,940 holes/yr		5.42	36.13	2.26	5.42	36.13	2.26
4				13,636 holes/yr		4.64	30.91	1.93	4.64	30.91	1.93
5				13,049 holes/yr		4.44	29.58	1.85	4.44	29.58	1.85

Blasting.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[1]	Control Efficiency	PM_{10} Emissions (ton/yr)	PM_{10} (lb/day)	PM_{10} (lb/hr)	$PM_{2.5}$ Emissions (ton/yr)	$PM_{2.5}$ (lb/day)	$PM_{2.5}$ (lb/hr)
1	MDAQMD Guidance, VI.B	63.75 lb/blast	3.68 lb/blast	202 blasts/yr	0%	6.44	63.75	63.75	0.37	3.68	3.68
2				254 blasts/yr		8.10	127.49	63.75	0.47	7.36	3.68
3				294 blasts/yr		9.37	127.49	63.75	0.54	7.36	3.68
4				252 blasts/yr		8.02	127.49	63.75	0.46	7.36	3.68
5				241 blasts/yr		7.67	63.75	63.75	0.44	3.68	3.68

Notes:

1. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the five project phases. Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010.
2. Assumed Control: None
3. Daily and hourly emission rates reflect the following operating schedules:

Drilling	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50
Blasting	**Phase 1**	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**
Weeks/Year	50	50	50	50	50
Max Blasts/Day	1	2	2	2	1
Max Blasts/Hour	1	1	1	1	1

4. Conversion factors:
   2,000 lb = 1 ton

Blasting Emission Factor.[1]

Data Input	Data Reference	Symbol	Value	Unit
Area Shifted per Blast	Calculated[2]	A	3,917	ft^2
PM_{10} size multiplier	MDAQMD Guidance (Em. Inventory Form)	k	0.52	--
$PM_{2.5}$ size multiplier	MDAQMD Guidance (Em. Inventory Form)	k	0.03	--
Blasting Emission Factor	*MDAQMD Guidance, VI.B*	*Ef*	*Calculated*	*lb/blast*

$$Ef = k * 0.0005 * A^{1.5}$$

Notes:

1. AP-42 Chapter 11.19.2, Crushed Stone Processing and Pulverized Mineral Processing, indicates that AP-42 Chapter 11.9, Western Surface Coal Mining, should not be used to estimate particulate matter emissions from blasting in stone quarries. Therefore, the approach outlined in *Emissions Inventory Guidance Mineral Handling and Processing Industries* , Mojave Desert Air Quality Management District, April 2000 (MDAQMD Guidance), sections VI.A and VI.B, was used instead.
2. Area shifted per blast calculated based on maximum production, blasting, explosives, blast pattern, and related data provided by Lehigh Southwest Cement Company for the proposed project, May 12, 2010.

Blasting Explosives Emissions

Project Phase	Emission Factor Reference	Emission Factors CO	NOx	SOx	CO_2	Explosives Used[3]	Control Efficiency[4]	CO Emissions[5,6] (ton/yr)	(lb/day)	NOx Emissions[5,6] (ton/yr)	(lb/day)	SOx Emissions[5,6] (ton/yr)	(lb/day)	CO_2 Emissions[5,6] (tonne/yr)	(lb/day)
1	AP-42 Chap. 13.3 (CO, NOx, SOx), AGO Factors & Methods Sec. 2.3 (CO_2)[1]	67.00 lb/ton	17.00 lb/ton	2.00 lb/ton	0.151 tonne/ton	3,117 tons/yr	0%	104.43	1,033.97	26.50	262.35	3.12	30.86	470.72	5,137.46
2						3,920 tons/yr		131.31	2,067.95	33.32	524.70	3.92	61.73	591.90	10,274.91
3						4,537 tons/yr		151.99	2,067.95	38.57	524.70	4.54	61.73	685.11	10,274.91
4						3,881 tons/yr		130.02	2,067.95	32.99	524.70	3.88	61.73	586.07	8,789.59
5						3,714 tons/yr		124.42	1,033.97	31.57	262.35	3.71	30.86	560.83	5,137.46

Notes:

1. Sources for emission factors associated with use of ANFO (ammonium nitrate/fuel oil):
   - CO, NOx, and SOx: U.S. AP-42 Chapter 13.3 (Explosives Detonation)
   - CO_2: *AGO Factors and Methods Workbook for Use in Australian Greenhouse Emissions Reporting*, Australian Greenhouse Office, December 2006, Section 2.3 (Explosives).
2. CO_2 emission factor reported as 0.167 tonne CO_2/tonne ANFO, equivalent to 0.151 tonne CO_2/ton ANFO, assuming 1 tonne/1,000 kg, 0.45359 kg/lb, and 2,000 lbs/short ton, or ton.
3. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the five project phases
   Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010
4. Assumed Control: None
5. Daily and hourly emission rates reflect the following operating schedules

Blasting	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Weeks/Year	50	50	50	50	50
Blasts/Week	4.0	5.1	5.9	5.0	4.8
Max Blasts/Day	1	2	2	2	1

6. Conversion factors:
   2,000 lb = 1 ton
   1,000 kg = 1 tonne
   0.45359 kg = 1 pound

Bulldozing, Scraping, and Grading Particulate Matter Emissions

Project Phase	Emission Factor Reference	Emission Factors		Annual Activity[1]	Control Efficiency[2]	PM_{10} Emissions[3,4]			$PM_{2.5}$ Emissions[3,4]		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
1	MDAQMD Guidance, Sec. VI.D	1.24E-01 lb/hr	1.86E-02 lb/hr	19,558 hrs/yr	0%	1.22	8.11	1.01	0.18	1.22	0.15
2				21,813 hrs/yr		1.36	9.04	0.56	0.20	1.36	0.08
3				21,875 hrs/yr		1.36	9.07	0.57	0.20	1.36	0.08
4				18,918 hrs/yr		1.18	7.84	0.49	0.18	1.18	0.07
5				19,167 hrs/yr		1.19	7.94	0.50	0.18	1.19	0.07

Notes:

1. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the five project phases. Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010.
2. Assumed Control: None
3. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

4. Conversion factors:
   2,000 lb = 1 ton

Bulldozing, Scraping, and Grading Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Moisture Content	AP-42 Table 13.2.4-1 (Various Limestone Products)	M	2.1	%
Silt Content, Limestone	MDAQMD Guidance, Sec. VI.D (Stockpile Table 2)	s	0.5	%
PM_{10} size multiplier	MDAQMD Guidance, Sec. VI.D	k	0.36	--
$PM_{2.5}$ size multiplier	WRAP AP-42 Fugitive Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Bulldozing, Scraping, Grading Factor	*MDAQMD Guidance, Sec. VI.D*	*Ef*	*Calculated*	*lb/hr*

$$E_f = 2.76 \times k \times \frac{s^{1.5}}{M^{1.4}}$$

Notes:

1. Source: *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors* (prepared for Western Governors' Association Western Regional Air Partnership (WRAP)), Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42).

Material Handling Particulate Matter Emissions

Summary - Material Handling

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate	Transfer Points	Control Efficiency	PM_{10} Emissions (ton/yr)	PM_{10} Emissions (lb/day)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (ton/yr)	$PM_{2.5}$ Emissions (lb/day)	$PM_{2.5}$ Emissions (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1						6.51	43.39	5.42	0.98	6.51	0.81
2							8.33	55.54	3.47	1.25	8.33	0.52
3							9.42	62.78	3.92	1.41	9.42	0.59
4							8.05	53.70	3.36	1.21	8.05	0.50
5							7.74	51.60	3.22	1.16	7.74	0.48

LS-Cement, LS-Aggregate, and Waste Rock Handling at South Quarry

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[1]	Transfer Points	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	11,133,402 tons/yr	1	0%	6.41	42.75	5.34	0.96	6.41	0.80
2				13,999,427 tons/yr	1		8.06	53.76	3.36	1.21	8.06	0.50
3				16,204,061 tons/yr	1		9.33	62.23	3.89	1.40	9.33	0.58
4				13,861,637 tons/yr	1		7.98	53.23	3.33	1.20	7.98	0.50
5				13,264,549 tons/yr	1		7.64	50.94	3.18	1.15	7.64	0.48

Topsoil Handling at South Quarry - To and From Topsoil Storage Area

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[2]	Transfer Points	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	165,348 tons/yr	1	0%	0.10	0.63	0.08	0.01	0.10	0.01
2				176,371 tons/yr	1		0.10	0.68	0.04	0.02	0.10	0.01
3				77,162 tons/yr	1		0.04	0.30	0.02	0.01	0.04	0.00
4				0 tons/yr	1		0.00	0.00	0.00	0.00	0.00	0.00
5				171,961 tons/yr	1		0.10	0.66	0.04	0.01	0.10	0.01

Topsoil Handling at South Quarry - Concurrent Reclamation

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[3]	Transfer Points	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	0 tons/yr	2	0%	0.00	0.00	0.00	0.00	0.00	0.00
2				143,301 tons/yr	2		0.17	1.10	0.07	0.02	0.17	0.01
3				33,070 tons/yr	2		0.04	0.25	0.02	0.01	0.04	0.00
4				60,627 tons/yr	2		0.07	0.47	0.03	0.01	0.07	0.00
5				0 tons/yr	2		0.00	0.00	0.00	0.00	0.00	0.00

Notes:

1. Annual process rates reflect maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the five project phases. Data provide by Lehigh Southwest Cement Company, May 12, 2010
2. Annual process rates reflect maximum anticipated storage and return of topsoil during each of the five project phases. Data provided by Lehigh Southwest Ceme Company, May 12, 2010.
3. Annual process rates reflect maximum anticipated excavation and use of topsoil for concurrent reclamation during each of the five project phases. Data provided b Lehigh Southwest Cement Company, May 12, 2010
4. Assumed Control: None
5. Daily and hourly emission rates reflect the following operating schedule

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

6. Conversion factors:
   2,000 lb = 1 ton

Material Handling Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Moisture Content	AP-42 Table 13.2.4-1 (Various Limestone Products)	M	2.1	%
Mean wind speed	Mean 2008 wind speed for Lehigh Station	U	5.27	mph
PM_{10} size multiplier	MDAQMD Guidance, Sec. VI.E	k	0.36	--
$PM_{2.5}$ size multiplier	WRAP AP-42 Fugitive Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Material Handling Emission Factor	*MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1*	*Ef*	*Calculated*	*lb/ton*

$$Ef = k \times 0.0032 \times \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Notes:

1. AP-42 Sec. 13.2.4.3 provides a PM_{10} size multiplier of 0.35 and a $PM_{2.5}$ size multiplier of 0.0053.

Particulate Matter Emissions from Unpaved Road Dust Entrainment

Project Phase	Emission Factor Reference	Emission Factors		Annual Activity[1]	Control Efficiency[2]	PM_{10} Emissions[3,4]			$PM_{2.5}$ Emissions[3,4]		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.2, Eqn 1a	2.10E+00 lb/mile	2.10E-01 lb/mile	211,202 miles/yr	75%	55.49	369.96	46.25	5.55	37.00	4.62
2				359,980 miles/yr		94.59	630.58	39.41	9.46	63.06	3.94
3				323,689 miles/yr		85.05	567.01	35.44	8.51	56.70	3.54
4				231,402 miles/yr		60.80	405.35	25.33	6.08	40.53	2.53
5				244,165 miles/yr		64.16	427.71	26.73	6.42	42.77	2.67

Notes:

1. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the five project phases. Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010.
2. Assumed Control: 75% control associated with watering of unpaved roads.
3. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

4. Conversion factors:
   2,000 lb = 1 ton

Unpaved Road Dust Entrainment Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Surface Material Silt Content	2008 CEIR, Table B-8	s	2.7	%
Average Vehicle Weight	Caterpillar Performance Handbook, MDV weight	W	125.4	tons
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	1.5	lb/mile
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.15	lb/mile
Empirical Constants	AP-42 13.2.2-2	a	0.9	--
	AP-42 13.2.2-2	b	0.45	--
Dust Entrainment Emission Factor	*AP-42 13.2.2, Eqn 1a*	*Ef*	*Calculated*	*lb/mile*

$$E_f = k\left(\frac{s}{12}\right)^a\left(\frac{W}{3}\right)^b$$

Particulate Matter Emissions from Wind Erosion

Unpaved Roads.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[1]	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1				12.97 acres/yr		5.80	38.67	4.83	0.87	5.80	0.73
2				38.49 acres/yr		17.22	114.80	7.17	2.58	17.22	1.08
3	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	34.73 acres/yr	75%	15.54	103.57	6.47	2.33	15.54	0.97
4				33.10 acres/yr		14.81	98.72	6.17	2.22	14.81	0.93
5				19.76 acres/yr		8.84	58.93	3.68	1.33	8.84	0.55

Summary - Active Quarry Areas.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity	Control Efficiency	PM_{10} Emissions (ton/yr)	PM_{10} Emissions (lb/day)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (ton/yr)	$PM_{2.5}$ Emissions (lb/day)	$PM_{2.5}$ Emissions (lb/hr)
1				63.27 acres/yr		33.30	221.97	27.75	4.99	33.30	4.16
2				158.69 acres/yr		76.42	509.49	31.84	11.46	76.42	4.78
3	AP-42 13.2.5, Eqn 2			88.38 acres/yr		54.91	366.10	22.88	8.24	54.91	3.43
4				91.54 acres/yr		55.88	372.53	23.28	8.38	55.88	3.49
5				132.58 acres/yr		77.73	518.17	32.39	11.66	77.73	4.86

Active Areas - Quarry Operations.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[2]	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1				23.67 acres/yr		21.18	141.20	17.65	3.18	21.18	2.65
2				47.35 acres/yr		42.36	282.40	17.65	6.35	42.36	2.65
3	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	47.35 acres/yr	50%	42.36	282.40	17.65	6.35	42.36	2.65
4				47.35 acres/yr		42.36	282.40	17.65	6.35	42.36	2.65
5				63.13 acres/yr		56.48	376.54	23.53	8.47	56.48	3.53

Active Areas - Topsoil Removal and Reclamation.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[3]	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1				39.60 acres/yr		12.12	80.77	10.10	1.82	12.12	1.51
2				111.34 acres/yr		34.06	227.09	14.19	5.11	34.06	2.13
3	AP-42 13.2.5, Eqn 2	6.12E-01 ton/acre-yr	9.18E-02 ton/acre-yr	41.04 acres/yr	50%	12.55	83.69	5.23	1.88	12.55	0.78
4				44.19 acres/yr		13.52	90.13	5.63	2.03	13.52	0.84
5				69.44 acres/yr		21.25	141.64	8.85	3.19	21.25	1.33

Notes:

1. Annual activity reflects roads necessary to support maximum anticipated production during each of the five project phases. Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010
2. Annual activity reflects maximum quarry operating and backfill areas during each of the five project phases. Data provided by Lehigh Southwest Cemen Company, May 12, 2010.
3. Annual activity reflects maximum quarry topsoil removal and reclamation areas during each of the five project phases. Data provided by Lehigh Southwes Cement Company, May 12, 2010.
4. Assumed Control: 75% control associated with watering of unpaved roads; 50% control associated with watering of active areas consistent with fugitive dust plan to be submitted to the BAAQMD.
5. Daily and hourly emission rates reflect the following operating schedule

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

6. Conversion factors:
   2,000 lb = 1 ton

Wind Erosion Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Erosion Potential per disturbance	AP-42 13.2.5, Eqn 3	P_i	Calculated	g/m^2
Friction Velocity per disturbance	AP-42 13.2.5, Eqn 4	u*	Calculated	m/s
Threshold Friction Velocity:		u^*_t		
Quarry Operations/Roads	AP-42 Table 13.2.5-2 (scraper tracks on coal pile)		0.62	m/s
Topsoil Removal/Reclamation	AP-42 Table 13.2.5-2 (overburden)		1.02	m/s
Fastest mile wind speed per disturbance at 10 meters	Daily maximum wind gust data from Lehigh Permanente Meteorological Station for 2008	u^+_{10}	Varies	m/s
Disturbances	Lehigh Permanente wind gust data	N	Daily (366)	--
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	0.5	--
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.075	--
Wind Erosion Emission Factor	*AP-42 13.2.5, Eqn 2*	*Ef*	*Calculated*	*g/(m²-yr)*

Eqn 3 $P = 58(u^* - u_t)^2 + 25(u^* - u_t)$

Eqn 4 $u^* = 0.053u_{10}$

Eqn 2 $E_f = k \sum_{i=1}^{N} P_i$

Toxic Air Contaminant Emissions

Annual Toxic Air Contaminant Emissions (pounds/year).

Toxic Air Contaminants (TAC):			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Overburden TAC Emission Factor (mg TAC /kg PM):			2.5	1.25	780	0.75	1.25	24	6.4	14	1.25	0.2	2.5	23	2.5	1.25	1.25	19	25	0.1	3712.8
Roads TAC Emission Factor (mg TAC/kg PM):			2.5	1.25	1000	0.75	1.25	41	9.8	25	2.3	0.14	2.5	54	2.5	1.25	1.25	83	34	1.9	7099.2
Phase	Component	Annual PM_{10} (tons/year)	Annual Toxic Air Contaminant Emissions (pounds/year)																		
1	Drilling	3.72	1.86E-02	9.31E-03	5.81E+00	5.59E-03	9.31E-03	1.79E-01	4.77E-02	1.04E-01	9.31E-03	1.49E-03	1.86E-02	1.71E-01	1.86E-02	9.31E-03	9.31E-03	1.42E-01	1.86E-01	7.45E-04	2.77E+01
	Blasting	6.44	3.22E-02	1.61E-02	1.00E+01	9.66E-03	1.61E-02	3.09E-01	8.24E-02	1.80E-01	1.61E-02	2.58E-03	3.22E-02	2.96E-01	3.22E-02	1.61E-02	1.61E-02	2.45E-01	3.22E-01	1.29E-03	4.78E+01
	Bulldozing, Scraping, and Grading	1.22	6.08E-03	3.04E-03	1.90E+00	1.82E-03	3.04E-03	5.84E-02	1.56E-02	3.40E-02	3.04E-03	4.86E-04	6.08E-03	5.59E-02	6.08E-03	3.04E-03	3.04E-03	4.62E-02	6.08E-02	2.43E-04	9.03E+00
	Material Handling	6.51	3.25E-02	1.63E-02	1.02E+01	9.76E-03	1.63E-02	3.12E-01	8.33E-02	1.82E-01	1.63E-02	2.60E-03	3.25E-02	2.99E-01	3.25E-02	1.63E-02	1.63E-02	2.47E-01	3.25E-01	1.30E-03	4.83E+01
	Dust Entrainment-Unpaved Roads	55.49	2.77E-01	1.39E-01	1.11E+02	8.32E-02	1.39E-01	4.55E+00	1.09E+00	2.77E+00	2.55E-01	1.55E-02	2.77E-01	5.99E+00	2.77E-01	1.39E-01	1.39E-01	9.21E+00	3.77E+00	2.11E-01	7.88E+02
	Wind Erosion-Unpaved Roads	5.80	2.90E-02	1.45E-02	1.16E+01	8.70E-03	1.45E-02	4.76E-01	1.14E-01	2.90E-01	2.67E-02	1.62E-03	2.90E-02	6.26E-01	2.90E-02	1.45E-02	1.45E-02	9.63E-01	3.94E-01	2.20E-02	8.24E+01
	Wind Erosion-Active Areas	33.30	1.66E-01	8.32E-02	5.19E+01	4.99E-02	8.32E-02	1.60E+00	4.26E-01	9.32E-01	8.32E-02	1.33E-02	1.66E-01	1.53E+00	1.66E-01	8.32E-02	8.32E-02	1.27E+00	1.66E+00	6.66E-03	2.47E+02
	Total - Phase 1	112.48	5.62E-01	2.81E-01	2.02E+02	1.69E-01	2.81E-01	7.48E+00	1.86E+00	4.50E+00	4.10E-01	3.76E-02	5.62E-01	8.97E+00	5.62E-01	2.81E-01	2.81E-01	1.21E+01	6.73E+00	2.43E-01	1.25E+03
2	Drilling	4.68	2.34E-02	1.17E-02	7.30E+00	7.02E-03	1.17E-02	2.25E-01	5.99E-02	1.31E-01	1.17E-02	1.87E-03	2.34E-02	2.15E-01	2.34E-02	1.17E-02	1.17E-02	1.78E-01	2.34E-01	9.36E-04	3.48E+01
	Blasting	8.10	4.05E-02	2.02E-02	1.26E+01	1.21E-02	2.02E-02	3.89E-01	1.04E-01	2.27E-01	2.02E-02	3.24E-03	4.05E-02	3.72E-01	4.05E-02	2.02E-02	2.02E-02	3.08E-01	4.05E-01	1.62E-03	6.01E+01
	Bulldozing, Scraping, and Grading	1.36	6.78E-03	3.39E-03	2.12E+00	2.03E-03	3.39E-03	6.51E-02	1.74E-02	3.80E-02	3.39E-03	5.42E-04	6.78E-03	6.24E-02	6.78E-03	3.39E-03	3.39E-03	5.15E-02	6.78E-02	2.71E-04	1.01E+01
	Material Handling	8.33	4.17E-02	2.08E-02	1.30E+01	1.25E-02	2.08E-02	4.00E-01	1.07E-01	2.33E-01	2.08E-02	3.33E-03	4.17E-02	3.83E-01	4.17E-02	2.08E-02	2.08E-02	3.17E-01	4.17E-01	1.67E-03	6.19E+01
	Dust Entrainment-Unpaved Roads	94.59	4.73E-01	2.36E-01	1.89E+02	1.42E-01	2.36E-01	7.76E+00	1.85E+00	4.73E+00	4.35E-01	2.65E-02	4.73E-01	1.02E+01	4.73E-01	2.36E-01	2.36E-01	1.57E+01	6.43E+00	3.59E-01	1.34E+03
	Wind Erosion-Unpaved Roads	17.22	8.61E-02	4.30E-02	3.44E+01	2.58E-02	4.30E-02	1.41E+00	3.37E-01	8.61E-01	7.92E-02	4.82E-03	8.61E-02	1.86E+00	8.61E-02	4.30E-02	4.30E-02	2.86E+00	1.17E+00	6.54E-02	2.44E+02
	Wind Erosion-Active Areas	76.42	3.82E-01	1.91E-01	1.19E+02	1.15E-01	1.91E-01	3.67E+00	9.78E-01	2.14E+00	1.91E-01	3.06E-02	3.82E-01	3.52E+00	3.82E-01	1.91E-01	1.91E-01	2.90E+00	3.82E+00	1.53E-02	5.67E+02
	Total - Phase 2	210.69	1.05E+00	5.27E-01	3.78E+02	3.16E-01	5.27E-01	1.39E+01	3.46E+00	8.36E+00	7.62E-01	7.09E-02	1.05E+00	1.66E+01	1.05E+00	5.27E-01	5.27E-01	2.23E+01	1.25E+01	4.45E-01	2.32E+03
3	Drilling	5.42	2.71E-02	1.35E-02	8.45E+00	8.13E-03	1.35E-02	2.60E-01	6.94E-02	1.52E-01	1.35E-02	2.17E-03	2.71E-02	2.49E-01	2.71E-02	1.35E-02	1.35E-02	2.06E-01	2.71E-01	1.08E-03	4.02E+01
	Blasting	9.37	4.69E-02	2.34E-02	1.46E+01	1.41E-02	2.34E-02	4.50E-01	1.20E-01	2.62E-01	2.34E-02	3.75E-03	4.69E-02	4.31E-01	4.69E-02	2.34E-02	2.34E-02	3.56E-01	4.69E-01	1.87E-03	6.96E+01
	Bulldozing, Scraping, and Grading	1.36	6.80E-03	3.40E-03	2.12E+00	2.04E-03	3.40E-03	6.53E-02	1.74E-02	3.81E-02	3.40E-03	5.44E-04	6.80E-03	6.26E-02	6.80E-03	3.40E-03	3.40E-03	5.17E-02	6.80E-02	2.72E-04	1.01E+01
	Material Handling	9.42	4.71E-02	2.35E-02	1.47E+01	1.41E-02	2.35E-02	4.52E-01	1.21E-01	2.64E-01	2.35E-02	3.77E-03	4.71E-02	4.33E-01	4.71E-02	2.35E-02	2.35E-02	3.58E-01	4.71E-01	1.88E-03	6.99E+01
	Dust Entrainment-Unpaved Roads	85.05	4.25E-01	2.13E-01	1.70E+02	1.28E-01	2.13E-01	6.97E+00	1.67E+00	4.25E+00	3.91E-01	2.38E-02	4.25E-01	9.19E+00	4.25E-01	2.13E-01	2.13E-01	1.41E+01	5.78E+00	3.23E-01	1.21E+03
	Wind Erosion-Unpaved Roads	15.54	7.77E-02	3.88E-02	3.11E+01	2.33E-02	3.88E-02	1.27E+00	3.04E-01	7.77E-01	7.15E-02	4.35E-03	7.77E-02	1.68E+00	7.77E-02	3.88E-02	3.88E-02	2.58E+00	1.06E+00	5.90E-02	2.21E+02
	Wind Erosion-Active Areas	54.91	2.75E-01	1.37E-01	8.57E+01	8.24E-02	1.37E-01	2.64E+00	7.03E-01	1.54E+00	1.37E-01	2.20E-02	2.75E-01	2.53E+00	2.75E-01	1.37E-01	1.37E-01	2.09E+00	2.75E+00	1.10E-02	4.08E+02
	Total - Phase 3	181.07	9.05E-01	4.53E-01	3.27E+02	2.72E-01	4.53E-01	1.21E+01	3.00E+00	7.28E+00	6.64E-01	6.04E-02	9.05E-01	1.46E+01	9.05E-01	4.53E-01	4.53E-01	1.98E+01	1.09E+01	3.98E-01	2.03E+03
4	Drilling	4.64	2.32E-02	1.16E-02	7.23E+00	6.95E-03	1.16E-02	2.23E-01	5.93E-02	1.30E-01	1.16E-02	1.85E-03	2.32E-02	2.13E-01	2.32E-02	1.16E-02	1.16E-02	1.76E-01	2.32E-01	9.27E-04	3.44E+01
	Blasting	8.02	4.01E-02	2.00E-02	1.25E+01	1.20E-02	2.00E-02	3.85E-01	1.03E-01	2.24E-01	2.00E-02	3.21E-03	4.01E-02	3.69E-01	4.01E-02	2.00E-02	2.00E-02	3.05E-01	4.01E-01	1.60E-03	5.95E+01
	Bulldozing, Scraping, and Grading	1.18	5.88E-03	2.94E-03	1.83E+00	1.76E-03	2.94E-03	5.64E-02	1.51E-02	3.29E-02	2.94E-03	4.70E-04	5.88E-03	5.41E-02	5.88E-03	2.94E-03	2.94E-03	4.47E-02	5.88E-02	2.35E-04	8.73E+00
	Material Handling	8.05	4.03E-02	2.01E-02	1.26E+01	1.21E-02	2.01E-02	3.87E-01	1.03E-01	2.26E-01	2.01E-02	3.22E-03	4.03E-02	3.71E-01	4.03E-02	2.01E-02	2.01E-02	3.06E-01	4.03E-01	1.61E-03	5.98E+01
	Dust Entrainment-Unpaved Roads	60.80	3.04E-01	1.52E-01	1.22E+02	9.12E-02	1.52E-01	4.99E+00	1.19E+00	3.04E+00	2.80E-01	1.70E-02	3.04E-01	6.57E+00	3.04E-01	1.52E-01	1.52E-01	1.01E+01	4.13E+00	2.31E-01	8.63E+02
	Wind Erosion-Unpaved Roads	14.81	7.40E-02	3.70E-02	2.96E+01	2.22E-02	3.70E-02	1.21E+00	2.90E-01	7.40E-01	6.81E-02	4.15E-03	7.40E-02	1.60E+00	7.40E-02	3.70E-02	3.70E-02	2.46E+00	1.01E+00	5.63E-02	2.10E+02
	Wind Erosion-Active Areas	55.88	2.79E-01	1.40E-01	8.72E+01	8.38E-02	1.40E-01	2.68E+00	7.15E-01	1.56E+00	1.40E-01	2.24E-02	2.79E-01	2.57E+00	2.79E-01	1.40E-01	1.40E-01	2.12E+00	2.79E+00	1.12E-02	4.15E+02
	Total - Phase 4	153.37	7.67E-01	3.83E-01	2.73E+02	2.30E-01	3.83E-01	9.93E+00	2.48E+00	5.96E+00	5.42E-01	5.23E-02	7.67E-01	1.17E+01	7.67E-01	3.83E-01	3.83E-01	1.55E+01	9.03E+00	3.03E-01	1.65E+03
5	Drilling	4.44	2.22E-02	1.11E-02	6.92E+00	6.65E-03	1.11E-02	2.13E-01	5.68E-02	1.24E-01	1.11E-02	1.77E-03	2.22E-02	2.04E-01	2.22E-02	1.11E-02	1.11E-02	1.69E-01	2.22E-01	8.87E-04	3.29E+01
	Blasting	7.67	3.84E-02	1.92E-02	1.20E+01	1.15E-02	1.92E-02	3.68E-01	9.82E-02	2.15E-01	1.92E-02	3.07E-03	3.84E-02	3.53E-01	3.84E-02	1.92E-02	1.92E-02	2.91E-01	3.84E-01	1.53E-03	5.70E+01
	Bulldozing, Scraping, and Grading	1.19	5.96E-03	2.98E-03	1.86E+00	1.79E-03	2.98E-03	5.72E-02	1.53E-02	3.34E-02	2.98E-03	4.77E-04	5.96E-03	5.48E-02	5.96E-03	2.98E-03	2.98E-03	4.53E-02	5.96E-02	2.38E-04	8.85E+00
	Material Handling	7.74	3.87E-02	1.93E-02	1.21E+01	1.16E-02	1.93E-02	3.72E-01	9.91E-02	2.17E-01	1.93E-02	3.10E-03	3.87E-02	3.56E-01	3.87E-02	1.93E-02	1.93E-02	2.94E-01	3.87E-01	1.55E-03	5.75E+01
	Dust Entrainment-Unpaved Roads	64.16	3.21E-01	1.60E-01	1.28E+02	9.62E-02	1.60E-01	5.26E+00	1.26E+00	3.21E+00	2.95E-01	1.80E-02	3.21E-01	6.93E+00	3.21E-01	1.60E-01	1.60E-01	1.06E+01	4.36E+00	2.44E-01	9.11E+02
	Wind Erosion-Unpaved Roads	8.84	4.42E-02	2.21E-02	1.77E+01	1.33E-02	2.21E-02	7.25E-01	1.73E-01	4.42E-01	4.07E-02	2.48E-03	4.42E-02	9.55E-01	4.42E-02	2.21E-02	2.21E-02	1.47E+00	6.01E-01	3.36E-02	1.26E+02
	Wind Erosion-Active Areas	77.73	3.89E-01	1.94E-01	1.21E+02	1.17E-01	1.94E-01	3.73E+00	9.95E-01	2.18E+00	1.94E-01	3.11E-02	3.89E-01	3.58E+00	3.89E-01	1.94E-01	1.94E-01	2.95E+00	3.89E+00	1.55E-02	5.77E+02
	Total - Phase 5	171.76	8.59E-01	4.29E-01	3.00E+02	2.58E-01	4.29E-01	1.07E+01	2.69E+00	6.42E+00	5.83E-01	5.99E-02	8.59E-01	1.24E+01	8.59E-01	4.29E-01	4.29E-01	1.59E+01	9.90E+00	2.97E-01	1.77E+03

Hourly Toxic Air Contaminant Emissions (pounds/hour).

Toxic Air Contaminants (TAC):			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Overburden TAC Emission Factor (mg TAC /kg PM):			2.5	1.25	780	0.75	1.25	24	6.4	14	1.25	0.2	2.5	23	2.5	1.25	1.25	19	25	0.1	3712.8
Unpaved Roads TAC Emission Factor (mg TAC/kg PM):			2.5	1.25	1000	0.75	1.25	41	9.8	25	2.3	0.14	2.5	54	2.5	1.25	1.25	83	34	1.9	7099.2
Phase	Component	Hourly PM_{10} (pounds/hr)	Hourly Toxic Air Contaminant Emissions (pounds/hour)																		
	Drilling	1.55	3.88E-06	1.94E-06	1.21E-03	1.16E-06	1.94E-06	3.72E-05	9.93E-06	2.17E-05	1.94E-06	3.10E-07	3.88E-06	3.57E-05	3.88E-06	1.94E-06	1.94E-06	2.95E-05	3.88E-05	1.55E-07	5.76E-03
	Blasting	63.75	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
	Bulldozing, Scraping, and Grading	1.01	2.53E-06	1.27E-06	7.90E-04	7.60E-07	1.27E-06	2.43E-05	6.48E-06	1.42E-05	1.27E-06	2.03E-07	2.53E-06	2.33E-05	2.53E-06	1.27E-06	1.27E-06	1.92E-05	2.53E-05	1.01E-07	3.76E-03
1	Material Handling	5.42	1.36E-05	6.78E-06	4.23E-03	4.07E-06	6.78E-06	1.30E-04	3.47E-05	7.59E-05	6.78E-06	1.08E-06	1.36E-05	1.25E-04	1.36E-05	6.78E-06	6.78E-06	1.03E-04	1.36E-04	5.42E-07	2.01E-02
	Dust Entrainment-Unpaved Roads	46.25	1.16E-04	5.78E-05	4.62E-02	3.47E-05	5.78E-05	1.90E-03	4.53E-04	1.16E-03	1.06E-04	6.47E-06	1.16E-04	2.50E-03	1.16E-04	5.78E-05	5.78E-05	3.84E-03	1.57E-03	8.79E-05	3.28E-01
	Wind Erosion-Unpaved Roads	4.83	1.21E-05	6.04E-06	4.83E-03	3.63E-06	6.04E-06	1.98E-04	4.74E-05	1.21E-04	1.11E-05	6.77E-07	1.21E-05	2.61E-04	1.21E-05	6.04E-06	6.04E-06	4.01E-04	1.64E-04	9.18E-06	3.43E-02
	Wind Erosion-Active Areas	27.75	6.94E-05	3.47E-05	2.16E-02	2.08E-05	3.47E-05	6.66E-04	1.78E-04	3.88E-04	3.47E-05	5.55E-06	6.94E-05	6.38E-04	6.94E-05	3.47E-05	3.47E-05	5.27E-04	6.94E-04	2.77E-06	1.03E-01
	Total - Phase 1	150.56	3.76E-04	1.88E-04	1.29E-01	1.13E-04	1.88E-04	4.48E-03	1.14E-03	2.67E-03	2.42E-04	2.70E-05	3.76E-04	5.05E-03	3.76E-04	1.88E-04	1.88E-04	6.13E-03	4.22E-03	1.07E-04	7.32E-01
	Drilling	1.95	4.88E-06	2.44E-06	1.52E-03	1.46E-06	2.44E-06	4.68E-05	1.25E-05	2.73E-05	2.44E-06	3.90E-07	4.88E-06	4.49E-05	4.88E-06	2.44E-06	2.44E-06	3.71E-05	4.88E-05	1.95E-07	7.24E-03
	Blasting	63.75	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
	Bulldozing, Scraping, and Grading	0.56	1.41E-06	7.06E-07	4.41E-04	4.24E-07	7.06E-07	1.36E-05	3.62E-06	7.91E-06	7.06E-07	1.13E-07	1.41E-06	1.30E-05	1.41E-06	7.06E-07	7.06E-07	1.07E-05	1.41E-05	5.65E-08	2.10E-03
2	Material Handling	3.47	8.68E-06	4.34E-06	2.71E-03	2.60E-06	4.34E-06	8.33E-05	2.22E-05	4.86E-05	4.34E-06	6.94E-07	8.68E-06	7.98E-05	8.68E-06	4.34E-06	4.34E-06	6.60E-05	8.68E-05	3.47E-07	1.29E-02
	Dust Entrainment-Unpaved Roads	39.41	9.85E-05	4.93E-05	3.94E-02	2.96E-05	4.93E-05	1.62E-03	3.86E-04	9.85E-04	9.06E-05	5.52E-06	9.85E-05	2.13E-03	9.85E-05	4.93E-05	4.93E-05	3.27E-03	1.34E-03	7.49E-05	2.80E-01
	Wind Erosion-Unpaved Roads	7.17	1.79E-05	8.97E-06	7.17E-03	5.38E-06	8.97E-06	2.94E-04	7.03E-05	1.79E-04	1.65E-05	1.00E-06	1.79E-05	3.87E-04	1.79E-05	8.97E-06	8.97E-06	5.96E-04	2.44E-04	1.36E-05	5.09E-02
	Wind Erosion-Active Areas	31.84	7.96E-05	3.98E-05	2.48E-02	2.39E-05	3.98E-05	7.64E-04	2.04E-04	4.46E-04	3.98E-05	6.37E-06	7.96E-05	7.32E-04	7.96E-05	3.98E-05	3.98E-05	6.05E-04	7.96E-04	3.18E-06	1.18E-01
	Total - Phase 2	148.16	3.70E-04	1.85E-04	1.26E-01	1.11E-04	1.85E-04	4.35E-03	1.11E-03	2.59E-03	2.34E-04	2.68E-05	3.70E-04	4.85E-03	3.70E-04	1.85E-04	1.85E-04	5.80E-03	4.12E-03	9.87E-05	7.08E-01
	Drilling	2.26	5.65E-06	2.82E-06	1.76E-03	1.69E-06	2.82E-06	5.42E-05	1.45E-05	3.16E-05	2.82E-06	4.52E-07	5.65E-06	5.19E-05	5.65E-06	2.82E-06	2.82E-06	4.29E-05	5.65E-05	2.26E-07	8.38E-03
	Blasting	63.75	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
	Bulldozing, Scraping, and Grading	0.57	1.42E-06	7.08E-07	4.42E-04	4.25E-07	7.08E-07	1.36E-05	3.63E-06	7.93E-06	7.08E-07	1.13E-07	1.42E-06	1.30E-05	1.42E-06	7.08E-07	7.08E-07	1.08E-05	1.42E-05	5.67E-08	2.10E-03
3	Material Handling	3.92	9.81E-06	4.90E-06	3.06E-03	2.94E-06	4.90E-06	9.42E-05	2.51E-05	5.49E-05	4.90E-06	7.85E-07	9.81E-06	9.02E-05	9.81E-06	4.90E-06	4.90E-06	7.45E-05	9.81E-05	3.92E-07	1.46E-02
	Dust Entrainment-Unpaved Roads	35.44	8.86E-05	4.43E-05	3.54E-02	2.66E-05	4.43E-05	1.45E-03	3.47E-04	8.86E-04	8.15E-05	4.96E-06	8.86E-05	1.91E-03	8.86E-05	4.43E-05	4.43E-05	2.94E-03	1.20E-03	6.73E-05	2.52E-01
	Wind Erosion-Unpaved Roads	6.47	1.62E-05	8.09E-06	6.47E-03	4.85E-06	8.09E-06	2.65E-04	6.34E-05	1.62E-04	1.49E-05	9.06E-07	1.62E-05	3.50E-04	1.62E-05	8.09E-06	8.09E-06	5.37E-04	2.20E-04	1.23E-05	4.60E-02
	Wind Erosion-Active Areas	22.88	5.72E-05	2.86E-05	1.78E-02	1.72E-05	2.86E-05	5.49E-04	1.46E-04	3.20E-04	2.86E-05	4.58E-06	5.72E-05	5.26E-04	5.72E-05	2.86E-05	2.86E-05	4.35E-04	5.72E-04	2.29E-06	8.50E-02
	Total - Phase 3	135.29	3.38E-04	1.69E-04	1.15E-01	1.01E-04	1.69E-04	3.96E-03	1.01E-03	2.36E-03	2.13E-04	2.45E-05	3.38E-04	4.41E-03	3.38E-04	1.69E-04	1.69E-04	5.25E-03	3.76E-03	8.90E-05	6.44E-01
	Drilling	1.93	4.83E-06	2.41E-06	1.51E-03	1.45E-06	2.41E-06	4.64E-05	1.24E-05	2.70E-05	2.41E-06	3.86E-07	4.83E-06	4.44E-05	4.83E-06	2.41E-06	2.41E-06	3.67E-05	4.83E-05	1.93E-07	7.17E-03
	Blasting	63.75	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
	Bulldozing, Scraping, and Grading	0.49	1.22E-06	6.12E-07	3.82E-04	3.67E-07	6.12E-07	1.18E-05	3.14E-06	6.86E-06	6.12E-07	9.80E-08	1.22E-06	1.13E-05	1.22E-06	6.12E-07	6.12E-07	9.31E-06	1.22E-05	4.90E-08	1.82E-03
4	Material Handling	3.36	8.39E-06	4.20E-06	2.62E-03	2.52E-06	4.20E-06	8.05E-05	2.15E-05	4.70E-05	4.20E-06	6.71E-07	8.39E-06	7.72E-05	8.39E-06	4.20E-06	4.20E-06	6.38E-05	8.39E-05	3.36E-07	1.25E-02
	Dust Entrainment-Unpaved Roads	25.33	6.33E-05	3.17E-05	2.53E-02	1.90E-05	3.17E-05	1.04E-03	2.48E-04	6.33E-04	5.83E-05	3.55E-06	6.33E-05	1.37E-03	6.33E-05	3.17E-05	3.17E-05	2.10E-03	8.61E-04	4.81E-05	1.80E-01
	Wind Erosion-Unpaved Roads	6.17	1.54E-05	7.71E-06	6.17E-03	4.63E-06	7.71E-06	2.53E-04	6.05E-05	1.54E-04	1.42E-05	8.64E-07	1.54E-05	3.33E-04	1.54E-05	7.71E-06	7.71E-06	5.12E-04	2.10E-04	1.17E-05	4.38E-02
	Wind Erosion-Active Areas	23.28	5.82E-05	2.91E-05	1.82E-02	1.75E-05	2.91E-05	5.59E-04	1.49E-04	3.26E-04	2.91E-05	4.66E-06	5.82E-05	5.36E-04	5.82E-05	2.91E-05	2.91E-05	4.42E-04	5.82E-04	2.33E-06	8.64E-02
	Total - Phase 4	124.31	3.11E-04	1.55E-04	1.04E-01	9.32E-05	1.55E-04	3.52E-03	9.03E-04	2.09E-03	1.88E-04	2.30E-05	3.11E-04	3.84E-03	3.11E-04	1.55E-04	1.55E-04	4.38E-03	3.39E-03	6.91E-05	5.68E-01
	Drilling	1.85	4.62E-06	2.31E-06	1.44E-03	1.39E-06	2.31E-06	4.44E-05	1.18E-05	2.59E-05	2.31E-06	3.70E-07	4.62E-06	4.25E-05	4.62E-06	2.31E-06	2.31E-06	3.51E-05	4.62E-05	1.85E-07	6.86E-03
	Blasting	63.75	1.59E-04	7.97E-05	4.97E-02	4.78E-05	7.97E-05	1.53E-03	4.08E-04	8.92E-04	7.97E-05	1.27E-05	1.59E-04	1.47E-03	1.59E-04	7.97E-05	7.97E-05	1.21E-03	1.59E-03	6.37E-06	2.37E-01
	Bulldozing, Scraping, and Grading	0.50	1.24E-06	6.21E-07	3.87E-04	3.72E-07	6.21E-07	1.19E-05	3.18E-06	6.95E-06	6.21E-07	9.93E-08	1.24E-06	1.14E-05	1.24E-06	6.21E-07	6.21E-07	9.43E-06	1.24E-05	4.96E-08	1.84E-03
5	Material Handling	3.22	8.06E-06	4.03E-06	2.52E-03	2.42E-06	4.03E-06	7.74E-05	2.06E-05	4.51E-05	4.03E-06	6.45E-07	8.06E-06	7.42E-05	8.06E-06	4.03E-06	4.03E-06	6.13E-05	8.06E-05	3.22E-07	1.20E-02
	Dust Entrainment-Unpaved Roads	26.73	6.68E-05	3.34E-05	2.67E-02	2.00E-05	3.34E-05	1.10E-03	2.62E-04	6.68E-04	6.15E-05	3.74E-06	6.68E-05	1.44E-03	6.68E-05	3.34E-05	3.34E-05	2.22E-03	9.09E-04	5.08E-05	1.90E-01
	Wind Erosion-Unpaved Roads	3.68	9.21E-06	4.60E-06	3.68E-03	2.76E-06	4.60E-06	1.51E-04	3.61E-05	9.21E-05	8.47E-06	5.16E-07	9.21E-06	1.99E-04	9.21E-06	4.60E-06	4.60E-06	3.06E-04	1.25E-04	7.00E-06	2.61E-02
	Wind Erosion-Active Areas	32.39	8.10E-05	4.05E-05	2.53E-02	2.43E-05	4.05E-05	7.77E-04	2.07E-04	4.53E-04	4.05E-05	6.48E-06	8.10E-05	7.45E-04	8.10E-05	4.05E-05	4.05E-05	6.15E-04	8.10E-04	3.24E-06	1.20E-01
	Total - Phase 5	132.12	3.30E-04	1.65E-04	1.10E-01	9.91E-05	1.65E-04	3.69E-03	9.49E-04	2.18E-03	1.97E-04	2.46E-05	3.30E-04	3.98E-03	3.30E-04	1.65E-04	1.65E-04	4.46E-03	3.58E-03	6.80E-05	5.94E-01

Notes:
1. TAC emission factors obtained from sampling performed 11/20/2008 analyzed via EPA Methods 3060/7199 and 6020/7471A. Note, non-detect (ND) results were assumed to be 1/2 the detection limit. See Table 5A of 2008 CEIR.
2. Conversion Factors:
   2,000 lb/ton
   1,000,000 mg/kg

Material Handling Particulate Matter Emissions

Summary - Material Handling.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate	Transfer Points	Control Efficiency	PM_{10} Emissions (ton/yr)	PM_{10} Emissions (lb/day)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (ton/yr)	$PM_{2.5}$ Emissions (lb/day)	$PM_{2.5}$ Emissions (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1						4.65	31.00	3.87	0.70	4.65	0.58
2							5.42	36.12	2.26	0.81	5.42	0.34
3							6.68	44.53	2.78	1.00	6.68	0.42
4							5.33	35.54	2.22	0.80	5.33	0.33
5							5.00	33.34	2.08	0.75	5.00	0.31

Waste Rock Handling at CMSA/North Quarry Infill Area.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[1]	Transfer Points	Control Efficiency[5]	PM_{10} Emissions[6,7] (ton/yr)	PM_{10} Emissions[6,7] (lb/day)	PM_{10} Emissions[6,7] (lb/hr)	$PM_{2.5}$ Emissions[6,7] (ton/yr)	$PM_{2.5}$ Emissions[6,7] (lb/day)	$PM_{2.5}$ Emissions[6,7] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	7,440,640 tons/yr	1	0%	4.29	28.57	3.57	0.64	4.29	0.54
2				8,818,537 tons/yr	1		5.08	33.87	2.12	0.76	5.08	0.32
3				11,023,171 tons/yr	1		6.35	42.33	2.65	0.95	6.35	0.40
4				8,680,747 tons/yr	1		5.00	33.34	2.08	0.75	5.00	0.31
5				8,083,659 tons/yr	1		4.66	31.04	1.94	0.70	4.66	0.29

Aggregate Fines Handling at CMSA/North Quarry Infill Area.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[2]	Transfer Points	Control Efficiency[5]	PM_{10} Emissions[6,7] (ton/yr)	PM_{10} Emissions[6,7] (lb/day)	PM_{10} Emissions[6,7] (lb/hr)	$PM_{2.5}$ Emissions[6,7] (ton/yr)	$PM_{2.5}$ Emissions[6,7] (lb/day)	$PM_{2.5}$ Emissions[6,7] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	551,159 tons/yr	1	0%	0.32	2.12	0.26	0.05	0.32	0.04
2				551,159 tons/yr	1		0.32	2.12	0.13	0.05	0.32	0.02
3				551,159 tons/yr	1		0.32	2.12	0.13	0.05	0.32	0.02
4				551,159 tons/yr	1		0.32	2.12	0.13	0.05	0.32	0.02
5				551,159 tons/yr	1		0.32	2.12	0.13	0.05	0.32	0.02

Topsoil Handling at CMSA/North Quarry Infill Area - From Topsoil Storage Area.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[3]	Transfer Points	Control Efficiency[5]	PM_{10} Emissions[6,7] (ton/yr)	PM_{10} Emissions[6,7] (lb/day)	PM_{10} Emissions[6,7] (lb/hr)	$PM_{2.5}$ Emissions[6,7] (ton/yr)	$PM_{2.5}$ Emissions[6,7] (lb/day)	$PM_{2.5}$ Emissions[6,7] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	0 tons/yr	1	0%	0.00	0.00	0.00	0.00	0.00	0.00
2				0 tons/yr	1		0.00	0.00	0.00	0.00	0.00	0.00
3				22,046 tons/yr	1		0.01	0.08	0.01	0.00	0.01	0.00
4				22,046 tons/yr	1		0.01	0.08	0.01	0.00	0.01	0.00
5				47,400 tons/yr	1		0.03	0.18	0.01	0.00	0.03	0.00

Topsoil Handling at CMSA/North Quarry Infill Area - Concurrent Reclamation.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[4]	Transfer Points	Control Efficiency[5]	PM_{10} Emissions[6,7] (ton/yr)	PM_{10} Emissions[6,7] (lb/day)	PM_{10} Emissions[6,7] (lb/hr)	$PM_{2.5}$ Emissions[6,7] (ton/yr)	$PM_{2.5}$ Emissions[6,7] (lb/day)	$PM_{2.5}$ Emissions[6,7] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	39,683 tons/yr	2	0%	0.05	0.30	0.04	0.01	0.05	0.01
2				17,637 tons/yr	2		0.02	0.14	0.01	0.00	0.02	0.00
3				0 tons/yr	2		0.00	0.00	0.00	0.00	0.00	0.00
4				0 tons/yr	2		0.00	0.00	0.00	0.00	0.00	0.00
5				0 tons/yr	2		0.00	0.00	0.00	0.00	0.00	0.00

Notes:

1. Annual process rates reflect maximum anticipated production of Waste Rock during each of the five project phases. Data provided by Lehigh Southwest Cement Company, May 12, 2010.
2. Annual process rates reflect disposal of aggregate fines in waste rock storage/infill areas during each of the five project phases. Data provided by Lehigh Southwest Cement Company, May 12, 2010.
3. Annual process rates reflect maximum anticipated return of topsoil for reclamation of the CMSA/North Quarry Infill during each of the five project phases. Data provided by Lehigh Southwest Cement Company, May 12, 2010. Topsoil transport for reclamation in the CMSA and North Quarry areas is not expected to occur in same year.
4. Annual process rates reflect maximum anticipated excavation and use of topsoil for concurrent reclamation during each of the five project phases. Data provided by Lehigh Southwest Cement Company, May 12, 2010.
5. Assumed Control: None
6. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

7. Conversion factors:
   2,000 lb = 1 ton

Material Handling Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Moisture Content	AP-42 Table 13.2.4-1 (Various Limestone Products)	M	2.1	%
Mean wind speed	Mean 2008 wind speed for Lehigh Station	U	5.27	mph
PM_{10} size multiplier	MDAQMD Guidance, Sec. VI.E	k	0.36	--
$PM_{2.5}$ size multiplier	WRAP AP-42 Fugitive Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Material Handling Emission Factor	*MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1*	*Ef*	*Calculated*	*lb/ton*

$$Ef = k \times 0.0032 \times \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Notes:

1. AP-42 Sec. 13.2.4.3 provides a PM_{10} size multiplier of 0.35 and a $PM_{2.5}$ size multiplier of 0.0053.

Particulate Matter Emissions from Unpaved Road Dust Entrainment

Project Phase	Emission Factor Reference	Emission Factors		Annual Activity[1]	Control Efficiency[2]	PM_{10} Emissions[3,4]			$PM_{2.5}$ Emissions[3,4]		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.2, Eqn 1a	2.10E+00 lb/mile	2.10E-01 lb/mile	452,309 miles/yr	75%	118.85	792.31	99.04	11.88	79.23	9.90
2				493,984 miles/yr		129.80	865.32	54.08	12.98	86.53	5.41
3				493,792 miles/yr		129.75	864.98	54.06	12.97	86.50	5.41
4				399,581 miles/yr		104.99	699.95	43.75	10.50	70.00	4.37
5				287,271 miles/yr		75.48	503.22	31.45	7.55	50.32	3.15

Notes:

1. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the five project phases. Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010.
2. Assumed Control: 75% control associated with watering of unpaved roads.
3. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

3. Conversion factors:
   2,000 lb = 1 ton

Unpaved Road Dust Entrainment Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Surface Material Silt Content	2008 CEIR, Table B-8	s	2.7	%
Average Vehicle Weight	Caterpillar Performance Handbook, MDV weight	W	125.4	tons
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	1.5	lb/mile
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.15	lb/mile
Empirical Constants	AP-42 13.2.2-2	a	0.9	--
	AP-42 13.2.2-2	b	0.45	--
Dust Entrainment Emission Factor	*AP-42 13.2.2, Eqn 1a*	*Ef*	*Calculated*	*lb/mile*

$$E_f = k\left(\frac{s}{12}\right)^a\left(\frac{W}{3}\right)^b$$

Particulate Matter Emissions from Wind Erosion

Unpaved Roads.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[1]	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	3.42 acres/yr	75%	1.53	10.19	1.27	0.23	1.53	0.19
2				7.92 acres/yr		3.54	23.62	1.48	0.53	3.54	0.22
3				2.29 acres/yr		1.02	6.82	0.43	0.15	1.02	0.06
4				2.81 acres/yr		1.26	8.38	0.52	0.19	1.26	0.08
5				2.81 acres/yr		1.26	8.38	0.52	0.19	1.26	0.08

Summary - Active Storage/Infill Areas.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity	Control Efficiency	PM_{10} Emissions (ton/yr)	PM_{10} Emissions (lb/day)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (ton/yr)	$PM_{2.5}$ Emissions (lb/day)	$PM_{2.5}$ Emissions (lb/hr)
1	AP-42 13.2.5, Eqn 2			72.69 acres/yr		27.31	182.04	22.75	4.10	27.31	3.41
2				110.48 acres/yr		70.97	473.10	29.57	10.64	70.97	4.44
3				78.91 acres/yr		33.43	222.89	13.93	5.02	33.43	2.09
4				94.70 acres/yr		47.55	317.03	19.81	7.13	47.55	2.97
5				132.58 acres/yr		81.44	542.95	33.93	12.22	81.44	5.09

Active Areas - Storage/Infill Operations.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[2]	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	8.61 acres/yr	50%	7.70	51.35	6.42	1.16	7.70	0.96
2				63.13 acres/yr		56.48	376.54	23.53	8.47	56.48	3.53
3				15.78 acres/yr		14.12	94.13	5.88	2.12	14.12	0.88
4				31.57 acres/yr		28.24	188.27	11.77	4.24	28.24	1.77
5				69.44 acres/yr		62.13	414.19	25.89	9.32	62.13	3.88

Active Areas - Topsoil Removal and Reclamation.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[3]	Control Efficiency[4]	PM_{10} Emissions[5,6] (ton/yr)	PM_{10} Emissions[5,6] (lb/day)	PM_{10} Emissions[5,6] (lb/hr)	$PM_{2.5}$ Emissions[5,6] (ton/yr)	$PM_{2.5}$ Emissions[5,6] (lb/day)	$PM_{2.5}$ Emissions[5,6] (lb/hr)
1	AP-42 13.2.5, Eqn 2	6.12E-01 ton/acre-yr	9.18E-02 ton/acre-yr	64.08 acres/yr	50%	19.60	130.69	16.34	2.94	19.60	2.45
2				47.35 acres/yr		14.49	96.57	6.04	2.17	14.49	0.91
3				63.13 acres/yr		19.31	128.76	8.05	2.90	19.31	1.21
4				63.13 acres/yr		19.31	128.76	8.05	2.90	19.31	1.21
5				63.13 acres/yr		19.31	128.76	8.05	2.90	19.31	1.21

Notes:

1. Annual activity reflects roads necessary to support maximum anticipated production during each of the five project phases. Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010
2. Annual activity reflects maximum waste storage/infill operating and backfill areas during each of the five project phases. Data provided by Lehigh Southwes Cement Company, May 12, 2010.
3. Annual activity reflects maximum quarry topsoil removal and reclamation areas during each of the five project phases. Data provided by Lehigh Southwes Cement Company, May 12, 2010.
4. Assumed Control: 75% control associated with watering of unpaved roads; 50% control associated with watering of active areas consistent with fugitive dust plan to be submitted to the BAAQMD.
5. Daily and hourly emission rates reflect the following operating schedule

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

6. Conversion factors:
   2,000 lb = 1 ton

Wind Erosion Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Erosion Potential per disturbance	AP-42 13.2.5, Eqn 3	P_i	Calculated	g/m^2
Friction Velocity per disturbance	AP-42 13.2.5, Eqn 4	u*	Calculated	m/s
Threshold Friction Velocity	AP-42 Table 13.2.5-2 (scraper tracks on coal pile)	u^*_t	0.62	m/s
Quarry Operations/Roads	AP-42 Table 13.2.5-2 (scraper tracks on coal pile)		0.62	m/s
Topsoil Removal/Reclamation	AP-42 Table 13.2.5-2 (overburden)		1.02	m/s
Fastest mile wind speed per disturbance at 10 meters	Daily maximum wind gust data from Lehigh Permanente Meteorological Station for 2008	u^+_{10}	Varies	m/s
Disturbances	Lehigh Permanente wind gust data	N	Daily (366)	--
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	0.5	--
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.075	--
Wind Erosion Emission Factor	*AP-42 13.2.5, Eqn 2*	*Ef*	*Calculated*	*g/(m²-yr)*

Eqn 3 $P = 58(u^* - u_t)^2 + 25(u^* - u_t)$

Eqn 4 $u^* = 0.053u_{10}$

Eqn 2 $E_f = k \sum_{i=1}^{N} P_i$

Toxic Air Contaminant Emissions

Annual Toxic Air Contaminant Emissions (pounds/year).

