ASHWORTH LEININGER GROUP

Air Quality Technical Analysis

Revised Reclamation Plan Amendment

Permanente Quarry
Santa Clara County, California

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December 13, 2011 (Updated)

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Appendices

Executive Summary

Lehigh Southwest Cement Company (Lehigh) operates the Permanente Quarry (Quarry), a limestone and aggregate mining operation approximately two miles west of the City of Cupertino. The proposed project is the County's approval of an amendment to the Quarry's reclamation plan and associated reclamation requirements to include currently disturbed areas.

This current *Air Quality Technical Analysis* is intended to support the County's evaluation of the proposed project under the California Environmental Quality Act (CEQA). Its purpose 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 compared to determine the net emissions changes anticipated to result from the project. These net emission increases or decreases are then compared to the Bay Area Air Quality Management District's (BAAQMD or District) CEQA significance thresholds. As shown below, the net emissions changes associated with the proposed project are below the District's CEQA significance thresholds.

Table ES-1 provides a comparison of the expected annual net emissions changes from the proposed project to the BAAQMD's 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]	(463.87)	(76.23)	(65.40)	(22.68)	(5.34)	1.80	4,920.11
BAAQMD CEQA Significance Threshold	15	10	Local Impacts[6]	10	10	N/A	10,000
Above Threshold? (Yes/No)	No	No	No	No	No	No	No

Table ES-2 provides a comparison of the daily net emissions changes anticipated from the proposed project to the BAAQMD's daily CEQA significance thresholds for criteria pollutants.

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 threshold for local CO impacts is the California Ambient Air Quality Standard for CO, established at 20.0 parts per million (ppm) for the 1-hour standard and at 9.0 ppm for the 8-hour standard.

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]	(3,441.35)	(581.93)	(749.86)	(315.42)	(44.09)	5.25
BAAQMD CEQA Significance Threshold	82	54	Local Impacts	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 4,900 metric tons CO_2e. This net emission increase is below the BAAQMD's GHG significance threshold of 10,000 metric tons per year CO_2e for stationary sources. The BAAQMD's GHG threshold of 10,000 metric tons per year is considered appropriate because the project's emissions sources are confined to a specific operational area as characteristic of a stationary source and include equipment that require permits to operate.

This current report updates the July 26, 2011 *Air Quality Technical Analysis* prepared by Ashworth Leininger Group (ALG) to reflect the following:

- Estimates of maximum waste rock haul truck trip length increased for 2012 and 2013, resulting in increased truck combustion emissions (including diesel particulate matter and greenhouse gases. This also increased average fleet-wide vehicle weight, in turn increasing particulate matter emissions from unpaved road dust entrainment.

- Because of the increased truck activity during 2012 and 2013, the peak Phase 1 year for combustion emissions changed from 2014 to 2013. This resulted in a different mix of activity by equipment type for the peak year, further changing the peak Phase 1 off-road equipment combustion emissions.

- Fleet-wide Phase 1 peak fuel use also increased slightly due to increased haul truck activity. This in turn resulted in slight increases to: fuel dispensing emissions, fuel delivery vehicle emissions, and paved road dust entrainment emissions.

- ALG corrected the load factors for three off-road diesel equipment categories in Tables C-21a and C-21b: rubber tired dozers – 59%; rubber-tired loaders – 54%; and water trucks – 20%. This resulted in a slight decrease in combustion-related emissions.

- Based on an area-by-area review of active disturbed areas for each year of the proposed project (see Table D-1), ALG updated the peak active area estimates to reflect areas disturbed during the peak year for each project phase. The July 26th estimates were based on the maximum expected activity for each area, independent of the year in which these maximum activities occurred. Therefore, the July 26th report overestimated wind erosion from active areas for the peak years in Phase 1 and 2. This report therefore reflects lower active area wind erosion particulate matter emissions.

- Emissions associated with Permanente Creek Reclamation Area activity have been incorporated. Total emissions are reflected in Appendix E. Note that peak emissions from Permanente Creek Reclamation Area activities only overlap peak emissions from other proposed project activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with material handling and unpaved road dust entrainment in Phase 1 and wind erosion from disturbed areas in Phase 2.

- Emissions associated with Permanente Creek long-range restoration activities expected to occur in Phase 3 of the project have been incorporated into the report. As part of this restoration effort, Lehigh anticipates removing approximately 18,000 cubic yards of fill materials and stabilizing slopes within two areas along Permanente Creek. Criteria, toxic air contaminant, and GHG emission estimates associated with this effort, assumed to occur during 2026, are presented in Appendix F to this report.

- The report now assumes importation of 170,000 cubic yards (63,000 tons) of mulched green waste, which will be blended with the West Material Storage Area material that will be returned to the quarry pit from 2023 to 2025. The mulched green waste is assumed to be transported from a supplier located 45 miles from the quarry in 20-ton on-road heavy duty diesel trucks. This activity increases particulate matter emissions from material handling, the overland conveyor system, and off- and on-road dust entrainment during Phase 2 of the proposed project. The increased truck activity also increases Phase 2 combustion-related emissions from on-road vehicles. The green waste transport trucks also indirectly affect off- and on-road dust entrainment emissions during Phase 1, since the trucks slightly decrease the project's average off-road vehicle weight and significantly increase the average on-road vehicle weight.

- ALG corrected assumptions regarding the Overland Conveyor System electrical power use to reflect Lehigh's anticipated use of electrical power regeneration from the braking force associated with the long downhill transport of infill material from the WMSA to the North Quarry using the fixed conveyor. It is expected that this power will be sufficient to operate approximately half of the other electrically powered equipment associated with the Overland Conveyor System.

Introduction

The Permanente 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 existing and planned operational areas of the Quarry occupy approximately 614 acres 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. If approved, the amendment would incorporate 1,238.6 acres of Lehigh's property representing existing and proposed disturbance of land and various undisturbed buffer areas.

Lehigh will continue to operate its existing North Quarry under its existing vested entitlements to extract limestone and aggregate resources until resources have been exhausted. Lehigh will then reclaim the North Quarry by relocating overburden material from the West Material Storage Area to the North Quarry area, covering this fill with a combination of overburden and topsoil blends, and revegetating the area.

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 by properly characterizing 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. The net emissions are then compared to applicable CEQA significance thresholds.

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 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.

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

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 the BAAQMD's CEQA Guidelines[7] (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 (see Tables S-3 and S-4).

- GHG emissions are expected to increase by a maximum of 4,900 metric tons per year, which is below the District's significance threshold of 10,000 metric tons per year (expressed as carbon dioxide equivalents, or CO_2e) for stationary sources. The 10,000 metric tons per year GHG significance threshold is considered appropriate because emissions sources are confined to a specific operational area as is typical of a stationary source and include equipment that require permits to operate.

As described in greater detail below, the baseline for the net emissions analysis considers the average annual emissions over an 11-year period from 2000-2010 (see Baseline Air Quality Emissions). Proposed project emissions are calculated for each of the 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 and daily particulate matter (PM_{10} and $PM_{2.5}$) emissions, criteria, TAC and GHG emissions are highest during Phase 1 of the proposed project, which conservatively counts emissions associated with ongoing mining operations although Lehigh is not seeking approval for these activities. Annual and daily PM_{10} and $PM_{2.5}$ emissions are the highest during Phase 2 of the proposed project.

The net emissions calculation, also conservatively, does not consider emissions from certain ongoing activities within Lehigh's property that may continue, including the continued operation of the primary and secondary crushers, and the rock plant.

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 that 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 this report does not provide a comprehensive evaluation of the various and comparatively minor emissions associated with Phase 3 of the project, during which the facility will remove the rock plant, crusher, and surge pile and provide restoration of mining operations and other areas. No quantification of these emissions is necessary as material handling, areal extent of dust entrainment and wind erosion, off-road vehicle usage and related activities are substantially lower than in Phase 1 or 2. Therefore, Phase 3 emission calculations will have no

[7] *California Environmental Quality Act: Air Quality Guidelines*, Bay Area Air Quality Management District, updated May 2011.

effect on the net emissions analysis presented herein. Note that this report presents an evaluation of emissions associated with Permanente Creek long-term restoration activities expected to occur in Phase 3 of the project. This evaluation is presented in Appendix F.

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 F. 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 submitted to the District in 2010
  - Use of an Overland Conveyor System, powered by electric motors, to move 75% of the waste rock from the WMSA to reclaim the North Quarry
  - Watering of conveyor transfer points and screens associated with the proposed Overland Conveyor System

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						
Quarry Operations						
Drilling	1.87	1.87	--	--	--	--
Blasting	3.78	0.22	35.45	9.00	--	1.06
Bulldozing, Scraping & Grading	0.59	0.09	--	--	--	--
Material Handling	3.23	0.48	--	--	--	--
Dust Entrainment - Unpaved Roads	75.47	7.55	--	--	--	--
Wind Erosion - Unpaved Roads	11.70	1.75	--	--	--	--
Wind Erosion - Disturbed Mine Area	554.96	83.24	--	--	--	--
Subtotal - Mining:	651.60	95.21	35.45	9.00	--	1.06
Waste Rock Land Filling						
Material Handling	1.53	0.23	--	--	--	--
Dust Entrainment - Unpaved Roads	74.91	7.49	--	--	--	--
Wind Erosion - Unpaved Roads	7.26	1.09	--	--	--	--
Subtotal - Land Filling:	83.70	8.81	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.06	--
Fuel Dispensing	--	--	--	--	0.01	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.08	--
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	19.04	17.58	250.86	314.77	23.47	0.16
On-road On-site Vehicles	0.01	0.01	0.74	0.10	0.06	0.00
On-road Off-site Vehicles	0.01	0.00	0.50	0.09	0.05	0.00
Dust Entrainment - Paved Roads	0.04	0.01	--	--	--	--
Subtotal - Combustion Sources:	19.10	17.60	252.11	315.01	23.59	0.16
Baseline Totals (tons/year):	**754.40**	**121.62**	**287.57**	**324.01**	**23.67**	**1.22**
Proposed Project						
Maximum Phase:	Phase 2	Phase 2	Phase 1	Phase 1	Phase 1	Phase 1
North Quarry						
Drilling	--	--	--	--	--	--
Blasting	--	--	94.09	23.87	--	2.81
Bulldozing, Scraping & Grading	1.26	0.19	--	--	--	--
Material Handling	5.71	0.86	--	--	--	--
Dust Entrainment - Unpaved Roads	8.56	0.86	--	--	--	--
Wind Erosion - Unpaved Roads	5.82	0.87	--	--	--	--
Wind Erosion - Active Areas	77.45	11.62	--	--	--	--
Subtotal - North Quarry:	98.81	14.39	94.09	23.87	--	2.81
Waste Rock Storage/Infill Areas						
Material Handling	5.75	0.86	--	--	--	--
Overland Conveyor System	10.14	2.08	--	--	--	--
Dust Entrainment - Unpaved Roads	44.35	4.44	--	--	--	--
Wind Erosion - Unpaved Roads	11.95	1.79	--	--	--	--
Wind Erosion - Active Areas	113.83	17.07	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	186.02	26.24	--	--	--	--

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
Permanente Creek Reclamation Area						
Bulldozing, Scraping & Grading	--	--	--	--	--	--
Material Handling	--	--	--	--	--	--
Unpaved Road Dust Entrainment	--	--	--	--	--	--
Wind Erosion - Disturbed Areas	0.05	0.01	--	--	--	--
Off-Road Diesel Equipment	--	--	--	--	--	--
Subtotal - Permanente Creek Recl. Area:	0.05	0.01	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.05	--
Fuel Dispensing	--	--	--	--	0.03	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.08	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.02	0.11	0.01	0.01
Off-road Diesel Equipment	4.97	4.59	127.00	277.13	18.14	0.20
On-road On-site Vehicles	0.01	0.00	0.52	0.07	0.05	0.00
On-road Off-site Vehicles	0.06	0.05	0.53	0.14	0.06	0.00
Dust Entrainment - Paved Roads	0.62	0.09	--	--	--	--
Subtotal - Combustion Sources:	5.67	4.74	128.07	277.45	18.26	0.21
Proposed Project Totals (tons/year):	**290.54**	**45.38**	**222.17**	**301.32**	**18.34**	**3.02**
Net Change (tons/year):	**(463.87)**	**(76.23)**	**(65.40)**	**(22.68)**	**(5.34)**	**1.80**
CEQA Significance Thresholds:						
BAAQMD (tons/year)	15	10	see Note 1	10	10	N/A
Exceed BAAQMD Thresholds?	**No**	**No**	**N/A**	**No**	**No**	**N/A**

Notes:

1. BAAQMD CEQA significance thresholds for local CO are 9.0 ppm (8-hr average) and 20.0 ppm (1-hr average).
2. In Phase 1, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with material handling and unpaved road dust entrainment.
3. In Phase 2, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with wind erosion from disturbed areas.

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						
Quarry Operations						
Drilling	45.70	45.70	--	--	--	--
Blasting	92.18	5.32	864.75	219.41	--	25.81
Bulldozing, Scraping & Grading	4.13	0.62	--	--	--	--
Material Handling	22.75	3.41	--	--	--	--
Dust Entrainment - Unpaved Roads	531.45	53.15	--	--	--	--
Wind Erosion - Unpaved Roads	82.38	12.36	--	--	--	--
Wind Erosion - Disturbed Mine Area	3,908.20	586.23	--	--	--	--
Subtotal - Mining:	4,686.79	706.78	864.75	219.41	--	25.81
Waste Rock Land Filling						
Material Handling	10.78	1.62	--	--	--	--
Dust Entrainment - Unpaved Roads	527.55	52.76	--	--	--	--
Wind Erosion - Unpaved Roads	51.12	7.67	--	--	--	--
Subtotal - Land Filling:	589.45	62.04	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.52	--
Fuel Dispensing	--	--	--	--	0.11	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.63	--
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	134.12	123.78	1,766.64	2,216.68	165.31	1.09
On-road On-site Vehicles	0.06	0.04	5.35	0.71	0.45	0.01
On-road Off-site Vehicles	0.06	0.04	3.61	1.01	0.41	0.00
Dust Entrainment - Paved Roads	0.31	0.05	--	--	--	--
Subtotal - Combustion Sources:	134.67	124.03	1,776.03	2,220.24	166.43	1.23
Baseline Totals (pounds/day):	**5,410.92**	**892.85**	**2,640.78**	**2,439.65**	**167.06**	**27.04**
Proposed Project						
Maximum Phase:	Phase 2	Phase 2	Phase 1	Phase 1	Phase 1	Phase 1
North Quarry						
Drilling	--	--	--	--	--	--
Blasting	--	--	1,033.97	262.35	--	30.86
Bulldozing, Scraping & Grading	8.40	1.26	--	--	--	--
Material Handling	38.10	5.71	--	--	--	--
Dust Entrainment - Unpaved Roads	57.07	5.71	--	--	--	--
Wind Erosion - Unpaved Roads	38.83	5.82	--	--	--	--
Wind Erosion - Active Areas	516.32	77.45	--	--	--	--
Subtotal - North Quarry:	658.72	95.95	1,033.97	262.35	--	30.86
Waste Rock Storage/Infill Areas						
Material Handling	38.32	5.75	--	--	--	--
Overland Conveyor System	67.62	13.84	--	--	--	--
Dust Entrainment - Unpaved Roads	295.67	29.57	--	--	--	--
Wind Erosion - Unpaved Roads	79.65	11.95	--	--	--	--
Wind Erosion - Active Areas	758.86	113.83	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	1,240.12	174.93	--	--	--	--

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
Permanente Creek Reclamation Area						
Bulldozing, Scraping & Grading	--	--	--	--	--	--
Material Handling	--	--	--	--	--	--
Unpaved Road Dust Entrainment	--	--	--	--	--	--
Wind Erosion - Disturbed Areas	28.29	4.24	--	--	--	--
Off-Road Diesel Equipment	--	--	--	--	--	--
Subtotal - Permanente Creek Recl. Area:	28.29	4.24	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.33	--
Fuel Dispensing	--	--	--	--	0.20	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.53	--
Combustion Sources						
Portable Diesel Welders	0.05	0.05	0.15	0.71	0.06	0.05
Off-road Diesel Equipment	37.65	34.75	849.61	1,859.77	121.64	1.37
On-road On-site Vehicles	0.04	0.03	3.58	0.45	0.32	0.01
On-road Off-site Vehicles	0.40	0.33	3.60	0.95	0.43	0.01
Dust Entrainment - Paved Roads	4.30	0.65	--	--	--	--
Subtotal - Combustion Sources:	42.44	35.80	856.95	1,861.88	122.44	1.43
Proposed Project Totals (lbs/day):	**1,969.57**	**310.92**	**1,890.92**	**2,124.24**	**122.97**	**32.30**
Net change (pounds/day):	**(3,441.35)**	**(581.93)**	**(749.86)**	**(315.42)**	**(44.09)**	**5.25**
CEQA Significance Thresholds:						
BAAQMD (pounds/day)	82	54	see Note 1	54	54	N/A
Exceed BAAQMD Thresholds?	**No**	**No**	**N/A**	**No**	**No**	**N/A**

Notes:

1. BAAQMD CEQA significance thresholds for local CO are 9.0 ppm (8-hr average) and 20.0 ppm (1-hr average).
2. In Phase 1, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with material handling and unpaved road dust entrainment.
3. In Phase 2, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with wind erosion from disturbed areas.

Table S-3. Comparison of Proposed Project to Baseline Emissions – Annual Toxic Air Contaminants (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
Baseline																				
Quarry Operations																				
Drilling	--	0.01	0.00	2.92	0.00	0.00	0.09	0.02	0.05	0.00	0.00	0.01	0.09	0.01	0.00	0.00	0.07	0.09	0.00	13.91
Blasting	--	0.02	0.01	5.90	0.01	0.01	0.18	0.05	0.11	0.01	0.00	0.02	0.17	0.02	0.01	0.01	0.14	0.19	0.00	28.07
Bulldozing, Scraping & Grading	--	0.00	0.00	0.92	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	4.36
Material Handling	--	0.02	0.01	5.04	0.00	0.01	0.16	0.04	0.09	0.01	0.00	0.02	0.15	0.02	0.01	0.01	0.12	0.16	0.00	23.99
Dust Entrainment - Unpaved Roads	--	0.38	0.19	150.93	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	1,071.50
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	--	2.77	1.39	865.75	0.83	1.39	26.64	7.10	15.54	1.39	0.22	2.77	25.53	2.77	1.39	1.39	21.09	27.75	0.11	4,120.95
Subtotal - Mining:	--	3.26	1.63	1,054.85	0.98	1.63	34.24	8.93	20.16	1.81	0.25	3.26	35.38	3.26	1.63	1.63	35.92	34.15	0.44	5,428.85
Waste Rock Land Filling																				
Material Handling	--	0.01	0.00	2.39	0.00	0.00	0.07	0.02	0.04	0.00	0.00	0.01	0.07	0.01	0.00	0.00	0.06	0.08	0.00	11.36
Dust Entrainment - Unpaved Roads	--	0.37	0.19	149.82	0.11	0.19	6.14	1.47	3.75	0.34	0.02	0.37	8.09	0.37	0.19	0.19	12.44	5.09	0.28	1,063.64
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:	--	0.42	0.21	166.73	0.13	0.21	6.81	1.63	4.15	0.38	0.02	0.42	8.94	0.42	0.21	0.21	13.70	5.66	0.31	1,178.07
Fuel Storage and Dispensing																				
Diesel Storage & Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gasoline Storage & Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	6.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Portable Gasoline Welders	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	38,088.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	3.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	38,098.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Baseline Totals (pounds/year):	**38,098.46**	**3.68**	**1.84**	**1,221.58**	**1.10**	**1.84**	**41.05**	**10.56**	**24.31**	**2.19**	**0.27**	**3.68**	**44.32**	**3.68**	**1.84**	**1.84**	**49.62**	**39.81**	**0.76**	**6,606.93**
Proposed Project - Maximum (Phase 1)																				
North Quarry																				
Drilling	--	0.02	0.01	5.23	0.01	0.01	0.16	0.04	0.09	0.01	0.00	0.02	0.15	0.02	0.01	0.01	0.13	0.17	0.00	24.91
Blasting	--	0.00	0.00	0.81	0.00	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.03	0.00	3.85
Bulldozing, Scraping & Grading	--	0.00	0.00	1.49	0.00	0.00	0.05	0.01	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.05	0.00	7.10
Material Handling	--	0.03	0.01	9.01	0.01	0.01	0.28	0.07	0.16	0.01	0.00	0.03	0.27	0.03	0.01	0.01	0.22	0.29	0.00	42.91
Dust Entrainment - Unpaved Roads	--	0.20	0.10	78.82	0.06	0.10	3.23	0.77	1.97	0.18	0.01	0.20	4.26	0.20	0.10	0.10	6.54	2.68	0.15	559.59
Wind Erosion - Unpaved Roads	--	0.03	0.01	11.65	0.01	0.01	0.48	0.11	0.29	0.03	0.00	0.03	0.63	0.03	0.01	0.01	0.97	0.40	0.02	82.70
Wind Erosion - Active Areas	--	0.42	0.21	132.16	0.13	0.21	4.07	1.08	2.37	0.21	0.03	0.42	3.90	0.42	0.21	0.21	3.22	4.24	0.02	629.10
Subtotal - North Quarry:	--	0.70	0.35	239.19	0.21	0.35	8.29	2.11	4.93	0.45	0.05	0.70	9.27	0.70	0.35	0.35	11.13	7.84	0.19	1,350.16
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.02	0.01	4.85	0.00	0.01	0.15	0.04	0.09	0.01	0.00	0.02	0.14	0.02	0.01	0.01	0.12	0.16	0.00	23.10
Overland Conveyor System	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dust Entrainment - Unpaved Roads	--	0.30	0.15	119.46	0.09	0.15	4.90	1.17	2.99	0.27	0.02	0.30	6.45	0.30	0.15	0.15	9.92	4.06	0.23	848.11
Wind Erosion - Unpaved Roads	--	0.02	0.01	7.88	0.01	0.01	0.32	0.08	0.20	0.02	0.00	0.02	0.43	0.02	0.01	0.01	0.65	0.27	0.01	55.92
Wind Erosion - Active Areas	--	0.08	0.04	25.33	0.02	0.04	0.78	0.21	0.45	0.04	0.01	0.08	0.75	0.08	0.04	0.04	0.62	0.81	0.00	120.58
Subtotal - Waste Rock Storage/Infill:	--	0.42	0.21	157.53	0.12	0.21	6.15	1.50	3.73	0.34	0.03	0.42	7.77	0.42	0.21	0.21	11.30	5.30	0.25	1,047.71
Permanente Creek Reclamation Area																				
Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Material Handling	--	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	0.07
Unpaved Road Dust Entrainment	--	0.00	0.00	0.03	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
Wind Erosion - Disturbed Areas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-Road Diesel Equipment	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Permanente Creek Recl. Area:	--	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	0.30
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	15.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	25,167.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	6.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	25,189.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Proposed Project Totals (pounds/year):	25,189.48	1.12	0.56	396.76	0.34	0.56	14.44	3.60	8.66	0.79	0.08	1.12	17.04	1.12	0.56	0.56	22.44	13.14	0.44	2,398.17
Net change (pounds/year):	**(12,908.99)**	**(2.56)**	**(1.28)**	**(824.82)**	**(0.77)**	**(1.28)**	**(26.62)**	**(6.96)**	**(15.66)**	**(1.41)**	**(0.20)**	**(2.56)**	**(27.28)**	**(2.56)**	**(1.28)**	**(1.28)**	**(27.18)**	**(26.67)**	**(0.32)**	**(4,208.75)**

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	**(12,908.99)**		**(13.96)**		**(5.86)**	**(17.44)**				**(0.05)**			**(22.57)**					**(148.28)**		**(13,117.15)**

Note:

1. Methodology for calculating cancer potency weighted net emissions change based on the cancer potency weighted emissions analysis provided in *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 T*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 included)
2. In Phase 1, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to TAC emissions associated with material handling and unpaved road dust entrainment.

Table S-4. Comparison of Proposed Project to Baseline Emissions – Hourly Toxic Air Contaminants (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
Baseline																				
Quarry Operations																				
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	0.07	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	0.34
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	0.03	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
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	0.19	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	0.91
Subtotal - Mining:	--	0.00	0.00	0.31	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	1.55
Waste Rock 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	0.03	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	0.23
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	0.26
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	8.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	8.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Baseline Totals (pounds/hour):	**8.45**	**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**	**1.81**
Proposed Project - Maximum (Phase 1)																				
North 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	0.00
Blasting	--	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
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	0.01	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	0.08
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	0.09
Subtotal - North Quarry:	--	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	0.21
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	0.00
Overland Conveyor System	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dust Entrainment - Unpaved Roads	--	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
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	0.02
Subtotal - Waste Rock Storage/Infill:	--	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	0.15
Permanente Creek Reclamation Area																				
Bulldozing, Scraping & Grading	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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
Unpaved Road Dust Entrainment	--	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 - Disturbed Areas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-Road Diesel Equipment	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Permanente Creek Recl. Area:	--	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
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	6.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	6.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Proposed Project Totals (pounds/hour):	6.69	0.00	0.00	0.06	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
Net change (pounds/hour):	**(1.76)**	**(0.00)**	**(0.00)**	**(0.28)**	**(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)**	**(1.45)**

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	**(1.76)**	**(0.00)**	**(0.00)**	**(0.01)**	**(0.00)**	**(0.01)**	**(0.05)**		**(1.83)**

Note:

1. Methodology for calculating cancer potency weighted net emissions change based on the cancer potency weighted emissions analysis provided in *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 T*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 included)
2. In Phase 1, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to TAC emissions associated with material handling and unpaved road dust entrainment.

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				
Quarry Operations				
Drilling	--	--	--	--
Blasting	159.81	--	--	159.81
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Disturbed Mine Area	--	--	--	--
Subtotal - Mining:	159.81	--	--	159.81
Waste Rock 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	1.80	0.00	0.00	1.81
Portable Gasoline Welders	0.06	0.00	0.00	0.06
Off-road Diesel Equipment	14,810.69	0.83	0.36	14,941.31
On-road On-site Vehicles	106.09	0.01	0.00	107.16
On-road Off-site Vehicles	50.84	0.00	0.00	51.40
Subtotal - Combustion Sources:	14,969.47	0.85	0.37	15,101.73
Indirect GHG Emissions				
Electricity Use	578.05	0.02	0.01	580.19
Baseline Totals (metric tons/year):	**15,707.33**	**0.87**	**0.37**	**15,841.74**
Proposed Project				
Maximum: Phase 1				
North Quarry				
Drilling	--	--	--	--
Blasting	424.11	--	--	424.11
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - North Quarry:	424.11	--	--	424.11

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	--	--	--	--
Overland Conveyor System	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	4.44	0.00	0.00	4.48
Off-road Diesel Equipment	19,430.78	1.09	0.48	19,602.15
On-road On-site Vehicles	80.44	0.01	0.00	81.17
On-road Off-site Vehicles	69.09	0.00	0.00	69.74
Subtotal - Combustion Sources:	19,584.76	1.10	0.48	19,757.55
Indirect GHG Emissions				
Electricity Use	578.05	0.02	0.01	580.19
Proposed Project Totals (metric tons/yr):	**20,586.92**	**1.13**	**0.49**	**20,761.85**
Net change (metric tons/year):	**4,879.59**	**0.26**	**0.11**	**4,920.11**
CEQA Significance Threshold:				
BAAQMD (metric tons/year)				10,000.00
Exceeds BAAQMD Threshold?				**No**

Note: Peak emissions from Permanente Creek Reclamation Area activities do not overlap peak emissions from other proposed project activities with respect to greenhouse gases in either Phase 1 or Phase 2.

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 associated 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 11-year period from January 1, 2000 to December 31, 2010, 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, ALG prepared baseline estimates of criteria pollutant, TAC, and GHG emissions associated with quarry operations for this 11-year baseline period. The following operations and activities are included in the baseline emissions estimates:

- Quarry operations
- Waste rock material storage (land filling)
- 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.
- 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.
- The Climate Registry, *General Reporting Protocol, Version 1.1*, May 2008.
- 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).

ALG based its calculation of baseline emissions from motor vehicles assuming emission factors for calendar year 2010. For off-road diesel equipment, ALG utilized zero-hour factors and deterioration rates from the California Air Resources Board's OFFROAD2007 emissions model to estimate emissions for each vehicle for calendar year 2010, accounting for vehicle age, horsepower, and baseline period use. Calculations assume that off-road diesel emission factors deteriorate only up to a maximum of 12,000 hours per the document, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements*, California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28.

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 an 11-year period (2000-2010). 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:

- Quarry Operations – This category encompasses the following emission sources associated with operation of the existing 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 for the baseline, 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[8]. 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[9] to 1.33 meters per second[10]). This methodology is also consistent with the technical approach used in the CEIR.

- Waste Rock 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 Quarry

- Combustion Sources – This category encompasses operation of the following equipment in conjunction with operation of the existing Quarry:
  - Portable Internal Combustion Engines (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)

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[8] 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.

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

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

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. 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, did not detect naturally occurring asbestos at the Quarry site. (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 diesel exhaust 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
Quarry Operations						
Drilling	1.87	1.87	--	--	--	--
Blasting	3.78	0.22	35.45	9.00	--	1.06
Bulldozing, Scraping & Grading	0.59	0.09	--	--	--	--
Material Handling	3.23	0.48	--	--	--	--
Dust Entrainment - Unpaved Roads	75.47	7.55	--	--	--	--
Wind Erosion - Unpaved Roads	11.70	1.75	--	--	--	--
Wind Erosion - Disturbed Mine Area	554.96	83.24	--	--	--	--
Waste Rock Land Filling						
Material Handling	1.53	0.23	--	--	--	--
Dust Entrainment - Unpaved Roads	74.91	7.49	--	--	--	--
Wind Erosion - Unpaved Roads	7.26	1.09	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.06	--
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	19.04	17.58	250.86	314.77	23.47	0.16
On-road On-site Vehicles	0.01	0.01	0.74	0.10	0.06	0.00
On-road Off-site Vehicles	0.01	0.00	0.50	0.09	0.05	0.00
Dust Entrainment - Paved Roads	0.04	0.01	--	--	--	--
Totals (tons/year):	754.40	121.62	287.57	324.01	23.67	1.22

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

Activity	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Quarry Operations						
Drilling	45.70	45.70	--	--	--	--
Blasting	92.18	5.32	864.75	219.41	--	25.81
Bulldozing, Scraping & Grading	4.13	0.62	--	--	--	--
Material Handling	22.75	3.41	--	--	--	--
Dust Entrainment - Unpaved Roads	531.45	53.15	--	--	--	--
Wind Erosion - Unpaved Roads	82.38	12.36	--	--	--	--
Wind Erosion - Disturbed Mine Area	3,908.20	586.23	--	--	--	--
Waste Rock Land Filling						
Material Handling	10.78	1.62	--	--	--	--
Dust Entrainment - Unpaved Roads	527.55	52.76	--	--	--	--
Wind Erosion - Unpaved Roads	51.12	7.67	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.52	--
Fuel Dispensing	--	--	--	--	0.11	--
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	134.12	123.78	1,766.64	2,216.68	165.31	1.09
On-road On-site Vehicles	0.06	0.04	5.35	0.71	0.45	0.01
On-road Off-site Vehicles	0.06	0.04	3.61	1.01	0.41	0.00
Dust Entrainment - Paved Roads	0.31	0.05	--	--	--	--
Totals (pounds/day):	5,410.92	892.85	2,640.78	2,439.65	167.06	27.04

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
Quarry Operations																				
Drilling	--	0.01	0.00	2.92	0.00	0.00	0.09	0.02	0.05	0.00	0.00	0.01	0.09	0.01	0.00	0.00	0.07	0.09	0.00	13.91
Blasting	--	0.02	0.01	5.90	0.01	0.01	0.18	0.05	0.11	0.01	0.00	0.02	0.17	0.02	0.01	0.01	0.14	0.19	0.00	28.07
Bulldozing, Scraping & Grading	--	0.00	0.00	0.92	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	4.36
Material Handling	--	0.02	0.01	5.04	0.00	0.01	0.16	0.04	0.09	0.01	0.00	0.02	0.15	0.02	0.01	0.01	0.12	0.16	0.00	23.99
Dust Entrainment - Unpaved Roads	--	0.38	0.19	150.93	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	1,071.50
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	--	2.77	1.39	865.75	0.83	1.39	26.64	7.10	15.54	1.39	0.22	2.77	25.53	2.77	1.39	1.39	21.09	27.75	0.11	4,120.95
Waste Rock Land Filling																				
Material Handling	--	0.01	0.00	2.39	0.00	0.00	0.07	0.02	0.04	0.00	0.00	0.01	0.07	0.01	0.00	0.00	0.06	0.08	0.00	11.36
Dust Entrainment - Unpaved Roads	--	0.37	0.19	149.82	0.11	0.19	6.14	1.47	3.75	0.34	0.02	0.37	8.09	0.37	0.19	0.19	12.44	5.09	0.28	1,063.64
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	38,088.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	3.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (pounds/year):	38,098.46	3.68	1.84	1,221.58	1.10	1.84	41.05	10.56	24.31	2.19	0.27	3.68	44.32	3.68	1.84	1.84	49.62	39.81	0.76	6,606.93

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
Quarry Operations																				
Drilling	--	1.43E-05	7.14E-06	4.46E-03	4.28E-06	7.14E-06	1.37E-04	3.66E-05	8.00E-05	7.14E-06	1.14E-06	1.43E-05	1.31E-04	1.43E-05	7.14E-06	7.14E-06	1.09E-04	1.43E-04	5.71E-07	2.12E-02
Blasting	--	2.30E-04	1.15E-04	7.19E-02	6.91E-05	1.15E-04	2.21E-03	5.90E-04	1.29E-03	1.15E-04	1.84E-05	2.30E-04	2.12E-03	2.30E-04	1.15E-04	1.15E-04	1.75E-03	2.30E-03	9.22E-06	3.42E-01
Bulldozing, Scraping & Grading	--	6.46E-07	3.23E-07	2.02E-04	1.94E-07	3.23E-07	6.20E-06	1.65E-06	3.62E-06	3.23E-07	5.17E-08	6.46E-07	5.94E-06	6.46E-07	3.23E-07	3.23E-07	4.91E-06	6.46E-06	2.58E-08	9.59E-04
Material Handling	--	3.55E-06	1.78E-06	1.11E-03	1.07E-06	1.78E-06	3.41E-05	9.10E-06	1.99E-05	1.78E-06	2.84E-07	3.55E-06	3.27E-05	3.55E-06	1.78E-06	1.78E-06	2.70E-05	3.55E-05	1.42E-07	5.28E-03
Dust Entrainment - Unpaved Roads	--	8.30E-05	4.15E-05	3.32E-02	2.49E-05	4.15E-05	1.36E-03	3.26E-04	8.30E-04	7.64E-05	4.65E-06	8.30E-05	1.79E-03	8.30E-05	4.15E-05	4.15E-05	2.76E-03	1.13E-03	6.31E-05	2.36E-01
Wind Erosion - Unpaved Roads	--	1.29E-05	6.44E-06	5.15E-03	3.86E-06	6.44E-06	2.11E-04	5.05E-05	1.29E-04	1.18E-05	7.21E-07	1.29E-05	2.78E-04	1.29E-05	6.44E-06	6.44E-06	4.27E-04	1.75E-04	9.78E-06	3.66E-02
Wind Erosion - Disturbed Mine Area	--	6.11E-04	3.05E-04	1.91E-01	1.83E-04	3.05E-04	5.86E-03	1.56E-03	3.42E-03	3.05E-04	4.89E-05	6.11E-04	5.62E-03	6.11E-04	3.05E-04	3.05E-04	4.64E-03	6.11E-03	2.44E-05	9.07E-01
Waste Rock Land Filling																				
Material Handling	--	1.68E-06	8.42E-07	5.25E-04	5.05E-07	8.42E-07	1.62E-05	4.31E-06	9.43E-06	8.42E-07	1.35E-07	1.68E-06	1.55E-05	1.68E-06	8.42E-07	8.42E-07	1.28E-05	1.68E-05	6.74E-08	2.50E-03
Dust Entrainment - Unpaved Roads	--	8.24E-05	4.12E-05	3.30E-02	2.47E-05	4.12E-05	1.35E-03	3.23E-04	8.24E-04	7.58E-05	4.62E-06	8.24E-05	1.78E-03	8.24E-05	4.12E-05	4.12E-05	2.74E-03	1.12E-03	6.26E-05	2.34E-01
Wind Erosion - Unpaved Roads	--	7.99E-06	3.99E-06	3.20E-03	2.40E-06	3.99E-06	1.31E-04	3.13E-05	7.99E-05	7.35E-06	4.47E-07	7.99E-06	1.73E-04	7.99E-06	3.99E-06	3.99E-06	2.65E-04	1.09E-04	6.07E-06	2.27E-02
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Portable Gasoline Welders	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	8.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (pounds/hour):	8.45	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	1.81

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

Activity	CO_2	CH_4	N_2O	CO_2e
Quarry Operations				
Drilling	--	--	--	--
Blasting	159.81	--	--	159.81
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Disturbed Mine Area	--	--	--	--
Waste Rock 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	1.80	0.00	0.00	1.81
Portable Gasoline Welders	0.06	0.00	0.00	0.06
Off-road Diesel Equipment	14,810.69	0.83	0.36	14,941.31
On-road On-site Vehicles	106.09	0.01	0.00	107.16
On-road Off-site Vehicles	50.84	0.00	0.00	51.40
Indirect GHG Emissions				
Electricity Use	578.05	0.02	0.01	580.19
Totals (metric tons/year):	15,707.33	0.87	0.37	15,841.74

Proposed Project Air Quality Emissions

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 the project phases. The following activities are included in the proposed project emission estimates for each phase:

- Continued operation of the existing Quarry during Phase 1 (a conservative approach because the Quarry is not seeking approval to continue these mining operations)
- Operation of the waste rock material storage areas associated with the Quarry
- Mobile sources and portable equipment associated with quarry operations
- Indirect greenhouse gas emissions associated with electricity and water use
- Reclamation of the existing North Quarry, waste rock material storage areas, and other disturbed areas in the project area, including the Permanente Creek Reclamation Area

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 the existing primary and secondary crushers, and
- Continued operation of the existing rock plant

As discussed above, the cement plant is not included since the facility is a separately-permitted industrial use, is not considered part of this project, and is not be affected by the proposed amendment to the 1985 reclamation plan. Similarly, the primary and secondary crushers and the rock plant have not been included because they could continue to operate.

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. 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[11], which are also specifically referenced in the appendices.

ALG based its calculation of emissions from motor vehicles assuming emission factors for calendar year 2012, the anticipated first year of operation under the proposed project. For off-road diesel equipment, ALG utilized zero-hour factors and deterioration rates from the California Air Resources Board's OFFROAD2007 emissions model to estimate emissions for each vehicle for the peak year of each phase (in terms of total horsepower-hours). As with the baseline analysis, proposed project off-road diesel emission calculations assume that off-road diesel emission factors deteriorate only up to a maximum of 12,000 hours. This is consistent with the document, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements*, California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28. With respect to wind erosion, all wind data were managed consistent with the baseline analysis, and relies on on-site meteorological data.