	Toxic Air Contaminants (TAC):		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	Overburden TAC Emission Factor (mg TAC /kg PM):		2.5	1.25	780	0.75	1.25	24	6.4	14	1.25	0.2	2.5	23	2.5	1.25	1.25	19	25	0.1	3712.8
	Roads TAC Emission Factor (mg TAC/kg PM):		2.5	1.25	1000	0.75	1.25	41	9.8	25	2.3	0.14	2.5	54	2.5	1.25	1.25	83	34	1.9	7099.2
Phase	Component	Annual PM_{10} (tons/year)	Annual Toxic Air Contaminant Emissions (pounds/year)																		
1	Material Handling	4.65	2.32E-02	1.16E-02	7.25E+00	6.97E-03	1.16E-02	2.23E-01	5.95E-02	1.30E-01	1.16E-02	1.86E-03	2.32E-02	2.14E-01	2.32E-02	1.16E-02	1.16E-02	1.77E-01	2.32E-01	9.30E-04	3.45E+01
	Dust Entrainment-Unpaved Roads	118.85	5.94E-01	2.97E-01	2.38E+02	1.78E-01	2.97E-01	9.75E+00	2.33E+00	5.94E+00	5.47E-01	3.33E-02	5.94E-01	1.28E+01	5.94E-01	2.97E-01	2.97E-01	1.97E+01	8.08E+00	4.52E-01	1.69E+03
	Wind Erosion-Unpaved Roads	1.53	7.64E-03	3.82E-03	3.06E+00	2.29E-03	3.82E-03	1.25E-01	2.99E-02	7.64E-02	7.03E-03	4.28E-04	7.64E-03	1.65E-01	7.64E-03	3.82E-03	3.82E-03	2.54E-01	1.04E-01	5.81E-03	2.17E+01
	Wind Erosion-Active Areas	27.31	1.37E-01	6.83E-02	4.26E+01	4.10E-02	6.83E-02	1.31E+00	3.50E-01	7.65E-01	6.83E-02	1.09E-02	1.37E-01	1.26E+00	1.37E-01	6.83E-02	6.83E-02	1.04E+00	1.37E+00	5.46E-03	2.03E+02
	Total - Phase 1	152.33	7.62E-01	3.81E-01	2.91E+02	2.28E-01	3.81E-01	1.14E+01	2.77E+00	6.91E+00	6.34E-01	4.65E-02	7.62E-01	1.45E+01	7.62E-01	3.81E-01	3.81E-01	2.12E+01	9.78E+00	4.64E-01	1.95E+03
2	Material Handling	5.42	2.71E-02	1.35E-02	8.45E+00	8.13E-03	1.35E-02	2.60E-01	6.93E-02	1.52E-01	1.35E-02	2.17E-03	2.71E-02	2.49E-01	2.71E-02	1.35E-02	1.35E-02	2.06E-01	2.71E-01	1.08E-03	4.02E+01
	Dust Entrainment-Unpaved Roads	129.80	6.49E-01	3.24E-01	2.60E+02	1.95E-01	3.24E-01	1.06E+01	2.54E+00	6.49E+00	5.97E-01	3.63E-02	6.49E-01	1.40E+01	6.49E-01	3.24E-01	3.24E-01	2.15E+01	8.83E+00	4.93E-01	1.84E+03
	Wind Erosion-Unpaved Roads	3.54	1.77E-02	8.86E-03	7.09E+00	5.31E-03	8.86E-03	2.91E-01	6.94E-02	1.77E-01	1.63E-02	9.92E-04	1.77E-02	3.83E-01	1.77E-02	8.86E-03	8.86E-03	5.88E-01	2.41E-01	1.35E-02	5.03E+01
	Wind Erosion-Active Areas	70.97	3.55E-01	1.77E-01	1.11E+02	1.06E-01	1.77E-01	3.41E+00	9.08E-01	1.99E+00	1.77E-01	2.84E-02	3.55E-01	3.26E+00	3.55E-01	1.77E-01	1.77E-01	2.70E+00	3.55E+00	1.42E-02	5.27E+02
	Total - Phase 2	209.72	1.05E+00	5.24E-01	3.86E+02	3.15E-01	5.24E-01	1.46E+01	3.59E+00	8.81E+00	8.04E-01	6.79E-02	1.05E+00	1.79E+01	1.05E+00	5.24E-01	5.24E-01	2.50E+01	1.29E+01	5.22E-01	2.46E+03
3	Material Handling	6.68	3.34E-02	1.67E-02	1.04E+01	1.00E-02	1.67E-02	3.21E-01	8.55E-02	1.87E-01	1.67E-02	2.67E-03	3.34E-02	3.07E-01	3.34E-02	1.67E-02	1.67E-02	2.54E-01	3.34E-01	1.34E-03	4.96E+01
	Dust Entrainment-Unpaved Roads	129.75	6.49E-01	3.24E-01	2.59E+02	1.95E-01	3.24E-01	1.06E+01	2.54E+00	6.49E+00	5.97E-01	3.63E-02	6.49E-01	1.40E+01	6.49E-01	3.24E-01	3.24E-01	2.15E+01	8.82E+00	4.93E-01	1.84E+03
	Wind Erosion-Unpaved Roads	1.02	5.11E-03	2.56E-03	2.05E+00	1.53E-03	2.56E-03	8.39E-02	2.00E-02	5.11E-02	4.70E-03	2.86E-04	5.11E-03	1.10E-01	5.11E-03	2.56E-03	2.56E-03	1.70E-01	6.96E-02	3.89E-03	1.45E+01
	Wind Erosion-Active Areas	33.43	1.67E-01	8.36E-02	5.22E+01	5.02E-02	8.36E-02	1.60E+00	4.28E-01	9.36E-01	8.36E-02	1.34E-02	1.67E-01	1.54E+00	1.67E-01	8.36E-02	8.36E-02	1.27E+00	1.67E+00	6.69E-03	2.48E+02
	Total - Phase 3	170.88	8.54E-01	4.27E-01	3.24E+02	2.56E-01	4.27E-01	1.26E+01	3.08E+00	7.66E+00	7.02E-01	5.27E-02	8.54E-01	1.60E+01	8.54E-01	4.27E-01	4.27E-01	2.32E+01	1.09E+01	5.05E-01	2.15E+03
4	Material Handling	5.33	2.67E-02	1.33E-02	8.32E+00	8.00E-03	1.33E-02	2.56E-01	6.82E-02	1.49E-01	1.33E-02	2.13E-03	2.67E-02	2.45E-01	2.67E-02	1.33E-02	1.33E-02	2.03E-01	2.67E-01	1.07E-03	3.96E+01
	Dust Entrainment-Unpaved Roads	104.99	5.25E-01	2.62E-01	2.10E+02	1.57E-01	2.62E-01	8.61E+00	2.06E+00	5.25E+00	4.83E-01	2.94E-02	5.25E-01	1.13E+01	5.25E-01	2.62E-01	2.62E-01	1.74E+01	7.14E+00	3.99E-01	1.49E+03
	Wind Erosion-Unpaved Roads	1.26	6.28E-03	3.14E-03	2.51E+00	1.89E-03	3.14E-03	1.03E-01	2.46E-02	6.28E-02	5.78E-03	3.52E-04	6.28E-03	1.36E-01	6.28E-03	3.14E-03	3.14E-03	2.09E-01	8.55E-02	4.78E-03	1.78E+01
	Wind Erosion-Active Areas	47.55	2.38E-01	1.19E-01	7.42E+01	7.13E-02	1.19E-01	2.28E+00	6.09E-01	1.33E+00	1.19E-01	1.90E-02	2.38E-01	2.19E+00	2.38E-01	1.19E-01	1.19E-01	1.81E+00	2.38E+00	9.51E-03	3.53E+02
	Total - Phase 4	159.13	7.96E-01	3.98E-01	2.95E+02	2.39E-01	3.98E-01	1.13E+01	2.76E+00	6.79E+00	6.21E-01	5.09E-02	7.96E-01	1.39E+01	7.96E-01	3.98E-01	3.98E-01	1.96E+01	9.87E+00	4.14E-01	1.90E+03
5	Material Handling	5.00	2.50E-02	1.25E-02	7.80E+00	7.50E-03	1.25E-02	2.40E-01	6.40E-02	1.40E-01	1.25E-02	2.00E-03	2.50E-02	2.30E-01	2.50E-02	1.25E-02	1.25E-02	1.90E-01	2.50E-01	1.00E-03	3.71E+01
	Dust Entrainment-Unpaved Roads	75.48	3.77E-01	1.89E-01	1.51E+02	1.13E-01	1.89E-01	6.19E+00	1.48E+00	3.77E+00	3.47E-01	2.11E-02	3.77E-01	8.15E+00	3.77E-01	1.89E-01	1.89E-01	1.25E+01	5.13E+00	2.87E-01	1.07E+03
	Wind Erosion-Unpaved Roads	1.26	6.28E-03	3.14E-03	2.51E+00	1.89E-03	3.14E-03	1.03E-01	2.46E-02	6.28E-02	5.78E-03	3.52E-04	6.28E-03	1.36E-01	6.28E-03	3.14E-03	3.14E-03	2.09E-01	8.55E-02	4.78E-03	1.78E+01
	Wind Erosion-Active Areas	81.44	4.07E-01	2.04E-01	1.27E+02	1.22E-01	2.04E-01	3.91E+00	1.04E+00	2.28E+00	2.04E-01	3.26E-02	4.07E-01	3.75E+00	4.07E-01	2.04E-01	2.04E-01	3.09E+00	4.07E+00	1.63E-02	6.05E+02
	Total - Phase 5	163.18	8.16E-01	4.08E-01	2.88E+02	2.45E-01	4.08E-01	1.04E+01	2.61E+00	6.26E+00	5.69E-01	5.61E-02	8.16E-01	1.23E+01	8.16E-01	4.08E-01	4.08E-01	1.60E+01	9.54E+00	3.09E-01	1.73E+03

Hourly Toxic Air Contaminant Emissions (pounds/hour).

	Toxic Air Contaminants (TAC):		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	Overburden TAC Emission Factor (mg TAC /kg PM):		2.5	1.25	780	0.75	1.25	24	6.4	14	1.25	0.2	2.5	23	2.5	1.25	1.25	19	25	0.1	3712.8
	Unpaved Roads TAC Emission Factor (mg TAC/kg PM):		2.5	1.25	1000	0.75	1.25	41	9.8	25	2.3	0.14	2.5	54	2.5	1.25	1.25	83	34	1.9	7099.2
Phase	Component	Hourly PM_{10} (pounds/hr)	Hourly Toxic Air Contaminant Emissions (pounds/hour)																		
1	Material Handling	3.87	9.69E-06	4.84E-06	3.02E-03	2.91E-06	4.84E-06	9.30E-05	2.48E-05	5.42E-05	4.84E-06	7.75E-07	9.69E-06	8.91E-05	9.69E-06	4.84E-06	4.84E-06	7.36E-05	9.69E-05	3.87E-07	1.44E-02
	Dust Entrainment-Unpaved Roads	99.04	2.48E-04	1.24E-04	9.90E-02	7.43E-05	1.24E-04	4.06E-03	9.71E-04	2.48E-03	2.28E-04	1.39E-05	2.48E-04	5.35E-03	2.48E-04	1.24E-04	1.24E-04	8.22E-03	3.37E-03	1.88E-04	7.03E-01
	Wind Erosion-Unpaved Roads	1.27	3.18E-06	1.59E-06	1.27E-03	9.55E-07	1.59E-06	5.22E-05	1.25E-05	3.18E-05	2.93E-06	1.78E-07	3.18E-06	6.88E-05	3.18E-06	1.59E-06	1.59E-06	1.06E-04	4.33E-05	2.42E-06	9.04E-03
	Wind Erosion-Active Areas	22.75	5.69E-05	2.84E-05	1.77E-02	1.71E-05	2.84E-05	5.46E-04	1.46E-04	3.19E-04	2.84E-05	4.55E-06	5.69E-05	5.23E-04	5.69E-05	2.84E-05	2.84E-05	4.32E-04	5.69E-04	2.28E-06	8.45E-02
	Total - Phase 1	126.94	3.17E-04	1.59E-04	1.21E-01	9.52E-05	1.59E-04	4.75E-03	1.15E-03	2.88E-03	2.64E-04	1.94E-05	3.17E-04	6.03E-03	3.17E-04	1.59E-04	1.59E-04	8.83E-03	4.08E-03	1.93E-04	8.11E-01
2	Material Handling	2.26	5.64E-06	2.82E-06	1.76E-03	1.69E-06	2.82E-06	5.42E-05	1.44E-05	3.16E-05	2.82E-06	4.51E-07	5.64E-06	5.19E-05	5.64E-06	2.82E-06	2.82E-06	4.29E-05	5.64E-05	2.26E-07	8.38E-03
	Dust Entrainment-Unpaved Roads	54.08	1.35E-04	6.76E-05	5.41E-02	4.06E-05	6.76E-05	2.22E-03	5.30E-04	1.35E-03	1.24E-04	7.57E-06	1.35E-04	2.92E-03	1.35E-04	6.76E-05	6.76E-05	4.49E-03	1.84E-03	1.03E-04	3.84E-01
	Wind Erosion-Unpaved Roads	1.48	3.69E-06	1.85E-06	1.48E-03	1.11E-06	1.85E-06	6.05E-05	1.45E-05	3.69E-05	3.40E-06	2.07E-07	3.69E-06	7.97E-05	3.69E-06	1.85E-06	1.85E-06	1.23E-04	5.02E-05	2.80E-06	1.05E-02
	Wind Erosion-Active Areas	29.57	7.39E-05	3.70E-05	2.31E-02	2.22E-05	3.70E-05	7.10E-04	1.89E-04	4.14E-04	3.70E-05	5.91E-06	7.39E-05	6.80E-04	7.39E-05	3.70E-05	3.70E-05	5.62E-04	7.39E-04	2.96E-06	1.10E-01
	Total - Phase 2	87.38	2.18E-04	1.09E-04	8.04E-02	6.55E-05	1.09E-04	3.04E-03	7.48E-04	1.83E-03	1.68E-04	1.41E-05	2.18E-04	3.73E-03	2.18E-04	1.09E-04	1.09E-04	5.22E-03	2.68E-03	1.09E-04	5.13E-01
3	Material Handling	2.78	6.96E-06	3.48E-06	2.17E-03	2.09E-06	3.48E-06	6.68E-05	1.78E-05	3.90E-05	3.48E-06	5.57E-07	6.96E-06	6.40E-05	6.96E-06	3.48E-06	3.48E-06	5.29E-05	6.96E-05	2.78E-07	1.03E-02
	Dust Entrainment-Unpaved Roads	54.06	1.35E-04	6.76E-05	5.41E-02	4.05E-05	6.76E-05	2.22E-03	5.30E-04	1.35E-03	1.24E-04	7.57E-06	1.35E-04	2.92E-03	1.35E-04	6.76E-05	6.76E-05	4.49E-03	1.84E-03	1.03E-04	3.84E-01
	Wind Erosion-Unpaved Roads	0.43	1.07E-06	5.33E-07	4.26E-04	3.20E-07	5.33E-07	1.75E-05	4.18E-06	1.07E-05	9.80E-07	5.97E-08	1.07E-06	2.30E-05	1.07E-06	5.33E-07	5.33E-07	3.54E-05	1.45E-05	8.10E-07	3.03E-03
	Wind Erosion-Active Areas	13.93	3.48E-05	1.74E-05	1.09E-02	1.04E-05	1.74E-05	3.34E-04	8.92E-05	1.95E-04	1.74E-05	2.79E-06	3.48E-05	3.20E-04	3.48E-05	1.74E-05	1.74E-05	2.65E-04	3.48E-04	1.39E-06	5.17E-02
	Total - Phase 3	71.20	1.78E-04	8.90E-05	6.75E-02	5.34E-05	8.90E-05	2.64E-03	6.41E-04	1.60E-03	1.46E-04	1.10E-05	1.78E-04	3.33E-03	1.78E-04	8.90E-05	8.90E-05	4.84E-03	2.27E-03	1.05E-04	4.49E-01
4	Material Handling	2.22	5.55E-06	2.78E-06	1.73E-03	1.67E-06	2.78E-06	5.33E-05	1.42E-05	3.11E-05	2.78E-06	4.44E-07	5.55E-06	5.11E-05	5.55E-06	2.78E-06	2.78E-06	4.22E-05	5.55E-05	2.22E-07	8.25E-03
	Dust Entrainment-Unpaved Roads	43.75	1.09E-04	5.47E-05	4.37E-02	3.28E-05	5.47E-05	1.79E-03	4.29E-04	1.09E-03	1.01E-04	6.12E-06	1.09E-04	2.36E-03	1.09E-04	5.47E-05	5.47E-05	3.63E-03	1.49E-03	8.31E-05	3.11E-01
	Wind Erosion-Unpaved Roads	0.52	1.31E-06	6.55E-07	5.24E-04	3.93E-07	6.55E-07	2.15E-05	5.13E-06	1.31E-05	1.20E-06	7.33E-08	1.31E-06	2.83E-05	1.31E-06	6.55E-07	6.55E-07	4.35E-05	1.78E-05	9.95E-07	3.72E-03
	Wind Erosion-Active Areas	19.81	4.95E-05	2.48E-05	1.55E-02	1.49E-05	2.48E-05	4.76E-04	1.27E-04	2.77E-04	2.48E-05	3.96E-06	4.95E-05	4.56E-04	4.95E-05	2.48E-05	2.48E-05	3.76E-04	4.95E-04	1.98E-06	7.36E-02
	Total - Phase 4	66.31	1.66E-04	8.29E-05	6.15E-02	4.97E-05	8.29E-05	2.34E-03	5.75E-04	1.42E-03	1.29E-04	1.06E-05	1.66E-04	2.90E-03	1.66E-04	8.29E-05	8.29E-05	4.09E-03	2.06E-03	8.63E-05	3.96E-01
5	Material Handling	2.08	5.21E-06	2.60E-06	1.63E-03	1.56E-06	2.60E-06	5.00E-05	1.33E-05	2.92E-05	2.60E-06	4.17E-07	5.21E-06	4.79E-05	5.21E-06	2.60E-06	2.60E-06	3.96E-05	5.21E-05	2.08E-07	7.74E-03
	Dust Entrainment-Unpaved Roads	31.45	7.86E-05	3.93E-05	3.15E-02	2.36E-05	3.93E-05	1.29E-03	3.08E-04	7.86E-04	7.23E-05	4.40E-06	7.86E-05	1.70E-03	7.86E-05	3.93E-05	3.93E-05	2.61E-03	1.07E-03	5.98E-05	2.23E-01
	Wind Erosion-Unpaved Roads	0.52	1.31E-06	6.55E-07	5.24E-04	3.93E-07	6.55E-07	2.15E-05	5.13E-06	1.31E-05	1.20E-06	7.33E-08	1.31E-06	2.83E-05	1.31E-06	6.55E-07	6.55E-07	4.35E-05	1.78E-05	9.95E-07	3.72E-03
	Wind Erosion-Active Areas	33.93	8.48E-05	4.24E-05	2.65E-02	2.55E-05	4.24E-05	8.14E-04	2.17E-04	4.75E-04	4.24E-05	6.79E-06	8.48E-05	7.80E-04	8.48E-05	4.24E-05	4.24E-05	6.45E-04	8.48E-04	3.39E-06	1.26E-01
	Total - Phase 5	67.99	1.70E-04	8.50E-05	6.01E-02	5.10E-05	8.50E-05	2.18E-03	5.44E-04	1.30E-03	1.19E-04	1.17E-05	1.70E-04	2.56E-03	1.70E-04	8.50E-05	8.50E-05	3.34E-03	1.99E-03	6.44E-05	3.61E-01

Notes:
1. TAC emission factors obtained from sampling performed 11/20/2008 analyzed via EPA Methods 3060/7199 and 6020/7471A. Note, non-detect (ND) results were assumed to be 1/2 the detection limit. See Table 5A of 2008 CEIR.
2. Conversion Factors:
2,000 lb/ton
1,000,000 mg/kg

Material Handling Particulate Matter Emissions

Summary - Material Handling.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate	Transfer Points	Control Efficiency	PM_{10} Emissions (ton/yr)	PM_{10} Emissions (lb/day)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (ton/yr)	$PM_{2.5}$ Emissions (lb/day)	$PM_{2.5}$ Emissions (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1						0.10	0.69	0.09	0.02	0.10	0.01
2							0.10	0.69	0.04	0.02	0.10	0.01
3							0.05	0.32	0.02	0.01	0.05	0.00
4							0.01	0.08	0.01	0.00	0.01	0.00
5							0.14	0.91	0.06	0.02	0.14	0.01

Topsoil Handling at Topsoil Storage Area - Material from Other Areas.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[1]	Transfer Points	Control Efficiency[2]	PM_{10} Emissions[3,4] (ton/yr)	PM_{10} Emissions[3,4] (lb/day)	PM_{10} Emissions[3,4] (lb/hr)	$PM_{2.5}$ Emissions[3,4] (ton/yr)	$PM_{2.5}$ Emissions[3,4] (lb/day)	$PM_{2.5}$ Emissions[3,4] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	165,348 tons/yr	1	0%	0.10	0.63	0.08	0.01	0.10	0.01
2				176,371 tons/yr	1		0.10	0.68	0.04	0.02	0.10	0.01
3				77,162 tons/yr	1		0.04	0.30	0.02	0.01	0.04	0.00
4				22,046 tons/yr	1		0.01	0.08	0.01	0.00	0.01	0.00
5				219,361 tons/yr	1		0.13	0.84	0.05	0.02	0.13	0.01

Topsoil Handling at Topsoil Storage Area - Material from Topsoil Storage Area.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Process Rate[1]	Transfer Points	Control Efficiency[2]	PM_{10} Emissions[3,4] (ton/yr)	PM_{10} Emissions[3,4] (lb/day)	PM_{10} Emissions[3,4] (lb/hr)	$PM_{2.5}$ Emissions[3,4] (ton/yr)	$PM_{2.5}$ Emissions[3,4] (lb/day)	$PM_{2.5}$ Emissions[3,4] (lb/hr)
1	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	6,614 tons/yr	2	0%	0.01	0.05	0.01	0.00	0.01	0.00
2				2,205 tons/yr	2		0.00	0.02	0.00	0.00	0.00	0.00
3				3,307 tons/yr	2		0.00	0.03	0.00	0.00	0.00	0.00
4				0 tons/yr	2		0.00	0.00	0.00	0.00	0.00	0.00
5				8,819 tons/yr	2		0.01	0.07	0.00	0.00	0.01	0.00

Notes:

1. Annual process rates reflect maximum anticipated storage and return of topsoil for reclamation of the CMSA, North Quarry Infill, South Quarry, and the Topsoil Storage Area itself during each of the five project phases. Data provided by Lehigh Southwest Cement Company, May 12, 2010.
2. Assumed Control: None
3. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

4. Conversion factors:
   2,000 lb = 1 ton

Material Handling Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Moisture Content	AP-42 Table 13.2.4-1 (Various Limestone Products)	M	2.1	%
Mean wind speed	Mean 2008 wind speed for Lehigh Station	U	5.27	mph
PM_{10} size multiplier	MDAQMD Guidance, Sec. VI.E	k	0.36	--
$PM_{2.5}$ size multiplier	WRAP AP-42 Fugitive Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Material Handling Emission Factor	*MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1*	*Ef*	*Calculated*	*lb/ton*

$$Ef = k \times 0.0032 \times \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Notes:

1. AP-42 Sec. 13.2.4.3 provides a PM_{10} size multiplier of 0.35 and a $PM_{2.5}$ size multiplier of 0.0053.

Particulate Matter Emissions from Unpaved Road Dust Entrainment

Project Phase	Emission Factor Reference	Emission Factors		Annual Activity[1]	Control Efficiency[2]	PM_{10} Emissions[3,4]			$PM_{2.5}$ Emissions[3,4]		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.2, Eqn 1a	2.10E+00 lb/mile	2.10E-01 lb/mile	46,764 miles/yr	75%	12.29	81.92	10.24	1.23	8.19	1.02
2				66,679 miles/yr		17.52	116.80	7.30	1.75	11.68	0.73
3				42,344 miles/yr		11.13	74.17	4.64	1.11	7.42	0.46
4				24,490 miles/yr		6.43	42.90	2.68	0.64	4.29	0.27
5				46,727 miles/yr		12.28	81.85	5.12	1.23	8.19	0.51

Notes:

1. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the five project phases. Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010.
2. Assumed Control: 75% control associated with watering of unpaved roads.
3. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

4. Conversion factors:
   2,000 lb = 1 ton

Unpaved Road Dust Entrainment Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Surface Material Silt Content	2008 CEIR, Table B-8	s	2.7	%
Average Vehicle Weight	Caterpillar Performance Handbook, MDV weight	W	125.4	tons
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	1.5	lb/mile
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.15	lb/mile
Empirical Constants	AP-42 13.2.2-2	a	0.9	--
	AP-42 13.2.2-2	b	0.45	--
Dust Entrainment Emission Factor	*AP-42 13.2.2, Eqn 1a*	*Ef*	*Calculated*	*lb/mile*

$$E_f = k\left(\frac{s}{12}\right)^a\left(\frac{W}{3}\right)^b$$

Particulate Matter Emissions from Wind Erosion

Unpaved Roads.

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[1]	Control Efficiency[3]	PM_{10} Emissions[4,5] (ton/yr)	PM_{10} (lb/day)	PM_{10} (lb/hr)	$PM_{2.5}$ Emissions[4,5] (ton/yr)	$PM_{2.5}$ (lb/day)	$PM_{2.5}$ (lb/hr)
1	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	5.61 acres/yr	75%	2.51	16.72	2.09	0.38	2.51	0.31
2				5.61 acres/yr		2.51	16.72	1.04	0.38	2.51	0.16
3				5.61 acres/yr		2.51	16.72	1.04	0.38	2.51	0.16
4				5.61 acres/yr		2.51	16.72	1.04	0.38	2.51	0.16
5				5.61 acres/yr		2.51	16.72	1.04	0.38	2.51	0.16

Active Topsoil Storage Removal, Operating, and Reclamation Areas

Project Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[2]	Control Efficiency[3]	PM_{10} Emissions[4,5] (ton/yr)	PM_{10} (lb/day)	PM_{10} (lb/hr)	$PM_{2.5}$ Emissions[4,5] (ton/yr)	$PM_{2.5}$ (lb/day)	$PM_{2.5}$ (lb/hr)
1	AP-42 13.2.5, Eqn 2	6.12E-01 ton/acre-yr	9.18E-02 ton/acre-yr	7.58 acres/yr	50%	2.32	15.45	1.93	0.35	2.32	0.29
2				5.84 acres/yr		1.79	11.91	0.74	0.27	1.79	0.11
3				0.00 acres/yr		0.00	0.00	0.00	0.00	0.00	0.00
4				0.00 acres/yr		0.00	0.00	0.00	0.00	0.00	0.00
5				4.59 acres/yr		1.40	9.36	0.59	0.21	1.40	0.09

Notes:

1. Annual activity reflects roads necessary to support maximum anticipated production during each of the five project phases. Data provided by Lehigh Southwest Cement Cement Company, May 12, 2010.
2. Annual activity reflects maximum topsoil removal, operating and reclamation areas during each of the five project phases. Data provided by Lehigh Southwest Cement Company, May 12, 2010.
3. Assumed Control: 75% control associated with watering of unpaved roads; 50% control associated with watering of active areas consistent with fugitive dust plan to be submitted to the BAAQMD.
4. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

5. Conversion factors:
   2,000 lb = 1 ton

Wind Erosion Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Erosion Potential per disturbance	AP-42 13.2.5, Eqn 3	P_i	Calculated	g/m^2
Friction Velocity per disturbance	AP-42 13.2.5, Eqn 4	u*	Calculated	m/s
Threshold Friction Velocity		u^*_t		
Roads	AP-42 Table 13.2.5-2 (scraper tracks on coal pile)		0.62	m/s
Topsoil Removal/Reclamation	AP-42 Table 13.2.5-2 (overburden)		1.02	m/s
Fastest mile wind speed per disturbance at 10 meters	Daily maximum wind gust data from Lehigh Permanente Meteorological Station for 2008	u^+_{10}	Varies	m/s
Disturbances	Lehigh Permanente wind gust data	N	Daily (366)	--
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	0.5	--
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.075	--
Wind Erosion Emission Factor	*AP-42 13.2.5, Eqn 2*	*Ef*	*Calculated*	*g/(m^2-yr)*

Eqn 3 $$P = 58(u^* - u_t)^2 + 25(u^* - u_t)$$

Eqn 4 $$u^* = 0.053u_{10}$$

Eqn 2 $$E_f = k \sum_{i=1}^{N} P_i$$

Toxic Air Contaminant Emissions

Annual Toxic Air Contaminant Emissions (pounds/year).

	Toxic Air Contaminants (TAC):		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	Overburden TAC Emission Factor (mg TAC /kg PM):		2.5	1.25	780	0.75	1.25	24	6.4	14	1.25	0.2	2.5	23	2.5	1.25	1.25	19	25	0.1	3712.8
	Roads TAC Emission Factor (mg TAC/kg PM):		2.5	1.25	1000	0.75	1.25	41	9.8	25	2.3	0.14	2.5	54	2.5	1.25	1.25	83	34	1.9	7099.2
Phase	Component	Annual PM_{10} (tons/year)	Annual Toxic Air Contaminant Emissions (pounds/year)																		
1	Material Handling	0.10	5.14E-04	2.57E-04	1.60E-01	1.54E-04	2.57E-04	4.94E-03	1.32E-03	2.88E-03	2.57E-04	4.11E-05	5.14E-04	4.73E-03	5.14E-04	2.57E-04	2.57E-04	3.91E-03	5.14E-03	2.06E-05	7.64E-01
	Dust Entrainment-Unpaved Roads	12.29	6.14E-02	3.07E-02	2.46E+01	1.84E-02	3.07E-02	1.01E+00	2.41E-01	6.14E-01	5.65E-02	3.44E-03	6.14E-02	1.33E+00	6.14E-02	3.07E-02	3.07E-02	2.04E+00	8.36E-01	4.67E-02	1.74E+02
	Wind Erosion-Unpaved Roads	2.51	1.25E-02	6.27E-03	5.02E+00	3.76E-03	6.27E-03	2.06E-01	4.92E-02	1.25E-01	1.15E-02	7.02E-04	1.25E-02	2.71E-01	1.25E-02	6.27E-03	6.27E-03	4.16E-01	1.71E-01	9.53E-03	3.56E+01
	Wind Erosion-Active Areas	2.32	1.16E-02	5.79E-03	3.62E+00	3.48E-03	5.79E-03	1.11E-01	2.97E-02	6.49E-02	5.79E-03	9.27E-04	1.16E-02	1.07E-01	1.16E-02	5.79E-03	5.79E-03	8.81E-02	1.16E-01	4.64E-04	1.72E+01
	Total - Phase 1	17.22	8.61E-02	4.30E-02	3.34E+01	2.58E-02	4.30E-02	1.33E+00	3.21E-01	8.08E-01	7.41E-02	5.11E-03	8.61E-02	1.71E+00	8.61E-02	4.30E-02	4.30E-02	2.55E+00	1.13E+00	5.67E-02	2.28E+02
2	Material Handling	0.10	5.21E-04	2.60E-04	1.62E-01	1.56E-04	2.60E-04	5.00E-03	1.33E-03	2.92E-03	2.60E-04	4.17E-05	5.21E-04	4.79E-03	5.21E-04	2.60E-04	2.60E-04	3.96E-03	5.21E-03	2.08E-05	7.73E-01
	Dust Entrainment-Unpaved Roads	17.52	8.76E-02	4.38E-02	3.50E+01	2.63E-02	4.38E-02	1.44E+00	3.43E-01	8.76E-01	8.06E-02	4.91E-03	8.76E-02	1.89E+00	8.76E-02	4.38E-02	4.38E-02	2.91E+00	1.19E+00	6.66E-02	2.49E+02
	Wind Erosion-Unpaved Roads	2.51	1.25E-02	6.27E-03	5.02E+00	3.76E-03	6.27E-03	2.06E-01	4.92E-02	1.25E-01	1.15E-02	7.02E-04	1.25E-02	2.71E-01	1.25E-02	6.27E-03	6.27E-03	4.16E-01	1.71E-01	9.53E-03	3.56E+01
	Wind Erosion-Active Areas	1.79	8.93E-03	4.47E-03	2.79E+00	2.68E-03	4.47E-03	8.58E-02	2.29E-02	5.00E-02	4.47E-03	7.15E-04	8.93E-03	8.22E-02	8.93E-03	4.47E-03	4.47E-03	6.79E-02	8.93E-02	3.57E-04	1.33E+01
	Total - Phase 2	21.92	1.10E-01	5.48E-02	4.30E+01	3.29E-02	5.48E-02	1.73E+00	4.17E-01	1.05E+00	9.69E-02	6.36E-03	1.10E-01	2.25E+00	1.10E-01	5.48E-02	5.48E-02	3.40E+00	1.46E+00	7.65E-02	2.98E+02
3	Material Handling	0.05	2.41E-04	1.21E-04	7.53E-02	7.24E-05	1.21E-04	2.32E-03	6.18E-04	1.35E-03	1.21E-04	1.93E-05	2.41E-04	2.22E-03	2.41E-04	1.21E-04	1.21E-04	1.83E-03	2.41E-03	9.65E-06	3.58E-01
	Dust Entrainment-Unpaved Roads	11.13	5.56E-02	2.78E-02	2.23E+01	1.67E-02	2.78E-02	9.12E-01	2.18E-01	5.56E-01	5.12E-02	3.12E-03	5.56E-02	1.20E+00	5.56E-02	2.78E-02	2.78E-02	1.85E+00	7.57E-01	4.23E-02	1.58E+02
	Wind Erosion-Unpaved Roads	2.51	1.25E-02	6.27E-03	5.02E+00	3.76E-03	6.27E-03	2.06E-01	4.92E-02	1.25E-01	1.15E-02	7.02E-04	1.25E-02	2.71E-01	1.25E-02	6.27E-03	6.27E-03	4.16E-01	1.71E-01	9.53E-03	3.56E+01
	Wind Erosion-Active Areas	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total - Phase 3	13.68	6.84E-02	3.42E-02	2.73E+01	2.05E-02	3.42E-02	1.12E+00	2.68E-01	6.83E-01	6.28E-02	3.84E-03	6.84E-02	1.47E+00	6.84E-02	3.42E-02	3.42E-02	2.27E+00	9.30E-01	5.18E-02	1.94E+02
4	Material Handling	0.01	6.35E-05	3.17E-05	1.98E-02	1.90E-05	3.17E-05	6.10E-04	1.63E-04	3.56E-04	3.17E-05	5.08E-06	6.35E-05	5.84E-04	6.35E-05	3.17E-05	3.17E-05	4.83E-04	6.35E-04	2.54E-06	9.43E-02
	Dust Entrainment-Unpaved Roads	6.43	3.22E-02	1.61E-02	1.29E+01	9.65E-03	1.61E-02	5.28E-01	1.26E-01	3.22E-01	2.96E-02	1.80E-03	3.22E-02	6.95E-01	3.22E-02	1.61E-02	1.61E-02	1.07E+00	4.38E-01	2.45E-02	9.14E+01
	Wind Erosion-Unpaved Roads	2.51	1.25E-02	6.27E-03	5.02E+00	3.76E-03	6.27E-03	2.06E-01	4.92E-02	1.25E-01	1.15E-02	7.02E-04	1.25E-02	2.71E-01	1.25E-02	6.27E-03	6.27E-03	4.16E-01	1.71E-01	9.53E-03	3.56E+01
	Wind Erosion-Active Areas	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total - Phase 4	8.96	4.48E-02	2.24E-02	1.79E+01	1.34E-02	2.24E-02	7.34E-01	1.75E-01	4.47E-01	4.12E-02	2.51E-03	4.48E-02	9.66E-01	4.48E-02	2.24E-02	2.24E-02	1.48E+00	6.09E-01	3.40E-02	1.27E+02
5	Material Handling	0.14	6.83E-04	3.41E-04	2.13E-01	2.05E-04	3.41E-04	6.55E-03	1.75E-03	3.82E-03	3.41E-04	5.46E-05	6.83E-04	6.28E-03	6.83E-04	3.41E-04	3.41E-04	5.19E-03	6.83E-03	2.73E-05	1.01E+00
	Dust Entrainment-Unpaved Roads	12.28	6.14E-02	3.07E-02	2.46E+01	1.84E-02	3.07E-02	1.01E+00	2.41E-01	6.14E-01	5.65E-02	3.44E-03	6.14E-02	1.33E+00	6.14E-02	3.07E-02	3.07E-02	2.04E+00	8.35E-01	4.67E-02	1.74E+02
	Wind Erosion-Unpaved Roads	2.51	1.25E-02	6.27E-03	5.02E+00	3.76E-03	6.27E-03	2.06E-01	4.92E-02	1.25E-01	1.15E-02	7.02E-04	1.25E-02	2.71E-01	1.25E-02	6.27E-03	6.27E-03	4.16E-01	1.71E-01	9.53E-03	3.56E+01
	Wind Erosion-Active Areas	1.40	7.02E-03	3.51E-03	2.19E+00	2.11E-03	3.51E-03	6.74E-02	1.80E-02	3.93E-02	3.51E-03	5.62E-04	7.02E-03	6.46E-02	7.02E-03	3.51E-03	3.51E-03	5.34E-02	7.02E-02	2.81E-04	1.04E+01
	Total - Phase 5	16.33	8.16E-02	4.08E-02	3.20E+01	2.45E-02	4.08E-02	1.29E+00	3.10E-01	7.82E-01	7.19E-02	4.76E-03	8.16E-02	1.67E+00	8.16E-02	4.08E-02	4.08E-02	2.51E+00	1.08E+00	5.65E-02	2.21E+02

Hourly Toxic Air Contaminant Emissions (pounds/hour).

	Toxic Air Contaminants (TAC):		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	Overburden TAC Emission Factor (mg TAC /kg PM):		2.5	1.25	780	0.75	1.25	24	6.4	14	1.25	0.2	2.5	23	2.5	1.25	1.25	19	25	0.1	3712.8
	Unpaved Roads TAC Emission Factor (mg TAC/kg PM):		2.5	1.25	1000	0.75	1.25	41	9.8	25	2.3	0.14	2.5	54	2.5	1.25	1.25	83	34	1.9	7099.2
Phase	Component	Hourly PM_{10} (pounds/hr)	Hourly Toxic Air Contaminant Emissions (pounds/hour)																		
1	Material Handling	0.09	2.14E-07	1.07E-07	6.69E-05	6.43E-08	1.07E-07	2.06E-06	5.49E-07	1.20E-06	1.07E-07	1.71E-08	2.14E-07	1.97E-06	2.14E-07	1.07E-07	1.07E-07	1.63E-06	2.14E-06	8.57E-09	3.18E-04
	Dust Entrainment-Unpaved Roads	10.24	2.56E-05	1.28E-05	1.02E-02	7.68E-06	1.28E-05	4.20E-04	1.00E-04	2.56E-04	2.36E-05	1.43E-06	2.56E-05	5.53E-04	2.56E-05	1.28E-05	1.28E-05	8.50E-04	3.48E-04	1.95E-05	7.27E-02
	Wind Erosion-Unpaved Roads	2.09	5.22E-06	2.61E-06	2.09E-03	1.57E-06	2.61E-06	8.57E-05	2.05E-05	5.22E-05	4.81E-06	2.93E-07	5.22E-06	1.13E-04	5.22E-06	2.61E-06	2.61E-06	1.73E-04	7.11E-05	3.97E-06	1.48E-02
	Wind Erosion-Active Areas	1.93	4.83E-06	2.41E-06	1.51E-03	1.45E-06	2.41E-06	4.64E-05	1.24E-05	2.70E-05	2.41E-06	3.86E-07	4.83E-06	4.44E-05	4.83E-06	2.41E-06	2.41E-06	3.67E-05	4.83E-05	1.93E-07	7.17E-03
	Total - Phase 1	14.35	3.59E-05	1.79E-05	1.39E-02	1.08E-05	1.79E-05	5.54E-04	1.34E-04	3.36E-04	3.09E-05	2.13E-06	3.59E-05	7.12E-04	3.59E-05	1.79E-05	1.79E-05	1.06E-03	4.70E-04	2.36E-05	9.50E-02
2	Material Handling	0.04	1.08E-07	5.42E-08	3.38E-05	3.25E-08	5.42E-08	1.04E-06	2.78E-07	6.07E-07	5.42E-08	8.68E-09	1.08E-07	9.98E-07	1.08E-07	5.42E-08	5.42E-08	8.24E-07	1.08E-06	4.34E-09	1.61E-04
	Dust Entrainment-Unpaved Roads	7.30	1.83E-05	9.13E-06	7.30E-03	5.48E-06	9.13E-06	2.99E-04	7.15E-05	1.83E-04	1.68E-05	1.02E-06	1.83E-05	3.94E-04	1.83E-05	9.13E-06	9.13E-06	6.06E-04	2.48E-04	1.39E-05	5.18E-02
	Wind Erosion-Unpaved Roads	1.04	2.61E-06	1.31E-06	1.04E-03	7.84E-07	1.31E-06	4.28E-05	1.02E-05	2.61E-05	2.40E-06	1.46E-07	2.61E-06	5.64E-05	2.61E-06	1.31E-06	1.31E-06	8.67E-05	3.55E-05	1.99E-06	7.42E-03
	Wind Erosion-Active Areas	0.74	1.86E-06	9.30E-07	5.81E-04	5.58E-07	9.30E-07	1.79E-05	4.76E-06	1.04E-05	9.30E-07	1.49E-07	1.86E-06	1.71E-05	1.86E-06	9.30E-07	9.30E-07	1.41E-05	1.86E-05	7.44E-08	2.76E-03
	Total - Phase 2	9.13	2.28E-05	1.14E-05	8.96E-03	6.85E-06	1.14E-05	3.61E-04	8.68E-05	2.20E-04	2.02E-05	1.33E-06	2.28E-05	4.69E-04	2.28E-05	1.14E-05	1.14E-05	7.08E-04	3.03E-04	1.59E-05	6.22E-02
3	Material Handling	0.02	5.03E-08	2.51E-08	1.57E-05	1.51E-08	2.51E-08	4.83E-07	1.29E-07	2.82E-07	2.51E-08	4.02E-09	5.03E-08	4.62E-07	5.03E-08	2.51E-08	2.51E-08	3.82E-07	5.03E-07	2.01E-09	7.47E-05
	Dust Entrainment-Unpaved Roads	4.64	1.16E-05	5.79E-06	4.64E-03	3.48E-06	5.79E-06	1.90E-04	4.54E-05	1.16E-04	1.07E-05	6.49E-07	1.16E-05	2.50E-04	1.16E-05	5.79E-06	5.79E-06	3.85E-04	1.58E-04	8.81E-06	3.29E-02
	Wind Erosion-Unpaved Roads	1.04	2.61E-06	1.31E-06	1.04E-03	7.84E-07	1.31E-06	4.28E-05	1.02E-05	2.61E-05	2.40E-06	1.46E-07	2.61E-06	5.64E-05	2.61E-06	1.31E-06	1.31E-06	8.67E-05	3.55E-05	1.99E-06	7.42E-03
	Wind Erosion-Active Areas	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total - Phase 3	5.70	1.43E-05	7.13E-06	5.70E-03	4.28E-06	7.13E-06	2.33E-04	5.58E-05	1.42E-04	1.31E-05	7.99E-07	1.43E-05	3.07E-04	1.43E-05	7.13E-06	7.13E-06	4.72E-04	1.94E-04	1.08E-05	4.04E-02
4	Material Handling	0.01	1.32E-08	6.61E-09	4.13E-06	3.97E-09	6.61E-09	1.27E-07	3.39E-08	7.41E-08	6.61E-09	1.06E-09	1.32E-08	1.22E-07	1.32E-08	6.61E-09	6.61E-09	1.01E-07	1.32E-07	5.29E-10	1.96E-05
	Dust Entrainment-Unpaved Roads	2.68	6.70E-06	3.35E-06	2.68E-03	2.01E-06	3.35E-06	1.10E-04	2.63E-05	6.70E-05	6.17E-06	3.75E-07	6.70E-06	1.45E-04	6.70E-06	3.35E-06	3.35E-06	2.23E-04	9.12E-05	5.09E-06	1.90E-02
	Wind Erosion-Unpaved Roads	1.04	2.61E-06	1.31E-06	1.04E-03	7.84E-07	1.31E-06	4.28E-05	1.02E-05	2.61E-05	2.40E-06	1.46E-07	2.61E-06	5.64E-05	2.61E-06	1.31E-06	1.31E-06	8.67E-05	3.55E-05	1.99E-06	7.42E-03
	Wind Erosion-Active Areas	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total - Phase 4	3.73	9.33E-06	4.66E-06	3.73E-03	2.80E-06	4.66E-06	1.53E-04	3.65E-05	9.32E-05	8.58E-06	5.23E-07	9.33E-06	2.01E-04	9.33E-06	4.66E-06	4.66E-06	3.09E-04	1.27E-04	7.08E-06	2.65E-02
5	Material Handling	0.06	1.42E-07	7.11E-08	4.44E-05	4.27E-08	7.11E-08	1.37E-06	3.64E-07	7.96E-07	7.11E-08	1.14E-08	1.42E-07	1.31E-06	1.42E-07	7.11E-08	7.11E-08	1.08E-06	1.42E-06	5.69E-09	2.11E-04
	Dust Entrainment-Unpaved Roads	5.12	1.28E-05	6.39E-06	5.12E-03	3.84E-06	6.39E-06	2.10E-04	5.01E-05	1.28E-04	1.18E-05	7.16E-07	1.28E-05	2.76E-04	1.28E-05	6.39E-06	6.39E-06	4.25E-04	1.74E-04	9.72E-06	3.63E-02
	Wind Erosion-Unpaved Roads	1.04	2.61E-06	1.31E-06	1.04E-03	7.84E-07	1.31E-06	4.28E-05	1.02E-05	2.61E-05	2.40E-06	1.46E-07	2.61E-06	5.64E-05	2.61E-06	1.31E-06	1.31E-06	8.67E-05	3.55E-05	1.99E-06	7.42E-03
	Wind Erosion-Active Areas	0.59	1.46E-06	7.32E-07	4.57E-04	4.39E-07	7.32E-07	1.40E-05	3.75E-06	8.19E-06	7.32E-07	1.17E-07	1.46E-06	1.35E-05	1.46E-06	7.32E-07	7.32E-07	1.11E-05	1.46E-05	5.85E-08	2.17E-03
	Total - Phase 5	6.80	1.70E-05	8.50E-06	6.66E-03	5.10E-06	8.50E-06	2.68E-04	6.45E-05	1.63E-04	1.50E-05	9.91E-07	1.70E-05	3.47E-04	1.70E-05	8.50E-06	8.50E-06	5.24E-04	2.26E-04	1.18E-05	4.61E-02

Notes:
1. TAC emission factors obtained from sampling performed 11/20/2008 analyzed via EPA Methods 3060/7199 and 6020/7471A. Note, non-detect (ND) results were assumed to be 1/2 the detection limit. See Table 5A of 2008 CEIR.
2. Conversion Factors:
   2,000 lb/ton
   1,000,000 mg/kg

Criteria Pollutant Emissions[1].

Project Phase	Component	Throughput[2]	Working Loss (lb/yr)	Breathing Loss (lb/yr)	Total ROC Emissions (ton/yr)	(lb/day)	(lb/hr)
	Diesel Storage - AST	2,583,486 gal/yr	24.40	8.15	0.016	1.08E-01	1.36E-02
1	Gasoline Storage - UST	14,500 gal/yr	122.35	0.00	0.061	4.08E-01	5.10E-02
	Total - Phase 1				0.077	0.516	0.065
	Diesel Storage - AST	3,488,645 gal/yr	27.97	8.15	0.018	1.20E-01	7.53E-03
2	Gasoline Storage - UST	16,500 gal/yr	139.22	0.00	0.070	4.64E-01	2.90E-02
	Total - Phase 2				0.088	0.584	0.037
	Diesel Storage - AST	3,156,013 gal/yr	26.66	8.15	0.017	1.16E-01	7.25E-03
3	Gasoline Storage - UST	16,000 gal/yr	135.00	0.00	0.068	4.50E-01	2.81E-02
	Total - Phase 3				0.085	0.566	0.035
	Diesel Storage - AST	3,034,694 gal/yr	26.18	8.15	0.017	1.14E-01	7.15E-03
4	Gasoline Storage - UST	14,500 gal/yr	122.35	0.00	0.061	4.08E-01	2.55E-02
	Total - Phase 4				0.078	0.522	0.033
	Diesel Storage - AST	3,177,214 gal/yr	26.74	8.15	0.017	1.16E-01	7.27E-03
5	Gasoline Storage - UST	13,000 gal/yr	109.69	0.00	0.055	3.66E-01	2.29E-02
	Total - Phase 5				0.072	0.482	0.030

Toxic Air Contaminant (TAC) Emissions[1].

Project Phase	Component	Hexane (-n)		Benzene		Toluene		Ethylbenzene		Xylene (-m)		1,2,4-Trimethylbenzene	
		(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)	(lb/hr)
	Diesel Storage - AST	0.01	0.00	0.07	0.00	0.75	0.00	0.10	0.00	1.89	0.00	1.51	0.00
1	Gasoline Storage - UST	0.64	0.00	0.70	0.00	0.78	0.00	0.05	0.00	0.21	0.00	0.02	0.00
	Total - Phase 1	0.65	0.00	0.77	0.00	1.53	0.00	0.15	0.00	2.11	0.00	1.53	0.00
	Diesel Storage - AST	0.01	0.00	0.07	0.00	0.83	0.00	0.11	0.00	2.10	0.00	1.67	0.00
2	Gasoline Storage - UST	0.72	0.00	0.80	0.00	0.88	0.00	0.06	0.00	0.24	0.00	0.02	0.00
	Total - Phase 2	0.74	0.00	0.87	0.00	1.71	0.00	0.17	0.00	2.34	0.00	1.69	0.00
	Diesel Storage - AST	0.01	0.00	0.07	0.00	0.80	0.00	0.11	0.00	2.02	0.00	1.61	0.00
3	Gasoline Storage - UST	0.70	0.00	0.77	0.00	0.86	0.00	0.06	0.00	0.24	0.00	0.02	0.00
	Total - Phase 3	0.72	0.00	0.84	0.00	1.66	0.00	0.17	0.00	2.26	0.00	1.63	0.00
	Diesel Storage - AST	0.01	0.00	0.07	0.00	0.79	0.00	0.11	0.00	2.00	0.00	1.59	0.00
4	Gasoline Storage - UST	0.64	0.00	0.70	0.00	0.78	0.00	0.05	0.00	0.21	0.00	0.02	0.00
	Total - Phase 4	0.65	0.00	0.77	0.00	1.57	0.00	0.16	0.00	2.21	0.00	1.61	0.00
	Diesel Storage - AST	0.01	0.00	0.07	0.00	0.80	0.00	0.11	0.00	2.03	0.00	1.62	0.00
5	Gasoline Storage - UST	0.57	0.00	0.63	0.00	0.70	0.00	0.05	0.00	0.19	0.00	0.02	0.00
	Total - Phase 5	0.59	0.00	0.70	0.00	1.50	0.00	0.16	0.00	2.22	0.00	1.63	0.00

Notes:

1. Emissions calculated using the U.S. Environmental Protection Agency's TANKS model Version 4.0.9d, the indicated throughput values, and tank parameters as presented below.
2. Diesel throughputs based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, May 12, 2010 for Phases 1-5. Gasoline throughputs throughput based on estimated in-plant vehicle use, mileage accruals, and fuel economy for Phases 1-5
3. Assumed operating schedule:

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

4. Conversion factor:
   2,000 lb = 1 ton
5. Emission calculation data inputs:

Parameter	Diesel - AST	Gasoline - UST
Capacity	20,000 gal	10,000 gal
Length	34.5 ft	25 ft
Diameter	10 ft	8.33 ft
Condition	Good	N/A

Criteria Emissions.

Project Phase	Component	EF Reference	ROC Emission Factor	Throughput[1]	Total ROC Emissions (ton/yr)	(lb/day)	(lb/hr)
1	Diesel Dispensing	SCAQMD [2]	0.000028 lb/gal	2,583,486 gal/yr	0.036	2.41E-01	3.01E-02
	Gasoline Dispensing	ARB [3]	0.00038 lb/gal	14,500 gal/yr	0.003	1.84E-02	2.30E-03
	Total - Phase 1				0.039	0.259	0.032
2	Diesel Dispensing			3,488,645 gal/yr	0.049	3.26E-01	2.04E-02
	Gasoline Dispensing			16,500 gal/yr	0.003	2.09E-02	1.31E-03
	Total - Phase 2				0.052	0.347	0.022
3	Diesel Dispensing			3,156,013 gal/yr	0.044	2.95E-01	1.84E-02
	Gasoline Dispensing			16,000 gal/yr	0.003	2.03E-02	1.27E-03
	Total - Phase 3				0.047	0.315	0.020
4	Diesel Dispensing			3,034,694 gal/yr	0.042	2.83E-01	1.77E-02
	Gasoline Dispensing			14,500 gal/yr	0.003	1.84E-02	1.15E-03
	Total - Phase 4				0.045	0.302	0.019
5	Diesel Dispensing			3,177,214 gal/yr	0.044	2.97E-01	1.85E-02
	Gasoline Dispensing			13,000 gal/yr	0.002	1.65E-02	1.03E-03
	Total - Phase 5				0.047	0.313	0.020

Toxic Air Contaminant (TAC) Emissions.

Project Phase	Component	EF Reference	Hexane (-n) (lb/yr)	(lb/hr)	Benzene (lb/yr)	(lb/hr)	Toluene (lb/yr)	(lb/hr)	Ethylbenzene (lb/yr)	(lb/hr)	Xylene (-m) (lb/yr)	(lb/hr)	1,2,4-Trimethylbenzene (lb/yr)	(lb/hr)
1	Diesel Dispensing	TANKs 4.0.9d	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.21	0.00	0.72	0.00
	Gasoline Dispensing	TANKs 4.0.9d	0.06	0.00	0.10	0.00	0.39	0.00	0.08	0.00	0.39	0.00	0.14	0.00
	Total - Phase 1		0.06	0.00	0.10	0.00	0.41	0.00	0.08	0.00	0.60	0.00	0.86	0.00
2	Diesel Dispensing		0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.28	0.00	0.98	0.00
	Gasoline Dispensing		0.06	0.00	0.11	0.00	0.44	0.00	0.09	0.00	0.44	0.00	0.16	0.00
	Total - Phase 2		0.06	0.00	0.11	0.00	0.47	0.00	0.10	0.00	0.72	0.00	1.13	0.00
3	Diesel Dispensing		0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.26	0.00	0.88	0.00
	Gasoline Dispensing		0.06	0.00	0.11	0.00	0.43	0.00	0.09	0.00	0.43	0.00	0.15	0.00
	Total - Phase 3		0.06	0.00	0.11	0.00	0.45	0.00	0.09	0.00	0.68	0.00	1.04	0.00
4	Diesel Dispensing		0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.25	0.00	0.85	0.00
	Gasoline Dispensing		0.06	0.00	0.10	0.00	0.39	0.00	0.08	0.00	0.39	0.00	0.14	0.00
	Total - Phase 4		0.06	0.00	0.10	0.00	0.41	0.00	0.09	0.00	0.63	0.00	0.99	0.00
5	Diesel Dispensing		0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.26	0.00	0.89	0.00
	Gasoline Dispensing		0.05	0.00	0.09	0.00	0.35	0.00	0.07	0.00	0.35	0.00	0.12	0.00
	Total - Phase 5		0.05	0.00	0.09	0.00	0.37	0.00	0.08	0.00	0.60	0.00	1.01	0.00

Notes:

1. Diesel throughputs based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, May 12, 2010 for Phases 1-5. Gasoline throughputs based on estimated in-plant vehicle use, mileage accruals, and fuel economy for Phases 1-5.
2. Diesel emission factor of 0.028 pound ROC/1,000 gallons based on the South Coast Air Quality Management District's "Supplemental Instructions for Liquid Organic Storage Tanks and References," June 2005, available at http://www.aqmd.gov/webappl/Help/AER/0405_LiquidOrganicStorageTank.pdf.
3. Gasoline dispensing emission factor of 0.38 pound ROC/1,000 gallons based on the California Air Resources Board's "Vapor Recovery Certification Procedure CP-201: Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities," amended May 25, 2006, available at http://www.arb.ca.gov/regact/pvvapor06/pvvapor06.htm. ROC assumed to equal HC.
4. Assumed operating schedule:

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

5. Conversion factor:
   2,000 lb = 1 ton
6. TAC fractions were obtained from the US EPA TANKS Model (v 4.0.9d) emission specificiation profiles, as follows:

Parameter	Diesel Fractions	Gasoline Fractions
Hexane (-n)	0.0000	0.0100
Benzene	0.0000	0.0180
Toluene	0.0003	0.0700
Ethylbenzene	0.0001	0.0140
Xylene (-m)	0.0029	0.0700
1,2,4-Trimethylbenzene	0.0100	0.0250

Emissions from Diesel-fired Welders

Project Phase	Usage (hr/yr)	Vehicle HP	PM_{10} Emissions			$PM_{2.5}$ Emissions		CO Emissions		NOx Emissions		ROG Emissions		SOx Emissions		CO_2 Emissions		CH_4 Emissions		N_2O Emissions		CO_2e Emissions	
			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(tonne/yr)	(lb/day)	(tonne/yr)	(lb/day)	(tonne/yr)	(lb/day)	(tonne/yr)	(lb/day)
1	322	60	0.00	0.01	0.00	0.00	0.01	0.02	0.10	0.01	0.10	0.00	0.01	0.00	0.00	4.76	35.01	0.00	0.00	0.00	0.00	4.81	35.3
2	401	60	0.00	0.01	0.00	0.00	0.01	0.02	0.13	0.02	0.12	0.00	0.02	0.00	0.00	5.93	43.60	0.00	0.00	0.00	0.00	5.99	44.0
3	461	60	0.00	0.01	0.00	0.00	0.01	0.02	0.15	0.02	0.14	0.00	0.02	0.00	0.00	6.83	50.21	0.00	0.00	0.00	0.00	6.90	50.7
4	397	60	0.00	0.01	0.00	0.00	0.01	0.02	0.13	0.02	0.12	0.00	0.02	0.00	0.00	5.88	43.19	0.00	0.00	0.00	0.00	5.93	43.6
5	380	60	0.00	0.01	0.00	0.00	0.01	0.02	0.12	0.02	0.11	0.00	0.02	0.00	0.00	5.63	41.40	0.00	0.00	0.00	0.00	5.69	41.8

Applicable Emission Factors.

Vehicle Type	Ave. HP - All Phases	Load Factor	Emission Factors (grams/brake horsepower-hour)								
			PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx	CO_2	CH_4	N_2O
Diesel Welders	60	45%	0.10	0.10	1.63	1.52	0.21	0.00	548.6	0.03	0.01

Notes:

1. Factors for NOx, PM, ROG, CO, and SOx based on South Coast Air Quality Management District,*Off-road Mobile Source Emission Factors*, October 2008 (available at http://www.aqmd.gov/CEQA/handbook/offroad/offroad.html), and data from the California Air Resources Board's OFFROAD2007 mode
2. Per AP-42 Chapter 3.3, Gasoline and Diesel Industrial Engines (Table 3.3-1 footnote b - all PM assumed to be < µm diameter), assume:
   PM_{10}/PM ratio = 100.0%
   $PM_{2.5}$/PM_{10} ratio = 100.0%
3. GHG emission factors presented below.
4. Assumed operating schedule:

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Activity Data.

Vehicle Type	Load Factor[1]	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
		Avg HP[2]	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr
Diesel Welders	45%	60	322	60	401	60	461	60	397	60	380

Notes:

1. Load factor derived from California Air Resources Board's OFFROAD2007 model (version dated December 15, 2006), "equip.csv" data file available at http://www.arb.ca.gov/msei/offroad/offroad.htm.
2. Average horsepower based on welding activity associated with quarry operations for 2000-2009 baseline period: 42.6 average horsepowe for diesel welders, and 12.6 average horsepower for gasoline welders. Given that more than 90% of welder use was associated wit diesel welders, an average horsepower rating of 60 HP is used for this analysis
3. Average operating hours/year based on welding activity associated with quarry operations for 2000-2009 baseline period, scaled t reflect the difference in maximum total production for each phase and production during the baseline perio

GHG Emission Factors for Off-Road Diesel Vehicles.

Units	CO_2	CH_4	N_2O	CO_2e
g/gallon[1,2]	10,150	0.58	0.26	[5]
g/bhp-hr[3,4]	548.6	0.032	0.014	[5]

Notes:

1. CO_2 factor in grams/gallon is from California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.3 (Carbon Dioxide Emission Factors for Transport Fuels), available at http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html. Table C.3 provides a factor of 10.15 kg CO_2/gallon, or 10,150 g CO_2/gallon.
2. CH_4 and N_2O factors in grams/gallon is from California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.6 (Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles
3. According to the notes to Table C.3, CO_2 emission factors are derived using the carbon content of each fuel type and the molar mass ratio of carbon dioxide to carbon of 44/12. Furthermore, the factors assume 100% oxidation, consistent with IPCC inventory guidelines. To calculate CO_2 emission rates in grams/brake horsepower-hour, the following equation was employed: CO_2 = (19.95 kg C/MMBtu) * (44g CO_2/12g C) * 7,500 Btu/bhp-hr * 1,000 g/kg * 1 MMBtu/1,000,000 Btu. Source for the brake specific fuel combustion factor of 7,500 Btu/bhp-hr: Santa Barbara County Air Pollution Control District, Piston IC Engine Technical Reference Document (November 1, 2002), Table 6 (Default Engir Specifications), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf
4. To convert CH_4 and N_2O factors in g/gallon to g/bhp, the following equations were employed:
   CH_4 = 0.58 g CH_4/gallon * (1 gallon/137,000 Btu) * 7,500 Btu/bhp-hr = 0.032 g CH_4/bhp-hr, and
   N_2O = 0.26 g N_2O/gallon * (1 gallon/137,000 Btu) * 7,500 Btu/bhp-hr = 0.014 g N_2O/bhp-hr.
   Source for brake specific fuel combustion factor of 7,500 Btu/bhp-hr and diesel higher heating value: SBCAPCD (op cit.
5. CO_2 equivalent emissions (CO_2e) calculated based on the global warming potentials in the IPCC's Second Assessment Report (SAR, 1996), as presented in the CCAR *General Reporting Protocol* (op cit.), Table C.1. CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O.

Emissions from Off-road Diesel-fired Equipment

Project Phase	Vehicle Type	Usage (hr/yr)	Vehicle HP	PM_{10} Emissions (ton/yr)	PM_{10} Emissions (lb/day)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (ton/yr)	$PM_{2.5}$ Emissions (lb/day)	CO Emissions (ton/yr)	CO Emissions (lb/day)	NOx Emissions (ton/yr)	NOx Emissions (lb/day)	ROG Emissions (ton/yr)	ROG Emissions (lb/day)	SOx Emissions (ton/yr)	SOx Emissions (lb/day)	CO_2 Emissions (tonne/yr)	CO_2 Emissions (lb/day)	CH_4 Emissions (tonne/yr)	CH_4 Emissions (lb/day)	N_2O Emissions (tonne/yr)	N_2O Emissions (lb/day)	CO_2e Emissions[3] (tonne/yr)	CO_2e Emissions[3] (lb/day)
1	Bore/Drill Rigs	4,184	600	0.06	0.4	0.05	0.06	0.4	1.57	10.5	3.94	26.3	0.22	1.5	0.01	0.1	1,032.93	7,590.8	0.06	0.4	0.03	0.2	1,042	7,661.0
	Rubber Tired Loaders	9,877	846	0.15	1.0	0.12	0.15	1.0	3.39	22.6	12.93	86.2	0.90	6.0	0.02	0.1	2,474.3	18,183.3	0.14	1.1	0.06	0.5	2,497	18,351.6
	Off-Highway Trucks	52,926	962	0.96	6.4	0.80	0.96	6.4	21.44	143.0	83.20	554.6	6.00	40.0	0.10	0.7	15,925.9	117,035.7	0.92	6.8	0.41	3.0	16,073	118,119.2
	Crawler Tractors	11,583	576	0.14	0.9	0.12	0.14	0.9	4.40	29.3	8.94	59.6	1.17	7.8	0.02	0.1	2,341.6	17,208.0	0.14	1.0	0.06	0.4	2,363	17,367.3
	Rubber Tired Dozers	1,662	355	0.01	0.1	0.01	0.01	0.1	0.45	3.0	0.73	4.9	0.11	0.7	0.00	0.0	191.0	1,403.5	0.01	0.1	0.00	0.0	193	1,416.5
	Graders	6,313	300	0.04	0.3	0.03	0.04	0.3	0.96	6.4	2.42	16.1	0.25	1.6	0.00	0.0	633.9	4,658.0	0.04	0.3	0.02	0.1	640	4,701.2
	Water Truck	6,729	705	0.03	0.2	0.03	0.03	0.2	0.68	4.5	1.99	13.2	0.19	1.2	0.00	0.0	520.5	3,825.2	0.03	0.2	0.01	0.1	525	3,860.6
	Excavators	3,117	380	0.02	0.1	0.02	0.02	0.1	0.47	3.2	1.41	9.4	0.12	0.8	0.00	0.0	370.4	2,721.6	0.02	0.2	0.01	0.1	374	2,746.8
	Hydroseeder (Pump)	53	115	0.00	0.0	0.00	0.00	0.0	0.01	0.1	0.01	0.1	0.00	0.0	0.00	0.0	2.5	18.2	0.00	0.0	0.00	0.0	2	18.4
	Portable Light Stands	2,400	11	0.00	0.0	0.00	0.00	0.0	0.06	0.4	0.07	0.5	0.01	0.1	0.00	0.0	10.4	76.6	0.00	0.0	0.00	0.0	11	77.3
	Total - Phase 1			1.42	9.5	1.18	1.42	9.5	33.42	222.8	115.64	770.9	8.97	59.8	0.16	1.0	23,503.33	172,720.8	1.36	10.0	0.61	4.5	23,720.93	174,319.9
2	Bore/Drill Rigs	5,839	600	0.09	0.6	0.04	0.09	0.6	2.19	14.6	5.50	36.7	0.31	2.1	0.01	0.1	1,441.56	10,593.7	0.08	0.6	0.04	0.3	1,455	10,691.8
	Rubber Tired Loaders	10,433	1,009	0.19	1.3	0.08	0.19	1.3	4.27	28.4	16.29	108.6	1.13	7.5	0.02	0.1	3,118.5	22,917.1	0.18	1.3	0.08	0.6	3,147	23,129.3
	Off-Highway Trucks	69,391	1,237	1.62	10.8	0.67	1.62	10.8	36.15	241.0	140.27	935.1	10.12	67.4	0.18	1.2	26,850.8	197,320.5	1.55	11.4	0.70	5.1	27,099	199,147.3
	Crawler Tractors	12,714	572	0.15	1.0	0.06	0.15	1.0	4.80	32.0	9.75	65.0	1.27	8.5	0.02	0.1	2,553.2	18,763.1	0.15	1.1	0.07	0.5	2,577	18,936.9
	Rubber Tired Dozers	2,493	355	0.02	0.1	0.01	0.02	0.1	0.68	4.5	1.09	7.3	0.17	1.1	0.00	0.0	286.5	2,105.2	0.02	0.1	0.01	0.1	289	2,124.7
	Graders	6,606	300	0.04	0.3	0.02	0.04	0.3	1.00	6.7	2.53	16.9	0.26	1.7	0.00	0.0	663.2	4,873.8	0.04	0.3	0.02	0.1	669	4,918.9
	Water Truck	7,021	705	0.03	0.2	0.01	0.03	0.2	0.71	4.7	2.07	13.8	0.19	1.3	0.00	0.0	543.1	3,991.4	0.03	0.2	0.01	0.1	548	4,028.4
	Excavators	2,181	380	0.02	0.1	0.01	0.02	0.1	0.33	2.2	0.99	6.6	0.09	0.6	0.00	0.0	259.1	1,904.3	0.01	0.1	0.01	0.0	262	1,921.9
	Hydroseeder (Pump)	68	115	0.00	0.0	0.00	0.00	0.0	0.02	0.1	0.01	0.1	0.00	0.0	0.00	0.0	3.2	23.4	0.00	0.0	0.00	0.0	3	23.6
	Portable Light Stands	2,400	11	0.00	0.0	0.00	0.00	0.0	0.06	0.4	0.07	0.5	0.01	0.1	0.00	0.0	10.4	76.6	0.00	0.0	0.00	0.0	11	77.3
	Total - Phase 2			2.16	14.4	0.90	2.16	14.4	50.19	334.6	178.58	1,190.6	13.55	90.3	0.24	1.6	35,729.62	262,569.2	2.07	15.2	0.93	6.8	36,060.41	265,000.0
3	Bore/Drill Rigs	6,759	600	0.10	0.7	0.04	0.10	0.7	2.53	16.9	6.37	42.5	0.36	2.4	0.01	0.1	1,668.58	12,262.0	0.10	0.7	0.04	0.3	1,684	12,375.5
	Rubber Tired Loaders	11,085	1,032	0.20	1.4	0.09	0.20	1.4	4.63	30.9	17.70	118.0	1.23	8.2	0.02	0.1	3,387.8	24,895.9	0.20	1.4	0.09	0.6	3,419	25,126.4
	Off-Highway Trucks	65,263	1,258	1.55	10.3	0.64	1.55	10.3	34.58	230.5	134.15	894.3	9.68	64.5	0.17	1.1	25,678.6	188,706.1	1.49	10.9	0.67	4.9	25,916	190,453.2
	Crawler Tractors	13,044	578	0.16	1.1	0.07	0.16	1.1	4.97	33.2	10.11	67.4	1.32	8.8	0.02	0.1	2,647.7	19,457.3	0.15	1.1	0.07	0.5	2,672	19,637.4
	Rubber Tired Dozers	2,493	355	0.02	0.1	0.01	0.02	0.1	0.68	4.5	1.09	7.3	0.17	1.1	0.00	0.0	286.5	2,105.2	0.02	0.1	0.01	0.1	289	2,124.7
	Graders	6,338	300	0.04	0.3	0.02	0.04	0.3	0.96	6.4	2.43	16.2	0.25	1.7	0.00	0.0	636.4	4,676.4	0.04	0.3	0.02	0.1	642	4,719.7
	Water Truck	6,754	705	0.03	0.2	0.01	0.03	0.2	0.68	4.5	1.99	13.3	0.19	1.2	0.00	0.0	522.4	3,839.4	0.03	0.2	0.01	0.1	527	3,874.9
	Excavators	1,633	380	0.01	0.1	0.00	0.01	0.1	0.25	1.7	0.74	4.9	0.06	0.4	0.00	0.0	194.0	1,425.7	0.01	0.1	0.01	0.0	196	1,438.9
	Hydroseeder (Pump)	95	115	0.00	0.0	0.00	0.00	0.0	0.02	0.2	0.02	0.1	0.00	0.0	0.00	0.0	4.4	32.5	0.00	0.0	0.00	0.0	4	32.8
	Portable Light Stands	2,400	11	0.00	0.0	0.00	0.00	0.0	0.06	0.4	0.07	0.5	0.01	0.1	0.00	0.0	10.4	76.6	0.00	0.0	0.00	0.0	11	77.3
	Total - Phase 3			2.11	14.1	0.88	2.11	14.1	49.36	329.1	174.67	1,164.5	13.26	88.4	0.23	1.6	35,036.72	257,477.2	2.03	14.9	0.91	6.7	35,361.09	259,860.9
4	Bore/Drill Rigs	5,782	600	0.09	0.6	0.04	0.09	0.6	2.17	14.4	5.45	36.3	0.31	2.1	0.01	0.1	1,427.37	10,489.4	0.08	0.6	0.04	0.3	1,441	10,586.5
	Rubber Tired Loaders	10,283	1,006	0.18	1.2	0.08	0.18	1.2	4.19	28.0	16.01	106.7	1.11	7.4	0.02	0.1	3,064.7	22,521.6	0.18	1.3	0.08	0.6	3,093	22,730.1
	Off-Highway Trucks	51,244	1,251	1.21	8.1	0.50	1.21	8.1	26.98	179.9	104.69	697.9	7.55	50.3	0.13	0.9	20,040.0	147,269.6	1.16	8.5	0.52	3.8	20,226	148,633.0
	Crawler Tractors	11,382	578	0.14	0.9	0.06	0.14	0.9	4.34	28.9	8.81	58.8	1.15	7.7	0.02	0.1	2,308.6	16,965.4	0.13	1.0	0.06	0.4	2,330	17,122.4
	Rubber Tired Dozers	2,078	355	0.01	0.1	0.01	0.01	0.1	0.56	3.8	0.91	6.1	0.14	0.9	0.00	0.0	238.7	1,754.3	0.01	0.1	0.01	0.0	241	1,770.6
	Graders	5,459	300	0.03	0.2	0.01	0.03	0.2	0.83	5.5	2.09	13.9	0.21	1.4	0.00	0.0	548.1	4,027.6	0.03	0.2	0.01	0.1	553	4,064.9
	Water Truck	5,874	705	0.03	0.2	0.01	0.03	0.2	0.59	3.9	1.73	11.6	0.16	1.1	0.00	0.0	454.4	3,339.5	0.03	0.2	0.01	0.1	459	3,370.4
	Excavators	1,459	380	0.01	0.1	0.00	0.01	0.1	0.22	1.5	0.66	4.4	0.06	0.4	0.00	0.0	173.4	1,274.1	0.01	0.1	0.00	0.0	175	1,285.9
	Hydroseeder (Pump)	114	115	0.00	0.0	0.00	0.00	0.0	0.03	0.2	0.02	0.2	0.00	0.0	0.00	0.0	5.3	39.0	0.00	0.0	0.00	0.0	5	39.3
	Portable Light Stands	2,400	11	0.00	0.0	0.00	0.00	0.0	0.06	0.4	0.07	0.5	0.01	0.1	0.00	0.0	10.4	76.6	0.00	0.0	0.00	0.0	11	77.3
	Total - Phase 4			1.71	11.4	0.71	1.71	11.4	39.97	266.4	140.46	936.4	10.71	71.4	0.19	1.3	28,270.97	207,757.1	1.64	12.0	0.73	5.4	28,532.70	209,680.5
5	Bore/Drill Rigs	5,533	600	0.08	0.5	0.03	0.08	0.5	2.07	13.8	5.21	34.8	0.29	2.0	0.01	0.1	1,365.89	10,037.6	0.08	0.6	0.04	0.3	1,379	10,130.5
	Rubber Tired Loaders	9,844	972	0.17	1.1	0.07	0.17	1.1	3.88	25.9	14.81	98.7	1.03	6.8	0.02	0.1	2,835.0	20,834.0	0.16	1.2	0.07	0.5	2,861	21,026.9
	Off-Highway Trucks	52,911	1,220	1.22	8.1	0.51	1.22	8.1	27.17	181.2	105.43	702.9	7.60	50.7	0.13	0.9	20,181.9	148,312.3	1.17	8.6	0.52	3.8	20,369	149,685.4
	Crawler Tractors	11,555	572	0.14	0.9	0.06	0.14	0.9	4.36	29.1	8.86	59.1	1.16	7.7	0.02	0.1	2,321.8	17,062.8	0.13	1.0	0.06	0.4	2,343	17,220.7
	Rubber Tired Dozers	2,078	355	0.01	0.1	0.01	0.01	0.1	0.56	3.8	0.91	6.1	0.14	0.9	0.00	0.0	238.7	1,754.3	0.01	0.1	0.01	0.0	241	1,770.6
	Graders	5,535	300	0.03	0.2	0.01	0.03	0.2	0.84	5.6	2.12	14.1	0.22	1.4	0.00	0.0	555.7	4,083.5	0.03	0.2	0.01	0.1	561	4,121.3
	Water Truck	5,950	705	0.03	0.2	0.01	0.03	0.2	0.60	4.0	1.76	11.7	0.16	1.1	0.00	0.0	460.3	3,382.5	0.03	0.2	0.01	0.1	465	3,413.8
	Excavators	1,204	380	0.01	0.1	0.00	0.01	0.1	0.18	1.2	0.55	3.6	0.05	0.3	0.00	0.0	143.1	1,051.6	0.01	0.1	0.00	0.0	144	1,061.4
	Hydroseeder (Pump)	133	115	0.00	0.0	0.00	0.00	0.0	0.03	0.2	0.03	0.2	0.00	0.0	0.00	0.0	6.2	45.5	0.00	0.0	0.00	0.0	6	45.9
	Portable Light Stands	2,400	11	0.00	0.0	0.00	0.00	0.0	0.06	0.4	0.07	0.5	0.01	0.1	0.00	0.0	10.4	76.6	0.00	0.0	0.00	0.0	11	77.3
	Total - Phase 5			1.70	11.3	0.71	1.70	11.3	39.76	265.1	139.75	931.7	10.66	71.1	0.19	1.3	28,119.04	206,640.7	1.63	12.0	0.73	5.4	28,379.37	208,553.8

Applicable Emission Factors.

Vehicle Type	Ave. HP - All Phases	Load Factor	Emission Factors (grams/brake horsepower-hour) PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx	CO_2	CH_4	N_2O
Bore/Drill Rigs	600	75%	0.03	0.03	0.76	1.9	0.11	0.00	548.6	0.03	0.01
Rubber Tired Loaders[3]	973	54%	0.03	0.03	0.68	2.6	0.18	0.00	548.6	0.03	0.01
Off-Highway Trucks[3]	1186	57%	0.03	0.03	0.67	2.6	0.19	0.00	548.6	0.03	0.01
Crawler Tractors	575	64%	0.03	0.03	0.93	1.9	0.25	0.00	548.6	0.03	0.01
Rubber Tired Dozers	355	59%	0.03	0.03	1.18	1.9	0.29	0.00	548.6	0.03	0.01
Graders	300	61%	0.03	0.03	0.75	1.9	0.19	0.00	548.6	0.03	0.01
Water Truck	705	20%	0.03	0.03	0.65	1.9	0.18	0.00	548.6	0.03	0.01
Excavators	380	57%	0.03	0.03	0.64	1.9	0.17	0.00	548.6	0.03	0.01
Hydroseeder (Pump)	115	74%	0.06	0.06	2.54	2.2	0.29	0.00	548.6	0.03	0.01
Portable Light Stands	11	74%	0.16	0.16	2.63	3.35	0.48	0.01	548.6	0.03	0.01

Notes:

1. The peak year for operation of the South Quarry during Phase 1 is the fifth year, which is assumed to be 2020. 2020 is also used as the basis for calculating emissions from combustion equipment/vehicles for the other phases of the proposed project.
2. Source for NOx and PM emission factors (except for engines smaller than 25 HP): California In-Use Off-Road Diesel-Fueled Vehicle Fleet Regulation - NOx and PM Target Emission Rates for Medium and Large Fleets, below. It is assumed that the Lehigh Southwest Cement Company Permanente ORD Fleet will comply with the 2020 target emission rates for medium and large vehicle fleets.
3. Lehigh anticipates purchasing new loaders and off-highway trucks for the proposed project; therefore, emission factors for this equipment reflects use of Interim/Final Tier 4 vehicles (2.6 g NOx/bhp-hr and 0.03 g PM/bhp-hr). Reference: Title 13 California Code of Regulations section 2423, Table 1b (Tier 4 Exhaust Emission Standards), assuming 1 kW-hr/1.341 bhp-hr.

4. Per AP-42 Chapter 3.3, Gasoline and Diesel Industrial Engines (Table 3.3-1 footnote b - all PM assumed to be < 1µm diameter), assume:
   PM_{10}/PM ratio = 100.0%
   $PM_{2.5}$/PM_{10} ratio = 100.0%
5. Factors for ROG, CO, SOx, and engines smaller than 25 HP based on South Coast Air Quality Management District, *Off-road Mobile Source Emission Factors*, October 2008 (available at http://www.aqmd.gov/CEQA/handbook/offroad/offroad.html), and data from the California Air Resources Board's OFFROAD2007 model.
6. GHG emission factors presented below.
7. Assumed operating schedule:

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Off-road Vehicle Fleet Activity Data.

	Load	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
Vehicle Type	Factor[1]	Avg HP[2]	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr
Bore/Drill Rigs	75%	600	4,184	600	5,839	600	6,759	600	5,782	600	5,533
Rubber Tired Loaders	54%	846	9,877	1,009	10,433	1,032	11,085	1,006	10,283	972	9,844
Off-Highway Trucks	57%	962	52,926	1,237	69,391	1,258	65,263	1,251	51,244	1,220	52,911
Crawler Tractors	64%	576	11,583	572	12,714	578	13,044	578	11,382	572	11,555
Rubber Tired Dozers	59%	355	1,662	355	2,493	355	2,493	355	2,078	355	2,078
Graders	61%	300	6,313	300	6,606	300	6,338	300	5,459	300	5,535
Water Truck	20%	705	6,729	705	7,021	705	6,754	705	5,874	705	5,950
Excavators	57%	380	3,117	380	2,181	380	1,633	380	1,459	380	1,204
Hydroseeder (Pump)	74%	115	53	115	68	115	95	115	114	115	133
Portable Light Stands	74%	11	2,400	11	2,400	11	2,400	11	2,400	11	2,400

Notes:
1. Load factors derived from California Air Resources Board's OFFROAD2007 model (version dated December 15, 2006), "equip.csv" data file, available at http://www.arb.ca.gov/msei/offroad/offroad.htm.
2. Average horsepower based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, May 12, 2010. If more than one equipment model (with differing horsepower specifications) is used, a composite average horsepower level is calculated for equipment type based on the anticipated equipment scheduling (in hours) for each model during each project phase.

California In-Use Off-Road Diesel-Fueled Vehicle Fleet Regulation - NOx and PM Target Emission Rates for Medium and Large Fleets.

Horsepower	Min	Max	Nitrogen Oxide (NOx) Fleet Average Targets (g/bhp-hr)										
Range	HP	HP	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
25-49 hp	25	49	5.8	5.6	5.3	5.1	4.9	4.6	4.4	4.2	4.0	3.7	3.5
50-74 hp	50	74	6.5	6.2	5.8	5.5	5.1	4.8	4.4	4.1	3.7	3.4	3.2
75-99 hp	75	99	7.1	6.7	6.2	5.7	5.2	4.8	4.3	3.8	3.3	2.8	2.4
100-174 hp	100	174	6.4	6.0	5.5	5.1	4.7	4.3	3.8	3.4	3.0	2.6	2.2
175-299 hp	175	299	6.2	5.8	5.3	4.9	4.5	4.1	3.6	3.2	2.8	2.3	1.9
300-599 hp	300	599	5.9	5.5	5.1	4.7	4.3	3.9	3.5	3.1	2.7	2.3	1.9
600-750 hp	600	750	6.1	5.6	5.2	4.8	4.4	4.0	3.6	3.2	2.7	2.3	1.9
> 750 hp	751	9999	7.2	6.8	6.5	6.1	5.7	5.3	4.9	4.5	4.1	3.8	3.4

Horsepower	Min	Max	Diesel Particulate Matter (DPM) Fleet Average Targets (g/bhp-hr)										
Range	HP	HP	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
25-49 hp	25	49	0.46	0.46	0.39	0.39	0.29	0.29	0.21	0.21	0.12	0.12	0.08
50-74 hp	50	74	0.60	0.60	0.43	0.43	0.23	0.23	0.18	0.18	0.12	0.12	0.08
75-99 hp	75	99	0.62	0.62	0.46	0.46	0.24	0.24	0.19	0.19	0.13	0.13	0.07
100-174 hp	100	174	0.33	0.33	0.26	0.26	0.18	0.18	0.14	0.14	0.10	0.10	0.06
175-299 hp	175	299	0.23	0.23	0.16	0.16	0.11	0.11	0.08	0.08	0.06	0.06	0.03
300-599 hp	300	599	0.18	0.18	0.14	0.14	0.11	0.11	0.08	0.08	0.06	0.06	0.03
600-750 hp	600	750	0.20	0.20	0.14	0.14	0.11	0.11	0.08	0.08	0.06	0.06	0.03
> 750 hp	751	9999	0.30	0.30	0.24	0.24	0.18	0.18	0.11	0.11	0.08	0.08	0.06

Notes:
1. Source: California Code of Regulations, Title 13, Article 4.8, Chapter 9, Sections 2449.1 (NOx - Table 1) and 2449.2 (PM - Table 2).

GHG Emission Factors for Off-Road Diesel Vehicles.

Units	CO_2	CH_4	N_2O	CO_2e
g/gallon[1,2]	10,150	0.58	0.26	[5]
g/bhp-hr[3,4]	548.6	0.032	0.014	[5]

Notes:
1. CO_2 factor in grams/gallon is from California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.3 (Carbon Dioxide Emission Factors for Transport Fuels), available at http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html. Table C.3 provides a factor of 10.15 kg CO_2/gallon, or 10,150 g CO_2/gallon.
2. CH_4 and N_2O factors in grams/gallon is from California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.6 (Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles.
3. According to the notes to Table C.3, CO_2 emission factors are derived using the carbon content of each fuel type and the molar mass ratio of carbon dioxide to carbon of 44/12. Furthermore, the factors assume 100% oxidation, consistent with IPCC inventory guidelines. To calculate CO_2 emission rates in grams/brake horsepower-hour, the following equation was employed: CO_2 = (19.95 kg C/MMBtu) * (44g CO_2/12g C) * 7,500 Btu/bhp-hr * 1,000 g/kg * 1 MMBtu/1,000,000 Btu. Source for the brake specific fuel combustion factor of 7,500 Btu/bhp-hr: Santa Barbara County Air Pollution Control District, Piston IC Engine Technical Reference Document (November 1, 2002), Table 6 (Default Engine Specifications), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.
4. To convert CH_4 and N_2O factors in g/gallon to g/bhp, the following equations were employed:
   CH_4 = 0.58 g CH_4/gallon * (1 gallon/137,000 Btu) * 7,500 Btu/bhp-hr 0.032 g CH_4/bhp-hr, and
   N_2O = 0.26 g N_2O/gallon * (1 gallon/137,000 Btu) * 7,500 Btu/bhp-hr = 0.014 g N_2O/bhp-hr.
   Source for brake specific fuel combustion factor of 7,500 Btu/bhp-hr and diesel higher heating value: SBCAPCD (op cit.)
5. CO_2 equivalent emissions (CO_2e) calculated based on the global warming potentials in the IPCC's Second Assessment Report (SAR, 1996), as presented in the CCAR *General Reporting Protocol* (op cit.), Table C.1. CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O.

On-road On-site Motor Vehicles - Emissions Other Than Entrained Road Dust

Project Phase	Activity[1] (mi/yr)	PM_{10} (ton/yr)	PM_{10} (lb/day)	$PM_{2.5}$ (ton/yr)	$PM_{2.5}$ (lb/day)	CO (ton/yr)	CO (lb/day)	NOx (ton/yr)	NOx (lb/day)	ROG (ton/yr)	ROG (lb/day)	SOx (ton/yr)	SOx (lb/day)	Diesel PM (lb/yr)	Diesel PM (lb/hr)	CO_2 (tonne/yr)	CO_2 (lb/day)	CH_4 (tonne/yr)	CH_4 (lb/day)	N_2O (tonne/yr)	N_2O (lb/day)	CO_2e[4] (tonne/yr)	CO_2e[4] (lb/day)
1	217,500	0.01	0.09	0.01	0.06	0.65	4.43	0.07	0.46	0.07	0.47	0.00	0.01	0.03	0.00	148.33	1,090.07	0.01	0.05	0.00	0.01	149.10	1,095.67
2	247,500	0.02	0.10	0.01	0.07	0.74	5.04	0.08	0.52	0.08	0.53	0.00	0.01	0.03	0.00	168.79	1,240.42	0.01	0.05	0.00	0.02	169.66	1,246.80
3	240,000	0.01	0.10	0.01	0.07	0.72	4.89	0.08	0.51	0.07	0.52	0.00	0.01	0.03	0.00	163.68	1,202.84	0.01	0.05	0.00	0.02	164.52	1,209.02
4	217,500	0.01	0.09	0.01	0.06	0.65	4.43	0.07	0.46	0.07	0.47	0.00	0.01	0.03	0.00	148.33	1,090.07	0.01	0.05	0.00	0.01	149.10	1,095.67
5	195,000	0.01	0.08	0.01	0.06	0.58	3.97	0.06	0.41	0.06	0.42	0.00	0.01	0.02	0.00	132.99	977.30	0.01	0.04	0.00	0.01	133.67	982.33

Notes:

1. Activity data based on estimated number of vehicles and mileage necessary to support maximum anticipated production during each of the five project phases, as documented below.
2. Assumed operating schedule:

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

3. Conversion factors:
   2,000 lb/ton
   0.45359 kg/lb
   1,000 kg/metric ton
4. CO_2 equivalent emissions (CO_2e) calculated based on the global warming potentials in the IPCC's Second Assessment Report (SAR, 1996), as presented in the CCAR General Reporting Protocol (op cit.), Table C.1. CO_2e = 1 * CO_2, 21 * CH_4, and 310 * N_2O.

2020 On-road Emission Factors for Santa Clara County - Other than Entrained Road Dust (units: pounds/mile)[1].

Vehicle Type	Time Period	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx	Diesel PM	CO_2	CH_4	N_2O
Medium Duty	Annual	0.00012253	0.00008792	0.00596213	0.00065161	0.00061389	0.00001453	0.00000013	1.50354527	0.00006364	0.00002061
Vehicles (MDVs)	Daily/Hourly	0.00012253	0.00008792	0.00610836	0.00063275	0.00064747	0.00001585	0.00000013	1.50354527	0.00006364	0.00002061

Notes:

1. Emission factors for on-road motor vehicles were derived from California Air Resources Board's EMFAC2007 (version 2.3) model daily seasonal emissions inventories (summer, winter, and annual average) for vehicles in Santa Clara County.

Activity Data - In-Plant Vehicles.

Project Phase	In-Plant Vehicles[1]	Ann. Mi/ Vehicle[2]	Miles/ Year
1	29	7,500	217,500
2	33	7,500	247,500
3	32	7,500	240,000
4	29	7,500	217,500
5	26	7,500	195,000

Notes:

1. Assumes a ratio of 0.4 in-plant vehicle (0.5-ton and larger pickups and SUVs) per Lehigh employee. This is the same ratio as experienced during facility operations during 2000-2009, with 24 in-plant vehicles for 60 employees.
2. Annual miles traveled per vehicles related to quarry operations. For the 2000-2009 period, the average quarry use per in-plant vehicle was calculated to be 6,600 miles/vehicle. For activities related to the South Quarry, this is estimated to be 7,500 miles/vehicle.

On-road Offsite Motor Vehicles - Emissions Other Than Entrained Road Dust

Project Phase	Trip Type	Activity[1] (mi/yr)	PM_{10} (ton/yr)	PM_{10} (lb/day)	$PM_{2.5}$ (ton/yr)	$PM_{2.5}$ (lb/day)	CO (ton/yr)	CO (lb/day)	NOx (ton/yr)	NOx (lb/day)	ROG (ton/yr)	ROG (lb/day)	SOx (ton/yr)	SOx (lb/day)	Diesel PM (lb/yr)	Diesel PM (lb/hr)	CO_2 (tonne/yr)	CO_2 (lb/day)	CH_4 (tonne/yr)	CH_4 (lb/day)	N_2O (tonne/yr)	N_2O (lb/day)	CO_2e[4] (tonne/yr)	CO_2e[4] (lb/day)
1	Fuel Transport	8,660	0.00	0.01	0.00	0.01	0.02	0.14	0.05	0.36	0.00	0.03	0.00	0.00	3.25	0.00	16.41	120.62	0.00	0.00	0.00	0.00	16.58	121.88
	Employee Commute	245,459	0.01	0.07	0.01	0.04	0.50	3.42	0.05	0.29	0.06	0.45	0.00	0.01	0.05	0.00	110.68	813.35	0.00	0.03	0.00	0.01	111.17	816.96
	Total - Phase 1	254,118	0.01	0.09	0.01	0.06	0.52	3.56	0.10	0.65	0.07	0.48	0.00	0.01	3.30	0.00	127.09	933.97	0.00	0.03	0.00	0.01	127.75	938.84
2	Fuel Transport	11,684	0.00	0.02	0.00	0.02	0.03	0.19	0.07	0.49	0.01	0.04	0.00	0.00	4.39	0.00	22.14	162.74	0.00	0.00	0.00	0.01	22.38	164.44
	Employee Commute	242,928	0.01	0.07	0.01	0.04	0.50	3.38	0.04	0.29	0.06	0.44	0.00	0.01	0.05	0.00	109.54	804.96	0.00	0.03	0.00	0.01	110.02	808.54
	Total - Phase 2	254,612	0.01	0.09	0.01	0.06	0.52	3.58	0.12	0.77	0.07	0.48	0.00	0.01	4.44	0.00	131.68	967.70	0.00	0.03	0.00	0.01	132.40	972.97
3	Fuel Transport	10,573	0.00	0.02	0.00	0.01	0.02	0.18	0.06	0.44	0.01	0.04	0.00	0.00	3.97	0.00	20.04	147.27	0.00	0.00	0.00	0.00	20.25	148.81
	Employee Commute	232,806	0.01	0.07	0.01	0.04	0.47	3.24	0.04	0.28	0.06	0.42	0.00	0.01	0.05	0.00	104.97	771.42	0.00	0.03	0.00	0.01	105.44	774.85
	Total - Phase 3	243,379	0.01	0.09	0.01	0.06	0.50	3.42	0.11	0.72	0.06	0.46	0.00	0.01	4.02	0.00	125.01	918.69	0.00	0.03	0.00	0.01	125.69	923.66
4	Fuel Transport	10,164	0.00	0.02	0.00	0.01	0.02	0.17	0.06	0.42	0.01	0.04	0.00	0.00	3.82	0.00	19.26	141.57	0.00	0.00	0.00	0.00	19.47	143.05
	Employee Commute	212,562	0.01	0.06	0.01	0.04	0.43	2.96	0.04	0.25	0.05	0.39	0.00	0.01	0.04	0.00	95.84	704.34	0.00	0.03	0.00	0.01	96.27	707.47
	Total - Phase 4	222,726	0.01	0.08	0.01	0.05	0.46	3.13	0.10	0.68	0.06	0.42	0.00	0.01	3.86	0.00	115.11	845.91	0.00	0.03	0.00	0.01	115.74	850.52
5	Fuel Transport	10,634	0.00	0.02	0.00	0.01	0.03	0.18	0.06	0.44	0.01	0.04	0.00	0.00	3.99	0.00	20.15	148.11	0.00	0.00	0.00	0.00	20.37	149.66
	Employee Commute	197,379	0.01	0.06	0.01	0.04	0.40	2.75	0.04	0.23	0.05	0.36	0.00	0.01	0.04	0.00	89.00	654.03	0.00	0.03	0.00	0.01	89.39	656.94
	Total - Phase 5	208,013	0.01	0.08	0.01	0.05	0.43	2.93	0.10	0.68	0.05	0.40	0.00	0.01	4.03	0.00	109.15	802.15	0.00	0.03	0.00	0.01	109.76	806.60

Notes:

1. Activity data based on estimated number of vehicles and mileage necessary to support maximum anticipated production during each of the five project phases, as documented below
2. Assumed operating schedule:

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

3. Conversion factors:
   2,000 lb/ton
   0.45359 kg/lb
   1,000 kg/metric ton
4. CO_2 equivalent emissions (CO_2e) calculated based on the global warming potentials in the IPCC's Second Assessment Report (SAR, 1996), as presented in the CCAR*General Reporting Protocol* (op cit.), Table C.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.

2020 On-road Emission Factors for Santa Clara County - Other than Entrained Road Dust (units: pounds/mile)[1].

Vehicle Type	Time Period	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx	Diesel PM	CO_2	CH_4	N_2O
Fuel Transport	Annual	0.00051706	0.00039194	0.00470614	0.01214944	0.00106110	0.00003989	0.00037547	4.17848910	0.00004929	0.00013746
(HHDT-DSL)[2]	Daily/Hourly	0.00051913	0.00039384	0.00500557	0.01246325	0.00104793	0.00003998	0.00037547	4.17848910	0.00004929	0.00013746
Employee	Annual	0.00008696	0.00005492	0.00407815	0.00036724	0.00049508	0.00000961	0.00000020	0.99407505	0.00003964	0.00001155
(Passenger)[3]	Daily/Hourly	0.00008696	0.00005492	0.00417640	0.00035683	0.00054590	0.00001049	0.00000020	0.99407505	0.00003964	0.00001155

Notes:

1. Emission factors for on-road motor vehicles were derived from California Air Resources Board's EMFAC2007 (version 2.3) model daily seasonal emissions inventories (summer, winter, and annual average) for vehicles in Santa Clara County.
2. Heavy-Heavy Duty Diesel Trucks.
3. Passenger Vehicles.

Activity Data - Fuel Transport.

Project Phase	Gasoline Use[1]	Diesel Use[2]	Total Fuel Use	Fuel Cap (Gal)[3]	Trips/ Year	Trip Dst (Miles)[4]	Miles/ Year[4]
1	14,500	2,583,486	2,597,986	6,000	433	10	8,660
2	16,500	3,488,645	3,505,145	6,000	584	10	11,684
3	16,000	3,156,013	3,172,013	6,000	529	10	10,573
4	14,500	3,034,694	3,049,194	6,000	508	10	10,164
5	13,000	3,177,214	3,190,214	6,000	532	10	10,634

Notes:

1. Gasoline use derived from the above information, based on estimated in-plant vehicle use, mileage accruals, and fuel economy for Phases 1-5
2. Diesel throughputs based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, May 12, 2010
3. Effective operating capacity per fuel transport truck assumed to be 6,000 gallons.
4. Trip distance assumed to be 10 miles (one-way). Total miles/year based on two-way trips

Activity Data - Employee Commute Trips.

Project	Maximum Employee Count[1]				Empl./	Work	Trip Dst	Miles/
Phase	Salary	Hourly	Contractor	Total	Vehicle[2]	Days/Yr	(Miles)[3]	Year
1	5	67	25	97	1	250	5.061	245,459
2	6	77	13	96	1	250	5.061	242,928
3	6	73	13	92	1	250	5.061	232,806
4	6	66	12	84	1	250	5.061	212,562
5	6	59	13	78	1	250	5.061	197,379

Notes:

1. Maximum employee count based on information provided by Lehigh Southwest Cement Company, May 12, 2010
2. It is assumed that the vehicle occupancy is 1 employee/vehicle and that each employee works an average of 250 days/year
3. First year of South Quarry operation assumed to be 2020. One-way trip distance is from EMFAC2007 emission inventory data for Santa Clara County (2020 data). Total miles/year based on two-way trips.

On-road Offsite Motor Vehicles - Entrained Road Dust Emissions

Project Phase	Annual Factors PM_{10}	Annual Factors $PM_{2.5}$	Daily/Hourly Factors PM_{10}	Daily/Hourly Factors $PM_{2.5}$	Annual Activity	Control Efficiency[1]	PM_{10} Emissions[2,3] (ton/yr)	PM_{10} Emissions[2,3] (lb/day)	PM_{10} Emissions[2,3] (lb/hr)	$PM_{2.5}$ Emissions[2,3] (ton/yr)	$PM_{2.5}$ Emissions[2,3] (lb/day)	$PM_{2.5}$ Emissions[2,3] (lb/hr)
1	0.0010 lb/mi (AP-42 Sec. 13.2.1, Eqn 2)	0.0002 lb/mi	0.0011 lb/mi (AP-42 Sec. 13.2.1, Eqn 1)	0.0002 lb/mi	254,118 miles/yr	0%	0.13	0.92	0.12	0.02	0.14	0.02
2					254,612 miles/yr		0.13	0.92	0.06	0.02	0.14	0.01
3					243,379 miles/yr		0.13	0.88	0.06	0.02	0.13	0.01
4					222,726 miles/yr		0.12	0.81	0.05	0.02	0.12	0.01
5					208,013 miles/yr		0.11	0.75	0.05	0.02	0.11	0.01

Notes:

1. Assumed Control: None
2. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

3. Conversion factors:
   2,000 lb = 1 ton

Emission Factors.

Road Type	PM_{10} k factor (lb/VMT)	sL^2 (g/m^2)	W^3 (tons)	C (lb/VMT)	P^4	N	$PM_{2.5}/PM_{10}$ Ratio[5]	VMT Fraction by Road Type[6]	PM_{10} Factors (lb/VMT) Daily & Hourly	PM_{10} Factors (lb/VMT) Annual	$PM_{2.5}$ Factors (lb/VMT) Daily & Hourly	$PM_{2.5}$ Factors (lb/VMT) Annual
Freeway	0.016	0.02	3.5	0.00047	62	365	15%	0.471	0.001	0.001	0.0001	0.0001
Major	0.016	0.035	3.5	0.00047	62	365	15%	0.407	0.001	0.001	0.0001	0.0001
Collector	0.016	0.035	3.5	0.00047	62	365	15%	0.055	0.001	0.001	0.0001	0.0001
Local	0.016	0.32	3.5	0.00047	62	365	15%	0.067	0.006	0.005	0.0008	0.0008
Composite Emission Factors (assuming Santa Clara County VMT fractions by road type)								1.000	0.0011	0.0010	0.0002	0.0002

Notes:

1. AP-42 Sec. 13.2.1 (Paved Roads, Eqn 1) provides the following equation to estimate entrained paved road dust emissions:

$$E = k\left(\frac{sL}{2}\right)^{0.65}\left(\frac{W}{3}\right)^{1.5} - C$$

where: E = particulate emission factor (grams/vehicle miles traveled, or lb/VMT),
k = particle size multiplier for particle size range and units of interest, 0.016 lb/VMT for PM_{10}
sL = road surface silt loading (grams per square meter, or g/m^2)
W = average weight (tons) of the vehicles traveling the road, and
C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lb/VMT for TSP and PM_{10}).

For long-term emissions (annual, seasonal, or monthly) AP-42 Sec. 13.2.1, Eqn 2 suggests that a precipitation correction factor can be applied as follows:

$$E_{ext} = \left[k\left(\frac{sL}{2}\right)^{0.65}\left(\frac{W}{3}\right)^{1.5} - C\right]\left(1 - \frac{P}{4N}\right)$$

where: E_{ext} = annual or other long-term particulate emission factor (grams/vehicle miles traveled, or g/VMT),
P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period, and
N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly).

Note that per AP-42 Sec. 13.2.1, emissions calculated for the fleet average only, not individual trip or weight classes.

2. Source: California Air Resources Board, Entrained Dust from Paved Road Travel: Emission Estimation Methodology Background Document, July 2, 1997, Table 3 (California Default Paved Road Silt Loading Values) - silt loading for local and collector road types, available at http://www.arb.ca.gov/ei/areasrc/arbmiscprocpaverddst.htm.
3. Average vehicle weight (W) for on-road offsite fleet derived below.
4. Number of days with precipitation at least 0.254 mm (0.01 in) from the University of Utah at http://www.met.utah.edu/jhorel/html/wx/climate/daysrain.html, data for San Francisco Airport (62 days/year).
5. The California Air Resources Board's "Almanac Emission Projection Data by EIC", 2009 (available at http://www.arb.ca.gov/ei/emissiondata.htm - Areawide Sources - Paved Road Dust), assumes a $PM_{2.5}/PM_{10}$ ratio of 15%.
6. Source: California Air Resources Board, Emissions Inventory Methodology Section 7.9: Entrained Paved Road Dust-Paved Road Travel, July 1997, Table 2 (1993 Roadway Travel Fractions and VMT Estimates for California Entrained Paved Road Dust Emission Estimates).

Activity Data - Fuel Transport and Employe Commute Vehicles.

	Fuel Transport Trucks			Employee Commute Vehicles			Totals		
Project Phase	Miles/ Year[1]	Ave. Veh. Wgt (tons)[2]	Annual Ton-Miles[3]	Miles/ Year[1]	Ave. Veh. Wgt (tons)[2]	Annual Ton-Miles[3]	Ton-Miles	Miles	Ave. Veh. Wgt (tons)
1	8,660	27.5	238,149	245,459	2.4	589,100	827,249	254,118	3.3
2	11,684	27.5	321,305	242,928	2.4	583,027	904,332	254,612	3.6
3	10,573	27.5	290,768	232,806	2.4	558,734	849,502	243,379	3.5
4	10,164	27.5	279,509	212,562	2.4	510,149	789,658	222,726	3.5
5	10,634	27.5	292,436	197,379	2.4	473,710	766,146	208,013	3.7
Total - All Phases							4,136,888	1,182,849	3.5

Notes:

1. Derivation of miles for each vehicle type documented previously.
2. Fuel transport trucks assumed to be 40 tons loaded and 15 tons unloaded (average weight of 27.5 tons). Source for average employee commute vehicle weight: California Air Resources Board, Emissions Inventory Methodology Section 7.9 (op cit.), Table 3 (Silt Loadings and Emission Factors for California Entrained Paved Road Dust Estimates), average vehicle weight for Santa Clara County (2.4 tons).
3. Used to calculate average vehicle weight for total fleet.

Indirect Greenhouse Gas Emissions Associated with Electrical Power Use.

Project Phase	Use	Electric Power Use Metric	Baseline Annual Use Metric	Baseline Annual Electric Power Use (kW-hr)	GHG Emission Factors (lb/MW-hr)[6]			Indirect GHG Emissions (MT/yr)[7]			
					CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2e[8]
	Quarry Dewatering[1]	6,720 hours/year	274.6 kilowatts (kW)	1,845,043							
1	Purchased Water (Dust Suppression)[2]	0 milion gal/yr	3,500 kW-hr/million gal	0							
	Quarry Office[3]	1,800 square feet	14.6 kW-hr/sq ft-yr	26,280							
	Total - Phase 1			1,871,323	724.12	0.0302	0.0081	614.64	0.03	0.01	617.31
	Quarry Dewatering[4]	0 hours/year	274.6 kilowatts (kW)	0							
2	Purchased Water (Dust Suppression)[2]	169 milion gal/yr	3,500 kW-hr/million gal	589,786							
	Quarry Office[3]	1,800 square feet	14.6 kW-hr/sq ft-yr	26,280							
	Total - Phase 2			616,066	724.12	0.0302	0.0081	202.35	0.01	0.00	203.23
	Quarry Dewatering[4]	0 hours/year	274.6 kilowatts (kW)	0							
3	Purchased Water (Dust Suppression)[2]	162 milion gal/yr	3,500 kW-hr/million gal	567,319							
	Quarry Office[3]	1,800 square feet	14.6 kW-hr/sq ft-yr	26,280							
	Total - Phase 3			593,599	724.12	0.0302	0.0081	194.97	0.01	0.00	195.82
	Quarry Dewatering[4]	0 hours/year	274.6 kilowatts (kW)	0							
4	Purchased Water (Dust Suppression)[2]	141 milion gal/yr	3,500 kW-hr/million gal	493,454							
	Quarry Office[3]	1,800 square feet	14.6 kW-hr/sq ft-yr	26,280							
	Total - Phase 4			519,734	724.12	0.0302	0.0081	170.71	0.01	0.00	171.45
	Quarry Dewatering[5]	6,720 hours/year	274.6 kilowatts (kW)	1,845,043							
5	Purchased Water (Dust Suppression)[2]	0 milion gal/yr	3,500 kW-hr/million gal	0							
	Quarry Office[3]	1,800 square feet	14.6 kW-hr/sq ft-yr	26,280							
	Total - Phase 5			1,871,323	724.12	0.0302	0.0081	614.64	0.03	0.01	617.31

Notes:

1. Current North Quarry dewatering system, powered by two 300 HP electric powered motors, is rated at 2,000 gallons per minute (gpm) but typically runs at 1,860 gpm. Each motor draws on average 33 amps at 4,160 volts. The dewatering system operates on average 24 hours/day, 7 days/week, 40 weeks/year. Assume that the North Quarry dewatering system will continue to operate at its present level through Phase 1. Source: Lehigh Southwest Cement Company, May 10, 2010.
2. For periods when a quarry dewatering system is operational, assume that water used for dust suppression is drawn from the quarry dewatering system; no purchased water is needed during these periods. The water-energy proxy value of 3,500 kW-hr per million gallons is derived from *Refining Estimates of Water-Related Energy Use in California* (Report No.CEC-500-2006-118), California Energy Commission, December 2006, page 2 (Northern California outdoor uses).
3. The quarry office measures 30 feet by 60 feet. The Electricity Energy Intensity (EEI) value of 14.6 kW-hr/square foot-year is derived from *the 2003 Commercial Buildings Energy Consumption Survey (CBECS): 2003 Detailed Tables* , U.S. Department of Energy - Energy Information Agency, Table C19 (Electricity Consumption and Conditional Energy Intensity by Census Division for Non-Mall Buildings, Part 3), data for office buildings, Pacific Census Division, available at www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/detailed_tables_2003.html.
4. From Phase 2-on, the North Quarry dewatering system is expected to no longer be operational since extraction operations from the quarry will have ceased.
5. During Phase 5, it is expected that a dewatering system will be required for the proposed South Quarry. It is assumed that the South Quarry dewatering system will operate at the same level as the current North Quarry dewatering system.
6. Source: California Climate Change Registry, *General Reporting Protocol: Reporting Entity-Wide Greenhouse Gas Emissions* (version 3.1), January 2009, p. 95 (Table C.2 - Carbon Dioxide, Methane, and Nitrous Oxide Electricity Emission Factors by eGRID Subregion, data for Western Electricity Coordinating Council (WECC) California (CAMX) Subregion.
7. Conversion factors:
   1,000 kW-hr/MW-hr
   0.45359 kilograms/pound
   1,000 kilograms/metric ton (MT)
8. Assumes global warming potentials (GWP) of 21g CO_2e/g CH_4, and 310 g CO_2e/g N_2O. Source: California Climate Change Registry, *General Reporting Protocol* , (op cit.), p. 94 (Table C.1 - Comparison of GWPs from the IPCC's Second and Third Assessment Reports), data from the Second Assessment Report (SAR), 1996.