[11] *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.

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

- Maximum anticipated annual production levels of limestone and waste rock
- Drilling and blasting necessary to support maximum anticipated production
- Estimated acres of actively disturbed areas (i.e., Quarry and waste storage/infill areas) 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

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 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 C documents each emission calculation by process/pollutant. Appendix D provides the supporting documentation (activity data and emission factors) that are relied upon to perform these calculations. (Emission estimates for Permanente Creek Reclamation Area activities are separately documented in Appendix E.)

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:

- Quarry Operations – This category encompasses the following emission sources associated with continued operation and reclamation of the existing 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 limestone and waste rock
  - Loading and dumping of materials into transport trucks during the excavation phase, and dumping of materials from transport trucks and the overland conveyor system during the quarry reclamation phase (referred to as material handling)
  - Dust entrainment due to vehicle travel on unpaved roads in the vicinity of the Quarry
  - Wind erosion associated with actively disturbed unpaved areas, including unpaved roads in the vicinity of the Quarry and active quarry operating and reclamation areas within the 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 West Material Storage Area (WMSA) and East Material Storage Area (EMSA):
  - Material handling associated with waste rock from the Quarry, reclamation of the WMSA and EMSA, and transport of waste rock for quarry reclamation
  - Bulldozing of waste rock in the WMSA to reclaim the North Quarry (this is accounted for in the bulldozing, scraping, and grading activity for quarry operations)
  - Operation of an overland conveyor system to transport waste rock from the WMSA into the North Quarry for reclamation of the Quarry. Lehigh will utilize a Grizzly screen to separate material that can be transported via the conveyor system from larger material that must be transported by truck. Lehigh expects that approximately 75% of the material will be transported by conveyor, and the remainder will be transported by truck.
  - Associated dust entrainment due to vehicle travel on unpaved roads in the vicinity of the WMSA and EMSA
  - Wind erosion associated with actively disturbed unpaved areas, including unpaved roads in the vicinity of waste rock material storage areas, active waste rock material storage/infill areas, and active reclamation areas within the WMSA and EMSA

- Permanente Creek Reclamation Area – Peak particulate matter and TAC emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed project activities with respect to material handling and unpaved road dust entrainment in Phase 1, and disturbed area wind erosion in Phase 2. (See Table D-1 for additional information on project activity overlap.) Therefore, Tables 6 through 9 reflect particulate matter and TAC emissions associated with the Permanente Creek Reclamation Area for these overlapped activities. (There is no overlap with respect to GHG emissions.) Incremental emissions increases associated with overlapped activities do not affect significance relative to overall proposed project emission totals. Additional documentation on Permanente Creek Reclamation Area emissions is provided in Appendix E.

[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.

- Permanente Creek Long-Term Restoration (Phase 3) – As noted previously, this report does not provide a comprehensive evaluation of emissions associated with Phase 3 of the project. This is because emissions from material handling, dust entrainment, wind erosion, off-road equipment, on-road vehicles, and related activities during Phase 3 will be substantially lower than in either Phase 1 or Phase 2. Therefore, Phase 3 emissions will not affect this report's analysis of peak emissions expected to occur during Phases 1 and 2. This report does include, however, an evaluation of emissions from Permanente Creek long-term restoration activities expected to occur during Phase 3 of the project. As part of the long-term restoration effort, Lehigh anticipates removing approximately 18,000 cubic yards of fill materials and stabilizing slopes along Permanente Creek. Work is expected to occur in two areas: a 1.8 acre upper area south of the North Quarry in the vicinity of current Pond 4, and a 1.2 acre lower area west of the current surge pile. Criteria, toxic air contaminant, and GHG emission estimates associated with this work, assumed to occur during 2026, are presented in Appendix F to this report.

- 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, waste rock storage and infill areas, 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 transporting topsoil and mulched green waste material from outside each area to be reclaimed (if necessary), and moving topsoil within an area as part of concurrent reclamation activities
  - Dust entrainment due to vehicle travel on unpaved roads
  - 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, did not detect naturally occurring asbestos at the Quarry site. (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 internal combustion engines, 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, operation of the overland conveyor system, 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
1	North Quarry	140.56	21.92	94.09	23.87	--	2.81
	Waste Rock Storage/Infill Areas	83.02	9.47	--	--	--	--
	Permanente Creek Reclamation Area	0.03	0.00	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.08	--
	Combustion Sources	13.03	11.70	128.07	277.45	18.26	0.21
	Total - Phase 1	236.64	43.08	222.17	301.32	18.34	3.02
2	North Quarry	98.81	14.39	--	--	--	--
	Waste Rock Storage/Infill Areas	186.02	26.24	--	--	--	--
	Permanente Creek Reclamation Area	0.05	0.01	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.05	--
	Combustion Sources	5.67	4.74	39.54	125.74	8.37	0.12
	Total - Phase 2	290.54	45.38	39.54	125.74	8.42	0.12

Notes:

1. In Phase 1, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with material handling and unpaved road dust entrainment.
2. In Phase 2, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with wind erosion from disturbed areas.

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

Phase	Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
1	North Quarry	939.34	146.25	1,033.97	262.35	--	30.86
	Waste Rock Storage/Infill Areas	553.47	63.11	--	--	--	--
	Permanente Creek Reclamation Area	10.87	1.28	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.53	--
	Combustion Sources	87.40	78.38	856.95	1,861.88	122.44	1.43
	Total - Phase 1	1,591.08	289.02	1,890.92	2,124.24	122.97	32.30
2	North Quarry	658.72	95.95	--	--	--	--
	Waste Rock Storage/Infill Areas	1,240.12	174.93	--	--	--	--
	Permanente Creek Reclamation Area	28.29	4.24	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--	0.33	--
	Combustion Sources	42.44	35.80	293.39	957.34	63.85	0.91
	Total - Phase 2	1,969.57	310.92	293.39	957.34	64.18	0.91

Notes:

1. In Phase 1, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with material handling and unpaved road dust entrainment.
2. In Phase 2, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to particulate matter emissions (PM_{10} and $PM_{2.5}$) associated with wind erosion from disturbed areas.

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
	North Quarry	--	0.70	0.35	239.19	0.21	0.35	8.29	2.11	4.93	0.45	0.05	0.70	9.27	0.70	0.35	0.35	11.13	7.84	0.19	1,350.16
	Waste Rock Storage/Infill Areas	--	0.42	0.21	157.53	0.12	0.21	6.15	1.50	3.73	0.34	0.03	0.42	7.77	0.42	0.21	0.21	11.30	5.30	0.25	1,047.71
1	Permanente Creek Reclamat'n Area	--	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	0.30
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	25,189.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 1	25,189.48	1.12	0.56	396.76	0.34	0.56	14.44	3.60	8.66	0.79	0.08	1.12	17.04	1.12	0.56	0.56	22.44	13.14	0.44	2,398.17
	North Quarry	--	0.49	0.25	160.47	0.15	0.25	5.23	1.36	3.08	0.28	0.04	0.49	5.44	0.49	0.25	0.25	5.60	5.20	0.07	831.13
	Waste Rock Storage/Infill Areas	--	0.93	0.47	314.96	0.28	0.47	10.84	2.76	6.45	0.58	0.07	0.93	12.05	0.93	0.47	0.47	14.27	10.31	0.24	1,762.60
2	Permanente Creek Reclamat'n Area	--	0.00	0.00	0.07	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	0.34
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	10,060.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 2	10,060.72	1.42	0.71	475.50	0.43	0.71	16.08	4.13	9.53	0.86	0.11	1.42	17.49	1.42	0.71	0.71	19.87	15.52	0.31	2,594.07

Notes:
1. In Phase 1, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to TAC emissions associated with material handling and unpaved road dust entrainment.
2. In Phase 2, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to TAC emissions associated with wind erosion from disturbed areas.

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
	North Quarry	--	1.12E-04	5.58E-05	3.76E-02	3.35E-05	5.58E-05	1.28E-03	3.28E-04	7.63E-04	6.89E-05	8.17E-06	1.12E-04	1.42E-03	1.12E-04	5.58E-05	5.58E-05	1.65E-03	1.23E-03	2.71E-05	2.08E-01
	Waste Rock Storage/Infill Areas	--	5.77E-05	2.88E-05	2.19E-02	1.73E-05	2.88E-05	8.54E-04	2.08E-04	5.17E-04	4.74E-05	3.55E-06	5.77E-05	1.08E-03	5.77E-05	2.88E-05	2.88E-05	1.57E-03	7.36E-04	3.41E-05	1.46E-01
1	Permanente Creek Reclamat'n Area	--	3.40E-06	1.70E-06	1.25E-03	1.02E-06	1.70E-06	4.75E-05	1.17E-05	2.86E-05	2.62E-06	2.19E-07	3.40E-06	5.83E-05	3.40E-06	1.70E-06	1.70E-06	8.17E-05	4.18E-05	1.71E-06	8.00E-03
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	6.69E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 1	6.69E+00	1.73E-04	8.63E-05	6.07E-02	5.18E-05	8.63E-05	2.19E-03	5.48E-04	1.31E-03	1.19E-04	1.19E-05	1.73E-04	2.55E-03	1.73E-04	8.63E-05	8.63E-05	3.30E-03	2.01E-03	6.29E-05	3.62E-01
	North Quarry	--	6.86E-05	3.43E-05	2.23E-02	2.06E-05	3.43E-05	7.27E-04	1.89E-04	4.28E-04	3.85E-05	5.25E-06	6.86E-05	7.55E-04	6.86E-05	3.43E-05	3.43E-05	7.77E-04	7.22E-04	9.94E-06	1.15E-01
	Waste Rock Storage/Infill Areas	--	1.29E-04	6.46E-05	4.37E-02	3.88E-05	6.46E-05	1.51E-03	3.84E-04	8.95E-04	8.10E-05	9.40E-06	1.29E-04	1.67E-03	1.29E-04	6.46E-05	6.46E-05	1.98E-03	1.43E-03	3.33E-05	2.45E-01
2	Permanente Creek Reclamat'n Area	--	8.84E-06	4.42E-06	2.76E-03	2.65E-06	4.42E-06	8.49E-05	2.26E-05	4.95E-05	4.42E-06	7.07E-07	8.84E-06	8.13E-05	8.84E-06	4.42E-06	4.42E-06	6.72E-05	8.84E-05	3.54E-07	1.31E-02
	Fuel Storage and Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Combustion Sources	8.37E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Total - Phase 2	8.37E+00	2.07E-04	1.03E-04	6.88E-02	6.20E-05	1.03E-04	2.32E-03	5.96E-04	1.37E-03	1.24E-04	1.54E-05	2.07E-04	2.51E-03	2.07E-04	1.03E-04	1.03E-04	2.83E-03	2.24E-03	4.36E-05	3.73E-01

Notes:
1. In Phase 1, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to TAC emissions associated with material handling and unpaved road dust entrainment.
2. In Phase 2, peak emissions from Permanente Creek Reclamation Area activities overlap peak emissions from other proposed activities with respect to TAC emissions associated with wind erosion from disturbed areas.

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

Phase	Component	CO_2	CH_4	N_2O	CO_2e
1	North Quarry	424.11	--	--	424.11
	Waste Rock Storage/Infill Areas	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--
	Combustion Sources	19,584.76	1.10	0.48	19,757.55
	Indirect GHG Emissions	578.05	0.02	0.01	580.19
	Total - Phase 1	20,586.92	1.13	0.49	20,761.85
2	North Quarry	--	--	--	--
	Waste Rock Storage/Infill Areas	--	--	--	--
	Fuel Storage and Dispensing	--	--	--	--
	Combustion Sources	10,568.37	0.59	0.26	10,661.97
	Indirect GHG Emissions	2,487.84	0.10	0.02	2,497.07
	Total - Phase 2	13,056.21	0.69	0.28	13,159.04

Note: Peak emissions from Permanente Creek Reclamation Area activities do not overlap peak emissions from other proposed project activities with respect to greenhouse gases in either Phase 1 or Phase 2.

Appendix A

Baseline Emission Calculations

Baseline Emission Calculations.

Table	Activity
	Quarry Operations
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 Quarry Area
A-5	Quarry Operations TAC Emissions
	Waste Rock Land Filling
A-6	Material Handling
A-7	Dust Entrainment – Unpaved Roads
A-7	Wind Erosion – Unpaved Roads
A-8	Waste Rock Land Filling TAC Emissions
	Fuel Storage and Dispensing
A-9	Fuel Storage
A-10	Fuel Dispensing
	Combustion Sources
A-11	Portable Diesel-fueled Welders
A-12	Portable Gasoline-fueled 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
	Emission Factors
A-18	Combustion Sources – Off-road Diesel Equipment
A-19	Combustion Sources – On-road Motor Vehicles

Table A-1. Baseline Quarry Operations - Drilling and Blasting.

Activity	Emission Factor Reference	Emission Factors		Annual Activity[1]	Control Efficiency[2]	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
Drilling	MDAQMD Guidance, VI.A	0.68 lb/hole	0.68 lb/hole	5,510 holes/yr	0%	1.87	45.70	5.71	1.87	45.70	5.71
Blasting	MDAQMD Guidance, VI.B	92.18 lb/blast	5.32 lb/blast	82 blasts/yr	0%	3.78	92.18	92.18	0.22	5.32	5.32
Totals:						5.65	137.88	97.90	2.09	51.01	11.03

Notes:
1. Annual activity based on quarry blasting records for 2000-2010.
2. Assumed control: none.
3. Average operating schedule (2000-2010):
   8 hours/day
   82 days/year
4. Blasting assumes:
   1 blast/day
   1 blast/hour
5. Conversion Factors:
   2,000 lb = 1 ton
   43,560 square feet = 1 acre

Blasting Emission Factor[1]

Data Input	Data Reference	Symbol	Value	Unit
Area Shifted per Blast	Calculated[2]	A	5,009	ft^2
PM_{10} Particle size multiplier	MDAQMD Guidance (Em. Inventory Form)	k	0.52	--
$PM_{2.5}$ Particle 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 production, blast pattern, and related data for 2000-2010, provided by Lehigh Southwest Cement Company, January 2010 and May 2011.

Table A-2. Baseline Quarry Operations - 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	1,058 tons/yr	0%	35.45	864.75	9.00	219.41	1.06	25.81	159.81	4,296.65

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 2000-2010.
4. Assumed control: none.
5. Average operating schedule (2000-2010):
   82 days/year
   1 blast/day
6. Conversion factors:
   2,000 lb = 1 ton
   1,000 kg = 1 tonne
   0.45359 kg = 1 pound

Table A-3. Baseline Quarry Operations - Various Material Handling Processes.

Activity	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[1]	Transfer Points	Control Efficiency[2]	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)
Material Handling	AP-42 13.2.4.3, MDAQMD	1.15E-03 lb/ton	1.73E-04 lb/ton	5,607,455 tons/yr	1	0%	3.23	22.75	1.42	0.48	3.41	0.21
Bulldozing, Scraping & Grading (BSG)	MDAQMD Guidance VI.D	1.24E-01 lb/hr	1.86E-02 lb/hr	9,443	N/A	0%	0.59	4.13	0.26	0.09	0.62	0.04
Total							3.82	26.88	1.68	0.57	4.03	0.25

Notes:
1. Throughputs based on quarry production records for 2000-2010.
2. Assumed control: none.
3. Average operating schedule (2000-2010):
   16 hours/day
   284 days/year
4. Conversion Factors:
   2,000 lb/ton
   43,560 square feet/acre

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
PM_{10} Particle size multiplier	MDAQMD Guidance, Secs. VI.D, VI.E	k	0.36	--
$PM_{2.5}$ Particle size multiplier	WRAP AP-42 Fug. Dust $PM_{2.5}/PM_{10}$ Ratios[1]	k	0.054	--
Material 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).

Table A-4. Baseline Quarry Operations - Unpaved Road Dust Entrainment and Wind Erosion.

Activity	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[1,2,3]	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	1.75 lb/VMT	0.18 lb/mile	344,744 miles/year	75%	75.47	531.45	33.22	7.55	53.15	3.32
Wind Erosion - Unpaved Roads	AP-42 13.2.5	1.40 ton/acre	0.21 ton/acre	33 acres/yr	75%	11.70	82.38	5.15	1.75	12.36	0.77
Wind Erosion - Disturbed Quarry Area	AP-42 13.2.5	1.40 ton/acre	0.21 ton/acre	395 acres/yr	0%	554.96	3,908.20	244.26	83.24	586.23	36.64

Notes:
1. Annual activity data based on 2000-2010 average road data (from annual topography maps) and average production rates.
2. Unpaved roads acreage based on average road data from annual topography maps.
3. Disturbed mine area acreage based on 2000-2010 average disturbed areas reported under 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 (2000-2010):
   16 hours/day
   284 days/year
6. Conversion Factors:
   2,000 lb/ton — 453.59 grams/pound
   43,560 square feet/acre — 4,047 square meters/acre

Unpaved Roads Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Surface Silt Content	2008 CEIR, Table B-8	s	2.7	%
Average Vehicle Weight	2011 Caterpillar Handbook & http://autos.yahoo.com	W	83.6	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 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 (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*	*$g/(m^2$-yr)*

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

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

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

Baseline Mining Miles Traveled Activity Data[1]

Trip Type	Trips/Year	1-Way Trip Distance	Annual Miles Traveled	Average Vehicle	Annual Ton-Miles[2]	Notes
Quarry Limestone Transport	27,307	3.4 mi/trip	187,694	151.1	28,363,250	(Calculations reflect two-way trips)
Quarry In-Plant Vehicles	--	--	157,051	3.0	471,152	
Total Fleet			344,744	83.6	28,834,402	

Notes:
1. Based on production, road length, and equipment data provided by Lehigh Southwest Cement Company, January 2010 and July 2011
2. Annual ton-miles used only to calculate average vehicle weight.

Table A-5. Baseline Quarry Operations - Toxic Air Contaminants.

Annual Emissions (pounds/year).

TAC[1]	TAC EF Overbuden (mg/kg)	TAC EF Roads (mg/kg)	PM_{10} (tpy)	Dust Entrainment Unpaved Roads 75.47	Wind Erosion Unpaved Roads 11.70	Wind Erosion Disturbed Area 554.96	Drilling 1.87	Blasting 3.78	Material Handling 3.23	BSG 0.59	Total TAC Emissions (lb/yr)
Antimony	2.5	2.5		3.77E-01	5.85E-02	2.77E+00	9.37E-03	1.89E-02	1.62E-02	2.94E-03	3.26E+00
Arsenic	1.25	1.25		1.89E-01	2.92E-02	1.39E+00	4.68E-03	9.45E-03	8.08E-03	1.47E-03	1.63E+00
Barium	780	1000		1.51E+02	2.34E+01	8.66E+02	2.92E+00	5.90E+00	5.04E+00	9.16E-01	1.05E+03
Beryllium	0.75	0.75		1.13E-01	1.75E-02	8.32E-01	2.81E-03	5.67E-03	4.85E-03	8.81E-04	9.77E-01
Cadmium	1.25	1.25		1.89E-01	2.92E-02	1.39E+00	4.68E-03	9.45E-03	8.08E-03	1.47E-03	1.63E+00
Chromium	24	41		6.19E+00	9.59E-01	2.66E+01	8.99E-02	1.81E-01	1.55E-01	2.82E-02	3.42E+01
Cobalt	6.4	9.8		1.48E+00	2.29E-01	7.10E+00	2.40E-02	4.84E-02	4.13E-02	7.51E-03	8.93E+00
Copper	14	25		3.77E+00	5.85E-01	1.55E+01	5.25E-02	1.06E-01	9.04E-02	1.64E-02	2.02E+01
Lead	1.25	2.3		3.47E-01	5.38E-02	1.39E+00	4.68E-03	9.45E-03	8.08E-03	1.47E-03	1.81E+00
Mercury	0.2	0.14		2.11E-02	3.28E-03	2.22E-01	7.49E-04	1.51E-03	1.29E-03	2.35E-04	2.50E-01
Molybdenum	2.5	2.5		3.77E-01	5.85E-02	2.77E+00	9.37E-03	1.89E-02	1.62E-02	2.94E-03	3.26E+00
Nickel	23	54		8.15E+00	1.26E+00	2.55E+01	8.62E-02	1.74E-01	1.49E-01	2.70E-02	3.54E+01
Selenium	2.5	2.5		3.77E-01	5.85E-02	2.77E+00	9.37E-03	1.89E-02	1.62E-02	2.94E-03	3.26E+00
Silver	1.25	1.25		1.89E-01	2.92E-02	1.39E+00	4.68E-03	9.45E-03	8.08E-03	1.47E-03	1.63E+00
Thallium	1.25	1.25		1.89E-01	2.92E-02	1.39E+00	4.68E-03	9.45E-03	8.08E-03	1.47E-03	1.63E+00
Vanadium	19	83		1.25E+01	1.94E+00	2.11E+01	7.12E-02	1.44E-01	1.23E-01	2.23E-02	3.59E+01
Zinc	25	34		5.13E+00	7.95E-01	2.77E+01	9.37E-02	1.89E-01	1.62E-01	2.94E-02	3.41E+01
Hex Chromium	0.1	1.9		2.87E-01	4.45E-02	1.11E-01	3.75E-04	7.56E-04	6.46E-04	1.17E-04	4.44E-01
Total Crystalline Silica	3712.8	7099.2		1.07E+03	1.66E+02	4.12E+03	1.39E+01	2.81E+01	2.40E+01	4.36E+00	5.43E+03

Hourly Emissions (pounds/hour).

TAC[1]	TAC EF Overbuden (mg/kg)	TAC EF Roads (mg/kg)	PM_{10} (lb/hr)	Dust Entrainment Unpaved Roads 33.22	Wind Erosion Unpaved Roads 5.15	Wind Erosion Disturbed Area 244.26	Drilling 5.71	Blasting 92.18	Material Handling 1.42	BSG 0.26	Total TAC Emissions (lb/hr)
Antimony	2.5	2.5		8.30E-05	1.29E-05	6.11E-04	1.43E-05	2.30E-04	3.55E-06	6.46E-07	9.56E-04
Arsenic	1.25	1.25		4.15E-05	6.44E-06	3.05E-04	7.14E-06	1.15E-04	1.78E-06	3.23E-07	4.78E-04
Barium	780	1000		3.32E-02	5.15E-03	1.91E-01	4.46E-03	7.19E-02	1.11E-03	2.02E-04	3.07E-01
Beryllium	0.75	0.75		2.49E-05	3.86E-06	1.83E-04	4.28E-06	6.91E-05	1.07E-06	1.94E-07	2.87E-04
Cadmium	1.25	1.25		4.15E-05	6.44E-06	3.05E-04	7.14E-06	1.15E-04	1.78E-06	3.23E-07	4.78E-04
Chromium	24	41		1.36E-03	2.11E-04	5.86E-03	1.37E-04	2.21E-03	3.41E-05	6.20E-06	9.83E-03
Cobalt	6.4	9.8		3.26E-04	5.05E-05	1.56E-03	3.66E-05	5.90E-04	9.10E-06	1.65E-06	2.58E-03
Copper	14	25		8.30E-04	1.29E-04	3.42E-03	8.00E-05	1.29E-03	1.99E-05	3.62E-06	5.77E-03
Lead	1.25	2.3		7.64E-05	1.18E-05	3.05E-04	7.14E-06	1.15E-04	1.78E-06	3.23E-07	5.18E-04
Mercury	0.2	0.14		4.65E-06	7.21E-07	4.89E-05	1.14E-06	1.84E-05	2.84E-07	5.17E-08	7.41E-05
Molybdenum	2.5	2.5		8.30E-05	1.29E-05	6.11E-04	1.43E-05	2.30E-04	3.55E-06	6.46E-07	9.56E-04
Nickel	23	54		1.79E-03	2.78E-04	5.62E-03	1.31E-04	2.12E-03	3.27E-05	5.94E-06	9.98E-03
Selenium	2.5	2.5		8.30E-05	1.29E-05	6.11E-04	1.43E-05	2.30E-04	3.55E-06	6.46E-07	9.56E-04
Silver	1.25	1.25		4.15E-05	6.44E-06	3.05E-04	7.14E-06	1.15E-04	1.78E-06	3.23E-07	4.78E-04
Thallium	1.25	1.25		4.15E-05	6.44E-06	3.05E-04	7.14E-06	1.15E-04	1.78E-06	3.23E-07	4.78E-04
Vanadium	19	83		2.76E-03	4.27E-04	4.64E-03	1.09E-04	1.75E-03	2.70E-05	4.91E-06	9.72E-03
Zinc	25	34		1.13E-03	1.75E-04	6.11E-03	1.43E-04	2.30E-03	3.55E-05	6.46E-06	9.90E-03
Hex Chromium	0.1	1.9		6.31E-05	9.78E-06	2.44E-05	5.71E-07	9.22E-06	1.42E-07	2.58E-08	1.07E-04
Total Crystalline Silica	3712.8	7099.2		2.36E-01	3.66E-02	9.07E-01	2.12E-02	3.42E-01	5.28E-03	9.59E-04	1.55E+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 grams/pound	1,000 milligrams/gram
907.18 kilograms/ton	2,000 pounds/ton

Table A-6. Baseline Waste Rock Land Filling Operations - Material Handling.

Activity	Emission Factor Reference	Emission Factors		Annual Activity[1]	Transfer Points	Control Efficiency[2]	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$				(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
Material Handling	AP-42 13.2.4.3, MDAQMD	1.15E-03 lb/ton	1.73E-04 lb/ton	2,656,620 tons/yr	1	0%	1.53	10.78	0.67	0.23	1.62	0.10

Notes:
1. Throughputs based on quarry production records for 2000-2010.
2. Assumed control: none.
3. Average operating schedule (2000-2010):
   16 hours/day
   284 days/year
4. Conversion Factors:
   2,000 lb/ton
   43,560 square feet/acre

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
PM_{10} Particle size multiplier	MDAQMD Guidance, Secs. VI.D, VI.E	k	0.36	--
$PM_{2.5}$ Particle size multiplier	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).

Table A-7. Baseline Waste Rock Land Filling Operations - Dust Entrainment and Wind Erosion.

Activity	Emission Factor Reference	Emission Factors PM_{10}	Emission Factors $PM_{2.5}$	Annual Activity[1,2]	Control Efficiency[3]	PM_{10} Emissions[4] (ton/yr)	PM_{10} Emissions[4] (lb/day)	PM_{10} Emissions[4] (lb/hr)	$PM_{2.5}$ Emissions[4] (ton/yr)	$PM_{2.5}$ Emissions[4] (lb/day)	$PM_{2.5}$ Emissions[4] (lb/hr)
Dust Entrainment - Unpaved Roads	AP-42 13.2.2	2.19 lb/VMT	0.22 lb/mile	274,011 miles/year	75%	74.91	527.55	32.97	7.49	52.76	3.30
Wind Erosion - Unpaved Roads	AP-42 13.2.5	1.40 ton/acre	0.21 ton/acre	21 acres/yr		7.26	51.12	3.20	1.09	7.67	0.48

Notes:
1. Throughputs based on 2000-2010 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 (2000-2010):
   16 hours/day
   284 days/year
5. Conversion Factors:
   2,000 lb/ton 453.59 grams/pound
   43,560 square feet/acre 4,047 square meters/acre

Unpaved Roads Emission Factor.

Data Input	Data Reference	Symbol	Value	Unit
Surface Silt Content	2008 CEIR, Table-8	s	2.7	%
Average Vehicle Weight	2011 Caterpillar Handbook	W	137.0	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 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 (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	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 $$E_f = k\sum_{P_i}^{N} P_i$$

Baseline Landfilling Miles Traveled 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	21,034	5.6 mi/trip	234,300	151.1	35,406,052	(Calculations reflect two-way trips)
Disposal of Rock Plant Fines	6,192	3.2 mi/trip	39,712	53.5	2,126,060	(Calculations reflect two-way trips)
Total Fleet			274,011	137.0	37,532,112	

Notes:
1. Based on production, road length, and equipment data provided by Lehigh Southwest Cement Company, January 2010 and July 2011
2. Annual ton-miles used only to calculate average vehicle weight.

Table A-8. Baseline Waste Rock Land Filling Operations - Toxic Air Contaminants.

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
			PM10 (tpy)	74.91	7.26	1.53	(lb/yr)
Antimony	2.5	2.5		3.75E-01	3.63E-02	7.65E-03	4.19E-01
Arsenic	1.25	1.25		1.87E-01	1.81E-02	3.83E-03	2.09E-01
Barium	780	1000		1.50E+02	1.45E+01	2.39E+00	1.67E+02
Beryllium	0.75	0.75		1.12E-01	1.09E-02	2.30E-03	1.26E-01
Cadmium	1.25	1.25		1.87E-01	1.81E-02	3.83E-03	2.09E-01
Chromium	24	41		6.14E+00	5.95E-01	7.35E-02	6.81E+00
Cobalt	6.4	9.8		1.47E+00	1.42E-01	1.96E-02	1.63E+00
Copper	14	25		3.75E+00	3.63E-01	4.28E-02	4.15E+00
Lead	1.25	2.3		3.45E-01	3.34E-02	3.83E-03	3.82E-01
Mercury	0.2	0.14		2.10E-02	2.03E-03	6.12E-04	2.36E-02
Molybdenum	2.5	2.5		3.75E-01	3.63E-02	7.65E-03	4.19E-01
Nickel	23	54		8.09E+00	7.84E-01	7.04E-02	8.94E+00
Selenium	2.5	2.5		3.75E-01	3.63E-02	7.65E-03	4.19E-01
Silver	1.25	1.25		1.87E-01	1.81E-02	3.83E-03	2.09E-01
Thallium	1.25	1.25		1.87E-01	1.81E-02	3.83E-03	2.09E-01
Vanadium	19	83		1.24E+01	1.21E+00	5.82E-02	1.37E+01
Zinc	25	34		5.09E+00	4.94E-01	7.65E-02	5.66E+00
Hex Chromium	0.1	1.9		2.85E-01	2.76E-02	3.06E-04	3.13E-01
Total Crystalline Silica	3712.8	7099.2		1.06E+03	1.03E+02	1.14E+01	1.18E+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
			PM10 (lb/hr)	32.97	3.20	0.67	(lb/hr)
Antimony	2.5	2.5		8.24E-05	7.99E-06	1.68E-06	9.21E-05
Arsenic	1.25	1.25		4.12E-05	3.99E-06	8.42E-07	4.61E-05
Barium	780	1000		3.30E-02	3.20E-03	5.25E-04	3.67E-02
Beryllium	0.75	0.75		2.47E-05	2.40E-06	5.05E-07	2.76E-05
Cadmium	1.25	1.25		4.12E-05	3.99E-06	8.42E-07	4.61E-05
Chromium	24	41		1.35E-03	1.31E-04	1.62E-05	1.50E-03
Cobalt	6.4	9.8		3.23E-04	3.13E-05	4.31E-06	3.59E-04
Copper	14	25		8.24E-04	7.99E-05	9.43E-06	9.14E-04
Lead	1.25	2.3		7.58E-05	7.35E-06	8.42E-07	8.40E-05
Mercury	0.2	0.14		4.62E-06	4.47E-07	1.35E-07	5.20E-06
Molybdenum	2.5	2.5		8.24E-05	7.99E-06	1.68E-06	9.21E-05
Nickel	23	54		1.78E-03	1.73E-04	1.55E-05	1.97E-03
Selenium	2.5	2.5		8.24E-05	7.99E-06	1.68E-06	9.21E-05
Silver	1.25	1.25		4.12E-05	3.99E-06	8.42E-07	4.61E-05
Thallium	1.25	1.25		4.12E-05	3.99E-06	8.42E-07	4.61E-05
Vanadium	19	83		2.74E-03	2.65E-04	1.28E-05	3.01E-03
Zinc	25	34		1.12E-03	1.09E-04	1.68E-05	1.25E-03
Hex Chromium	0.1	1.9		6.26E-05	6.07E-06	6.74E-08	6.88E-05
Total Crystalline Silica	3712.8	7099.2		2.34E-01	2.27E-02	2.50E-03	2.59E-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 grams/pound	1,000 milligrams/gram
907.18 kilograms/ton	2,000 pounds/ton

Table A-9. Baseline Fuel Storage and Dispensing - Fuel Storage.

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	411,277 gal/yr	9.74	5.58	0.008	6.13E-02	1.53E-02
Diesel Storage - UST	US EPA TANKs 4.0.9d	411,277 gal/yr	7.93	0.00	0.004	3.17E-02	7.93E-03
Gasoline Storage - UST	US EPA TANKs 4.0.9d	12,615 gal/yr	106.44	0.00	0.053	4.26E-01	1.06E-01
Total					0.065	0.519	0.130

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	0.00	0.00	0.03	0.00	0.35	0.00	0.05	0.00	0.89	0.00	0.71	0.00
Diesel Storage - UST	US EPA TANKs 4.0.9d	0.00	0.00	0.02	0.00	0.18	0.00	0.02	0.00	0.46	0.00	0.36	0.00
Gasoline Storage - UST	US EPA TANKs 4.0.9d	0.55	0.00	0.61	0.00	0.68	0.00	0.04	0.00	0.19	0.00	0.02	0.00
Total		0.55	0.00	0.66	0.00	1.21	0.00	0.11	0.00	1.54	0.00	1.09	0.00

Notes:

1. Quarry fuel use throughputs based on fuel purchase records for 2000-2010.
2. Both criteria and TAC emissions were calculated using the US EPA TANKS Model (v 4.0.9d).
3. Average operating schedule (2000-2010):
   4 hours/day
   250 days/year
4. Conversion factors:
   2,000 lb/ton

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	--

Table A-10. Baseline Fuel Storage and Dispensing - Fuel Dispensing.

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	822,554 gal/yr	0.012	9.21E-02	2.30E-02
Gasoline Dispensing	ARB [3]	0.00038	lb/gal	12,615 gal/yr	0.002	1.92E-02	4.79E-03
Total					0.014	0.111	0.028

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	0.23	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	0.34	0.00	0.07	0.00	0.40	0.00	0.35	0.00

Notes:

1. Quarry fuel use throughputs based on fuel purchase records for 2000-2010.
2. Diesel emission factor (0.028 lb/1,000 gallons) based on SCAQMD AER "Supplemental Instructions for Liquid Organic Storage Tanks and References" June 2005.
3. Gasoline emission factor (0.38 pounds/1,000 gallons) based on ARB "Vapor Recovery Certification Procedure CP - 201 Amended: May 25, 2006.
4. Average operating schedule (2000-2010):
   4 hours/day
   250 days/year
5. Conversion factors:
   2,000 lb/ton

TAC Emission Factors from TANKS.

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.

Table A-11. Baseline Combustion Sources - Portable Diesel-Fueled Welders.

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	1.43E+00	8.16E-05	3.66E-05	--
Annual Emissions (tons/year, except GHGs expressed in metric tons/year)	0.01	0.04	0.00	0.00	0.00	0.00	1.80	0.00	0.00	1.81
Daily Emissions (lbs/day)	0.38	1.78	0.14	0.12	0.13	0.13	82.07	0.00	0.00	82.82
Hourly Emissions (lbs/hour)	0.13	0.59	0.05	0.04	0.04	0.04	27.36	0.00	0.00	27.61

Toxic Air Contaminant Emissions from Diesel-Fueled Welders.

	Diesel PM	1,3-Buta-diene	Acetalde-hyde	Acrolein	Benzene	Formal-dehyde	PAHs	Propylene	Toluene	Xylenes
Emission Factors (lb/MMBtu)[1,3]	--	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	3.42E-07	6.71E-06	8.09E-07	8.16E-06	1.03E-05	1.47E-06	2.26E-05	3.58E-06	2.49E-06
Annual Emissions (lbs/year)	6.11	0.00	0.02	0.00	0.02	0.03	0.00	0.06	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 factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Tables 13.1 (U.S. Default CO_2 Emission Factors for Transport Fuels) and 13.6 (Default CH_4 and N_2O Emission Factors Factors for Non-Highway Vehicles - factors for diesel-fueled construction vehicles.)
   To convert factors in grams/gallon to pounds/bhp-hr, the following equations were employed:
   CO_2 = 10,150 grams CO_2/gallon * (1 gallon diesel/7.05 lb) * (0.45 lb diesel/bhp-hr BSFC) * (1 lb/453.59 grams) = 1.43 pounds CO_2/bhp-hr
   CH_4 = 0.58 grams CH_4/gallon * (1 gallon diesel/7.05 lb) * (0.45 lb diesel/bhp-hr BSFC) * (1 lb/453.59 grams) = 8.16 X 10^{-5} pound CH_4/bhp-hr
   N_2O = 0.26 grams N_2O/gallon * (1 gallon diesel/7.05 lb) * (0.45 lb diesel/bhp-hr BSFC) * (1 lb/453.59 grams) = 3.66 X 10^{-5} pound N_2O/bhp-hr
3. TAC emission factors converted from lb/MMBtu assuming 137,000 Btu/gallon diesel, 0.45 lb diesel/bhp-hr brake-specific fuel consumption (BSFC), and 7.05 lb/gallon diesel.
4. Conversion factors:
   453.59 grams/pound
   2,000 pounds/ton
   1,000,000 grams/metric ton
   0.45 lb/hp-hr BSFC (from Offroad2007)
   137,000 Btu/gallon (from AP-42)
   1,000,000 Btu/MMBtu
   7.05 lb/gal diesel (from AP-42)
   ROG = TOC

Table A-11. Baseline Combustion Sources - Portable Diesel-Fueled Welders.

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 - 2010	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 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).

Table A-12. Baseline Combustion Sources - Portable Gasoline-Fueled Welders.

Criteria and Greenhouse Gas 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	1.61E+00	9.11E-05	4.01E-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	9.10	0.00	0.00	9.18
Hourly Emissions (lbs/hour)	0.04	0.06	0.12	0.00	0.00	0.00	9.10	0.00	0.00	9.18

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)	7.59E-05	3.15E-04	2.85E-04	2.73E-07	1.19E-05
Annual Emissions (lbs/year)	0.01	0.02	0.02	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 factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Tables 13.1 (U.S. Default CO_2 Emission Factors for Transport Fuels) and 13.6 (Default CH_4 and N_2O Emission Factors Factors for Non-Highway Vehicles - factors for gasoline-fueled construction vehicles.)
   To convert factors in grams/gallon to pounds/bhp-hr, the following equations were employed:
   CO_2 = 8,810 grams CO_2/gallon * (1 gallon gasoline/6.17 lb) * (0.51 lb gasoline/bhp-hr BSFC) * (1 lb/453.59 grams) = 1.61 pounds CO_2/bhp-hr
   CH_4 = 0.50 grams CH_4/gallon * (1 gallon gasoline/6.17 lb) * (0.51 lb gasoline/bhp-hr BSFC) * (1 lb/453.59 grams) = 9.11 X 10^{-5} pound CH_4/bhp-hr
   N_2O = 0.22 grams N_2O/gallon * (1 gallon gasoline/6.17 lb) * (0.51 lb gasoline/bhp-hr BSFC) * (1 lb/453.59 grams) = 4.10 X 10^{-5} pound N_2O/bhp-hr
3. TAC 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 (accessed June 17, 2011). TAC emission factors converted from lb/1,000 gal assuming 0.51 lb gasoline/bhp-hr brake-specific fuel consumption (BSFC) and 6.17 lb/gallon gasoline.
4. Conversion factors:

453.59 grams/pound	0.51 lb/hp-hr BSFC (from Offroad2007)
2,000 pounds/ton	6.17 lb/gal diesel (from AP-42)
1,000,000 grams/metric ton	ROG = TOC

Table A-12. Baseline Combustion Sources - Portable Gasoline-Fueled Welders.

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.

Gasoline-Fueled Welder Inventory.

Brand	Model	HP	Fuel	Department	% Time Used at Quarry 2000 - 2010	Total Hours/ Year	Hours Allocated To Quarry
Miller	Blue Star 6000	13	Gasoline	Maintenance	5%	75	3.8
Miller	Blue Star 185	12.75	Gasoline	Maintenance	0%	75	0.0
Miller	Blue Star 185	12.75	Gasoline	Maintenance	5%	75	3.8
Miller	Blue Star 6000	13	Gasoline	Maintenance	5%	75	3.8
Miller	Blue Fire 180	13	Gasoline	Maintenance	0%	75	0.0
Lincoln	Power Arc 5000	11	Gasoline	Yard	3%	75	2.3
Totals:						450	13.5

Source: Inventory provided by Lehigh Southwest Cement Company, January 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).

Table A-13. Baseline Combustion Sources - Off-Road Diesel Equipment.

Off-Road Diesel Equipment Emissions - Annual (Tons per Year).

Equipment	Model	Model Year	Horse-power	Hours per Year	Load Factor	Emissions (tons/year)								Emissions (metric tons/year)			
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Bore/Drill Rigs	DM50	1989	525	616.4	0.75	0.32	0.27	3.70	3.53	0.23	0.23	0.21	0.00	137.93	0.01	0.00	139.14
	LM100	1994	115	28.0	0.75	0.01	0.00	0.02	0.04	0.00	0.00	0.00	0.00	1.37	0.00	0.00	1.38
	DK45	1999	450	1,928.3	0.75	0.69	0.58	2.40	7.03	0.45	0.45	0.41	0.00	369.85	0.02	0.01	373.11
Crawler Tractors	D10N	1995	520	497.3	0.64	0.18	0.15	0.61	1.79	0.11	0.11	0.10	0.00	94.05	0.01	0.00	94.88
	D10R	1997	570	1,761.8	0.64	0.68	0.57	2.37	6.94	0.44	0.44	0.41	0.00	365.25	0.02	0.01	368.47
	D10R	1999	570	2,561.7	0.64	0.99	0.83	3.44	10.10	0.64	0.64	0.59	0.01	531.09	0.03	0.01	535.77
	D10N	1995	520	1,031.7	0.64	0.37	0.31	1.26	3.71	0.24	0.24	0.22	0.00	195.13	0.01	0.00	196.85
	D10T	2005	580	785.2	0.64	0.11	0.10	0.35	1.56	0.05	0.05	0.05	0.00	165.63	0.01	0.00	167.09
	D10T	2005	580	655.5	0.64	0.10	0.08	0.30	1.31	0.05	0.05	0.04	0.00	138.28	0.01	0.00	139.50
Excavators	LS-5800	1995	300	223.2	0.57	0.04	0.03	0.14	0.41	0.03	0.03	0.02	0.00	21.69	0.00	0.00	21.88
Graders	16G	1995	275	1,188.0	0.61	0.21	0.18	0.73	2.15	0.14	0.14	0.13	0.00	113.25	0.01	0.00	114.25
Off-Highway Trucks																	
150-ton Trucks	785	1992	1290	2,760.0	0.57	2.67	2.23	30.97	29.52	1.94	1.94	1.79	0.01	1,153.34	0.06	0.03	1,163.51
	785B	1993	1290	3,675.2	0.57	3.55	2.98	41.24	39.31	2.58	2.58	2.38	0.02	1,535.75	0.09	0.04	1,549.29
	785B	1995	1290	3,428.6	0.57	3.31	2.78	38.47	36.67	2.41	2.41	2.22	0.02	1,432.71	0.08	0.04	1,445.34
	785B	1995	1290	3,469.0	0.57	3.35	2.81	38.93	37.10	2.44	2.44	2.25	0.02	1,449.59	0.08	0.04	1,462.38
	785B	1996	1290	3,731.7	0.57	3.60	3.02	41.87	39.91	2.62	2.62	2.42	0.02	1,559.37	0.09	0.04	1,573.12
100-ton Trucks	777C	1996	870	1,407.3	0.57	0.92	0.77	10.65	10.15	0.67	0.67	0.62	0.00	396.61	0.02	0.01	400.11
	777D	2000	938	1,738.2	0.57	0.83	0.70	3.42	10.04	0.41	0.41	0.38	0.01	528.15	0.03	0.01	532.80
	777D	2005	938	765.1	0.57	0.19	0.16	0.50	3.29	0.10	0.10	0.10	0.00	232.47	0.01	0.01	234.52
	777D	2005	938	961.1	0.57	0.24	0.21	0.62	4.13	0.13	0.13	0.12	0.00	292.04	0.02	0.01	294.61
	777D	2006	938	701.7	0.57	0.14	0.12	0.44	2.29	0.07	0.07	0.07	0.00	213.21	0.01	0.01	215.09
	777F	2007	938	298.9	0.57	0.05	0.04	0.18	0.86	0.03	0.03	0.02	0.00	90.81	0.01	0.00	91.61
60-ton Truck	773B	1994	650	2,378.4	0.57	1.16	0.97	13.45	12.82	0.84	0.84	0.78	0.01	500.78	0.03	0.01	505.19
40-ton Trucks	740	2003	415	1,878.7	0.57	0.20	0.17	0.56	2.58	0.09	0.09	0.08	0.00	252.56	0.01	0.01	254.79
	740	2003	415	2,162.3	0.57	0.23	0.19	0.64	2.97	0.10	0.10	0.09	0.00	290.68	0.02	0.01	293.24
	740	2003	415	1,989.0	0.57	0.21	0.18	0.59	2.73	0.09	0.09	0.09	0.00	267.38	0.02	0.01	269.74
Rubber Tired Dozers	824C	1995	315	962.3	0.59	0.19	0.16	0.66	1.93	0.12	0.12	0.11	0.00	101.63	0.01	0.00	102.53
Rubber Tired Loaders	992D	1995	710	2,291.6	0.54	0.93	0.78	3.24	9.49	0.60	0.60	0.56	0.01	499.32	0.03	0.01	503.72
	992D	1996	710	2,478.7	0.54	1.01	0.85	3.50	10.27	0.65	0.65	0.60	0.01	540.08	0.03	0.01	544.84
	WA-900	1999	897	2,240.2	0.54	0.97	0.82	4.00	11.72	0.48	0.48	0.45	0.01	616.66	0.03	0.02	622.10
	992G	2005	800	938.4	0.54	0.19	0.16	0.49	3.26	0.10	0.10	0.09	0.00	230.37	0.01	0.01	232.40
	992G	2006	800	754.0	0.54	0.12	0.10	0.38	1.99	0.06	0.06	0.06	0.00	185.11	0.01	0.00	186.74
	992G	2007	800	522.6	0.54	0.07	0.06	0.26	1.22	0.04	0.04	0.03	0.00	128.31	0.01	0.00	129.44
Water Trucks	773E	2003	671	2,229.3	0.20	0.13	0.11	0.38	1.74	0.06	0.06	0.06	0.00	170.02	0.01	0.00	171.52
Portable Light Towers	ML 695	2002	11	2,272.0	0.74	0.02	0.02	0.10	0.19	0.01	0.01	0.01	0.00	10.22	0.00	0.00	10.31
Total Off-Road Equipment Emissions:						28.00	23.47	250.86	314.77	19.04	19.04	17.58	0.16	14,810.69	0.83	0.36	14,941.31

Conversion Factors:

453.59 grams/pound

2,000 pounds/ton

1,000,000 grams/metric ton

Table A-13. Baseline Combustion Sources - Off-Road Diesel Equipment.

Off-Road Diesel Equipment Emissions - Daily (Pounds per Day).

Equipment	Model	Model Year	Horse-power	Hours per Day	Load Factor	Emissions (pounds/day)											
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Bore/Drill Rigs	DM50	1989	525	2.2	0.75	2.24	1.88	26.08	24.86	1.63	1.63	1.51	0.01	1,070.68	0.06	0.03	1,080.13
	LM100	1994	115	0.1	0.75	0.04	0.04	0.12	0.31	0.03	0.03	0.03	0.00	10.65	0.00	0.00	10.75
	DK45	1999	450	6.8	0.75	4.87	4.08	16.88	49.52	3.14	3.14	2.90	0.03	2,871.09	0.16	0.07	2,896.41
Crawler Tractors	D10N	1995	520	1.8	0.64	1.24	1.04	4.29	12.59	0.80	0.80	0.74	0.01	730.09	0.04	0.02	736.52
	D10R	1997	570	6.2	0.64	4.81	4.03	16.67	48.90	3.11	3.11	2.87	0.03	2,835.38	0.16	0.07	2,860.39
	D10R	1999	570	9.0	0.64	7.00	5.86	24.24	71.11	4.52	4.52	4.17	0.04	4,122.72	0.23	0.10	4,159.08
	D10N	1995	520	3.6	0.64	2.57	2.15	8.91	26.13	1.66	1.66	1.53	0.01	1,514.76	0.09	0.04	1,528.12
	D10T	2005	580	2.8	0.64	0.81	0.68	2.49	11.02	0.38	0.38	0.35	0.01	1,285.77	0.07	0.03	1,297.11
	D10T	2005	580	2.3	0.64	0.67	0.56	2.08	9.20	0.32	0.32	0.29	0.01	1,073.41	0.06	0.03	1,082.87
Excavators	LS-5800	1995	300	0.8	0.57	0.29	0.24	0.99	2.90	0.18	0.18	0.17	0.00	168.35	0.01	0.00	169.84
Graders	16G	1995	275	4.2	0.61	1.49	1.25	5.17	15.16	0.96	0.96	0.89	0.01	879.14	0.05	0.02	886.89
Off-Highway Trucks																	
150-ton Trucks	785	1992	1290	9.7	0.57	18.77	15.74	218.10	207.89	13.66	13.66	12.61	0.09	8,953.17	0.50	0.22	9,032.13
	785B	1993	1290	12.9	0.57	25.00	20.95	290.42	276.82	18.19	18.19	16.79	0.11	11,921.69	0.67	0.29	12,026.83
	785B	1995	1290	12.1	0.57	23.32	19.55	270.93	258.25	16.97	16.97	15.66	0.11	11,121.83	0.63	0.27	11,219.91
	785B	1995	1290	12.2	0.57	23.59	19.78	274.13	261.29	17.17	17.17	15.85	0.11	11,252.91	0.63	0.28	11,352.15
	785B	1996	1290	13.1	0.57	25.38	21.27	294.88	281.08	18.47	18.47	17.05	0.12	12,105.07	0.68	0.30	12,211.83
100-ton Trucks	777C	1996	870	5.0	0.57	6.46	5.41	75.00	71.49	4.70	4.70	4.34	0.03	3,078.79	0.17	0.08	3,105.95
	777D	2000	938	6.1	0.57	5.88	4.92	24.11	70.71	2.92	2.92	2.69	0.04	4,099.89	0.23	0.10	4,136.04
	777D	2005	938	2.7	0.57	1.37	1.15	3.50	23.15	0.73	0.73	0.67	0.02	1,804.61	0.10	0.04	1,820.53
	777D	2005	938	3.4	0.57	1.72	1.44	4.40	29.08	0.92	0.92	0.85	0.02	2,267.02	0.13	0.06	2,287.02
	777D	2006	938	2.5	0.57	1.01	0.84	3.10	16.13	0.50	0.50	0.46	0.02	1,655.11	0.09	0.04	1,669.71
	777F	2007	938	1.1	0.57	0.34	0.28	1.28	6.06	0.18	0.18	0.17	0.01	704.95	0.04	0.02	711.17
60-ton Truck	773B	1994	650	8.4	0.57	8.15	6.83	94.70	90.27	5.93	5.93	5.47	0.04	3,887.42	0.22	0.10	3,921.71
40-ton Trucks	740	2003	415	6.6	0.57	1.40	1.18	3.93	18.18	0.63	0.63	0.58	0.02	1,960.56	0.11	0.05	1,977.85
	740	2003	415	7.6	0.57	1.61	1.35	4.52	20.92	0.72	0.72	0.67	0.02	2,256.48	0.13	0.06	2,276.38
	740	2003	415	7.0	0.57	1.48	1.24	4.16	19.24	0.67	0.67	0.61	0.02	2,075.65	0.12	0.05	2,093.95
Rubber Tired Dozers	824C	1995	315	3.4	0.59	1.34	1.12	4.64	13.61	0.86	0.86	0.80	0.01	788.95	0.04	0.02	795.91
Rubber Tired Loaders	992D	1995	710	8.1	0.54	6.58	5.51	22.79	66.85	4.25	4.25	3.92	0.04	3,876.09	0.22	0.10	3,910.27
	992D	1996	710	8.7	0.54	7.11	5.96	24.65	72.31	4.59	4.59	4.24	0.04	4,192.52	0.24	0.10	4,229.49
	WA-900	1999	897	7.9	0.54	6.86	5.75	28.15	82.57	3.41	3.41	3.14	0.05	4,787.02	0.27	0.12	4,829.24
	992G	2005	800	3.3	0.54	1.36	1.14	3.47	22.94	0.72	0.72	0.67	0.02	1,788.34	0.10	0.04	1,804.11
	992G	2006	800	2.7	0.54	0.87	0.73	2.69	14.00	0.44	0.44	0.40	0.01	1,436.94	0.08	0.04	1,449.61
	992G	2007	800	1.8	0.54	0.48	0.40	1.80	8.57	0.26	0.26	0.24	0.01	996.07	0.06	0.02	1,004.85
Water Trucks	773E	2003	671	7.8	0.20	0.94	0.79	2.64	12.24	0.42	0.42	0.39	0.01	1,319.85	0.07	0.03	1,331.49
Portable Light Towers	ML 695	2002	11	8.0	0.74	0.15	0.12	0.70	1.31	0.08	0.08	0.07	0.00	79.36	0.00	0.00	80.06
Total Off-Road Equipment Emissions:						197.22	165.31	1,766.64	2,216.68	134.12	134.12	123.78	1.09	114,972.34	6.47	2.83	115,986.31

Conversion Factors:

453.59 grams/pound

Table A-13. Baseline Combustion Sources - Off-Road Diesel Equipment.

Off-Road Equipment Emission Factors (Grams/Horsepower-hour).

Equipment	Model	Model Year	Horse-power	Calculation Year	Cumulative Hours	Emission Factors (grams/horsepower-hour)										
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O
Bore/Drill Rigs	DM50	1989	525	2010	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
	LM100	1994	115	2010	12000	2.239	1.877	6.324	16.612	1.573	1.573	1.452	0.0054	568.3	0.032	0.014
	DK45	1999	450	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
Crawler Tractors	D10N	1995	520	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	D10R	1997	570	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	D10R	1999	570	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	D10N	1995	520	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	D10T	2005	580	2010	10000	0.356	0.298	1.102	4.871	0.168	0.168	0.155	0.0054	568.3	0.032	0.014
	D10T	2005	580	2010	10000	0.356	0.298	1.102	4.871	0.168	0.168	0.155	0.0054	568.3	0.032	0.014
Excavators	LS-5800	1995	300	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
Graders	16G	1995	275	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
Off-Highway Trucks																
150-ton Trucks	785	1992	1290	2010	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
	785B	1993	1290	2010	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
	785B	1995	1290	2010	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
	785B	1995	1290	2010	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
	785B	1996	1290	2010	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
100-ton Trucks	777C	1996	870	2010	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
	777D	2000	938	2010	12000	0.814	0.683	3.342	9.802	0.404	0.404	0.373	0.0054	568.3	0.032	0.014
	777D	2005	938	2010	10000	0.432	0.362	1.102	7.290	0.230	0.230	0.212	0.0054	568.3	0.032	0.014
	777D	2005	938	2010	10000	0.432	0.362	1.102	7.290	0.230	0.230	0.212	0.0054	568.3	0.032	0.014
	777D	2006	938	2010	8000	0.346	0.290	1.066	5.537	0.172	0.172	0.159	0.0054	568.3	0.032	0.014
	777F	2007	938	2010	6000	0.273	0.229	1.029	4.889	0.146	0.146	0.135	0.0054	568.3	0.032	0.014
60-ton Truck	773B	1994	650	2010	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
40-ton Trucks	740	2003	415	2010	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	740	2003	415	2010	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	740	2003	415	2010	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
Rubber Tired Dozers	824C	1995	315	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
Rubber Tired Loaders	992D	1995	710	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	992D	1996	710	2010	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	WA-900	1999	897	2010	12000	0.814	0.683	3.342	9.802	0.404	0.404	0.373	0.0054	568.3	0.032	0.014
	992G	2005	800	2010	10000	0.432	0.362	1.102	7.290	0.230	0.230	0.212	0.0054	568.3	0.032	0.014
	992G	2006	800	2010	8000	0.346	0.290	1.066	5.537	0.172	0.172	0.159	0.0054	568.3	0.032	0.014
	992G	2007	800	2010	6000	0.273	0.229	1.029	4.889	0.146	0.146	0.135	0.0054	568.3	0.032	0.014
Water Trucks	773E	2003	671	2010	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
Portable Light Towers	ML 695	2002	10.7	2010	12000	1.050	0.880	5.000	9.350	0.570	0.570	0.526	0.0054	568.3	0.032	0.014

Notes:

1. Per the document, *Overview: OFFROAD Model*, California Air Resources Board, November 2006 (available at www.arb.ca.gov/msei/offroad/offroad.htm), THC, CO, NOx, PM, and CO_2 emission factors are determined by the following equation:

   EF = ZH + dr * CHrs, where

   EF = emission factor, in grams per hoursepower-hour (g/bhp-hr)

   ZH = zero-hour emission rate or when the equipment is new (g/bhp-hr)

   dr = deterioration rate or the increase in ZH emissions as the equipment is used (g/bhp-hr^2)

   CHrs = cumulative hours or total number of hours accumulated on the equipment
2. Values utilized in the above emission factor table for ZH and dr are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided.)
3. ROG = 83.82% THC, PM10 = 100% PM, and PM2.5 = 92.29% PM. Source: *2008 Estimated Annual Average Emissions – Statewide*, California Air Resources Board, data for Off-Road Equipment, sorted for diesel-fueled vehicles, available at http://www.arb.ca.gov/ei/emissiondata.htm (accessed February 25, 2011).

Table A-13. Baseline Combustion Sources - Off-Road Diesel Equipment.

4. Per the document, *Overview: OFFROAD Model* (op cit.) and the OFFROAD2007 emfac.csv file, the SO_2 emission factor is based on fuel sulfur content and brake-specific fuel consumption. Per *Title 13 California Code of Regulations* sec. 2281 (Sulfur Content of Fuel), as of June 2006 diesel sulfur content in diesel fuel is limited to 15 parts per million. Per the October 2010 CARB Staff Report (op cit.), CARB staff used BSFC values from EPA's NONROAD emissions model, as documented in the report, *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition* (EPA Report No. EPA420-P-04-009/NR-009C), U.S. Environmental Protection Agency, April 2004. Table A2 of the EPA report (pages A5-A8) documents that for diesel engines up to 100 hp, a brake specific fuel consumption (BSFC) value of 0.408 lb/hp-hr is used. For diesel engines larger than 100 hp, a BSFC value of 0.367 lb/hp-hr is used. The above factors assume a BSFC value of 0.4 lb/hp-hr. The SO2 emission factor is calculated as follows:
   EF_{SO2} = (Parts S in fuel/million) * (MW_{SO2}/MW_S) * BSFC (lb/hp-hr) * 453.6 g/lb
   = (15 parts S/million) * (64 g/g-mole SO_2/32 g/g-mole S) * 0.4 lb/hp-hr * 453.6 g/lb
   = 0.0054 g SO_2/hp-hr
5. CH_4 and N_2O factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Table 13.6 (Default CH_4 and N_2O Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles. 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 higher heating value of 137,000 Btu/gallon for diesel and 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), Tables 5 (Default Fuel Properties) and 6 (Default Engine Specifications - diesel turbocharged engines), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.
6. 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 Climate Registry *General Reporting Protocol* (op cit.), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
7. Cumulative hours for each equipment item assumes that each item accumulates 2,000 hours of operation each year. Per the document, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements,* California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28, CARB staff now assumes emission factors deteriorate only up to a maximum of 12,000 hours.
8. 2000-2009 baseline annual activity data provided by Lehigh Southwest Cement Company, January 2010. 2010 baseline annual activity data provided by Lehigh Southwest Cement Company, July 2011. Daily activity data derived from average annual activity data using the average annual quarry operating days.
9. Equipment load factors from *Offroad2007* (Version 2.0.1.2), op cit.

Table A-14. Baseline Combustion Sources - On-road On-site Vehicles.

Annual Emissions (2010 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 On-ste Vehicles	0.74	0.10	0.06	0.00	0.01	0.01	0.00	106.09	0.01	0.00	107.16

Daily Baseline Emissions (2010 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 On-ste Vehicles	5.35	0.71	0.45	0.01	0.06	0.04	0.00	823.54	0.06	0.02	831.84

Hourly Baseline Emissions (2010 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 On-ste Vehicles	0.34	0.04	0.03	0.00	0.00	0.00	0.00	52.12	0.00	0.00	52.65

Emission Factors for 2010 - 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]	0.00945913	0.00131351	0.00079302	0.00001445	0.00010530	0.00007191	0.00000033	1.48922029	0.00010197	0.00004151
	Peak Day[4]	0.00968096	0.00127762	0.00081321	0.00001575	0.00010530	0.00007191	0.00000033	1.48922029	0.00010197	0.00004151

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	On-site Use Mi./Day	On-site Use Mi./Hour
Average 2000 - 2010 Gasoline Use Allocated To:								
Quarry	12,615	189,218	-32,167	284	16	157,051	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 Climate Registry, *General Reporting Protocol*, Version 1.1 (May 2008), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
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 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, 2000 - 2010 gasoline and diesel fuel consumption data 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 later years (11-year average of 17% personal use). Personal use estimates provided by Lehigh Southwest Cement Company, January 2010.
8. Source for quarry hours: Lehigh Southwest Cement Company, equipment availability data - December 2009 (2000-2008) and January 2010 (2009); daily production data - May 2011 (2010).
9. Quarry operating hours/day: 16 hours/day (two shifts/day).
10. Conversion Factors:
    453.59 grams/pound
    2,000 pounds/ton
    1,000,000 grams/metric ton

Table A-15. Baseline Combustion Sources - On-road Off-site Vehicles.

Annual Emissions (2010 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	0.01	0.05	0.00	0.00	0.00	0.00	0.00	5.29	0.00	0.00	5.34
Employee Commute	Passenger	0.49	0.05	0.05	0.00	0.00	0.00	0.00	45.56	0.00	0.00	46.06
Total - All Trip Types:		0.50	0.09	0.05	0.00	0.01	0.00	0.00	50.84	0.00	0.00	51.40

Daily Baseline Emissions (2010 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	0.20	0.68	0.05	0.00	0.03	0.02	0.02	83.83	0.00	0.00	84.73
Employee Commute	Passenger	3.42	0.33	0.36	0.00	0.03	0.02	0.00	353.65	0.03	0.01	357.55
Total - All Trip Types:		3.61	1.01	0.41	0.00	0.06	0.04	0.02	437.48	0.03	0.01	442.29

Hourly Baseline Emissions (2010 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	0.20	0.68	0.05	0.00	0.03	0.02	0.02	83.83	0.00	0.00	84.73
Employee Commute	Passenger	1.71	0.17	0.18	0.00	0.01	0.01	0.00	176.83	0.02	0.01	178.78
Total - All Trip Types:		1.91	0.85	0.23	0.00	0.04	0.03	0.02	260.66	0.02	0.01	263.51

Emission Factors for 2010 - 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	0.00983090	0.03391604	0.00240666	0.00004002	0.00136212	0.00116940	0.00122053	4.19153919	0.00011178	0.00013789
Passenger Vehicles[3]		0.00967582	0.00094533	0.00101525	0.00000977	0.00008434	0.00005240	0.00000079	1.00112300	0.00008773	0.00002969
Heavy-heavy Duty Truck - Diesel (HHDT-DSL)[4]	Peak Day	0.01019910	0.03469475	0.00238586	0.00004012	0.00136977	0.00117643	0.00122053	4.19153919	0.00011178	0.00013789
Passenger Vehicles[5]		0.00993492	0.00091773	0.00109191	0.00001063	0.00008434	0.00005240	0.00000079	1.00112300	0.00008773	0.00002969

Baseline Activity Data.

Trip Type	Trips/Year	Trips/Day	Trips/Hour	Trip Distance	Notes
Quarry Fuel Transport[6]	139	1	1	10	(one-way - two-way trips reflected in calculations)
Employee Commute[7]	9,940	35	35	5.046	(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 Climate Registry, *General Reporting Protocol* , Version 1.1 (May 2008), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
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: Permanente Quarry Baseline On-road Off-site Motor Vehicle Activity Data. Since the total trips per year associated with fuel transport is less than 250 trips/year it is assumed that 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 by the average annual operating days . Daily trips assume 1 two-way trip/day per employee, and hourly trips assume 1 one-way trip/employee. Average employee count and operating day data:
   35 average employee count (2000-2010)
   284 quarry work days/year (2000-2010)
8. Conversion Factors:
   453.59 grams/pound
   2,000 pounds/ton
   1,000,000 grams/metric ton

Table A-16. Baseline Combustion Sources - On-road Dust Entrainment.

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	2,780			20			20		
Employee Commute	100,324			353			177		
Fleet Average:	103,104	0.04	0.01	373	0.31	0.05	197	0.16	0.02

Notes:
1. Assumed Control: none
2. Conversion factors:
   2,000 pounds/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)		$PM_{2.5}$ 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

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 g/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: [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).
   Note that per AP-42 Sec. 13.2.1, emissions are to be 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 & collector road types, available at 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

Table A-16. Baseline Combustion Sources - On-road Dust Entrainment.

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).

Baseline Activity Data.[1]

Trip Type	Trips/Year	1-Way Trip Distance (mi/trip)	Ann. Miles Traveled	Av. Veh. Weight (tons)[2]	Annual Ton-Miles[3]	Trips/Day	Trips/Hour	Notes
Quarry Fuel Transport	139	10	2,780	27.5	76,450	1	1	(Calculations reflect two-way trips)
Employee Commute	9,940	5.046	100,324	2.4	240,778	35	35	(Annual/daily calculations reflect two-way trips; hourly calculations reflect one-way trips)
Total Fleet			103,104	3.1	317,228			

Notes:

1. Source for data other than average vehicle weight data: see On-road Off-site Motor Vehicles - Emissions Other Than Entrained Road Dust.
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.

Table A-17. Baseline Indirect Greenhouse Gas Emissions - Electrical Power Use.

Use	Annual Activity	Annual Electric Power Use Metric	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	681.01	0.02829	0.00623	578.05	0.02	0.01	580.19

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 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: U.S. Department of Energy, *Emissions & Generation Resource Integrated Database (eGRID)*, eGRID2010 Version 1.1, May 2011, available at http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html - 2007 Summary Table 1 ("Year 2007 eGRID Subregion Emissions - Greenhouse Gases"), data for Western Electricity Coordinating Council (WECC) California (CAMX) Subregion.
6. 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 Climate Registry's *General Reporting Protocol*, Version 1.1 (May 2008), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
7. Conversion factors:
   1,000 kW-hr/MW-hr
   0.45359 kilograms/pound
   1,000 kilograms/metric ton (MT)

Table A-18. Baseline Combustion Sources - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	1	15	1994	1.5	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	10	0.00E+00	G/HP-HR	1	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	1999	1.05	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	9.35	0.00E+00	G/HP-HR	0.57	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2004	0.68	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	6.08	0.00E+00	G/HP-HR	0.47	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2007	0.49	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	4.37	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2040	0.49	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	4.37	0.00E+00	G/HP-HR	0.19	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	1994	1.84	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	6.92	0.00E+00	G/HP-HR	0.76	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	1999	0.9	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	6.92	0.00E+00	G/HP-HR	0.57	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2004	0.64	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	5.79	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2007	0.57	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	4.57	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2040	0.57	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	4.57	0.00E+00	G/HP-HR	0.19	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	1987	1.84	2.35E-04	G/HP-HR	5	5.13E-04	G/HP-HR	7	1.05E-04	G/HP-HR	0.76	5.89E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	1998	1.8	2.30E-04	G/HP-HR	5	5.13E-04	G/HP-HR	6.9	1.04E-04	G/HP-HR	0.76	5.89E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2003	1.45	1.85E-04	G/HP-HR	4.1	4.20E-04	G/HP-HR	5.55	1.03E-04	G/HP-HR	0.6	4.65E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2004	0.64	9.80E-05	G/HP-HR	3.27	3.34E-04	G/HP-HR	5.1	9.33E-05	G/HP-HR	0.43	3.36E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2005	0.37	6.90E-05	G/HP-HR	3	3.05E-04	G/HP-HR	4.95	9.67E-05	G/HP-HR	0.38	2.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2007	0.24	5.45E-05	G/HP-HR	2.86	2.90E-04	G/HP-HR	4.88	9.83E-05	G/HP-HR	0.35	2.72E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2012	0.1	4.00E-05	G/HP-HR	2.72	2.76E-04	G/HP-HR	4.8	1.00E-04	G/HP-HR	0.16	1.20E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2040	0.1	4.00E-05	G/HP-HR	2.72	2.76E-04	G/HP-HR	2.9	6.00E-05	G/HP-HR	0.01	1.20E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	1987	1.44	6.66E-05	G/HP-HR	4.8	1.27E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.84	6.11E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	1997	0.99	4.58E-05	G/HP-HR	3.49	9.23E-05	G/HP-HR	8.75	2.02E-04	G/HP-HR	0.69	5.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2003	0.99	4.58E-05	G/HP-HR	3.49	9.23E-05	G/HP-HR	6.9	1.60E-04	G/HP-HR	0.69	5.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2004	0.46	3.33E-05	G/HP-HR	3.23	8.55E-05	G/HP-HR	5.64	1.03E-04	G/HP-HR	0.39	2.85E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2005	0.28	2.92E-05	G/HP-HR	3.14	8.33E-05	G/HP-HR	5.22	8.40E-05	G/HP-HR	0.29	2.12E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2007	0.19	2.71E-05	G/HP-HR	3.09	8.21E-05	G/HP-HR	5.01	7.45E-05	G/HP-HR	0.24	1.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2011	0.1	2.50E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.89	3.80E-05	G/HP-HR	0.2	8.58E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2012	0.09	2.31E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.53	3.38E-05	G/HP-HR	0.07	4.30E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2014	0.09	2.31E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.53	3.38E-05	G/HP-HR	0.01	1.04E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2040	0.07	1.74E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	1.4	1.88E-05	G/HP-HR	0.01	1.04E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1969	1.32	6.11E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	14	3.24E-04	G/HP-HR	0.77	5.60E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1971	1.1	5.09E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.66	4.80E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1979	1	4.63E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	12	2.78E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1984	0.94	4.35E-05	G/HP-HR	4.3	1.14E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1987	0.88	4.07E-05	G/HP-HR	4.2	1.11E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1996	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	8.17	1.89E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2002	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	6.9	1.60E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2003	0.33	2.79E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	5.26	9.64E-05	G/HP-HR	0.24	1.70E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2004	0.22	2.63E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	4.72	7.52E-05	G/HP-HR	0.19	1.35E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2006	0.16	2.57E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	4.44	6.46E-05	G/HP-HR	0.16	1.18E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2011	0.1	2.50E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	2.45	3.20E-05	G/HP-HR	0.14	1.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2014	0.09	2.17E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	2.27	2.88E-05	G/HP-HR	0.01	5.00E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2040	0.05	1.17E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	5.00E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR

Table A-18. Baseline Combustion Sources - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	176	250	1969	1.32	6.11E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	14	3.24E-04	G/HP-HR	0.77	5.60E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1971	1.1	5.09E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.66	4.80E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1979	1	4.63E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	12	2.78E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1984	0.94	4.35E-05	G/HP-HR	4.3	1.14E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1987	0.88	4.07E-05	G/HP-HR	4.2	1.11E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1995	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	8.17	1.89E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2002	0.32	1.48E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	6.25	1.45E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2003	0.19	2.09E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	5	9.05E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2004	0.14	2.30E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	4.58	7.23E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2006	0.12	2.40E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	4.38	6.33E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2010	0.1	2.50E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.59E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2013	0.07	1.83E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2040	0.05	1.17E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1995	0.68	2.37E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2000	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2001	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2002	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2004	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2005	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2013	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1995	0.68	2.37E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2001	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2002	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2003	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2005	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2013	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR

Table A-18. Baseline Combustion Sources - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	751	1000	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1999	0.68	1.12E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2005	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2006	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2007	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2009	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.08	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2014	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.06	2.50E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.02	1.00E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1999	0.68	1.12E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2005	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2006	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2007	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2009	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.08	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2014	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.06	2.50E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.02	1.00E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR

Notes:

1. The above factors are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided).
2. The above factors are consistent with the factors used by CARB staff to estimate off-road diesel equipment emissions, as documented in *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements*, California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), Attachment D (Diesel Emission Factors (g/bhp-hr)).

Table A.19. Baseline Combustion Sources - Emission Factors for On-road Motor Vehicles.

Emission Factors for 2010.[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	0.00983090	0.00967582	0.00945913	0.01019910	(Win)	0.00993492	(Win)	0.00968096	(Win)
NOx	lb/mile	0.03391604	0.00094533	0.00131351	0.03469475	(Sum)	0.00091773	(Sum)	0.00127762	(Sum)
ROG	lb/mile	0.00240666	0.00101525	0.00079302	0.00238586	(Sum)	0.00109191	(Sum)	0.00081321	(Sum)
SOx	lb/mile	0.00004002	0.00000977	0.00001445	0.00004012	(Sum)	0.00001063	(Sum)	0.00001575	(Sum)
PM_{10}	lb/mile	0.00136212	0.00008434	0.00010530	0.00136977	(Win)	0.00008434	(Win)	0.00010530	(Win)
$PM_{2.5}$	lb/mile	0.00116940	0.00005240	0.00007191	0.00117643	(Win)	0.00005240	(Win)	0.00007191	(Win)
Diesel Particulates[8]										
DPM_{10}	lb/mile	0.00122053	0.00000079	0.00000033	0.00122053	(Ann)	0.00000079	(Ann)	0.00000033	(Ann)
$DPM_{2.5}$	lb/mile	0.00112289	0.00000073	0.00000031	0.00112289	(Ann)	0.00000073	(Ann)	0.00000031	(Ann)
Greenhouse Gases[9]										
CO_2	lb/mile	4.19153919	1.00112300	1.48922029	4.19153919	(Ann)	1.00112300	(Ann)	1.48922029	(Ann)
CH_4	lb/mile	0.00011178	0.00008773	0.00010197	0.00011178	(Ann)	0.00008773	(Ann)	0.00010197	(Ann)
N_2O	lb/mile	0.00013789	0.00002969	0.00004151	0.00013789	(Ann)	0.00002969	(Ann)	0.00004151	(Ann)
EMFAC Trips[10]										
Trip Distance	mi/trip	31.441	5.046	5.825	31.441	(Ann)	5.046	(Ann)	5.825	(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 2010 annual average emission inventory for Santa Clara County.
3. Source: EMFAC2007 model 2010 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. "(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. Factor for nitrous oxide (N_2O) are based on the California Air Resources Board's methodology described in *California's 1990-2004 Greenhouse Gas 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 B

Baseline Supporting Documentation

Baseline Supporting Documentation.

Table B-1. Permanente Quarry Baseline Production: 2000 - 2010 (units: short tons).

Year	Limestone - High Grade	Limestone - Medium Grade	Rock Plant Aggregate	Mineral Aggregate Plant	Quarry Production Totals	Waste	Production Totals with Waste	Rock Plant Waste (Fines)
2000	1,217,359	971,951	1,326,029	406,358	3,921,697	2,727,467	6,649,164	238,685
2001	1,106,881	931,488	1,315,476	501,931	3,855,776	3,544,363	7,400,139	236,786
2002	891,503	960,893	1,388,034	758,660	3,999,090	3,475,817	7,474,907	249,846
2003	887,950	811,898	1,365,049	691,026	3,755,923	3,260,202	7,016,125	245,709
2004	950,351	989,437	1,205,394	596,808	3,741,990	4,006,314	7,748,304	216,971
2005	910,575	845,010	1,183,260	395,388	3,334,233	3,873,880	7,208,113	212,987
2006	687,692	986,517	1,399,287	--	3,073,496	1,182,283	4,255,779	251,872
2007	794,373	847,203	1,206,124	--	2,847,700	2,081,220	4,928,920	217,102
2008	578,990	570,859	1,026,369	--	2,176,218	1,135,480	3,311,698	184,746
2009	439,951	596,802	883,587	--	1,920,340	984,439	2,904,779	159,046
2010	551,460	719,348	945,940	--	2,216,748	567,333	2,784,081	170,269
11-Year Average	819,735	839,219	1,204,050	558,362	3,167,565	2,439,891	5,607,455	216,729
Peak Year	1,217,359	989,437	1,399,287	758,660	3,999,090	4,006,314	7,748,304	251,872

Sources:

1. 2000-2010 limestone, rock plant, mineral aggregate, and waste data from monthly quarry production reports (year to date values from December report for each year)
2. Rock Plant waste (fines) assume that waste = 18% of the Rock Plant aggregate input

Table B-2. Permanente Quarry Baseline Work Days and Shifts: 2000 - 2010.

Year	Days Worked:			Total Quarry Work Days	Total Days in Year
	1 Shift	2 Shifts	3 Shifts		
2000	37	16	251	304	366
2001	43	10	249	302	365
2002	27	10	242	279	365
2003	46	19	224	289	365
2004	47	12	244	303	366
2005	40	61	196	297	365
2006	34	212	40	286	365
2007	32	218	25	275	365
2008	68	187	1	256	366
2009	65	201	0	266	365
2010	87	178	0	265	365
Averages	48	102	134	284	365.3

Notes:

1. Sources: Lehigh Southwest Cement Company, equipment availability data - December 2009 (2000-2008) and January 2010 (2009); daily production data - May 2011 (2010).

Table B-3. Permanente Quarry Baseline Drilling and Blasting: 2000-2010.