South Coast AQMD Off-Road 2020 Emission Factors for Selected Off-Road Diesel Equipment from the California Air Resources Board's Off-Road Emissions Model.[1]

Equipment	Minimum HP	Maximum HP	Average HP[2]	South Coast AQMD Hourly Emission Rates (lb/hr)[3]							Emission Factors Based on Average HP (g/hp-hr)[4]						
				ROG	CO	NOx	SOx	PM[5]	CO_2	CH_4	ROG	CO	NOx	SOx	PM	CO_2	CH_4
Bore/Drill Rigs	1	15	11	0.0120	0.0632	0.0754	0.0002	0.0029	10.3	0.0011	0.50	2.60	3.11	0.01	0.12	426.61	0.04
	16	25	17	0.0193	0.0658	0.1219	0.0002	0.0046	16.0	0.0017	0.51	1.76	3.25	0.01	0.12	426.61	0.05
	26	50	33	0.0196	0.2205	0.1756	0.0004	0.0020	31.0	0.0018	0.27	3.03	2.41	0.01	0.03	426.61	0.02
	51	120	82	0.0280	0.4662	0.2329	0.0009	0.0040	77.1	0.0025	0.15	2.58	1.29	0.01	0.02	426.61	0.01
	121	175	150	0.0402	0.7542	0.1862	0.0016	0.0051	141	0.0036	0.12	2.28	0.56	0.00	0.02	426.61	0.01
	176	250	200	0.0474	0.3426	0.1617	0.0021	0.0044	188	0.0043	0.11	0.78	0.37	0.00	0.01	426.61	0.01
	251	500	331	0.0784	0.5512	0.2622	0.0031	0.0072	311	0.0071	0.11	0.76	0.36	0.00	0.01	426.61	0.01
	501	750	654	0.1549	1.0891	0.5202	0.0062	0.0143	615	0.0140	0.11	0.76	0.36	0.00	0.01	426.61	0.01
	751	1000	987	0.2442	1.6437	3.9853	0.0093	0.0530	928	0.0220	0.11	0.76	1.83	0.00	0.02	426.61	0.01
Crawler Tractors	1	50	31	0.0699	0.2771	0.2107	0.0003	0.0150	24.9	0.0063	1.02	4.06	3.08	0.00	0.22	364.04	0.09
	51	120	82	0.0831	0.4628	0.4896	0.0008	0.0371	65.8	0.0075	0.46	2.56	2.71	0.00	0.21	364.04	0.04
	121	175	151	0.1123	0.7302	0.7150	0.0014	0.0398	121	0.0101	0.34	2.19	2.15	0.00	0.12	364.04	0.03
	176	250	207	0.1188	0.3966	0.8681	0.0019	0.0315	166	0.0107	0.26	0.87	1.90	0.00	0.07	364.04	0.02
	251	500	323	0.1759	0.6665	1.2170	0.0025	0.0455	259	0.0159	0.25	0.94	1.71	0.00	0.06	364.04	0.02
	501	750	579	0.3168	1.1935	2.2429	0.0047	0.0828	465	0.0286	0.25	0.93	1.76	0.00	0.06	364.04	0.02
	751	1000	820	0.4836	1.8458	5.2162	0.0066	0.1425	658	0.0436	0.27	1.02	2.89	0.00	0.08	364.04	0.02
Excavators	1	25	23	0.0198	0.0677	0.1253	0.0002	0.0047	16.4	0.0018	0.39	1.33	2.47	0.00	0.09	324.22	0.04
	26	50	35	0.0384	0.2446	0.1862	0.0003	0.0080	25.0	0.0035	0.50	3.17	2.41	0.00	0.10	324.22	0.04
	51	120	103	0.0583	0.4979	0.3717	0.0009	0.0206	73.6	0.0053	0.26	2.19	1.64	0.00	0.09	324.22	0.02
	121	175	157	0.0703	0.6637	0.3868	0.0013	0.0195	112	0.0063	0.20	1.92	1.12	0.00	0.06	324.22	0.02
	176	250	222	0.0828	0.3276	0.4493	0.0018	0.0154	159	0.0075	0.17	0.67	0.92	0.00	0.03	324.22	0.02
	251	500	327	0.1198	0.4591	0.6028	0.0023	0.0219	234	0.0108	0.17	0.64	0.84	0.00	0.03	324.22	0.01
	501	750	542	0.1987	0.7606	1.0153	0.0039	0.0365	387	0.0179	0.17	0.64	0.85	0.00	0.03	324.22	0.02
Generators	1	15	11	0.0116	0.0638	0.0814	0.0002	0.0038	10	0.0011	0.48	2.63	3.35	0.01	0.16	420.92	0.04
	16	25	19	0.0224	0.0769	0.1410	0.0002	0.0064	18	0.0020	0.54	1.84	3.37	0.01	0.15	420.92	0.05
	26	50	33	0.0379	0.2161	0.2199	0.0004	0.0106	31	0.0034	0.52	2.97	3.02	0.01	0.15	420.92	0.05
	51	120	84	0.0506	0.4641	0.4378	0.0009	0.0250	78	0.0046	0.27	2.51	2.36	0.00	0.13	420.92	0.02
	121	175	153	0.0676	0.7323	0.5990	0.0016	0.0266	142	0.0061	0.20	2.17	1.78	0.00	0.08	420.92	0.02
	176	250	229	0.0747	0.3844	0.7614	0.0024	0.0218	213	0.0067	0.15	0.76	1.51	0.00	0.04	420.92	0.01
	251	500	363	0.1125	0.5968	1.0874	0.0033	0.0333	337	0.0102	0.14	0.75	1.36	0.00	0.04	420.92	0.01
	501	750	586	0.1842	0.9634	1.7962	0.0055	0.0544	544	0.0166	0.14	0.75	1.39	0.00	0.04	420.92	0.01
	751	9999	1130	0.4502	2.0059	6.6947	0.0105	0.1476	1049	0.0406	0.18	0.81	2.69	0.00	0.06	420.92	0.02
Graders	1	50	36	0.0563	0.2762	0.2156	0.0004	0.0124	27.5	0.0051	0.71	3.48	2.72	0.00	0.16	346.97	0.06
	51	120	98	0.0738	0.5090	0.4568	0.0009	0.0311	75.0	0.0067	0.34	2.36	2.11	0.00	0.14	346.97	0.03
	121	175	162	0.0918	0.7282	0.5622	0.0014	0.0303	124	0.0083	0.26	2.04	1.57	0.00	0.08	346.97	0.02
	176	250	225	0.0999	0.3683	0.6701	0.0019	0.0230	172	0.0090	0.20	0.74	1.35	0.00	0.05	346.97	0.02
	251	500	300	0.1284	0.4966	0.7982	0.0023	0.0288	229	0.0116	0.19	0.75	1.21	0.00	0.04	346.97	0.02
	501	750	635	0.2731	1.0508	1.7425	0.0049	0.0621	486	0.0246	0.20	0.75	1.24	0.00	0.04	346.97	0.02
Off-Highway Trucks	1	175	175	0.0837	0.7538	0.4564	0.0014	0.0234	125	0.0076	0.22	1.95	1.18	0.00	0.06	324.22	0.02
	176	250	233	0.0927	0.3514	0.5042	0.0019	0.0173	167	0.0084	0.18	0.68	0.98	0.00	0.03	324.22	0.02
	251	500	381	0.1488	0.5446	0.7481	0.0027	0.0273	272	0.0134	0.18	0.65	0.89	0.00	0.03	324.22	0.02
	501	750	618	0.2416	0.8831	1.2347	0.0044	0.0446	442	0.0218	0.18	0.65	0.91	0.00	0.03	324.22	0.02
	751	1000	874	0.3613	1.2913	3.8920	0.0063	0.0903	625	0.0326	0.19	0.67	2.02	0.00	0.05	324.22	0.02
Pumps	1	15	8	0.0096	0.0464	0.0595	0.0001	0.0030	7	0.0009	0.54	2.63	3.37	0.01	0.17	420.92	0.05
	16	25	21	0.0265	0.0850	0.1558	0.0002	0.0073	19	0.0024	0.57	1.84	3.37	0.01	0.16	420.92	0.05
	26	50	37	0.0465	0.2546	0.2497	0.0004	0.0126	34	0.0042	0.57	3.12	3.06	0.01	0.15	420.92	0.05
	51	120	84	0.0537	0.4713	0.4442	0.0009	0.0263	78	0.0048	0.29	2.54	2.40	0.00	0.14	420.92	0.03
	121	175	151	0.0712	0.7336	0.6007	0.0016	0.0277	140	0.0064	0.21	2.20	1.80	0.00	0.08	420.92	0.02
	176	250	217	0.0760	0.3700	0.7338	0.0023	0.0215	201	0.0069	0.16	0.77	1.53	0.00	0.04	420.92	0.01
	251	500	372	0.1241	0.6189	1.1297	0.0034	0.0355	345	0.0112	0.15	0.75	1.38	0.00	0.04	420.92	0.01
	501	750	615	0.2075	1.0232	1.9114	0.0057	0.0594	571	0.0187	0.15	0.75	1.41	0.00	0.04	420.92	0.01
	751	9999	1460	0.6127	2.6255	8.7489	0.0136	0.1961	1355	0.0553	0.19	0.82	2.72	0.00	0.06	420.92	0.02
Rubber Tired Dozers	1	175	175	0.1509	0.8124	0.9962	0.0015	0.0561	129	0.0136	0.39	2.11	2.58	0.00	0.15	335.60	0.04
	176	250	248	0.1701	0.5279	1.2898	0.0021	0.0516	183	0.0153	0.31	0.97	2.36	0.00	0.09	335.60	0.03
	251	500	358	0.2291	0.9276	1.6868	0.0026	0.0673	265	0.0207	0.29	1.18	2.14	0.00	0.09	335.60	0.03
	501	750	539	0.3461	1.3934	2.5948	0.0040	0.1024	399	0.0312	0.29	1.17	2.18	0.00	0.09	335.60	0.03
	751	1000	800	0.5438	2.2500	5.5311	0.0060	0.1672	592	0.0491	0.31	1.28	3.14	0.00	0.09	335.60	0.03
Rubber Tired Loaders	1	25	25	0.0204	0.0697	0.1291	0.0002	0.0048	16.9	0.0018	0.37	1.26	2.34	0.00	0.09	307.16	0.03
	26	50	46	0.0615	0.3080	0.2424	0.0004	0.0137	31.1	0.0055	0.61	3.04	2.39	0.00	0.13	307.16	0.05
	51	120	87	0.0563	0.3977	0.3529	0.0007	0.0237	58.9	0.0051	0.29	2.07	1.84	0.00	0.12	307.16	0.03
	121	175	157	0.0767	0.6215	0.4713	0.0012	0.0253	106	0.0069	0.22	1.80	1.36	0.00	0.07	307.16	0.02
	176	250	220	0.0848	0.3159	0.5655	0.0017	0.0194	149	0.0077	0.17	0.65	1.17	0.00	0.04	307.16	0.02
	251	500	350	0.1302	0.5016	0.8032	0.0023	0.0291	237	0.0118	0.17	0.65	1.04	0.00	0.04	307.16	0.02
	501	750	717	0.2680	1.0271	1.6958	0.0049	0.0606	486	0.0242	0.17	0.65	1.07	0.00	0.04	307.16	0.02
	751	1000	877	0.3484	1.3166	4.0040	0.0060	0.0983	594	0.0314	0.18	0.68	2.07	0.00	0.05	307.16	0.02
Welders	1	15	11	0.0080	0.0388	0.0498	0.0001	0.0025	6.2	0.0007	0.33	1.60	2.05	0.00	0.10	255.96	0.03
	16	25	20	0.0153	0.0492	0.0903	0.0001	0.0042	11.3	0.0014	0.35	1.12	2.05	0.00	0.10	255.96	0.03
	26	50	46	0.0435	0.2219	0.1968	0.0003	0.0110	26.0	0.0039	0.43	2.19	1.94	0.00	0.11	255.96	0.04
	51	120	70	0.0321	0.2508	0.2344	0.0005	0.0153	40	0.0029	0.21	1.63	1.52	0.00	0.10	255.96	0.02
	121	175	174	0.0600	0.5396	0.4393	0.0011	0.0223	98	0.0054	0.16	1.41	1.15	0.00	0.06	255.96	0.01
	176	250	211	0.0551	0.2294	0.4536	0.0013	0.0142	119	0.0050	0.12	0.49	0.98	0.00	0.03	255.96	0.01
	251	500	297	0.0748	0.3117	0.5690	0.0016	0.0192	168	0.0067	0.11	0.48	0.87	0.00	0.03	255.96	0.01

Notes:

1. Source: South Coast Air Quality Management District, *Off-road Mobile Source Emission Factors*, October 2008 (available at http://www.aqmd.gov/CEQA/handbook/offroad/offroad.html).
2. Average horsepower data from California Air Resources Board's OFFROAD2007 model equip.csv input file (version dated Dated December 15, 2006).
3. Emission rates in pounds per hour from South Coast Off-Road Mobile Source Emission Factor spreadsheet for 2009.
4. Emission factors derived from the South Coast AQMD hourly emission rates and average engine horsepower for each class, assuming 453.59 grams per pound
5. Assume PM = PM_{10} = $PM_{2.5}$

Emission Factors for 2020.[1]

		Annual Emission Factors[2]			Daily/Hourly Emission Factors[3]		
Parameter	Units	Heavy-heavy Duty Trucks - Diesel[4]	Passenger Vehicles[5]	Medium Duty Vehicles[6]	Heavy-heavy Duty Trucks - Diesel[4]	Passenger Vehicles[5]	Medium Duty Vehicles[6]
Criteria Pollutants[7]							
CO	lb/mile	0.00470614	0.00407815	0.00596213	0.00500557 (Win)	0.00417640 (Sum)	0.00610836 (Sum)
NOx	lb/mile	0.01214944	0.00036724	0.00065161	0.01246325 (Sum)	0.00035683 (Sum)	0.00063275 (Sum)
ROG	lb/mile	0.00106110	0.00049508	0.00061389	0.00104793 (Sum)	0.00054590 (Sum)	0.00064747 (Sum)
SOx	lb/mile	0.00003989	0.00000961	0.00001453	0.00003998 (Sum)	0.00001049 (Sum)	0.00001585 (Sum)
PM_{10}	lb/mile	0.00051706	0.00008696	0.00012253	0.00051913 (Win)	0.00008696 (Win)	0.00012253 (Win)
$PM_{2.5}$	lb/mile	0.00039194	0.00005492	0.00008792	0.00039384 (Win)	0.00005492 (Win)	0.00008792 (Win)
Diesel Particulates[8]							
DPM_{10}	lb/mile	0.00037547	0.00000020	0.00000013	0.00037547 (Ann)	0.00000020 (Ann)	0.00000013 (Ann)
$DPM_{2.5}$	lb/mile	0.00034543	0.00000019	0.00000012	0.00034543 (Ann)	0.00000019 (Ann)	0.00000012 (Ann)
Greenhouse Gases[9]							
CO_2	lb/mile	4.17848910	0.99407505	1.50354527	4.17848910 (Ann)	0.99407505 (Ann)	1.50354527 (Ann)
CH_4	lb/mile	0.00004929	0.00003964	0.00006364	0.00004929 (Ann)	0.00003964 (Ann)	0.00006364 (Ann)
N_2O	lb/mile	0.00013746	0.00001155	0.00002061	0.00013746 (Ann)	0.00001155 (Ann)	0.00002061 (Ann)
EMFAC Trips[10]							
Trip Distance	mi/trip	34.375	5.061	5.542	34.375 (Ann)	5.061 (Ann)	5.542 (Ann)

Notes:

1. Emission factors for on-road motor vehicles were derived from California Air Resources Board's EMFAC2007 (version 2.3) model daily seasonal emissions inventories (summer, winter, and annual average) for vehicles in Santa Clara County.
2. Source: EMFAC2007 model 2020 annual average emission inventory for Santa Clara County.
3. Source: EMFAC2007 model 2020 seasonal average emission inventories for Santa Clara County, as follows: a) emission factors for diesel particulates and greenhouse gases, as well as average trip distances, are based on annual average data; b) emission factors for NOx and ROG (both ozone precursors) are based on summer season data since peak ozone levels are typically observed in the summer; c) emission factors for the remaining pollutants (CO, SOx, PM_{10}, and $PM_{2.5}$) are based on peak emission rates observed between the winter and summer seasons. Note that "(Ann)" indicates that a factor is based on annual average data, "(Sum)" indicates that a factor is based on summer season data, and that "(Win)" indicates that a factor is based on winter season data.
4. Includes the following vehicle class: Heavy-Heavy-Duty Trucks (33,001 to 60,000 pounds) - diesel-fueled vehicles only.
5. Includes the following vehicle classes: Light Duty Autos, Light Duty Trucks, & Medium Duty Vehicles (8,500 pounds curb weight and under).
6. Includes the following vehicle class: Medium Duty Vehicles (5,751 to 8,500 pounds curb weight).
7. Criteria pollutant emission factors include total emissions for each pollutant. In addition to exhaust emissions, ROG factors include diurnal, hot soak, running loss, and resting loss emissions, and PM_{10} and $PM_{2.5}$ factors include emissions from brake wear and tire wear.
8. Diesel particulate emission factors include only exhaust PM emissions from diesel vehicles. For calculation purposes, DPM_{10} (diesel particulates sized 10 microns and smaller) is used to represent diesel particulate matter (DPM).
9. Greenhouse gas emission factors for carbon dioxide (CO_2) and methane (CH_4) based on EMFAC2007 exhaust emissions for each compound. Factors for nitrous oxide (N_2O) are based on the California Air Resources Board's methodology described in *California's 1990-2004 Greenhouse Gas Emissions Emissions Inventory and 1990 Emissions Level: Technical Support Document*, May 2009, pp 28-29 (available at http://www.arb.ca.gov/cc/inventory/doc/doc.htm). For diesel vehicles, N_2O emissions are based on an ARB-observed N_2O emission rate per gallon of diesel fuel. For gasoline vehicles, N_2O emissions are based on a linear correlation of N_2O emissions to NOx exhaust emissions.
10. Based on EMFAC2007 emission inventories for Santa Clara County.

Appendix C

Proposed Project Supporting Documentation

Proposed Project Supporting Documentation Appendices.

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South Quarry Production by Phase and by Year

South Quarry Production by Phase (units: short tons, or tons).

Phase	LS - Cement[3]	LS - Aggregate[4]	Waste Rock	Aggregate Fines	Topsoil Movements - To/From TSA: South Quarry	North Quarry Backfill	CMSA/ CMSA Road	Total Topsoil	Topsoil-Concurrent Reclamation: South Quarry	CMSA	Topsoil Storage	Total Production[5]
1	1,212,549	2,480,213	7,440,640	551,159	165,348	0	0	165,348	0	39,683	6,614	11,684,561
2	2,425,098	2,755,793	8,818,537	551,159	176,371	0	0	176,371	143,301	17,637	2,205	14,550,585
3	2,425,098	2,755,793	11,023,171	551,159	77,162	22,046	0	77,162	33,070	0	3,307	16,755,219
4	2,425,098	2,755,793	8,680,747	551,159	0	22,046	0	22,046	60,627	0	0	14,412,796
5	2,425,098	2,755,793	8,083,659	551,159	171,961	22,046	47,400	219,361	0	0	8,819	13,815,707

South Quarry Production by Phase and by Year (units: metric tons, or tonnes).

Year	Phase	LS - Cement[3]	LS - Aggregate[4]	Waste Rock	Aggregate Fines	Topsoil Movements - To/From TSA: South Quarry	North Quarry Backfill	CMSA/ CMSA Road	Total Topsoil	Topsoil-Concurrent Reclamation: South Quarry	CMSA	Topsoil Storage	Total Production[5]
2000-2009	Baseline	1,540,152	1,115,679	2,383,266	200,822	--	--	--	--	--	--		5,239,919
1	1					50,000	0	0	50,000	0	0	2,000	0
2	1					150,000	0	0	150,000	0	0	6,000	0
3	1	550,000	2,250,000	1,375,000	500,000	25,000	0	0	25,000	0	0	2,000	4,675,000
4	1	550,000	2,250,000	4,375,000	500,000	25,000	0	0	25,000	0	36,000	2,000	7,675,000
5	1	1,100,000	2,250,000	6,750,000	500,000	25,000	0	0	25,000	0	17,000	2,000	10,600,000
6	2	2,200,000	2,500,000	6,938,000	500,000	75,000	0	0	75,000	100,000	16,000	2,000	12,138,000
7	2	2,200,000	2,500,000	8,000,000	500,000	160,000	0	0	160,000	0	0	2,000	13,200,000
8	2	2,200,000	2,500,000	8,000,000	500,000	0	0	0	0	130,000	0	0	13,200,000
9	3	2,200,000	2,500,000	9,000,000	500,000	70,000	0	0	70,000	0	0	3,000	14,200,000
10	3	2,200,000	2,500,000	10,000,000	500,000	0	0	0	0	0	0	0	15,200,000
11	3	2,200,000	2,500,000	9,000,000	500,000	0	11,000	0	11,000	30,000	0	0	14,200,000
12	3	2,200,000	2,500,000	10,000,000	500,000	0	20,000	0	20,000	30,000	0	0	15,200,000
13	4	2,200,000	2,500,000	7,875,000	500,000	0	20,000	0	20,000	55,000	0	0	13,075,000
14	4	2,200,000	2,500,000	7,276,500	500,000	0	20,000	0	20,000	0	0	0	12,476,500
15	5	2,200,000	2,500,000	7,333,333	500,000	156,000	20,000	0	176,000	0	0	3,000	12,533,333
16	5	2,200,000	2,500,000	7,333,333	500,000	156,000	20,000	0	176,000	0	0	8,000	12,533,333
17	5-Ultimate	2,200,000	2,500,000	5,000,000	500,000	156,000	0	43,000	199,000	0	0	8,000	10,200,000
TOTALS:		28,600,000	36,750,000	108,256,167	7,500,000	1,048,000	111,000	43,000	1,202,000	345,000	69,000	40,000	181,106,167

Notes:

1. Quarry production data based on maximum quarry production data provided by Lehigh Southwest Cement Company, May 12, 2010.
2. Conversion factors:

   1.10232 short ton/metric ton.
3. Production of LS-Cement occurs in both North Quarry and in South Quarry during Phase 1. LSC expects one-quarter of total LS-Cement production will occur in South Quarry in Years 3 and 4, and that LS-Cement production in South Quarry will increase to one-half of total production in Year 5. From Phase 2-on, LS-Cement production is expected to occur only in South Quarry.
4. Production of LS-Aggregate occurs in both North Quarry and in South Quarry during Phase 1. LSC expects 90% of total LS-Aggregate production will occur in South Quarry during Phase 1. From Phase 2-on, LS-Aggregate production is expected to occur only in South Quarry.
5. Total production reflects the sum of LS-Cement, LS-Aggregate, Waste Rock, and Aggregate Fines.
6. Production of limestone and waste rock from the South Quarry is assumed to commence in 2020; therefore, as a worst-case assumption, 2020 is used as the basis for calculating on- and off-road vehicle emissions.

Assumed Operating Schedule.

Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

South Quarry Drilling and Blasting Activity

Activity	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Blasts:					
Maximum Production (tonnes/year)[1]	10,100,000	12,700,000	14,700,000	12,575,000	12,033,333
Tonnes/Blast[1]	50,000	50,000	50,000	50,000	50,000
Blasts/Year[2]	202	254	294	252	241
Holes Drilled:					
Hole Depth (feet/hole)[1]	53	53	53	53	53
Tonnes/Foot Drilled[1]	17.4	17.4	17.4	17.4	17.4
Holes Drilled/Year[2]	10,952	13,771	15,940	13,636	13,049
Explosives Used:					
Powder Factor[1] (grams explosive/tonne blasted rock)	280	280	280	280	280
Tonnes Explosive/Year[1,3]	2,828	3,556	4,116	3,521	3,369
Tons Explosive/Year[4]	3,117	3,920	4,537	3,881	3,714
Area Shifted per Blast:					
Blast Pattern (holes)[1]	4	4	4	4	4
Average Blast Patterns/Blast[2]	13.55	13.55	13.55	13.55	13.55
Area Shifted per Pattern (ft^2)[1]	289	289	289	289	289
Area Shifted per Blast (ft^2)[2]	3,917	3,917	3,917	3,917	3,917

Notes:

1. Maximum production, blasting, explosives, blast pattern, and related data reflect maximum anticipated activity in South Quarry during each of the five project phases. Data provided by Lehigh Southwest Cement Company, May 12, 2010.
2. Calculated based on preceding data.
3. Explosive used: ANFO (ammonium nitrate/fuel oil).
4. (1 short ton) * (2,000 lb/short ton) * (0.45359 kg/lb) * (1 metric ton/1,000 kg) = 1.10232 short ton/metric ton.

Drilling and Blasting Schedule.

Activity	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Drilling:					
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50
Blasting:					
Weeks/Year	50	50	50	50	50
Blasts/Week	4.0	5.1	5.9	5.0	4.8
Blast Days/Week	5	5	5	5	5
Max Blasts/Day	1	2	2	2	1
Max Blasts/Hour	1	1	1	1	1

Average Wind Speed Data for Lehigh Permanente Meteorological Station for 2008.

Date	Average Wind Speed (mph)	Date	Average Wind Speed (mph)	Date	Average Wind Speed (mph)
1/1/2008	3.43	3/1/2008	7.08	5/1/2008	5.14
1/2/2008	4.23	3/2/2008	9.24	5/2/2008	4.03
1/3/2008	14.26	3/3/2008	6.49	5/3/2008	4.55
1/4/2008	15.77	3/4/2008	5.28	5/4/2008	5.61
1/5/2008	7.02	3/5/2008	4.53	5/5/2008	4.38
1/6/2008	5.14	3/6/2008	4.80	5/6/2008	5.01
1/7/2008	3.99	3/7/2008	4.35	5/7/2008	5.78
1/8/2008	8.40	3/8/2008	4.44	5/8/2008	4.18
1/9/2008	3.56	3/9/2008	4.11	5/9/2008	4.69
1/10/2008	2.56	3/10/2008	4.55	5/10/2008	4.03
1/11/2008	3.71	3/11/2008	3.83	5/11/2008	4.98
1/12/2008	3.62	3/12/2008	4.52	5/12/2008	5.05
1/13/2008	5.06	3/13/2008	5.15	5/13/2008	4.70
1/14/2008	3.31	3/14/2008	5.10	5/14/2008	4.80
1/15/2008	4.55	3/15/2008	6.98	5/15/2008	6.17
1/16/2008	8.83	3/16/2008	10.62	5/16/2008	5.47
1/17/2008	7.71	3/17/2008	6.38	5/17/2008	4.33
1/18/2008	6.02	3/18/2008	3.85	5/18/2008	3.82
1/19/2008	4.29	3/19/2008	4.55	5/19/2008	4.04
1/20/2008	5.28	3/20/2008	5.13	5/20/2008	6.81
1/21/2008	5.26	3/21/2008	5.99	5/21/2008	7.34
1/22/2008	3.78	3/22/2008	4.57	5/22/2008	8.90
1/23/2008	3.24	3/23/2008	3.83	5/23/2008	7.29
1/24/2008	9.32	3/24/2008	4.63	5/24/2008	6.58
1/25/2008	10.45	3/25/2008	4.53	5/25/2008	6.67
1/26/2008	9.48	3/26/2008	6.81	5/26/2008	5.70
1/27/2008	12.06	3/27/2008	6.80	5/27/2008	6.63
1/28/2008	6.07	3/28/2008	4.92	5/28/2008	5.30
1/29/2008	6.11	3/29/2008	5.19	5/29/2008	6.69
1/30/2008	5.54	3/30/2008	7.05	5/30/2008	5.98
1/31/2008	5.97	3/31/2008	5.53	5/31/2008	5.60
2/1/2008	5.23	4/1/2008	4.67	6/1/2008	5.36
2/2/2008	7.42	4/2/2008	3.48	6/2/2008	5.17
2/3/2008	10.40	4/3/2008	4.35	6/3/2008	5.35
2/4/2008	9.48	4/4/2008	5.34	6/4/2008	5.56
2/5/2008	5.87	4/5/2008	4.95	6/5/2008	5.39
2/6/2008	4.56	4/6/2008	5.84	6/6/2008	5.70
2/7/2008	3.66	4/7/2008	5.44	6/7/2008	4.98
2/8/2008	5.71	4/8/2008	6.27	6/8/2008	4.26
2/9/2008	6.42	4/9/2008	4.63	6/9/2008	4.30
2/10/2008	4.43	4/10/2008	4.68	6/10/2008	6.70
2/11/2008	4.80	4/11/2008	6.03	6/11/2008	7.94
2/12/2008	4.36	4/12/2008	5.63	6/12/2008	5.12
2/13/2008	7.55	4/13/2008	5.33	6/13/2008	4.29
2/14/2008	10.02	4/14/2008	6.65	6/14/2008	4.25
2/15/2008	4.54	4/15/2008	6.58	6/15/2008	4.13
2/16/2008	3.61	4/16/2008	5.06	6/16/2008	4.59
2/17/2008	3.21	4/17/2008	4.16	6/17/2008	5.38
2/18/2008	3.86	4/18/2008	4.33	6/18/2008	4.76
2/19/2008	4.28	4/19/2008	7.89	6/19/2008	5.28
2/20/2008	3.78	4/20/2008	7.13	6/20/2008	4.96
2/21/2008	9.57	4/21/2008	5.95	6/21/2008	5.69
2/22/2008	4.35	4/22/2008	6.15	6/22/2008	4.22
2/23/2008	8.30	4/23/2008	5.83	6/23/2008	4.17
2/24/2008	9.46	4/24/2008	5.64	6/24/2008	4.05
2/25/2008	5.45	4/25/2008	5.34	6/25/2008	4.35
2/26/2008	5.49	4/26/2008	4.66	6/26/2008	3.67
2/27/2008	4.40	4/27/2008	5.11	6/27/2008	4.30
2/28/2008	3.98	4/28/2008	4.67	6/28/2008	4.88
2/29/2008	3.53	4/29/2008	8.63	6/29/2008	4.67
		4/30/2008	7.44	6/30/2008	4.77

Date	Average Wind Speed (mph)	Date	Average Wind Speed (mph)	Date	Average Wind Speed (mph)
7/1/2008	4.30	9/1/2008	6.43	11/1/2008	10.98
7/2/2008	4.14	9/2/2008	6.02	11/2/2008	5.13
7/3/2008	4.76	9/3/2008	4.99	11/3/2008	7.78
7/4/2008	4.89	9/4/2008	5.33	11/4/2008	6.70
7/5/2008	4.96	9/5/2008	4.80	11/5/2008	6.00
7/6/2008	4.02	9/6/2008	4.22	11/6/2008	6.12
7/7/2008	4.11	9/7/2008	4.10	11/7/2008	7.46
7/8/2008	4.27	9/8/2008	4.33	11/8/2008	4.83
7/9/2008	3.33	9/9/2008	4.51	11/9/2008	8.00
7/10/2008	3.84	9/10/2008	4.13	11/10/2008	4.07
7/11/2008	4.35	9/11/2008	3.85	11/11/2008	3.88
7/12/2008	4.76	9/12/2008	4.35	11/12/2008	3.67
7/13/2008	4.61	9/13/2008	4.05	11/13/2008	7.73
7/14/2008	4.82	9/14/2008	4.08	11/14/2008	7.25
7/15/2008	5.25	9/15/2008	3.58	11/15/2008	6.86
7/16/2008	4.52	9/16/2008	4.23	11/16/2008	3.68
7/17/2008	4.32	9/17/2008	5.85	11/17/2008	3.34
7/18/2008	4.14	9/18/2008	6.28	11/18/2008	2.92
7/19/2008	4.03	9/19/2008	6.55	11/19/2008	3.43
7/20/2008	5.30	9/20/2008	5.07	11/20/2008	4.78
7/21/2008	4.99	9/21/2008	4.38	11/21/2008	6.57
7/22/2008	4.53	9/22/2008	5.19	11/22/2008	3.81
7/23/2008	3.71	9/23/2008	5.50	11/23/2008	3.92
7/24/2008	3.84	9/24/2008	4.86	11/24/2008	3.81
7/25/2008	3.72	9/25/2008	3.99	11/25/2008	4.06
7/26/2008	4.73	9/26/2008	4.10	11/26/2008	3.53
7/27/2008	4.14	9/27/2008	3.54	11/27/2008	3.68
7/28/2008	4.61	9/28/2008	3.62	11/28/2008	3.90
7/29/2008	4.79	9/29/2008	3.89	11/29/2008	7.78
7/30/2008	4.03	9/30/2008	3.43	11/30/2008	3.27
7/31/2008	3.89	10/1/2008	3.70	12/1/2008	2.95
8/1/2008	4.08	10/2/2008	4.34	12/2/2008	4.48
8/2/2008	4.60	10/3/2008	5.90	12/3/2008	4.36
8/3/2008	4.05	10/4/2008	4.41	12/4/2008	5.46
8/4/2008	4.28	10/5/2008	4.15	12/5/2008	4.17
8/5/2008	4.37	10/6/2008	4.19	12/6/2008	3.82
8/6/2008	4.14	10/7/2008	3.83	12/7/2008	3.58
8/7/2008	4.64	10/8/2008	4.35	12/8/2008	5.18
8/8/2008	5.14	10/9/2008	5.79	12/9/2008	4.80
8/9/2008	5.08	10/10/2008	9.29	12/10/2008	4.52
8/10/2008	4.50	10/11/2008	11.24	12/11/2008	3.90
8/11/2008	3.79	10/12/2008	9.96	12/12/2008	3.62
8/12/2008	3.75	10/13/2008	6.40	12/13/2008	7.41
8/13/2008	3.54	10/14/2008	5.13	12/14/2008	5.75
8/14/2008	3.62	10/15/2008	5.09	12/15/2008	6.14
8/15/2008	3.58	10/16/2008	6.12	12/16/2008	7.04
8/16/2008	4.34	10/17/2008	4.98	12/17/2008	7.23
8/17/2008	4.72	10/18/2008	3.98	12/18/2008	6.21
8/18/2008	4.68	10/19/2008	3.75	12/19/2008	5.48
8/19/2008	4.94	10/20/2008	3.90	12/20/2008	5.28
8/20/2008	4.68	10/21/2008	5.23	12/21/2008	4.50
8/21/2008	4.43	10/22/2008	8.11	12/22/2008	5.70
8/22/2008	4.16	10/23/2008	5.30	12/23/2008	3.59
8/23/2008	4.44	10/24/2008	6.17	12/24/2008	11.40
8/24/2008	4.00	10/25/2008	5.30	12/25/2008	11.80
8/25/2008	4.47	10/26/2008	2.86	12/26/2008	7.07
8/26/2008	5.07	10/27/2008	3.09	12/27/2008	3.75
8/27/2008	5.33	10/28/2008	2.92	12/28/2008	5.23
8/28/2008	4.76	10/29/2008	2.92	12/29/2008	5.76
8/29/2008	3.91	10/30/2008	6.46	12/30/2008	4.91
8/30/2008	3.80	10/31/2008	10.70	12/31/2008	2.91
8/31/2008	4.34				
Average of Daily Averages:					5.272

Unpaved Roads (Data for Dust Entrainment from Unpaved Roads)

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Summary.

	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Totals-All Phases	
Project Phase/Detail	Miles/Year	Ave. Weight	Miles/Year	Ave. Weight	Miles/Year	Ave. Weight	Miles/Year	Ave. Weight	Miles/Year	Ave. Weight	Miles/Year	Ave. Weight
South Quarry												
100-ton Trucks	69,667		--		--		--		--		69,667	
150-ton Trucks	11,034		211,480.1		179,689		100,902		127,165		630,270	
In-Plant Vehicles	130,500		148,500		144,000		130,500		117,000		670,500	
Total - South Quarry	211,202		359,980		323,689		231,402		244,165		1,370,437	
CMSA/North Quarry												
40-ton Trucks	39,666		43,299		43,299		43,299		43,299		212,860	
100-ton Trucks	--		--		--		--		--		0	
150-ton Trucks	347,394		376,435		378,494		291,033		185,473		1,578,828	
In-Plant Vehicles	65,250		74,250		72,000		65,250		58,500		335,250	
Total - CMSA/North Quarry	452,309		493,984		493,792		399,581		287,271		2,126,938	
Topsoil Storage												
40-ton Trucks	25,014		41,929		18,344		2,740		27,227		115,254	
In-Plant Vehicles	21,750		24,750		24,000		21,750		19,500		111,750	
Total - Topsoil Storage	46,764		66,679		42,344		24,490		46,727		227,004	
Fleet Totals												
40-ton Trucks	64,680	54.8	85,227	54.8	61,642	54.8	46,038	54.8	70,526	54.8	328,114	54.8
100-ton Trucks	69,667	125.4	0	125.4	0	125.4	0	125.4	0	125.4	69,667	125.4
150-ton Trucks	358,428	197.9	587,915	197.9	558,183	197.9	391,935	197.9	312,637	197.9	2,209,098	197.9
In-Plant Vehicles	217,500	3.0	247,500	3.0	240,000	3.0	217,500	3.0	195,000	3.0	1,117,500	3.0
Total/Composite	710,275	118.1	920,643	132.2	859,825	133.2	655,473	123.2	578,163	114.7	3,724,379	125.4

Notes:
1. Based on production, road length, and equipment use data provided by Lehigh Southwest Cement Company, May 12, 2010
2. Derivation of average vehicle weight (in tons) is presented below.

Derivation of Average Vehicle Weights.

	40-ton Off-highway Truck[2]	100-ton Off-highway Truck[3]	150-ton Off-highway Truck[4]	In-Plant Vehicles[5]
Rated Load (tons)	40.0	100.0	150.0	--
Normal Haul Weight (tons)[6]	35.0	90.0	142.0	--
Empty Weight (tons)	37.3	80.4	126.9	--
Full Weight (tons)	72.3	170.4	268.9	--
Average Weight	54.8	125.4	197.9	3.0

Notes:
1. Data for Off-highway Trucks from "Caterpillar Performance Handbook," No. 39 (January 2009)
2. Data for a Caterpillar 769D Construction/Mining Truck. Empty operating weight of 74,682 pounds
3. Data for a Caterpillar 777F Construction/Mining Truck. Empty operating weight of 160,885 pounds (chassis + body system)
4. Data for a Caterpillar 785C Construction/Mining Truck. Empty operating weight of 253,719 pounds
5. Since vehicles can range from 5,500 to 6,600 pounds curb weight, an average weight of 6,000 pounds (3.0 tons) was used
6. Source: Lehigh Southwest Cement Company, January 12, 2010

Assumed Allocation of In-Plant Vehicle Mileage to Proposed Project Areas

Project Area	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Percent Allocation:					
South Quarry	60%	60%	60%	60%	60%
CMSA/North Quarry	30%	30%	30%	30%	30%
Topsoil Storage	10%	10%	10%	10%	10%
Total Miles - allocated to:	217,500	247,500	240,000	217,500	195,000
South Quarry	130,500	148,500	144,000	130,500	117,000
CMSA/North Quarry	65,250	74,250	72,000	65,250	58,500
Topsoil Storage	21,750	24,750	24,000	21,750	19,500

Off-Highway Truck Trips and Miles Traveled (Data for Entrained Road Dust Calculations)

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Summary.

	LS-Cement and LS-Aggregate From South Quarry		Waste Rock to CMSA/North Quarry		Aggregate Fines to CMSA/North Quarry	Topsoil - 40-ton Trucks[5]				
Project Phase/Detail	100-ton Trucks[2,4]	150-ton Trucks[3,4]	100-ton Trucks	150-ton Trucks	40-ton Trucks[5]	South Quarry	North Quarry Backfill	CMSA/ CMSA Road	Total Topsoil[6]	Notes
Truck Data										
Normal Haul Weight (Tons)[7]	90	142	90	142	35	35	35	35	35	
Normal Haul Weight (Tonnes)[8]	81.6	128.8	81.6	128.8	31.8	31.8	31.8	31.8	31.8	
Phase 1										
Throughput (Tonnes/Year)[9]	2,680,000	670,000	--	6,750,000	500,000	150,000	0	0	150,000	
Trips/Year	32,843.1	5,201.9	--	52,406.8	15,723.3	4,717	0	0	4,717	
Linear Feet/Trip (one-way)	5,600	5,600	--	17,500	6,660	14,000	0	0	14,000	
Miles/Trip (round trip)	2.12	2.12	--	6.63	2.52	5.30	0.00	0.00	5.30	
Miles/Year	69,667	11,034	--	347,394	39,666	25,014	0	0	25,014	
Phase 2										
Throughput (Tonnes/Year)	--	4,700,000	--	8,000,000	500,000	160,000	0	0	160,000	
Trips/Year	--	36,490.7	--	62,111.8	15,723.3	5,031	0	0	5,031	
Linear Feet/Trip (one-way)	--	15,300	--	16,000	7,270	22,000	0	0	22,000	
Miles/Trip (round trip)	--	5.80	--	6.06	2.75	8.33	0.00	0.00	8.33	
Miles/Year	--	211,480	--	376,435	43,299	41,929	0	0	41,929	
Phase 3										
Throughput (Tonnes/Year)	--	4,700,000	--	9,000,000	500,000	70,000	20,000	0	70,000	SQ Topsoil in Year 1; NQ Backfill
Trips/Year	--	36,490.7	--	69,875.8	15,723.3	2,201	629	0	2,201	Topsoil in Years 3 and 4 - no overlap.
Linear Feet/Trip (one-way)	--	13,000	--	14,300	7,270	22,000	10,500	0	22,000	NQ Backfill Topsoil omitted from
Miles/Trip (round trip)	--	4.92	--	5.42	2.75	8.33	3.98	0.00	8.33	Topsoil totals for Phase 3.
Miles/Year	--	179,689	--	378,494	43,299	18,344	2,501	0	18,344	
Phase 4										
Throughput (Tonnes/Year)	--	4,700,000	--	7,276,500	500,000	0	20,000	0	20,000	
Trips/Year	--	36,490.7	--	56,494.6	15,723.3	0	629	0	629	
Linear Feet/Trip (one-way)	--	7,300	--	13,600	7,270	0	11,500	0	11,500	
Miles/Trip (round trip)	--	2.77	--	5.15	2.75	0.00	4.36	0.00	4.36	
Miles/Year	--	100,902	--	291,033	43,299	0	2,740	0	2,740	
Phase 5										
Throughput (Tonnes/Year)	--	4,700,000	--	7,333,333	500,000	156,000	20,000	43,000	176,000	SQ & NQ Backfill Topsoil in Yrs 1 &
Trips/Year	--	36,490.7	--	56,935.8	15,723.3	4,906	629	1,352	5,535	2 only (max trip dist. in Yr 2); CMSA/
Linear Feet/Trip (one-way)[10]	--	9,200	--	8,600	7,270	13,050	12,500	9,651	12,988	CMSA Rd Topsoil only in Yr 3. Since
Miles/Trip (round trip)	--	3.48	--	3.26	2.75	4.94	4.73	3.66	4.92	Waste Rock drops, Yr 2 is max year.
Miles/Year	--	127,165	--	185,473	43,299	24,250	2,978	4,943	27,227	CMSA/CMSA Rd omitted from Topsoil totals for Phase 5.

Notes:

1. Throughput and one-way trip length based on production and road length data provided by Lehigh Southwest Cement Company, May 12, 2010
2. 100-ton trucks are used to haul limestone (LS-Cement and LS-Aggregate) during all five years of Phase 1 and Waste Rock during the first three years of Phase 1.
3. 150-ton trucks are used to haul limestone (LS-Cement and LS-Aggregate) and Waste Rock during Phases 1 through 5.
4. During the peak years of Phase 1, it is assumed that 100-ton trucks will haul 80% of the limestone and that 150-ton trucks will haul 20% of the limestone and all of the waste.
5. 40-ton trucks are used to haul fines and topsoil.
6. Total Topsoil trip distance reflects a production-weighted average of distances associated with the SQ Topsoil, NQ Backfill Topsoil, and CMSA/CMSA Road Topsoil activities.
7. Source: Lehigh Southwest Cement Company, January 12, 2010.
8. Normal haul weight converted from short tons (tons) to metric tons (tonnes) assuming 2,000 lb/ton, 0.45359 kg/lb, and 1 tonne/1,000 kg
9. Maximum throughput for each process stream for each project phase.
10. CMSA/CMSA Road Topsoil trip distance reflects a production-weighted average of the distances associated with reclamation of the CMSA versus reclamation of the CMSA Access Road.

Wind Erosion Data - Unpaved Roads and Active Areas

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Mine Area	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
South Quarry:					
Unpaved Road Length (ft)	7,060	20,960	18,910	18,025	10,760
Unpaved Road Width (ft)	80	80	80	80	80
Unpaved Roads (acre)	12.97	38.49	34.73	33.10	19.76
Topsoil Removal (acre)	39.60	63.99	25.25	12.63	0.00
Operating Area (acre)	23.67	47.35	47.35	47.35	47.35
Backfill (acre)	0.00	0.00	0.00	0.00	15.78
Reclaimed (acre)	0.00	47.35	15.78	31.57	69.44
Total Active Areas (acre)	63.27	158.69	88.38	91.54	132.58
Waste Storage - CMSA and North Quarry Backfill:					
Unpaved Road Length (ft)	2,480	5,750	1,660	2,040	2,040
Unpaved Road Width (ft)	60	60	60	60	60
Unpaved Roads (acre)	3.42	7.92	2.29	2.81	2.81
Topsoil Removal (acre)	19.89	12.63	0.00	0.00	0.00
Operating Area (acre)[3]	8.61	6.31	0.00	0.00	0.00
Backfill (acre)	0.00	56.82	15.78	31.57	69.44
Reclaimed (acre)	44.19	34.72	63.13	63.13	63.13
Total Active Areas (acre)	72.69	110.48	78.91	94.70	132.58
Topsoil Storage Area:					
Unpaved Road Length (ft)	8,140	8,140	8,140	8,140	8,140
Unpaved Road Width (ft)	30	30	30	30	30
Unpaved Roads (acre)	5.61	5.61	5.61	5.61	5.61
Topsoil Removal (acre)	4.02	2.68	0.00	0.00	0.00
Operating Area (acre)	3.56	3.16	0.00	0.00	0.00
Reclaimed (acre)	0.00	0.00	0.00	0.00	4.59
Total Active Areas (acre)	7.58	5.84	0.00	0.00	4.59
Total Unpaved Roads (acres)	21.99	52.02	42.62	41.52	28.18
Total Active Areas (acres)	143.54	275.01	167.30	186.24	269.74

Notes:

1. Active unpaved road acreage based on project phasing maps provided by Lehigh Southwest Cement Company, February 5, 2010. (See separate documentation on unpaved roads-wind erosion.) Conversion from square feet to acres assumes: 43,560 square feet/acre.
2. Data on active mine areas based on active mine area data provided by Lehigh Southwest Cement Company, May 12, 2010.
3. Since the proposed project does not include continued operation of the North Quarry, mine operating area for the North Quarry Backfill does not include excavation of limestone from the North Quarry.

Unpaved Roads (Data for Wind Erosion from Unpaved Roads)

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Permanente Quarry Unpaved Road Lengths[1].

Unpaved Road	Associated With	Road Width (feet)	Road Lengths (linear feet)				
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
South Quarry to Primary Crusher	South Quarry	80	5,160	5,160	5,160	5,000	8,860
South Quarry Perimeter/Upper Access Road	South Quarry	80	--[2]	10,650	9,470	9,105	--
South Quarry Middle Access Road	South Quarry	80	--	3,250	2,380	2,020	--
Road Stub to Quarry Yard[3]	South Quarry	80	1,900	1,900	1,900	1,900	1,900
Road to CMSA (Waste)	Waste Rock	60	2,480	3,200	--	--	--
Road to North Quarry (Waste)	Waste Rock	60	--	2,550	1,660	2,040	2,040
Primary Crusher to TSA/Rock Plant	Topsoil Storage	30	8,140	8,140	8,140	8,140	8,140
Total Unpaved Roads			17,680	34,850	28,710	28,205	20,940

Notes:

1. Unpaved road lengths and widths based on project phasing maps provided by Lehigh Southwest Cement Company on February 5, 2010 (maps dated January 26, 2010). This information is used to estimate wind erosion associated with unpaved roads. (Dust entrainment associated with unpaved roads is based on truck trips associated with quarry production.)
2. South Quarry Perimeter/Upper Access Road is to be constructed (10,950 feet) during Phase 1, but is not assumed to be active until Phase 2.
3. This portion of the quarry unpaved road system is actively used during all phases of quarry operation, but is not otherwise allocated to another unpaved road segment.

Wind Erosion PM Emission Factor - Quarry, Waste Storage/Infill, Unpaved Roads

threshold friction velocity (u^*_t) = 0.62 m/s (AP-42 Table Table 13.2.5-2 - Scraper tracks on coal pile)

$k(PM_{2.5})$ = 0.075

$k(PM_{10})$ = 0.5

Weekday Efs: PM_{10} = 1.40 ton/acre*yr

$PM_{2.5}$ = 0.21 ton/acre*yr

366 Day/Year Efs: PM_{10} = 1.79 ton/acre*yr

$PM_{2.5}$ = 0.27 ton/acre*yr

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
1/1/2008	1	12.5	5.58800073	5.58800073	0.296164039	0		0
1/2/2008	2	19.5	8.717281138	8.717281138	0.4620159	0		0
1/3/2008	3	45.5	20.34032266	20.34032266	1.078037101	23.61921069		23.61921069
1/4/2008	4	67.6	30.21990795	30.21990795	1.601655121	80.43289108		80.43289108
1/5/2008	5	33.9	15.15465798	15.15465798	0.803196873	6.526465287		0
1/6/2008	6	17.8	7.957313039	7.957313039	0.421737591	0		0
1/7/2008	7	13	5.811520759	5.811520759	0.3080106	0		0
1/8/2008	8	43.1	19.26742652	19.26742652	1.021173605	19.36387531		19.36387531
1/9/2008	9	10.4	4.649216607	4.649216607	0.24640848	0		0
1/10/2008	10	12.7	5.677408741	5.677408741	0.300902663	0		0
1/11/2008	11	12.3	5.498592718	5.498592718	0.291425414	0		0
1/12/2008	12	14	6.258560817	6.258560817	0.331703723	0		0
1/13/2008	13	18.5	8.27024108	8.27024108	0.438322777	0		0
1/14/2008	14	10.8	4.82803263	4.82803263	0.255885729	0		0
1/15/2008	15	14	6.258560817	6.258560817	0.331703723	0		0
1/16/2008	16	28.6	12.78534567	12.78534567	0.67762332	1.633168941		1.633168941
1/17/2008	17	25.8	11.53363351	11.53363351	0.611282576	0		0
1/18/2008	18	16.5	7.376160963	7.376160963	0.390936531	0		0
1/19/2008	19	11.5	5.140960671	5.140960671	0.272470916	0		0
1/20/2008	20	24	10.7289614	10.7289614	0.568634954	0		0
1/21/2008	21	16.3	7.286752951	7.286752951	0.386197906	0		0
1/22/2008	22	14.2	6.347968829	6.347968829	0.336442348	0		0
1/23/2008	23	11.4	5.096256665	5.096256665	0.270101603	0		0
1/24/2008	24	25.2	11.26540947	11.26540947	0.597066702	0		0
1/25/2008	25	31.1	13.90294582	13.90294582	0.736856128	3.713413778		3.713413778
1/26/2008	26	27.1	12.11478558	12.11478558	0.642083636	0.58037674		0
1/27/2008	27	55	24.58720321	24.58720321	1.30312177	44.14405472		0
1/28/2008	28	22.5	10.05840131	10.05840131	0.53309527	0		0
1/29/2008	29	25.6	11.44422549	11.44422549	0.606543951	0		0
1/30/2008	30	19.4	8.672577132	8.672577132	0.459646588	0		0
1/31/2008	31	30	13.41120175	13.41120175	0.710793693	2.74796501		2.74796501
2/1/2008	32	15.8	7.063232922	7.063232922	0.374351345	0		0
2/2/2008	33	36.7	16.40637014	16.40637014	0.869537618	9.850043747		0
2/3/2008	34	32.8	14.66291391	14.66291391	0.777134437	5.36045236		0
2/4/2008	35	27.6	12.33830561	12.33830561	0.653930197	0.915027915		0.915027915
2/5/2008	36	19.4	8.672577132	8.672577132	0.459646588	0		0
2/6/2008	37	15	6.705600875	6.705600875	0.355396846	0		0
2/7/2008	38	15.4	6.884416899	6.884416899	0.364874096	0		0
2/8/2008	39	15.1	6.750304881	6.750304881	0.357766159	0		0
2/9/2008	40	15.9	7.107936928	7.107936928	0.376720657	0		0
2/10/2008	41	14.2	6.347968829	6.347968829	0.336442348	0		0
2/11/2008	42	15.4	6.884416899	6.884416899	0.364874096	0		0
2/12/2008	43	13.3	5.945632776	5.945632776	0.315118537	0		0
2/13/2008	44	34.3	15.333474	15.333474	0.812674122	6.970005458		6.970005458