Year	Total Annual Production (Short Tons)	Calculated Annual Feet Drilled	Calculated Holes Drilled per Year	Calculated 4-Hole Patterns/Year	Calculated Annual Surface Disturbance (Square Feet)	Actual Blasting Patterns/Year	Blasting Patterns/ Week	Production (Short Tons) per Actual Pattern	Calculated Surface Disturbance per Actual Pattern	Explosives Used (Tons)
2000	6,649,164	346,311	6,534	1,634	472,093	105	2.0	63,325.4	4,496	1261.4
2001	7,400,139	385,424	7,272	1,818	525,413	77	1.5	96,105.7	6,824	1179.4
2002	7,474,907	389,318	7,346	1,836	530,721	71	1.4	105,280.4	7,475	1113.0
2003	7,016,125	365,423	6,895	1,724	498,148	67	1.3	104,718.3	7,435	1000.8
2004	7,748,304	403,558	7,614	1,904	550,133	90	1.7	86,092.3	6,113	1343.5
2005	7,208,113	375,423	7,083	1,771	511,779	71	1.4	101,522.7	7,208	1318.0
2006	4,255,779	221,655	4,182	1,046	302,162	88	1.7	48,361.1	3,434	662.0
2007	4,928,920	256,715	4,844	1,211	349,955	114	2.2	43,236.1	3,070	1602.0
2008	3,311,698	172,484	3,254	814	235,132	85	1.6	38,961.2	2,766	790.0
2009	2,904,779	151,291	2,855	714	206,240	56	1.1	51,871.1	3,683	579.8
2010	2,784,081	145,004	2,736	684	197,671	76	1.5	36,632.6	2,601	792.1
Average	5,607,455	292,055	5,510	1,378	398,132	82	1.6	70,555.2	5,009	1,058

Sources:
Production data from monthly quarry production reports (year to date for December of each year)
2000-2009 blasting and explosives data: Lehigh Southwest Cement Company, January 2010.
2010 blasting and explosives data: Lehigh Southwest Cement Company, May 2011.

Blast Pattern Assumptions (used to calculate surface disturbance - based on information provided by Lehigh 5/12/2010):
289 square foot disturbance per 4-hole pattern, assuming a 17-foot X 17-foot pattern
53 feet drilled/hole
19.2 short tons produced/foot drilled, 6.5-inch hole (Lehigh data indicates 17.4 tonnes produced/foot drilled)

Explosives Used:
ANFO (Ammonium Nitrate and Diesel Mixture)
Emulsion (Ammonium Nitrate in slurry form - water proof)
Cast Boosters
Non-electric ignitation system (blasting caps down the hole and surafce delays.)

Table B-4. Permanente Quarry Baseline Unpaved Road Data: 2000-2010.

Roadway Area, Widths, and Distances.

Roadway Segment	Area, (ft^2)	Acres	Width (feet)	Distance (miles)	Notes
NQ to WMSA	900,928	20.7	80	2.1	Crusher to WMSA
NQ to EMSA	264,980	6.1	60	0.8	Crusher to EMSA (width taken from Google Earth)
North Quarry	1,451,698	33.3	80	3.4	Bottom of Pit to Crusher
Rock Plant	170,070	3.9	30	1.1	Rock Plant to Crusher

Sources: From Topography Maps and/or aerial photos, information provided by Lehigh Southwest Cement Company, January 2010.

Truck Characteristics and Activity.

	Average Production (tons/yr)	Load Capacity (tons)	Operating Weight (Empty) (tons)	Average Truck Weight (tons)	Truck Trips (round trips /year)	Total Traveled (miles/yr)
Quarry Products[2]	3,167,565	116.0	93.1	151.1	27,307	187,694
Quarry Waste[2]	2,439,891	116.0	93.1	151.1	21,034	234,300
Rock Plant Waste	216,729	35.0	36.0	53.5	6,192	39,712

Notes:

1. Source: Information provided by Lehigh Southwest Cement Company, January 2010.
2. Truck weight data for Quarry Products and Quarry Waste reflects an average of the Cat 777 (100-ton) and Cat 785 (150-ton) trucks.

Wind Erosion Data.

Year	Disturbed Acreage	Reclaimed Acreage
2000	200	0
2001	200	0
2002	200	0
2003	200	5
2004	421	10
2005	411	0
2006	558	4
2007	554	15
2008	542	0
2009	522	0
2010	540	0
Average	395.27	3.09

Conversion Factors:

43,560 square feet = 1 acre
5,280 feet = 1 mile

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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

Table B-5. Wind Erosion Particulate Matter Factors for Unpaved Roads and Disturbed Mine Areas.

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
		Max u^+ (m/s):	43.899		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. Used max daily gust speed from 2008 met data for u+. 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 was 98.2 mph at 09:00. 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 09:00 and 10:00 that imply the tower could have been serviced or repaired during that period. Therefore, for the purposes of this analysis, data for 7/15/2008 at 09:00 was invalidated, leaving a maximum wind gust of 16.6 mph at 14:00 for that day.

Table B-6. Permanente Quarry Baseline Off-road Diesel Equipment Activity: 2000 - 2010.

Category	Equipment ID	Manufacturer	Model	Year	HP	Operating Hours 2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Sum (Hrs)	Summary Period	Years	Baseline Usage[1] Hrs/Year	Hrs/Day
Bore/Drill Rigs[2]	874-014	Ingersoll Rand	DM50	1989	525	1,219.0	721.0	611.5	1,010.0	895.0	474.5	--	--	--	--	--	4,931.0	2000-2007	8	616.4	2.2
	874-015	Ingersoll Rand	LM100	1994	115	68.0	36.0	106.0	14.0	--	--	--	--	--	--	--	224.0	2000-2007	8	28.0	0.1
	874-016	Driltech	DK45	1999	450	2,073.5	2,295.5	2,556.0	1,958.5	2,309.5	2,108.5	1,679.0	446.0	29.0	--	--	15,426.5	2000-2007	8	1,928.3	6.8
Crawler Tractors	842-030	Caterpillar	D10N	1995	520	2,870.0	2,174.0	426.0	--	--	--	--	--	--	--	--	5,470.0	2000-2010	11	497.3	1.8
	842-032	Caterpillar	D10R	1997	570	2,770.0	3,358.5	3,686.0	2,656.5	3,040.5	3,045.5	823.0	--	--	--	--	19,380.0	2000-2010	11	1,761.8	6.2
	842-033	Caterpillar	D10R	1999	570	4,024.0	4,666.5	3,870.0	3,927.5	4,432.0	3,069.5	958.0	1,657.0	892.5	682.0	--	28,179.0	2000-2010	11	2,561.7	9.0
	842-034	Caterpillar	D10N	1995	520	--	--	1,835.0	2,439.0	3,386.0	2,891.5	797.5	--	--	--	--	11,349.0	2000-2010	11	1,031.7	3.6
	842-035	Caterpillar	D10T	2005	580	--	--	--	--	--	572.0	2,677.0	1,460.0	929.0	1,375.3	1,623.5	8,636.8	2000-2010	11	785.2	2.8
	842-036	Caterpillar	D10T	2005	580	--	--	--	--	--	416.0	2,262.5	1,360.5	782.0	1,105.0	1,284.3	7,210.3	2000-2010	11	655.5	2.3
Excavators	844-006	Link Belt	LS-5800	1995	300	--	--	--	259.0	340.0	70.5	--	--	--	--	--	669.5	2003-2005	3	223.2	0.8
Graders	845-009	Caterpillar	16G	1995	275	1,875.5	1,374.5	991.0	1,128.5	1,558.5	1,254.0	1,396.0	1,039.0	612.0	1,042.0	796.5	13,067.5	2000-2010	11	1,188.0	4.2
Off-Highway Trucks																					
150-ton Trucks	858-063	Caterpillar	785	1992	1290	4,424.0	4,237.0	5,098.0	4,848.0	5,032.5	4,060.0	2,661.0	--	--	--	--	30,360.5	2000-2010	11	2,760.0	9.7
	858-064	Caterpillar	785B	1993	1290	5,408.0	4,856.5	4,328.0	5,025.0	5,607.5	4,089.5	2,951.5	2,792.5	2,162.0	2,157.0	1,049.4	40,426.9	2000-2010	11	3,675.2	12.9
	858-065	Caterpillar	785B	1995	1290	5,412.0	5,355.0	5,168.0	4,646.0	5,852.5	4,928.5	2,434.5	2,425.0	1,493.0	--	--	37,714.5	2000-2010	11	3,428.6	12.1
	858-066	Caterpillar	785B	1995	1290	4,824.5	3,872.0	5,345.5	4,750.5	5,334.0	4,941.0	2,751.0	2,090.0	2,271.5	1,979.0	--	38,159.0	2000-2010	11	3,469.0	12.2
	858-067	Caterpillar	785B	1996	1290	5,102.0	4,928.5	4,609.5	5,140.5	5,547.0	4,745.0	3,076.0	2,501.0	2,389.0	2,568.0	442.2	41,048.7	2000-2010	11	3,731.7	13.1
100-ton Trucks[3]	858-070	Caterpillar	777C	1996	870	2,006.0	2,657.0	1,478.5	2,151.0	3,154.5	2,234.5	1,084.5	303.0	57.0	--	354.4	15,480.4	2000-2010	11	1,407.3	5.0
	858-071	Caterpillar	777D	2000	938	--	3,692.5	2,043.0	2,879.5	3,786.0	3,039.0	1,407.5	619.5	300.0	359.0	994.1	19,120.1	2000-2010	11	1,738.2	6.1
	858-077	Caterpillar	777D	2005	938	--	--	--	--	--	2,226.0	2,424.5	1,502.5	717.0	601.0	945.0	8,416.0	2000-2010	11	765.1	2.7
	858-078	Caterpillar	777D	2005	938	--	--	--	--	--	1,771.5	2,394.0	1,584.0	896.0	1,385.0	2,541.9	10,572.4	2000-2010	11	961.1	3.4
	858-079	Caterpillar	777D	2006	938	--	--	--	--	--	--	306.0	1,596.0	978.0	1,566.0	3,272.7	7,718.7	2000-2010	11	701.7	2.5
	858-080	Caterpillar	777F	2007	938	--	--	--	--	--	--	--	215.0	735.0	773.0	1,564.6	3,287.6	2000-2010	11	298.9	1.1
60-ton Truck	827-037	Caterpillar	773B	1994	650	3,968.0	3,255.0	3,303.0	3,259.0	3,398.5	3,239.5	2,027.5	2,554.0	857.0	246.0	54.5	26,162.0	2000-2010	11	2,378.4	8.4
40-ton Trucks[4]	858-074	Caterpillar	740	2003	415	--	--	--	--	1,957.2	1,957.2	1,957.2	1,957.2	1,957.2	1,957.2	1,408.0	13,151.0	2004-2010	7	1,878.7	6.6
	858-075	Caterpillar	740	2003	415	--	--	--	--	2,185.3	2,185.3	2,185.3	2,185.3	2,185.3	2,185.3	2,024.0	15,136.0	2004-2010	7	2,162.3	7.6
	858-076	Caterpillar	740	2003	415	--	--	--	--	1,915.3	1,915.3	1,915.3	1,915.3	1,915.3	1,915.3	2,431.0	13,923.0	2004-2010	7	1,989.0	7.0
Rubber Tired Dozers[5,6]	841-005	Caterpillar	824C	1995	315	1,114.5	1,272.5	1,047.0	1,309.0	1,361.0	1,231.0	790.0	325.0	167.0	821.0	947.4	10,385.4	2000-2010	11	962.3	3.4
	Rental	Caterpillar	824C	1995	315	199.5	--	--	--	--	--	--	--	--	--	--	199.5	2000-2010	11	--	--
Rubber Tired Loaders[7]	843-064	Caterpillar	992D	1995	710	4,022.0	3,325.5	4,650.5	4,227.5	3,877.5	3,763.5	1,341.5	--	--	--	--	25,208.0	2000-2010	11	2,291.6	8.1
	843-067	Caterpillar	992D	1996	710	3,411.0	3,784.5	3,995.5	3,857.0	4,922.0	4,523.5	1,560.5	266.0	136.0	352.0	457.9	27,265.9	2000-2010	11	2,478.7	8.7
	843-072	Komatsu	WA-900	1999	897	4,311.5	4,413.0	3,453.5	3,719.0	4,083.5	3,514.0	729.5	418.0	--	--	--	24,642.0	2000-2010	11	2,240.2	7.9
	843-080	Caterpillar	992G	2005	800	--	--	--	--	--	418.0	3,195.0	2,313.0	1,427.5	1,693.0	1,275.5	10,322.0	2000-2010	11	938.4	3.3
	843-081	Caterpillar	992G	2006	800	--	--	--	--	--	--	685.0	2,365.0	1,255.5	1,638.0	2,350.3	8,293.8	2000-2010	11	754.0	2.7
	843-082	Caterpillar	992G	2007	800	--	--	--	--	--	--	--	791.0	1,551.0	1,595.0	1,812.1	5,749.1	2000-2010	11	522.6	1.8
Water Trucks	827-045	Caterpillar	773E	2003	671	--	--	--	--	--	--	--	--	--	2,205.0	2,253.7	4,458.7	2009-2010	2	2,229.3	7.8
Portable Light Towers[8]	725-039	Allmand	ML 695	1999	10.7																
	725-040	Allmand	ML 695	1999	10.7																
	725-041	Allmand	ML 695	2002	10.7																
	725-042	Allmand	ML 695	2002	10.7																
	725-043	Allmand	ML 695	2002	10.7																
	725-044	Allmand	ML 695	2002	10.7																
	725-045	Allmand	ML 695	2002	10.7																
	725-046	Allmand	ML 695	2003	10.7																
	725-047	Allmand	ML 695	2003	10.7																
Totals:			Average:	2002	10.7															2,272.0	8.0

Notes:

1. Baseline usage hours/year based on identified number of years in summary period. Baseline usage hours/day assumes the following average quarry operating schedule (2000-2010): 284 days per year
2. Bore/drill rigs are summarized for the years 2000-2007, since the quarry switched to use of a private drilling contractor in 2008; contractor records are not available.
3. Caterpillar 777D truck, ID 858-071, in service 1/18/2001 - vehicle assumed to be 2000 model (Tier 1).
4. Hours reported for the Cat-740 trucks for 2004-2009 are total vehicle operating hours as of the end of 2009. Source: Lehigh Southwest Cement Company, January 2010. These hours are allocated uniformly over each vehicle's six-year operating life from 2004-2009.
5. Caterpillar rubber tired dozer, ID 841-005, in service 2/1996 - vehicle assumed to be 1995 model (Tier 0).
6. Information for rental rubber tired dozer used in 2000 is assumed to be the same as the 841-005 rubber tired dozer.
7. Komatsu WA-900 rubber tired loader, ID 843-072, in service 1/17/2000 - vehicle assumed to be 1999 model (Tier 0).
8. Two portable light towers are assumed to operate for four hours each quarry operating day over the baseline period.

Table B-7. Permanente Quarry Baseline On-road Off-site Motor Vehicle Activity Data.

Employee Data.

	Employees[1]			
Year	Rock Plant	Min Agg Plant	Quarry	Total
2000	28	3	40	71
2001	29	3	39	71
2002	29	3	39	71
2003	28	3	42	73
2004	19	3	42	64
2005	21	1	39	61
2006	22	--	36	58
2007	22	--	26	48
2008	23	--	28	51
2009	20	--	28	48
2010	20	--	28	48
Average	24	3	35	62

Employee Commute Trips:[2] 5.046 (one-way - two-way trips reflected in calculations)

Baseline Fuel Use Activity Data.

	Gasoline				Diesel				Total Trips			
	Facility Fuel Use	Allocated To[4]			Facility Fuel Use	Allocated To[5]						
Year	(gal/yr)[3]	Quarry (gal/yr)	Rock Plant (gal/yr)	Min. Agg. Plt (gal/yr)	(gal/yr)[3]	Quarry (gal/yr)	Rock Plant (gal/yr)	Min. Agg. Plt (gal/yr)	Tot. Facil. (trips/yr)	Quarry (trips/yr)	Rock Plant (trips/yr)	Min. Agg. (trips/yr)
2000	34,994				1,309,701							
2001	37,942				1,291,835							
2002	39,454				1,287,842							
2003	40,336				1,260,178							
2004	42,241				1,428,160							
2005	38,446				1,413,613							
2006	28,130				1,014,203							
2007	20,745				920,124							
2008	19,161				663,584							
2009	20,271				593,784							
2010	25,179				567,743							
Average	31,536	12,615	1,577	-	1,068,252	822,554	128,190	-				
Transport Trucks (/yr)	5.26	2.10	0.26	-	178.04	137.09	21.37	-	183	139	22	-

Assumed fuel transport trip distance: 10 (one-way)

Notes:

1. Source: employee data provided by Lehigh Southwest Cement Company, January 2010 (2000 - 2009) and July 2011(2010).
2. Source: EMFAC2007 data for Santa Clara County.
3. Source: gasoline and diesel fuel consumption data provided by Lehigh Southwest Cement Company, January 2010 (2000 - 2009), and July 2011 (2010).
4. Assumes an allocation of 40% of gasoline use to the quarry, 5% to the rock plant, and 0% to the mineral aggregate plant for the period from 2000 - 2010. Source: Lehigh Southwest Cement Company, January 2010.
5. Assumes an allocation of 77% of diesel use to the quarry, 12% to the rock plant, and 0% to the mineral aggregate plant for the period from 2000 - 2010. Source: Lehigh Southwest Cement Company, January 2010.

Appendix C

Proposed Project Emission Calculations

Proposed Project Emission Calculations.

Table	Activity
	Summary Tables
C-1	Annual Criteria Pollutant Emissions
C-2	Daily Criteria Pollutant Emissions
C-3	Annual Toxic Air Contaminant Emissions
C-4	Hourly Toxic Air Contaminant Emissions
C-5	Annual Greenhouse Gas Emissions
	Quarry Operations
C-6	Drilling
C-6, C-7	Blasting
C-8	Bulldozing, Scraping & Grading
C-9	Material Handling
C-10	Dust Entrainment – Unpaved Roads
C-11	Wind Erosion – Unpaved Roads
C-11	Wind Erosion – Active Quarry Areas
C-12	Toxic Air Contaminants
	Waste Rock Storage/Infill Areas
C-13	Material Handling
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C-16	Wind Erosion – Active Storage/Infill Areas
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C-18	Fuel Storage
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C-20	Portable Diesel Welders
C-21a – C-21b	Off-road Diesel Equipment
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Lehigh Southwest Cement Company, Inc.
Air Quality Technical Analysis
Appendix C: Proposed Project Emission Calculations

Table C-1. Annual Criteria Pollutant Emissions Summary Table.

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

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
North Quarry						
Drilling	3.36	3.36	--	--	--	--
Blasting	0.52	0.03	94.09	23.87	--	2.81
Bulldozing, Scraping & Grading	0.96	0.14	--	--	--	--
Material Handling	5.78	0.87	--	--	--	--
Dust Entrainment - Unpaved Roads	39.41	3.94	--	--	--	--
Wind Erosion - Unpaved Roads	5.82	0.87	--	--	--	--
Wind Erosion - Active Areas	84.72	12.71	--	--	--	--
Subtotal - North Quarry:	140.56	21.92	94.09	23.87	--	2.81
Waste Rock Storage/Infill Areas						
Material Handling	3.11	0.47	--	--	--	--
Overland Conveyor System	--	--	--	--	--	--
Dust Entrainment - Unpaved Roads	59.73	5.97	--	--	--	--
Wind Erosion - Unpaved Roads	3.94	0.59	--	--	--	--
Wind Erosion - Active Areas	16.24	2.44	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	83.02	9.47	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.05	--
Fuel Dispensing	--	--	--	--	0.03	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.08	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.02	0.11	0.01	0.01
Off-road Diesel Equipment	12.58	11.61	127.00	277.13	18.14	0.20
On-road On-site Vehicles	0.01	0.00	0.52	0.07	0.05	0.00
On-road Off-site Vehicles	0.01	0.01	0.53	0.14	0.06	0.00
Dust Entrainment - Paved Roads	0.42	0.06	--	--	--	--
Subtotal - Combustion Sources:	13.03	11.70	128.07	277.45	18.26	0.21
Totals (ton/yr):	236.61	43.08	222.17	301.32	18.34	3.02

Date: 12/13/2011

Table C-1. Annual Criteria Pollutant Emissions Summary Table.

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

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
North Quarry						
Drilling	--	--	--	--	--	--
Blasting	--	--	--	--	--	--
Bulldozing, Scraping & Grading	1.26	0.19	--	--	--	--
Material Handling	5.71	0.86	--	--	--	--
Dust Entrainment - Unpaved Roads	8.56	0.86	--	--	--	--
Wind Erosion - Unpaved Roads	5.82	0.87	--	--	--	--
Wind Erosion - Active Areas	77.45	11.62	--	--	--	--
Subtotal - North Quarry:	98.81	14.39	--	--	--	--
Waste Rock Storage/Infill Areas						
Material Handling	5.75	0.86	--	--	--	--
Overland Conveyor System	10.14	2.08	--	--	--	--
Dust Entrainment - Unpaved Roads	44.35	4.44	--	--	--	--
Wind Erosion - Unpaved Roads	11.95	1.79	--	--	--	--
Wind Erosion - Active Areas	113.83	17.07	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	186.02	26.24	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.04	--
Fuel Dispensing	--	--	--	--	0.01	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.05	--
Combustion Sources						
Portable Diesel Welders	0.01	0.01	0.02	0.10	0.01	0.01
Off-road Diesel Equipment	4.97	4.59	38.28	124.16	8.18	0.11
On-road On-site Vehicles	0.01	0.00	0.43	0.06	0.04	0.00
On-road Off-site Vehicles	0.06	0.05	0.81	1.42	0.14	0.00
Dust Entrainment - Paved Roads	0.62	0.09	--	--	--	--
Subtotal - Combustion Sources:	5.67	4.74	39.54	125.74	8.37	0.12
Totals (ton/yr):	290.49	45.38	39.54	125.74	8.42	0.12

Table C-2. Daily Criteria Pollutant Emissions Summary Table.

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

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
North Quarry						
Drilling	22.37	22.37	--	--	--	--
Blasting	5.70	0.33	1,033.97	262.35	--	30.86
Bulldozing, Scraping & Grading	6.37	0.96	--	--	--	--
Material Handling	38.52	5.78	--	--	--	--
Dust Entrainment - Unpaved Roads	262.75	26.27	--	--	--	--
Wind Erosion - Unpaved Roads	38.83	5.82	--	--	--	--
Wind Erosion - Active Areas	564.80	84.72	--	--	--	--
Subtotal - North Quarry:	939.34	146.25	1,033.97	262.35	--	30.86
Waste Rock Storage/Infill Areas						
Material Handling	20.74	3.11	--	--	--	--
Overland Conveyor System	--	--				
Dust Entrainment - Unpaved Roads	398.22	39.82	--	--	--	--
Wind Erosion - Unpaved Roads	26.26	3.94	--	--	--	--
Wind Erosion - Active Areas	108.26	16.24	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	553.47	63.11	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.33	--
Fuel Dispensing	--	--	--	--	0.20	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.53	--
Combustion Sources						
Portable Diesel Welders	0.05	0.05	0.15	0.71	0.06	0.05
Off-road Diesel Equipment	84.32	77.82	849.61	1,859.77	121.64	1.37
On-road On-site Vehicles	0.04	0.03	3.58	0.45	0.32	0.01
On-road Off-site Vehicles	0.06	0.04	3.60	0.95	0.43	0.01
Dust Entrainment - Paved Roads	2.92	0.44	--	--	--	--
Subtotal - Combustion Sources:	87.40	78.38	856.95	1,861.88	122.44	1.43
Totals (pounds/day):	1,580.21	287.74	1,890.92	2,124.24	122.97	32.30

Table C-2. Daily Criteria Pollutant Emissions Summary Table.

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

Component	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
North Quarry						
Drilling	--	--	--	--	--	--
Blasting	--	--	--	--	--	--
Bulldozing, Scraping & Grading	8.40	1.26	--	--	--	--
Material Handling	38.10	5.71	--	--	--	--
Dust Entrainment - Unpaved Roads	57.07	5.71	--	--	--	--
Wind Erosion - Unpaved Roads	38.83	5.82	--	--	--	--
Wind Erosion - Active Areas	516.32	77.45	--	--	--	--
Subtotal - North Quarry:	658.72	95.95	--	--	--	--
Waste Rock Storage/Infill Areas						
Material Handling	38.32	5.75	--	--	--	--
Overland Conveyor System	67.62	13.84	--	--	--	--
Dust Entrainment - Unpaved Roads	295.67	29.57	--	--	--	--
Wind Erosion - Unpaved Roads	79.65	11.95	--	--	--	--
Wind Erosion - Active Areas	758.86	113.83	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	1,240.12	174.93	--	--	--	--
Fuel Storage and Dispensing						
Fuel Storage	--	--	--	--	0.27	--
Fuel Dispensing	--	--	--	--	0.06	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	0.33	--
Combustion Sources						
Portable Diesel Welders	0.05	0.05	0.14	0.66	0.05	0.04
Off-road Diesel Equipment	37.65	34.75	284.72	946.62	62.56	0.84
On-road On-site Vehicles	0.04	0.03	2.95	0.37	0.26	0.01
On-road Off-site Vehicles	0.40	0.33	5.58	9.68	0.98	0.02
Dust Entrainment - Paved Roads	4.30	0.65	--	--	--	--
Subtotal - Combustion Sources:	42.44	35.80	293.39	957.34	63.85	0.91
Totals (pounds/day):	1,941.28	306.68	293.39	957.34	64.18	0.91

Table C-3. Annual Toxic Air Contaminant (TAC) Emissions Summary Table.

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
North Quarry																				
Drilling	--	0.02	0.01	5.23	0.01	0.01	0.16	0.04	0.09	0.01	0.00	0.02	0.15	0.02	0.01	0.01	0.13	0.17	0.00	24.91
Blasting	--	0.00	0.00	0.81	0.00	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.03	0.00	3.85
Bulldozing, Scraping & Grading	--	0.00	0.00	1.49	0.00	0.00	0.05	0.01	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.05	0.00	7.10
Material Handling	--	0.03	0.01	9.01	0.01	0.01	0.28	0.07	0.16	0.01	0.00	0.03	0.27	0.03	0.01	0.01	0.22	0.29	0.00	42.91
Dust Entrainment - Unpaved Roads	--	0.20	0.10	78.82	0.06	0.10	3.23	0.77	1.97	0.18	0.01	0.20	4.26	0.20	0.10	0.10	6.54	2.68	0.15	559.59
Wind Erosion - Unpaved Roads	--	0.03	0.01	11.65	0.01	0.01	0.48	0.11	0.29	0.03	0.00	0.03	0.63	0.03	0.01	0.01	0.97	0.40	0.02	82.70
Wind Erosion - Active Areas	--	0.42	0.21	132.16	0.13	0.21	4.07	1.08	2.37	0.21	0.03	0.42	3.90	0.42	0.21	0.21	3.22	4.24	0.02	629.10
Subtotal - North Quarry:	--	0.70	0.35	239.19	0.21	0.35	8.29	2.11	4.93	0.45	0.05	0.70	9.27	0.70	0.35	0.35	11.13	7.84	0.19	1,350.16
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.02	0.01	4.85	0.00	0.01	0.15	0.04	0.09	0.01	0.00	0.02	0.14	0.02	0.01	0.01	0.12	0.16	0.00	23.10
Overland Conveyor System	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dust Entrainment - Unpaved Roads	--	0.30	0.15	119.46	0.09	0.15	4.90	1.17	2.99	0.27	0.02	0.30	6.45	0.30	0.15	0.15	9.92	4.06	0.23	848.11
Wind Erosion - Unpaved Roads	--	0.02	0.01	7.88	0.01	0.01	0.32	0.08	0.20	0.02	0.00	0.02	0.43	0.02	0.01	0.01	0.65	0.27	0.01	55.92
Wind Erosion - Active Areas	--	0.08	0.04	25.33	0.02	0.04	0.78	0.21	0.45	0.04	0.01	0.08	0.75	0.08	0.04	0.04	0.62	0.81	0.00	120.58
Subtotal - Waste Rock Storage/Infill:	--	0.42	0.21	157.53	0.12	0.21	6.15	1.50	3.73	0.34	0.03	0.42	7.77	0.42	0.21	0.21	11.30	5.30	0.25	1,047.71
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	15.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	25,167.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	6.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	25,189.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/yr):	25,189.48	1.12	0.56	396.71	0.34	0.56	14.43	3.60	8.66	0.79	0.08	1.12	17.04	1.12	0.56	0.56	22.44	13.14	0.44	2,397.87

Table C-3. Annual Toxic Air Contaminant (TAC) Emissions Summary Table.

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
North Quarry																				
Drilling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Blasting	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bulldozing, Scraping & Grading	--	0.01	0.00	1.97	0.00	0.00	0.06	0.02	0.04	0.00	0.00	0.01	0.06	0.01	0.00	0.00	0.05	0.06	0.00	9.36
Material Handling	--	0.03	0.01	8.92	0.01	0.01	0.27	0.07	0.16	0.01	0.00	0.03	0.26	0.03	0.01	0.01	0.22	0.29	0.00	42.44
Dust Entrainment - Unpaved Roads	--	0.04	0.02	17.12	0.01	0.02	0.70	0.17	0.43	0.04	0.00	0.04	0.92	0.04	0.02	0.02	1.42	0.58	0.03	121.54
Wind Erosion - Unpaved Roads	--	0.03	0.01	11.65	0.01	0.01	0.48	0.11	0.29	0.03	0.00	0.03	0.63	0.03	0.01	0.01	0.97	0.40	0.02	82.70
Wind Erosion - Active Areas	--	0.39	0.19	120.82	0.12	0.19	3.72	0.99	2.17	0.19	0.03	0.39	3.56	0.39	0.19	0.19	2.94	3.87	0.02	575.10
Subtotal - North Quarry:	--	0.49	0.25	160.47	0.15	0.25	5.23	1.36	3.08	0.28	0.04	0.49	5.44	0.49	0.25	0.25	5.60	5.20	0.07	831.13
Waste Rock Storage/Infill Areas																				
Material Handling	--	0.03	0.01	8.97	0.01	0.01	0.28	0.07	0.16	0.01	0.00	0.03	0.26	0.03	0.01	0.01	0.22	0.29	0.00	42.68
Overland Conveyor System	--	0.05	0.03	15.82	0.02	0.03	0.49	0.13	0.28	0.03	0.00	0.05	0.47	0.05	0.03	0.03	0.39	0.51	0.00	75.31
Dust Entrainment - Unpaved Roads	--	0.22	0.11	88.70	0.07	0.11	3.64	0.87	2.22	0.20	0.01	0.22	4.79	0.22	0.11	0.11	7.36	3.02	0.17	629.71
Wind Erosion - Unpaved Roads	--	0.06	0.03	23.90	0.02	0.03	0.98	0.23	0.60	0.05	0.00	0.06	1.29	0.06	0.03	0.03	1.98	0.81	0.05	169.64
Wind Erosion - Active Areas	--	0.57	0.28	177.57	0.17	0.28	5.46	1.46	3.19	0.28	0.05	0.57	5.24	0.57	0.28	0.28	4.33	5.69	0.02	845.25
Subtotal - Waste Rock Storage/Infill:	--	0.93	0.47	314.96	0.28	0.47	10.84	2.76	6.45	0.58	0.07	0.93	12.05	0.93	0.47	0.47	14.27	10.31	0.24	1,762.60
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	14.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	9,949.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	97.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	10,060.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/yr):	10,060.72	1.42	0.71	475.43	0.43	0.71	16.07	4.13	9.53	0.86	0.11	1.42	17.48	1.42	0.71	0.71	19.87	15.51	0.31	2,593.73

Table C-4. Hourly Toxic Air Contaminant (TAC) Emissions Summary Table.

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
North Quarry																				
Drilling	--	2.33E-06	1.16E-06	7.27E-04	6.99E-07	1.16E-06	2.24E-05	5.96E-06	1.30E-05	1.16E-06	1.86E-07	2.33E-06	2.14E-05	2.33E-06	1.16E-06	1.16E-06	1.77E-05	2.33E-05	9.32E-08	3.46E-03
Blasting	--	1.43E-05	7.13E-06	4.45E-03	4.28E-06	7.13E-06	1.37E-04	3.65E-05	7.98E-05	7.13E-06	1.14E-06	1.43E-05	1.31E-04	1.43E-05	7.13E-06	7.13E-06	1.08E-04	1.43E-04	5.70E-07	2.12E-02
Bulldozing, Scraping & Grading	--	6.64E-07	3.32E-07	2.07E-04	1.99E-07	3.32E-07	6.37E-06	1.70E-06	3.72E-06	3.32E-07	5.31E-08	6.64E-07	6.11E-06	6.64E-07	3.32E-07	3.32E-07	5.04E-06	6.64E-06	2.65E-08	9.86E-04
Material Handling	--	4.01E-06	2.01E-06	1.25E-03	1.20E-06	2.01E-06	3.85E-05	1.03E-05	2.25E-05	2.01E-06	3.21E-07	4.01E-06	3.69E-05	4.01E-06	2.01E-06	2.01E-06	3.05E-05	4.01E-05	1.61E-07	5.96E-03
Dust Entrainment - Unpaved Roads	--	2.74E-05	1.37E-05	1.09E-02	8.21E-06	1.37E-05	4.49E-04	1.07E-04	2.74E-04	2.52E-05	1.53E-06	2.74E-05	5.91E-04	2.74E-05	1.37E-05	1.37E-05	9.09E-04	3.72E-04	2.08E-05	7.77E-02
Wind Erosion - Unpaved Roads	--	4.04E-06	2.02E-06	1.62E-03	1.21E-06	2.02E-06	6.63E-05	1.59E-05	4.04E-05	3.72E-06	2.27E-07	4.04E-06	8.74E-05	4.04E-06	2.02E-06	2.02E-06	1.34E-04	5.50E-05	3.07E-06	1.15E-02
Wind Erosion - Active Areas	--	5.88E-05	2.94E-05	1.84E-02	1.77E-05	2.94E-05	5.65E-04	1.51E-04	3.29E-04	2.94E-05	4.71E-06	5.88E-05	5.41E-04	5.88E-05	2.94E-05	2.94E-05	4.47E-04	5.88E-04	2.35E-06	8.74E-02
Subtotal - North Quarry:	--	1.12E-04	5.58E-05	3.76E-02	3.35E-05	5.58E-05	1.28E-03	3.28E-04	7.63E-04	6.89E-05	8.17E-06	1.12E-04	1.42E-03	1.12E-04	5.58E-05	5.58E-05	1.65E-03	1.23E-03	2.71E-05	2.08E-01
Waste Rock Storage/Infill Areas																				
Material Handling	--	2.16E-06	1.08E-06	6.74E-04	6.48E-07	1.08E-06	2.07E-05	5.53E-06	1.21E-05	1.08E-06	1.73E-07	2.16E-06	1.99E-05	2.16E-06	1.08E-06	1.08E-06	1.64E-05	2.16E-05	8.64E-08	3.21E-03
Overland Conveyor System	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dust Entrainment - Unpaved Roads	--	4.15E-05	2.07E-05	1.66E-02	1.24E-05	2.07E-05	6.80E-04	1.63E-04	4.15E-04	3.82E-05	2.32E-06	4.15E-05	8.96E-04	4.15E-05	2.07E-05	2.07E-05	1.38E-03	5.64E-04	3.15E-05	1.18E-01
Wind Erosion - Unpaved Roads	--	2.74E-06	1.37E-06	1.09E-03	8.21E-07	1.37E-06	4.49E-05	1.07E-05	2.74E-05	2.52E-06	1.53E-07	2.74E-06	5.91E-05	2.74E-06	1.37E-06	1.37E-06	9.08E-05	3.72E-05	2.08E-06	7.77E-03
Wind Erosion - Active Areas	--	1.13E-05	5.64E-06	3.52E-03	3.38E-06	5.64E-06	1.08E-04	2.89E-05	6.32E-05	5.64E-06	9.02E-07	1.13E-05	1.04E-04	1.13E-05	5.64E-06	5.64E-06	8.57E-05	1.13E-04	4.51E-07	1.67E-02
Subtotal - Waste Rock Storage/Infill:	--	5.77E-05	2.88E-05	2.19E-02	1.73E-05	2.88E-05	8.54E-04	2.08E-04	5.17E-04	4.74E-05	3.55E-06	5.77E-05	1.08E-03	5.77E-05	2.88E-05	2.88E-05	1.57E-03	7.36E-04	3.41E-05	1.46E-01
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	2.10E-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	6.69E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	4.73E-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	9.23E-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	6.69E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/hr):	6.69E+00	1.69E-04	8.46E-05	5.94E-02	5.07E-05	8.46E-05	2.14E-03	5.36E-04	1.28E-03	1.16E-04	1.17E-05	1.69E-04	2.49E-03	1.69E-04	8.46E-05	8.46E-05	3.22E-03	1.96E-03	6.12E-05	3.54E-01

Table C-4. Hourly Toxic Air Contaminant (TAC) Emissions Summary Table.

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
North Quarry																				
Drilling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Blasting	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bulldozing, Scraping & Grading	--	8.75E-07	4.38E-07	2.73E-04	2.63E-07	4.38E-07	8.40E-06	2.24E-06	4.90E-06	4.38E-07	7.00E-08	8.75E-07	8.05E-06	8.75E-07	4.38E-07	4.38E-07	6.65E-06	8.75E-06	3.50E-08	1.30E-03
Material Handling	--	3.97E-06	1.98E-06	1.24E-03	1.19E-06	1.98E-06	3.81E-05	1.02E-05	2.22E-05	1.98E-06	3.17E-07	3.97E-06	3.65E-05	3.97E-06	1.98E-06	1.98E-06	3.02E-05	3.97E-05	1.59E-07	5.89E-03
Dust Entrainment - Unpaved Roads	--	5.94E-06	2.97E-06	2.38E-03	1.78E-06	2.97E-06	9.75E-05	2.33E-05	5.94E-05	5.47E-06	3.33E-07	5.94E-06	1.28E-04	5.94E-06	2.97E-06	2.97E-06	1.97E-04	8.08E-05	4.52E-06	1.69E-02
Wind Erosion - Unpaved Roads	--	4.04E-06	2.02E-06	1.62E-03	1.21E-06	2.02E-06	6.63E-05	1.59E-05	4.04E-05	3.72E-06	2.27E-07	4.04E-06	8.74E-05	4.04E-06	2.02E-06	2.02E-06	1.34E-04	5.50E-05	3.07E-06	1.15E-02
Wind Erosion - Active Areas	--	5.38E-05	2.69E-05	1.68E-02	1.61E-05	2.69E-05	5.16E-04	1.38E-04	3.01E-04	2.69E-05	4.30E-06	5.38E-05	4.95E-04	5.38E-05	2.69E-05	2.69E-05	4.09E-04	5.38E-04	2.15E-06	7.99E-02
Subtotal - North Quarry:	--	6.86E-05	3.43E-05	2.23E-02	2.06E-05	3.43E-05	7.27E-04	1.89E-04	4.28E-04	3.85E-05	5.25E-06	6.86E-05	7.55E-04	6.86E-05	3.43E-05	3.43E-05	7.77E-04	7.22E-04	9.94E-06	1.15E-01
Waste Rock Storage/Infill Areas																				
Material Handling	--	3.99E-06	2.00E-06	1.25E-03	1.20E-06	2.00E-06	3.83E-05	1.02E-05	2.24E-05	2.00E-06	3.19E-07	3.99E-06	3.67E-05	3.99E-06	2.00E-06	2.00E-06	3.03E-05	3.99E-05	1.60E-07	5.93E-03
Overland Conveyor System	--	7.04E-06	3.52E-06	2.20E-03	2.11E-06	3.52E-06	6.76E-05	1.80E-05	3.94E-05	3.52E-06	5.63E-07	7.04E-06	6.48E-05	7.04E-06	3.52E-06	3.52E-06	5.35E-05	7.04E-05	2.82E-07	1.05E-02
Dust Entrainment - Unpaved Roads	--	3.08E-05	1.54E-05	1.23E-02	9.24E-06	1.54E-05	5.05E-04	1.21E-04	3.08E-04	2.83E-05	1.72E-06	3.08E-05	6.65E-04	3.08E-05	1.54E-05	1.54E-05	1.02E-03	4.19E-04	2.34E-05	8.75E-02
Wind Erosion - Unpaved Roads	--	8.30E-06	4.15E-06	3.32E-03	2.49E-06	4.15E-06	1.36E-04	3.25E-05	8.30E-05	7.63E-06	4.65E-07	8.30E-06	1.79E-04	8.30E-06	4.15E-06	4.15E-06	2.75E-04	1.13E-04	6.31E-06	2.36E-02
Wind Erosion - Active Areas	--	7.90E-05	3.95E-05	2.47E-02	2.37E-05	3.95E-05	7.59E-04	2.02E-04	4.43E-04	3.95E-05	6.32E-06	7.90E-05	7.27E-04	7.90E-05	3.95E-05	3.95E-05	6.01E-04	7.90E-04	3.16E-06	1.17E-01
Subtotal - Waste Rock Storage/Infill:	--	1.29E-04	6.46E-05	4.37E-02	3.88E-05	6.46E-05	1.51E-03	3.84E-04	8.95E-04	8.10E-05	9.40E-06	1.29E-04	1.67E-03	1.29E-04	6.46E-05	6.46E-05	1.98E-03	1.43E-03	3.33E-05	2.45E-01
Fuel Storage and Dispensing																				
Fuel Storage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuel Dispensing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Combustion Sources																				
Portable Diesel Welders	1.96E-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Off-road Diesel Equipment	8.35E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road On-site Vehicles	3.90E-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
On-road Off-site Vehicles	1.35E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Combustion Sources:	8.37E+00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Totals (lb/hr):	8.37E+00	1.98E-04	9.89E-05	6.60E-02	5.93E-05	9.89E-05	2.23E-03	5.73E-04	1.32E-03	1.20E-04	1.46E-05	1.98E-04	2.43E-03	1.98E-04	9.89E-05	9.89E-05	2.76E-03	2.15E-03	4.33E-05	3.60E-01

Table C-5. Annual Greenhouse Gas (GHG) Emissions Summary Table.

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

Component	CO_2	CH_4	N_2O	CO_2e
North Quarry				
Drilling	--	--	--	--
Blasting	424.11	--	--	424.11
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - North Quarry:	424.11	--	--	424.11
Waste Rock Storage/Infill Areas				
Material Handling	--	--	--	--
Overland Conveyor System	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	4.44	0.00	0.00	4.48
Off-road Diesel Equipment	19,430.78	1.09	0.48	19,602.15
On-road On-site Vehicles	80.44	0.01	0.00	81.17
On-road Off-site Vehicles	69.09	0.00	0.00	69.74
Subtotal - Combustion Sources:	19,584.76	1.10	0.48	19,757.55
Indirect GHG Emissions				
Electricity Use	578.05	0.02	0.01	580.19
Totals (metric tons/yr):	20,586.92	1.13	0.49	20,761.85

Table C-5. Annual Greenhouse Gas (GHG) Emissions Summary Table.

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

Component	CO_2	CH_4	N_2O	CO_2e
North Quarry				
Drilling	--	--	--	--
Blasting	--	--	--	--
Bulldozing, Scraping & Grading	--	--	--	--
Material Handling	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - North Quarry:	--	--	--	--
Waste Rock Storage/Infill Areas				
Material Handling	--	--	--	--
Overland Conveyor System	--	--	--	--
Dust Entrainment - Unpaved Roads	--	--	--	--
Wind Erosion - Unpaved Roads	--	--	--	--
Wind Erosion - Active Areas	--	--	--	--
Subtotal - Waste Rock Storage/Infill:	--	--	--	--
Fuel Storage and Dispensing				
Fuel Storage	--	--	--	--
Fuel Dispensing	--	--	--	--
Subtotal - Fuel Storage/Dispensing:	--	--	--	--
Combustion Sources				
Portable Diesel Welders	4.17	0.00	0.00	4.20
Off-road Diesel Equipment	10,258.51	0.58	0.25	10,348.98
On-road On-site Vehicles	66.25	0.00	0.00	66.85
On-road Off-site Vehicles	239.45	0.01	0.01	241.94
Subtotal - Combustion Sources:	10,568.37	0.59	0.26	10,661.97
Indirect GHG Emissions				
Electricity Use	2,487.84	0.10	0.02	2,497.07
Totals (metric tons/yr):	13,056.21	0.69	0.28	13,159.04

Table C-6. Proposed Project Quarry Operations - Drilling and Blasting.

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	9,868 holes/yr	0%	3.36	22.37	0.93	3.36	22.37	0.93
2				0 holes/yr		--	--	--	--	--	--

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	5.70 lb/blast	0.33 lb/blast	182 blasts/yr	0%	0.52	5.70	5.70	0.03	0.33	0.33
2				0 blasts/yr		--	--	--	--	--	--

Notes:

1. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the project phases. Data provided by Lehigh Southwest Cement Cement Company, July 2011.
2. Assumed Control: None
3. Daily and hourly emission rates reflect the following operating schedules:

Drilling	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50
Blasting	**Phase 1**	**Phase 2**
Weeks/Year	50	50
Max Blasts/Day	1	0
Max Blasts/Hour	1	0

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	783	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, July 2011.

Table C-7. Proposed Project Quarry Operations - Blasting Explosives.

Project Phase	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)
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	2,809 tons/yr	0%	94.09	1,033.97	23.87	262.35	2.81	30.86	424.11	5,137.46
2						0 tons/yr		--	--	--	--	--	--	--	--

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 project phases.
   Data provided by Lehigh Southwest Cement Cement Company, July 2011.
4. Assumed Control: None
5. Daily and hourly emission rates reflect the following operating schedules:

Blasting	Phase 1	Phase 2
Weeks/Year	50	50
Blasts/Week	3.6	0.0
Max Blasts/Day	1	0

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

Table C-8. Proposed Project Quarry Operations - Bulldozing, Scraping, and Grading.

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} 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.D	1.24E-01 lb/hr	1.86E-02 lb/hr	15,374 hrs/yr	0%	0.96	6.37	0.27	0.14	0.96	0.04
2				20,276 hrs/yr		1.26	8.40	0.35	0.19	1.26	0.05

Notes:

1. Annual activity reflects the maximum total operating hours for bulldozers and graders observed during each phase of the project, as documented in Appendix D.
2. Assumed Control: None
3. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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).

Table C-9. Proposed Project Quarry Operations - Material Handling.

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,						5.78	38.52	1.61	0.87	5.78	0.24
2	AP-42 13.2.4.3, Eqn 1						5.71	38.10	1.59	0.86	5.71	0.24

LS-Cement, LS-Aggregate, and Waste Rock Handling at North 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,	1.15E-03 lb/ton	1.73E-04 lb/ton	10,031,085 tons/yr	1	0%	5.78	38.52	1.61	0.87	5.78	0.24
2	AP-42 13.2.4.3, Eqn 1			9,920,854 tons/yr	1		5.71	38.10	1.59	0.86	5.71	0.24

Topsoil Handling at North Quarry - From Outside North Quarry.

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,	1.15E-03 lb/ton	1.73E-04 lb/ton	0 tons/yr	1	0%	--	--	--	--	--	--
2	AP-42 13.2.4.3, Eqn 1			0 tons/yr	1		--	--	--	--	--	--

Topsoil Handling at North 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,	1.15E-03 lb/ton	1.73E-04 lb/ton	0 tons/yr	2	0%	--	--	--	--	--	--
2	AP-42 13.2.4.3, Eqn 1			0 tons/yr	2		--	--	--	--	--	--

Notes:

1. Annual process rates reflect maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
2. Annual process rates reflect maximum anticipated storage and return of topsoil during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
3. Annual process rates reflect maximum anticipated excavation and use of topsoil for concurrent reclamation during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
4. Assumed Control: None
5. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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.

Table C-10. Proposed Project Quarry Operations - 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	1.75E+00 lb/mile	1.75E-01 lb/mile	180,487 miles/yr	75%	39.41	262.75	10.95	3.94	26.27	1.09
2				39,200 miles/yr		8.56	57.07	2.38	0.86	5.71	0.24

Notes:

1. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the project phases. Data provided by Lehigh Southwest Cement Cement Company, August 2011.
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
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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	83.1	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*

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

Table C-11. Proposed Project Quarry Operations - 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} (lb/day)	PM_{10} (lb/hr)	$PM_{2.5}$ Emissions[5,6] (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	13.02 acres/yr	75%	5.82	38.83	1.62	0.87	5.82	0.24
2				13.02 acres/yr		5.82	38.83	1.62	0.87	5.82	0.24

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} (lb/day)	PM_{10} (lb/hr)	$PM_{2.5}$ Emissions (ton/yr)	$PM_{2.5}$ (lb/day)	$PM_{2.5}$ (lb/hr)
1	AP-42 13.2.5, Eqn 2			94.70 acres/yr		84.72	564.80	23.53	12.71	84.72	3.53
2				129.02 acres/yr		77.45	516.32	21.51	11.62	77.45	3.23

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} (lb/day)	PM_{10} (lb/hr)	$PM_{2.5}$ Emissions[5,6] (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	94.70 acres/yr	50%	84.72	564.80	23.53	12.71	84.72	3.53
2				64.51 acres/yr		57.71	384.75	16.03	8.66	57.71	2.40

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} (lb/day)	PM_{10} (lb/hr)	$PM_{2.5}$ Emissions[5,6] (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	0.00 acres/yr	50%	--	--	--	--	--	--
2				64.51 acres/yr		19.74	131.57	5.48	2.96	19.74	0.82

Notes:

1. Annual activity reflects roads necessary to support maximum anticipated production during each of the project phases. Data provided by Lehigh Southwest Cement Cement Company, July 2011.
2. Annual activity reflects maximum quarry operating and backfill areas during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
3. Annual activity reflects maximum quarry topsoil removal and reclamation areas during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
4. Assumed Control: 75% control associated with watering of unpaved roads; 50% control associated with watering of active areas consistent with fugitive dust plan submitted to the BAAQMD in 2010.
5. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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 $E_f = k \sum_{i=1}^{N} P_i$

Table C-12. Proposed Project Quarry Operations - Toxic Air Contaminants.

Annual Toxic Air Contaminant Emissions (pounds/year).

			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	Toxic Air Contaminants (TAC):																				
	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	Annual PM_{10} (tons/year)	Annual Toxic Air Contaminant Emissions (pounds/year)																		
	Drilling	3.36	1.68E-02	8.39E-03	5.23E+00	5.03E-03	8.39E-03	1.61E-01	4.29E-02	9.39E-02	8.39E-03	1.34E-03	1.68E-02	1.54E-01	1.68E-02	8.39E-03	8.39E-03	1.27E-01	1.68E-01	6.71E-04	2.49E+01
	Blasting	0.52	2.59E-03	1.30E-03	8.09E-01	7.78E-04	1.30E-03	2.49E-02	6.64E-03	1.45E-02	1.30E-03	2.08E-04	2.59E-03	2.39E-02	2.59E-03	1.30E-03	1.30E-03	1.97E-02	2.59E-02	1.04E-04	3.85E+00
	Bulldozing, Scraping, and Grading	0.96	4.78E-03	2.39E-03	1.49E+00	1.43E-03	2.39E-03	4.59E-02	1.22E-02	2.68E-02	2.39E-03	3.82E-04	4.78E-03	4.40E-02	4.78E-03	2.39E-03	2.39E-03	3.63E-02	4.78E-02	1.91E-04	7.10E+00
1	Material Handling	5.78	2.89E-02	1.44E-02	9.01E+00	8.67E-03	1.44E-02	2.77E-01	7.40E-02	1.62E-01	1.44E-02	2.31E-03	2.89E-02	2.66E-01	2.89E-02	1.44E-02	1.44E-02	2.20E-01	2.89E-01	1.16E-03	4.29E+01
	Dust Entrainment-Unpaved Roads	39.41	1.97E-01	9.85E-02	7.88E+01	5.91E-02	9.85E-02	3.23E+00	7.72E-01	1.97E+00	1.81E-01	1.10E-02	1.97E-01	4.26E+00	1.97E-01	9.85E-02	9.85E-02	6.54E+00	2.68E+00	1.50E-01	5.60E+02
	Wind Erosion-Unpaved Roads	5.82	2.91E-02	1.46E-02	1.16E+01	8.74E-03	1.46E-02	4.78E-01	1.14E-01	2.91E-01	2.68E-02	1.63E-03	2.91E-02	6.29E-01	2.91E-02	1.46E-02	1.46E-02	9.67E-01	3.96E-01	2.21E-02	8.27E+01
	Wind Erosion-Active Areas	84.72	4.24E-01	2.12E-01	1.32E+02	1.27E-01	2.12E-01	4.07E+00	1.08E+00	2.37E+00	2.12E-01	3.39E-02	4.24E-01	3.90E+00	4.24E-01	2.12E-01	2.12E-01	3.22E+00	4.24E+00	1.69E-02	6.29E+02
	Total - Phase 1	140.56	7.03E-01	3.51E-01	2.39E+02	2.11E-01	3.51E-01	8.29E+00	2.11E+00	4.93E+00	4.46E-01	5.08E-02	7.03E-01	9.27E+00	7.03E-01	3.51E-01	3.51E-01	1.11E+01	7.84E+00	1.91E-01	1.35E+03
	Drilling	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Blasting	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Bulldozing, Scraping, and Grading	1.26	6.30E-03	3.15E-03	1.97E+00	1.89E-03	3.15E-03	6.05E-02	1.61E-02	3.53E-02	3.15E-03	5.04E-04	6.30E-03	5.80E-02	6.30E-03	3.15E-03	3.15E-03	4.79E-02	6.30E-02	2.52E-04	9.36E+00
2	Material Handling	5.71	2.86E-02	1.43E-02	8.92E+00	8.57E-03	1.43E-02	2.74E-01	7.31E-02	1.60E-01	1.43E-02	2.29E-03	2.86E-02	2.63E-01	2.86E-02	1.43E-02	1.43E-02	2.17E-01	2.86E-01	1.14E-03	4.24E+01
	Dust Entrainment-Unpaved Roads	8.56	4.28E-02	2.14E-02	1.71E+01	1.28E-02	2.14E-02	7.02E-01	1.68E-01	4.28E-01	3.94E-02	2.40E-03	4.28E-02	9.24E-01	4.28E-02	2.14E-02	2.14E-02	1.42E+00	5.82E-01	3.25E-02	1.22E+02
	Wind Erosion-Unpaved Roads	5.82	2.91E-02	1.46E-02	1.16E+01	8.74E-03	1.46E-02	4.78E-01	1.14E-01	2.91E-01	2.68E-02	1.63E-03	2.91E-02	6.29E-01	2.91E-02	1.46E-02	1.46E-02	9.67E-01	3.96E-01	2.21E-02	8.27E+01
	Wind Erosion-Active Areas	77.45	3.87E-01	1.94E-01	1.21E+02	1.16E-01	1.94E-01	3.72E+00	9.91E-01	2.17E+00	1.94E-01	3.10E-02	3.87E-01	3.56E+00	3.87E-01	1.94E-01	1.94E-01	2.94E+00	3.87E+00	1.55E-02	5.75E+02
	Total - Phase 2	98.81	4.94E-01	2.47E-01	1.60E+02	1.48E-01	2.47E-01	5.23E+00	1.36E+00	3.08E+00	2.77E-01	3.78E-02	4.94E-01	5.44E+00	4.94E-01	2.47E-01	2.47E-01	5.60E+00	5.20E+00	7.15E-02	8.31E+02

Hourly Toxic Air Contaminant Emissions (pounds/hour).

			Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
	Toxic Air Contaminants (TAC):																				
	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	0.93	2.33E-06	1.16E-06	7.27E-04	6.99E-07	1.16E-06	2.24E-05	5.96E-06	1.30E-05	1.16E-06	1.86E-07	2.33E-06	2.14E-05	2.33E-06	1.16E-06	1.16E-06	1.77E-05	2.33E-05	9.32E-08	3.46E-03
	Blasting	5.70	1.43E-05	7.13E-06	4.45E-03	4.28E-06	7.13E-06	1.37E-04	3.65E-05	7.98E-05	7.13E-06	1.14E-06	1.43E-05	1.31E-04	1.43E-05	7.13E-06	7.13E-06	1.08E-04	1.43E-04	5.70E-07	2.12E-02
	Bulldozing, Scraping, and Grading	0.27	6.64E-07	3.32E-07	2.07E-04	1.99E-07	3.32E-07	6.37E-06	1.70E-06	3.72E-06	3.32E-07	5.31E-08	6.64E-07	6.11E-06	6.64E-07	3.32E-07	3.32E-07	5.04E-06	6.64E-06	2.65E-08	9.86E-04
1	Material Handling	1.61	4.01E-06	2.01E-06	1.25E-03	1.20E-06	2.01E-06	3.85E-05	1.03E-05	2.25E-05	2.01E-06	3.21E-07	4.01E-06	3.69E-05	4.01E-06	2.01E-06	2.01E-06	3.05E-05	4.01E-05	1.61E-07	5.96E-03
	Dust Entrainment-Unpaved Roads	10.95	2.74E-05	1.37E-05	1.09E-02	8.21E-06	1.37E-05	4.49E-04	1.07E-04	2.74E-04	2.52E-05	1.53E-06	2.74E-05	5.91E-04	2.74E-05	1.37E-05	1.37E-05	9.09E-04	3.72E-04	2.08E-05	7.77E-02
	Wind Erosion-Unpaved Roads	1.62	4.04E-06	2.02E-06	1.62E-03	1.21E-06	2.02E-06	6.63E-05	1.59E-05	4.04E-05	3.72E-06	2.27E-07	4.04E-06	8.74E-05	4.04E-06	2.02E-06	2.02E-06	1.34E-04	5.50E-05	3.07E-06	1.15E-02
	Wind Erosion-Active Areas	23.53	5.88E-05	2.94E-05	1.84E-02	1.77E-05	2.94E-05	5.65E-04	1.51E-04	3.29E-04	2.94E-05	4.71E-06	5.88E-05	5.41E-04	5.88E-05	2.94E-05	2.94E-05	4.47E-04	5.88E-04	2.35E-06	8.74E-02
	Total - Phase 1	44.60	1.12E-04	5.58E-05	3.76E-02	3.35E-05	5.58E-05	1.28E-03	3.28E-04	7.63E-04	6.89E-05	8.17E-06	1.12E-04	1.42E-03	1.12E-04	5.58E-05	5.58E-05	1.65E-03	1.23E-03	2.71E-05	2.08E-01
	Drilling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Blasting	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Bulldozing, Scraping, and Grading	0.35	8.75E-07	4.38E-07	2.73E-04	2.63E-07	4.38E-07	8.40E-06	2.24E-06	4.90E-06	4.38E-07	7.00E-08	8.75E-07	8.05E-06	8.75E-07	4.38E-07	4.38E-07	6.65E-06	8.75E-06	3.50E-08	1.30E-03
2	Material Handling	1.59	3.97E-06	1.98E-06	1.24E-03	1.19E-06	1.98E-06	3.81E-05	1.02E-05	2.22E-05	1.98E-06	3.17E-07	3.97E-06	3.65E-05	3.97E-06	1.98E-06	1.98E-06	3.02E-05	3.97E-05	1.59E-07	5.89E-03
	Dust Entrainment-Unpaved Roads	2.38	5.94E-06	2.97E-06	2.38E-03	1.78E-06	2.97E-06	9.75E-05	2.33E-05	5.94E-05	5.47E-06	3.33E-07	5.94E-06	1.28E-04	5.94E-06	2.97E-06	2.97E-06	1.97E-04	8.08E-05	4.52E-06	1.69E-02
	Wind Erosion-Unpaved Roads	1.62	4.04E-06	2.02E-06	1.62E-03	1.21E-06	2.02E-06	6.63E-05	1.59E-05	4.04E-05	3.72E-06	2.27E-07	4.04E-06	8.74E-05	4.04E-06	2.02E-06	2.02E-06	1.34E-04	5.50E-05	3.07E-06	1.15E-02
	Wind Erosion-Active Areas	21.51	5.38E-05	2.69E-05	1.68E-02	1.61E-05	2.69E-05	5.16E-04	1.38E-04	3.01E-04	2.69E-05	4.30E-06	5.38E-05	4.95E-04	5.38E-05	2.69E-05	2.69E-05	4.09E-04	5.38E-04	2.15E-06	7.99E-02
	Total - Phase 2	27.45	6.86E-05	3.43E-05	2.23E-02	2.06E-05	3.43E-05	7.27E-04	1.89E-04	4.28E-04	3.85E-05	5.25E-06	6.86E-05	7.55E-04	6.86E-05	3.43E-05	3.43E-05	7.77E-04	7.22E-04	9.94E-06	1.15E-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

Table C-13. Proposed Project Waste Rock Storage/Infill Operations - Material Handling.

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,						3.11	20.74	0.86	0.47	3.11	0.13
2	AP-42 13.2.4.3, Eqn 1						5.75	38.32	1.60	0.86	5.75	0.24

Waste Rock Handling at Material Storage Areas.

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,	1.15E-03 lb/ton	1.73E-04 lb/ton	4,850,195 tons/yr	1	0%	2.79	18.63	0.78	0.42	2.79	0.12
2	AP-42 13.2.4.3, Eqn 1			9,920,854 tons/yr	1		5.71	38.10	1.59	0.86	5.71	0.24

Aggregate Fines Handling at Material Storage Areas.

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,	1.15E-03 lb/ton	1.73E-04 lb/ton	551,159 tons/yr	1	0%	0.32	2.12	0.09	0.05	0.32	0.01
2	AP-42 13.2.4.3, Eqn 1			0 tons/yr	1		--	--	--	--	--	--

Topsoil Handling at Material Storage Areas - To/From Onsite Storage.

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,	1.15E-03 lb/ton	1.73E-04 lb/ton	0 tons/yr	1	0%	--	--	--	--	--	--
2	AP-42 13.2.4.3, Eqn 1			22,046 tons/yr	1		0.01	0.08	0.00	0.00	0.01	0.00

Topsoil Handling at Material Storage Areas - 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,	1.15E-03 lb/ton	1.73E-04 lb/ton	0 tons/yr	2	0%	--	--	--	--	--	--
2	AP-42 13.2.4.3, Eqn 1			17,637 tons/yr	2		0.02	0.14	0.01	0.00	0.02	0.00

Notes:

1. Annual process rates reflect maximum anticipated excavation of waste rock during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011. From 2023 to 2025, mulched green waste will be added to the overland conveyor system waste rock feed, and is added to the above process rate.
2. Annual process rates reflect disposal of aggregate fines in material storage areas. Data provided by Lehigh Southwest Cement Company, July 2011.
3. Annual process rates reflect maximum anticipated onsite storage and use of topsoil for reclamation of the material storage areas during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
4. Annual process rates reflect maximum anticipated excavation and concurrent use of topsoil for reclamation during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
5. Assumed Control: None
6. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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.

Table C-14. Proposed Project Waste Rock Storage/Infill Operations - Overland Conveyor System.

Project	Component		Process Rate	Transfer Points		Screens		Component Emission Factors		PM_{10} Emissions			$PM_{2.5}$ Emissions		
Phase	Count	Description	(tons/year)	Uncontrolled	Controlled	Uncontrolled	Controlled	PM_{10} (lb/ton)	$PM_{2.5}$ (lb/ton)	tons/year	pounds/day	pounds/hour	tons/year	pounds/day	pounds/hour
	--	Heavy Duty Conveyor (7 ft width)	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	Mobile Grizzly Screen	--	--	--	--	--	--	--	--	--	--	--	--	--
1	--	Portable Conveyors (4 ft X 125 ft)	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	Overland Conveyor System	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	Telestacker (4 ft X 190 ft max.)	--	--	--	--	--	--	--	--	--	--	--	--	--
		Totals:								--	--	--	--	--	--
	1	Heavy Duty Conveyor (7 ft width)	9,941,854	--	1	--	--	4.60E-05	1.30E-05	0.23	1.52	0.06	0.06	0.43	0.02
	1	Mobile Grizzly Screen	9,941,854	--	1	--	1	7.86E-04	6.30E-05	3.91	26.05	1.09	0.31	2.09	0.09
2	31	Portable Conveyors (4 ft X 125 ft)	7,461,640	--	31	--	--	1.43E-03	4.03E-04	5.32	35.47	1.48	1.50	10.02	0.42
	1	Overland Conveyor System	7,461,640	--	3	--	--	1.38E-04	3.90E-05	0.51	3.43	0.14	0.15	0.97	0.04
	1	Telestacker (4 ft X 190 ft max.)	7,461,640	--	1	--	--	4.60E-05	1.30E-05	0.17	1.14	0.05	0.05	0.32	0.01
		Totals:								10.14	67.62	2.82	2.08	13.84	0.58

Emission Factors.[4]

Component	PM_{10}	$PM_{2.5}$[5]	Units
Transfer Points, Uncontrolled	0.0011	0.0003171	lb/ton
Transfer Points, Controlled	0.000046	0.000013	lb/ton
Screening, Uncontrolled	0.0087	0.0005952	lb/ton
Screening, Controlled	0.00074	0.00005	lb/ton
Crushing, Uncontrolled	0.0024	0.0004484	lb/ton
Crushing, Controlled	0.00054	0.0001	lb/ton

Notes:

1. Source for process rate information: Lehigh Southwest Cement Company, July 2011. It is estimated that 25% of the waste rock to be transported from the WMSA to the North Quarry during Phase 2 will be transported by truck, and 75% by an electrically-powered overland conveyor system. From 2023 to 2025, mulched green waste will be added to the overland conveyor system waste rock feed, and is added to the above process rate.
2. During Phase 2, a maximum of 31 portable 4-foot by 125-foot conveyors will be used to transport material to and from the fixed overland conveyor system: 27 in the WMSA area (Grizzly outfeed to the overland conveyor system), and 4 in the North Quarry area (overland conveyor to the 190-foot telecaster for infill into the North Quarry).
3. The heavy duty conveyor, the telecaster, and each portable conveyor is assumed to have one transfer point. The Grizzly is assumed to have one transfer point in addition to the screen. The overland conveyor system is expected to have two segments from 2021-2023 and three segments from 2024-2025, each segment with a transfer point.
4. Source for emission factors: AP-42, Table 11.19.2-2.
5. Uncontrolled $PM_{2.5}$ emission factors were back-calculated from controlled $PM_{2.5}$ emission factors assuming the same control efficiencies as listed for PM_{10} in AP-42 Section 11.19.2.2.
6. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

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

Table C-15. Proposed Project Waste Rock Storage/Infill Operations - 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	1.75E+00 lb/mile	1.75E-01 lb/mile	273,545 miles/yr	75%	59.73	398.22	16.59	5.97	39.82	1.66
2				203,105 miles/yr		44.35	295.67	12.32	4.44	29.57	1.23

Notes:

1. Annual activity reflects activity necessary to support maximum anticipated production of LS-Cement, LS-Aggregate, and Waste Rock during each of the project phases. Data provided by Lehigh Southwest Cement Cement Company, August 2011.
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
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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	83.1	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*

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

Table C-16. Proposed Project Waste Rock Storage/Infill Operations - Wind Erosion.

Unpaved Roads.

Project Phase	Emission Factor Reference	Emission Factors		Annual Activity[1]	Control Efficiency[4]	PM_{10} Emissions[5,6]			$PM_{2.5}$ Emissions[5,6]		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	8.80 acres/yr	75%	3.94	26.26	1.09	0.59	3.94	0.16
2				26.71 acres/yr		11.95	79.65	3.32	1.79	11.95	0.50

Summary - Active Storage/Infill Areas.

Project Phase	Emission Factor Reference	Emission Factors		Annual Activity	Control Efficiency	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.5, Eqn 2			30.99 acres/yr		16.24	108.26	4.51	2.44	16.24	0.68
2				189.62 acres/yr		113.83	758.86	31.62	17.07	113.83	4.74

Active Areas - Storage/Infill Operations.

Project Phase	Emission Factor Reference	Emission Factors		Annual Activity[2]	Control Efficiency[4]	PM_{10} Emissions[5,6]			$PM_{2.5}$ Emissions[5,6]		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	11.48 acres/yr	50%	10.27	68.46	2.85	1.54	10.27	0.43
2				94.81 acres/yr		84.82	565.49	23.56	12.72	84.82	3.53

Active Areas - Topsoil Removal and Reclamation.

Project Phase	Emission Factor Reference	Emission Factors		Annual Activity[3]	Control Efficiency[4]	PM_{10} Emissions[5,6]			$PM_{2.5}$ Emissions[5,6]		
		PM_{10}	$PM_{2.5}$			(ton/yr)	(lb/day)	(lb/hr)	(ton/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.5, Eqn 2	6.12E-01 ton/acre-yr	9.18E-02 ton/acre-yr	19.51 acres/yr	50%	5.97	39.80	1.66	0.90	5.97	0.25
2				94.81 acres/yr		29.01	193.37	8.06	4.35	29.01	1.21

Notes:

1. Annual activity reflects roads necessary to support maximum anticipated activity during each of the project phases. Data provided by Lehigh Southwest Cement Cement Company, July 2011.
2. Annual activity reflects maximum waste storage/infill operating and backfill areas during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
3. Annual activity reflects maximum quarry topsoil removal and reclamation areas during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
4. Assumed Control: 75% control associated with watering of unpaved roads; 50% control associated with watering of active areas consistent with fugitive dust plan submitted to the BAAQMD in 2010.
5. Daily and hourly emission rates reflect the following operating schedule:

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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 $$u^* = 0.053 u_{10}$$

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

Table C-17. Proposed Project Waste Rock Storage/Infill Operations - Toxic Air Contaminants.

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
	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	Annual PM_{10} (tons/year)	Annual Toxic Air Contaminant Emissions (pounds/year)																		
	Material Handling	3.11	1.56E-02	7.78E-03	4.85E+00	4.67E-03	7.78E-03	1.49E-01	3.98E-02	8.71E-02	7.78E-03	1.24E-03	1.56E-02	1.43E-01	1.56E-02	7.78E-03	7.78E-03	1.18E-01	1.56E-01	6.22E-04	2.31E+01
	Overland Conveyor System	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1	Dust Entrainment-Unpaved Roads	59.73	2.99E-01	1.49E-01	1.19E+02	8.96E-02	1.49E-01	4.90E+00	1.17E+00	2.99E+00	2.75E-01	1.67E-02	2.99E-01	6.45E+00	2.99E-01	1.49E-01	1.49E-01	9.92E+00	4.06E+00	2.27E-01	8.48E+02
	Wind Erosion-Unpaved Roads	3.94	1.97E-02	9.85E-03	7.88E+00	5.91E-03	9.85E-03	3.23E-01	7.72E-02	1.97E-01	1.81E-02	1.10E-03	1.97E-02	4.25E-01	1.97E-02	9.85E-03	9.85E-03	6.54E-01	2.68E-01	1.50E-02	5.59E+01
	Wind Erosion-Active Areas	16.24	8.12E-02	4.06E-02	2.53E+01	2.44E-02	4.06E-02	7.79E-01	2.08E-01	4.55E-01	4.06E-02	6.50E-03	8.12E-02	7.47E-01	8.12E-02	4.06E-02	4.06E-02	6.17E-01	8.12E-01	3.25E-03	1.21E+02
	Total - Phase 1	83.02	4.15E-01	2.08E-01	1.58E+02	1.25E-01	2.08E-01	6.15E+00	1.50E+00	3.73E+00	3.41E-01	2.56E-02	4.15E-01	7.77E+00	4.15E-01	2.08E-01	2.08E-01	1.13E+01	5.30E+00	2.46E-01	1.05E+03
	Material Handling	5.75	2.87E-02	1.44E-02	8.97E+00	8.62E-03	1.44E-02	2.76E-01	7.36E-02	1.61E-01	1.44E-02	2.30E-03	2.87E-02	2.64E-01	2.87E-02	1.44E-02	1.44E-02	2.18E-01	2.87E-01	1.15E-03	4.27E+01
	Overland Conveyor System	10.14	5.07E-02	2.54E-02	1.58E+01	1.52E-02	2.54E-02	4.87E-01	1.30E-01	2.84E-01	2.54E-02	4.06E-03	5.07E-02	4.67E-01	5.07E-02	2.54E-02	2.54E-02	3.85E-01	5.07E-01	2.03E-03	7.53E+01
2	Dust Entrainment-Unpaved Roads	44.35	2.22E-01	1.11E-01	8.87E+01	6.65E-02	1.11E-01	3.64E+00	8.69E-01	2.22E+00	2.04E-01	1.24E-02	2.22E-01	4.79E+00	2.22E-01	1.11E-01	1.11E-01	7.36E+00	3.02E+00	1.69E-01	6.30E+02
	Wind Erosion-Unpaved Roads	11.95	5.97E-02	2.99E-02	2.39E+01	1.79E-02	2.99E-02	9.80E-01	2.34E-01	5.97E-01	5.50E-02	3.35E-03	5.97E-02	1.29E+00	5.97E-02	2.99E-02	2.99E-02	1.98E+00	8.12E-01	4.54E-02	1.70E+02
	Wind Erosion-Active Areas	113.83	5.69E-01	2.85E-01	1.78E+02	1.71E-01	2.85E-01	5.46E+00	1.46E+00	3.19E+00	2.85E-01	4.55E-02	5.69E-01	5.24E+00	5.69E-01	2.85E-01	2.85E-01	4.33E+00	5.69E+00	2.28E-02	8.45E+02
	Total - Phase 2	186.02	9.30E-01	4.65E-01	3.15E+02	2.79E-01	4.65E-01	1.08E+01	2.76E+00	6.45E+00	5.83E-01	6.77E-02	9.30E-01	1.20E+01	9.30E-01	4.65E-01	4.65E-01	1.43E+01	1.03E+01	2.40E-01	1.76E+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)																		
	Material Handling	0.86	2.16E-06	1.08E-06	6.74E-04	6.48E-07	1.08E-06	2.07E-05	5.53E-06	1.21E-05	1.08E-06	1.73E-07	2.16E-06	1.99E-05	2.16E-06	1.08E-06	1.08E-06	1.64E-05	2.16E-05	8.64E-08	3.21E-03
	Overland Conveyor System	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1	Dust Entrainment-Unpaved Roads	16.59	4.15E-05	2.07E-05	1.66E-02	1.24E-05	2.07E-05	6.80E-04	1.63E-04	4.15E-04	3.82E-05	2.32E-06	4.15E-05	8.96E-04	4.15E-05	2.07E-05	2.07E-05	1.38E-03	5.64E-04	3.15E-05	1.18E-01
	Wind Erosion-Unpaved Roads	1.09	2.74E-06	1.37E-06	1.09E-03	8.21E-07	1.37E-06	4.49E-05	1.07E-05	2.74E-05	2.52E-06	1.53E-07	2.74E-06	5.91E-05	2.74E-06	1.37E-06	1.37E-06	9.08E-05	3.72E-05	2.08E-06	7.77E-03
	Wind Erosion-Active Areas	4.51	1.13E-05	5.64E-06	3.52E-03	3.38E-06	5.64E-06	1.08E-04	2.89E-05	6.32E-05	5.64E-06	9.02E-07	1.13E-05	1.04E-04	1.13E-05	5.64E-06	5.64E-06	8.57E-05	1.13E-04	4.51E-07	1.67E-02
	Total - Phase 1	23.06	5.77E-05	2.88E-05	2.19E-02	1.73E-05	2.88E-05	8.54E-04	2.08E-04	5.17E-04	4.74E-05	3.55E-06	5.77E-05	1.08E-03	5.77E-05	2.88E-05	2.88E-05	1.57E-03	7.36E-04	3.41E-05	1.46E-01
	Material Handling	1.60	3.99E-06	2.00E-06	1.25E-03	1.20E-06	2.00E-06	3.83E-05	1.02E-05	2.24E-05	2.00E-06	3.19E-07	3.99E-06	3.67E-05	3.99E-06	2.00E-06	2.00E-06	3.03E-05	3.99E-05	1.60E-07	5.93E-03
	Overland Conveyor System	2.82	7.04E-06	3.52E-06	2.20E-03	2.11E-06	3.52E-06	6.76E-05	1.80E-05	3.94E-05	3.52E-06	5.63E-07	7.04E-06	6.48E-05	7.04E-06	3.52E-06	3.52E-06	5.35E-05	7.04E-05	2.82E-07	1.05E-02
2	Dust Entrainment-Unpaved Roads	12.32	3.08E-05	1.54E-05	1.23E-02	9.24E-06	1.54E-05	5.05E-04	1.21E-04	3.08E-04	2.83E-05	1.72E-06	3.08E-05	6.65E-04	3.08E-05	1.54E-05	1.54E-05	1.02E-03	4.19E-04	2.34E-05	8.75E-02
	Wind Erosion-Unpaved Roads	3.32	8.30E-06	4.15E-06	3.32E-03	2.49E-06	4.15E-06	1.36E-04	3.25E-05	8.30E-05	7.63E-06	4.65E-07	8.30E-06	1.79E-04	8.30E-06	4.15E-06	4.15E-06	2.75E-04	1.13E-04	6.31E-06	2.36E-02
	Wind Erosion-Active Areas	31.62	7.90E-05	3.95E-05	2.47E-02	2.37E-05	3.95E-05	7.59E-04	2.02E-04	4.43E-04	3.95E-05	6.32E-06	7.90E-05	7.27E-04	7.90E-05	3.95E-05	3.95E-05	6.01E-04	7.90E-04	3.16E-06	1.17E-01
	Total - Phase 2	51.67	1.29E-04	6.46E-05	4.37E-02	3.88E-05	6.46E-05	1.51E-03	3.84E-04	8.95E-04	8.10E-05	9.40E-06	1.29E-04	1.67E-03	1.29E-04	6.46E-05	6.46E-05	1.98E-03	1.43E-03	3.33E-05	2.45E-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

Table C-18. Proposed Project Fuel Storage and Dispensing - Fuel Storage.