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
2/14/2008	45	29.9	13.36649775	13.36649775	0.70842438	2.664104034		2.664104034
2/15/2008	46	15.2	6.795008887	6.795008887	0.360135471	0		0
2/16/2008	47	12.2	5.453888712	5.453888712	0.289056102	0		0
2/17/2008	48	11.4	5.096256665	5.096256665	0.270101603	0		0
2/18/2008	49	11.2	5.006848654	5.006848654	0.265362979	0		0
2/19/2008	50	13.9	6.213856811	6.213856811	0.329334411	0		0
2/20/2008	51	17.2	7.689089004	7.689089004	0.407521717	0		0
2/21/2008	52	33.2	14.84172994	14.84172994	0.786611687	5.775340508		5.775340508
2/22/2008	53	16.1	7.19734494	7.19734494	0.381459282	0		0
2/23/2008	54	37.9	16.94281821	16.94281821	0.897969365	11.43071828		0
2/24/2008	55	47.1	21.05558675	21.05558675	1.115946098	26.66447929		0
2/25/2008	56	13	5.811520759	5.811520759	0.3080106	0		0
2/26/2008	57	12.7	5.677408741	5.677408741	0.300902663	0		0
2/27/2008	58	14	6.258560817	6.258560817	0.331703723	0		0
2/28/2008	59	14.2	6.347968829	6.347968829	0.336442348	0		0
2/29/2008	60	19.1	8.538465115	8.538465115	0.452538651	0		0
3/1/2008	61	29	12.96416169	12.96416169	0.68710057	1.938658457		0
3/2/2008	62	30.7	13.72412979	13.72412979	0.727378879	3.353224946		0
3/3/2008	63	14.6	6.526784852	6.526784852	0.345919597	0		0
3/4/2008	64	17.4	7.778497016	7.778497016	0.412260342	0		0
3/5/2008	65	13	5.811520759	5.811520759	0.3080106	0		0
3/6/2008	66	15.4	6.884416899	6.884416899	0.364874096	0		0
3/7/2008	67	17.6	7.867905027	7.867905027	0.416998966	0		0
3/8/2008	68	20.1	8.985505173	8.985505173	0.476231774	0		0
3/9/2008	69	13	5.811520759	5.811520759	0.3080106	0		0
3/10/2008	70	17.5	7.823201021	7.823201021	0.414629654	0		0
3/11/2008	71	98.2	43.89933373	43.89933373	2.326664688	211.6034699		211.6034699
3/12/2008	72	15.8	7.063232922	7.063232922	0.374351345	0		0
3/13/2008	73	25.9	11.57833751	11.57833751	0.613651888	0		0
3/14/2008	74	20.7	9.253729208	9.253729208	0.490447648	0		0
3/15/2008	75	29.3	13.09827371	13.09827371	0.694208507	2.174613008		0
3/16/2008	76	31.4	14.03705783	14.03705783	0.743964065	3.990392816		0
3/17/2008	77	24.3	10.86307342	10.86307342	0.575742891	0		0
3/18/2008	78	15.6	6.973824911	6.973824911	0.36961272	0		0
3/19/2008	79	16.9	7.554976986	7.554976986	0.40041378	0		0
3/20/2008	80	20.5	9.164321196	9.164321196	0.485709023	0		0
3/21/2008	81	20.1	8.985505173	8.985505173	0.476231774	0		0
3/22/2008	82	15.3	6.839712893	6.839712893	0.362504783	0		0
3/23/2008	83	17.2	7.689089004	7.689089004	0.407521717	0		0
3/24/2008	84	20.6	9.209025202	9.209025202	0.488078336	0		0
3/25/2008	85	18.6	8.314945086	8.314945086	0.44069209	0		0
3/26/2008	86	23.9	10.68425739	10.68425739	0.566265642	0		0
3/27/2008	87	25.2	11.26540947	11.26540947	0.597066702	0		0
3/28/2008	88	19.2	8.583169121	8.583169121	0.454907963	0		0
3/29/2008	89	28.5	12.74064166	12.74064166	0.675254008	1.558424518		0
3/30/2008	90	38.1	17.03222622	17.03222622	0.90270799	11.70328058		0
3/31/2008	91	14.3	6.392672835	6.392672835	0.33881166	0		0
4/1/2008	92	18.9	8.449057103	8.449057103	0.447800026	0		0
4/2/2008	93	12.3	5.498592718	5.498592718	0.291425414	0		0
4/3/2008	94	16.5	7.376160963	7.376160963	0.390936531	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
4/4/2008	95	20.8	9.298433214	9.298433214	0.49281696	0		0
4/5/2008	96	17.9	8.002017045	8.002017045	0.424106903	0		0
4/6/2008	97	22.8	10.19251333	10.19251333	0.540203207	0		0
4/7/2008	98	20.8	9.298433214	9.298433214	0.49281696	0		0
4/8/2008	99	23.6	10.55014538	10.55014538	0.559157705	0		0
4/9/2008	100	19.1	8.538465115	8.538465115	0.452538651	0		0
4/10/2008	101	16.8	7.510272981	7.510272981	0.398044468	0		0
4/11/2008	102	18.1	8.091425056	8.091425056	0.428845528	0		0
4/12/2008	103	13.8	6.169152805	6.169152805	0.326965099	0		0
4/13/2008	104	17.2	7.689089004	7.689089004	0.407521717	0		0
4/14/2008	105	26.6	11.89126555	11.89126555	0.630237074	0.262005123		0.262005123
4/15/2008	106	25.9	11.57833751	11.57833751	0.613651888	0		0
4/16/2008	107	17.6	7.867905027	7.867905027	0.416998966	0		0
4/17/2008	108	15.3	6.839712893	6.839712893	0.362504783	0		0
4/18/2008	109	16	7.152640934	7.152640934	0.379089969	0		0
4/19/2008	110	31.2	13.94764982	13.94764982	0.739225441	3.805088941		0
4/20/2008	111	20.2	9.030209179	9.030209179	0.478601086	0		0
4/21/2008	112	22.6	10.10310532	10.10310532	0.535464582	0		0
4/22/2008	113	22	9.834881284	9.834881284	0.521248708	0		0
4/23/2008	114	20.8	9.298433214	9.298433214	0.49281696	0		0
4/24/2008	115	17.1	7.644384998	7.644384998	0.405152405	0		0
4/25/2008	116	18.9	8.449057103	8.449057103	0.447800026	0		0
4/26/2008	117	18.8	8.404353097	8.404353097	0.445430714	0		0
4/27/2008	118	21.2	9.477249237	9.477249237	0.50229421	0		0
4/28/2008	119	17.3	7.73379301	7.73379301	0.40989103	0		0
4/29/2008	120	72.2	32.27629221	32.27629221	1.710643487	96.25727374		96.25727374
4/30/2008	121	22.9	10.23721734	10.23721734	0.542572519	0		0
5/1/2008	122	18.4	8.225537074	8.225537074	0.435953465	0		0
5/2/2008	123	14.6	6.526784852	6.526784852	0.345919597	0		0
5/3/2008	124	19.2	8.583169121	8.583169121	0.454907963	0		0
5/4/2008	125	26.5	11.84656155	11.84656155	0.627867762	0.200284347		0
5/5/2008	126	16.3	7.286752951	7.286752951	0.386197906	0		0
5/6/2008	127	15.5	6.929120905	6.929120905	0.367243408	0		0
5/7/2008	128	26.8	11.98067356	11.98067356	0.634975699	0.387400223		0.387400223
5/8/2008	129	16.5	7.376160963	7.376160963	0.390936531	0		0
5/9/2008	130	15.8	7.063232922	7.063232922	0.374351345	0		0
5/10/2008	131	14.7	6.571488858	6.571488858	0.348288909	0		0
5/11/2008	132	20.3	9.074913185	9.074913185	0.480970399	0		0
5/12/2008	133	23.9	10.68425739	10.68425739	0.566265642	0		0
5/13/2008	134	20.4	9.119617191	9.119617191	0.483339711	0		0
5/14/2008	135	17.4	7.778497016	7.778497016	0.412260342	0		0
5/15/2008	136	17.8	7.957313039	7.957313039	0.421737591	0		0
5/16/2008	137	17.9	8.002017045	8.002017045	0.424106903	0		0
5/17/2008	138	15.2	6.795008887	6.795008887	0.360135471	0		0
5/18/2008	139	14.7	6.571488858	6.571488858	0.348288909	0		0
5/19/2008	140	14	6.258560817	6.258560817	0.331703723	0		0
5/20/2008	141	34.3	15.333474	15.333474	0.812674122	6.970005458		6.970005458
5/21/2008	142	26.9	12.02537757	12.02537757	0.637345011	0.451074546		0.451074546
5/22/2008	143	36	16.0934421	16.0934421	0.852952431	8.97128723		8.97128723
5/23/2008	144	30.1	13.45590576	13.45590576	0.713163005	2.832477168		2.832477168

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
5/24/2008	145	24.2	10.81836941	10.81836941	0.573373579	0		0
5/25/2008	146	27	12.07008158	12.07008158	0.639714324	0.515400052		0
5/26/2008	147	21.5	9.611361255	9.611361255	0.509402147	0		0
5/27/2008	148	27.1	12.11478558	12.11478558	0.642083636	0.58037674		0.58037674
5/28/2008	149	25.7	11.4889295	11.4889295	0.608913263	0		0
5/29/2008	150	28.9	12.91945769	12.91945769	0.684731257	1.861309305		1.861309305
5/30/2008	151	17.2	7.689089004	7.689089004	0.407521717	0		0
5/31/2008	152	17.6	7.867905027	7.867905027	0.416998966	0		0
6/1/2008	153	24.7	11.04188944	11.04188944	0.58522014	0		0
6/2/2008	154	17.6	7.867905027	7.867905027	0.416998966	0		0
6/3/2008	155	23.2	10.37132935	10.37132935	0.549680456	0		0
6/4/2008	156	26.1	11.66774552	11.66774552	0.618390513	0		0
6/5/2008	157	21.4	9.566657249	9.566657249	0.507032834	0		0
6/6/2008	158	22.6	10.10310532	10.10310532	0.535464582	0		0
6/7/2008	159	18.6	8.314945086	8.314945086	0.44069209	0		0
6/8/2008	160	19.1	8.538465115	8.538465115	0.452538651	0		0
6/9/2008	161	17.6	7.867905027	7.867905027	0.416998966	0		0
6/10/2008	162	22.6	10.10310532	10.10310532	0.535464582	0		0
6/11/2008	163	21.7	9.700769267	9.700769267	0.514140771	0		0
6/12/2008	164	19.9	8.896097161	8.896097161	0.47149315	0		0
6/13/2008	165	14.6	6.526784852	6.526784852	0.345919597	0		0
6/14/2008	166	13.9	6.213856811	6.213856811	0.329334411	0		0
6/15/2008	167	14.9	6.66089687	6.66089687	0.353027534	0		0
6/16/2008	168	12.9	5.766816753	5.766816753	0.305641288	0		0
6/17/2008	169	22.5	10.05840131	10.05840131	0.53309527	0		0
6/18/2008	170	16.6	7.420864969	7.420864969	0.393305843	0		0
6/19/2008	171	20.2	9.030209179	9.030209179	0.478601086	0		0
6/20/2008	172	17.4	7.778497016	7.778497016	0.412260342	0		0
6/21/2008	173	23.9	10.68425739	10.68425739	0.566265642	0		0
6/22/2008	174	15.6	6.973824911	6.973824911	0.36961272	0		0
6/23/2008	175	15.2	6.795008887	6.795008887	0.360135471	0		0
6/24/2008	176	15.5	6.929120905	6.929120905	0.367243408	0		0
6/25/2008	177	14.7	6.571488858	6.571488858	0.348288909	0		0
6/26/2008	178	12.6	5.632704735	5.632704735	0.298533351	0		0
6/27/2008	179	16.2	7.242048946	7.242048946	0.383828594	0		0
6/28/2008	180	15.4	6.884416899	6.884416899	0.364874096	0		0
6/29/2008	181	16.8	7.510272981	7.510272981	0.398044468	0		0
6/30/2008	182	15.1	6.750304881	6.750304881	0.357766159	0		0
7/1/2008	183	13.7	6.1244488	6.1244488	0.324595786	0		0
7/2/2008	184	14.9	6.66089687	6.66089687	0.353027534	0		0
7/3/2008	185	20.4	9.119617191	9.119617191	0.483339711	0		0
7/4/2008	186	17.7	7.912609033	7.912609033	0.419368279	0		0
7/5/2008	187	19.9	8.896097161	8.896097161	0.47149315	0		0
7/6/2008	188	13.7	6.1244488	6.1244488	0.324595786	0		0
7/7/2008	189	16.3	7.286752951	7.286752951	0.386197906	0		0
7/8/2008	190	15.4	6.884416899	6.884416899	0.364874096	0		0
7/9/2008	191	13.5	6.035040788	6.035040788	0.319857162	0		0
7/10/2008	192	13.9	6.213856811	6.213856811	0.329334411	0		0
7/11/2008	193	15.2	6.795008887	6.795008887	0.360135471	0		0
7/12/2008	194	16.3	7.286752951	7.286752951	0.386197906	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
7/13/2008	195	16.7	7.465568975	7.465568975	0.395675156	0		0
7/14/2008	196	16.2	7.242048946	7.242048946	0.383828594	0		0
7/15/2008	197	16.6	7.420864969	7.420864969	0.393305843	0		0
7/16/2008	198	13.8	6.169152805	6.169152805	0.326965099	0		0
7/17/2008	199	16.4	7.331456957	7.331456957	0.388567219	0		0
7/18/2008	200	12.7	5.677408741	5.677408741	0.300902663	0		0
7/19/2008	201	14	6.258560817	6.258560817	0.331703723	0		0
7/20/2008	202	16.4	7.331456957	7.331456957	0.388567219	0		0
7/21/2008	203	15.3	6.839712893	6.839712893	0.362504783	0		0
7/22/2008	204	14.9	6.66089687	6.66089687	0.353027534	0		0
7/23/2008	205	14.3	6.392672835	6.392672835	0.33881166	0		0
7/24/2008	206	15.3	6.839712893	6.839712893	0.362504783	0		0
7/25/2008	207	16.6	7.420864969	7.420864969	0.393305843	0		0
7/26/2008	208	19.6	8.761985144	8.761985144	0.464385213	0		0
7/27/2008	209	17.1	7.644384998	7.644384998	0.405152405	0		0
7/28/2008	210	15.9	7.107936928	7.107936928	0.376720657	0		0
7/29/2008	211	18	8.046721051	8.046721051	0.426476216	0		0
7/30/2008	212	15.7	7.018528916	7.018528916	0.371982033	0		0
7/31/2008	213	15.3	6.839712893	6.839712893	0.362504783	0		0
8/1/2008	214	15.1	6.750304881	6.750304881	0.357766159	0		0
8/2/2008	215	21.3	9.521953243	9.521953243	0.504663522	0		0
8/3/2008	216	14.8	6.616192864	6.616192864	0.350658222	0		0
8/4/2008	217	13.8	6.169152805	6.169152805	0.326965099	0		0
8/5/2008	218	12.4	5.543296724	5.543296724	0.293794726	0		0
8/6/2008	219	14.4	6.43737684	6.43737684	0.341180973	0		0
8/7/2008	220	15.1	6.750304881	6.750304881	0.357766159	0		0
8/8/2008	221	18.3	8.180833068	8.180833068	0.433584153	0		0
8/9/2008	222	16.6	7.420864969	7.420864969	0.393305843	0		0
8/10/2008	223	17.8	7.957313039	7.957313039	0.421737591	0		0
8/11/2008	224	15.3	6.839712893	6.839712893	0.362504783	0		0
8/12/2008	225	12.8	5.722112747	5.722112747	0.303271976	0		0
8/13/2008	226	13.5	6.035040788	6.035040788	0.319857162	0		0
8/14/2008	227	12.3	5.498592718	5.498592718	0.291425414	0		0
8/15/2008	228	12.7	5.677408741	5.677408741	0.300902663	0		0
8/16/2008	229	14.8	6.616192864	6.616192864	0.350658222	0		0
8/17/2008	230	15.2	6.795008887	6.795008887	0.360135471	0		0
8/18/2008	231	17.3	7.73379301	7.73379301	0.40989103	0		0
8/19/2008	232	20.6	9.209025202	9.209025202	0.488078336	0		0
8/20/2008	233	17.7	7.912609033	7.912609033	0.419368279	0		0
8/21/2008	234	17	7.599680992	7.599680992	0.402783093	0		0
8/22/2008	235	15.5	6.929120905	6.929120905	0.367243408	0		0
8/23/2008	236	15.2	6.795008887	6.795008887	0.360135471	0		0
8/24/2008	237	14	6.258560817	6.258560817	0.331703723	0		0
8/25/2008	238	17	7.599680992	7.599680992	0.402783093	0		0
8/26/2008	239	17	7.599680992	7.599680992	0.402783093	0		0
8/27/2008	240	18.6	8.314945086	8.314945086	0.44069209	0		0
8/28/2008	241	16.6	7.420864969	7.420864969	0.393305843	0		0
8/29/2008	242	13.8	6.169152805	6.169152805	0.326965099	0		0
8/30/2008	243	13.5	6.035040788	6.035040788	0.319857162	0		0
8/31/2008	244	15.7	7.018528916	7.018528916	0.371982033	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
9/1/2008	245	20.8	9.298433214	9.298433214	0.49281696	0		0
9/2/2008	246	17.9	8.002017045	8.002017045	0.424106903	0		0
9/3/2008	247	17.8	7.957313039	7.957313039	0.421737591	0		0
9/4/2008	248	16.1	7.19734494	7.19734494	0.381459282	0		0
9/5/2008	249	16.6	7.420864969	7.420864969	0.393305843	0		0
9/6/2008	250	15.9	7.107936928	7.107936928	0.376720657	0		0
9/7/2008	251	13.9	6.213856811	6.213856811	0.329334411	0		0
9/8/2008	252	15	6.705600875	6.705600875	0.355396846	0		0
9/9/2008	253	15.5	6.929120905	6.929120905	0.367243408	0		0
9/10/2008	254	16.4	7.331456957	7.331456957	0.388567219	0		0
9/11/2008	255	13.3	5.945632776	5.945632776	0.315118537	0		0
9/12/2008	256	13.1	5.856224765	5.856224765	0.310379913	0		0
9/13/2008	257	13	5.811520759	5.811520759	0.3080106	0		0
9/14/2008	258	12.6	5.632704735	5.632704735	0.298533351	0		0
9/15/2008	259	11.8	5.275072689	5.275072689	0.279578853	0		0
9/16/2008	260	14.8	6.616192864	6.616192864	0.350658222	0		0
9/17/2008	261	17.4	7.778497016	7.778497016	0.412260342	0		0
9/18/2008	262	18.9	8.449057103	8.449057103	0.447800026	0		0
9/19/2008	263	24.6	10.99718544	10.99718544	0.582850828	0		0
9/20/2008	264	19.3	8.627873126	8.627873126	0.457277276	0		0
9/21/2008	265	15.4	6.884416899	6.884416899	0.364874096	0		0
9/22/2008	266	19.8	8.851393156	8.851393156	0.469123837	0		0
9/23/2008	267	15.8	7.063232922	7.063232922	0.374351345	0		0
9/24/2008	268	15.9	7.107936928	7.107936928	0.376720657	0		0
9/25/2008	269	16.9	7.554976986	7.554976986	0.40041378	0		0
9/26/2008	270	16.6	7.420864969	7.420864969	0.393305843	0		0
9/27/2008	271	14.8	6.616192864	6.616192864	0.350658222	0		0
9/28/2008	272	12.6	5.632704735	5.632704735	0.298533351	0		0
9/29/2008	273	13.4	5.990336782	5.990336782	0.317487849	0		0
9/30/2008	274	12.3	5.498592718	5.498592718	0.291425414	0		0
10/1/2008	275	16.9	7.554976986	7.554976986	0.40041378	0		0
10/2/2008	276	19.4	8.672577132	8.672577132	0.459646588	0		0
10/3/2008	277	24.6	10.99718544	10.99718544	0.582850828	0		0
10/4/2008	278	20.9	9.34313722	9.34313722	0.495186273	0		0
10/5/2008	279	16.9	7.554976986	7.554976986	0.40041378	0		0
10/6/2008	280	14.4	6.43737684	6.43737684	0.341180973	0		0
10/7/2008	281	15.5	6.929120905	6.929120905	0.367243408	0		0
10/8/2008	282	16.7	7.465568975	7.465568975	0.395675156	0		0
10/9/2008	283	21.4	9.566657249	9.566657249	0.507032834	0		0
10/10/2008	284	32.9	14.70761792	14.70761792	0.77950375	5.463197623		5.463197623
10/11/2008	285	32.8	14.66291391	14.66291391	0.777134437	5.36045236		0
10/12/2008	286	22.9	10.23721734	10.23721734	0.542572519	0		0
10/13/2008	287	20.1	8.985505173	8.985505173	0.476231774	0		0
10/14/2008	288	17.1	7.644384998	7.644384998	0.405152405	0		0
10/15/2008	289	14.4	6.43737684	6.43737684	0.341180973	0		0
10/16/2008	290	18.5	8.27024108	8.27024108	0.438322777	0		0
10/17/2008	291	14.4	6.43737684	6.43737684	0.341180973	0		0
10/18/2008	292	14.8	6.616192864	6.616192864	0.350658222	0		0
10/19/2008	293	12.7	5.677408741	5.677408741	0.300902663	0		0
10/20/2008	294	14.7	6.571488858	6.571488858	0.348288909	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
10/21/2008	295	16.6	7.420864969	7.420864969	0.393305843	0		0
10/22/2008	296	23.7	10.59484938	10.59484938	0.561527017	0		0
10/23/2008	297	11.6	5.185664677	5.185664677	0.274840228	0		0
10/24/2008	298	14.2	6.347968829	6.347968829	0.336442348	0		0
10/25/2008	299	12.8	5.722112747	5.722112747	0.303271976	0		0
10/26/2008	300	10.8	4.82803263	4.82803263	0.255885729	0		0
10/27/2008	301	11.2	5.006848654	5.006848654	0.265362979	0		0
10/28/2008	302	9.9	4.425696578	4.425696578	0.234561919	0		0
10/29/2008	303	11.8	5.275072689	5.275072689	0.279578853	0		0
10/30/2008	304	73.1	32.67862827	32.67862827	1.731967298	99.51451623		99.51451623
10/31/2008	305	36.5	16.31696213	16.31696213	0.864798993	9.595714545		9.595714545
11/1/2008	306	39.5	17.65808231	17.65808231	0.935878362	13.68414916		0
11/2/2008	307	24.5	10.95248143	10.95248143	0.580481516	0		0
11/3/2008	308	34.9	15.60169804	15.60169804	0.826889996	7.654851184		7.654851184
11/4/2008	309	22.8	10.19251333	10.19251333	0.540203207	0		0
11/5/2008	310	16.4	7.331456957	7.331456957	0.388567219	0		0
11/6/2008	311	15.3	6.839712893	6.839712893	0.362504783	0		0
11/7/2008	312	16.4	7.331456957	7.331456957	0.388567219	0		0
11/8/2008	313	38	16.98752222	16.98752222	0.900338678	11.56667384		0
11/9/2008	314	32.6	14.5735059	14.5735059	0.772395813	5.15691538		0
11/10/2008	315	15.9	7.107936928	7.107936928	0.376720657	0		0
11/11/2008	316	11.6	5.185664677	5.185664677	0.274840228	0		0
11/12/2008	317	15.2	6.795008887	6.795008887	0.360135471	0		0
11/13/2008	318	21.2	9.477249237	9.477249237	0.50229421	0		0
11/14/2008	319	21.8	9.745473272	9.745473272	0.516510083	0		0
11/15/2008	320	15.7	7.018528916	7.018528916	0.371982033	0		0
11/16/2008	321	9.6	4.29158456	4.29158456	0.227453982	0		0
11/17/2008	322	11.1	4.962144648	4.962144648	0.262993666	0		0
11/18/2008	323	9.5	4.246880554	4.246880554	0.225084669	0		0
11/19/2008	324	13.4	5.990336782	5.990336782	0.317487849	0		0
11/20/2008	325	16.6	7.420864969	7.420864969	0.393305843	0		0
11/21/2008	326	22.5	10.05840131	10.05840131	0.53309527	0		0
11/22/2008	327	13.6	6.079744794	6.079744794	0.322226474	0		0
11/23/2008	328	11.8	5.275072689	5.275072689	0.279578853	0		0
11/24/2008	329	11.7	5.230368683	5.230368683	0.27720954	0		0
11/25/2008	330	13.4	5.990336782	5.990336782	0.317487849	0		0
11/26/2008	331	12.9	5.766816753	5.766816753	0.305641288	0		0
11/27/2008	332	13.5	6.035040788	6.035040788	0.319857162	0		0
11/28/2008	333	9.3	4.157472543	4.157472543	0.220346045	0		0
11/29/2008	334	23.4	10.46073737	10.46073737	0.55441908	0		0
11/30/2008	335	12.2	5.453888712	5.453888712	0.289056102	0		0
12/1/2008	336	10.5	4.693920613	4.693920613	0.248777792	0		0
12/2/2008	337	14.5	6.482080846	6.482080846	0.343550285	0		0
12/3/2008	338	15.2	6.795008887	6.795008887	0.360135471	0		0
12/4/2008	339	16.5	7.376160963	7.376160963	0.390936531	0		0
12/5/2008	340	12.3	5.498592718	5.498592718	0.291425414	0		0
12/6/2008	341	14.7	6.571488858	6.571488858	0.348288909	0		0
12/7/2008	342	12.2	5.453888712	5.453888712	0.289056102	0		0
12/8/2008	343	18.9	8.449057103	8.449057103	0.447800026	0		0
12/9/2008	344	17.3	7.73379301	7.73379301	0.40989103	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
12/10/2008	345	12.1	5.409184706	5.409184706	0.286686789	0		0
12/11/2008	346	16.1	7.19734494	7.19734494	0.381459282	0		0
12/12/2008	347	13.2	5.90092877	5.90092877	0.312749225	0		0
12/13/2008	348	30.5	13.63472178	13.63472178	0.722640254	3.177037624		0
12/14/2008	349	22.1	9.87958529	9.87958529	0.52361802	0		0
12/15/2008	350	26.8	11.98067356	11.98067356	0.634975699	0.387400223		0.387400223
12/16/2008	351	22	9.834881284	9.834881284	0.521248708	0		0
12/17/2008	352	23.5	10.50544137	10.50544137	0.556788393	0		0
12/18/2008	353	22	9.834881284	9.834881284	0.521248708	0		0
12/19/2008	354	21.9	9.790177278	9.790177278	0.518879396	0		0
12/20/2008	355	13.5	6.035040788	6.035040788	0.319857162	0		0
12/21/2008	356	23.5	10.50544137	10.50544137	0.556788393	0		0
12/22/2008	357	25.6	11.44422549	11.44422549	0.606543951	0		0
12/23/2008	358	16.5	7.376160963	7.376160963	0.390936531	0		0
12/24/2008	359	38.9	17.38985827	17.38985827	0.921662488	12.81957711		12.81957711
12/25/2008	360	40.8	18.23923438	18.23923438	0.966679422	15.63780962		15.63780962
12/26/2008	361	26.8	11.98067356	11.98067356	0.634975699	0.387400223		0.387400223
12/27/2008	362	12.2	5.453888712	5.453888712	0.289056102	0		0
12/28/2008	363	12.9	5.766816753	5.766816753	0.305641288	0		0
12/29/2008	364	18.4	8.225537074	8.225537074	0.435953465	0		0
12/30/2008	365	16.4	7.331456957	7.331456957	0.388567219	0		0
12/31/2008	366	10.6	4.738624619	4.738624619	0.251147105	0		0
		Max u^+ (m/s):	43.89933373		Sum:	802.2133353	g/m2*yr	629.4721489
		Conversion Factors:	907,185	grams/ton	Ef (TSP) =	3.58	ton/acre*yr	2.81
			4,047	m^2/acre	Ef (PM_{10}) =	1.79	ton/acre*yr	1.40
					EF ($PM_{2.5}$) =	0.27	ton/acre*yr	0.21
						(Every Day)		(Week Days)

Notes:

1. For u+ used max daily gust speed from met data set for 2008. Anemometer height is at 10m; no height correction to 10m is required.
2. u^*_t obtained from Table 13.2.5-2 AP-42
3. The higest recorded wind gust from the Hanson meteorological station on 7/15/2008 is 98.2mph at hour 9:00. This value appears inconsistent with the daily wind gust trends on that day (< 20 mph for all other hours). In addition, there are a number of invalid parameters (e.g. temperature, RH) recorded for hours 9:00 and 10:00 that imply the tower could have been serviced or repaired during that period. Also, evaluation of wind data from other nearby meteorological stations on the same day reveal gusts of the same magnitude for that day. Therefore, for the purposes of this analysis, the max wind gust for 7/15/2008 is 16.6 mph at hour 14:00.

Wind Erosion PM Emission Factor - Topsoil Removal/Storage and Reclamation

threshold friction velocity (u^*_t) = 1.02 m/s (AP-42 Table Table 13.2.5-2 - Overburden)

$k(PM_{2.5})$ = 0.075

$k(PM_{10})$ = 0.5

Weekday Efs: PM_{10} = 0.58 ton/acre*yr

$PM_{2.5}$ = 0.09 ton/acre*yr

366 Day/Year Efs: PM_{10} = 0.61 ton/acre*yr

$PM_{2.5}$ = 0.09 ton/acre*yr

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
1/1/2008	1	12.5	5.58800073	5.58800073	0.296164039	0		0
1/2/2008	2	19.5	8.717281138	8.717281138	0.4620159	0		0
1/3/2008	3	45.5	20.34032266	20.34032266	1.078037101	1.646289212		1.646289212
1/4/2008	4	67.6	30.21990795	30.21990795	1.601655121	34.16409346		34.16409346
1/5/2008	5	33.9	15.15465798	15.15465798	0.803196873	0		0
1/6/2008	6	17.8	7.957313039	7.957313039	0.421737591	0		0
1/7/2008	7	13	5.811520759	5.811520759	0.3080106	0		0
1/8/2008	8	43.1	19.26742652	19.26742652	1.021173605	0.029420019		0.029420019
1/9/2008	9	10.4	4.649216607	4.649216607	0.24640848	0		0
1/10/2008	10	12.7	5.677408741	5.677408741	0.300902663	0		0
1/11/2008	11	12.3	5.498592718	5.498592718	0.291425414	0		0
1/12/2008	12	14	6.258560817	6.258560817	0.331703723	0		0
1/13/2008	13	18.5	8.27024108	8.27024108	0.438322777	0		0
1/14/2008	14	10.8	4.82803263	4.82803263	0.255885729	0		0
1/15/2008	15	14	6.258560817	6.258560817	0.331703723	0		0
1/16/2008	16	28.6	12.78534567	12.78534567	0.67762332	0		0
1/17/2008	17	25.8	11.53363351	11.53363351	0.611282576	0		0
1/18/2008	18	16.5	7.376160963	7.376160963	0.390936531	0		0
1/19/2008	19	11.5	5.140960671	5.140960671	0.272470916	0		0
1/20/2008	20	24	10.7289614	10.7289614	0.568634954	0		0
1/21/2008	21	16.3	7.286752951	7.286752951	0.386197906	0		0
1/22/2008	22	14.2	6.347968829	6.347968829	0.336442348	0		0
1/23/2008	23	11.4	5.096256665	5.096256665	0.270101603	0		0
1/24/2008	24	25.2	11.26540947	11.26540947	0.597066702	0		0
1/25/2008	25	31.1	13.90294582	13.90294582	0.736856128	0		0
1/26/2008	26	27.1	12.11478558	12.11478558	0.642083636	0		0
1/27/2008	27	55	24.58720321	24.58720321	1.30312177	11.72720458		0
1/28/2008	28	22.5	10.05840131	10.05840131	0.53309527	0		0
1/29/2008	29	25.6	11.44422549	11.44422549	0.606543951	0		0
1/30/2008	30	19.4	8.672577132	8.672577132	0.459646588	0		0
1/31/2008	31	30	13.41120175	13.41120175	0.710793693	0		0
2/1/2008	32	15.8	7.063232922	7.063232922	0.374351345	0		0
2/2/2008	33	36.7	16.40637014	16.40637014	0.869537618	0		0
2/3/2008	34	32.8	14.66291391	14.66291391	0.777134437	0		0
2/4/2008	35	27.6	12.33830561	12.33830561	0.653930197	0		0
2/5/2008	36	19.4	8.672577132	8.672577132	0.459646588	0		0
2/6/2008	37	15	6.705600875	6.705600875	0.355396846	0		0
2/7/2008	38	15.4	6.884416899	6.884416899	0.364874096	0		0
2/8/2008	39	15.1	6.750304881	6.750304881	0.357766159	0		0
2/9/2008	40	15.9	7.107936928	7.107936928	0.376720657	0		0
2/10/2008	41	14.2	6.347968829	6.347968829	0.336442348	0		0
2/11/2008	42	15.4	6.884416899	6.884416899	0.364874096	0		0
2/12/2008	43	13.3	5.945632776	5.945632776	0.315118537	0		0
2/13/2008	44	34.3	15.333474	15.333474	0.812674122	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
2/14/2008	45	29.9	13.36649775	13.36649775	0.70842438	0		0
2/15/2008	46	15.2	6.795008887	6.795008887	0.360135471	0		0
2/16/2008	47	12.2	5.453888712	5.453888712	0.289056102	0		0
2/17/2008	48	11.4	5.096256665	5.096256665	0.270101603	0		0
2/18/2008	49	11.2	5.006848654	5.006848654	0.265362979	0		0
2/19/2008	50	13.9	6.213856811	6.213856811	0.329334411	0		0
2/20/2008	51	17.2	7.689089004	7.689089004	0.407521717	0		0
2/21/2008	52	33.2	14.84172994	14.84172994	0.786611687	0		0
2/22/2008	53	16.1	7.19734494	7.19734494	0.381459282	0		0
2/23/2008	54	37.9	16.94281821	16.94281821	0.897969365	0		0
2/24/2008	55	47.1	21.05558675	21.05558675	1.115946098	2.932580355		0
2/25/2008	56	13	5.811520759	5.811520759	0.3080106	0		0
2/26/2008	57	12.7	5.677408741	5.677408741	0.300902663	0		0
2/27/2008	58	14	6.258560817	6.258560817	0.331703723	0		0
2/28/2008	59	14.2	6.347968829	6.347968829	0.336442348	0		0
2/29/2008	60	19.1	8.538465115	8.538465115	0.452538651	0		0
3/1/2008	61	29	12.96416169	12.96416169	0.68710057	0		0
3/2/2008	62	30.7	13.72412979	13.72412979	0.727378879	0		0
3/3/2008	63	14.6	6.526784852	6.526784852	0.345919597	0		0
3/4/2008	64	17.4	7.778497016	7.778497016	0.412260342	0		0
3/5/2008	65	13	5.811520759	5.811520759	0.3080106	0		0
3/6/2008	66	15.4	6.884416899	6.884416899	0.364874096	0		0
3/7/2008	67	17.6	7.867905027	7.867905027	0.416998966	0		0
3/8/2008	68	20.1	8.985505173	8.985505173	0.476231774	0		0
3/9/2008	69	13	5.811520759	5.811520759	0.3080106	0		0
3/10/2008	70	17.5	7.823201021	7.823201021	0.414629654	0		0
3/11/2008	71	98.2	43.89933373	43.89933373	2.326664688	131.6942284		131.6942284
3/12/2008	72	15.8	7.063232922	7.063232922	0.374351345	0		0
3/13/2008	73	25.9	11.57833751	11.57833751	0.613651888	0		0
3/14/2008	74	20.7	9.253729208	9.253729208	0.490447648	0		0
3/15/2008	75	29.3	13.09827371	13.09827371	0.694208507	0		0
3/16/2008	76	31.4	14.03705783	14.03705783	0.743964065	0		0
3/17/2008	77	24.3	10.86307342	10.86307342	0.575742891	0		0
3/18/2008	78	15.6	6.973824911	6.973824911	0.36961272	0		0
3/19/2008	79	16.9	7.554976986	7.554976986	0.40041378	0		0
3/20/2008	80	20.5	9.164321196	9.164321196	0.485709023	0		0
3/21/2008	81	20.1	8.985505173	8.985505173	0.476231774	0		0
3/22/2008	82	15.3	6.839712893	6.839712893	0.362504783	0		0
3/23/2008	83	17.2	7.689089004	7.689089004	0.407521717	0		0
3/24/2008	84	20.6	9.209025202	9.209025202	0.488078336	0		0
3/25/2008	85	18.6	8.314945086	8.314945086	0.44069209	0		0
3/26/2008	86	23.9	10.68425739	10.68425739	0.566265642	0		0
3/27/2008	87	25.2	11.26540947	11.26540947	0.597066702	0		0
3/28/2008	88	19.2	8.583169121	8.583169121	0.454907963	0		0
3/29/2008	89	28.5	12.74064166	12.74064166	0.675254008	0		0
3/30/2008	90	38.1	17.03222622	17.03222622	0.90270799	0		0
3/31/2008	91	14.3	6.392672835	6.392672835	0.33881166	0		0
4/1/2008	92	18.9	8.449057103	8.449057103	0.447800026	0		0
4/2/2008	93	12.3	5.498592718	5.498592718	0.291425414	0		0
4/3/2008	94	16.5	7.376160963	7.376160963	0.390936531	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
4/4/2008	95	20.8	9.298433214	9.298433214	0.49281696	0		0
4/5/2008	96	17.9	8.002017045	8.002017045	0.424106903	0		0
4/6/2008	97	22.8	10.19251333	10.19251333	0.540203207	0		0
4/7/2008	98	20.8	9.298433214	9.298433214	0.49281696	0		0
4/8/2008	99	23.6	10.55014538	10.55014538	0.559157705	0		0
4/9/2008	100	19.1	8.538465115	8.538465115	0.452538651	0		0
4/10/2008	101	16.8	7.510272981	7.510272981	0.398044468	0		0
4/11/2008	102	18.1	8.091425056	8.091425056	0.428845528	0		0
4/12/2008	103	13.8	6.169152805	6.169152805	0.326965099	0		0
4/13/2008	104	17.2	7.689089004	7.689089004	0.407521717	0		0
4/14/2008	105	26.6	11.89126555	11.89126555	0.630237074	0		0
4/15/2008	106	25.9	11.57833751	11.57833751	0.613651888	0		0
4/16/2008	107	17.6	7.867905027	7.867905027	0.416998966	0		0
4/17/2008	108	15.3	6.839712893	6.839712893	0.362504783	0		0
4/18/2008	109	16	7.152640934	7.152640934	0.379089969	0		0
4/19/2008	110	31.2	13.94764982	13.94764982	0.739225441	0		0
4/20/2008	111	20.2	9.030209179	9.030209179	0.478601086	0		0
4/21/2008	112	22.6	10.10310532	10.10310532	0.535464582	0		0
4/22/2008	113	22	9.834881284	9.834881284	0.521248708	0		0
4/23/2008	114	20.8	9.298433214	9.298433214	0.49281696	0		0
4/24/2008	115	17.1	7.644384998	7.644384998	0.405152405	0		0
4/25/2008	116	18.9	8.449057103	8.449057103	0.447800026	0		0
4/26/2008	117	18.8	8.404353097	8.404353097	0.445430714	0		0
4/27/2008	118	21.2	9.477249237	9.477249237	0.50229421	0		0
4/28/2008	119	17.3	7.73379301	7.73379301	0.40989103	0		0
4/29/2008	120	72.2	32.27629221	32.27629221	1.710643487	44.93141593		44.93141593
4/30/2008	121	22.9	10.23721734	10.23721734	0.542572519	0		0
5/1/2008	122	18.4	8.225537074	8.225537074	0.435953465	0		0
5/2/2008	123	14.6	6.526784852	6.526784852	0.345919597	0		0
5/3/2008	124	19.2	8.583169121	8.583169121	0.454907963	0		0
5/4/2008	125	26.5	11.84656155	11.84656155	0.627867762	0		0
5/5/2008	126	16.3	7.286752951	7.286752951	0.386197906	0		0
5/6/2008	127	15.5	6.929120905	6.929120905	0.367243408	0		0
5/7/2008	128	26.8	11.98067356	11.98067356	0.634975699	0		0
5/8/2008	129	16.5	7.376160963	7.376160963	0.390936531	0		0
5/9/2008	130	15.8	7.063232922	7.063232922	0.374351345	0		0
5/10/2008	131	14.7	6.571488858	6.571488858	0.348288909	0		0
5/11/2008	132	20.3	9.074913185	9.074913185	0.480970399	0		0
5/12/2008	133	23.9	10.68425739	10.68425739	0.566265642	0		0
5/13/2008	134	20.4	9.119617191	9.119617191	0.483339711	0		0
5/14/2008	135	17.4	7.778497016	7.778497016	0.412260342	0		0
5/15/2008	136	17.8	7.957313039	7.957313039	0.421737591	0		0
5/16/2008	137	17.9	8.002017045	8.002017045	0.424106903	0		0
5/17/2008	138	15.2	6.795008887	6.795008887	0.360135471	0		0
5/18/2008	139	14.7	6.571488858	6.571488858	0.348288909	0		0
5/19/2008	140	14	6.258560817	6.258560817	0.331703723	0		0
5/20/2008	141	34.3	15.333474	15.333474	0.812674122	0		0
5/21/2008	142	26.9	12.02537757	12.02537757	0.637345011	0		0
5/22/2008	143	36	16.0934421	16.0934421	0.852952431	0		0
5/23/2008	144	30.1	13.45590576	13.45590576	0.713163005	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
5/24/2008	145	24.2	10.81836941	10.81836941	0.573373579	0		0
5/25/2008	146	27	12.07008158	12.07008158	0.639714324	0		0
5/26/2008	147	21.5	9.611361255	9.611361255	0.509402147	0		0
5/27/2008	148	27.1	12.11478558	12.11478558	0.642083636	0		0
5/28/2008	149	25.7	11.4889295	11.4889295	0.608913263	0		0
5/29/2008	150	28.9	12.91945769	12.91945769	0.684731257	0		0
5/30/2008	151	17.2	7.689089004	7.689089004	0.407521717	0		0
5/31/2008	152	17.6	7.867905027	7.867905027	0.416998966	0		0
6/1/2008	153	24.7	11.04188944	11.04188944	0.58522014	0		0
6/2/2008	154	17.6	7.867905027	7.867905027	0.416998966	0		0
6/3/2008	155	23.2	10.37132935	10.37132935	0.549680456	0		0
6/4/2008	156	26.1	11.66774552	11.66774552	0.618390513	0		0
6/5/2008	157	21.4	9.566657249	9.566657249	0.507032834	0		0
6/6/2008	158	22.6	10.10310532	10.10310532	0.535464582	0		0
6/7/2008	159	18.6	8.314945086	8.314945086	0.44069209	0		0
6/8/2008	160	19.1	8.538465115	8.538465115	0.452538651	0		0
6/9/2008	161	17.6	7.867905027	7.867905027	0.416998966	0		0
6/10/2008	162	22.6	10.10310532	10.10310532	0.535464582	0		0
6/11/2008	163	21.7	9.700769267	9.700769267	0.514140771	0		0
6/12/2008	164	19.9	8.896097161	8.896097161	0.47149315	0		0
6/13/2008	165	14.6	6.526784852	6.526784852	0.345919597	0		0
6/14/2008	166	13.9	6.213856811	6.213856811	0.329334411	0		0
6/15/2008	167	14.9	6.66089687	6.66089687	0.353027534	0		0
6/16/2008	168	12.9	5.766816753	5.766816753	0.305641288	0		0
6/17/2008	169	22.5	10.05840131	10.05840131	0.53309527	0		0
6/18/2008	170	16.6	7.420864969	7.420864969	0.393305843	0		0
6/19/2008	171	20.2	9.030209179	9.030209179	0.478601086	0		0
6/20/2008	172	17.4	7.778497016	7.778497016	0.412260342	0		0
6/21/2008	173	23.9	10.68425739	10.68425739	0.566265642	0		0
6/22/2008	174	15.6	6.973824911	6.973824911	0.36961272	0		0
6/23/2008	175	15.2	6.795008887	6.795008887	0.360135471	0		0
6/24/2008	176	15.5	6.929120905	6.929120905	0.367243408	0		0
6/25/2008	177	14.7	6.571488858	6.571488858	0.348288909	0		0
6/26/2008	178	12.6	5.632704735	5.632704735	0.298533351	0		0
6/27/2008	179	16.2	7.242048946	7.242048946	0.383828594	0		0
6/28/2008	180	15.4	6.884416899	6.884416899	0.364874096	0		0
6/29/2008	181	16.8	7.510272981	7.510272981	0.398044468	0		0
6/30/2008	182	15.1	6.750304881	6.750304881	0.357766159	0		0
7/1/2008	183	13.7	6.1244488	6.1244488	0.324595786	0		0
7/2/2008	184	14.9	6.66089687	6.66089687	0.353027534	0		0
7/3/2008	185	20.4	9.119617191	9.119617191	0.483339711	0		0
7/4/2008	186	17.7	7.912609033	7.912609033	0.419368279	0		0
7/5/2008	187	19.9	8.896097161	8.896097161	0.47149315	0		0
7/6/2008	188	13.7	6.1244488	6.1244488	0.324595786	0		0
7/7/2008	189	16.3	7.286752951	7.286752951	0.386197906	0		0
7/8/2008	190	15.4	6.884416899	6.884416899	0.364874096	0		0
7/9/2008	191	13.5	6.035040788	6.035040788	0.319857162	0		0
7/10/2008	192	13.9	6.213856811	6.213856811	0.329334411	0		0
7/11/2008	193	15.2	6.795008887	6.795008887	0.360135471	0		0
7/12/2008	194	16.3	7.286752951	7.286752951	0.386197906	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
7/13/2008	195	16.7	7.465568975	7.465568975	0.395675156	0		0
7/14/2008	196	16.2	7.242048946	7.242048946	0.383828594	0		0
7/15/2008	197	16.6	7.420864969	7.420864969	0.393305843	0		0
7/16/2008	198	13.8	6.169152805	6.169152805	0.326965099	0		0
7/17/2008	199	16.4	7.331456957	7.331456957	0.388567219	0		0
7/18/2008	200	12.7	5.677408741	5.677408741	0.300902663	0		0
7/19/2008	201	14	6.258560817	6.258560817	0.331703723	0		0
7/20/2008	202	16.4	7.331456957	7.331456957	0.388567219	0		0
7/21/2008	203	15.3	6.839712893	6.839712893	0.362504783	0		0
7/22/2008	204	14.9	6.66089687	6.66089687	0.353027534	0		0
7/23/2008	205	14.3	6.392672835	6.392672835	0.33881166	0		0
7/24/2008	206	15.3	6.839712893	6.839712893	0.362504783	0		0
7/25/2008	207	16.6	7.420864969	7.420864969	0.393305843	0		0
7/26/2008	208	19.6	8.761985144	8.761985144	0.464385213	0		0
7/27/2008	209	17.1	7.644384998	7.644384998	0.405152405	0		0
7/28/2008	210	15.9	7.107936928	7.107936928	0.376720657	0		0
7/29/2008	211	18	8.046721051	8.046721051	0.426476216	0		0
7/30/2008	212	15.7	7.018528916	7.018528916	0.371982033	0		0
7/31/2008	213	15.3	6.839712893	6.839712893	0.362504783	0		0
8/1/2008	214	15.1	6.750304881	6.750304881	0.357766159	0		0
8/2/2008	215	21.3	9.521953243	9.521953243	0.504663522	0		0
8/3/2008	216	14.8	6.616192864	6.616192864	0.350658222	0		0
8/4/2008	217	13.8	6.169152805	6.169152805	0.326965099	0		0
8/5/2008	218	12.4	5.543296724	5.543296724	0.293794726	0		0
8/6/2008	219	14.4	6.43737684	6.43737684	0.341180973	0		0
8/7/2008	220	15.1	6.750304881	6.750304881	0.357766159	0		0
8/8/2008	221	18.3	8.180833068	8.180833068	0.433584153	0		0
8/9/2008	222	16.6	7.420864969	7.420864969	0.393305843	0		0
8/10/2008	223	17.8	7.957313039	7.957313039	0.421737591	0		0
8/11/2008	224	15.3	6.839712893	6.839712893	0.362504783	0		0
8/12/2008	225	12.8	5.722112747	5.722112747	0.303271976	0		0
8/13/2008	226	13.5	6.035040788	6.035040788	0.319857162	0		0
8/14/2008	227	12.3	5.498592718	5.498592718	0.291425414	0		0
8/15/2008	228	12.7	5.677408741	5.677408741	0.300902663	0		0
8/16/2008	229	14.8	6.616192864	6.616192864	0.350658222	0		0
8/17/2008	230	15.2	6.795008887	6.795008887	0.360135471	0		0
8/18/2008	231	17.3	7.73379301	7.73379301	0.40989103	0		0
8/19/2008	232	20.6	9.209025202	9.209025202	0.488078336	0		0
8/20/2008	233	17.7	7.912609033	7.912609033	0.419368279	0		0
8/21/2008	234	17	7.599680992	7.599680992	0.402783093	0		0
8/22/2008	235	15.5	6.929120905	6.929120905	0.367243408	0		0
8/23/2008	236	15.2	6.795008887	6.795008887	0.360135471	0		0
8/24/2008	237	14	6.258560817	6.258560817	0.331703723	0		0
8/25/2008	238	17	7.599680992	7.599680992	0.402783093	0		0
8/26/2008	239	17	7.599680992	7.599680992	0.402783093	0		0
8/27/2008	240	18.6	8.314945086	8.314945086	0.44069209	0		0
8/28/2008	241	16.6	7.420864969	7.420864969	0.393305843	0		0
8/29/2008	242	13.8	6.169152805	6.169152805	0.326965099	0		0
8/30/2008	243	13.5	6.035040788	6.035040788	0.319857162	0		0
8/31/2008	244	15.7	7.018528916	7.018528916	0.371982033	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
9/1/2008	245	20.8	9.298433214	9.298433214	0.49281696	0		0
9/2/2008	246	17.9	8.002017045	8.002017045	0.424106903	0		0
9/3/2008	247	17.8	7.957313039	7.957313039	0.421737591	0		0
9/4/2008	248	16.1	7.19734494	7.19734494	0.381459282	0		0
9/5/2008	249	16.6	7.420864969	7.420864969	0.393305843	0		0
9/6/2008	250	15.9	7.107936928	7.107936928	0.376720657	0		0
9/7/2008	251	13.9	6.213856811	6.213856811	0.329334411	0		0
9/8/2008	252	15	6.705600875	6.705600875	0.355396846	0		0
9/9/2008	253	15.5	6.929120905	6.929120905	0.367243408	0		0
9/10/2008	254	16.4	7.331456957	7.331456957	0.388567219	0		0
9/11/2008	255	13.3	5.945632776	5.945632776	0.315118537	0		0
9/12/2008	256	13.1	5.856224765	5.856224765	0.310379913	0		0
9/13/2008	257	13	5.811520759	5.811520759	0.3080106	0		0
9/14/2008	258	12.6	5.632704735	5.632704735	0.298533351	0		0
9/15/2008	259	11.8	5.275072689	5.275072689	0.279578853	0		0
9/16/2008	260	14.8	6.616192864	6.616192864	0.350658222	0		0
9/17/2008	261	17.4	7.778497016	7.778497016	0.412260342	0		0
9/18/2008	262	18.9	8.449057103	8.449057103	0.447800026	0		0
9/19/2008	263	24.6	10.99718544	10.99718544	0.582850828	0		0
9/20/2008	264	19.3	8.627873126	8.627873126	0.457277276	0		0
9/21/2008	265	15.4	6.884416899	6.884416899	0.364874096	0		0
9/22/2008	266	19.8	8.851393156	8.851393156	0.469123837	0		0
9/23/2008	267	15.8	7.063232922	7.063232922	0.374351345	0		0
9/24/2008	268	15.9	7.107936928	7.107936928	0.376720657	0		0
9/25/2008	269	16.9	7.554976986	7.554976986	0.40041378	0		0
9/26/2008	270	16.6	7.420864969	7.420864969	0.393305843	0		0
9/27/2008	271	14.8	6.616192864	6.616192864	0.350658222	0		0
9/28/2008	272	12.6	5.632704735	5.632704735	0.298533351	0		0
9/29/2008	273	13.4	5.990336782	5.990336782	0.317487849	0		0
9/30/2008	274	12.3	5.498592718	5.498592718	0.291425414	0		0
10/1/2008	275	16.9	7.554976986	7.554976986	0.40041378	0		0
10/2/2008	276	19.4	8.672577132	8.672577132	0.459646588	0		0
10/3/2008	277	24.6	10.99718544	10.99718544	0.582850828	0		0
10/4/2008	278	20.9	9.34313722	9.34313722	0.495186273	0		0
10/5/2008	279	16.9	7.554976986	7.554976986	0.40041378	0		0
10/6/2008	280	14.4	6.43737684	6.43737684	0.341180973	0		0
10/7/2008	281	15.5	6.929120905	6.929120905	0.367243408	0		0
10/8/2008	282	16.7	7.465568975	7.465568975	0.395675156	0		0
10/9/2008	283	21.4	9.566657249	9.566657249	0.507032834	0		0
10/10/2008	284	32.9	14.70761792	14.70761792	0.77950375	0		0
10/11/2008	285	32.8	14.66291391	14.66291391	0.777134437	0		0
10/12/2008	286	22.9	10.23721734	10.23721734	0.542572519	0		0
10/13/2008	287	20.1	8.985505173	8.985505173	0.476231774	0		0
10/14/2008	288	17.1	7.644384998	7.644384998	0.405152405	0		0
10/15/2008	289	14.4	6.43737684	6.43737684	0.341180973	0		0
10/16/2008	290	18.5	8.27024108	8.27024108	0.438322777	0		0
10/17/2008	291	14.4	6.43737684	6.43737684	0.341180973	0		0
10/18/2008	292	14.8	6.616192864	6.616192864	0.350658222	0		0
10/19/2008	293	12.7	5.677408741	5.677408741	0.300902663	0		0
10/20/2008	294	14.7	6.571488858	6.571488858	0.348288909	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
10/21/2008	295	16.6	7.420864969	7.420864969	0.393305843	0		0
10/22/2008	296	23.7	10.59484938	10.59484938	0.561527017	0		0
10/23/2008	297	11.6	5.185664677	5.185664677	0.274840228	0		0
10/24/2008	298	14.2	6.347968829	6.347968829	0.336442348	0		0
10/25/2008	299	12.8	5.722112747	5.722112747	0.303271976	0		0
10/26/2008	300	10.8	4.82803263	4.82803263	0.255885729	0		0
10/27/2008	301	11.2	5.006848654	5.006848654	0.265362979	0		0
10/28/2008	302	9.9	4.425696578	4.425696578	0.234561919	0		0
10/29/2008	303	11.8	5.275072689	5.275072689	0.279578853	0		0
10/30/2008	304	73.1	32.67862827	32.67862827	1.731967298	47.1992336		47.1992336
10/31/2008	305	36.5	16.31696213	16.31696213	0.864798993	0		0
11/1/2008	306	39.5	17.65808231	17.65808231	0.935878362	0		0
11/2/2008	307	24.5	10.95248143	10.95248143	0.580481516	0		0
11/3/2008	308	34.9	15.60169804	15.60169804	0.826889996	0		0
11/4/2008	309	22.8	10.19251333	10.19251333	0.540203207	0		0
11/5/2008	310	16.4	7.331456957	7.331456957	0.388567219	0		0
11/6/2008	311	15.3	6.839712893	6.839712893	0.362504783	0		0
11/7/2008	312	16.4	7.331456957	7.331456957	0.388567219	0		0
11/8/2008	313	38	16.98752222	16.98752222	0.900338678	0		0
11/9/2008	314	32.6	14.5735059	14.5735059	0.772395813	0		0
11/10/2008	315	15.9	7.107936928	7.107936928	0.376720657	0		0
11/11/2008	316	11.6	5.185664677	5.185664677	0.274840228	0		0
11/12/2008	317	15.2	6.795008887	6.795008887	0.360135471	0		0
11/13/2008	318	21.2	9.477249237	9.477249237	0.50229421	0		0
11/14/2008	319	21.8	9.745473272	9.745473272	0.516510083	0		0
11/15/2008	320	15.7	7.018528916	7.018528916	0.371982033	0		0
11/16/2008	321	9.6	4.29158456	4.29158456	0.227453982	0		0
11/17/2008	322	11.1	4.962144648	4.962144648	0.262993666	0		0
11/18/2008	323	9.5	4.246880554	4.246880554	0.225084669	0		0
11/19/2008	324	13.4	5.990336782	5.990336782	0.317487849	0		0
11/20/2008	325	16.6	7.420864969	7.420864969	0.393305843	0		0
11/21/2008	326	22.5	10.05840131	10.05840131	0.53309527	0		0
11/22/2008	327	13.6	6.079744794	6.079744794	0.322226474	0		0
11/23/2008	328	11.8	5.275072689	5.275072689	0.279578853	0		0
11/24/2008	329	11.7	5.230368683	5.230368683	0.27720954	0		0
11/25/2008	330	13.4	5.990336782	5.990336782	0.317487849	0		0
11/26/2008	331	12.9	5.766816753	5.766816753	0.305641288	0		0
11/27/2008	332	13.5	6.035040788	6.035040788	0.319857162	0		0
11/28/2008	333	9.3	4.157472543	4.157472543	0.220346045	0		0
11/29/2008	334	23.4	10.46073737	10.46073737	0.55441908	0		0
11/30/2008	335	12.2	5.453888712	5.453888712	0.289056102	0		0
12/1/2008	336	10.5	4.693920613	4.693920613	0.248777792	0		0
12/2/2008	337	14.5	6.482080846	6.482080846	0.343550285	0		0
12/3/2008	338	15.2	6.795008887	6.795008887	0.360135471	0		0
12/4/2008	339	16.5	7.376160963	7.376160963	0.390936531	0		0
12/5/2008	340	12.3	5.498592718	5.498592718	0.291425414	0		0
12/6/2008	341	14.7	6.571488858	6.571488858	0.348288909	0		0
12/7/2008	342	12.2	5.453888712	5.453888712	0.289056102	0		0
12/8/2008	343	18.9	8.449057103	8.449057103	0.447800026	0		0
12/9/2008	344	17.3	7.73379301	7.73379301	0.40989103	0		0

Date	N	u (max gust) (mph)	u^+ (m/s)	u^+_{10} (m/s)	u* (m/s)	P_i (g/m^2)	Weekday Only:	Pi (g/m^2)
12/10/2008	345	12.1	5.409184706	5.409184706	0.286686789	0		0
12/11/2008	346	16.1	7.19734494	7.19734494	0.381459282	0		0
12/12/2008	347	13.2	5.90092877	5.90092877	0.312749225	0		0
12/13/2008	348	30.5	13.63472178	13.63472178	0.722640254	0		0
12/14/2008	349	22.1	9.87958529	9.87958529	0.52361802	0		0
12/15/2008	350	26.8	11.98067356	11.98067356	0.634975699	0		0
12/16/2008	351	22	9.834881284	9.834881284	0.521248708	0		0
12/17/2008	352	23.5	10.50544137	10.50544137	0.556788393	0		0
12/18/2008	353	22	9.834881284	9.834881284	0.521248708	0		0
12/19/2008	354	21.9	9.790177278	9.790177278	0.518879396	0		0
12/20/2008	355	13.5	6.035040788	6.035040788	0.319857162	0		0
12/21/2008	356	23.5	10.50544137	10.50544137	0.556788393	0		0
12/22/2008	357	25.6	11.44422549	11.44422549	0.606543951	0		0
12/23/2008	358	16.5	7.376160963	7.376160963	0.390936531	0		0
12/24/2008	359	38.9	17.38985827	17.38985827	0.921662488	0		0
12/25/2008	360	40.8	18.23923438	18.23923438	0.966679422	0		0
12/26/2008	361	26.8	11.98067356	11.98067356	0.634975699	0		0
12/27/2008	362	12.2	5.453888712	5.453888712	0.289056102	0		0
12/28/2008	363	12.9	5.766816753	5.766816753	0.305641288	0		0
12/29/2008	364	18.4	8.225537074	8.225537074	0.435953465	0		0
12/30/2008	365	16.4	7.331456957	7.331456957	0.388567219	0		0
12/31/2008	366	10.6	4.738624619	4.738624619	0.251147105	0		0
		Max u^+ (m/s):	43.89933373		Sum:	274.3244655	g/m2*yr	259.6646806
		Conversion Factors:	907,185	grams/ton	Ef (TSP) =	1.22	ton/acre*yr	1.16
			4,047	m^2/acre	Ef (PM_{10}) =	0.61	ton/acre*yr	0.58
					EF ($PM_{2.5}$) =	0.09	ton/acre*yr	0.09
						(Every Day)		(Week Days)

Notes:

1. For u+ used max daily gust speed from met data set for 2008. Anemometer height is at 10m; no height correction to 10m is required.
2. u^*_t obtained from Table 13.2.5-2 AP-42
3. The higest recorded wind gust from the Hanson meteorological station on 7/15/2008 is 98.2mph at hour 9:00. This value appears inconsistent with the daily wind gust trends on that day (< 20 mph for all other hours). In addition, there are a number of invalid parameters (e.g. temperature, RH) recorded for hours 9:00 and 10:00 that imply the tower could have been serviced or repaired during that period. Also, evaluation of wind data from other nearby meteorological stations on the same day reveal gusts of the same magnitude for that day. Therefore, for the purposes of this analysis, the max wind gust for 7/15/2008 is 16.6 mph at hour 14:00.