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)
1	Diesel Storage - AST	2,080,248 gal/yr	22.41	8.15	0.015	1.02E-01	4.24E-03
	Gasoline Storage - UST	7,933 gal/yr	67.50	0.00	0.034	2.25E-01	9.38E-03
	Total - Phase 1				0.049	0.327	0.014
2	Diesel Storage - AST	540,188 gal/yr	13.02	8.15	0.011	7.06E-02	2.94E-03
	Gasoline Storage - UST	6,533 gal/yr	59.06	0.00	0.030	1.97E-01	8.20E-03
	Total - Phase 2				0.040	0.267	0.011

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)
1	Diesel Storage - AST	0.01	0.00	0.06	0.00	0.71	0.00	0.10	0.00	1.77	0.00	1.42	0.00
	Gasoline Storage - UST	0.35	0.00	0.39	0.00	0.43	0.00	0.03	0.00	0.12	0.00	0.01	0.00
	Total - Phase 1	0.36	0.00	0.45	0.00	1.14	0.00	0.13	0.00	1.89	0.00	1.43	0.00
2	Diesel Storage - AST	0.01	0.00	0.05	0.00	0.49	0.00	0.07	0.00	1.23	0.00	0.98	0.00
	Gasoline Storage - UST	0.31	0.00	0.34	0.00	0.37	0.00	0.02	0.00	0.10	0.00	0.01	0.00
	Total - Phase 2	0.32	0.00	0.39	0.00	0.86	0.00	0.09	0.00	1.33	0.00	0.99	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, August 2011. Gasoline throughputs throughput based on estimated in-plant vehicle use, mileage accruals, and fuel economy for the project phases.
3. Assumed operating schedule:

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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

Table C-19. Proposed Project Fuel Storage and Dispensing - Fuel Dispensing.

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	2,080,248 gal/yr	0.029	1.94E-01	8.09E-03
	Gasoline Dispensing	ARB [3]	0.00038 lb/gal	7,933 gal/yr	0.002	1.00E-02	4.19E-04
	Total - Phase 1				0.031	0.204	0.009
2	Diesel Dispensing			540,188 gal/yr	0.008	5.04E-02	2.10E-03
	Gasoline Dispensing			6,533 gal/yr	0.001	8.28E-03	3.45E-04
	Total - Phase 2				0.009	0.059	0.002

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	0.17	0.00	0.58	0.00
	Gasoline Dispensing	TANKs 4.0.9d	0.03	0.00	0.05	0.00	0.21	0.00	0.04	0.00	0.21	0.00	0.08	0.00
	Total - Phase 1		0.03	0.00	0.05	0.00	0.23	0.00	0.05	0.00	0.38	0.00	0.66	0.00
2	Diesel Dispensing		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.15	0.00
	Gasoline Dispensing		0.02	0.00	0.04	0.00	0.17	0.00	0.03	0.00	0.17	0.00	0.06	0.00
	Total - Phase 2		0.02	0.00	0.04	0.00	0.18	0.00	0.04	0.00	0.22	0.00	0.21	0.00

Notes:

1. Diesel throughputs based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, August 2011. Gasoline throughputs based on estimated in-plant vehicle use, mileage accruals, and fuel economy for the project phases.
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
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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

Table C-20. Proposed Project Combustion Sources - Portable Diesel-Fueled Welders.

Criteria Pollutant and Greenhouse Gas (GHG) Emissions.

Project	Usage	Vehicle	PM_{10}		$PM_{2.5}$		CO		NOx		ROG		SOx		CO_2		CH_4		N_2O		CO_2e	
Phase	(hr/yr)	HP	(ton/yr)	(lb/day)	(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	305	50	0.01	0.05	0.01	0.05	0.02	0.15	0.11	0.71	0.01	0.06	0.01	0.05	4.44	32.66	0.00	0.00	0.00	0.00	4.48	33.0
2	286	50	0.01	0.05	0.01	0.05	0.02	0.14	0.10	0.66	0.01	0.05	0.01	0.04	4.17	30.61	0.00	0.00	0.00	0.00	4.20	30.9

Toxic Air Contaminant (TAC) Emissions:

Project	Usage	Vehicle	Diesel PM		1,3-Butadiene		Acetaldehyde		Acrolein		Benzene		Formalde		PAHs		Propylene		Toluene		Xylenes	
Phase	(hr/yr)	HP	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)	(lb/year)	(lb/hour)
1	305	50	15.09	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.06	0.00	0.07	0.00	0.01	0.00	0.15	0.00	0.02	0.00	0.02	0.00
2	286	50	14.15	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.05	0.00	0.07	0.00	0.01	0.00	0.15	0.00	0.02	0.00	0.02	0.00

Applicable Emission Factors.

		Emission	Criteria Pollutant Emission Factors[1]						GHG Emission Factors[2,3]			TAC Emission Factors[1,4]								
Vehicle Type	Ave. HP - All Phases	Factor Units	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx	CO_2	CH_4	N_2O	Diesel PM	1,3-Butadiene	Acetaldehyde	Acrolein	Benzene	Formaldehyde	PAHs	Propylene	Toluene	Xylenes
Diesel Welders	50	lb/MMBtu	--	--	--	--	--	--	--	--	--	--	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	2.20E-03	6.68E-03	3.10E-02	2.51E-03	2.05E-03	1.43E+00	8.16E-05	3.66E-05	2.20E-03	3.42E-07	6.71E-06	8.09E-07	8.16E-06	1.03E-05	1.47E-06	2.26E-05	3.58E-06	2.49E-06

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 factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Tables 13.1 (U.S. Default CO_2 Emission Factors for Transport Fuels) and 13.6 (Default CH_4 and N_2O Emission Factors Factors for Non-Highway Vehicles - factors for diesel-fueled construction vehicles.)
   To convert factors in grams/gallon to pounds/bhp-hr, the following equations were employed:
   CO_2 = 10,150 grams CO_2/gallon * (1 gallon diesel/7.05 lb) * (0.45 lb diesel/bhp-hr BSFC) * (1 lb/453.59 grams) = 1.43 pounds CO_2/bhp-hr
   CH_4 = 0.58 grams CH_4/gallon * (1 gallon diesel/7.05 lb) * (0.45 lb diesel/bhp-hr BSFC) * (1 lb/453.59 grams) = 8.16 X 10^5 pound CH_4/bhp-hr
   N_2O = 0.26 grams N_2O/gallon * (1 gallon diesel/7.05 lb) * (0.45 lb diesel/bhp-hr BSFC) * (1 lb/453.59 grams) = 3.66 X 10^5 pound N_2O/bhp-hr
3. 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 Climate Registry *General Reporting Protocol* (op cit.), Table B.1. CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O.
4. TAC emission factors converted from lb/MMBtu assuming 137,000 Btu/gallon diesel, 0.45 lb diesel/bhp-hr brake-specific fuel consumption (BSFC), and 7.05 lb/gallon diesel.
5. Conversion factors:
   453.59 grams/pound
   2,000 pounds/ton
   1,000,000 grams/metric ton
   0.45 lb/hp-hr BSFC (from Offroad2007)
   137,000 Btu/gallon (from AP-42)
   1,000,000 Btu/MMBtu
   7.05 lb/gal diesel (from AP-42)
   ROG = TOC
6. Assumed operating schedule:

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

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
Diesel Welders	45%	50	305	50	286	50	0	50	0	50	0

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 2000-2010 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 50 HP is assumed, and all welders are assumed to be diesel.
3. Average operating hours/year based on welding activity associated with quarry operations for 2000-2010 baseline period, scaled to reflect the difference in maximum total production for each phase and production during the baseline period.

Table C-21a. Proposed Project Combustion Sources - Off-Road Diesel Equipment (Phase 1).

Phase 1 Emissions - Annual (Tons per Year).

						Emissions (tons/year)								Emissions (metric tons/year)			
Equipment	Model	Model Year	Horse-power	Hours per Year	Load Factor	THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Bore/Drill Rigs	DM45	2009	600	4,057.5	0.75	0.62	0.52	2.14	9.57	0.31	0.31	0.29	0.01	1,037.64	0.06	0.03	1,046.79
Crawler Tractors	D11T	2009	850	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D11T	2009	850	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D11T	2009	850	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D10R	1999	570	3,324.0	0.64	1.29	1.08	4.47	13.10	0.83	0.83	0.77	0.01	689.12	0.04	0.02	695.20
	D10T	2005	580	3,324.0	0.64	0.55	0.46	1.55	6.78	0.24	0.24	0.23	0.01	701.21	0.04	0.02	707.39
	D10T	2005	580	3,324.0	0.64	0.55	0.46	1.55	6.78	0.24	0.24	0.23	0.01	701.21	0.04	0.02	707.39
(with disc)	D8T	2009	310	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
Excavators	345D	2009	380	664.8	0.57	0.05	0.04	0.17	0.70	0.02	0.02	0.02	0.00	81.83	0.00	0.00	82.55
Graders	16G	1995	275	1,952.9	0.61	0.35	0.29	1.21	3.54	0.22	0.22	0.21	0.00	186.17	0.01	0.00	187.81
	16M	2009	297	1,952.9	0.61	0.12	0.10	0.42	1.73	0.06	0.06	0.06	0.00	201.06	0.01	0.00	202.84
Off-Highway Trucks																	
150-ton Trucks	785B	1993	1290	4,267.2	0.57	4.12	3.45	47.88	45.64	3.00	3.00	2.77	0.02	1,783.16	0.10	0.04	1,798.88
100-ton Trucks	777C	1996	870	4,393.2	0.57	2.86	2.40	33.25	31.69	2.08	2.08	1.92	0.01	1,238.10	0.07	0.03	1,249.02
	777D	2000	938	4,393.2	0.57	2.11	1.77	8.65	25.38	1.05	1.05	0.97	0.01	1,334.87	0.08	0.03	1,346.65
	777D	2005	938	4,393.2	0.57	1.18	0.99	2.95	19.41	0.64	0.64	0.59	0.01	1,334.87	0.08	0.03	1,346.65
	777D	2005	938	4,393.2	0.57	1.18	0.99	2.95	19.41	0.64	0.64	0.59	0.01	1,334.87	0.08	0.03	1,346.65
	777D	2006	938	4,393.2	0.57	1.10	0.92	2.95	15.10	0.51	0.51	0.47	0.01	1,334.87	0.08	0.03	1,346.65
	777F	2007	938	4,393.2	0.57	1.05	0.88	2.95	13.64	0.47	0.47	0.44	0.01	1,334.87	0.08	0.03	1,346.65
	777F	2009	938	4,393.2	0.57	0.80	0.67	2.76	12.31	0.40	0.40	0.37	0.01	1,334.87	0.08	0.03	1,346.65
	777F	2009	938	4,393.2	0.57	0.80	0.67	2.76	12.31	0.40	0.40	0.37	0.01	1,334.87	0.08	0.03	1,346.65
40-ton Trucks	740	2003	415	1,929.0	0.57	0.20	0.17	0.57	2.65	0.09	0.09	0.08	0.00	259.32	0.01	0.01	261.61
	740	2003	415	1,929.0	0.57	0.20	0.17	0.57	2.65	0.09	0.09	0.08	0.00	259.32	0.01	0.01	261.61
	740	2003	415	1,929.0	0.57	0.20	0.17	0.57	2.65	0.09	0.09	0.08	0.00	259.32	0.01	0.01	261.61
Rubber Tired Dozers	824C	1995	315	1,246.5	0.59	0.25	0.21	0.85	2.50	0.16	0.16	0.15	0.00	131.65	0.01	0.00	132.81
Rubber Tired Loaders	992G	2005	800	2,669.9	0.54	0.58	0.48	1.45	9.53	0.31	0.31	0.29	0.01	655.47	0.04	0.02	661.25
	992G	2006	800	2,669.9	0.54	0.54	0.45	1.45	7.41	0.25	0.25	0.23	0.01	655.47	0.04	0.02	661.25
	992G	2007	800	2,669.9	0.54	0.52	0.43	1.45	6.70	0.23	0.23	0.21	0.01	655.47	0.04	0.02	661.25
	988H	2009	501	1,101.9	0.54	0.10	0.09	0.35	1.56	0.05	0.05	0.05	0.00	169.42	0.01	0.00	170.91
Water Trucks	773E	2003	671	2,493.0	0.20	0.15	0.13	0.42	1.94	0.07	0.07	0.06	0.00	190.13	0.01	0.00	191.81
	773F	2009	703	2,493.0	0.20	0.12	0.10	0.41	1.84	0.06	0.06	0.06	0.00	199.20	0.01	0.00	200.95
Contractor Lowboy Truck	Paystar 5600	2009	360	--	0.57	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Truck	Paystar 5600	2009	360	--	0.20	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Pump	T330	2009	115	--	0.50	--	--	--	--	--	--	--	--	--	--	--	--
Portable Light Towers	ML 695	2002	10.7	7,200.0	0.74	0.07	0.06	0.31	0.59	0.04	0.04	0.03	0.00	32.40	0.00	0.00	32.68
Total Off-Road Equipment Emissions:				86,344.3		21.64	18.14	127.00	277.13	12.58	12.58	11.61	0.20	19,430.78	1.09	0.48	19,602.15
Diesel PM Emissions:											12.58						

Conversion Factors:

453.59 grams/pound
2,000 pounds/ton
1,000,000 grams/metric ton

Table C-21a. Proposed Project Combustion Sources - Off-Road Diesel Equipment (Phase 1).

Phase 1 Emissions - Daily (Pounds per Day).

		Model	Horse-	Hours	Load	Emissions (pounds/day)											
Equipment	Model	Year	power	per Day	Factor	THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Bore/Drill Rigs	DM45	2009	600	13.5	0.75	4.14	3.47	14.30	63.80	2.10	2.10	1.94	0.07	7,625.37	0.43	0.19	7,692.62
Crawler Tractors	D11T	2009	850	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D11T	2009	850	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D11T	2009	850	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D10R	1999	570	11.1	0.64	8.59	7.20	29.78	87.35	5.55	5.55	5.12	0.05	5,064.18	0.29	0.12	5,108.84
	D10T	2005	580	11.1	0.64	3.66	3.06	10.32	45.22	1.63	1.63	1.50	0.05	5,153.02	0.29	0.13	5,198.47
	D10T	2005	580	11.1	0.64	3.66	3.06	10.32	45.22	1.63	1.63	1.50	0.05	5,153.02	0.29	0.13	5,198.47
(with disc)	D8T	2009	310	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
Excavators	345D	2009	380	8.0	0.57	1.15	0.96	4.07	16.90	0.59	0.59	0.54	0.02	2,171.01	0.12	0.05	2,190.16
Graders	16G	1995	275	6.5	0.61	2.32	1.95	8.05	23.60	1.50	1.50	1.38	0.01	1,368.12	0.08	0.03	1,380.19
	16M	2009	297	6.5	0.61	0.78	0.65	2.77	11.50	0.40	0.40	0.37	0.01	1,477.57	0.08	0.04	1,490.60
Off-Highway Trucks																	
150-ton Trucks	785B	1993	1290	14.2	0.57	27.48	23.03	319.22	304.28	20.00	20.00	18.45	0.12	13,104.02	0.74	0.32	13,219.59
100-ton Trucks	777C	1996	870	14.6	0.57	19.08	15.99	221.64	211.27	13.88	13.88	12.81	0.09	9,098.54	0.51	0.22	9,178.78
	777D	2000	938	14.6	0.57	14.06	11.78	57.69	169.20	6.98	6.98	6.44	0.09	9,809.69	0.55	0.24	9,896.20
	777D	2005	938	14.6	0.57	7.84	6.57	19.65	129.43	4.24	4.24	3.91	0.09	9,809.69	0.55	0.24	9,896.20
	777D	2005	938	14.6	0.57	7.84	6.57	19.65	129.43	4.24	4.24	3.91	0.09	9,809.69	0.55	0.24	9,896.20
	777D	2006	938	14.6	0.57	7.32	6.13	19.65	100.65	3.42	3.42	3.16	0.09	9,809.69	0.55	0.24	9,896.20
	777F	2007	938	14.6	0.57	7.02	5.88	19.65	90.94	3.15	3.15	2.91	0.09	9,809.69	0.55	0.24	9,896.20
	777F	2009	938	14.6	0.57	5.33	4.47	18.39	82.07	2.70	2.70	2.49	0.09	9,809.69	0.55	0.24	9,896.20
	777F	2009	938	14.6	0.57	5.33	4.47	18.39	82.07	2.70	2.70	2.49	0.09	9,809.69	0.55	0.24	9,896.20
40-ton Trucks	740	2003	415	6.4	0.57	1.36	1.14	3.82	17.67	0.61	0.61	0.56	0.02	1,905.70	0.11	0.05	1,922.51
	740	2003	415	6.4	0.57	1.36	1.14	3.82	17.67	0.61	0.61	0.56	0.02	1,905.70	0.11	0.05	1,922.51
	740	2003	415	6.4	0.57	1.36	1.14	3.82	17.67	0.61	0.61	0.56	0.02	1,905.70	0.11	0.05	1,922.51
Rubber Tired Dozers	824C	1995	315	4.2	0.59	1.64	1.38	5.69	16.69	1.06	1.06	0.98	0.01	967.49	0.05	0.02	976.03
Rubber Tired Loaders	992G	2005	800	8.9	0.54	3.85	3.23	9.65	63.55	2.08	2.08	1.92	0.05	4,816.92	0.27	0.12	4,859.40
	992G	2006	800	8.9	0.54	3.59	3.01	9.65	49.42	1.68	1.68	1.55	0.05	4,816.92	0.27	0.12	4,859.40
	992G	2007	800	8.9	0.54	3.44	2.89	9.65	44.66	1.55	1.55	1.43	0.05	4,816.92	0.27	0.12	4,859.40
	988H	2009	501	3.7	0.54	0.68	0.57	2.33	10.42	0.34	0.34	0.32	0.01	1,245.00	0.07	0.03	1,255.98
Water Trucks	773E	2003	671	8.3	0.20	1.00	0.84	2.80	12.95	0.45	0.45	0.41	0.01	1,397.23	0.08	0.03	1,409.55
	773F	2009	703	8.3	0.20	0.80	0.67	2.74	12.25	0.40	0.40	0.37	0.01	1,463.86	0.08	0.04	1,476.77
Contractor Lowboy Truck	Paystar 5600	2009	360	--	0.57	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Truck	Paystar 5600	2009	360	--	0.20	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Pump	T330	2009	115	--	0.50	--	--	--	--	--	--	--	--	--	--	--	--
Portable Light Towers	ML 695	2002	10.7	24.0	0.74	0.44	0.37	2.09	3.92	0.24	0.24	0.22	0.00	238.09	0.01	0.01	240.19
Total Off-Road Equipment Emissions:				293.6		145.12	121.64	849.61	1,859.77	84.32	84.32	77.82	1.37	144,362.21	8.13	3.56	145,635.38
Diesel PM Emissions:	(pounds/day)										84.32						
	(pounds/hour)										6.69						

Conversion Factors:

453.59 grams/pound

12.6 hp-hour weighted hours/day (Phase 1)

Table C-21a. Proposed Project Combustion Sources - Off-Road Diesel Equipment (Phase 1).

Phase 1 Off-Road Equipment Emission Factors (Grams/Horsepower-hour).

Equipment	Model	Model Year	Horse-power	Calculation Year	Cumulative Hours	Emission Factors (grams/horsepower-hour)										
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O
Bore/Drill Rigs	DM45	2009	600	2013	8000	0.309	0.259	1.066	4.755	0.156	0.156	0.144	0.0054	568.3	0.032	0.014
Crawler Tractors	D11T	2009	850	2013	8000	0.309	0.259	1.066	4.755	0.156	0.156	0.144	0.0054	568.3	0.032	0.014
	D11T	2009	850	2013	8000	0.309	0.259	1.066	4.755	0.156	0.156	0.144	0.0054	568.3	0.032	0.014
	D11T	2009	850	2013	8000	0.309	0.259	1.066	4.755	0.156	0.156	0.144	0.0054	568.3	0.032	0.014
	D10R	1999	570	2013	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	D10T	2005	580	2013	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
	D10T	2005	580	2013	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
(with disc)	D8T	2009	310	2013	8000	0.300	0.251	1.066	4.424	0.154	0.154	0.142	0.0054	568.3	0.032	0.014
Excavators	345D	2009	380	2013	8000	0.300	0.251	1.066	4.424	0.154	0.154	0.142	0.0054	568.3	0.032	0.014
Graders	16G	1995	275	2013	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	16M	2009	297	2013	8000	0.300	0.251	1.066	4.424	0.154	0.154	0.142	0.0054	568.3	0.032	0.014
Off-Highway Trucks																
150-ton Trucks	785B	1993	1290	2013	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
100-ton Trucks	777C	1996	870	2013	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
	777D	2000	938	2013	12000	0.814	0.683	3.342	9.802	0.404	0.404	0.373	0.0054	568.3	0.032	0.014
	777D	2005	938	2013	12000	0.454	0.381	1.138	7.498	0.246	0.246	0.227	0.0054	568.3	0.032	0.014
	777D	2005	938	2013	12000	0.454	0.381	1.138	7.498	0.246	0.246	0.227	0.0054	568.3	0.032	0.014
	777D	2006	938	2013	12000	0.424	0.355	1.138	5.831	0.198	0.198	0.183	0.0054	568.3	0.032	0.014
	777F	2007	938	2013	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	777F	2009	938	2013	8000	0.309	0.259	1.066	4.755	0.156	0.156	0.144	0.0054	568.3	0.032	0.014
	777F	2009	938	2013	8000	0.309	0.259	1.066	4.755	0.156	0.156	0.144	0.0054	568.3	0.032	0.014
40-ton Trucks	740	2003	415	2013	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	740	2003	415	2013	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	740	2003	415	2013	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
Rubber Tired Dozers	824C	1995	315	2013	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
Rubber Tired Loaders	992G	2005	800	2013	12000	0.454	0.381	1.138	7.498	0.246	0.246	0.227	0.0054	568.3	0.032	0.014
	992G	2006	800	2013	12000	0.424	0.355	1.138	5.831	0.198	0.198	0.183	0.0054	568.3	0.032	0.014
	992G	2007	800	2013	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	988H	2009	501	2013	8000	0.309	0.259	1.066	4.755	0.156	0.156	0.144	0.0054	568.3	0.032	0.014
Water Trucks	773E	2003	671	2013	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	773F	2009	703	2013	8000	0.309	0.259	1.066	4.755	0.156	0.156	0.144	0.0054	568.3	0.032	0.014
Contractor Lowboy Truck	Paystar 5600	2009	360	2013	8000	0.300	0.251	1.066	4.424	0.154	0.154	0.142	0.0054	568.3	0.032	0.014
Hydroseeder Truck	Paystar 5600	2009	360	2013	8000	0.300	0.251	1.066	4.424	0.154	0.154	0.142	0.0054	568.3	0.032	0.014
Hydroseeder Pump	T330	2009	115	2013	8000	0.407	0.341	3.747	5.606	0.381	0.381	0.351	0.0054	568.3	0.032	0.014
Portable Light Towers	ML 695	2002	10.7	2013	12000	1.050	0.880	5.000	9.350	0.570	0.570	0.526	0.0054	568.3	0.032	0.014

Notes:

1. Per the document, *Overview: OFFROAD Model*, California Air Resources Board, November 2006 (available at www.arb.ca.gov/msei/offroad/offroad.htm), THC, CO, NOx, PM, and CO_2 emission factors are determined by the following equation:

   EF = ZH + dr * CHrs, where

   EF = emission factor, in grams per hoursepower-hour (g/bhp-hr)

   ZH = zero-hour emission rate or when the equipment is new (g/bhp-hr)

   dr = deterioration rate or the increase in ZH emissions as the equipment is used (g/bhp-hr^2)

   CHrs = cumulative hours or total number of hours accumulated on the equipment
2. Values utilized in the above emission factor table for ZH and dr are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided.)
3. ROG = 83.82% THC, PM10 = 100% PM, and PM2.5 = 92.29% PM. Source: *2008 Estimated Annual Average Emissions – Statewide*, California Air Resources Board, data for Off-Road Equipment, sorted for diesel-fueled vehicles, available at http://www.arb.ca.gov/ei/emissiondata.htm (accessed February 25, 2011).

Table C-21a. Proposed Project Combustion Sources - Off-Road Diesel Equipment (Phase 1).

4. Per the document, *Overview: OFFROAD Model* (op cit.) and the OFFROAD2007 emfac.csv file, the SO_2 emission factor is based on fuel sulfur content and brake-specific fuel consumption. Per *Title 13 California Code of Regulations* sec. 2281 (Sulfur Content of Fuel), as of June 2006 diesel sulfur content in diesel fuel is limited to 15 parts per million. Per the October 2010 CARB Staff Report (op cit.), CARB staff used BSFC values from EPA's NONROAD emissions model, as documented in the report, *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition* (EPA Report No. EPA420-P-04-009/NR-009C), U.S. Environmental Protection Agency, April 2004. Table A2 of the EPA report (pages A5-A8) documents that for diesel engines up to 100 hp, a brake specific fuel consumption (BSFC) value of 0.408 lb/hp-hr is used. For diesel engines larger than 100 hp, a BSFC value of 0.367 lb/hp-hr is used. The above factors assume a BSFC value of 0.4 lb/hp-hr. The SO_2 emission factor is calculated as follows:

   EF_{SO2} = (Parts S in fuel/million) * (MW_{SO2}/MW_S) * BSFC (lb/hp-hr) * 453.6 g/lb

   = (15 parts S/million) * (64 g/g-mole SO_2/32 g/g-mole S) * 0.4 lb/hp-hr * 453.6 g/lb

   = 0.0054 g SO_2/hp-hr

5. CH_4 and N_2O factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Table 13.6 (Default CH_4 and N_2O Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles. 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 higher heating value of 137,000 Btu/gallon for diesel and 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), Tables 5 (Default Fuel Properties) and 6 (Default Engine Specifications - diesel turbocharged engines), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.

6. 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 Climate Registry *General Reporting Protocol* (op cit.), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.

7. Cumulative hours for each equipment item assumes that each item accumulates 2,000 hours of operation each year. Per the document, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements,* California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28, CARB staff now assumes emission factors deteriorate only up to a maximum of 12,000 hours.

8. Annual and daily activity data based on information provided by Lehigh Southwest Cement Company, August 2011, as documented in Appendix D.

9. Equipment load factors from *Offroad2007* (Version 2.0.1.2), op cit. The hydroseeder truck is assumed to have the same load profile (0.20) as a water truck. The hydroseeder pump is assigned a 0.50 load factor applicable to diesel sprayers. The light towers are assigned a 0.74 load factor applicable to diesel generator sets.

Table C-21b. Proposed Project Combustion Sources - Off-Road Diesel Equipment (Phase 2).

Phase 2 Emissions - Annual (Tons per Year).

Equipment	Model	Model Year	Horse-power	Hours per Year	Load Factor	Emissions (tons/year) THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	Emissions (metric tons/year) CO_2	CH_4	N_2O	CO_2e
Bore/Drill Rigs	DM45	2009	600	--	0.75	--	--	--	--	--	--	--	--	--	--	--	--
Crawler Tractors	D11T	2009	850	4,155.0	0.64	1.00	0.84	2.84	12.43	0.45	0.45	0.41	0.01	1,284.54	0.07	0.03	1,295.87
	D11T	2009	850	4,155.0	0.64	1.00	0.84	2.84	12.43	0.45	0.45	0.41	0.01	1,284.54	0.07	0.03	1,295.87
	D11T	2009	850	4,155.0	0.64	1.00	0.84	2.84	12.43	0.45	0.45	0.41	0.01	1,284.54	0.07	0.03	1,295.87
	D10R	1999	570	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D10T	2005	580	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D10T	2005	580	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
(with disc)	D8T	2009	310	914.1	0.64	0.08	0.07	0.23	0.93	0.04	0.04	0.03	0.00	103.07	0.01	0.00	103.97
Excavators	345D	2009	380	498.6	0.57	0.05	0.04	0.14	0.55	0.02	0.02	0.02	0.00	61.37	0.00	0.00	61.92
Graders	16G	1995	275	1,267.3	0.61	0.23	0.19	0.78	2.30	0.15	0.15	0.13	0.00	120.81	0.01	0.00	121.88
	16M	2009	297	1,267.3	0.61	0.10	0.08	0.29	1.17	0.04	0.04	0.04	0.00	130.48	0.01	0.00	131.63
Off-Highway Trucks				--													
150-ton Trucks	785B	1993	1290	--	0.57	--	--	--	--	--	--	--	--	--	--	--	--
100-ton Trucks	777C	1996	870	1,687.5	0.57	1.10	0.92	12.77	12.17	0.80	0.80	0.74	0.00	475.57	0.03	0.01	479.77
	777D	2000	938	1,687.5	0.57	0.81	0.68	3.32	9.75	0.40	0.40	0.37	0.01	512.74	0.03	0.01	517.26
	777D	2005	938	1,687.5	0.57	0.45	0.38	1.13	7.46	0.24	0.24	0.23	0.01	512.74	0.03	0.01	517.26
	777D	2005	938	1,687.5	0.57	0.45	0.38	1.13	7.46	0.24	0.24	0.23	0.01	512.74	0.03	0.01	517.26
	777D	2006	938	1,687.5	0.57	0.42	0.35	1.13	5.80	0.20	0.20	0.18	0.01	512.74	0.03	0.01	517.26
	777F	2007	938	1,687.5	0.57	0.40	0.34	1.13	5.24	0.18	0.18	0.17	0.01	512.74	0.03	0.01	517.26
	777F	2009	938	1,687.5	0.57	0.40	0.34	1.13	4.96	0.18	0.18	0.16	0.01	512.74	0.03	0.01	517.26
	777F	2009	938	1,687.5	0.57	0.40	0.34	1.13	4.96	0.18	0.18	0.16	0.01	512.74	0.03	0.01	517.26
40-ton Trucks	740	2003	415	83.1	0.57	0.01	0.01	0.02	0.11	0.00	0.00	0.00	0.00	11.17	0.00	0.00	11.27
	740	2003	415	83.1	0.57	0.01	0.01	0.02	0.11	0.00	0.00	0.00	0.00	11.17	0.00	0.00	11.27
	740	2003	415	83.1	0.57	0.01	0.01	0.02	0.11	0.00	0.00	0.00	0.00	11.17	0.00	0.00	11.27
Rubber Tired Dozers	824C	1995	315	2,077.5	0.59	0.41	0.34	1.42	4.17	0.26	0.26	0.24	0.00	219.42	0.01	0.01	221.36
Rubber Tired Loaders	992G	2005	800	1,800.0	0.54	0.39	0.33	0.98	6.43	0.21	0.21	0.19	0.00	441.91	0.02	0.01	445.81
	992G	2006	800	1,800.0	0.54	0.36	0.30	0.98	5.00	0.17	0.17	0.16	0.00	441.91	0.02	0.01	445.81
	992G	2007	800	1,800.0	0.54	0.35	0.29	0.98	4.52	0.16	0.16	0.14	0.00	441.91	0.02	0.01	445.81
	988H	2009	501	415.5	0.54	0.05	0.04	0.14	0.62	0.02	0.02	0.02	0.00	63.88	0.00	0.00	64.45
Water Trucks	773E	2003	671	1,558.1	0.20	0.09	0.08	0.26	1.21	0.04	0.04	0.04	0.00	118.83	0.01	0.00	119.88
	773F	2009	703	1,558.1	0.20	0.10	0.08	0.27	1.20	0.04	0.04	0.04	0.00	124.50	0.01	0.00	125.60
Contractor Lowboy Truck	Paystar 5600	2009	360	--	0.57	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Truck	Paystar 5600	2009	360	83.1	0.20	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	3.40	0.00	0.00	3.43
Hydroseeder Pump	T330	2009	115	83.1	0.50	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00	2.72	0.00	0.00	2.74
Portable Light Towers	ML 695	2002	10.7	7,200.0	0.74	0.07	0.06	0.31	0.59	0.04	0.04	0.03	0.00	32.40	0.00	0.00	32.68
Total Off-Road Equipment Emissions:				48,537.0		9.76	8.18	38.28	124.16	4.97	4.97	4.59	0.11	10,258.51	0.58	0.25	10,348.98
Diesel PM Emissions:											4.97						

Conversion Factors:
453.59 grams/pound
2,000 pounds/ton
1,000,000 grams/metric ton

Table C-21b. Proposed Project Combustion Sources - Off-Road Diesel Equipment (Phase 2).

Phase 2 Emissions - Daily (Pounds per Day).

		Model	Horse-	Hours	Load	Emissions (pounds/day)											
Equipment	Model	Year	power	per Day	Factor	THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Bore/Drill Rigs	DM45	2009	600	--	0.75	--	--	--	--	--	--	--	--	--	--	--	--
Crawler Tractors	D11T	2009	850	13.9	0.64	6.70	5.61	18.91	82.84	2.98	2.98	2.75	0.09	9,439.80	0.53	0.23	9,523.05
	D11T	2009	850	13.9	0.64	6.70	5.61	18.91	82.84	2.98	2.98	2.75	0.09	9,439.80	0.53	0.23	9,523.05
	D11T	2009	850	13.9	0.64	6.70	5.61	18.91	82.84	2.98	2.98	2.75	0.09	9,439.80	0.53	0.23	9,523.05
	D10R	1999	570	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D10T	2005	580	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
	D10T	2005	580	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
(with disc)	D8T	2009	310	8.0	0.64	1.40	1.17	3.98	16.22	0.62	0.62	0.57	0.02	1,988.59	0.11	0.05	2,006.13
Excavators	345D	2009	380	8.0	0.57	1.53	1.28	4.35	17.71	0.67	0.67	0.62	0.02	2,171.01	0.12	0.05	2,190.16
Graders	16G	1995	275	4.2	0.61	1.51	1.26	5.22	15.31	0.97	0.97	0.90	0.01	887.82	0.05	0.02	895.65
	16M	2009	297	4.2	0.61	0.67	0.57	1.92	7.82	0.30	0.30	0.27	0.01	958.85	0.05	0.02	967.31
Off-Highway Trucks																	
150-ton Trucks	785B	1993	1290	--	0.57	--	--	--	--	--	--	--	--	--	--	--	--
100-ton Trucks	777C	1996	870	5.6	0.57	7.33	6.14	85.14	81.15	5.33	5.33	4.92	0.03	3,494.87	0.20	0.09	3,525.69
	777D	2000	938	5.6	0.57	5.40	4.53	22.16	64.99	2.68	2.68	2.47	0.04	3,768.03	0.21	0.09	3,801.26
	777D	2005	938	5.6	0.57	3.01	2.53	7.55	49.71	1.63	1.63	1.50	0.04	3,768.03	0.21	0.09	3,801.26
	777D	2005	938	5.6	0.57	3.01	2.53	7.55	49.71	1.63	1.63	1.50	0.04	3,768.03	0.21	0.09	3,801.26
	777D	2006	938	5.6	0.57	2.81	2.36	7.55	38.66	1.31	1.31	1.21	0.04	3,768.03	0.21	0.09	3,801.26
	777F	2007	938	5.6	0.57	2.69	2.26	7.55	34.93	1.21	1.21	1.12	0.04	3,768.03	0.21	0.09	3,801.26
	777F	2009	938	5.6	0.57	2.67	2.24	7.55	33.07	1.19	1.19	1.10	0.04	3,768.03	0.21	0.09	3,801.26
	777F	2009	938	5.6	0.57	2.67	2.24	7.55	33.07	1.19	1.19	1.10	0.04	3,768.03	0.21	0.09	3,801.26
40-ton Trucks	740	2003	415	8.0	0.57	1.70	1.42	4.75	21.98	0.76	0.76	0.70	0.02	2,370.98	0.13	0.06	2,391.89
	740	2003	415	8.0	0.57	1.70	1.42	4.75	21.98	0.76	0.76	0.70	0.02	2,370.98	0.13	0.06	2,391.89
	740	2003	415	8.0	0.57	1.70	1.42	4.75	21.98	0.76	0.76	0.70	0.02	2,370.98	0.13	0.06	2,391.89
Rubber Tired Dozers	824C	1995	315	6.9	0.59	2.74	2.29	9.48	27.81	1.77	1.77	1.63	0.02	1,612.49	0.09	0.04	1,626.71
Rubber Tired Loaders	992G	2005	800	6.0	0.54	2.60	2.18	6.51	42.85	1.40	1.40	1.29	0.03	3,247.50	0.18	0.08	3,276.14
	992G	2006	800	6.0	0.54	2.42	2.03	6.51	33.32	1.13	1.13	1.04	0.03	3,247.50	0.18	0.08	3,276.14
	992G	2007	800	6.0	0.54	2.32	1.95	6.51	30.11	1.04	1.04	0.96	0.03	3,247.50	0.18	0.08	3,276.14
	988H	2009	501	8.0	0.54	1.92	1.61	5.43	23.80	0.86	0.86	0.79	0.03	2,711.66	0.15	0.07	2,735.58
Water Trucks	773E	2003	671	5.2	0.20	0.62	0.52	1.75	8.10	0.28	0.28	0.26	0.01	873.27	0.05	0.02	880.97
	773F	2009	703	5.2	0.20	0.65	0.54	1.83	8.03	0.29	0.29	0.27	0.01	914.91	0.05	0.02	922.98
Contractor Lowboy Truck	Paystar 5600	2009	360	--	0.57	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Truck	Paystar 5600	2009	360	8.0	0.20	0.51	0.43	1.45	5.89	0.22	0.22	0.21	0.01	721.67	0.04	0.02	728.03
Hydroseeder Pump	T330	2009	115	8.0	0.50	0.52	0.44	4.13	5.99	0.46	0.46	0.42	0.01	576.33	0.03	0.01	581.41
Portable Light Towers	ML 695	2002	10.7	24.0	0.74	0.44	0.37	2.09	3.92	0.24	0.24	0.22	0.00	238.09	0.01	0.01	240.19
Total Off-Road Equipment Emissions:				218.3		74.64	62.56	284.72	946.62	37.65	37.65	34.75	0.84	88,700.61	4.99	2.19	89,482.89
Diesel PM Emissions:	(pounds/day)										37.65						
	(pounds/hour)										8.35						

Conversion Factors:

453.59 grams/pound

4.5 hp-hour weighted hours/day (Phase 2)

Table C-21b. Proposed Project Combustion Sources - Off-Road Diesel Equipment (Phase 2).

Phase 2 Off-Road Equipment Emission Factors (Grams/Horsepower-hour).

Equipment	Model	Model Year	Horse-power	Calculation Year	Cumulative Hours	Emission Factors (grams/horsepower-hour)										
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O
Bore/Drill Rigs	DM45	2009	600	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
Crawler Tractors	D11T	2009	850	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
	D11T	2009	850	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
	D11T	2009	850	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
	D10R	1999	570	2023	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	D10T	2005	580	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
	D10T	2005	580	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
(with disc)	D8T	2009	310	2023	12000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Excavators	345D	2009	380	2023	12000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Graders	16G	1995	275	2023	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
	16M	2009	297	2023	12000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Off-Highway Trucks																
150-ton Trucks	785B	1993	1290	2023	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
100-ton Trucks	777C	1996	870	2023	12000	1.192	0.999	13.844	13.196	0.867	0.867	0.800	0.0054	568.3	0.032	0.014
	777D	2000	938	2023	12000	0.814	0.683	3.342	9.802	0.404	0.404	0.373	0.0054	568.3	0.032	0.014
	777D	2005	938	2023	12000	0.454	0.381	1.138	7.498	0.246	0.246	0.227	0.0054	568.3	0.032	0.014
	777D	2005	938	2023	12000	0.454	0.381	1.138	7.498	0.246	0.246	0.227	0.0054	568.3	0.032	0.014
	777D	2006	938	2023	12000	0.424	0.355	1.138	5.831	0.198	0.198	0.183	0.0054	568.3	0.032	0.014
	777F	2007	938	2023	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	777F	2009	938	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
	777F	2009	938	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
40-ton Trucks	740	2003	415	2023	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	740	2003	415	2023	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	740	2003	415	2023	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
Rubber Tired Dozers	824C	1995	315	2023	12000	0.964	0.808	3.342	9.802	0.622	0.622	0.574	0.0054	568.3	0.032	0.014
Rubber Tired Loaders	992G	2005	800	2023	12000	0.454	0.381	1.138	7.498	0.246	0.246	0.227	0.0054	568.3	0.032	0.014
	992G	2006	800	2023	12000	0.424	0.355	1.138	5.831	0.198	0.198	0.183	0.0054	568.3	0.032	0.014
	992G	2007	800	2023	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	988H	2009	501	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
Water Trucks	773E	2003	671	2023	12000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
	773F	2009	703	2023	12000	0.403	0.338	1.138	4.987	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
Contractor Lowboy Truck	Paystar 5600	2009	360	2023	12000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Hydroseeder Truck	Paystar 5600	2009	360	2023	12000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Hydroseeder Pump	T330	2009	115	2023	12000	0.515	0.432	4.075	5.904	0.451	0.451	0.416	0.0054	568.3	0.032	0.014
Portable Light Towers	ML 695	2002	10.7	2023	12000	1.050	0.880	5.000	9.350	0.570	0.570	0.526	0.0054	568.3	0.032	0.014

Notes:

1. Per the document, *Overview: OFFROAD Model*, California Air Resources Board, November 2006 (available at www.arb.ca.gov/msei/offroad/offroad.htm), THC, CO, NOx, PM, and CO_2 emission factors are determined by the following equation:

   EF = ZH + dr * CHrs, where

   EF = emission factor, in grams per hoursepower-hour (g/bhp-hr)

   ZH = zero-hour emission rate or when the equipment is new (g/bhp-hr)

   dr = deterioration rate or the increase in ZH emissions as the equipment is used (g/bhp-hr^2)

   CHrs = cumulative hours or total number of hours accumulated on the equipment
2. Values utilized in the above emission factor table for ZH and dr are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided.)
3. ROG = 83.82% THC, PM10 = 100% PM, and PM2.5 = 92.29% PM. Source: *2008 Estimated Annual Average Emissions – Statewide*, California Air Resources Board, data for Off-Road Equipment, sorted for diesel-fueled vehicles, available at http://www.arb.ca.gov/ei/emissiondata.htm (accessed February 25, 2011).

Table C-21b. Proposed Project Combustion Sources - Off-Road Diesel Equipment (Phase 2).

4. Per the document, *Overview: OFFROAD Model* (op cit.) and the OFFROAD2007 emfac.csv file, the SO_2 emission factor is based on fuel sulfur content and brake-specific fuel consumption. Per *Title 13 California Code of Regulations* sec. 2281 (Sulfur Content of Fuel), as of June 2006 diesel sulfur content in diesel fuel is limited to 15 parts per million. Per the October 2010 CARB Staff Report (op cit.), CARB staff used BSFC values from EPA's NONROAD emissions model, as documented in the report, *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition* (EPA Report No. EPA420-P-04-009/NR-009C), U.S. Environmental Protection Agency, April 2004. Table A2 of the EPA report (pages A5-A8) documents that for diesel engines up to 100 hp, a brake specific fuel consumption (BSFC) value of 0.408 lb/hp-hr is used. For diesel engines larger than 100 hp, a BSFC value of 0.367 lb/hp-hr is used. The above factors assume a BSFC value of 0.4 lb/hp-hr. The SO_2 emission factor is calculated as follows:

   EF_{SO2} = (Parts S in fuel/million) * (MW_{SO2}/MW_S) * BSFC (lb/hp-hr) * 453.6 g/lb

   = (15 parts S/million) * (64 g/g-mole SO_2/32 g/g-mole S) * 0.4 lb/hp-hr * 453.6 g/lb

   = 0.0054 g SO_2/hp-hr

5. CH_4 and N_2O factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Table 13.6 (Default CH_4 and N_2O Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles. 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 higher heating value of 137,000 Btu/gallon for diesel and 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), Tables 5 (Default Fuel Properties) and 6 (Default Engine Specifications - diesel turbocharged engines), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.
6. 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 Climate Registry *General Reporting Protocol* (op cit.), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
7. Cumulative hours for each equipment item assumes that each item accumulates 2,000 hours of operation each year. Per the document, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements,* California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28, CARB staff now assumes emission factors deteriorate only up to a maximum of 12,000 hours.
8. Annual and daily activity data based on information provided by Lehigh Southwest Cement Company, August 2011, as documented in Appendix D.
9. Equipment load factors from *Offroad2007* (Version 2.0.1.2), op cit. The hydroseeder truck is assumed to have the same load profile (0.20) as a water truck. The hydroseeder pump is assigned a 0.50 load factor applicable to diesel sprayers. The light towers are assigned a 0.74 load factor applicable to diesel generator sets.

Table C-22. Proposed Project Combustion Sources - On-road On-site Vehicles.

Project	Activity[1]	PM_{10}		$PM_{2.5}$		CO		NOx		ROG		SOx		Diesel PM		CO_2		CH_4		N_2O		CO_2e[4]	
Phase	(mi/yr)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)	(lb/day)	(lb/yr)	(lb/hr)	(tonne/yr)	(lb/day)	(tonne/yr)	(lb/day)	(tonne/yr)	(lb/day)	(tonne/yr)	(lb/day)
1	119,000	0.01	0.04	0.00	0.03	0.52	3.58	0.07	0.45	0.05	0.32	0.00	0.01	0.03	0.00	80.44	591.17	0.01	0.04	0.00	0.01	81.17	596.52
2	98,000	0.01	0.04	0.00	0.03	0.43	2.95	0.06	0.37	0.04	0.26	0.00	0.01	0.03	0.00	66.25	486.84	0.00	0.03	0.00	0.01	66.85	491.25

Notes:

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

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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 $310 * N_2O$.

2012 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	0.00011157	0.00007773	0.00881505	0.00117603	0.00077339	0.00001445	0.00000029	1.49033217	0.00009458	0.00003717
Vehicles (MDVs)[2]	Daily/Hourly	0.00011157	0.00007773	0.00901903	0.00114280	0.00079595	0.00001575	0.00000029	1.49033217	0.00009458	0.00003717

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. First year of operation is assumed to be 2012.
2. Medium duty vehicles.

Table C-23. Proposed Project Combustion Sources - On-road Off-site Vehicles (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	6,961	0.00	0.03	0.00	0.02	0.03	0.20	0.09	0.64	0.01	0.05	0.00	0.00	6.57	0.00	13.22	97.13	0.00	0.00	0.00	0.00	13.36	98.17
	Green Waste Transport	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Employee Commute	123,628	0.01	0.04	0.00	0.02	0.50	3.41	0.05	0.31	0.05	0.38	0.00	0.00	0.08	0.00	55.87	410.56	0.00	0.03	0.00	0.01	56.38	414.33
	Total - Phase 1	130,589	0.01	0.06	0.01	0.04	0.53	3.60	0.14	0.95	0.06	0.43	0.00	0.01	6.64	0.00	69.09	507.69	0.00	0.03	0.00	0.01	69.74	512.49
2	Fuel Transport	1,822	0.00	0.01	0.00	0.01	0.01	0.05	0.02	0.17	0.00	0.01	0.00	0.00	1.72	0.00	3.46	25.43	0.00	0.00	0.00	0.00	3.50	25.70
	Green Waste Transport	101,460	0.06	0.37	0.05	0.31	0.42	2.89	1.36	9.28	0.10	0.67	0.00	0.01	95.72	0.01	192.66	1,415.83	0.00	0.03	0.01	0.05	194.72	1,430.93
	Employee Commute	95,875	0.00	0.03	0.00	0.02	0.39	2.64	0.04	0.24	0.04	0.30	0.00	0.00	0.06	0.00	43.33	318.39	0.00	0.02	0.00	0.01	43.72	321.31
	Total - Phase 2	199,158	0.06	0.40	0.05	0.33	0.81	5.58	1.42	9.68	0.14	0.98	0.00	0.02	97.50	0.01	239.45	1,759.66	0.01	0.06	0.01	0.06	241.94	1,777.94

Notes:

1. Activity data based on estimated number of vehicles and mileage necessary to support maximum anticipated production during each of the project phases, as documented in Appendix D.
2. Mulched green waste transport includes both on- and off-site travel; calculations for total travel presented here since the vast majority of activity occurs off-site.
3. Assumed operating schedule:

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

4. Conversion factors:
   2,000 lb/ton
   0.45359 kg/lb
   1,000 kg/metric ton
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. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.

2012 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	0.00108499	0.00091443	0.00820033	0.02679915	0.00198780	0.00003997	0.00094340	4.18637274	0.00009233	0.00013772
(HHDT-DSL)[2]	Daily/Hourly	0.00109085	0.00091983	0.00854385	0.02742554	0.00196968	0.00004006	0.00094340	4.18637274	0.00009233	0.00013772
Employee Commute	Annual	0.00008520	0.00005324	0.00805851	0.00077949	0.00086024	0.00000970	0.00000062	0.99627575	0.00007373	0.00002448
(Passenger)[3]	Daily/Hourly	0.00008520	0.00005324	0.00826512	0.00075629	0.00093037	0.00001056	0.00000062	0.99627575	0.00007373	0.00002448

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. First year of operation is assumed to be 2012.
2. Heavy-Heavy Duty Diesel Trucks.
3. Passenger Vehicles.

Table C-24. Proposed Project Combustion Sources - On-road Dust Entrainment.

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	0.0064 lb/mi	0.0010 lb/mi	0.0067 lb/mi	0.0010 lb/mi	130,589 miles/yr	0%	0.42	2.92	0.12	0.06	0.44	0.02
2	(AP-42 Sec. 13.2.1, Eqn 2)		(AP-42 Sec. 13.2.1, Eqn 1)		192,198 miles/yr		0.62	4.30	0.18	0.09	0.65	0.03

Notes:

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

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	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	9.7	0.00047	62	365	15%	0.471	0.004	0.004	0.0006	0.0006
Major	0.016	0.035	9.7	0.00047	62	365	15%	0.407	0.006	0.006	0.0009	0.0009
Collector	0.016	0.035	9.7	0.00047	62	365	15%	0.055	0.006	0.006	0.0009	0.0009
Local	0.016	0.32	9.7	0.00047	62	365	15%	0.067	0.028	0.027	0.0042	0.0040
Composite Emission Factors (assuming Santa Clara County VMT fractions by road type)								1.000	0.0067	0.0064	0.0010	0.0010

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

Table C-24. Proposed Project Combustion Sources - On-road Dust Entrainment.

(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			Mulched Green Waste 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]	Miles/ Year[1]	Ave. Veh. Wgt (tons)[2]	Annual Ton-Miles[3]	Ton-Miles	Miles	Ave. Veh. Wgt (tons)
1	6,961	27.5	191,417	0	25.0	0	123,628	2.4	296,708	488,125	130,589	3.7
2	1,822	27.5	50,116	94,500	25.0	2,362,500	95,875	2.4	230,100	2,642,716	192,198	13.8
Total - All Phases										3,130,841	322,787	9.7

Notes:

1. Derivation of miles for each vehicle type documented previously.
2. On-road 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.

Table C-25. Proposed Project Indirect Greenhouse Gas Emissions - Electrical Power Use.

Project Phase	Use	Annual Activity	Annual Electric Power Use Metric	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[8]
1	Quarry Dewatering[1]	6,720 hours/year	274.6 kilowatts (kW)	1,845,043							
	Purchased Water (Dust Suppression)[2]	0 million gal/yr	3,500 kW-hr/million gal	--							
	Overland Conveyor System[3]	0 hours/year	3,674.1 kilowatts (kW)	--							
	Quarry Office[4]	1,800 square feet	14.6 kW-hr/sq ft-yr	26,280							
	Total - Phase 1			1,871,323	681.01	0.02829	0.00623	578.05	0.02	0.01	580.19
2	Quarry Dewatering	0 hours/year	274.6 kilowatts (kW)	--							
	Purchased Water (Dust Suppression)	107 million gal/yr	3,500 kW-hr/million gal	373,653							
	Overland Conveyor System	7,200 hours/year	1,063.1 kilowatts (kW)	7,653,960							
	Quarry Office	1,800 square feet	14.6 kW-hr/sq ft-yr	26,280							
	Total - Phase 2			8,053,893	681.01	0.02829	0.00623	2,487.84	0.10	0.02	2,497.07

Notes:

1. Current 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 quarry dewatering system will continue to operate at its present level through Phase 1. From the start of Phase 2, the quarry dewatering system is expected to no longer be operational since extraction operations from the quarry will have ceased.
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. For times when purchased water is needed, the quantity of purchased water is the total of water used by the water trucks and water needed to control emissions from the overland conveyor system. Water used by water trucks is calculated assuming a water flow rate of 400 gallons/minute and 60 minutes/hour for each water truck operating hour. Water used for overland conveyor system dust control is calculated assuming a water flow rate of 2 gallons/minute, 60 minutes/hour, and 7,200 hours/year (3 shifts for 300 operating days) for each material transfer point and screen. 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 Overland Conveyor System will consist of the following components: a fixed downhill overland conveyor (equipped with four 500-HP electric motors capable of regenerating power from the braking force from downhill transport of infill material), one heavy-duty conveyor (500-HP electric motor), one telestacker (100-HP motor), and up to 31 portable conveyors (each 75-HP). This totals 2,000-HP of electrical power regeneration capacity, and 2,925-HP in other electrical motors. It is assumed that on average, the fixed downhill overland conveyor regeneration system will be 75% efficient, generating the equivalent of 1,500-HP in electrical horsepower, for a net electrical power requirement of 1,425-HP. Assuming 746 watts/HP, this is equivalent to 1,063.1 kilowatts (kW). The Overland Conveyor System is assumed to operate 24 hours/day, 6 days/week, and 50 weeks/year (7,200 hours/year) during Phase 2.
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:
   www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/detailed_tables_2003.html.
5. Source: U.S. Department of Energy, *Emissions & Generation Resource Integrated Database (eGRID)*, eGRID2010 Version 1.1, May 2011, available at http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html - 2007 Summary Table 1 ("Year 2007 eGRID Subregion Emissions - Greenhouse Gases"), data for Western Electricity Coordinating Council (WECC) California (CAMX) Subregion.
6. 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 Climate Registry's *General Reporting Protocol*, Version 1.1 (May 2008), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
7. Conversion factors:
   1,000 kW-hr/MW-hr
   0.45359 kilograms/pound
   1,000 kilograms/metric ton (MT)

Table C-26. Proposed Project Combustion Sources - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	1	15	1994	1.5	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	10	0.00E+00	G/HP-HR	1	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	1999	1.05	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	9.35	0.00E+00	G/HP-HR	0.57	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2004	0.68	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	6.08	0.00E+00	G/HP-HR	0.47	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2007	0.49	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	4.37	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2040	0.49	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	4.37	0.00E+00	G/HP-HR	0.19	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	1994	1.84	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	6.92	0.00E+00	G/HP-HR	0.76	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	1999	0.9	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	6.92	0.00E+00	G/HP-HR	0.57	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2004	0.64	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	5.79	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2007	0.57	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	4.57	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2040	0.57	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	4.57	0.00E+00	G/HP-HR	0.19	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	1987	1.84	2.35E-04	G/HP-HR	5	5.13E-04	G/HP-HR	7	1.05E-04	G/HP-HR	0.76	5.89E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	1998	1.8	2.30E-04	G/HP-HR	5	5.13E-04	G/HP-HR	6.9	1.04E-04	G/HP-HR	0.76	5.89E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2003	1.45	1.85E-04	G/HP-HR	4.1	4.20E-04	G/HP-HR	5.55	1.03E-04	G/HP-HR	0.6	4.65E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2004	0.64	9.80E-05	G/HP-HR	3.27	3.34E-04	G/HP-HR	5.1	9.33E-05	G/HP-HR	0.43	3.36E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2005	0.37	6.90E-05	G/HP-HR	3	3.05E-04	G/HP-HR	4.95	9.67E-05	G/HP-HR	0.38	2.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2007	0.24	5.45E-05	G/HP-HR	2.86	2.90E-04	G/HP-HR	4.88	9.83E-05	G/HP-HR	0.35	2.72E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2012	0.1	4.00E-05	G/HP-HR	2.72	2.76E-04	G/HP-HR	4.8	1.00E-04	G/HP-HR	0.16	1.20E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2040	0.1	4.00E-05	G/HP-HR	2.72	2.76E-04	G/HP-HR	2.9	6.00E-05	G/HP-HR	0.01	1.20E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	1987	1.44	6.66E-05	G/HP-HR	4.8	1.27E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.84	6.11E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	1997	0.99	4.58E-05	G/HP-HR	3.49	9.23E-05	G/HP-HR	8.75	2.02E-04	G/HP-HR	0.69	5.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2003	0.99	4.58E-05	G/HP-HR	3.49	9.23E-05	G/HP-HR	6.9	1.60E-04	G/HP-HR	0.69	5.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2004	0.46	3.33E-05	G/HP-HR	3.23	8.55E-05	G/HP-HR	5.64	1.03E-04	G/HP-HR	0.39	2.85E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2005	0.28	2.92E-05	G/HP-HR	3.14	8.33E-05	G/HP-HR	5.22	8.40E-05	G/HP-HR	0.29	2.12E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2007	0.19	2.71E-05	G/HP-HR	3.09	8.21E-05	G/HP-HR	5.01	7.45E-05	G/HP-HR	0.24	1.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2011	0.1	2.50E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.89	3.80E-05	G/HP-HR	0.2	8.58E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2012	0.09	2.31E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.53	3.38E-05	G/HP-HR	0.07	4.30E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2014	0.09	2.31E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.53	3.38E-05	G/HP-HR	0.01	1.04E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2040	0.07	1.74E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	1.4	1.88E-05	G/HP-HR	0.01	1.04E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1969	1.32	6.11E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	14	3.24E-04	G/HP-HR	0.77	5.60E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1971	1.1	5.09E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.66	4.80E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1979	1	4.63E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	12	2.78E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1984	0.94	4.35E-05	G/HP-HR	4.3	1.14E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1987	0.88	4.07E-05	G/HP-HR	4.2	1.11E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1996	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	8.17	1.89E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2002	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	6.9	1.60E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2003	0.33	2.79E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	5.26	9.64E-05	G/HP-HR	0.24	1.70E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2004	0.22	2.63E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	4.72	7.52E-05	G/HP-HR	0.19	1.35E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2006	0.16	2.57E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	4.44	6.46E-05	G/HP-HR	0.16	1.18E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2011	0.1	2.50E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	2.45	3.20E-05	G/HP-HR	0.14	1.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2014	0.09	2.17E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	2.27	2.88E-05	G/HP-HR	0.01	5.00E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2040	0.05	1.17E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	5.00E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR

Table C-26. Proposed Project Combustion Sources - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	176	250	1969	1.32	6.11E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	14	3.24E-04	G/HP-HR	0.77	5.60E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1971	1.1	5.09E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.66	4.80E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1979	1	4.63E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	12	2.78E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1984	0.94	4.35E-05	G/HP-HR	4.3	1.14E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1987	0.88	4.07E-05	G/HP-HR	4.2	1.11E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1995	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	8.17	1.89E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2002	0.32	1.48E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	6.25	1.45E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2003	0.19	2.09E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	5	9.05E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2004	0.14	2.30E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	4.58	7.23E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2006	0.12	2.40E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	4.38	6.33E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2010	0.1	2.50E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.59E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2013	0.07	1.83E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2040	0.05	1.17E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1995	0.68	2.37E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2000	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2001	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2002	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2004	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2005	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2013	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1995	0.68	2.37E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2001	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2002	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2003	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2005	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2013	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR

Table C-26. Proposed Project Combustion Sources - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	751	1000	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1999	0.68	1.12E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2005	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2006	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2007	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2009	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.08	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2014	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.06	2.50E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.02	1.00E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1999	0.68	1.12E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2005	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2006	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2007	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2009	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.08	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2014	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.06	2.50E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.02	1.00E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR

Notes:

1. The above factors are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided).
2. The above factors are consistent with the factors used by CARB staff to estimate off-road diesel equipment emissions, as documented in *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements*, California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), Attachment D (Diesel Emission Factors (g/bhp-hr)).

Table C-27. Proposed Project Combustion Sources - Emission Factors for On-road Motor Vehicles.

Emission Factors for 2012.[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	0.00820033	0.00805851	0.00881505	0.00854385 (Win)	0.00826512 (Win)	0.00901903 (Win)
NOx	lb/mile	0.02679915	0.00077949	0.00117603	0.02742554 (Sum)	0.00075629 (Sum)	0.00114280 (Sum)
ROG	lb/mile	0.00198780	0.00086024	0.00077339	0.00196968 (Sum)	0.00093037 (Sum)	0.00079595 (Sum)
SOx	lb/mile	0.00003997	0.00000970	0.00001445	0.00004006 (Sum)	0.00001056 (Sum)	0.00001575 (Sum)
PM_{10}	lb/mile	0.00108499	0.00008520	0.00011157	0.00109085 (Win)	0.00008520 (Win)	0.00011157 (Win)
$PM_{2.5}$	lb/mile	0.00091443	0.00005324	0.00007773	0.00091983 (Win)	0.00005324 (Win)	0.00007773 (Win)
Diesel Particulates[8]							
DPM_{10}	lb/mile	0.00094340	0.00000062	0.00000029	0.00094340 (Ann)	0.00000062 (Ann)	0.00000029 (Ann)
$DPM_{2.5}$	lb/mile	0.00086793	0.00000057	0.00000026	0.00086793 (Ann)	0.00000057 (Ann)	0.00000026 (Ann)
Greenhouse Gases[9]							
CO_2	lb/mile	4.18637274	0.99627575	1.49033217	4.18637274 (Ann)	0.99627575 (Ann)	1.49033217 (Ann)
CH_4	lb/mile	0.00009233	0.00007373	0.00009458	0.00009233 (Ann)	0.00007373 (Ann)	0.00009458 (Ann)
N_2O	lb/mile	0.00013772	0.00002448	0.00003717	0.00013772 (Ann)	0.00002448 (Ann)	0.00003717 (Ann)
EMFAC Trips[10]							
Trip Distance	mi/trip	32.540	5.046	5.672	32.540 (Ann)	5.046 (Ann)	5.672 (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 2012 annual average emission inventory for Santa Clara County.
3. Source: EMFAC2007 model 2012 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 D

Proposed Project Supporting Documentation

Proposed Project Supporting Documentation.

Table D-1. Identification of Peak Activity by Project Phase for Proposed Project.

Category	Annual Activity Indicator	Project Component	Phase 1 2012	2013	2014	2015	2016	2017	2018	2019	2020	Phase 2 2021	2022	2023	2024	2025
Bulldozing, Scraping, and Grading	Hours per Year	Proposed Project	15,124	15,124	15,374	14,736	14,543	12,354	12,465	12,664	12,465	16,911	17,077	17,991	20,276	19,944
		Permanente Creek Reclamation Area	16	--	--	--	--	--	--	--	--	--	--	--	--	32
		Total:	15,140	15,124	15,374	14,736	14,543	12,354	12,465	12,664	12,465	16,911	17,077	17,991	20,276	19,976
Material Handling	Total Production + Topsoil Movements (Tonnes per Year)	Proposed Project	9,600,000	9,325,000	9,325,000	8,000,000	7,950,000	6,218,000	6,200,000	6,210,000	5,200,000	9,046,000	9,017,000	9,055,051	9,034,051	9,034,051
		Permanente Creek Reclamation Area	8,000	--	--	--	--	--	--	--	--	--	--	--	--	1,600
		Total:	9,608,000	9,325,000	9,325,000	8,000,000	7,950,000	6,218,000	6,200,000	6,210,000	5,200,000	9,046,000	9,017,000	9,055,051	9,034,051	9,035,651
Unpaved Road Dust Entrainment	Total Miles per Year Associated With Haul Truck Transport	Proposed Project	335,032	331,237	290,080	309,610	270,080	200,621	210,636	228,181	222,590	137,490	111,234	94,459	77,647	37,435
		Permanente Creek Reclamation Area	76	--	--	--	--	--	--	--	--	--	--	--	--	76
		Total:	335,108	331,237	290,080	309,610	270,080	200,621	210,636	228,181	222,590	137,490	111,234	94,459	77,647	37,511
Wind Erosion - Disturbed Areas	Topsoil Removal, Operating, Backfill, and Reclaimed Areas (Acres/Year)	Proposed Project	114	118	114	126	111	119	101	119	101	96	237	255	316	319
		Permanente Creek Reclamation Area	0.03	--	--	--	--	--	--	--	--	--	--	--	--	0.03
		Total:	114	118	114	126	111	119	101	119	101	96	237	255	316	319
Off-Road Diesel Equipment	Thousand Hp-Hours per Year	Proposed Project	57,144	60,984	57,060	52,837	47,681	37,625	39,431	42,594	40,278	31,764	31,555	31,885	28,953	27,337
		Permanente Creek Reclamation Area	61	--	--	--	--	--	--	--	--					34
		Total:	57,205	60,984	57,060	52,837	47,681	37,625	39,431	42,594	40,278	31,764	31,555	31,885	28,953	27,371

Notes:

1. Data for each year derived from applicable source data as documented in Appendices D and E, *Air Quality Technical Analysis*, November 22, 2011, except as noted below.
2. Unpaved road dust entrainment mileage is calculated based on quarry production, waste rock (less that transported by conveyor), aggregate fines, and topsoil tranported each year, multiplied by the corresponding trip length for each year (based on expected trip origin and destination). Trip length data provided by Lehigh Southwest Cement Company, July 2011.
3. Distrubed acres/year is based on quarry operating and reclaimed areas and waste rock operating, reclaimed, and topsoil removal areas for each year provided by Lehigh Southwest Cement Company, July 2011. Disturbed areas associated with unpaved roads is not assumed to vary each year within each project phase, and is therefore not reflected in the above table.
4. Disturbed area wind erosion for Permanente Creek Reclamation Area activities is expected to occur on only seven days in Phase 1 (Areas 3 and 5) and seven days in Phase 2 (Areas 1 and 2). Since disturbed areas are expressed in acres/year for the proposed RPA, Permanente Creek Reclamation Area disturbed area data is converted to average annual acres disturbed per year by multiplying average daily disturbed areas by 7 days and dividing by 365 days per year.

Table D-2. Quarry Production by Phase and by Year.

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

Phase	Peak Year	LS - Cement	LS - Aggregate	Waste Rock (Truck)	Waste Rock (Conveyor)	Aggregate Fines	Topsoil Movements						Mulched Green Waste	Total Production[4]
							WMSA		EMSA			Total Movements		
							Stockpiled	Used	Stockpiled	Used	Concurrent			
1	2012	2,425,098	2,755,793	4,850,195	--	551,159	--	--	--	--	--	--	--	10,582,244
2	2023	--	--	2,480,213	7,440,640	--	--	11,023	--	11,023	17,637	39,683	21,000	9,920,854

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

Phase	Year	LS - Cement	LS - Aggregate	Waste Rock (Truck)	Waste Rock (Conveyor)	Aggregate Fines	Excavation Source	Waste Destination	Topsoil Movements						Mulched Green Waste	Total Production[4]	Total Production+ Movements
									WMSA		EMSA			Total Topsoil Movements			
									Stockpiled	Used	Stockpiled	Used	Concurrent				
Baseline	2000-2010	1,504,970	1,092,290	2,213,420	--	196,612	--	--	40,000	--	--	--	--	40,000	--	5,007,292	5,047,292
1	2012	2,200,000	2,500,000	4,400,000	--	500,000	Quarry	EMSA/West Wall	--	--	--	--	--	--	--	9,600,000	9,600,000
1	2013	2,200,000	2,500,000	4,125,000	--	500,000	Quarry	EMSA/West Wall	--	--	--	--	--	--	--	9,325,000	9,325,000
1	2014	2,200,000	2,500,000	4,125,000	--	500,000	Quarry	EMSA/West Wall	--	--	--	--	--	--	--	9,325,000	9,325,000
1	2015	2,200,000	2,500,000	2,750,000	--	500,000	Quarry	EMSA/West Wall	--	--	40,000	10,000	--	50,000	--	7,950,000	8,000,000
1	2016	2,200,000	2,500,000	2,750,000	--	500,000	Quarry	EMSA/West Wall	--	--	--	--	--	--	--	7,950,000	7,950,000
1	2017	2,200,000	2,500,000	1,000,000	--	500,000	Quarry	EMSA/West Wall	--	--	--	--	18,000	18,000	--	6,200,000	6,218,000
1	2018	2,200,000	2,500,000	1,000,000	--	500,000	Quarry	EMSA/West Wall	--	--	--	--	--	--	--	6,200,000	6,200,000
1	2019	2,200,000	2,500,000	1,000,000	--	500,000	Quarry	EMSA/West Wall	--	--	--	10,000	--	10,000	--	6,200,000	6,210,000
1	2020	2,200,000	2,500,000	--	--	500,000	Quarry	EMSA/West Wall	--	--	--	--	--	--	--	5,200,000	5,200,000
2	2021	--	--	2,250,000	6,750,000	--	WMSA	North Quarry	--	--	--	10,000	36,000	46,000	--	9,000,000	9,046,000
2	2022	--	--	2,250,000	6,750,000	--	WMSA	North Quarry	--	--	--	--	17,000	17,000	--	9,000,000	9,017,000
2	2023	--	--	2,250,000	6,750,000	--	WMSA	North Quarry	--	10,000	--	10,000	16,000	36,000	19,051	9,000,000	9,055,051
2	2024	--	--	2,250,000	6,750,000	--	WMSA	North Quarry	--	15,000	--	--	--	15,000	19,051	9,000,000	9,034,051
2	2025	--	--	2,250,000	6,750,000	--	WMSA	North Quarry	--	15,000	--	--	--	15,000	19,051	9,000,000	9,034,051
TOTALS:		19,800,000	22,500,000	32,400,000	33,750,000	4,500,000			40,000	40,000	40,000	40,000	87,000	247,000	57,152	112,950,000	113,214,152

Notes:

1. Quarry production data based on maximum quarry production data provided by Lehigh Southwest Cement Company, July 2011.
2. Peak quarry production by phase is based on the year in which the maximum quarry production in conjunction with total topsoil movement occurs.
3. Conversion factors:
   1.10232 short ton/metric ton.
4. Total production reflects the sum of LS-Cement, LS-Aggregate, Waste Rock, and Aggregate Fines.
5. Estimates of muched green waste movements provided by Lehigh Southwest Cement Company, November 2011 are converted from short tons to metric tons, and added to the sum of Total Production + Movements.

Assumed Operating Schedule.

Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

Table D-3. Drilling and Blasting Activity.

Activity	Phase 1	Phase 2
Blasts:		
Maximum Production (tonnes/year)[1]	9,100,000	--
Tonnes/Blast[1]	50,000	50,000
Blasts/Year[2]	182	--
Holes Drilled:		
Hole Depth (feet/hole)[1]	53	53
Tonnes/Foot Drilled[1]	17.4	17.4
Holes Drilled/Year[2]	9,868	--
Explosives Used:		
Powder Factor[1] (grams explosive/tonne blasted rock)	280	280
Tonnes Explosive/Year[1,3]	2,548	--
Tons Explosive/Year[4]	2,809	--
Area Shifted per Blast:		
Blast Pattern (holes)[1]	4	4
Average Blast Patterns/Blast[2]	13.55	--
Area Shifted per Pattern (ft^2)[1]	289	289
Area Shifted per Blast (ft^2)[2]	3,917	--

Notes:
1. Maximum production, blasting, explosives, blast pattern, and related data reflect maximum anticipated activity in during each of the project phases. Data provided by Lehigh Southwest Cement Company, July 2011.
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
Drilling:			
	Hours/Day	24	24
	Days/Week	6	6
	Weeks/Year	50	50
Blasting:			
	Weeks/Year	50	50
	Blasts/Week	3.6	0.0
	Blast Days/Week	5	5
	Max Blasts/Day	1	0
	Max Blasts/Hour	1	0

Table D-4. 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

Table D-4. 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)
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

Table D-5. Unpaved Roads (Data for Dust Entrainment from Unpaved Roads).

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

Summary.

	Phase 1		Phase 2		Totals-All Phases	
Project Phase/Detail	Miles/Year	Ave. Weight	Miles/Year	Ave. Weight	Miles/Year	Ave. Weight
North Quarry Operation						
100-ton Trucks	109,087		--		109,087	
150-ton Trucks	--		--		--	
In-Plant Vehicles	71,400		39,200		110,600	
Total - North Quarry	180,487		39,200		219,687	
Waste Rock Storage/Infill						
20-ton Trucks (Green Waste)	--		6,960		6,960	
40-ton Trucks	58,962		522		59,484	
100-ton Trucks	137,868		136,823		274,691	
150-ton Trucks	29,115		--		29,115	
In-Plant Vehicles	47,600		58,800		106,400	
Total - Waste Storage/Infill	273,545		203,105		476,650	
Fleet Totals						
20-ton Trucks (Green Waste)	--	25.0	6,960	25.0	6,960	25.0
40-ton Trucks	58,962	55.4	522	55.4	59,484	55.4
100-ton Trucks	246,955	125.2	136,823	125.2	383,778	125.2
150-ton Trucks	29,115	196.9	--	196.9	29,115	196.9
In-Plant Vehicles	119,000	3.0	98,000	3.0	217,000	3.0
Total/Composite	454,032	88.7	242,305	72.7	696,337	83.1

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

Table D-5. Unpaved Roads (Data for Dust Entrainment from Unpaved Roads).

Derivation of Average Vehicle Weights.

	40-ton Off-highway Truck[1]	100-ton Off-highway Truck[1]	150-ton Off-highway Truck[1]	20-ton On-highway Truck[2]	In-Plant Vehicles[3]
Nominal Rated Load (tons)	40.0	100.0	150.0	20.0	--
Normal Haul Weight (tons)[4]	35.0	90.0	142.0	20.0	--
Empty Weight (tons)	37.9	80.2	125.9	15.0	--
Full Weight (tons)	72.9	170.2	267.9	35.0	--
Average Weight	55.4	125.2	196.9	25.0	3.0

Notes:

1. Data for Off-highway Trucks from "Caterpillar Performance Handbook," No. 41 (January 2011):
   Caterpillar 740B Articulated Truck: operating weight (empty) of 75,824 pounds.
   Caterpillar 777F Construction/Mining Truck: operating machine weight of 160,360 pounds.
   Caterpillar 785D Construction/Mining Truck: operating machine weight of 251,812 pounds.
2. On-road mulched green waste transport trucks assumed to be 35 tons loaded and 15 tons unloaded (average weight of 25 tons).
3. 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.
4. Source for normal haul weights for off-highway quarry trucks: Lehigh Southwest Cement Company, January 2010.
5. Assumed Allocation of In-Plant Vehicle Mileage to Proposed Project Areas.

Project Area	Phase 1	Phase 2
Percent Allocation:		
North Quarry	60%	40%
Waste Rock Storage/Infill	40%	60%
Total Miles - allocated to:	119,000	98,000
North Quarry	71,400	39,200
Waste Rock Storage/Infill	47,600	58,800

Table D-6. Off-Highway Truck Trips and Miles Traveled (Data for Entrained Road Dust Calculations).

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

Summary.

	LS-Cement and LS-Aggregate		Waste Rock		Aggregate Fines	Topsoil EMSA/WMSA	Mulched Green Waste
Project Phase/Detail	100-ton Trucks[2,4]	150-ton Trucks[3,4]	100-ton Trucks	150-ton Trucks	40-ton Trucks[5]	40-ton Trucks[5]	20-ton Trucks
Truck Data							
Normal Haul Weight (Tons)[6]	90	142	90	142	35	35	20
Normal Haul Weight (Tonnes)[7]	81.6	128.8	81.6	128.8	31.8	31.8	18.1
Phase 1							
Throughput (Tonnes/Year)[8]	4,700,000	--	3,300,000	1,100,000	500,000	--	--
Trips/Year	57,598.0	--	40,441.2	8,540.4	15,723.3	--	--
Linear Feet/Trip (one-way)	5,000	5,000	9,000	9,000	9,900	--	--
Miles/Trip (round trip)	1.89	1.89	3.41	3.41	3.75	--	--
Miles/Year	109,087	--	137,868	29,115	58,962	--	--
Phase 2							
Throughput (Tonnes/Year)	--	--	2,250,000	--	--	36,000	19,051
Trips/Year	--	--	27,573.5	--	--	1,132.1	1,050.0
Linear Feet/Trip (one-way)	--	--	13,100	13,100	--	1,217	17,500
Miles/Trip (round trip)	--	--	4.96	4.96	--	0.46	6.63
Miles/Year	--	--	136,823	--	--	522	6,960

Notes:

1. Throughput and one-way trip length based on production and road length data provided by Lehigh Southwest Cement Company, July 2011.
2. 100-ton trucks are used to haul all of the limestone (LS-Cement and LS-Aggregate) during Phase 1 and 75% of the waste rock during Phase 1.
3. 150-ton trucks are used to haul none of the limestone and 25% of the waste rock during Phase 1.
4. During the peak years of Phase 2, it is assumed that 100-ton trucks will haul 25% of the total waste rock to be transported from the WMSA to the North Quarry, with 75% of the waste rock transported by an overland conveyor system. 150-ton trucks are not expected to be used during Phase 2.
5. 40-ton trucks are used to haul fines and topsoil.
6. Source of normal haul weight data for off-highway quarry trucks: Lehigh Southwest Cement Company, January 2010. Source of normal haul weight for mulched green waste trucks (on-highway trucks traveling on-site): Lehigh Southwest Cement Company, November 2011.
7. 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, or: 1.10232 short ton/metric ton.
8. Throuhput data for each phase is based on the year in which the maximum sum of production, soil, fines, and green waste transport occurs.

Table D-7. Wind Erosion Data - Unpaved Roads and Active Areas.

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

Mine Area	Phase 1	Phase 2
North Quarry:		
Unpaved Road Length (ft)	7,090	7,090
Average Unpaved Road Width (ft)	80	80
Unpaved Roads (acre)	13	13
Topsoil Removal (acre)	--	--
Operating Area (acre)	95	65
Backfill (acre)	--	--
Reclaimed (acre)	--	65
Total Active Areas (acre)	95	129
Waste Storage		
Unpaved Road Length (ft)	8,160	17,900
Unpaved Road Width (ft)	47	65
Unpaved Roads (acre)	9	27
Topsoil Removal (acre)	6	--
Operating Area (acre)	11	95
Reclaimed (acre)	14	95
Total Active Areas (acre)	31	190
Total Unpaved Roads (acres)	22	40
Total Active Areas (acres)	126	319

Notes:

1. Active unpaved road acreage based on project phasing maps provided by Lehigh Southwest Cement Company in February 2010 and July 2011. (See separate documentation on unpaved roads-wind erosion.) Conversion from square feet to acres assumes 43,560 square feet/acre.
2. Data on active areas based on active area data provided by Lehigh Southwest Cement Company, July 2011. Data for each phase is based on the year in which the maximum sum of all active areas occurs.