Off-Road Diesel Fleet Activity Data

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Summary.

		Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
Vehicle Type	Load Factor[1]	Avg HP[2]	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr
Bore/Drill Rigs	75%	600	4,184	600	5,839	600	6,759	600	5,782	600	5,533
Rubber Tired Loaders	54%	846	9,877	1,009	10,433	1,032	11,085	1,006	10,283	972	9,844
Off-Highway Trucks	57%	962	52,926	1,237	69,391	1,258	65,263	1,251	51,244	1,220	52,911
Crawler Tractors	64%	576	11,583	572	12,714	578	13,044	578	11,382	572	11,555
Rubber Tired Dozers	59%	355	1,662	355	2,493	355	2,493	355	2,078	355	2,078
Graders	61%	300	6,313	300	6,606	300	6,338	300	5,459	300	5,535
Water Truck	20%	705	6,729	705	7,021	705	6,754	705	5,874	705	5,950
Excavators	57%	380	3,117	380	2,181	380	1,633	380	1,459	380	1,204
Hydroseeder (Pump)	74%	115	53	115	68	115	95	115	114	115	133
Portable Light Towers	74%	11	2,400	11	2,400	11	2,400	11	2,400	11	2,400

Notes:

1. Load factors derived from California Air Resources Board's OFFROAD2007 model (version dated December 15, 2006), “equip.csv” data file, available at http://www.arb.ca.gov/msei/offroad/offroad.htm.
2. Average horsepower based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, May 12, 2010. If more than one equipment model (with differing horsepower specifications) is used, a composite average horsepower level is calculated by equipment type based on the anticipated equipment scheduling (in hours) for each model during each project phase.

Assumed Off Road Diesel Vehicle Inventory.

Vehicle Type	Model	Net HP	Notes
Bore/Drill Rigs	IR DM45	600	6.5-inch diameter hole
Load and Haul			
Rubber Tired Loader	Cat 988	500	9-yd Bucket
Rubber Tired Loader	Cat 992	800	16-yd Bucket
Rubber Tired Loader	Cat 994	1,460	24-yd Bucket
Off-Highway Truck	Cat 769	490	40-ton Payload
Off-Highway Truck	Cat 777	940	100-ton Payload; Phase 1 only
Off-Highway Truck	Cat 785	1350	150-ton Payload
Auxiliary/Support/Reclamation			
Track Dozer	Cat D10	580	
Track Dozer (w/ disc)	Cat D8	310	Includes disc attachment for reclamation
Rubber Tired Dozer	Cat 824	355	
Grader	Cat G16	300	
Water Truck	Cat 773	705	12,000 gal tank on Cat 773 chassis
Excavator	Cat 345	380	
Hydroseeder (Pump)	Finn T330	115	Equipped with John Deere 4045T diesel eng.
Portable Light Towers	Allmand ML695	10.7	Include generator powered by diesel engine

Off-Road Diesel Equipment Operating Hours

			Load and Haul						Auxiliary/Support/Reclamation										Equipment Totals by Type								
			Loaders		Trucks - LS		Trucks - Waste Rock		D-10	824	G16	Water		40-ton	Cat 988	D-8	Hydro-	Light	Bore/	Rubber	Off-		Rubber					Portable
		Drill	Cat 992	Cat 994	Cat 777	Cat 785	Cat 777	Cat 785	Dozer	Dozer	Grader	Truck	Excavator	Truck	Loader	Dozer	seeder	Stands[4]	Drill	Tired	Highway	Crawler	Tired Dozer		Water	Exca-	Hydro-	Light
Phase	Year	(600 HP)	(800 HP)	(1,460 HP)	(940 HP)	(1,350 HP)	(940 HP)	(1,350 HP)	(580 HP)	(355 HP)	(300 HP)	(705 HP)	(380 HP)	(490 HP)	(500 HP)	(310 HP)	(115 HP)	(11 HP)	Rigs	Loaders	Trucks	Tractors	(824 Dozer)	Graders	Trucks	vators	seeder	Stands
1	1	2,621	5,854	0	14,462	2,582	4,414	759	8,094	1,247	3,949	4,364	989	6,246	1,269	30	0	2,400	2,621	7,123	28,462	8,123	1,247	3,949	4,364	989	0	2,400
1	2	2,621	5,971	0	16,527	2,582	5,161	887	7,659	1,247	3,515	3,931	554	4,497	1,269	34	0	2,400	2,621	7,240	29,655	7,693	1,247	3,515	3,931	554	0	2400
1	3	2,793	6,274	0	20,659	3,099	7,097	1,663	10,222	1,247	6,090	6,506	3,117	20,408	1,269	70	0	2,400	2,793	7,542	52,926	10,292	1,247	6,090	6,506	3,117	0	2400
1	4	4,172	5,165	2,232	12,396	2,582	0	20,089	11,158	1,247	6,313	6,729	2,391	13,389	1,269	425	53	2,400	4,172	8,665	48,457	11,583	1,247	6,313	6,729	2,391	53	2400
1	5	4,184	5,165	3,444	12,396	2,066	0	30,995	11,323	1,662	5,576	5,992	1,226	6,340	1,269	212	29	2,400	4,184	9,877	51,797	11,534	1,662	5,576	5,992	1,226	29	2400
2	6	4,057	5,165	3,469	0	25,824	0	31,221	12,277	1,662	6,606	7,021	2,181	8,674	1,269	437	68	2,400	4,057	9,902	65,719	12,714	1,662	6,606	7,021	2,181	68	2400
2	7	5,839	5,165	4,000	0	23,242	0	36,000	11,752	2,078	6,057	6,473	1,656	10,150	1,269	366	0	2,400	5,839	10,433	69,391	12,118	2,078	6,057	6,473	1,656	0	2400
2	8	5,839	5,165	4,000	0	12,912	0	36,000	11,658	2,493	5,940	6,355	1,894	6,071	1,269	295	57	2,400	5,839	10,433	54,983	11,954	2,493	5,940	6,355	1,894	57	2400
3	9	6,299	5,165	4,348	0	23,242	0	34,783	11,397	2,493	5,634	6,050	1,633	7,239	1,269	162	0	2,400	6,299	10,781	65,263	11,559	2,493	5,634	6,050	1,633	0	2400
3	10	6,759	5,165	4,651	0	15,495	0	25,581	12,507	2,493	5,859	6,274	1,080	4,690	1,269	0	0	2,400	6,759	11,085	45,766	12,507	2,493	5,859	6,274	1,080	0	2400
3	11	6,299	5,165	4,186	0	12,912	0	31,395	12,957	2,493	6,338	6,754	1,531	5,384	1,269	86	62	2,400	6,299	10,619	49,691	13,044	2,493	6,338	6,754	1,531	62	2400
3	12	6,759	5,165	4,651	0	15,495	0	32,558	12,809	2,493	6,195	6,611	1,383	5,339	1,269	101	95	2,400	6,759	11,085	53,392	12,910	2,493	6,195	6,611	1,383	95	2400
4	13	5,782	5,165	3,663	0	15,495	0	18,314	11,223	2,078	5,459	5,874	1,459	5,524	1,269	158	114	2,400	5,782	10,096	39,332	11,382	2,078	5,459	5,874	1,459	114	2400
4	14	5,506	5,165	3,850	0	15,495	0	30,800	10,889	2,078	5,083	5,498	792	4,950	1,269	33	76	2,400	5,506	10,283	51,244	10,922	2,078	5,083	5,498	792	76	2400
5	15	5,533	5,165	3,411	0	18,077	0	23,876	11,239	2,078	5,521	5,936	1,143	7,495	1,269	296	114	2,400	5,533	9,844	49,447	11,535	2,078	5,521	5,936	1,143	114	2400
5	16	5,533	5,165	3,411	0	18,077	0	27,287	11,250	2,078	5,535	5,950	1,154	7,547	1,269	304	133	2,400	5,533	9,844	52,911	11,555	2,078	5,535	5,950	1,154	133	2400
5	17	4,460	5,165	2,326	0	20,659	0	18,605	9,639	2,078	4,767	5,182	1,204	7,553	1,269	342	111	2,400	4,460	8,759	46,817	9,981	2,078	4,767	5,182	1,204	111	2400
																		Phase 1 Composite HP[1]:	600	846	962	576	355	300	705	380	115	11
																		Phase 2 Composite HP:	600	1,009	1,237	572	355	300	705	380	115	11
																		Phase 3 Composite HP:	600	1,032	1,258	578	355	300	705	380	115	11
																		Phase 4 Composite HP:	600	1,006	1,251	578	355	300	705	380	115	11
																		Phase 5 Composite HP:	600	972	1,220	572	355	300	705	380	115	11

Notes:

1. Based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, May 12, 2010.
2. If more than one equipment model (with differing horsepower specifications) is used, a composite average horsepower level is calculated by equipment type based on the anticipated equipment scheduling (in hours) for each model during each project phase.
3. Assumed efficiency (Operating Hours/Scheduled Hours) for equipment other than drill and portable light stands: 83.1%

Portable Internal Combustion Equipment

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Summary.

	Load	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
Equipment Type	Factor[1]	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr
Diesel Welders	45%	60	322	60	401	60	461	60	397	60	380

Notes:

1. Load factor derived from California Air Resources Board's OFFROAD2007 model (version dated December 15, 2006), “equip.csv” data file, available at http://www.arb.ca.gov/msei/offroad/offroad.htm.
2. Average horsepower based on welding activity associated with quarry operations for 2000-2009 baseline period: 42.6 average horsepower for diesel welders, and 12.6 average horsepower for gasoline welders. Given that more than 90% of welder use was associated with diesel welders, an average horsepower rating of 60 HP is used for this analysis. All welders assumed to be diesel.
3. Average operating hours/year based on welding activity associated with quarry operations for 2000-2009 baseline period, scaled to reflect the ratio between maximum total production for each phase and production during the baseline period. Baseline welder use:
   145 hours/year for diesel welders
   14 hours/year for gasoline welders

On-road Vehicle Activity

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Summary.

		Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
Trip Type	Vehicle Type	Number of Vehicles	Miles/ Year	Number of Vehicles	Miles/ Year	Number of Vehicles	Miles/ Year	Number of Vehicles	Miles/ Year	Number of Vehicles	Miles/ Year
Employee Commute	Passenger	97	245,459	96	242,928	92	232,806	84	212,562	78	197,379
In-plant Vehicles	MDV[1]	29	217,500	33	247,500	32	240,000	29	217,500	26	195,000
Fuel Transport	HDDT[2]	--	8,660	--	11,684	--	10,573	--	10,164	--	10,634
Total			471,618		502,112		483,379		440,226		403,013

Notes:
1. Medium Duty Vehicle.
2. Heavy-duty Diesel Truck.

Employee Commute Trips.

	Maximum Employee Count[1]				Employees	Work	Trip Dist.	Miles/
Project Phase	Salary	Hourly	Contractor	Total	/Vehicle[2]	Days/Year	(Miles)[3]	Year
1	5	67	25	97	1	250	5.061	245,459
2	6	77	13	96	1	250	5.061	242,928
3	6	73	13	92	1	250	5.061	232,806
4	6	66	12	84	1	250	5.061	212,562
5	6	59	13	78	1	250	5.061	197,379

Notes:
1. Maximum employee count based on information provided by Lehigh Southwest Cement Company, May 12, 201(
2. It is assumed that the vehicle occupancy is 1 employee/vehicle and that each employee works an average of 250 days/yea
3. The peak year for operation of the South Quarry during Phase 1 is the fifth year, which is assumed to be 2020. As a worst-case assumptio 2020 is also used as the basis for calculating emissions from combustion equipment/vehicles for the other phases of the proposed project. The or way trip distance is from EMFAC2007 emission inventory data for Santa Clara County (2020 data). Total miles/year are based on two-way trip

In-Plant Vehicles.

	In-Plant	Ann. Miles/	Miles/	Gasoline Consumption	
Project Phase	Vehicles[1]	Vehicle[2]	Year	(Miles/Gal)[3]	(Gal/Year)
1	29	7,500	217,500	15	14,500
2	33	7,500	247,500	15	16,500
3	32	7,500	240,000	15	16,000
4	29	7,500	217,500	15	14,500
5	26	7,500	195,000	15	13,000

Notes:
1. Assumes a ratio of 0.4 in-plant vehicle (0.5-ton and larger pickups and SUVs) per Lehigh employee. This is the same ratio as experience during facility operations during 2000-2009, with 24 in-plant vehicles for 60 employees
2. Annual miles traveled per vehicles related to quarry operations. For the 2000-2009 period, the average quarry use per in-plant vehic was calculated to be 6,600 miles/vehicle. For activities related to the South Quarry, this is estimated to be 7,500 miles/vehicl
3. Source: U.S. Department of Energy and U.S. Environmental Protection Agency, Fuel Economy Guide, for 2005 two- and four-wheel drive For F150 pickups (8 cylinder, 4.6 liter engine) and 2005 two- and four-wheel drive Ford Explorer Sports Utility Vehicles (8 cylinder, 4.6 liter engine Combined city and highway fuel economies range between 16 and 17 miles per gallon. To be conservative, a value of 15 MPG was assume

Fuel Transport.

	Gasoline	Diesel	Total Fuel	Fuel Cap-	Vehicles	Trip Dis-	Miles/
Project Phase	Use(Gal)[1]	Use(Gal)[2]	Use (Gal)	acity (Gal)[3]	Trips/Year	tance (Mi.)[3]	Year[4]
1	14,500	2,583,486	2,597,986	6,000	433	10	8,660
2	16,500	3,488,645	3,505,145	6,000	584	10	11,684
3	16,000	3,156,013	3,172,013	6,000	529	10	10,573
4	14,500	3,034,694	3,049,194	6,000	508	10	10,164
5	13,000	3,177,214	3,190,214	6,000	532	10	10,634

Notes:
1. Gasoline use derived from the above information, based on estimated in-plant vehicle use, mileage accruals, and fuel economy for Phases 1-
2. Diesel throughputs based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Compan May 12, 2010.
3. Effective operating capacity per fuel transport truck assumed to be 6,000 gallons
4. Trip distance assumed to be 10 miles (one-way). Total miles/year based on two-way trips

Fuel Storage & Dispensing

Operating Schedule	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Hours/Day	8	16	16	16	16
Days/Week	6	6	6	6	6
Weeks/Year	50	50	50	50	50

Fuel Throughput (gallons/year).

	Phase 1 (Gallons/Year)	Phase 2 (Gallons/Year)	Phase 3 (Gallons/Year)	Phase 4 (Gallons/Year)	Phase 5 (Gallons/Year)
Diesel[1]	2,583,486	3,488,645	3,156,013	3,034,694	3,177,214
Gasoline[2]	14,500	16,500	16,000	14,500	13,000

Notes:

1. Diesel throughputs based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, May 12, 2010 for Phases 1-5.
2. Gasoline throughputs based on estimated in-plant vehicle use, mileage accruals, and fuel economy for Phases 1-5.

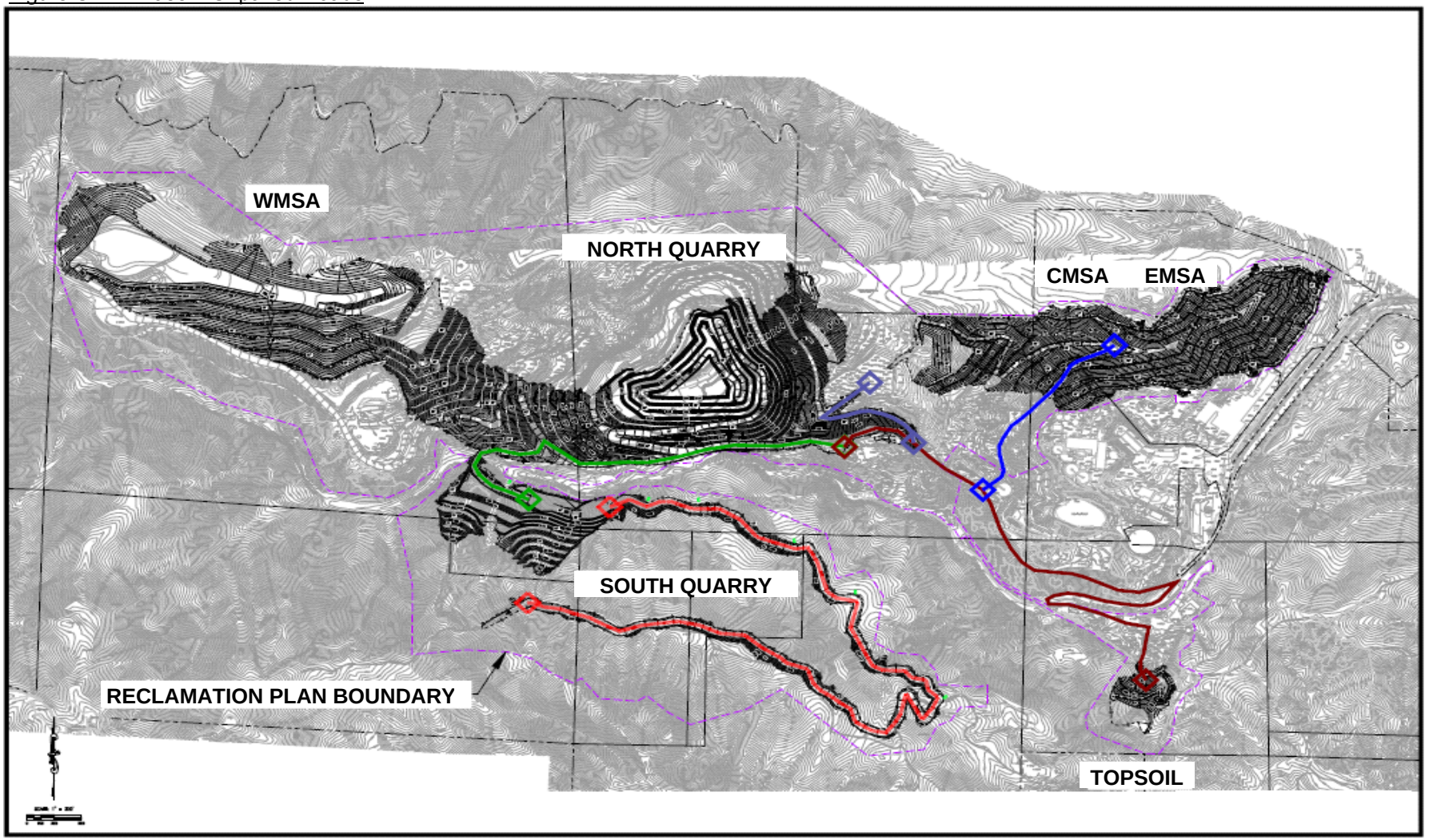
Tank Parameters.

Parameter	Diesel Above Ground[1]	Gasoline Underground[2]
Capacity	20,000 gal	10,000 gal
Length	34.5 ft	25 ft
Diameter	10 ft	8.33 ft
Condition	Good	N/A

Notes:

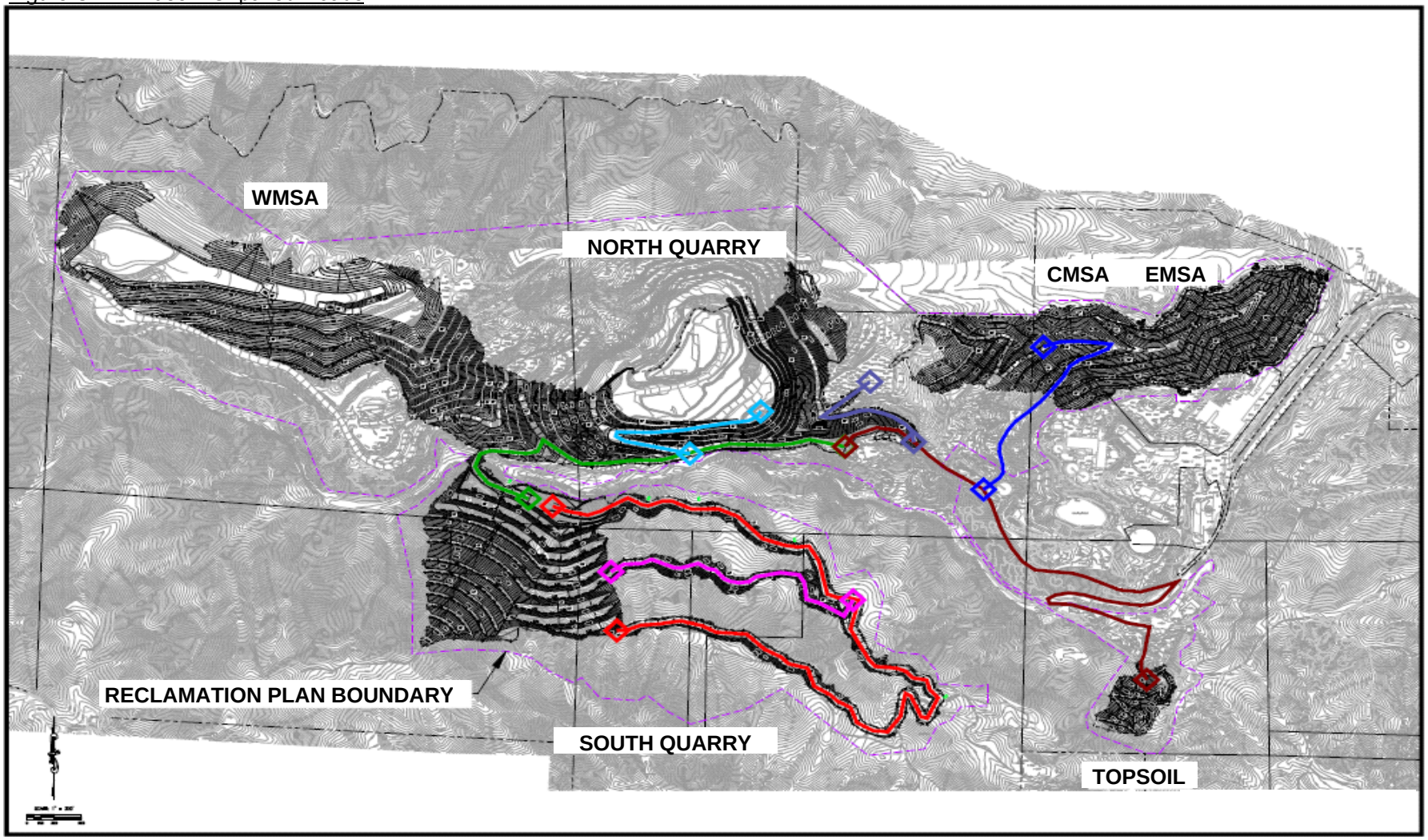
1. Assumes use of a 20,000 gallon above ground diesel storage tank to serve the project.
2. Assumes use of a 10,000 gallon below ground gasoline storage tank with the same parameters as the existing underground gasoline storage tank.

Figure C-1 - Phase 1 Unpaved Roads.



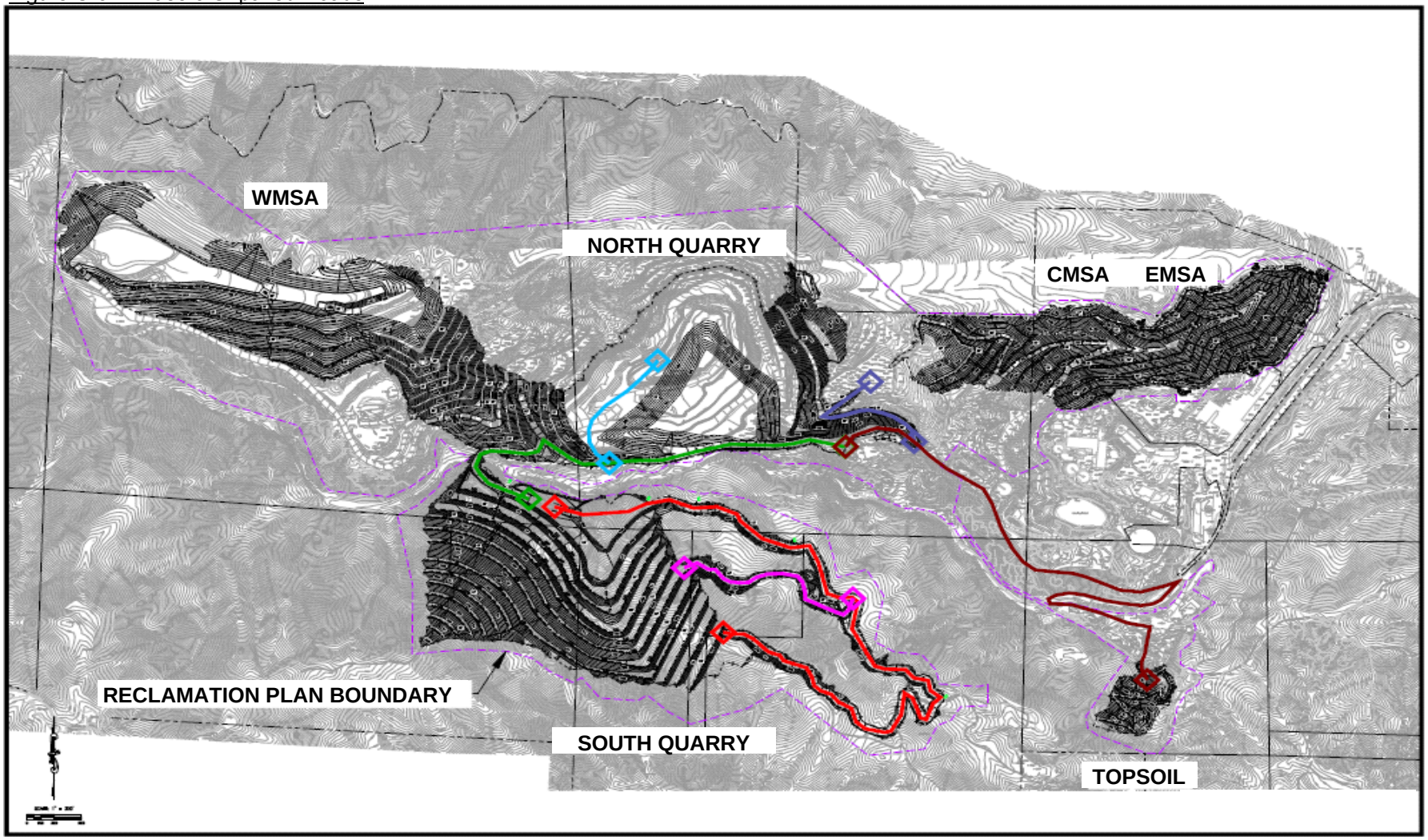
South Quarry to Primary Crusher:		5,160 linear feet
South Quarry Perimeter/Upper Access Road:		not assumed active until Phase 2
Road Stub to Quarry Yard		1,900 linear feet
Road to CMSA (Waste):		6,050 linear feet
Primary Crusher to TSA/Rock Plant:		8,140 linear feet

Figure C-2 - Phase 2 Unpaved Roads.



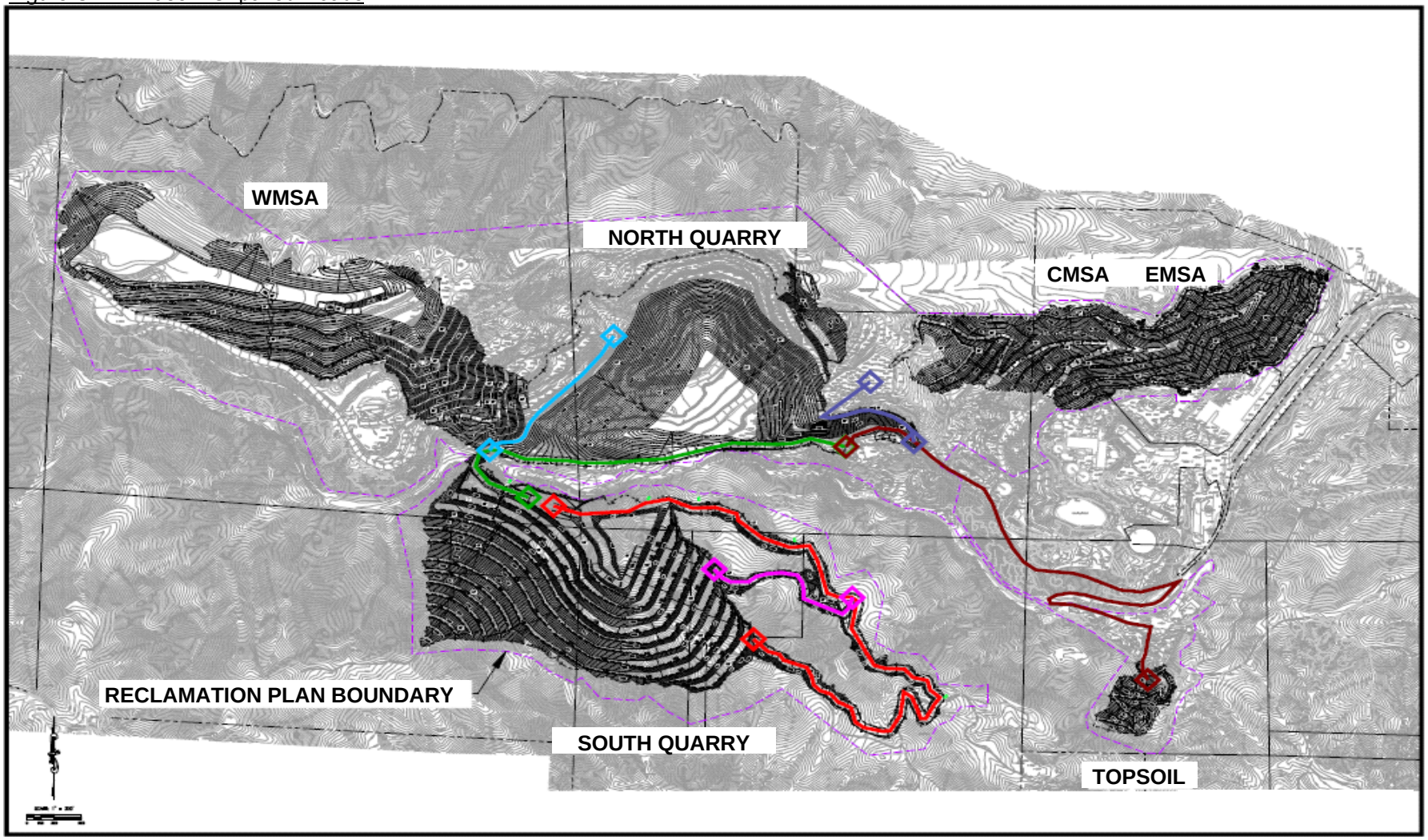
South Quarry to Primary Crusher		5,160 linear feet
South Quarry Perimeter/Upper Access Road		10,650 linear feet
South Quarry Middle Access Road		3,250 linear feet
Road to CMSA (Waste)		6,050 linear feet
Road to North Quarry (Waste)		2,290 linear feet
Primary Crusher to TSA/Rock Plant		8,140 linear feet

Figure C-3 - Phase 3 Unpaved Roads.



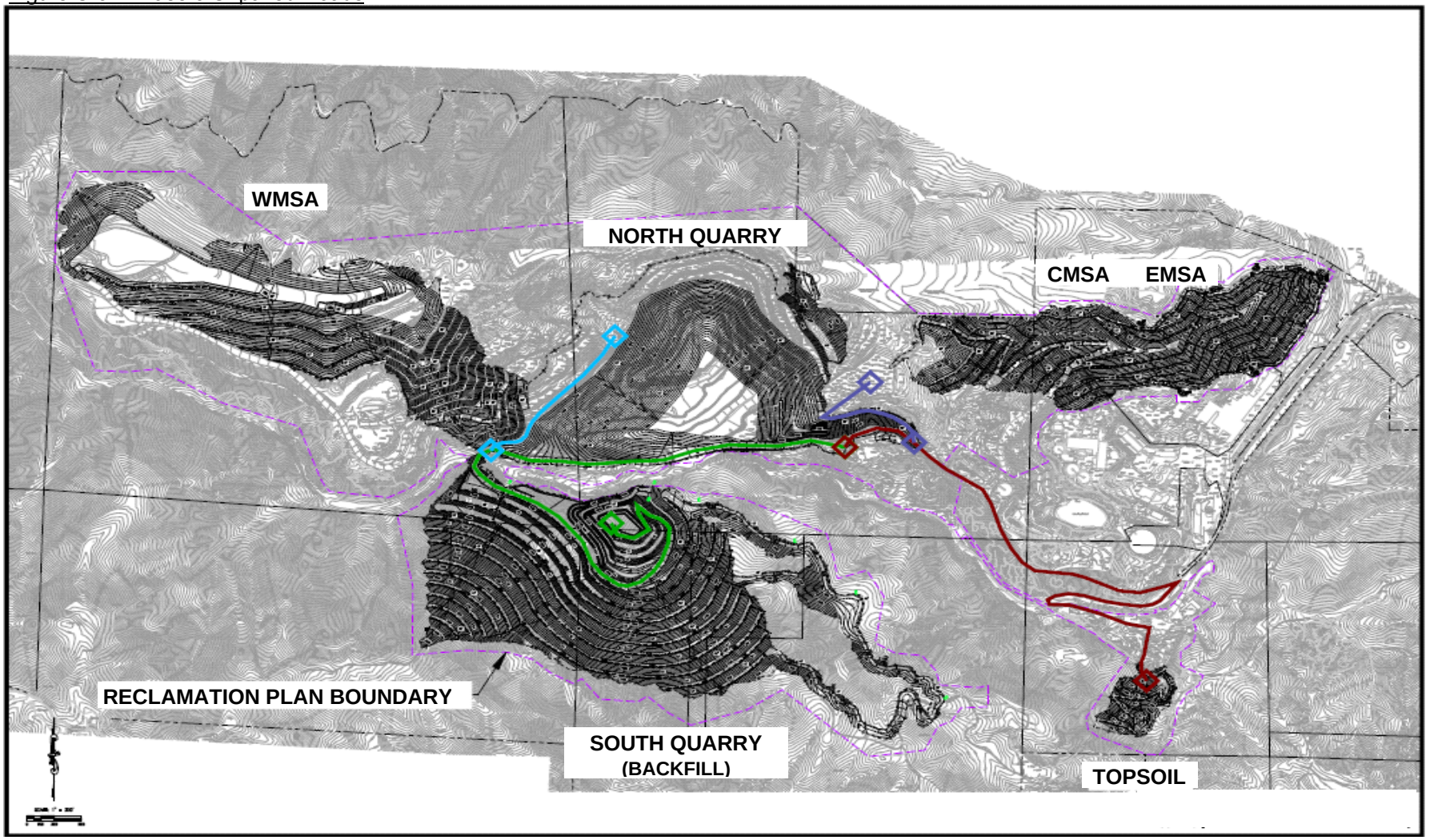
South Quarry to Primary Crusher	5,160 linear feet
South Quarry Perimeter/Upper Access Road	9,470 linear feet
South Quarry Middle Access Road	2,380 linear feet
Road Stub to Quarry Yard	1,900 linear feet
Road to North Quarry (Waste)	2,000 linear feet
Primary Crusher to TSA/Rock Plant	8,140 linear feet

Figure C-4 - Phase 4 Unpaved Roads.



South Quarry to Primary Crusher	———	5,000 linear feet
South Quarry Perimeter/Upper Access Road	———	9,105 linear feet
South Quarry Middle Access Road	———	2,020 linear feet
Road Stub to Quarry Yard	———	1,900 linear feet
Road to North Quarry (Waste)	———	3,600 linear feet
Primary Crusher to TSA/Rock Plant	———	8,140 linear feet

Figure C-5 - Phase 5 Unpaved Roads.



South Quarry to Primary Crusher	———	8,860 linear feet
Road Stub to Quarry Yard	———	1,900 linear feet
Road to North Quarry (Waste)	———	3,600 linear feet
Primary Crusher to TSA/Rock Plant	———	8,140 linear feet

Appendix D

Permanente Creek Bridge Construction Emission Calculations

Permanente Creek Bridge Construction Emission Calculations Appendices.

Permanente Creek Bridge Construction Figure.

Bridge Construction Bulldozing, Scraping, and Grading Particulate Matter Emissions.

Construction Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Activity[1]	Control Efficiency[2]	PM_{10} Emissions[3,4] (tons)	PM_{10} Emissions[3,4] (lb/day)	PM_{10} Emissions[3,4] (lb/hr)	$PM_{2.5}$ Emissions[3,4] (tons)	$PM_{2.5}$ Emissions[3,4] (lb/day)	$PM_{2.5}$ Emissions[3,4] (lb/hr)
Excavation	MDAQMD Guidance, Sec. VI.D	1.24E-01 lb/hr	1.86E-02 lb/hr	86 hours	0%	0.01	0.71	0.09	0.00	0.11	0.01
Piles				--		--	--	--	--	--	--
Concrete Work				--		--	--	--	--	--	--
Arch Culvert				--		--	--	--	--	--	--
MSE Walls				--		--	--	--	--	--	--
Fill				68 hours		0.00	0.56	0.07	0.00	0.08	0.01

Notes:

1. Activity based on Anticipated Bridge Construction Fugitive Dust-Related Process Rates (documented separately).
2. Assumed Control: None
3. Daily and hourly emission rates reflect the following contruction schedule:

Schedule	Excavation	Piles	Concrete	Arch Culvert	MSE Walls	Fill
Hours/Day	8	8	8	8	8	8
Days/Week	5	5	5	5	5	5
Weeks	3	5	3	1	1	3

4. Conversion factors:
   2,000 lb = 1 ton

Bulldozing, Scraping, and Grading Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Moisture Content	AP-42 Table 13.2.4-1 (Various Limestone Products)	M	2.1	%
Silt Content, Limestone	MDAQMD Guidance, Sec. VI.D (Stockpile Table 2)	s	0.5	%
PM_{10} size multiplier	MDAQMD Guidance, Sec. VI.D	k	0.36	--
$PM_{2.5}$ size multiplier	WRAP AP-42 Fugitive Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Bulldozing, Scraping, Grading Factor	*MDAQMD Guidance, Sec. VI.D*	*Ef*	*Calculated*	*lb/hr*

$$E_f = 2.76 \times k \times \frac{s^{1.5}}{M^{1.4}}$$

Notes:

1. Source: *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors* (prepared for Western Governors' Association Western Regional Air Partnership (WRAP)), Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42).

Bridge Construction Material Handling Particulate Matter Emissions.

Construction Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Activity[1]	Transfer Points	Control Efficiency[2]	PM_{10} Emissions[3,4] (tons)	PM_{10} Emissions[3,4] (lb/day)	PM_{10} Emissions[3,4] (lb/hr)	$PM_{2.5}$ Emissions[3,4] (tons)	$PM_{2.5}$ Emissions[3,4] (lb/day)	$PM_{2.5}$ Emissions[3,4] (lb/hr)
Excavation	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	18,000 tons	1	0%	0.01	1.38	0.17	0.00	0.21	0.03
Piles				--	1		--	--	--	--	--	--
Concrete Work				--	1		--	--	--	--	--	--
Arch Culvert				--	1		--	--	--	--	--	--
MSE Walls				--	1		--	--	--	--	--	--
Fill				14,000 tons	1		0.01	1.08	0.13	0.00	0.16	0.02

Notes:

1. Activity based on Anticipated Bridge Construction Fugitive Dust-Related Process Rates (documented separately).
2. Assumed Control: None
3. Daily and hourly emission rates reflect the following contruction schedule:

Schedule	Excavation	Piles	Concrete	Arch Culvert	MSE Walls	Fill
Hours/Day	8	8	8	8	8	8
Days/Week	5	5	5	5	5	5
Weeks	3	5	3	1	1	3

4. Conversion factors:
   2,000 lb = 1 ton

Material Handling Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Moisture Content	AP-42 Table 13.2.4-1 (Various Limestone Products)	M	2.1	%
Mean wind speed	Mean 2008 wind speed for Lehigh Station	U	5.27	mph
PM_{10} size multiplier	MDAQMD Guidance, Sec. VI.E	k	0.36	--
$PM_{2.5}$ size multiplier	WRAP AP-42 Fugitive Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Material Handling Emission Factor	*MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1*	*Ef*	*Calculated*	*lb/ton*

$$Ef = k \times 0.0032 \times \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Bridge Construction Unpaved Road Dust Entrainment Particulate Matter Emissions.

Construction Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Activity[1]	Control Efficiency[2]	PM_{10} Emissions[3,4] (tons)	PM_{10} Emissions[3,4] (lb/day)	PM_{10} Emissions[3,4] (lb/hr)	$PM_{2.5}$ Emissions[3,4] (tons)	$PM_{2.5}$ Emissions[3,4] (lb/day)	$PM_{2.5}$ Emissions[3,4] (lb/hr)
Excavation	AP-42 13.2.2, Eqn 1a	5.37E-01 lb/mile	5.37E-02 lb/mile	507.0 miles	75%	0.03	4.54	0.57	0.00	0.45	0.06
Piles				845.0 miles		0.06	4.54	0.57	0.01	0.45	0.06
Concrete Work				865.3 miles		0.06	7.75	0.97	0.01	0.77	0.10
Arch Culvert				175.8 miles		0.01	4.72	0.59	0.00	0.47	0.06
MSE Walls				263.6 miles		0.02	7.08	0.88	0.00	0.71	0.09
Fill				507.0 miles		0.03	4.54	0.57	0.00	0.45	0.06

Notes:

1. Activity based on Anticipated Bridge Construction Fugitive Dust-Related Process Rates (documented separately).
2. Assumed Control: 75% control associated with watering of unpaved roads.
3. Daily and hourly emission rates reflect the following contruction schedule:

Schedule	Excavation	Piles	Concrete	Arch Culvert	MSE Walls	Fill
Hours/Day	8	8	8	8	8	8
Days/Week	5	5	5	5	5	5
Weeks	3	5	3	1	1	3

4. Conversion factors:
   2,000 lb = 1 ton

Unpaved Road Dust Entrainment Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Unpaved Surface Material Silt Content	2008 CEIR, Table B-1	s	2.7	%
Average Vehicle Weight	Average Vehicle Weight (documented separately)	W	6.0	tons
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	1.5	lb/mile
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.15	lb/mile
Empirical Constants	AP-42 13.2.2-2	a	0.9	--
	AP-42 13.2.2-2	b	0.45	--
Dust Entrainment Emission Factor	*AP-42 13.2.2, Eqn 1a*	*Ef*	*Calculated*	*lb/mile*

$$E_f = k\left(\frac{s}{12}\right)^a\left(\frac{W}{3}\right)^b$$

Bridge Construction Active Area Wind Erosion Particulate Matter Emissions.

Construction Phase	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Activity[1]	Control Efficiency[2]	PM_{10} Emissions[3,4] (tons)	PM_{10} Emissions[3,4] (lb/day)	PM_{10} Emissions[3,4] (lb/hr)	$PM_{2.5}$ Emissions[3,4] (tons)	$PM_{2.5}$ Emissions[3,4] (lb/day)	$PM_{2.5}$ Emissions[3,4] (lb/hr)
Excavation	AP-42 13.2.5, Eqn 2	6.12E-01 ton/acre-yr	9.18E-02 ton/acre-yr	5 acres	50%	0.09	11.77	1.47	0.01	1.76	0.22
Piles				1 acres		0.03	2.35	0.29	0.00	0.35	0.04
Concrete Work				1 acres		0.02	2.35	0.29	0.00	0.35	0.04
Arch Culvert				1 acres		0.01	2.35	0.29	0.00	0.35	0.04
MSE Walls				1 acres		0.01	2.35	0.29	0.00	0.35	0.04
Fill				5 acres		0.09	11.77	1.47	0.01	1.76	0.22

Notes:

1. Activity based on Anticipated Bridge Construction Fugitive Dust-Related Process Rates (documented separately).
2. Assumed Control: 50% control associated with watering of active areas consistent with fugitive dust plan to be submitted to the BAAQMD.
3. Daily and hourly emission rates reflect the following contruction schedule:

Schedule	Excavation	Piles	Concrete	Arch Culvert	MSE Walls	Fill
Hours/Day	8	8	8	8	8	8
Days/Week	5	5	5	5	5	5
Weeks	3	5	3	1	1	3

4. Conversion factors:
   2,000 lb = 1 ton

Wind Erosion Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Erosion Potential per disturbance	AP-42 13.2.5, Eqn 3	P_i	Calculated	g/m^2
Friction Velocity per disturbance	AP-42 13.2.5, Eqn 4	u*	Calculated	m/s
Threshold Friction Velocity:	AP-42 Table 13.2.5-2 (overburden)	u^*_t	1.02	m/s
Fastest mile wind speed per disturbance at 10 meters	Daily maximum wind gust data from Lehigh Permanente Meteorological Station for 2008	u^+_{10}	Varies	m/s
Disturbances	Lehigh Permanente wind gust data	N	Daily (366)	--
PM_{10} Size Multiplier	AP-42 13.2.2-2	k	0.5	--
$PM_{2.5}$ Size Multiplier	AP-42 13.2.2-2	k	0.075	--
Wind Erosion Emission Factor	*AP-42 13.2.5, Eqn 2*	*Ef*	*Calculated*	*g/(m²-yr)*

Eqn 3 $$P = 58(u^* - u_t)^2 + 25(u^* - u_t)$$

Eqn 4 $$u^* = 0.053u_{10}$$

Eqn 2 $$E_f = k \sum_{i=1}^{N} P_i$$

Toxic Air Contaminant Emissions Over Course of Bridge Construction (pounds).

	Toxic Air Contaminants (TAC):		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	Overburden TAC Emission Factor (mg TAC /kg PM):		2.5	1.25	780	0.75	1.25	24	6.4	14	1.3	0.2	2.5	23	2.5	1.3	1.3	19	25	0.1	3712.8
	Roads TAC Emission Factor (mg TAC/kg PM):		2.5	1.25	1000	0.75	1.25	41	9.8	25	2.3	0.14	2.5	54	2.5	1.25	1.25	83	34	1.9	7099.2
Construction Phase	Component	PM_{10} (tons)	Toxic Air Contaminant Emissions (pounds)																		
Excavation	Bulldozing, Scraping, and Grading	0.01	2.67E-05	1.34E-05	8.34E-03	8.02E-06	1.34E-05	2.57E-04	6.84E-05	1.50E-04	1.39E-05	2.14E-06	2.67E-05	2.46E-04	2.67E-05	1.39E-05	1.39E-05	2.03E-04	2.67E-04	1.07E-06	3.97E-02
	Material Handling	0.01	5.18E-05	2.59E-05	1.62E-02	1.56E-05	2.59E-05	4.98E-04	1.33E-04	2.90E-04	2.70E-05	4.15E-06	5.18E-05	4.77E-04	5.18E-05	2.70E-05	2.70E-05	3.94E-04	5.18E-04	2.07E-06	7.70E-02
	Dust Entrainment-Unpaved Roads	0.03	1.70E-04	8.51E-05	6.81E-02	5.11E-05	8.51E-05	2.79E-03	6.67E-04	1.70E-03	1.57E-04	9.53E-06	1.70E-04	3.68E-03	1.70E-04	8.51E-05	8.51E-05	5.65E-03	2.31E-03	1.29E-04	4.83E-01
	Wind Erosion-Active Areas	0.09	4.41E-04	2.21E-04	1.38E-01	1.32E-04	2.21E-04	4.24E-03	1.13E-03	2.47E-03	2.29E-04	3.53E-05	4.41E-04	4.06E-03	4.41E-04	2.29E-04	2.29E-04	3.35E-03	4.41E-03	1.76E-05	6.55E-01
	Total - Excavation	0.14	6.90E-04	3.45E-04	2.30E-01	2.07E-04	3.45E-04	7.78E-03	2.00E-03	4.61E-03	4.27E-04	5.11E-05	6.90E-04	8.46E-03	6.90E-04	3.55E-04	3.55E-04	9.60E-03	7.51E-03	1.50E-04	1.26E+00
Piles	Bulldozing, Scraping, and Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment-Unpaved Roads	0.06	2.84E-04	1.42E-04	1.13E-01	8.51E-05	1.42E-04	4.65E-03	1.11E-03	2.84E-03	2.61E-04	1.59E-05	2.84E-04	6.13E-03	2.84E-04	1.42E-04	1.42E-04	9.42E-03	3.86E-03	2.16E-04	8.05E-01
	Wind Erosion-Active Areas	0.03	1.47E-04	7.35E-05	4.59E-02	4.41E-05	7.35E-05	1.41E-03	3.77E-04	8.24E-04	7.65E-05	1.18E-05	1.47E-04	1.35E-03	1.47E-04	7.65E-05	7.65E-05	1.12E-03	1.47E-03	5.88E-06	2.18E-01
	Total - Piles	0.09	4.31E-04	2.15E-04	1.59E-01	1.29E-04	2.15E-04	6.06E-03	1.49E-03	3.66E-03	3.37E-04	2.77E-05	4.31E-04	7.48E-03	4.31E-04	2.18E-04	2.18E-04	1.05E-02	5.33E-03	2.21E-04	1.02E+00
Concrete Work	Bulldozing, Scraping, and Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment-Unpaved Roads	0.06	2.90E-04	1.45E-04	1.16E-01	8.71E-05	1.45E-04	4.76E-03	1.14E-03	2.90E-03	2.67E-04	1.63E-05	2.90E-04	6.27E-03	2.90E-04	1.45E-04	1.45E-04	9.64E-03	3.95E-03	2.21E-04	8.25E-01
	Wind Erosion-Active Areas	0.02	8.82E-05	4.41E-05	2.75E-02	2.65E-05	4.41E-05	8.47E-04	2.26E-04	4.94E-04	4.59E-05	7.06E-06	8.82E-05	8.12E-04	8.82E-05	4.59E-05	4.59E-05	6.71E-04	8.82E-04	3.53E-06	1.31E-01
	Total - Concrete Work	0.08	3.79E-04	1.89E-04	1.44E-01	1.14E-04	1.89E-04	5.61E-03	1.36E-03	3.40E-03	3.13E-04	2.33E-05	3.79E-04	7.09E-03	3.79E-04	1.91E-04	1.91E-04	1.03E-02	4.83E-03	2.24E-04	9.56E-01
Arch Culvert	Bulldozing, Scraping, and Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment-Unpaved Roads	0.01	5.90E-05	2.95E-05	2.36E-02	1.77E-05	2.95E-05	9.68E-04	2.31E-04	5.90E-04	5.43E-05	3.30E-06	5.90E-05	1.27E-03	5.90E-05	2.95E-05	2.95E-05	1.96E-03	8.02E-04	4.48E-05	1.68E-01
	Wind Erosion-Active Areas	0.01	2.94E-05	1.47E-05	9.18E-03	8.82E-06	1.47E-05	2.82E-04	7.53E-05	1.65E-04	1.53E-05	2.35E-06	2.94E-05	2.71E-04	2.94E-05	1.53E-05	1.53E-05	2.24E-04	2.94E-04	1.18E-06	4.37E-02
	Total - Arch Culvert	0.02	8.84E-05	4.42E-05	3.28E-02	2.65E-05	4.42E-05	1.25E-03	3.07E-04	7.55E-04	6.96E-05	5.66E-06	8.84E-05	1.55E-03	8.84E-05	4.48E-05	4.48E-05	2.18E-03	1.10E-03	4.60E-05	2.11E-01
MSE Walls	Bulldozing, Scraping, and Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment-Unpaved Roads	0.02	8.85E-05	4.42E-05	3.54E-02	2.65E-05	4.42E-05	1.45E-03	3.47E-04	8.85E-04	8.14E-05	4.96E-06	8.85E-05	1.91E-03	8.85E-05	4.42E-05	4.42E-05	2.94E-03	1.20E-03	6.73E-05	2.51E-01
	Wind Erosion-Active Areas	0.01	2.94E-05	1.47E-05	9.18E-03	8.82E-06	1.47E-05	2.82E-04	7.53E-05	1.65E-04	1.53E-05	2.35E-06	2.94E-05	2.71E-04	2.94E-05	1.53E-05	1.53E-05	2.24E-04	2.94E-04	1.18E-06	4.37E-02
	Total - MSE Walls	0.02	1.18E-04	5.90E-05	4.46E-02	3.54E-05	5.90E-05	1.73E-03	4.22E-04	1.05E-03	9.67E-05	7.31E-06	1.18E-04	2.18E-03	1.18E-04	5.95E-05	5.95E-05	3.16E-03	1.50E-03	6.84E-05	2.95E-01
Fill	Bulldozing, Scraping, and Grading	0.00	2.11E-05	1.06E-05	6.59E-03	6.34E-06	1.06E-05	2.03E-04	5.41E-05	1.18E-04	1.10E-05	1.69E-06	2.11E-05	1.94E-04	2.11E-05	1.10E-05	1.10E-05	1.61E-04	2.11E-04	8.45E-07	3.14E-02
	Material Handling	0.01	4.03E-05	2.02E-05	1.26E-02	1.21E-05	2.02E-05	3.87E-04	1.03E-04	2.26E-04	2.10E-05	3.23E-06	4.03E-05	3.71E-04	4.03E-05	2.10E-05	2.10E-05	3.06E-04	4.03E-04	1.61E-06	5.99E-02
	Dust Entrainment-Unpaved Roads	0.03	1.70E-04	8.51E-05	6.81E-02	5.11E-05	8.51E-05	2.79E-03	6.67E-04	1.70E-03	1.57E-04	9.53E-06	1.70E-04	3.68E-03	1.70E-04	8.51E-05	8.51E-05	5.65E-03	2.31E-03	1.29E-04	4.83E-01
	Wind Erosion-Active Areas	0.09	4.41E-04	2.21E-04	1.38E-01	1.32E-04	2.21E-04	4.24E-03	1.13E-03	2.47E-03	2.29E-04	3.53E-05	4.41E-04	4.06E-03	4.41E-04	2.29E-04	2.29E-04	3.35E-03	4.41E-03	1.76E-05	6.55E-01
	Total - Fill	0.13	6.73E-04	3.36E-04	2.25E-01	2.02E-04	3.36E-04	7.62E-03	1.95E-03	4.52E-03	4.18E-04	4.97E-05	6.73E-04	8.30E-03	6.73E-04	3.47E-04	3.47E-04	9.47E-03	7.34E-03	1.49E-04	1.23E+00
Total Bridge Construction TAC Emissions:			2.38E-03	1.19E-03	8.36E-01	7.14E-04	1.19E-03	3.01E-02	7.53E-03	1.80E-02	1.66E-03	1.65E-04	2.38E-03	3.51E-02	2.38E-03	1.22E-03	1.22E-03	4.53E-02	2.76E-02	8.60E-04	4.97E+00

Hourly Toxic Air Contaminant Emissions Over Course of Bridge Construction (pounds/hour).

Toxic Air Contaminants (TAC):			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Overburden TAC Emission Factor (mg TAC /kg PM):			2.5	1.25	780	0.75	1.25	24	6.4	14	1.25	0.2	2.5	23	2.5	1.25	1.25	19	25	0.1	3712.8
Unpaved Roads TAC Emission Factor (mg TAC/kg PM):			2.5	1.25	1000	0.75	1.25	41	9.8	25	2.3	0.14	2.5	54	2.5	1.25	1.25	83	34	1.9	7099.2
Construction Phase	Component	Hourly PM_{10} (pounds/hr)	Hourly Toxic Air Contaminant Emissions (pounds/hour)																		
Excavation	Bulldozing, Scraping, and Grading	0.09	2.23E-07	1.11E-07	6.95E-05	6.68E-08	1.11E-07	2.14E-06	5.70E-07	1.25E-06	1.11E-07	1.78E-08	2.23E-07	2.05E-06	2.23E-07	1.11E-07	1.11E-07	1.69E-06	2.23E-06	8.91E-09	3.31E-04
	Material Handling	0.17	4.32E-07	2.16E-07	1.35E-04	1.30E-07	2.16E-07	4.15E-06	1.11E-06	2.42E-06	2.16E-07	3.46E-08	4.32E-07	3.97E-06	4.32E-07	2.16E-07	2.16E-07	3.28E-06	4.32E-06	1.73E-08	6.42E-04
	Dust Entrainment-Unpaved Roads	0.57	1.42E-06	7.09E-07	5.67E-04	4.25E-07	7.09E-07	2.33E-05	5.56E-06	1.42E-05	1.30E-06	7.94E-08	1.42E-06	3.06E-05	1.42E-06	7.09E-07	7.09E-07	4.71E-05	1.93E-05	1.08E-06	4.03E-03
	Wind Erosion-Active Areas	1.47	3.68E-06	1.84E-06	1.15E-03	1.10E-06	1.84E-06	3.53E-05	9.41E-06	2.06E-05	1.84E-06	2.94E-07	3.68E-06	3.38E-05	3.68E-06	1.84E-06	1.84E-06	2.79E-05	3.68E-05	1.47E-07	5.46E-03
	Total - Excavation	2.30	5.75E-06	2.88E-06	1.92E-03	1.73E-06	2.88E-06	6.48E-05	1.66E-05	3.84E-05	3.47E-06	4.26E-07	5.75E-06	7.05E-05	5.75E-06	2.88E-06	2.88E-06	8.00E-05	6.26E-05	1.25E-06	1.05E-02
Piles	Bulldozing, Scraping, and Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment-Unpaved Roads	0.57	1.42E-06	7.09E-07	5.67E-04	4.25E-07	7.09E-07	2.33E-05	5.56E-06	1.42E-05	1.30E-06	7.94E-08	1.42E-06	3.06E-05	1.42E-06	7.09E-07	7.09E-07	4.71E-05	1.93E-05	1.08E-06	4.03E-03
	Wind Erosion-Active Areas	0.29	7.35E-07	3.68E-07	2.29E-04	2.21E-07	3.68E-07	7.06E-06	1.88E-06	4.12E-06	3.68E-07	5.88E-08	7.35E-07	6.77E-06	7.35E-07	3.68E-07	3.68E-07	5.59E-06	7.35E-06	2.94E-08	1.09E-03
	Total - Piles	0.86	2.15E-06	1.08E-06	7.97E-04	6.46E-07	1.08E-06	3.03E-05	7.44E-06	1.83E-05	1.67E-06	1.38E-07	2.15E-06	3.74E-05	2.15E-06	1.08E-06	1.08E-06	5.27E-05	2.66E-05	1.11E-06	5.12E-03
Concrete Work	Bulldozing, Scraping, and Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment-Unpaved Roads	0.97	2.42E-06	1.21E-06	9.68E-04	7.26E-07	1.21E-06	3.97E-05	9.49E-06	2.42E-05	2.23E-06	1.36E-07	2.42E-06	5.23E-05	2.42E-06	1.21E-06	1.21E-06	8.04E-05	3.29E-05	1.84E-06	6.87E-03
	Wind Erosion-Active Areas	0.29	7.35E-07	3.68E-07	2.29E-04	2.21E-07	3.68E-07	7.06E-06	1.88E-06	4.12E-06	3.68E-07	5.88E-08	7.35E-07	6.77E-06	7.35E-07	3.68E-07	3.68E-07	5.59E-06	7.35E-06	2.94E-08	1.09E-03
	Total - Concrete Work	1.26	3.16E-06	1.58E-06	1.20E-03	9.47E-07	1.58E-06	4.68E-05	1.14E-05	2.83E-05	2.59E-06	1.94E-07	3.16E-06	5.90E-05	3.16E-06	1.58E-06	1.58E-06	8.59E-05	4.03E-05	1.87E-06	7.97E-03
Arch Culvert	Bulldozing, Scraping, and Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment-Unpaved Roads	0.59	1.47E-06	7.37E-07	5.90E-04	4.42E-07	7.37E-07	2.42E-05	5.78E-06	1.47E-05	1.36E-06	8.26E-08	1.47E-06	3.19E-05	1.47E-06	7.37E-07	7.37E-07	4.90E-05	2.01E-05	1.12E-06	4.19E-03
	Wind Erosion-Active Areas	0.29	7.35E-07	3.68E-07	2.29E-04	2.21E-07	3.68E-07	7.06E-06	1.88E-06	4.12E-06	3.68E-07	5.88E-08	7.35E-07	6.77E-06	7.35E-07	3.68E-07	3.68E-07	5.59E-06	7.35E-06	2.94E-08	1.09E-03
	Total - Arch Culvert	0.88	2.21E-06	1.11E-06	8.19E-04	6.63E-07	1.11E-06	3.12E-05	7.66E-06	1.89E-05	1.72E-06	1.41E-07	2.21E-06	3.86E-05	2.21E-06	1.11E-06	1.11E-06	5.46E-05	2.74E-05	1.15E-06	5.28E-03
MSE Walls	Bulldozing, Scraping, and Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Material Handling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dust Entrainment-Unpaved Roads	0.88	2.21E-06	1.11E-06	8.85E-04	6.64E-07	1.11E-06	3.63E-05	8.67E-06	2.21E-05	2.04E-06	1.24E-07	2.21E-06	4.78E-05	2.21E-06	1.11E-06	1.11E-06	7.35E-05	3.01E-05	1.68E-06	6.28E-03
	Wind Erosion-Active Areas	0.29	7.35E-07	3.68E-07	2.29E-04	2.21E-07	3.68E-07	7.06E-06	1.88E-06	4.12E-06	3.68E-07	5.88E-08	7.35E-07	6.77E-06	7.35E-07	3.68E-07	3.68E-07	5.59E-06	7.35E-06	2.94E-08	1.09E-03
	Total - MSE Walls	1.18	2.95E-06	1.47E-06	1.11E-03	8.84E-07	1.47E-06	4.33E-05	1.06E-05	2.62E-05	2.40E-06	1.83E-07	2.95E-06	5.46E-05	2.95E-06	1.47E-06	1.47E-06	7.90E-05	3.74E-05	1.71E-06	7.37E-03
Fill	Bulldozing, Scraping, and Grading	0.07	1.76E-07	8.81E-08	5.50E-05	5.28E-08	8.81E-08	1.69E-06	4.51E-07	9.86E-07	8.81E-08	1.41E-08	1.76E-07	1.62E-06	1.76E-07	8.81E-08	8.81E-08	1.34E-06	1.76E-06	7.05E-09	2.62E-04
	Material Handling	0.13	3.36E-07	1.68E-07	1.05E-04	1.01E-07	1.68E-07	3.23E-06	8.60E-07	1.88E-06	1.68E-07	2.69E-08	3.36E-07	3.09E-06	3.36E-07	1.68E-07	1.68E-07	2.55E-06	3.36E-06	1.34E-08	4.99E-04
	Dust Entrainment-Unpaved Roads	0.57	1.42E-06	7.09E-07	5.67E-04	4.25E-07	7.09E-07	2.33E-05	5.56E-06	1.42E-05	1.30E-06	7.94E-08	1.42E-06	3.06E-05	1.42E-06	7.09E-07	7.09E-07	4.71E-05	1.93E-05	1.08E-06	4.03E-03
	Wind Erosion-Active Areas	1.47	3.68E-06	1.84E-06	1.15E-03	1.10E-06	1.84E-06	3.53E-05	9.41E-06	2.06E-05	1.84E-06	2.94E-07	3.68E-06	3.38E-05	3.68E-06	1.84E-06	1.84E-06	2.79E-05	3.68E-05	1.47E-07	5.46E-03
	Total - Fill	2.24	5.61E-06	2.80E-06	1.87E-03	1.68E-06	2.80E-06	6.35E-05	1.63E-05	3.76E-05	3.40E-06	4.15E-07	5.61E-06	6.92E-05	5.61E-06	2.80E-06	2.80E-06	7.89E-05	6.12E-05	1.25E-06	1.02E-02
Maximum Hourly Bridge Construction TAC Emissions:			5.75E-06	2.88E-06	1.92E-03	1.73E-06	2.88E-06	6.48E-05	1.66E-05	3.84E-05	3.47E-06	4.26E-07	5.75E-06	7.05E-05	5.75E-06	2.88E-06	2.88E-06	8.59E-05	6.26E-05	1.87E-06	1.05E-02

Notes:

1. TAC emission factors obtained from sampling performed 11/20/2008 analyzed via EPA Methods 3060/7199 and 6020/7471A. Note, non-detect (ND) results were assumed to be 1/2 the detection limit. See Table 5A of 2008 CEIR.
2. Conversion Factors:
   2,000 lb/ton
   1,000,000 mg/kg

Summary: Combustion Sources - Off-road Diesel Equipment and On-Road Motor Vehicles.

Construction	Duration	PM_{10}		$PM_{2.5}$		CO		NOx		ROG		SOx		DPM		CO_2		CH_4		N_2O		CO_2e	
Phase	(Weeks)	(tons)	(lb/day)	(tons)	(lb/day)	(tons)	(lb/day)	(tons)	(lb/day)	(tons)	(lb/day)	(tons)	(lb/day)	(lb)	(lb/hr)	(tonne)	(lb/day)	(tonne)	(lb/day)	(tonne)	(lb/day)	(tonne)	(lb/day)
Excavation	3	0.01	1.04	0.01	1.04	0.07	8.69	0.30	40.10	0.02	2.57	0.00	0.03	15.51	0.13	48.92	7,189.59	0.00	0.42	0.00	0.19	49.37	7,255.80
Piles	5	0.01	0.62	0.01	0.62	0.08	6.29	0.31	24.43	0.01	1.07	0.00	0.03	15.24	0.08	48.55	4,280.97	0.00	0.25	0.00	0.11	48.99	4,320.25
Concrete Work	3	0.00	0.33	0.00	0.26	0.03	3.39	0.06	7.79	0.01	0.69	0.00	0.02	3.72	0.03	14.57	2,141.17	0.00	0.03	0.00	0.07	14.72	2,163.16
Arch Culvert	1	0.00	0.30	0.00	0.29	0.01	2.64	0.03	10.95	0.00	0.68	0.00	0.01	1.42	0.04	4.69	2,067.90	0.00	0.11	0.00	0.05	4.73	2,086.83
MSE Walls	1	0.00	0.26	0.00	0.21	0.01	2.79	0.02	6.19	0.00	0.56	0.00	0.02	0.98	0.02	3.90	1,717.71	0.00	0.03	0.00	0.05	3.94	1,735.26
Fill	3	0.01	0.82	0.01	0.81	0.05	6.92	0.23	31.32	0.02	2.03	0.00	0.03	12.11	0.10	38.34	5,635.73	0.00	0.33	0.00	0.15	38.70	5,687.55
Emissions Over Entire Period		0.03		0.02		0.23		0.94		0.06		0.00		48.97		158.96		0.01		0.00		160.44	
Max Daily/Hourly Emissions			1.04		1.04		8.69		40.10		2.57		0.03		0.13		7,189.59		0.42		0.19		7,255.80

Combustion Sources - Off-road Diesel Equipment and On-Road Motor Vehicles.

Construction	Duration		Usage	PM_{10}		$PM_{2.5}$		CO		NOx		ROG		SOx		DPM		CO_2		CH_4		N_2O		CO_2e	
Phase	(Weeks)	Vehicle Type	(hours)	(lb)	(lb/day)	(lb)	(lb/day)	(lb)	(lb/day)	(lb)	(lb/day)	(lb)	(lb/day)	(lb)	(lb/day)	(lb)	(lb/hr)	(tonne)	(lb/day)	(tonne)	(lb/day)	(tonne)	(lb/day)	(tonne)	(lb/day)
		Excavator	43	1.64	0.11	1.64	0.11	13.56	0.90	63.65	4.24	4.03	0.27	0.07	0.00	1.64	0.01	5.11	751.01	0.00	0.04	0.00	0.02	5.16	757.97
		Dozer	43	2.82	0.19	2.82	0.19	37.15	2.48	109.09	7.27	10.27	0.68	0.13	0.01	2.82	0.02	8.76	1,287.06	0.00	0.07	0.00	0.03	8.84	1,298.97
		Grader	43	1.39	0.09	1.39	0.09	14.02	0.93	53.78	3.59	3.93	0.26	0.06	0.00	1.39	0.01	4.32	634.51	0.00	0.04	0.00	0.02	4.36	640.39
Excavation	3	40-ton Trucks	181	8.92	0.59	8.92	0.59	53.09	3.54	345.50	23.03	17.84	1.19	0.19	0.01	8.92	0.07	27.73	4,076.34	0.00	0.24	0.00	0.11	27.99	4,114.08
		Water Truck	43	0.74	0.05	0.74	0.05	4.43	0.30	28.80	1.92	1.49	0.10	0.02	0.00	0.74	0.01	2.31	339.79	0.00	0.02	0.00	0.01	2.33	342.94
		Employee Vehicles	150 trips	0.13	0.01	0.08	0.01	8.03	0.54	0.71	0.05	0.99	0.07	0.02	0.00	0.00	0.00	0.69	100.88	0.00	0.00	0.00	0.00	0.69	101.46
		Total - Excavation		15.64	1.04	15.59	1.04	130.28	8.69	601.53	40.10	38.54	2.57	0.48	0.03	15.51	0.13	48.92	7,189.59	0.00	0.42	0.00	0.19	49.37	7,255.80
		Drill Rig	192	15.24	0.61	15.24	0.61	143.87	5.75	609.54	24.38	24.98	1.00	0.82	0.03	15.24	0.08	47.40	4,180.09	0.00	0.24	0.00	0.11	47.84	4,218.79
Piles	5	Employee Vehicles	250 trips	0.22	0.01	0.14	0.01	13.39	0.54	1.18	0.05	1.65	0.07	0.03	0.00	0.00	0.00	1.14	100.88	0.00	0.00	0.00	0.00	1.15	101.46
		Total - Piles		15.46	0.62	15.38	0.62	157.26	6.29	610.72	24.43	26.63	1.07	0.84	0.03	15.24	0.08	48.55	4,280.97	0.00	0.25	0.00	0.11	48.99	4,320.25
		HHDD Trucks	106 trips	4.78	0.32	3.78	0.25	42.75	2.85	116.19	7.75	9.30	0.62	0.29	0.02	3.72	0.03	13.88	2,040.29	0.00	0.03	0.00	0.07	14.03	2,061.70
Concrete Work	3	Employee Vehicles	150 trips	0.13	0.01	0.08	0.01	8.03	0.54	0.71	0.05	0.99	0.07	0.02	0.00	0.00	0.00	0.69	100.88	0.00	0.00	0.00	0.00	0.69	101.46
		Total - Concrete Work		4.91	0.33	3.86	0.26	50.78	3.39	116.90	7.79	10.29	0.69	0.31	0.02	3.72	0.03	14.57	2,141.17	0.00	0.03	0.00	0.07	14.72	2,163.16
		Crane	40	1.35	0.27	1.35	0.27	9.72	1.94	52.31	10.46	2.89	0.58	0.04	0.01	1.35	0.03	4.20	1,851.53	0.00	0.11	0.00	0.05	4.24	1,868.67
Arch Culvert	1	HHDD Trucks	2 trips	0.09	0.02	0.07	0.01	0.81	0.16	2.19	0.44	0.18	0.04	0.01	0.00	0.07	0.00	0.26	115.49	0.00	0.00	0.00	0.00	0.26	116.70
		Employee Vehicles	50 trips	0.04	0.01	0.03	0.01	2.68	0.54	0.24	0.05	0.33	0.07	0.01	0.00	0.00	0.00	0.23	100.88	0.00	0.00	0.00	0.00	0.23	101.46
		Total - Arch Culvert		1.48	0.30	1.45	0.29	13.21	2.64	54.74	10.95	3.40	0.68	0.05	0.01	1.42	0.04	4.69	2,067.90	0.00	0.11	0.00	0.05	4.73	2,086.83
		HHDD Trucks	28 trips	1.26	0.25	1.00	0.20	11.29	2.26	30.69	6.14	2.46	0.49	0.08	0.02	0.98	0.02	3.67	1,616.83	0.00	0.02	0.00	0.05	3.71	1,633.80
MSE Walls	1	Employee Vehicles	50 trips	0.04	0.01	0.03	0.01	2.68	0.54	0.24	0.05	0.33	0.07	0.01	0.00	0.00	0.00	0.23	100.88	0.00	0.00	0.00	0.00	0.23	101.46
		Total - MSE Walls		1.31	0.26	1.03	0.21	13.97	2.79	30.93	6.19	2.79	0.56	0.08	0.02	0.98	0.02	3.90	1,717.71	0.00	0.03	0.00	0.05	3.94	1,735.26
		Excavator	34	1.30	0.09	1.30	0.09	10.72	0.71	50.33	3.36	3.19	0.21	0.05	0.00	1.30	0.01	4.04	593.82	0.00	0.03	0.00	0.02	4.08	599.32
		Dozer	34	2.23	0.15	2.23	0.15	29.37	1.96	86.26	5.75	8.12	0.54	0.10	0.01	2.23	0.02	6.92	1,017.67	0.00	0.06	0.00	0.03	6.99	1,027.09
		Grader	34	1.10	0.07	1.10	0.07	11.08	0.74	42.52	2.83	3.10	0.21	0.05	0.00	1.10	0.01	3.41	501.71	0.00	0.03	0.00	0.01	3.45	506.35
Fill	3	40-ton Trucks	140	6.90	0.46	6.90	0.46	41.07	2.74	267.24	17.82	13.80	0.92	0.15	0.01	6.90	0.06	21.45	3,152.97	0.00	0.18	0.00	0.08	21.65	3,182.16
		Water Truck	34	0.59	0.04	0.59	0.04	3.50	0.23	22.77	1.52	1.18	0.08	0.01	0.00	0.59	0.00	1.83	268.67	0.00	0.02	0.00	0.01	1.84	271.16
		Employee Vehicles	150 trips	0.13	0.01	0.08	0.01	8.03	0.54	0.71	0.05	0.99	0.07	0.02	0.00	0.00	0.00	0.69	100.88	0.00	0.00	0.00	0.00	0.69	101.46
		Total - Fill		12.24	0.82	12.19	0.81	103.78	6.92	469.83	31.32	30.38	2.03	0.38	0.03	12.11	0.10	38.34	5,635.73	0.00	0.33	0.00	0.15	38.70	5,687.55

Notes:
1. Emissions based on assumed bridge construction schedule (documented separately), and emission factors, load factors, and equipment characteristics documented below.
2. Assumed operating schedule:
   2 commute hours/day
   8 hours/day
   5 days/week

Emission Factors for Off-Road Equipment.

Vehicle Type	Net HP[1]	Load Factor[2]	Emission Factors (grams/brake horsepower-hour)[3,4,5,6] PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx	CO_2	CH_4	N_2O
Excavators	380	57%	0.08	0.08	0.66	3.1	0.20	0.00	548.6	0.03	0.01
Crawler Tractors	580	64%	0.08	0.08	1.06	3.1	0.29	0.00	548.6	0.03	0.01
Graders	300	61%	0.08	0.08	0.81	3.1	0.23	0.00	548.6	0.03	0.01
Off-Highway Trucks	490	57%	0.08	0.08	0.48	3.1	0.16	0.00	548.6	0.03	0.01
Water Truck	490	20%	0.08	0.08	0.48	3.1	0.16	0.00	548.6	0.03	0.01
Bore/Drill Rigs	600	75%	0.08	0.08	0.76	3.2	0.13	0.00	548.6	0.03	0.01
Cranes	445	43%	0.08	0.08	0.58	3.1	0.17	0.00	548.6	0.03	0.01

Notes:
1. Average horsepower based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, May 15, 2010. If more than one equipment model (with differing horsepower specifications) is used, a composite average horsepower level is calculated for equipment type based on the anticipated equipment scheduling (in hours) for each model during each project phase.
2. Load factors derived from California Air Resources Board's OFFROAD2007 model (version dated December 15, 2006), "equip.csv" data file, available at http://www.arb.ca.gov/msei/offroad/offroad.htm.
3. Source for NOx and PM emission factors: California In-Use Off-Road Diesel-Fueled Vehicle Fleet Regulation - NOx and PM Target Emission Rates for Medium and Large Fleets, below. It is assumed that the construction ORD fleet will comply with the 2017 target emission rates for medium and large vehicle fleets.
4. Per AP-42 Chapter 3.3, Gasoline and Diesel Industrial Engines (Table 3.3-1 footnote b - all PM assumed to be < 1 µm diameter), assume:
   100% TSP:PM10 ratio
   100% PM10:PM2.5 ratio
5. Factors for ROG, CO and SOx based on South Coast Air Quality Management District, *Off-road Mobile Source Emission Factors* , October 2008 (available at http://www.aqmd.gov/CEQA/handbook/offroad/offroad.html), and data from the California Air Resources Board's OFFROAD2007 model.

6. GHG emission factors documented below.

2017 Emission Factors On-road Motor Vehicles for Santa Clara County - Other than Entrained Road Dust (units: pounds/mile) [1].

Vehicle Type	Trip Length (mi.)[4]	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx	Diesel PM	CO_2	CH_4	N_2O
HHDT-DSL[2]	34.554	0.00065206	0.00051614	0.00583573	0.01586060	0.00126934	0.00003998	0.00050747	4.17776093	0.00005961	0.00013744
Employee Commute[3]	5.059	0.00008676	0.00005472	0.00529352	0.00046771	0.00065325	0.00001053	0.00000031	0.99703211	0.00004914	0.00001515

Notes:
1. Emission factors for on-road motor vehicles were derived from California Air Resources Board's EMFAC2007 (version 2.3) model daily seasonal emissions inventories (summer, winter, and annual average) for vehicles in Santa Clara County.
2. Heavy-Heavy Duty Diesel Trucks.
3. Passenger Vehicles.
4. One-way trip length - two way trips used in calculations

California In-Use Off-Road Diesel-Fueled Vehicle Fleet Regulation - NOx and PM Target Emission Rates for Medium and Large Fleets.

Horsepower	Min	Max	NOx Fleet Average Targets (g/bhp-hr)										
Group	HP	HP	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
25-49 hp	25	49	5.8	5.6	5.3	5.1	4.9	4.6	4.4	4.2	4.0	3.7	3.5
50-74 hp	50	74	6.5	6.2	5.8	5.5	5.1	4.8	4.4	4.1	3.7	3.4	3.2
75-99 hp	75	99	7.1	6.7	6.2	5.7	5.2	4.8	4.3	3.8	3.3	2.8	2.4
100-174 hp	100	174	6.4	6.0	5.5	5.1	4.7	4.3	3.8	3.4	3.0	2.6	2.2
175-299 hp	175	299	6.2	5.8	5.3	4.9	4.5	4.1	3.6	3.2	2.8	2.3	1.9
300-599 hp	300	599	5.9	5.5	5.1	4.7	4.3	3.9	3.5	3.1	2.7	2.3	1.9
600-750 hp	600	750	6.1	5.6	5.2	4.8	4.4	4.0	3.6	3.2	2.7	2.3	1.9
> 750 hp	751	9999	7.2	6.8	6.5	6.1	5.7	5.3	4.9	4.5	4.1	3.8	3.4

Horsepower	Min	Max	DPM Fleet Average Targets (g/bhp-hr)										
Group	HP	HP	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
25-49 hp	25	49	0.46	0.46	0.39	0.39	0.29	0.29	0.21	0.21	0.12	0.12	0.08
50-74 hp	50	74	0.60	0.60	0.43	0.43	0.23	0.23	0.18	0.18	0.12	0.12	0.08
75-99 hp	75	99	0.62	0.62	0.46	0.46	0.24	0.24	0.19	0.19	0.13	0.13	0.07
100-174 hp	100	174	0.33	0.33	0.26	0.26	0.18	0.18	0.14	0.14	0.10	0.10	0.06
175-299 hp	175	299	0.23	0.23	0.16	0.16	0.11	0.11	0.08	0.08	0.06	0.06	0.03
300-599 hp	300	599	0.18	0.18	0.14	0.14	0.11	0.11	0.08	0.08	0.06	0.06	0.03
600-750 hp	600	750	0.20	0.20	0.14	0.14	0.11	0.11	0.08	0.08	0.06	0.06	0.03
> 750 hp	751	9999	0.30	0.30	0.24	0.24	0.18	0.18	0.11	0.11	0.08	0.08	0.06

Notes:
1. Source: California Code of Regulations, Title 13, Article 4.8, Chapter 9, Sections 2449.1 (NOx - Table 1) and 2449.2 (PM - Table 2).

GHG Emission Factors for Off-Road Diesel Vehicles.

Units	CO_2	CH_4	N_2O	CO_2e
g/gallon[1,2]	10,150	0.58	0.26	[5]
g/bhp-hr[3,4]	548.6	0.032	0.014	[5]

Notes:
1. CO_2 factor in grams/gallon is from California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.3 (Carbon Dioxide Emission Factors for Transport Fuels), available at http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html. Table C.3 provides a factor of 10.15 kg CO_2/gallon, or 10,150 g CO_2/gallon.
2. CH_4 and N_2O factors in grams/gallon is from California Climate Action Registry, General Reporting Protocol Version 3.1 (January 2009), Table C.6 (Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles.
3. According to the notes to Table C.3, CO_2 emission factors are derived using the carbon content of each fuel type and the molar mass ratio of carbon dioxide to carbon of 44/12. Furthermore, the factors assume 100% oxidation, consistent with IPCC inventory guidelines. To calculate CO_2 emission rates in grams/brake horsepower-hour, the following equation was employed: CO_2 = (19.95 kg C/MMBtu) * (44g CO_2/12g C) * 7,500 Btu/bhp-hr * 1,000 g/kg * 1 MMBtu/1,000,000 Btu. Source for the brake specific fuel combustion factor of 7,500 Btu/bhp-hr: Santa Barbara County Air Pollution Control District, Piston IC Engine Technical Reference Document (November 1, 2002), Table 6 (Default Engine Specifications), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.
4. To convert CH_4 and N_2O factors in g/gallon to g/bhp, the following equations were employed:
   CH_4 = 0.58 g CH_4/gallon * (1 gallon/137,000 Btu) * 7,500 Btu/bhp-hr = 0.032 g CH_4/bhp-hr, and
   N_2O = 0.26 g N_2O/gallon * (1 gallon/137,000 Btu) * 7,500 Btu/bhp-hr = 0.014 g N_2O/bhp-hr.
   Source for brake specific fuel combustion factor of 7,500 Btu/bhp-hr and diesel higher heating value: SBCAPCD (op cit.)
5. CO_2 equivalent emissions (CO_2e) calculated based on the global warming potentials in the IPCC's Second Assessment Report (SAR, 1996), as presented in the CCAR General Reporting Protocol (op cit.), Table C.1. CO_2e = 1 * CO_2, 21 * CH_4, and 310 * N_2O.

Anticipated Bridge Construction Equipment Schedule.

Construction Phase	Process Rate	Equipment	Type[4]	Engine Size (HP)	Units	Hours	Duration	Hours Operated in Week:[5] 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Excavation[1]	18,000 tons cut	Excavator	ORD	380	1	43	3 week(s)	14	14	14													
		Dozer	ORD	580	1	43		14	14	14													
		Grader	ORD	300	1	43		14	14	14													
		40-ton Trucks	ORD	490	4	181		60	60	60													
		Water Truck	ORD	490	1	43		14	14	14													
		Employee Veh.[3]	Hwy	--	10	150 trips		50	50	50													
Piles[2]	48 piles	Drill Rig	ORD	600	1	192	5 week(s)				38	38	38	38	38								
		Employee Veh.[3]	Hwy	--	10	250 trips					50	50	50	50	50								
Concrete Work[2]	850 cubic yards	HHDD Trucks	Hwy	--	106	106 trips	3 week(s)									35	35	35					
		Employee Veh.[3]	Hwy	--	10	150 trips										50	50	50					
Arch Culvert[2]	--	Crane	ORD	445	1	40	1 week(s)												40				
		HHDT Trucks	Hwy	--	2	2 trips													2				
		Employee Veh.[3]	Hwy	--	10	50 trips													50				
MSE Walls[2]	--	HHDD Trucks	Hwy	--	28	28 trips	1 week(s)													28			
		Employee Veh.[3]	Hwy	--	10	50 trips														50			
Fill[1]	14,000 tons fill	Excavator	ORD	380	1	34	3 week(s)														11	11	11
		Dozer	ORD	580	1	34															11	11	11
		Grader	ORD	300	1	34															11	11	11
		40-ton Truck	ORD	490	4	140															47	47	47
		Water Truck	ORD	490	1	34															11	11	11
		Employee Veh.[3]	Hwy	--	10	150 trips															50	50	50
Total - All Phases	--	Excavator	ORD	380	1	77	16 week(s)	14	14	14											11	11	11
		Crawler Tractor	ORD	580	1	77		14	14	14											11	11	11
		Grader	ORD	300	1	77		14	14	14											11	11	11
		Off-Highway Truck	ORD	490	4	321		60	60	60											47	47	47
		Water Truck	ORD	490	1	77		14	14	14											11	11	11
		Bore/Drill Rig	ORD	600	1	192					38	38	38	38	38								
		Crane	ORD	445	1	40													40				
		HHDT Trucks	Hwy	--	--	136 trips										35	35	35	2	28			
		Employee Veh.	Hwy	--	10	800 trips		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50

Notes:
1. Information on process rates and hours for the excavation and fill phases from Lehigh Southwest Cement Company, May 12, 2010.
2. Information on process rates and hours for the piles, concrete work, arch culvert, and MSE walls phases from Pace Engineering, January 12, 2010.
3. For employee commute vehicles, it is assumed that there will be a maximum of 10 employees commuting to the bridge construction site each day, and that employee commute trips would happen 10 hours each week (one hour in the morning, one hour in the afternoon, five days each week).
4. ORD refers to off-road diesel equipment, Hwy refers to on-road motor vehicles.
5. Scheduling assumes that there will not be any overlap between bridge construction phases, and that each phase occurs over a minimum number of weeks, based on anticipated equipment scheduling.

Assumed Off Road Diesel Vehicle Inventory.

Vehicle Type	Model	Net HP	Notes
Excavator	Cat 345	380	
Crawler Tractor	Cat D10	580	Tracked dozer
Grader	Cat G16	300	
Off-Highway Truck	Cat 769	490	40-ton payload
Water Truck	Cat 769	490	Cat 769 chassis assumed
Bore/Drill Rig	IR DM45	600	
Crane	Link-Belt HTC-8690	445	90-ton hydraulic truck crane

Notes:
1. Equipment information (model and horsepower) assumed to be the same as provided for the proposed project, except for the water truck and crane.
2. The water truck is assumed to be based on a 490-HP Caterpillar 769 chassis.
3. The crane is assumed to be a 90-ton Link-Belt HTC-8690 hydraulic truck crane. Information on the unit's net horsepower from Link-Belt Cranes specifications, available at http://www.linkbelt.com/lit/home_cranes1.htm.

Anticipated Bridge Construction Fugitive Dust-Related Process Rates.

Construction Phase	Duration	Fugitive Dust Emitting Processes				
		Bulldozing, Scraping, & Grading[1]	Material Handling[1]	Dust Entrainment[2]		Active Disturbed Area[3]
				HHDD Trucks	Employee Commute	
Excavation	3 week(s)	86 hours	18,000 tons	--	507.0 miles	5 acres
Piles	5 week(s)	--	--	--	845.0 miles	1 acres
Concrete Work	3 week(s)	--	--	358.3 miles	507.0 miles	1 acres
Arch Culvert	1 week(s)	--	--	6.8 miles	169.0 miles	1 acres
MSE Walls	1 week(s)	--	--	94.6 miles	169.0 miles	1 acres
Fill	3 week(s)	68 hours	14,000 tons	--	507.0 miles	5 acres
Totals:	16 week(s)	154 hours	32,000 tons	459.7 miles	2,704.0 miles	3 acres

Notes:

1. See Anticipated Bridge Construction Equipment Schedule, documented separately, for duration, bulldozing/scraping/grading hours, and material handling.
2. Miles for dust entrainment based on vehicle trips from Anticipated Bridge Construction Equipment Schedule, and miles traveled per trip on onpaved roads to reach the bridge construction site, estimated to be:
   1.69 miles/trip
3. Values for active disturbed area are assumed: for periods during which there will be excavation and fill activities, the area reflects a more extensive disturbed area associated with earth moving; for other periods, the area represents the area including and immediately surrounding the bridge construction site.

Average Vehicle Weight.

Vehicle Type	Miles Traveled	Vehicle Weight[1]	Ton-Miles[2]
Heavy-heavy Duty Diesel Trucks	459.7 miles	27.5 tons	12,641.2 ton-miles
Employee Commute Vehicles	2,704.0 miles	2.4 tons	6,489.6 ton-miles
Totals - Entire Fleet	3,163.7 miles	6.0 tons (average)	19,130.8 ton-miles

Notes:

1. Heavy-heavy duty diesel trucks (HHDDTs) assumed to be 40 tons loaded and 15 tons unloaded (average weight of 27.5 tons). Source for average employee commute vehicle weight: California Air Resources Board, Entrained Dust from Paved Road Travel: Emission Estimation Methodology Background Document, Section 7.9, Table 3 (Silt Loadings and Emission Factors for California Entrained Paved Road Dust Estimates), average vehicle weight for Santa Clara County (2.4 tons).
2. Used to calculate average vehicle weight for total fleet.

South Coast AQMD Off-Road 2017 Emission Factors for Selected Off-Road Diesel Equipment from the California Air Resources Board's Off-Road Emissions Model.[1]

Equipment	Minimum HP	Maximum HP	Average HP[2]	South Coast AQMD Hourly Emission Rates (lb/hr)[3]							Emission Factors Based on Average HP (g/hp-hr)[4]						
				ROG	CO	NOx	SOx	PM[5]	CO_2	CH_4	ROG	CO	NOx	SOx	PM	CO_2	CH_4
Bore/Drill Rigs	1	15	11	0.0120	0.0632	0.0754	0.0002	0.0029	10.3	0.0011	0.50	2.60	3.11	0.01	0.12	426.61	0.04
	16	25	17	0.0193	0.0658	0.1219	0.0002	0.0046	16.0	0.0017	0.51	1.76	3.25	0.01	0.12	426.61	0.05
	26	50	33	0.0210	0.2215	0.1992	0.0004	0.0044	31.0	0.0019	0.29	3.04	2.74	0.01	0.06	426.61	0.03
	51	120	82	0.0326	0.4667	0.2962	0.0009	0.0095	77.1	0.0029	0.18	2.58	1.64	0.01	0.05	426.61	0.02
	121	175	150	0.0519	0.7541	0.3589	0.0016	0.0121	141	0.0047	0.16	2.28	1.09	0.00	0.04	426.61	0.01
	176	250	200	0.0580	0.3426	0.3124	0.0021	0.0088	188	0.0052	0.13	0.78	0.71	0.00	0.02	426.61	0.01
	251	500	331	0.0955	0.5511	0.5035	0.0031	0.0145	311	0.0086	0.13	0.76	0.69	0.00	0.02	426.61	0.01
	501	750	654	0.1891	1.0890	1.0018	0.0062	0.0287	615	0.0171	0.13	0.76	0.69	0.00	0.02	426.61	0.01
	751	1000	987	0.3016	1.6457	4.3972	0.0093	0.0855	928	0.0272	0.14	0.76	2.02	0.00	0.04	426.61	0.01
Cranes	1	50	43	0.0709	0.2588	0.2087	0.0003	0.0168	23	0.0064	0.75	2.73	2.20	0.00	0.18	244.59	0.07
	51	120	93	0.0690	0.3509	0.4155	0.0006	0.0341	50	0.0062	0.34	1.71	2.03	0.00	0.17	244.59	0.03
	121	175	149	0.0807	0.4774	0.5549	0.0009	0.0314	80	0.0073	0.25	1.45	1.69	0.00	0.10	244.59	0.02
	176	250	208	0.0830	0.2572	0.6832	0.0013	0.0235	112	0.0075	0.18	0.56	1.49	0.00	0.05	244.59	0.02
	251	500	334	0.1262	0.4243	0.9704	0.0018	0.0351	180	0.0114	0.17	0.58	1.32	0.00	0.05	244.59	0.02
	501	750	562	0.2137	0.7132	1.6890	0.0030	0.0602	303	0.0193	0.17	0.58	1.36	0.00	0.05	244.59	0.02
	751	9999	1800	0.7823	2.5343	8.2827	0.0098	0.2344	971	0.0706	0.20	0.64	2.09	0.00	0.06	244.59	0.02
Crawler Tractors	1	50	31	0.0876	0.2947	0.2312	0.0003	0.0197	24.9	0.0079	1.28	4.31	3.38	0.00	0.29	364.04	0.12
	51	120	82	0.1008	0.4707	0.5971	0.0008	0.0489	65.8	0.0091	0.56	2.60	3.30	0.00	0.27	364.04	0.05
	121	175	151	0.1347	0.7342	0.9293	0.0014	0.0522	121	0.0122	0.40	2.21	2.79	0.00	0.16	364.04	0.04
	176	250	207	0.1413	0.4308	1.1399	0.0019	0.0426	166	0.0127	0.31	0.94	2.50	0.00	0.09	364.04	0.03
	251	500	323	0.2069	0.7531	1.5987	0.0025	0.0609	259	0.0187	0.29	1.06	2.25	0.00	0.09	364.04	0.03
	501	750	579	0.3726	1.3475	2.9402	0.0047	0.1106	465	0.0336	0.29	1.06	2.30	0.00	0.09	364.04	0.03
	751	1000	820	0.5672	2.1186	6.0245	0.0066	0.1793	658	0.0512	0.31	1.17	3.33	0.00	0.10	364.04	0.03
Excavators	1	25	23	0.0198	0.0677	0.1253	0.0002	0.0047	16.4	0.0018	0.39	1.33	2.47	0.00	0.09	324.22	0.04
	26	50	35	0.0521	0.2568	0.2082	0.0003	0.0128	25.0	0.0047	0.68	3.33	2.70	0.00	0.17	324.22	0.06
	51	120	103	0.0760	0.5042	0.4840	0.0009	0.0340	73.6	0.0069	0.33	2.22	2.13	0.00	0.15	324.22	0.03
	121	175	157	0.0896	0.6644	0.5783	0.0013	0.0308	112	0.0081	0.26	1.92	1.67	0.00	0.09	324.22	0.02
	176	250	222	0.0992	0.3354	0.6878	0.0018	0.0231	159	0.0090	0.20	0.69	1.41	0.00	0.05	324.22	0.02
	251	500	327	0.1415	0.4762	0.8988	0.0023	0.0323	234	0.0128	0.20	0.66	1.25	0.00	0.04	324.22	0.02
	501	750	542	0.2356	0.7890	1.5359	0.0039	0.0544	387	0.0213	0.20	0.66	1.29	0.00	0.05	324.22	0.02
Graders	1	50	36	0.0743	0.2932	0.2387	0.0004	0.0176	27.5	0.0067	0.94	3.69	3.01	0.00	0.22	346.97	0.08
	51	120	98	0.0928	0.5166	0.5753	0.0009	0.0447	75.0	0.0084	0.43	2.39	2.66	0.00	0.21	346.97	0.04
	121	175	162	0.1135	0.7301	0.7781	0.0014	0.0429	124	0.0102	0.32	2.04	2.18	0.00	0.12	346.97	0.03
	176	250	225	0.1180	0.3848	0.9383	0.0019	0.0321	172	0.0106	0.24	0.78	1.89	0.00	0.06	346.97	0.02
	251	500	300	0.1497	0.5344	1.1139	0.0023	0.0400	229	0.0135	0.23	0.81	1.68	0.00	0.06	346.97	0.02
	501	750	635	0.3187	1.1303	2.4323	0.0049	0.0862	486	0.0288	0.23	0.81	1.74	0.00	0.06	346.97	0.02
Off-Highway Trucks	1	175	175	0.1712	0.6931	0.9973	0.0011	0.0834	94	0.0154	0.44	1.80	2.58	0.00	0.22	242.96	0.04
	176	250	233	0.1697	0.8122	1.1987	0.0015	0.0677	130	0.0153	0.33	1.58	2.33	0.00	0.13	253.89	0.03
	251	500	381	0.1344	0.4001	1.1003	0.0015	0.0446	130	0.0121	0.16	0.48	1.31	0.00	0.05	155.27	0.01
	501	750	618	0.5434	2.2170	4.4309	0.0057	0.1765	568	0.0490	0.40	1.63	3.25	0.00	0.13	416.99	0.04
	751	1000	874	0.8220	3.4738	8.4378	0.0082	0.2696	814	0.0742	0.43	1.80	4.38	0.00	0.14	422.60	0.04

Notes:

1. Source: South Coast Air Quality Management District, *Off-road Mobile Source Emission Factors*, October 2008 (available at http://www.aqmd.gov/CEQA/handbook/offroad/offroad.html).
2. Average horsepower data from California Air Resources Board's OFFROAD2007 model equip.csv input file (version dated Dated December 15, 2006).
3. Emission rates in pounds per hour from South Coast Off-Road Mobile Source Emission Factor spreadsheet for 2017.
4. Emission factors derived from the South Coast AQMD hourly emission rates and average engine horsepower for each class, assuming 453.59 grams per pound.
5. Assume PM = PM_{10} = $PM_{2.5}$

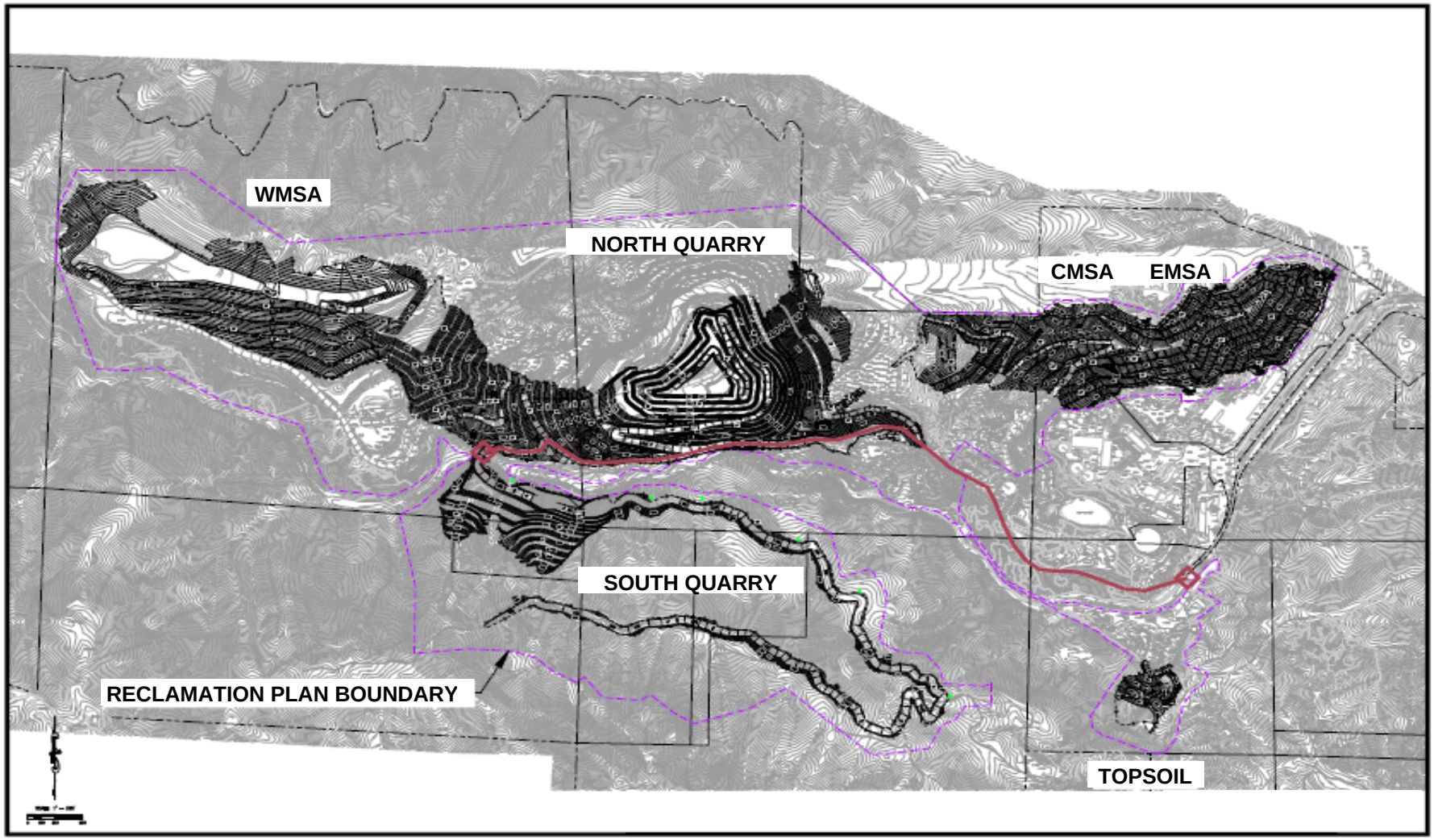
On-road Motor Vehicle Emission Factors for 2017.

		Annual Emission Factors[2]			Daily/Hourly Emission Factors[3]		
Parameter	Units	Heavy-heavy Duty Trucks - Diesel[4]	Passenger Vehicles[5]	Medium Duty Vehicles[6]	Heavy-heavy Duty Trucks - Diesel[4]	Passenger Vehicles[5]	Medium Duty Vehicles[6]
Criteria Pollutants[7]							
CO	lb/mile	0.00553154	0.00518230	0.00696687	0.00583573 (Win)	0.00529352 (Sum)	0.00711366 (Sum)
NOx	lb/mile	0.01547678	0.00048190	0.00082506	0.01586060 (Sum)	0.00046771 (Sum)	0.00080099 (Sum)
ROG	lb/mile	0.00128339	0.00059600	0.00068106	0.00126934 (Sum)	0.00065325 (Sum)	0.00071107 (Sum)
SOx	lb/mile	0.00003988	0.00000965	0.00001455	0.00003998 (Sum)	0.00001053 (Sum)	0.00001586 (Sum)
PM_{10}	lb/mile	0.00064906	0.00008676	0.00012100	0.00065206 (Win)	0.00008676 (Win)	0.00012100 (Win)
$PM_{2.5}$	lb/mile	0.00051339	0.00005472	0.00008649	0.00051614 (Win)	0.00005472 (Win)	0.00008649 (Win)
Diesel Particulates[8]							
DPM_{10}	lb/mile	0.00050747	0.00000031	0.00000018	0.00050747 (Ann)	0.00000031 (Ann)	0.00000018 (Ann)
$DPM_{2.5}$	lb/mile	0.00046688	0.00000029	0.00000017	0.00046688 (Ann)	0.00000029 (Ann)	0.00000017 (Ann)
Greenhouse Gases[9]							
CO_2	lb/mile	4.17776093	0.99703211	1.50337358	4.17776093 (Ann)	0.99703211 (Ann)	1.50337358 (Ann)
CH_4	lb/mile	0.00005961	0.00004914	0.00007456	0.00005961 (Ann)	0.00004914 (Ann)	0.00007456 (Ann)
N_2O	lb/mile	0.00013744	0.00001515	0.00002608	0.00013744 (Ann)	0.00001515 (Ann)	0.00002608 (Ann)
EMFAC Trips[10]							
Trip Distance	mi/trip	34.554	5.059	5.544	34.554 (Ann)	5.059 (Ann)	5.544 (Ann)

Notes:

1. Emission factors for on-road motor vehicles were derived from California Air Resources Board's EMFAC2007 (version 2.3) model daily seasonal emissions inventories (summer, winter, and annual average) for vehicles in Santa Clara County.
2. Source: EMFAC2007 model 2017 annual average emission inventory for Santa Clara County.
3. Source: EMFAC2007 model 2017 seasonal average emission inventories for Santa Clara County, as follows: a) emission factors for diesel particulates and greenhouse gases, as well as average trip distances, are based on annual average data; b) emission factors for NOx and ROG (both ozone precursors) are based on summer season data since peak ozone levels are typically observed in the summer; c) emission factors for the remaining pollutants (CO, SOx, PM_{10}, and $PM_{2.5}$) are based on peak emission rates observed between the winter and summer seasons. Note that "(Ann)" indicates that a factor is based on annual average data, "(Sum)" indicates that a factor is based on summer season data, and that "(Win)" indicates that a factor is based on winter season data.
4. Includes the following vehicle class: Heavy-Heavy-Duty Trucks (33,001 to 60,000 pounds) - diesel-fueled vehicles only.
5. Includes the following vehicle classes: Light Duty Autos, Light Duty Trucks, & Medium Duty Vehicles (8,500 pounds curb weight and under).
6. Includes the following vehicle class: Medium Duty Vehicles (5,751 to 8,500 pounds curb weight).
7. Criteria pollutant emission factors include total emissions for each pollutant. In addition to exhaust emissions, ROG factors include diurnal, hot soak, running loss, and resting loss emissions, and PM_{10} and $PM_{2.5}$ factors include emissions from brake wear and tire wear.
8. Diesel particulate emission factors include only exhaust PM emissions from diesel vehicles. For calculation purposes, DPM_{10} (diesel particulates sized 10 microns and smaller) is used to represent diesel particulate matter (DPM).
9. Greenhouse gas emission factors for carbon dioxide (CO_2) and methane (CH_4) based on EMFAC2007 exhaust emissions for each compound. Factors for nitrous oxide (N_2O) are based on the California Air Resources Board's methodology described in *California's 1990-2004 Greenhouse Gas Emissions Emissions Inventory and 1990 Emissions Level: Technical Support Document* , May 2009, pp 28-29 (available at http://www.arb.ca.gov/cc/inventory/doc/doc.htm). For diesel vehicles, N_2O emissions are based on an ARB-observed N_2O emission rate per gallon of diesel fuel. For gasoline vehicles, N_2O emissions are based on a linear correlation of N_2O emissions to NOx exhaust emissions.
10. Based on EMFAC2007 emission inventories for Santa Clara County.

Figure D-1 - Bridge Construction Unpaved Road.



Rock Plant to Permanente Creek Bridge Crossing: —— 8,900 linear feet (1.69 miles)

Appendix E

Vegetation Greenhouse Gas Inventory and Analysis Technical Report

Forester's Co-Op
Professional Forestry &
GIS - Geographic Information Services

Vegetation Greenhouse Gas Inventory and Analysis Technical Report

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Permanente Quarry Reclamation Plan Amendment and Condition Use Permit Project Santa Clara County, California

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Date Prepared:
May 21, 2010

Prepared by:
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Forester's Co-Op
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Table of Contents

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Executive Summary

Lehigh Southwest Cement Company (Lehigh) has commissioned this Vegetation Greenhouse Gas (GHG) Inventory and Analysis Technical Report to collect analytical filed data and provide an analysis of greenhouse gases (GHG) accounting in connection with the removal, replacement and preservation of certain vegetation communities (i.e., carbon stocks).

This Report sets forth an inventory of existing and projected future carbon stocks in the 1,105-acre area covered by the proposed Reclamation Plan Amendment (Project Area). This Report also contains existing and future carbon inventories for an additional 2,405 acres representing the remainder of Lehigh's 3,510 acre property outside of the Project Area, including a 345-acre Preservation Area located adjacent to the Project Area.

The conclusions reached by this Report are as follows:

- The Project Area contains an a total inventory of approximately 118,655 metric tonnes of GHG, representing existing and future mining areas, and buffer areas which will not be disturbed
- Within the Project Area, an estimated 66,583 metric tonnes of GHG is stored within existing and future mining areas which excludes buffers
- Implementation of the proposed project will initially result in a decrease to overall GHG storage, mainly due to vegetation removal in the South Quarry
- The project proposes reclamation activities which will result in the eventual capture of 74,548 metric tonnes of carbon, a net gain of 8,435 metric tonnes (11 percent) over existing inventories in the Project area at the 50-year interval
- Lehigh's property beyond the Project Area contains an estimated 564,188 metric tonnes of carbon stocks in 2,205 acres; approximately 44,249.9 metric tonnes of GHG-carbon stock which can be considered as surplus when compared to current protocol baseline data.
- Lehigh has identified a 345-acre Preservation Area outside of the Project Area; the Preservation Area contains approximately 6,649.5 metric tonnes of GHG-carbon stock which can be considered as surplus when compared to current protocol baseline data.

Introduction

This Vegetation Greenhouse Gas (GHG) Inventory and Analysis Technical Report contains analytical field data and provides an analysis of greenhouse gases (GHG) accounting in connection with the removal, replacement and preservation of vegetation communities (i.e., carbon stocks) in an approximate 1,105-acre Project Area covered by the proposed reclamation Plan Amendment and other portions of Lehigh's property. The Reclamation Plan Amendment (RPA) reflects Lehigh's commitment to reclaim mined lands, i.e., to "minimize water degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion and other adverse effects from surface mining operations, so that minded lands are reclaimed to a usable condition which is readily adaptable for alternative land uses and create no danger to health or safety" (Pubic Resource Code Section 2733).

This Vegetation GHG Technical Report inventories and assesses the present and future forest/vegetation-related GHGs within each area covered by the RPA. The assessment of GHG emissions, sequestration and forest carbon stocks within this area is a complex undertaking. On the one hand, activities allowed under the CUP would remove existing vegetation (i.e. carbon stocks) and convert lands to non-forest use, liberating GHG in the process. At the same time, concurrent reclamation will result in re-vegetation and reforestation in non-forested areas, as well as leaving certain forested areas intact, which would remove GHG from the atmosphere and provide for a carbon sink within the Lehigh ownership.

This Technical Report adopts the following objectives:

1. Implement a forest carbon field inventory protocol within the Project Area which is representative of all identified vegetation types.
2. Calculate and report current existing GHG carbon stocks for all forest resource pools within the Project Area.
3. Provide future projections of GHG sequestration of forest carbon stock levels utilizing planting scheme outlined in the re-vegetation plan contained in the RPA.
4. Utilizing data from the carbon field inventory protocol to extrapolate and expand GHG calculations so as to estimate current existing GHG carbon stocks for the forested areas outside the Project Area, comprising approximately 2,405 acres.

The scope of this Technical Report is to inventory, calculate, and report current and project future forest GHG stocks utilizing the best available information and proposed re-vegetation plans pursuant to evaluation methods that are currently utilized under the California Environmental Quality Act (CEQA). To the extent that future project changes are contemplated (i.e., as a result of project revisions or changes to mitigation measures), additional forest carbon stock data and analysis may be required to update this Technical Report.

Description of Project

The Permanente Quarry (Quarry) is a limestone and aggregate mining operation in the unincorporated foothills of western Santa Clara County (County), located approximately two miles west of the City of Cupertino. The Quarry occupies a portion of a 3,510-acre property owned by Hanson Permanente Cement, Inc., and is operated by Lehigh Southwest Cement Company (collectively, Lehigh).

The proposed project is the County's approval of an amendment to the Quarry's current reclamation plan. The amendment (hereinafter, the RPA) would broaden the existing reclamation plan to include areas currently disturbed by mining activities, and lands scheduled to be disturbed by mining over approximately the next 20 years. The RPA would incorporate 1,105 acres (hereinafter, the Project Area) of Lehigh's 3,510-acre ownership. The proposed post-mining use for the Project Area is open space. The project also includes the County's approval of a Conditional Use Permit (CUP) for certain future mining operations within the Project Area. The CUP would allow mineral extraction, loading and hauling on approximately 117 acres, representing a portion of the approximately 206.5 acre area known as the South Quarry. Mined rock would be transported to existing facilities in other parts of the Quarry for processing.

Project Physical Description/Location

The Project Area encompasses 1,105 acres and is located in T7S, R2W portions of Section 16, 17, 18, 19, 20, 21 MDB&M approximately two air miles west of Cupertino, CA. The project stretches over two Calwater planning watersheds. The southern portion of the project lies within the Stevens Creek Reservoir watershed and the northern portion of the project falls within the Permanente Creek Calwater watershed, all within Santa Clara County. The Project Area contains a number of unnamed Class II and III watercourses that eventually flow north into Permanente Creek, a Class I watercourse located just north of the Project Area boundary. Four Natural Resource Conservation Service (NRCS) soil types have been identified within the project boundary; Los Gatos – Maymen Stony soils, Permanente stony soils, Los Gatos clay loam, and Maymen loam. The climate consists of moderate winter temperatures followed by warm, arid temperatures during the summer. The annual precipitation for the area ranges from 20-25 inches per year, typically as rain. The elevations range from approximately 500 feet to approximately 2,000 feet above mean sea level, with slopes ranging from 0 to 65%.

The Project Area falls primarily within the mixed hardwood Central California Coast ecotype. The elevation and coastal influence provides for a diverse mix of vegetation. The northern facing slopes of the Project Area, when compared to the southern facing slopes, host a variety of vegetative communities. This difference is mainly due to the cool, moist conditions of the northern facing slopes which support stands of mixed oak woodlands. The southern facing slopes' exposure to sun and heat supports mixed-chaparral, mixed shrub and patches of grassland communities.

Currently, the vegetation in the Project Area is comprised of 501 acres of mixed chaparral, shrubs, mixed oak woodland, and grassland communities. The remaining 604 acres is comprised of non-vegetated active quarry area, roads or rock-outcrops. On the

southern facing slopes, mixed chaparral shrub species are the dominate plant communities and includes identified native species: *Baccharis pilularis* (coyote brush), *Quercus berberidifolia* (scrub oak), *Adenostoma fasciculatum* (chamise), *Heteromeles arbutifolia* (toyon), and *Toxicodendron diversilobum* (poison oak). The north-facing slopes and ravines overstory species includes: *Quercus agrifolia* (coast live oak), *Umbellularia californica* (California bay), *Aesculus californica* (California buckeye), and *Q. berberidfolia* (scrub oak). The dominant brush species within the understory of the oak woodlands on the northern facing slopes are *B. pilularis* (coyote brush) and *T. diversilobum* (poison oak).

The map on the following page illustrates the general location of the Project Area boundary.

Regulatory GHG Guidance

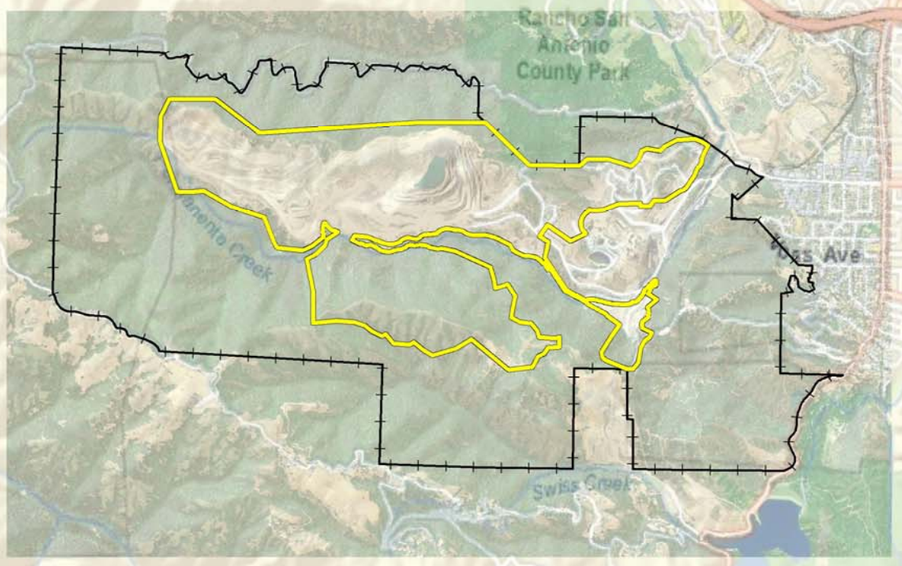
In 2006, the California Governor signed into law Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006. In the wake of AB 32, the analysis of GHGs as part of the CEQA environmental review has been the subject of regulatory guidance. In April 2009, the Office of Planning and Research submitted amendments to the CEQA guidelines (Code of Regulations, Title 14, Section 15000, et seq.) concerning the analysis of GHG. The proposed amendments were adopted by the Natural Resources Agency in July 2009 and became effective in March 2010. The guidelines are intended to provide clarity to various industry groups, developers, environmentalists, and state agencies over how GHG emissions should be treated during CEQA reviews. However, the CEQA guidelines do not outline quantification methods in assessing GHG emissions. To quantify the vegetative GHG the Climate Action Reserve's (CAR) Forest Project Protocol 3.1 methodology was implemented. The following are important amendments that give guidance to lead agencies regarding the assessment and mitigation of impacts related to the emission of GHGs:

- Section 15064.4 – "Determining the Significance of Impacts from Greenhouse Gas Emissions"
- Subsection 15126.4(c) - "Mitigation Measures Related to Greenhouse gas Emissions"
- Section 15183.5 – "Tiering and Streamlining the Analysis of GHG Emissions"

Reclamation Plan Amendment Project

Permanente Quarry

Santa Clara County, California



Reclamation Plan Amendment Project Area Boundary (1,105 Acres)

Lehigh Property (3,510 Acres)

N

0 0.5 1 Miles

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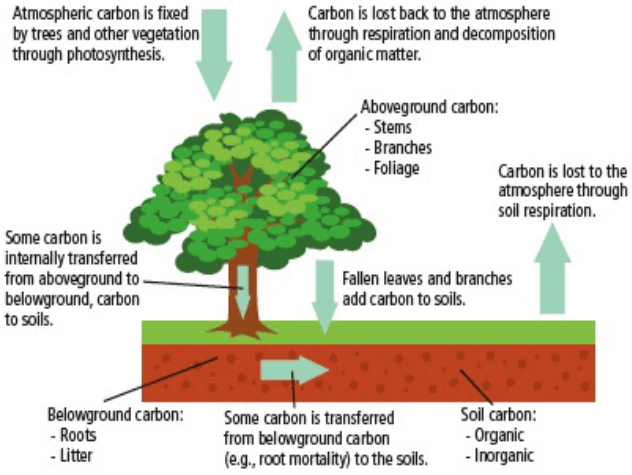
Prepared April 2010

Section 1- Forest Carbon Resources

Forest Carbon Cycle

Plants have evolved specialized systems that enable them to convert carbon dioxide and water into carbon sugars, oxygen (O_2), and water by a process known as photosynthesis. The CO_2 emissions produced by fossil fuels, cement industries, and humans are in part taken up by plants, synthesized and stored. The capture and synthesis of CO_2 is crucial to the ecosystem's reduction of greenhouse gas emissions. Plants capture carbon through epidermal pores called stomata (which are most abundant in the leaf), then synthesizes the CO_2, via photosynthesis into plant building carbon sugars. Finally, those carbon sugars are stored in the plants cellular biomass (trunk/bole, leaves, stems, branches, roots, etc.). During this process, O_2 is released as a by-product of photosynthesis through the stomata. Photosynthesis binds approximately 100 billion metric tons of carbon per year into carbon compounds (Raven, p.136). Nationally, carbon sequestration offset removed 13 percent of total greenhouse gas emissions in 2006 (EPA, 2006). The diagram below depicts the forest carbon cycle.



Source: U.S. Environmental Protection Agency

The amount of carbon stored in a plant's biomass is dependent upon different variables including age, natural/unnatural disturbances, growth rates, and chemical elements. For example, younger trees will synthesize and store larger quantities of carbon than compared to older trees. This is due to specific growth phases of their life cycle; requiring large amounts of nutrients (i.e. carbon sugars, etc.) to be consumed in order to reach full maturity. Plants release stored carbon, through oxidation or decomposition, into the atmosphere. The release of stored carbon could be due to human and/or natural disturbances such as wildfire, disease, pests, or harvesting.

Forest Carbon Quantification Guidelines

There exist a direct correlation between forest biomass volumetric inventories and forest carbon stocks inventories that allow for quantification of carbon stocks using traditional forest inventory methods. The chosen conversion protocol for use in this Technical Report is the recently approved Climate Action Registry (CAR) Forest Project Protocol (FPP) 3.1 methodologies and

guidelines. In October 2009 the FPP 3.1 was approved by CAR, and hence forward serves as a guide designed to address not only forests' ability to sequester and emit GHG, but how a forest carbon baseline is established so that long term approaches for monitoring forest carbon change can be established. In detail, the FPP 3.1 outlines information and evaluation methods for measuring and calculating carbon quantities in California's unique forestlands. The project's forest GHG quantification and analysis has been developed in reference to these guidelines. The CAR methodology was chosen as method to quantify the vegetative GHG on the site which will satisfy the CEQA guidelines.

Section 2 - GHG Inventory Methods and Measurements

The two goals of the carbon field inventory protocol is to: 1) establish randomly located pre-identified plot locations within the Project Area and 2) accurately measure all forest carbon pools outlined in CAR-FPP Version 3.1. A secondary effort followed these same goals to randomly establish plots outside the Project Area for data extrapolation to create an estimation of sequestered GHG within all vegetation types found outside the Project Area boundary and within Lehigh's 3,510 acre property (Refer to Appendix A).

During the week of January 25th – 29th, Forester's Co-Op and WRA personnel implemented the forest carbon field inventory protocol for this project. The standing forest within the proposed South Quarry exhibits all vegetation types that are represented within the Project Area, hence field inventory focused on the South Quarry as a reference for developing a site-wide inventory. Utilizing GIS point shape files imported into a Trimble GeoXH GPS, inventory crews navigated to pre-designated locations. Plots were distributed throughout the South Quarry on a 550' x 550' grid. Inventory crews established a total of 37 plots, approximately 1 plot every 8.2 acres within the South Quarry. A total of 501 acres of vegetation is identified within the Project Area, excluding active quarry sites, roads, rock outcrops, and disturbed areas which were not inventoried.

Table 1: Project Area Vegetation Types and Number of Plots

Vegetation Type	*Vegetation Class*	*Acres*	*# of Plots*
Chamise Chaparral	Shrub	103	4
California Bay Forest	Forest	60	6
Oak Chaparral	Shrub	62	6
Oak Woodland and Forest	Forest	124	7
Northern Mixed Chaparral	Shrub	71	8
Poison Oak Scrub	Shrub	30	2
Mixed Scrub	Shrub	33	2
Non-native Annual Grassland	Grassland	17	1
Buckeye Woodland	Forest	1	1
Total		501	37

All Forest carbon pools outlined in CAR FPP Version 3.1 were recorded and measured. These carbon pools included Standing Live, Standing Dead, Shrub and Herbaceous Understory, Lying Dead Wood, and Litter and Duff. The only forest carbon pool that was not sampled during this inventory was the Soil carbon. Soil had originally been sampled by WRA in which 14 soil samples were randomly taken. This data in conjunction with NRCS soil series data will be used to quantify soil carbon stocks.

Standing Live Carbon Pool

Mixed-oak woodland and shrubs were among the most common tree species sampled in the standing live carbon pool inventory. Oak woodland tree species included *Quercus douglasii* (blue oak), *Q. wislizeni* (interior live oak), *Q. agrifolia* (coastal/California live oak), and *Q. berberidifolia* (scrub oak). Other tree species present in the inventory included *Platanus racemosa* (California Sycamore), *Alnus rhombifolia* (white alder), *Arbutus menziesii* (Pacific madrone), *Aesculus californica* (California buckeye), and *Cercoparpus betuloides* (mountain mahogany). Within each plot taken, all portions of the tree (e.g. trunk (bole), stump, bark, branches, leaves, and roots) were calculated for the standing live tree carbon estimate. The standing live carbon stock was inventoried using two types of plots.

1. Trees with a minimum DBH size class of 5" and 15' total height were measured on a 1/10th acre fixed radius plot (37.2' radius). If a tree was determined to be within the fixed radius distance species, DBH to the nearest 10th inch, total tree height, and crown ratio to the nearest 5% was recorded.
2. Trees with a maximum DBH size class of 4.9" were measured on a 1/100th acre fixed radius plot (11.8' radius). Trees determined to be within the plot were tallied by species and DBH Class to the nearest one inch.

The two pictures below are representative of the standing live carbon pools within the Project Area.

Standing Dead Carbon Pool

In many forests a considerable amount of carbon can be identified in standing dead trees. For the purposes of this inventory, standing dead trees with a minimum DBH of 5" and 15' total height were identified and measured. A 1/10th acre fixed radius plot (37.2') was again utilized to determine if a dead tree would be inventoried. If a dead tree was determined to be in the plot the following was recorded species (if identifiable), DBH to the nearest two inch class, total height, and Brown's decay class. Brown's decay class for standing dead trees can be classified in the following four categories.

1. Tree with branches and twigs, resembles a live tree (except for leaves).
2. Tree absent of twigs, but with persistent small and large branches.
3. Tree with large branches only.
4. Bole only, no branches.

Shrubs and Herbaceous Understory Carbon Pool

Of the shrub and herbaceous understory carbon pool, dominate species included *Heteromeles arbutifolia* (toyon), *Adenostoma fasciculatum* (chamise), *Toxicodendron diversilobum* (poison oak), and *Baccharis pilularis* (coyote brush). Two methods of measuring this carbon pool were employed during the inventory.

1. On the 1/10th acre fixed radius plot already established, percent shrub and herbaceous cover by species and average height class was recorded.

2. The Stereo Photo Series for Quantifying Natural Fuels Volume VII was used to match the appropriate photo series picture with the plot's shrub and herbaceous understory. These estimates were ocular and are representative on average of the acre in which the plot is located.

Lying Dead Wood Carbon Pool

CAR FPP version 3.1 specifications of dead woody material included any piece(s) of dead woody material from a tree, e.g. dead boles, limbs and large root masses, on the ground. For the purposes of this inventory, a minimum average diameter of 5" and length of 8' was recorded. A North to South transect through the center of the 1/10th acre plot was taken. If a piece of down woody material crossed the transect the species was recorded as well as the decay class ranging from 1 – 3 (1-sound, 2-intermediate, 3-rotten).

Litter and Duff Carbon Pool

Litter is the dead plant material that can still be identified (e.g. leaves, grasses and small branches). The organic material layer at the soil surface under the litter layer is referred to as the duff layer. The duff layer consists of dead plant materials that cannot be identified as leaves, grasses, and small branches. Litter and duff samples were field inventoried using the Natural Fuels Photo Series Volume VII.

Soil Carbon Pool

The Soil carbon pool was not sampled during the field inventory. WRA provided a soil report dated March 19, 2009 in which 14 soil samples were analyzed by Soil and Plant Laboratory, Inc. The samples were delineated into four general vegetation categories; Oak Woodland, Bay Forest, Chaparral, and Grassland. In order to calculate soil carbon three physical soil properties are needed; topsoil depth, bulk density, and organic matter. WRA sampled 13 locations within the Project Area that "represented native topsoil to 12-inches in depth." Top soil depth and bulk density were not included within the soil report. Hence, the Natural Resource Conservation Service (NRCS) soil survey data was used for the purposes of this Report. Data samples did report percent organic matter at specific locations and were used for calculating organic matter within the NRCS soils types. Topsoil depth and bulk density values were extracted based on NRCS soil data descriptions. Table 2 outlines the NRCS soil data used to calculate soil carbon for the Project Area.

Table 2: Project Area - NRCS Soil Series Data

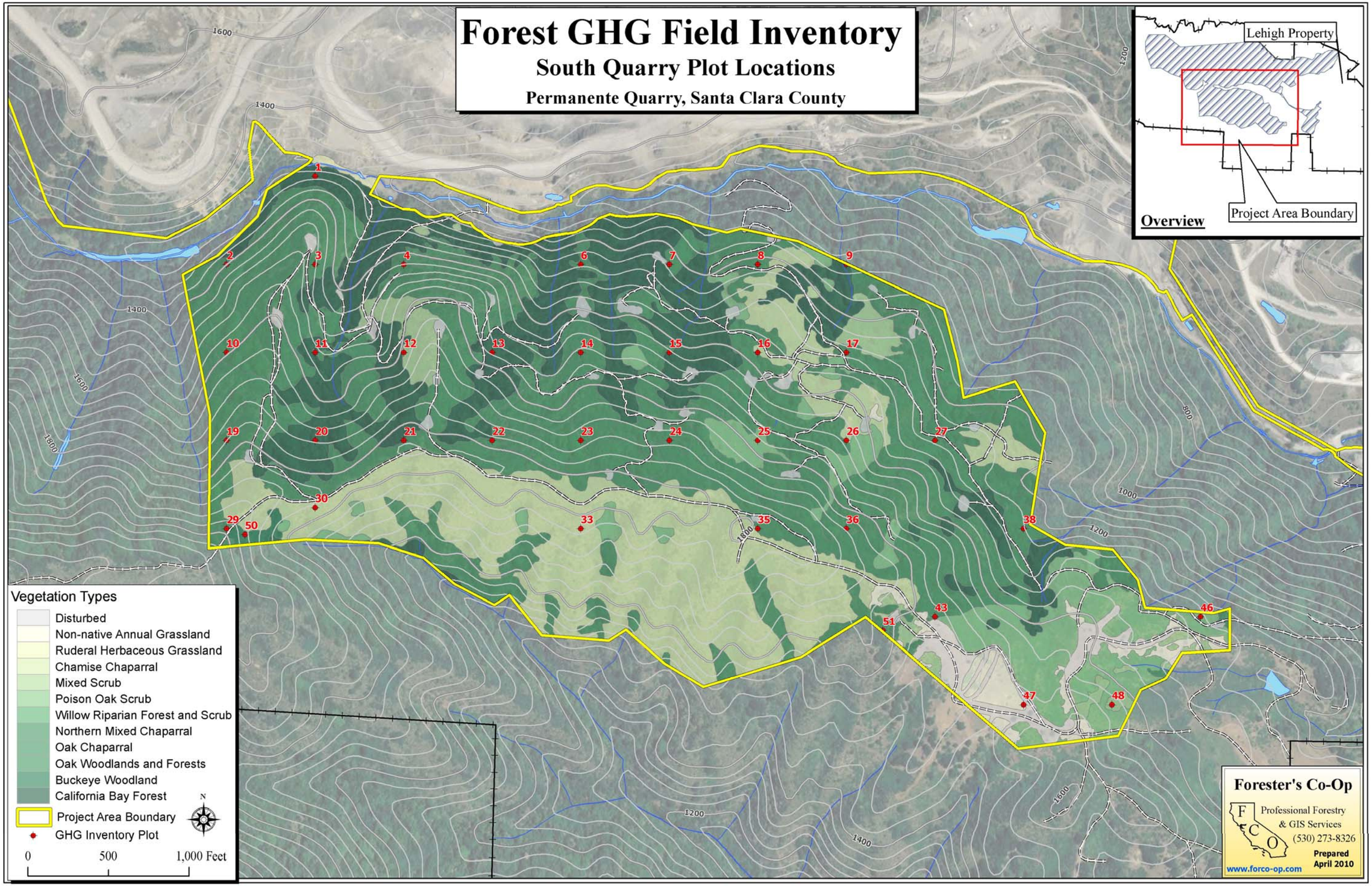
Soil Series	*Acres*	*Topsoil Depth (in)*	*Bulk Density*	*% Organic Matter*
Non-Forest Area (Quarry)	604	0	0	0
Los Gatos – Maymen Soils	265	10	1.2	7.6
Permanente Stony Soils	90	10	1.28	5.8
Los Gatos Clay Loam	95	10	1.28	7.6
Maymen Loam	21	14	1.28	6.5
Soper gravelly loam	16	6	1.28	3.5
Pit	14	0	0	0

The map on the following page illustrates the location of inventory plots and vegetation types that was sampled within the South Quarry.

Forest GHG Field Inventory

South Quarry Plot Locations

Permanente Quarry, Santa Clara County



Section 3 – GHG Inventory Results

Inventory Calculations

Determining the amount of GHG within each of the six pre-identified forest carbon pool requires a collection of methods, equations, and software programs. The standing live tree carbon pool, by far the most extensive and complex, was compiled using the Forest and Stand Evaluation Environment (FORSEE), a software program owned and licensed by the California Growth and Yield Modeling Cooperative (CAGYM). FORSEE was chosen for this project based on its proven history in providing accurate accounts of forest stands in terms of biomass, stocking, and growth. Cubic foot volume equations determined by the CAR FPP Version 3.1 were used on individual tree species to convert above-ground biomass. Above-ground biomass coupled with the below-ground biomass equation (outlined in the FPP) determined the total volume of live tree carbon in tonnes/acre. The remaining carbon stock pools were calculated based on the directions outlined in the FPP, much of which follows the Methods for Measuring and Monitoring Forest Carbon Projects in California document by Brown, S., Shoch, D., Pearson, T., & Delaney, M. (2004).

Inventory Results

The Project Area existing forest GHG stocks have been calculated from the inventory collected within the South Quarry disturbance area and extrapolated by using the per acre values to the 474 acres of vegetation within the entire 1,105 acres of the Project Area boundary. The numbers represent the total volume of CO_2 that is currently stored through natural biological processes. As previously discussed, the accumulation of GHG in the forest is represented in the six carbon pools outlined below in Table 3**. As of February 2010, the current amount of GHG accounted for within the Project Area forest is approximately 118,655 Tonnes of GHG.**

Table 3: Project Area – Metric Tonnes of Forest GHG by Carbon Pool					
Category	*Carbon Pool*	*Forested*	*Shrub*	*Grassland*	*Totals*
Living Biomass	Standing Live	18,642	4,267	0	22,909
	Shrubs and Herbaceous Understory	351	1,878	3	2,232
Onsite Dead Biomass	Standing Dead	271	81	0	352
	Lying Dead Wood	9	4	0	13
	Litter	1,758	1,371	97	3,226
Soil	Soil	33,965	54,292	1,666	89,923
Total		54,996	61,893	1,766	118,655

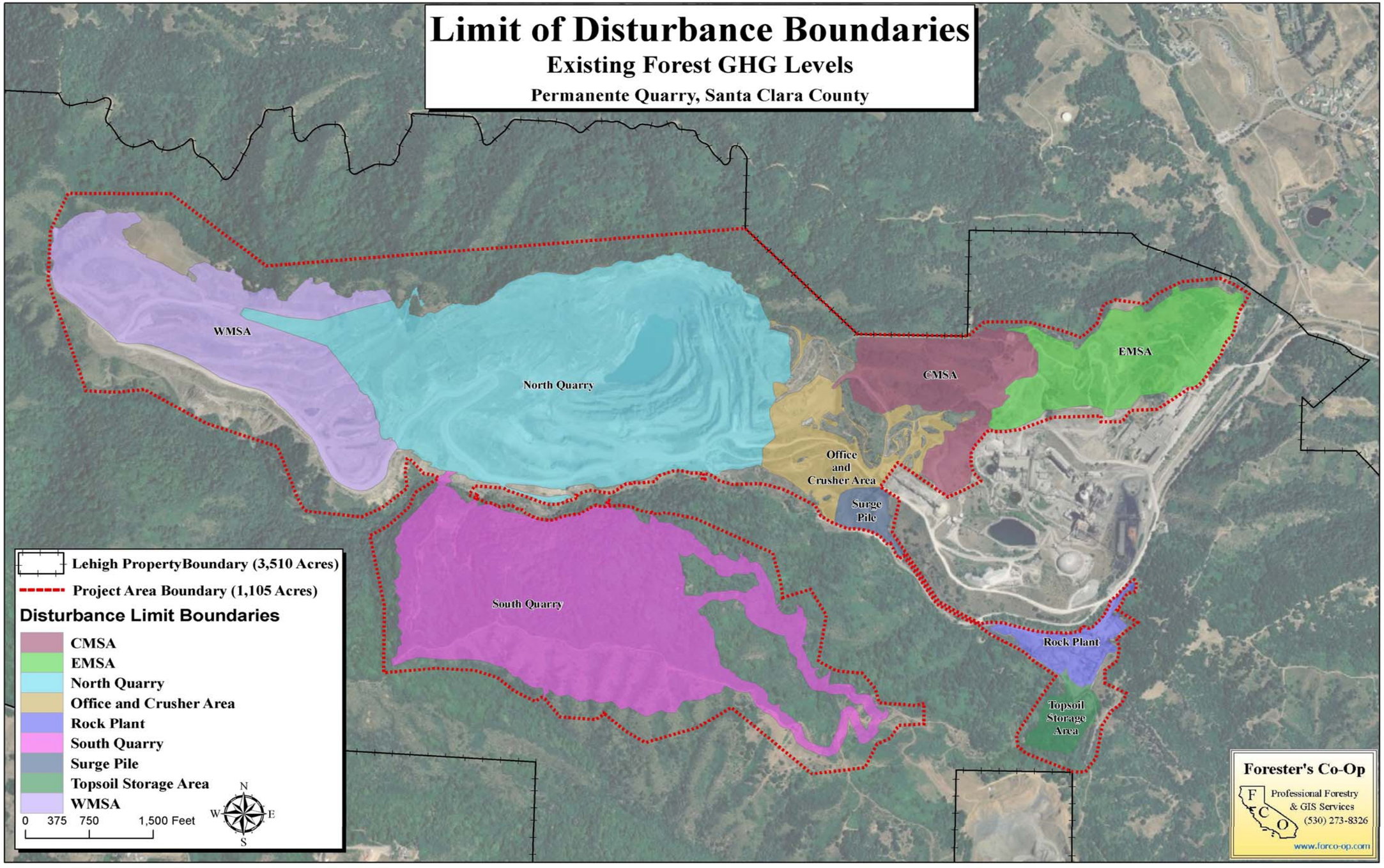
Disturbance Limits

The Project Area encompasses current and future scheduled mining activities. These activities have been geographically delineated into eight disturbance areas: West Material Storage Area, North Quarry, Office/Crusher, East Materials Storage Area, Central Materials Storage Area, Surge Pile, Rock Plant, Topsoil Storage Area, South Quarry. The Disturbance Limits encompass 69% of the total Project Area. These eight areas comprise a total of 788.3 acres of which 260 acres have vegetative cover. To accurately assess the GHG emission impact for the project, the forest GHG levels within each disturbance area has been calculated. This analysis provides potential GHG impacts through various intervals associated with this RPA. Table 4 below outlines the current Forest GHG stocks within each of the disturbance areas. **As of February 2010, the current amount of GHG accounted for within the Disturbance Limits (i.e. areas currently disturbed or that are planned for mining disturbance as part of ongoing operations) of the Project Area is approximately 66,583 Tonnes of GHG. Therefore, the current Forest GHG inventory of intact vegetation within the Project Boundary and outside the 2010 limits of disturbance is estimated to be 53,930 Tonnes.**

Table 4: Metric Tonnes of Forest GHG within Disturbance Areas of the Project Area

	RPA - Disturbance Areas									
Carbon Pool	*Rock Plant*	*EMSA*	*CMSA*	*North Quarry*	*Office/ Crusher*	*South Quarry*	*Surge Pile*	*Top Soil*	*WMSA*	*Totals*
Acres	15.5	62.6	52.2	274.1	39.4	206.5	9	11.4	117.6	788.3
Vegetative Acres	0.03	22.2	30	3.7	1	192.2	0.01	7.7	0	256.8
Live Trees	27	776	753	239	348	9,325	6	668	313	12,455
Snags	1	3	14	2	6	199	0	4	2	231
LWD	0	2	1	0	1	6	0	0	0	10
Shrubs	4	37	219	23	86	907	1	6	29	1,312
Litter	5	186	148	40	102	1,354	2	69	48	1,954
Soils	71	2,467	2,066	927	2,407	40,000	55	1,208	1,420	50,621
Total	**108**	**3,471**	**3,201**	**1,231**	**2,950**	**51,791**	**64**	**1,955**	**1,812**	**66,583**

The map on the following pages illustrates each disturbance boundary within the Project Area.


Limit of Disturbance Boundaries
Existing Forest GHG Levels
Permanente Quarry, Santa Clara County
WMSA
North Quarry
CMSA
EMSA
Office and Crusher Area
Surge Pile
South Quarry
Rock Plant
Topsoil Storage Area
Lehigh PropertyBoundary (3,510 Acres)
Project Area Boundary (1,105 Acres)
Disturbance Limit Boundaries
CMSA
EMSA
North Quarry
Office and Crusher Area
Rock Plant
South Quarry
Surge Pile
Topsoil Storage Area
WMSA
0 375 750 1,500 Feet
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S
Forester's Co-Op
Professional Forestry & GIS Services
(530) 273-8326
www.forco-op.com

Inventory Statistics

In order to meet the statistical accuracy standards as outlined in the FPP Version 3.1, a sampling error of less than 20% at 90% Confidence Interval must be achieved. Table 5 below illustrates the statistical results for all carbon pools inventoried.

Table 5: Project Area GHG Statistics	
Mean	279.4288839
Standard Error	12.45327935
Median	248.6488421
Mode	221.9427903
Standard Deviation	75.75034102
Sample Variance	5738.114164
Kurtosis	6.710973954
Skewness	2.439930761
Range	360.3921892
Minimum	221.9427903
Maximum	582.3349795
Sum	10338.8687
Count	37
Confidence Level(90.0%)	21.02484281
Standard Error @ 90% Confidence	**7.50%**

The sampling error as outlined in the FPP 3.1 is computed by utilizing the standard error, total tonnes of GHG, and confidence interval factor of 90% as follows:

- Standard Error for all Carbon Pools combined = 7.5%
- Total Tonnes GHG = 118,655
- Standard Error = 9,372
- 90% Confidence Interval factor = 1.645
- (1.645 * 9,372)/124,959 * 100 = 12.3% Sampling Error

This GHG Inventory meets the statistical requirements as outlined in the FPP 3.1 of a sampling error of 12.3% at a 90% Confidence Interval.

Section 4 –GHG Sequestration Projection

Utilizing the proposed Revegetation Plan component of the RPA, a projection of GHG for each of the disturbance areas within the Project Area was implemented. The Revegetation Plan outlines detailed planting specifications for trees as follows:

- *The north- and east-facing benches can support a wider variety of tree and shrub species since they have less solar radiation and higher soil moisture.*
- *These north-facing and east facing benches will be revegetated with approximately 38 acres of oak-dominated plantings along with hydroseed.*
- *Target quantity of approximately 10,000 oak trees is scheduled in these areas, in addition to other native tree species.*
- *South-facing benches will be hydroseeded and 54 acres of these benches will also be planted with approximately 22,000 grey pine (Pinus sabiniana), a native tree species that is tolerant of drier conditions, along with shrub plantings.*

The plan outlines that shrubs will be planted within the 92 acres of benches at a spacing of approximately 4.5 feet. Additionally, hydroseeding will take place within the remaining disturbance limits as follows;

- *In the Project Area, contoured surfaces will be covered with native grass, herb, and shrub species via hydroseeding a homogenous slurry of mulch, fertilizer, seed, and a binding agent over the areas to be revegetated.*
- *Drainage ditches and access roads will be left bare until the completion of the contouring and slope hydroseeding, at which time unneeded roads will be revegetated.*
- *Local seed suppliers have developed appropriate native seed mixes for reclamation and are testing several mixes in the test plots.*
- *A preliminary hydroseed mix of shrubs and grasses is shown in the Revegetation Plan, which includes species known to thrive in undisturbed Quarry areas or observed to perform well in previous revegetation areas and preliminary test plot results.*
- *These species should be used, pending availability, for the earliest stages of the proposed reclamation project.*
- *Test plot results will be used to further refine and expand the species selection.*

The GHG projections for the areas within the Disturbance Limits are estimated in ten year increments up to year fifty. Using similar methodology for assessing the current standing levels of GHG within the Project Area, projected GHG sequestration was modeled based on the procedures outlined in the Revegetation Plan. Four of the six carbon pools will be accounted for within this projection including; Standing Live Trees, Shrubs/Herbaceous Understory, Litter/Duff, and Soils. It should be noted that over the fifty year time frame, survival rate for the planted trees was adjusted with 15% mortality over the first ten years and 10% mortality each remaining decade. Furthermore, the Revegetation Plan stipulates an organic matter content of 4.8 percent. Hence 4.8 percent organic matter was used to

model soil GHG levels into the future. The two remaining pools, Standing Dead and Lying Dead wood, are not accounted for due to expected practices of removing standing dead trees from the quarry sites. Additionally, these two pools represent a small fraction of carbon that currently exists within the Project Area.

Under the Revegetation Plan, the eight disturbance areas have a different planting prescription in regards to shrubs, grasses, and trees. For this reason, each disturbance site is assessed independently. The Revegetation Plan describes how disturbed areas will be recontoured and planted as follows:

- *Overburden rock will generally be contoured at a maximum of 2:1 slopes, interrupted at 40-foot intervals with 40-foot wide benches for slope stability.*
- *Drainage swales will be created on the interior edges of benches to collect and direct stormwater.*
- *Reclamation will include revegetation of disturbed ground, except for active roads and drainage swales, with native species following the guidance set forth in the Reclamation Standards.*
- *Reclamation will occur in phases as areas are brought to final contours with progressive revegetation of slopes and benches as the planned landforms are completed.*

Each of the eight areas within the Disturbance Limits is separately evaluated below.

West Material Storage Area (WMSA)

The WMSA consists of approximately 117.6 acres, of which 109.1 acres will be targeted for revegetation, due to drainage gutters and terracing the effective area for plantings is smaller than the total disturbance area. As outlined in the Revegetation Plan, approximately 7.4 acres will be planted with grey pine on benches totaling approximately 2,975 trees (402 trees/acre). These benches will be hydroseeded as well, with 12" topsoil spread evenly. The remaining 101.7 acres will be hydroseeded with 3" topsoil spread evenly. Table 6 below outlines the projected amount of GHG that will be sequestered within the WMSA at ten years time periods up to year fifty.

Table 6: WMSA – Projected Forest Metric Tonnes of GHG Summary Table

Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	313	51	100	759	1,098	1,820
Shrubs & Herbaceous Understory	29	422	642	758	837	1,086
Standing Dead	2	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	0	N/A	N/A	N/A	N/A	N/A
Litter	48	154	209	209	209	209
Soils	1,420	8,146	8,146	8,146	8,146	8,146
Total	**3,624**	**8,773**	**9,097**	**9,872**	**10,290**	**11,261**

North Quarry

The North Quarry consists of approximately 271.4 acres, of which 268.9 acres will be targeted for re-vegetation. As outlined in the Revegetation Plan, approximately 2.7 acres will be planted with grey pine on benches totaling approximately 1,085 trees (402 trees/acre). These benches will be hydroseeded as well, with 12" topsoil spread evenly. The remaining 266.2 acres will be hydroseeded with 3" topsoil spread evenly. Table 7 below outlines the projected amount of GHG that will be sequestered within the North Quarry at ten years time periods up to year fifty.

Table 7: North Quarry – Projected Forest Metric Tonnes of GHG Summary Table						
Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	239	19	37	277	401	664
Shrubs & Herbaceous Understory	23	1,040	1,583	1,868	2,063	2,677
Standing Dead	2	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	0	N/A	N/A	N/A	N/A	N/A
Litter	40	380	514	514	514	514
Soils	927	16,820	16,820	16,820	16,820	16,820
Total	**1,231**	**18.259**	**18,917**	**19,479**	**19,798**	**20,675**

South Quarry

The South Quarry consists of approximately 206.5 acres, approximately all of which acres will be targeted for revegetation. As outlined in the Revegetation Plan, approximately 24.6 acres will be planted with oaks on north and east facing benches totaling approximately 6,593 trees (283 trees/acre). Additionally, on the 15.4 acres of south facing benches grey pine will be planted totaling approximately 6,191 trees (402 trees/acre). These benches will be hydroseeded as well, with 12" topsoil spread evenly. The remaining area will be hydroseeded with 3" topsoil spread evenly. Table 8 below outlines the projected amount of GHG that will be sequestered within the South Quarry at ten years time periods up to year fifty.

Table 8: South Quarry – Projected Forest Metric Tonnes of GHG Summary Table						
Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	9,325	159	395	2,200	3,510	5,139
Shrubs & Herbaceous Understory	907	709	1,079	1,273	1,405	1,824
Standing Dead	199	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	6	N/A	N/A	N/A	N/A	N/A
Litter	1,354	259	350	350	350	350
Soils	40,000	12,902	12,902	12,902	12,902	12,902
Total	**51,791**	**14,029**	**14,726**	**16,725**	**18,167**	**20,215**

Office/Crusher

The Office/Crusher consists of approximately 39.4 acres, of which 22.9 acres will be targeted for revegetation. As outlined in the Revegetation Plan, approximately 2.6 acres will be planted with grey pine on benches totaling approximately 1,045 trees (402 trees/acre). These benches will be hydroseeded as well, with 12" topsoil spread evenly. The remaining 20.3 acres will be hydroseeded with 3" topsoil spread evenly. Table 9 below outlines the projected amount of GHG that will be sequestered within the Office/Crusher Area at ten years time periods up to year fifty.

Table 9: Office/Crusher – Projected Forest Metric Tonnes of GHG Summary Table						
Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	348	18	35	267	386	639
Shrubs & Herbaceous Understory	86	89	135	159	176	228
Standing Dead	6	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	1	N/A	N/A	N/A	N/A	N/A
Litter	102	32	44	44	44	44
Soils	2,407	3,625	3,625	3,625	3,625	3,625
Total	**2,950**	**3,764**	**3,839**	**4,095**	**4,231**	**4,536**

Surge Pile

The Surge Pile consists of approximately 9.0 acres, of which 8.7 acres will be targeted for revegetation. The entire 8.7 acres will be hydroseeded with 3" topsoil spread evenly. Table 10 below outlines the projected amount of GHG that will be sequestered within the Surge Pile at ten years time periods up to year fifty.

Table 10: Surge Pile – Projected Forest Metric Tonnes of GHG Summary Table						
Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	6	0	0	0	0	0
Shrubs & Herbaceous Understory	1	34	51	60	67	87
Standing Dead	0	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	0	N/A	N/A	N/A	N/A	N/A
Litter	2	12	17	17	17	17
Soils	55	576	576	576	576	576
Total	**64**	**622**	**644**	**653**	**660**	**680**

Central Materials Storage Area (CMSA)

The Central Materials Storage Area (CMSA) is an overburden storage area located immediately west of the East Materials Storage Area. The CMSA consists of approximately 52.2 acres of overburden storage area, of which 51.4 acres will be targeted for revegetation. As outlined in the Revegetation Plan, approximately 7.0 acres will be planted with oaks on north and east facing benches totaling approximately 1,876 trees (268 trees/acre). Additionally, approximately 8.5 acres will be planted with grey pine on

south facing benches totaling approximately 3,417 trees (301 trees/acre). These benches will be hydroseeded as well with 12" topsoil spread evenly. The remaining 35.9 acres willbe hydroseeded with 3" topsoil spread evenly. Table 11 below outlines the projected amount of GHG that will be sequestered within the CMSA at ten year intervals up to 50 years.

Table 11: CMSA – Projected Forest Metric Tonnes of GHG Summary Table						
Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	753	79	175	1,139	1,727	2,698
Shrubs & Herbaceous Understory	219	175	265	313	346	449
Standing Dead	14	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	1	N/A	N/A	N/A	N/A	N/A
Litter	148	64	86	86	86	86
Soils	2,066	3,148	3,148	3,148	3,148	3,148
Total	**3,201**	**3,465**	**3,675**	**4,686**	**5,307**	**6,381**

East Material Storage Area (EMSA)

The EMSA consists of approximately 62.6 acres, approximately all of which are targeted for revegetation pursuant to a reclamation plan amendment specific to the EMSA submitted in April 2009. The projected GHG storage in the EMSA is based on the 2009 amendment is shown in Table 12 below.

Table 12: EMSA – Projected Forest Metric Tonnes of GHG Summary Table						
Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	776	94	210	1,360	2,062	3,223
Shrubs & Herbaceous Understory	37	208	317	374	413	536
Standing Dead	3	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	2	N/A	N/A	N/A	N/A	N/A
Litter	186	76	103	103	103	103
Soils	2,467	3,759	3,759	3,759	3,759	3,759
Total	**3,471**	**4,138**	**4,388**	**5,596**	**6,337**	**7,621**

Rock Plant

The Rock Plant consists of approximately 15.5 acres, of which 15 acres will be targeted for revegetation. As outlined in the Revegetation Plan, approximately 1.9 acres will be planted with grey pine on benches totaling approximately 764 trees (402 trees/acre). These benches will be hydroseeded as well, with 12" topsoil spread evenly. The remaining 13.1 acres will be hydroseeded with 3" topsoil spread evenly. Table 13 below outlines the projected amount of GHG that will be sequestered within the Rock Plant Area at ten years time periods up to year fifty.

Table 13: Rock Plant – Projected Forest Metric Tonnes of GHG Summary Table

Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	27	13	26	195	282	467
Shrubs & Herbaceous Understory	4	58	88	104	115	149
Standing Dead	1	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	0	N/A	N/A	N/A	N/A	N/A
Litter	5	21	29	29	29	29
Soils	71	988	988	988	988	988
Total	**108**	**1,080**	**1,131**	**1,316**	**1,414**	**1,633**

Topsoil Storage Area

The Topsoil Storage Area consists of approximately 11.4 acres, of which 10.7 acres will be targeted for revegetation. As outlined in the Revegetation Plan, approximately 3.1 acres will be planted with grey pine on benches totaling approximately 1,246 trees (402 trees/acre). These benches will be hydroseeded as well, with 12" topsoil spread evenly. The remaining 7.6 acres will be hydroseeded with 3" topsoil spread evenly. Table 14 below outlines the projected amount of GHG that will be sequestered within the Topsoil Storage Area at ten years time periods up to year fifty.

Table 14: Topsoil Storage Area – Projected Forest Metric Tonnes of GHG Summary Table

Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	668	21	42	318	460	762
Shrubs & Herbaceous Understory	6	41	63	74	82	107
Standing Dead	4	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	0	N/A	N/A	N/A	N/A	N/A
Litter	69	15	20	20	20	20
Soils	1,208	657	657	657	657	657
Total	**1,955**	**734**	**782**	**1,069**	**1,219**	**1,546**

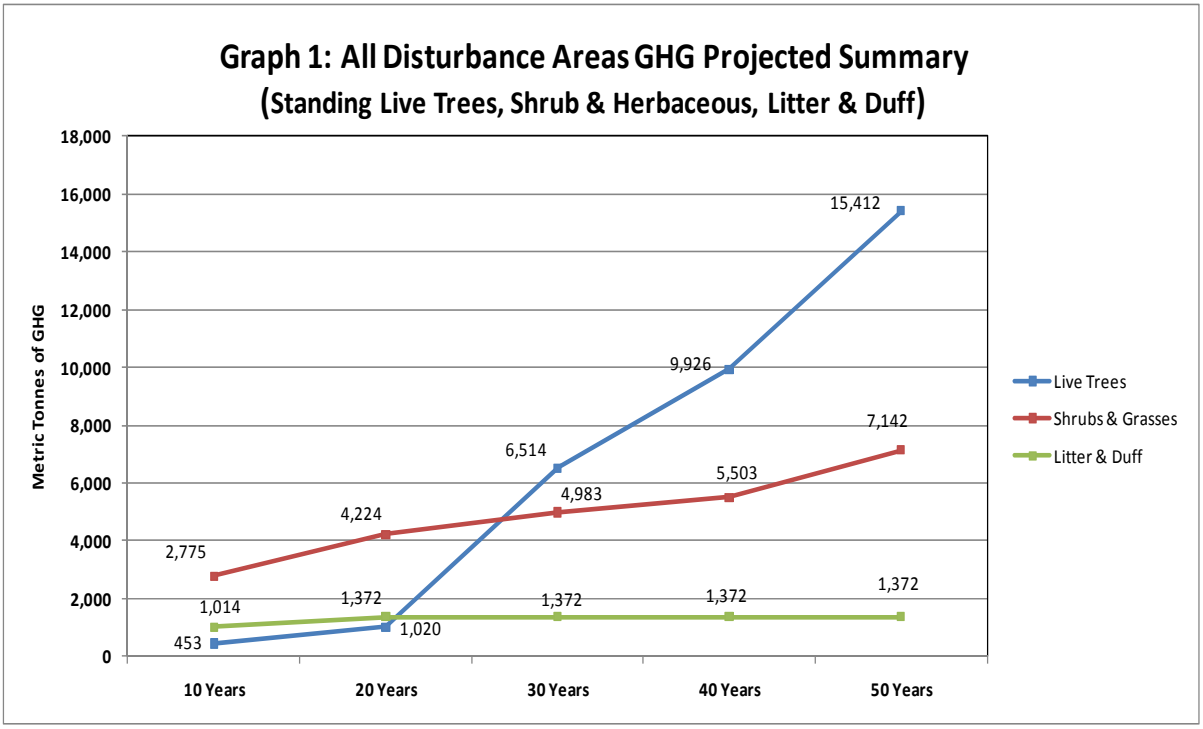
Summary of RPA Revegetation Plan GHG Sequestration

Graph 1 below outlines the GHG pool levels within all the disturbance areas of the Project Area over the next fifty years with implementation of the project. The Standing Live Trees, Shrubs & Herbaceous Understory, and Litter are plotted for each ten year time period, illustrating how the implementation of the Revegetation Plan will grow and accumulate GHG within these pools. The soil carbon pool will stay relatively stagnant following the implementation of the Revegetation Plan until the carbon cycle begins to breakdown and accumulate organic matter within the soil.

Table 15: Summary of Disturbance Areas – Projected Forest Metric Tonnes of GHG Summary Table

Carbon Pool	*Baseline*	*10 Yrs*	*20Yrs*	*30Yrs*	*40Yrs*	*50Yrs*
Standing Live Trees	12,280	453	1,020	6,515	9,926	15,412
Shrubs & Herbaceous Understory	1.067	2,776	4,223	4,983	5,504	7,143
Standing Dead	214	N/A	N/A	N/A	N/A	N/A
Lying Dead Biomass	192	N/A	N/A	N/A	N/A	N/A
Litter	1,739	1,013	1,372	1,372	1,372	1,372
Soils	50,621	50,621	50,621	50,621	50,621	50,621
Total	**66,583**	**54,864**	**57,236**	**63,491**	**67,423**	**74,653**
Percent Change from Baseline	**--**	**-17%**	**-13%**	**-4%**	**2%**	**11%**

The following summary Graph 1 has been prepared to illistrate the 50-year projected GHG sequestration for all Disturbance Areas.



Section 5 – Results Conclusion

The Project Area consists of 1,105 acres of which 474 acres have vegetative cover with a standing GHG amount 118,655 metric tonnes. Within this boundary, eight disturbance areas have been delineated, representing areas where vegetation removal and revegetation will take place. The eight disturbance areas have a total acreage of 765 of which 260 acres have vegetative cover. The total GHG of all carbon pools of the eight disturbance areas is 66,583 metric tonnes, this represents the amount of GHG being removed form the Project Area. The eight disturbance areas will undergo revegetation specified in the RPA. The total acreage of the disturbance areas to be revegetated will be 754.9. Although Table 15 indicates that the GHG level does not fully rebound in the disturbed areas, it should be noted that the live vegetative carbon pools will re-establish GHG levels greater than the baseline amount by year 50.

Appendix A –Permanente Quarry GHG Property Wide Assessment

There is approximately 2,405 acres of vegetated/forested areas outside the Project Area and within Lehigh's 3,510 acre property. Table 16 lists the vegetation types that exist within this relatively undisturbed area of the property. This appendix provides an estimate of the existing sequestered GHG inventory within this 2,405-acre area. Similar to the South Quarry forest types, the area is dominated by oak woodland, shrubs, and grass. Forest and vegetation carbon calculations have been expanded to estimate a property-wide GHG inventory utilizing the 37 inventory plots within the South Quarry area, the additional 16 plots randomly placed outside the South Quarry area, as well as tree and vegetation field data collected in 2009. This data was used to estimate certain forested vegetation types that were not sampled and does not include a reduction for areas such as roads, rocky outcrops, disturbed areas, and water bodies. The estimate provided below is not a statistically-sound estimate due to an inadequate sample size of the existing variability in the vegetation types outside the Project Area. Table 17 below provides an estimate of the sequestered GHG inventory within the vegetation types outside the Project Area and within the 3,510 acre property.

Table 16: Permanente Vegetation Types outside the RPA Area

Vegetation Communities	Acres	Plots
Buckeye Woodland	22	2
California Bay Forest	379	6
Chamise Chaparral	362	4
Mixed Scrub	48	2
Non-native Annual Grassland	39	1
Northern Mixed Chaparral	289	8
Oak Chaparral	165	6
Oak Woodlands and Forests	795	15
Poison Oak Scrub	80	2
Sycamore Riparian	7	2
White Alder Riparian Forest	15	2
Willow Riparian Forest and Scrub	4	3
Total Veg. Types (excludes 210 Ac Non-Veg. Types, Rds, Water, etc)	2,205	53

As of February 2010, the estimated amount of GHG accounted for within the 2,405 Acre property (outside the Project Area Boundary) is estimated at 564,188 Tonnes of GHG.

Table 17: Forest GHG Summary Table for Area outside Project Area

Carbon Pool	*Metric Tonnes of GHG*
Standing Live Trees	140,270
Shrubs & Herbaceous Understory	8,984
Standing Dead	2,300
Lying Dead Biomass	78
Litter	16,846
Soils	395,710
Total	**564,188**

Appendix B – Permanente Quarry - Potential for Carbon Credit

Forest projects developed to meet the stringent requirements of and approved by the Climate Action Reserve under the Forest Project Protocol (CAR-FPP) allow for landowners to receive a credit for carbon reserves on their property above a CAR published "business as usual" baseline. For CAR approved forest projects, the tonnes per acre of carbon that is above a projects "business as usual" baseline is known as the project's additionality and then may be accounted for as a carbon credit. CAR publishes its baseline from inventory plot data taken by the US Forest Service FIA program for forested communities on privately owned land. The Permanente Quarry property is located in the *Central California Coast and Ranges* Ecosection and the Forest Community type is *Mixed Hardwood*, this category's baseline is set at 19 metric tonnes of carbon (C) per acre. It should be noted that the CAR baseline figures are published in units of carbon (C) as opposed to units of GHG Tonnes that are the basic units of this Technical Report. In both Table 18 and 19 below the multiplier of 3.667 has been applied to the published CAR baseline figure to be consistent with the standardized GHG units in this Report. Also, CAR published live tree baseline data also includes the below ground biomass pool. The comparison calculations in this Appendix as done throughout the Report also include this allometric formula to combine both live tree and below ground biomass into one reported live tree GHG pool.

The focus areas for this analysis were twofold and included only the forested strata. The two areas considered in this analysis are; the on-site preservation area (Preservation Area) located in the southeast corner of the Permanente Property totaling approximately 345 acres, and the entire Permanente Property less the RPA area and less the Preservation Area which totals 2,060 acres. The Preservation Area contains 148 acres of forested communities which have a surplus of GHG above the published CAR baseline and could qualify for potential carbon credits. The remaining 197 acres of the Preservation Area is not forested and would not be eligible for the CAR program because a carbon credit protocol has not been developed for these non-forest vegetation types. Within the remaining balance of the Permanente Property, 2060 acres, there are 1,164 acres of forested vegetation strata. A CAR baseline analysis was done using the carbon values calculated using all 53 sample plots and expanding these values across the forested strata only.

The Preservation Area yields a potential surplus which averages 44.93 GHG tonnes per acre above baseline, refer to Table 18. This equals an estimated total surplus of 6,649.5 tonnes GHG above the CAR published baseline for the forested communities within the Preservation Area.

The forested communities within the balance of the Permanente Property yields a potential surplus of 32.30 tonnes GHG per acre above baseline, refer to Table 19. This equals an estimated total surplus of 37,600.4 tonnes of GHG above the CAR published baseline for the forested communities within the Preservation Area.

Table 18: Preservation Area					
Forested Community	**Acres**	**Weighted Forest Carbon per Acre, Converted to GHG**	**Total Forest Type GHG**	**Published CAR FPP Forest Carbon Baseline @ (19 TC/Acre*3.667=69.6 T GHG/Acre) Expanded by Strata Acres**	**Reported "Surplus" GHG by Forest Type**
Buckeye Woodland	4.5	114.4	514.8	313.5	201.3
Oak Woodlands & Forest	137.1	114.4	15,685.7	9,542.2	6,143.5
Sycamore Riparian	6.8	114.4	778	473.3	304.7
				Total Preservation Area Surplus GHG =	**6,649.5**
Mixed Scrub*	3.9	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Non-Native Annual Grassland*	11.3	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Northern Mixed Chaparral*	70.1	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Poison Oak Scrub*	12.6	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Chemise Chaparral*	76.1	N/A	N/A	No Published Baseline for this Veg. Type	N/A

*Strata that do not meet the CAR definition of Forest hence there are no published CAR baseline data for these vegetation types

Table 19: Remaining Un-Impacted Area					
Forested Community	**Acres**	**Weighted Forest Carbon per Acre, Converted to GHG**	**Total Forest Type GHG**	**Published CAR FPP Forest Carbon Baseline @ (19 TC/Acre*3.667=69.6 T GHG/Acre) Expanded by Strata Acres**	**Reported "Surplus" GHG by Forest Type**
Buckeye Woodland	18.3	101.9	1,864.8	1,273.7	591.1
California Bay Forest	392.2	101.9	39,965.2	27,297.1	12,668.1
Oak Woodlands & Forest	735.1	101.9	74,906.7	51,163	23,743.7

Table 19 continued:					
White Alder Riparian Forest	14.6	101.9	1,487.7	1,016.2	471.5
Willow Riparian Forest and Scrub	3.9	101.9	397.4	271.4	126
Total Remaining Un-Impacted Area Surplus GHG = 37,600.4					
Chemise Chaparral*	330.4	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Mixed Scrub*	50.2	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Non-Native Annual Grassland*	34.8	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Northern Mixed Chaparral*	247.1	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Oak Chaparral*	186.2	N/A	N/A	No Published Baseline for this Veg. Type	N/A
Poison Oak Scrub*	83.7	N/A	N/A	No Published Baseline for this Veg. Type	N/A

* Strata that do not meet the CAR definition of Forest hence there are no published CAR baseline data for these vegetation types

The CAR-FPP provides requirements and guidance for quantifying the net climate benefits of project activities that sequester carbon on forestland. The protocol provides project eligibility rules; methods to calculate a project's net effects on greenhouse gas (GHG) emissions and removals of CO from the atmosphere ("removals"); procedures for assessing the risk that carbon sequestered by a project may be reversed (i.e. released back to the atmosphere); and approaches for long term project monitoring and reporting. Projects organized under this protocol ensure that the net GHG reductions and removals caused by a project are accounted for in a complete, additional, consistent, transparent, accurate, and are conservative and can be reported to the Reserve as the basis for issuing carbon offset credits.

The organization of a CAR forest carbon sequestration project is beyond the scope of work for this Technical Report. The simple comparisons made here are to illustrate that at this point in time the forest types of both the Preservation Area & balance of the Permanente property forests are indeed above published CAR baselines and that the difference can be considered as a "surplus" of sequestered GHG. The total surplus GHG tonnes within the Preservation Area and the balance of the Permanente have been calculated in Tables #18 & 19 to total 44,249.9 tonnes of GHG. This significant volume of "Surplus" GHG within these forests types is a testimonial to the prudent forest conservation stewardship practiced by Lehigh Cement over many decades.

At this time Lehigh has not chosen to pursue the development of a CAR approved third party verified Forest project which would be needed if Lehigh chose to report these "surplus" carbon tonnes as additional GHG which then could be registered by the Reserve as a carbon credit. The simple comparisons of Lehigh forest GHG inventory outside of the RPA boundary to that of the published CAR project baselines do not reflect that Lehigh intends to or is bound to develop and register a forest carbon project with the Climate Action Reserve.

Appendix C - References

1. Brown Sandra, David Shoch, Tim Pearson and Matt Delaney. 2004. "Methods for Measuring and Monitoring Forest Carbon Projects in CA." Winrock International: Arlington VA, for the Regents of California/ California Institute of Energy Efficiency.

2. Climate Action Registry. Forest Project Protocol Version 3.1. Online, http://www.climateactionreserve.org/wp-content/uploads/2009/03/Forest-Project-Protocol-Version-3.1.pdf

3. Natural Resource Conservation Service. Online, http://soildatamart.nrcs.usda.gov/

4. Ottmar, R.D., R.E. Vihnanek, and J.C. Regelbrugge. 2000. Stereo photo series for quantifying natural fuels. Volume IV: pinyon-juniper, sagebush, and chaparral types in the Southwestern United States. PMS 833. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center.

5. Ottmar, R.D., R.E. Vihnanek, C.S. Wright and D.L. Olson. 2004. Stereo photo series for quantifying natural fuels. Volume VII:Oregon white oak, California deciduous oak, and mixed conifer with shrub types in the Western United States. PMS 839. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center.

6. Raven, Peter. 2005. Biology of Plants, Seventh Edition. p.136.

7. Gaman, Tom. Carbon Resources in California Oak Woodland. 2008.

8. Pillsbury, N.H., et al. Coast Live Oak Thinning Study in the Central Coast of California. Gen . Tech. Rep. PSW-100. Berkeley, CA. Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture 1987