Table D-8. Unpaved Roads (Data for Wind Erosion from Unpaved Roads).

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

Permanente Quarry Unpaved Road Lengths[1].

Unpaved Road	Associated With	Ave. Road Width (feet)	Road Lengths (linear feet) Phase 1	Phase 2
Road Into North Quarry	North Quarry	80	3,450	3,450
Top of North Quarry to Primary Crusher	North Quarry	80	1,740	1,740
Road to Quarry Yard[2]	North Quarry	80	1,900	1,900
Primary Crusher to EMSA	Waste Rock	60	4,680	4,680
Rock Plant to EMSA Road	Waste Rock	30	3,480	3,480
WMSA to Top of North Quarry	Waste Rock	80	--	9,740
Total Unpaved Roads			15,250	24,990

Notes:

1. Unpaved road lengths and widths based on project phasing maps provided by Lehigh Southwest Cement Company in July 2011 and February 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. This portion of the Permanente Quarry unpaved road system is actively used during all phases, but is not otherwise allocated to another unpaved road segment.

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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

Table D-9. Wind Erosion Particulate Matter Emission Factors - Quarry, Waste Storage/Infill, Unpaved Roads.

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
		Max u^+ (m/s):	43.899		Sum:	802.213	g/m2*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. Used max daily gust speed from 2008 met data for u+. 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 was 98.2 mph at 09:00. 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 09:00 and 10:00 that imply the tower could have been serviced or repaired during that period. Therefore, for the purposes of this analysis, data for 7/15/2008 at 09:00 was invalidated, leaving a maximum wind gust of 16.6 mph at 14:00 for that day.

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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	1.646		1.646
1/4/2008	4	67.6	30.220	30.220	1.602	34.164		34.164
1/5/2008	5	33.9	15.155	15.155	0.803	0.000		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	0.029		0.029
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	0.000		0.000
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	0.000		0.000
1/26/2008	26	27.1	12.115	12.115	0.642	0.000		0.000
1/27/2008	27	55	24.587	24.587	1.303	11.727		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	0.000		0.000
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	0.000		0.000
2/3/2008	34	32.8	14.663	14.663	0.777	0.000		0.000
2/4/2008	35	27.6	12.338	12.338	0.654	0.000		0.000
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

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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	0.000		0.000
2/14/2008	45	29.9	13.366	13.366	0.708	0.000		0.000
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	0.000		0.000
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	0.000		0.000
2/24/2008	55	47.1	21.056	21.056	1.116	2.933		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	0.000		0.000
3/2/2008	62	30.7	13.724	13.724	0.727	0.000		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	131.694		131.694
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	0.000		0.000
3/16/2008	76	31.4	14.037	14.037	0.744	0.000		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

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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	0.000		0.000
3/30/2008	90	38.1	17.032	17.032	0.903	0.000		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	0.000		0.000
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	0.000		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

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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	44.931		44.931
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	0.000		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	0.000		0.000
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	0.000		0.000
5/21/2008	142	26.9	12.025	12.025	0.637	0.000		0.000
5/22/2008	143	36	16.093	16.093	0.853	0.000		0.000
5/23/2008	144	30.1	13.456	13.456	0.713	0.000		0.000
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	0.000		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	0.000		0.000
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	0.000		0.000
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

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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	0.000		0.000
10/11/2008	285	32.8	14.663	14.663	0.777	0.000		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	47.199		47.199
10/31/2008	305	36.5	16.317	16.317	0.865	0.000		0.000
11/1/2008	306	39.5	17.658	17.658	0.936	0.000		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	0.000		0.000
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

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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	0.000		0.000
11/9/2008	314	32.6	14.574	14.574	0.772	0.000		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	0.000		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	0.000		0.000
12/16/2008	351	22	9.835	9.835	0.521	0.000		0.000

Table D-10. Wind Erosion Particulate Matter Emission Factors - Topsoil Removal/Storage and Reclamation.

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	0.000		0.000
12/25/2008	360	40.8	18.239	18.239	0.967	0.000		0.000
12/26/2008	361	26.8	11.981	11.981	0.635	0.000		0.000
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
		Max u^+ (m/s):	43.899		Sum:	274.324	g/m2*yr	259.665
		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. Used max daily gust speed from 2008 met data for u+. 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 (overburden): 1.02 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 was 98.2 mph at 09:00. 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 09:00 and 10:00 that imply the tower could have been serviced or repaired during that period. Therefore, for the purposes of this analysis, data for 7/15/2008 at 09:00 was invalidated, leaving a maximum wind gust of 16.6 mph at 14:00 for that day.

Table D-11. Off-road Diesel Equipment Activity Data (Units: Annual Hours).

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

					Phase 1		Phase 2	
					Peak Year: 2013		Peak Year: 2023	
Category	Manufacturer	Model	Year	HP	Hours/Year	Hours/Day	Hours/Year	Hours/Day
Bore/Drill Rigs	Ingersoll Rand	DM45	2009	600	4,057	13.5	--	--
Crawler Tractors	Caterpillar	D11T	2009	850	--	--	4,155	13.9
	Caterpillar	D11T	2009	850	--	--	4,155	13.9
	Caterpillar	D11T	2009	850	--	--	4,155	13.9
	Caterpillar	D10R	1999	570	3,324	11.1	--	--
	Caterpillar	D10T	2005	580	3,324	11.1	--	--
	Caterpillar	D10T	2005	580	3,324	11.1	--	--
(with disc)	Caterpillar	D8T	2009	310	--	--	914	8.0
Excavators	Caterpillar	345D	2009	380	665	8.0	499	8.0
Graders	Caterpillar	16G	1995	275	1,953	6.5	1,267	4.2
	Caterpillar	16M	2009	297	1,953	6.5	1,267	4.2
Off-Highway Trucks								
150-ton Trucks	Caterpillar	785B	1993	1290	4,267	14.2	--	--
100-ton Trucks	Caterpillar	777C	1996	870	4,393	14.6	1,688	5.6
	Caterpillar	777D	2000	938	4,393	14.6	1,688	5.6
	Caterpillar	777D	2005	938	4,393	14.6	1,688	5.6
	Caterpillar	777D	2005	938	4,393	14.6	1,688	5.6
	Caterpillar	777D	2006	938	4,393	14.6	1,688	5.6
	Caterpillar	777F	2007	938	4,393	14.6	1,688	5.6
	Caterpillar	777F	2009	938	4,393	14.6	1,688	5.6
	Caterpillar	777F	2009	938	4,393	14.6	1,688	5.6
40-ton Trucks	Caterpillar	740	2003	415	1,929	6.4	83	8.0
	Caterpillar	740	2003	415	1,929	6.4	83	8.0
	Caterpillar	740	2003	415	1,929	6.4	83	8.0
Rubber Tired Dozers	Caterpillar	824C	1995	315	1,247	4.2	2,078	6.9
Rubber Tired Loaders	Caterpillar	992G	2005	800	2,670	8.9	1,800	6.0
	Caterpillar	992G	2006	800	2,670	8.9	1,800	6.0
	Caterpillar	992G	2007	800	2,670	8.9	1,800	6.0
	Caterpillar	988H	2009	501	1,102	3.7	416	8.0
Water Trucks	Caterpillar	773E	2003	671	2,493	8.3	1,558	5.2
	Caterpillar	773F	2009	703	2,493	8.3	1,558	5.2
Contractor Lowboy Truck	International	Paystar 5600	2009	360	--	--	--	--
Hydroseeder Truck	International	Paystar 5600	2009	360	--	--	83	8.0
Hydroseeder Pump	Finn	T330	2009	115	--	--	83	8.0
Portable Light Towers	Allmand	ML 695	2002	10.7	7,200	24.0	7,200	24.0
Total Hours:					86,344	293.6	48,537	218.3
Hp-Hour Weighted Hours/Day:						12.6		4.5
Total Thousand Hp-Hours:					60,984		31,885	

Notes:

1. Based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, August 2011.
2. Annual hours for each equipment item based on year during which peak total horsepower-hours occurs during each of the project phases. Daily hours for each equipment item calculated from annual hours assuming indicated operating schedule, except for equipment items with non-zero hours below 1,000 hours - which are assumed to operate 8 hours/day if active during the peak year.

Table D-12. Off-road Diesel Equipment Operating Hours (Units: Annual Hours).

					Phase 1									Phase 2				
Category	Manufacturer	Model	Year	HP	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Bore/Drill Rigs	Ingersoll Rand	DM45	2009	600	4,184	4,057	4,057	3,425	3,425	2,621	2,621	2,621	2,161	--	--	--	--	--
Crawler Tractors	Caterpillar	D11T	2009	850	--	--	--	--	--	--	--	--	--	4,155	4,155	4,155	4,155	4,155
	Caterpillar	D11T	2009	850	--	--	--	--	--	--	--	--	--	4,155	4,155	4,155	4,155	4,155
	Caterpillar	D11T	2009	850	--	--	--	--	--	--	--	--	--	4,155	4,155	4,155	4,155	4,155
	Caterpillar	D10R	1999	570	3,324	3,324	3,324	3,047	3,047	2,521	2,493	2,493	2,493	--	--	--	--	--
	Caterpillar	D10T	2005	580	3,324	3,324	3,324	3,047	3,047	2,521	2,493	2,493	2,493	--	--	--	--	--
	Caterpillar	D10T	2005	580	3,324	3,324	3,324	3,047	3,047	2,521	2,493	2,493	2,493	--	--	--	--	--
	Caterpillar	D8T	2009	310	--	--	--	27	--	55	--	100	--	42	--	914	997	1,163
Excavators	Caterpillar	345D	2009	380	665	665	665	831	665	416	332	515	332	457	391	499	391	391
Graders	Caterpillar	16G	1995	275	1,953	1,953	2,078	2,119	2,078	1,704	1,662	1,691	1,662	1,309	1,267	1,267	1,330	1,288
	Caterpillar	16M	2009	297	1,953	1,953	2,078	2,119	2,078	1,704	1,662	1,691	1,662	1,309	1,267	1,267	1,330	1,288
Off-Highway Trucks																		
150-ton Trucks	Caterpillar	785B	1993	1290	3,793	4,267	3,556	2,845	2,134	862	948	1,109	--	--	--	--	--	--
100-ton Trucks	Caterpillar	777C	1996	870	3,928	4,393	3,937	3,682	3,093	2,454	2,777	3,187	3,228	1,688	1,688	1,688	1,125	1,000
	Caterpillar	777D	2000	938	3,928	4,393	3,937	3,682	3,093	2,454	2,777	3,187	3,228	1,688	1,688	1,688	1,125	1,000
	Caterpillar	777D	2005	938	3,928	4,393	3,937	3,682	3,093	2,454	2,777	3,187	3,228	1,688	1,688	1,688	1,125	1,000
	Caterpillar	777D	2005	938	3,928	4,393	3,937	3,682	3,093	2,454	2,777	3,187	3,228	1,688	1,688	1,688	1,125	1,000
	Caterpillar	777D	2006	938	3,928	4,393	3,937	3,682	3,093	2,454	2,777	3,187	3,228	1,688	1,688	1,688	1,125	1,000
	Caterpillar	777F	2007	938	3,928	4,393	3,937	3,682	3,093	2,454	2,777	3,187	3,228	1,688	1,688	1,688	1,125	1,000
	Caterpillar	777F	2009	938	3,928	4,393	3,937	3,682	3,093	2,454	2,777	3,187	3,228	1,688	1,688	1,688	1,125	1,000
	Caterpillar	777F	2009	938	3,928	4,393	3,937	3,682	3,093	2,454	2,777	3,187	3,228	1,688	1,688	1,688	1,125	1,000
40-ton Trucks	Caterpillar	740	2003	415	1,929	1,929	2,182	2,401	2,695	2,248	1,761	1,436	1,393	332	111	83	55	139
	Caterpillar	740	2003	415	1,929	1,929	2,182	2,401	2,695	2,248	1,761	1,436	1,393	332	111	83	55	139
	Caterpillar	740	2003	415	1,929	1,929	2,182	2,401	2,695	2,248	1,761	1,436	1,393	332	111	83	55	139
Rubber Tired Dozers	Caterpillar	824C	1995	315	1,247	1,247	1,247	1,330	1,247	1,330	1,662	1,704	1,662	1,787	2,078	2,078	4,155	3,740
Rubber Tired Loaders	Caterpillar	992G	2005	800	2,733	2,670	2,670	2,354	2,354	1,951	1,951	1,990	1,722	1,800	1,800	1,800	1,800	1,600
	Caterpillar	992G	2006	800	2,733	2,670	2,670	2,354	2,354	1,951	1,951	1,990	1,722	1,800	1,800	1,800	1,800	1,600
	Caterpillar	992G	2007	800	2,733	2,670	2,670	2,354	2,354	1,951	1,951	1,990	1,722	1,800	1,800	1,800	1,800	1,600
	Caterpillar	988H	2009	501	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	416	416	416	416	416
Water Trucks	Caterpillar	773E	2003	671	2,493	2,493	2,493	2,348	2,285	1,911	1,870	1,920	1,870	1,517	1,558	1,558	1,974	1,766
	Caterpillar	773F	2009	703	2,493	2,493	2,493	2,348	2,285	1,911	1,870	1,920	1,870	1,517	1,558	1,558	1,974	1,766
Contractor Lowboy Truck	International	Paystar 5600	2009	360	5	--	--	--	--	--	--	23	--	--	--	--	--	--
Hydroseeder Truck	International	Paystar 5600	2009	360	--	--	--	27	--	55	--	17	--	42	--	83	166	332
Hydroseeder Pump	Finn	T330	2009	115	--	--	--	27	--	55	--	17	--	42	--	83	166	332
Portable Light Towers	Allmand	ML 695	2002	10.7	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200
Total Hours:					82,471	86,344	82,991	78,609	73,524	60,716	61,759	64,883	62,169	47,997	47,432	48,537	47,128	45,362
Total Thousand Hp-Hours:					57,144	60,984	57,060	52,837	47,681	37,625	39,431	42,594	40,278	31,764	31,555	31,885	28,953	27,337

Notes:

1. Based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, August 2011.
2. Portable light towers are assumed to operate an average of 12 hours each operating day during Phases 1 and 2 (assumed 3 shifts/day).
3. Equipment required to be purchased or contracted in the future are conservatively assumed to be used 2009 model year equipment.
4. Even though the Contractor Lowboy Truck and Hydroseeder Truck are on-road heavy duty trucks, for calculation purposes they are conservatively assumed to be off-road trucks.
5. Assumed efficiency (Operating Hours/Scheduled Hours) for equipment other than drill rigs, contractor lowboy truck, and portable light stands:
   83.1%

Table D-13. Portable Internal Combustion Equipment.

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

Summary.

	Load	Phase 1		Phase 2	
Equipment Type	Factor[1]	Avg HP	Hrs/Yr	Avg HP	Hrs/Yr
Diesel Welders	45%	50	305	50	286

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 2000-2010 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 50 HP is assumed, and all welders are assumed to be diesel.
3. Average operating hours/year based on welding activity associated with quarry operations for 2000-2010 baseline period, scaled to reflect the ratio between maximum 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

Table D-14. On-road Vehicle Activity.

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

Summary.

		Phase 1		Phase 2	
Trip Type	Vehicle Type	Number of Vehicles	Miles/ Year	Number of Vehicles	Miles/ Year
Employee Commute	Passenger	49	123,628	38	95,875
In-plant Vehicles	MDV[1]	17	119,000	14	98,000
Fuel Transport	HDDT[2]	--	6,961	--	1,822
Green Waste Transport (On-Site)	HDDT	--	--	--	6,960
Green Waste Transport (Off-Site)	HDDT	--	--	--	94,500
Total			249,589		297,158

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	4	38	7	49	1	250	5.046	123,628
2	3	32	3	38	1	250	5.046	95,875

Notes:
1. Maximum employee count based on information provided by Lehigh Southwest Cement Company, August 2011.
2. It is assumed that the vehicle occupancy is 1 employee/vehicle and that each employee works an average of 250 days/year.
3. The initial year for operation of the proposed project is assumed to be 2012. As a worst-case assumption for operation of on-road motor vehicles, 2012 is used as the basis for calculating emissions for the proposed project. The one-way trip distance is from EMFAC2007 emissions inventory data for Santa Clara County (2012 data). Total miles/year are based on two-way trips.

In-Plant Vehicles.

	In-Plant	Ann. Miles/	Miles/	Gasoline Consumption	
Project Phase	Vehicles[1]	Vehicle[2]	Year	(Miles/Gal)[3]	(Gal/Year)
1	17	7,000	119,000	15	7,933
2	14	7,000	98,000	15	6,533

Table D-14. On-road Vehicle Activity.

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 2000-2010, with 24 in-plant vehicles for 60 employees.
2. Annual miles traveled per vehicles related to quarry operations. For the 2000-2010 period, the average quarry use per in-plant vehicle was calculated to be 6,600 miles/vehicle. For activities related to the proposed project, this is estimated to be 7,000 miles/vehicle.
3. 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, 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 assumed.

Fuel Transport.

Project Phase	Gasoline Use(Gal)[1]	Diesel Use(Gal)[2]	Total Fuel Use (Gal)	Fuel Capacity (Gal)[3]	Vehicles Trips/Year	Trip Distance (Mi.)[4]	Miles/Year[4]
1	7,933	2,080,248	2,088,182	6,000	348	10	6,961
2	6,533	540,188	546,721	6,000	91	10	1,822

Notes:
1. Gasoline use derived from the above information, based on estimated in-plant vehicle use, mileage accruals, and fuel economy.
2. Diesel throughput based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, August 2011.
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.

Mulched Green Waste Transport.

Project Phase	Truck Trips	On-Site Transport Miles/Trip	On-Site Transport Total Miles	Off-Site Transport Miles/Trip	Off-Site Transport Total Miles	Total Miles
1	--	--	--	--	--	--
2	1,050	6.63	6,960	90.00	94,500	101,460

Notes:
1. Mulched green waste truck trips and on-site trip mileage (round trip) derived previously in Table D-6.
2. Mulched green waste truck off-site trip mileage of 90 miles (round trip) assumes the green waste supplier is located 45 miles from the quarry.

Table D-15. Fuel Storage & Dispensing.

Operating Schedule	Phase 1	Phase 2
Hours/Day	24	24
Days/Week	6	6
Weeks/Year	50	50

Fuel Throughput (gallons/year).

	Phase 1 (Gallons/Year)	Phase 2 (Gallons/Year)
Diesel[1]	2,080,248	540,188
Gasoline[2]	7,933	6,533

Notes:

1. Diesel throughputs based on scheduling information and equipment specifications provided by Lehigh Southwest Cement Company, August 2011.
2. Gasoline throughputs based on estimated in-plant vehicle use, mileage accruals, and fuel economy for the proposed project.

Appendix E

Permanente Creek Reclamation Area Emission Calculations

Permanente Creek Reclamation Area Emission Calculations.

Table E-1. Permanente Creek Reclamation Area - Total Criteria Pollutant Emissions (tons).

Project Phase	Emission Source Category	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Phase 1	Bulldozing, Scraping & Grading	0.00	0.00	--	--	--	--
Subareas	Material Handling	0.01	0.00	--	--	--	--
3, 4, 5, 6, & 7	Unpaved Road Dust Entrainment	0.02	0.00	--	--	--	--
(2012)	Wind Erosion - Disturbed Areas	0.05	0.01	--	--	--	--
	Off-Road Diesel Equipment	0.01	0.01	0.04	0.15	0.01	0.00
	Subtotal - Phase 1	0.08	0.02	0.04	0.15	0.01	0.00
Phase 2	Bulldozing, Scraping & Grading	0.00	0.00	--	--	--	--
Subareas	Material Handling	0.00	0.00	--	--	--	--
1 & 2	Unpaved Road Dust Entrainment	0.02	0.00	--	--	--	--
(2025)	Wind Erosion - Disturbed Areas	0.05	0.01	--	--	--	--
	Off-Road Diesel Equipment	0.00	0.00	0.03	0.10	0.01	0.00
	Subtotal - Phase 2	0.07	0.01	0.03	0.10	0.01	0.00

Table E-2. Permanente Creek Reclamation Area - Daily Criteria Pollutant Emissions (pounds/day).

Project Phase	Emission Source Category	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Phase 1	Bulldozing, Scraping & Grading	0.99	0.15	--	--	--	--
Subareas	Material Handling	3.88	0.58	--	--	--	--
3, 4, 5, 6, & 7	Unpaved Road Dust Entrainment	6.99	0.70	--	--	--	--
(2012)	Wind Erosion - Disturbed Areas	20.83	3.13	--	--	--	--
	Off-Road Diesel Equipment	1.61	1.48	10.87	48.27	2.68	0.05
	Subtotal - Phase 1	34.30	6.04	10.87	48.27	2.68	0.05
Phase 2	Bulldozing, Scraping & Grading	0.99	0.15	--	--	--	--
Subareas	Material Handling	1.23	0.18	--	--	--	--
1 & 2	Unpaved Road Dust Entrainment	11.06	1.11	--	--	--	--
(2025)	Wind Erosion - Disturbed Areas	28.29	4.24	--	--	--	--
	Off-Road Diesel Equipment	2.23	2.06	14.64	58.41	4.06	0.06
	Subtotal - Phase 2	43.80	7.74	14.64	58.41	4.06	0.06

Table E-3. Permanente Creek Reclamation Area - Total Toxic Air Contaminant Emissions (pounds).

Project Phase	Emission Source Category	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Phase 1	Bulldozing, Scraping & Grading	--	4.97E-06	2.49E-06	1.55E-03	1.49E-06	2.49E-06	4.77E-05	1.27E-05	2.78E-05	2.59E-06	3.98E-07	4.97E-06	4.58E-05	4.97E-06	2.59E-06	2.59E-06	3.78E-05	4.97E-05	1.99E-07	7.39E-03
Subareas	Material Handling	--	4.61E-05	2.30E-05	1.44E-02	1.38E-05	2.30E-05	4.42E-04	1.18E-04	2.58E-04	2.40E-05	3.69E-06	4.61E-05	4.24E-04	4.61E-05	2.40E-05	2.40E-05	3.50E-04	4.61E-04	1.84E-06	6.84E-02
3, 4, 5, 6, & 7	Unpaved Road Dust Entrainment	--	8.30E-05	4.15E-05	3.32E-02	2.49E-05	4.15E-05	1.36E-03	3.25E-04	8.30E-04	7.63E-05	4.65E-06	8.30E-05	1.79E-03	8.30E-05	4.15E-05	4.15E-05	2.75E-03	1.13E-03	6.31E-05	2.36E-01
(2012)	Wind Erosion - Disturbed Areas	--	2.62E-04	1.31E-04	8.18E-02	7.87E-05	1.31E-04	2.52E-03	6.71E-04	1.47E-03	1.36E-04	2.10E-05	2.62E-04	2.41E-03	2.62E-04	1.36E-04	1.36E-04	1.99E-03	2.62E-03	1.05E-05	3.89E-01
	Off-Road Diesel Equipment	10.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Phase 1	10.70	3.96E-04	1.98E-04	1.31E-01	1.19E-04	1.98E-04	4.37E-03	1.13E-03	2.58E-03	2.39E-04	2.97E-05	3.96E-04	4.67E-03	3.96E-04	2.04E-04	2.04E-04	5.14E-03	4.26E-03	7.56E-05	7.01E-01
Phase 2	Bulldozing, Scraping & Grading	--	9.95E-06	4.97E-06	3.10E-03	2.98E-06	4.97E-06	9.55E-05	2.55E-05	5.57E-05	5.17E-06	7.96E-07	9.95E-06	9.15E-05	9.95E-06	5.17E-06	5.17E-06	7.56E-05	9.95E-05	3.98E-07	1.48E-02
Subareas	Material Handling	--	9.22E-06	4.61E-06	2.88E-03	2.76E-06	4.61E-06	8.85E-05	2.36E-05	5.16E-05	4.79E-06	7.37E-07	9.22E-06	8.48E-05	9.22E-06	4.79E-06	4.79E-06	7.00E-05	9.22E-05	3.69E-07	1.37E-02
1 & 2	Unpaved Road Dust Entrainment	--	8.30E-05	4.15E-05	3.32E-02	2.49E-05	4.15E-05	1.36E-03	3.25E-04	8.30E-04	7.63E-05	4.65E-06	8.30E-05	1.79E-03	8.30E-05	4.15E-05	4.15E-05	2.75E-03	1.13E-03	6.31E-05	2.36E-01
(2025)	Wind Erosion - Disturbed Areas	--	2.28E-04	1.14E-04	7.13E-02	6.85E-05	1.14E-04	2.19E-03	5.85E-04	1.28E-03	1.19E-04	1.83E-05	2.28E-04	2.10E-03	2.28E-04	1.19E-04	1.19E-04	1.74E-03	2.28E-03	9.14E-06	3.39E-01
	Off-Road Diesel Equipment	7.77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Phase 2	7.77	3.31E-04	1.65E-04	1.10E-01	9.92E-05	1.65E-04	3.74E-03	9.59E-04	2.22E-03	2.05E-04	2.45E-05	3.31E-04	4.07E-03	3.31E-04	1.70E-04	1.70E-04	4.64E-03	3.60E-03	7.30E-05	6.03E-01

Table E-4. Permanente Creek Reclamation Area - Hourly Toxic Air Contaminant Emissions (pounds/hour).

Project Phase	Emission Source Category	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Phase 1	Bulldozing, Scraping & Grading	--	3.11E-07	1.55E-07	9.70E-05	9.32E-08	1.55E-07	2.98E-06	7.96E-07	1.74E-06	1.55E-07	2.49E-08	3.11E-07	2.86E-06	3.11E-07	1.55E-07	1.55E-07	2.36E-06	3.11E-06	1.24E-08	4.62E-04
Subareas	Material Handling	--	1.21E-06	6.06E-07	3.78E-04	3.64E-07	6.06E-07	1.16E-05	3.10E-06	6.79E-06	6.06E-07	9.70E-08	1.21E-06	1.12E-05	1.21E-06	6.06E-07	6.06E-07	9.22E-06	1.21E-05	4.85E-08	1.80E-03
3, 4, 5, 6, & 7	Unpaved Road Dust Entrainment	--	2.18E-06	1.09E-06	8.73E-04	6.55E-07	1.09E-06	3.58E-05	8.56E-06	2.18E-05	2.01E-06	1.22E-07	2.18E-06	4.72E-05	2.18E-06	1.09E-06	1.09E-06	7.25E-05	2.97E-05	1.66E-06	6.20E-03
(2012)	Wind Erosion - Disturbed Areas	--	6.51E-06	3.26E-06	2.03E-03	1.95E-06	3.26E-06	6.25E-05	1.67E-05	3.65E-05	3.26E-06	5.21E-07	6.51E-06	5.99E-05	6.51E-06	3.26E-06	3.26E-06	4.95E-05	6.51E-05	2.60E-07	9.67E-03
	Off-Road Diesel Equipment	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Phase 1	0.20	1.02E-05	5.11E-06	3.38E-03	3.07E-06	5.11E-06	1.13E-04	2.91E-05	6.68E-05	6.03E-06	7.65E-07	1.02E-05	1.21E-04	1.02E-05	5.11E-06	5.11E-06	1.34E-04	1.10E-04	1.98E-06	1.81E-02
Phase 2	Bulldozing, Scraping & Grading	--	3.11E-07	1.55E-07	9.70E-05	9.32E-08	1.55E-07	2.98E-06	7.96E-07	1.74E-06	1.55E-07	2.49E-08	3.11E-07	2.86E-06	3.11E-07	1.55E-07	1.55E-07	2.36E-06	3.11E-06	1.24E-08	4.62E-04
Subareas	Material Handling	--	3.84E-07	1.92E-07	1.20E-04	1.15E-07	1.92E-07	3.69E-06	9.83E-07	2.15E-06	1.92E-07	3.07E-08	3.84E-07	3.53E-06	3.84E-07	1.92E-07	1.92E-07	2.92E-06	3.84E-06	1.54E-08	5.70E-04
1 & 2	Unpaved Road Dust Entrainment	--	3.46E-06	1.73E-06	1.38E-03	1.04E-06	1.73E-06	5.67E-05	1.36E-05	3.46E-05	3.18E-06	1.94E-07	3.46E-06	7.47E-05	3.46E-06	1.73E-06	1.73E-06	1.15E-04	4.70E-05	2.63E-06	9.82E-03
(2025)	Wind Erosion - Disturbed Areas	--	8.84E-06	4.42E-06	2.76E-03	2.65E-06	4.42E-06	8.49E-05	2.26E-05	4.95E-05	4.42E-06	7.07E-07	8.84E-06	8.13E-05	8.84E-06	4.42E-06	4.42E-06	6.72E-05	8.84E-05	3.54E-07	1.31E-02
	Off-Road Diesel Equipment	0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal - Phase 2	0.28	1.30E-05	6.50E-06	4.36E-03	3.90E-06	6.50E-06	1.48E-04	3.80E-05	8.80E-05	7.95E-06	9.56E-07	1.30E-05	1.62E-04	1.30E-05	6.50E-06	6.50E-06	1.87E-04	1.42E-04	3.01E-06	2.40E-02

Table E-5. Permanente Creek Reclamation Area - Greenhouse Gas Emissions (metric tons).

Project Phase	Emission Source Category	CO_2	CH_4	N_2O	CO_2e
Phase 1	Bulldozing, Scraping & Grading	--	--	--	--
Subareas	Material Handling	--	--	--	--
3, 4, 5, 6, & 7	Unpaved Road Dust Entrainment	--	--	--	--
(2012)	Wind Erosion - Disturbed Areas	--	--	--	--
	Off-Road Diesel Equipment	16.56	0.00	0.00	16.70
	Subtotal - Phase 1	16.56	0.00	0.00	16.70
Phase 2	Bulldozing, Scraping & Grading	--	--	--	--
Subareas	Material Handling	--	--	--	--
1 & 2	Unpaved Road Dust Entrainment	--	--	--	--
(2025)	Wind Erosion - Disturbed Areas	--	--	--	--
	Off-Road Diesel Equipment	10.53	0.00	0.00	10.62
	Subtotal - Phase 2	10.53	0.00	0.00	10.62

Table E-6. Identification of Peak Activity by Project Phase for Proposed Project.

Category	Annual Activity Indicator	Project Component	Phase 1									Phase 2				
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Bulldozing, Scraping, and Grading	Hours per Year	Proposed Project	15,124	15,124	15,374	14,736	14,543	12,354	12,465	12,664	12,465	16,911	17,077	17,991	20,276	19,944
		Permanente Creek	16	--	--	--	--	--	--	--	--	--	--	--	--	32
		Reclamation Area														
		Total:	15,140	15,124	15,374	14,736	14,543	12,354	12,465	12,664	12,465	16,911	17,077	17,991	20,276	19,976
Material Handling	Total Production + Topsoil Movements (Tonnes per Year)	Proposed Project	9,600,000	9,325,000	9,325,000	8,000,000	7,950,000	6,218,000	6,200,000	6,210,000	5,200,000	9,046,000	9,017,000	9,055,051	9,034,051	9,034,051
		Permanente Creek	8,000	--	--	--	--	--	--	--	--	--	--	--	--	1,600
		Reclamation Area														
		Total:	9,608,000	9,325,000	9,325,000	8,000,000	7,950,000	6,218,000	6,200,000	6,210,000	5,200,000	9,046,000	9,017,000	9,055,051	9,034,051	9,035,651
Unpaved Road Dust Entrainment	Total Miles per Year Associated With Haul Truck Transport	Proposed Project	335,032	331,237	290,080	309,610	270,080	200,621	210,636	228,181	222,590	137,490	111,234	94,459	77,647	37,435
		Permanente Creek	76	--	--	--	--	--	--	--	--	--	--	--	--	76
		Reclamation Area														
		Total:	335,108	331,237	290,080	309,610	270,080	200,621	210,636	228,181	222,590	137,490	111,234	94,459	77,647	37,511
Wind Erosion - Disturbed Areas	Topsoil Removal, Operating, Backfill, and Reclaimed Areas (Acres/Year)	Proposed Project	114	118	114	126	111	119	101	119	101	96	237	255	316	319
		Permanente Creek	0.03	--	--	--	--	--	--	--	--	--	--	--	--	0.03
		Reclamation Area														
		Total:	114	118	114	126	111	119	101	119	101	96	237	255	316	319
Off-Road Diesel Equipment	Thousand Hp-Hours per Year	Proposed Project	57,144	60,984	57,060	52,837	47,681	37,625	39,431	42,594	40,278	31,764	31,555	31,885	28,953	27,337
		Permanente Creek	61	--	--	--	--	--	--	--	--					34
		Reclamation Area														
		Total:	57,205	60,984	57,060	52,837	47,681	37,625	39,431	42,594	40,278	31,764	31,555	31,885	28,953	27,371

Notes:

1. Data for each year derived from applicable source data as documented in Appendices D and E, *Air Quality Technical Analysis*, except as noted below.
2. Unpaved road dust entrainment mileage is calculated based on quarry production, waste rock (less that transported by conveyor), aggregate fines, and topsoil tranported each year, multiplied by the corresponding trip length for each year (based on expected trip origin and destination). Trip length data provided by Lehigh Southwest Cement Company, July 2011.
3. Distrubed acres/year is based on quarry operating and reclaimed areas and waste rock operating, reclaimed, and topsoil removal areas for each year provided by Lehigh Southwest Cement Company, July 2011. Disturbed areas associated with unpaved roads is not assumed to vary each year within each project phase, and is therefore not reflected in the above table.
4. Disturbed area wind erosion from Permanente Creek Reclamation Area activities is expected to occur on only seven days in Phase 1 (Subareas 3 and 5) and seven days in Phase 2 (Subareas 1 and 2). Since disturbed areas are expressed in acres/year for the proposed RPA, Permanente Creek Reclamation Area disturbance activity is converted to average annual acres disturbed per year by multiplying average daily disturbed areas by 7 days and dividing by 365 days per year.

Table E-7. Permanente Creek Reclamation Area - Bulldozing, Scraping & Grading.

Project Phase	Emission Factor Reference	Emission Factors		Activity		Control Efficiency	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$				(tons/yr)	(lb/day)	(lb/hr)	(tons/yr)	(lb/day)	(lb/hr)
1	MDAQMD Guidance, Sec. VI.D	1.24E-01 lb/hr	1.86E-02 lb/hr	16 hours/year	8 hours/day	0%	0.00	0.99	0.12	0.00	0.15	0.02
2				32 hours/year	8 hours/day		0.00	0.99	0.12	0.00	0.15	0.02

Notes:
1. Activity based on Assumed Activity Data (documented separately).
2. Assumed Control: None
3. Conversion factors:
   2,000 lb = 1 ton
   8 hours/day

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).

Table E-8. Permanente Creek Reclamation Area - Material Handling.

Project Phase	Emission Factor Reference	Emission Factors		Process Rates			Transfer Points	Control Efficiency	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$	Tons/Year	Tons/Day	Tons/Hour			(tons/yr)	(lb/day)	(lb/hr)	(tons/yr)	(lb/day)	(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	8,000 tons	1,684 tons	211 tons	2	0%	0.01	3.88	0.49	0.00	0.58	0.07
2				1,600 tons	533 tons	67 tons	2		0.00	1.23	0.15	0.00	0.18	0.02

Notes:
1. Activity based on Assumed Activity Data (documented separately).
2. Assumed Control: None
3. 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*

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

Table E-9. Permanente Creek Reclamation Area - Unpaved Road Dust Entrainment.

Project Phase	Emission Factor Reference	Emission Factors		Activity			Control Efficiency	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$	Miles/Year	Miles/Day	Miles/Hour		(tons/yr)	(lb/day)	(lb/hr)	(tons/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.2, Eqn 1a	1.75E+00 lb/mile	1.75E-01 lb/mile	76 miles	16 miles	2 miles	75%	0.02	6.99	0.87	0.00	0.70	0.09
2				76 miles	25 miles	3 miles		0.02	11.06	1.38	0.00	1.11	0.14

Notes:

1. Activity based on Assumed Activity Data (documented separately).
2. Assumed Control: 75% control associated with watering of unpaved roads.
3. 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 - Entire Facility (see App. D, *Air Quality Technical Analysis*)	W	83.7	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*

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

Table E-10. Permanente Creek Reclamation Area - Wind Erosion.

Project Phase	Emission Factor Reference	Emission Factors		Disturbed Area			Control Efficiency	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$	Ave. Acres	Total Days	Max. Acres		(tons/yr)	(lb/day)	(lb/hr)	(tons/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	1.5 acres	7 days	2.1 acres	0%	0.05	20.83	2.60	0.01	3.13	0.39
2				1.3 acres	7 days	2.9 acres		0.05	28.29	3.54	0.01	4.24	0.53

Notes:

1. Activity based on Assumed Activity Data (documented separately).
2. Annual wind erosion emissions are based on acres disturbed over a one-year period. Therefore, average disturbed acres (for each phase) are multiplied by total days of area disturbance (for each phase) and divided by 365 days per year to calculate annual emissions. Daily and hourly emissions are based on the maximum acreage disturbed in a single day.
3. Assumed Control: None
4. Conversion factors:
   2,000 lb = 1 ton
   8 hours/day
   365 days/year

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*	*$g/(m^2$-yr)*

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

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

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

Table E-11. Permanente Creek Reclamation Area - Toxic Air Contaminants.

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	1.3	0.2	2.5	23	2.5	1.3	1.3	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
Project Phase	Component	PM_{10} (tons/year)	Toxic Air Contaminant Emissions (pounds)																		
1	Bulldozing, Scraping, and Grading	0.00	4.97E-06	2.49E-06	1.55E-03	1.49E-06	2.49E-06	4.77E-05	1.27E-05	2.78E-05	2.59E-06	3.98E-07	4.97E-06	4.58E-05	4.97E-06	2.59E-06	2.59E-06	3.78E-05	4.97E-05	1.99E-07	7.39E-03
	Material Handling	0.01	4.61E-05	2.30E-05	1.44E-02	1.38E-05	2.30E-05	4.42E-04	1.18E-04	2.58E-04	2.40E-05	3.69E-06	4.61E-05	4.24E-04	4.61E-05	2.40E-05	2.40E-05	3.50E-04	4.61E-04	1.84E-06	6.84E-02
	Unpaved Road Dust Entrainment	0.02	8.30E-05	4.15E-05	3.32E-02	2.49E-05	4.15E-05	1.36E-03	3.25E-04	8.30E-04	7.63E-05	4.65E-06	8.30E-05	1.79E-03	8.30E-05	4.15E-05	4.15E-05	2.75E-03	1.13E-03	6.31E-05	2.36E-01
	Wind Erosion-Disturbed Areas	0.05	2.62E-04	1.31E-04	8.18E-02	7.87E-05	1.31E-04	2.52E-03	6.71E-04	1.47E-03	1.36E-04	2.10E-05	2.62E-04	2.41E-03	2.62E-04	1.36E-04	1.36E-04	1.99E-03	2.62E-03	1.05E-05	3.89E-01
	Total - Phase 1	0.08	3.96E-04	1.98E-04	1.31E-01	1.19E-04	1.98E-04	4.37E-03	1.13E-03	2.58E-03	2.39E-04	2.97E-05	3.96E-04	4.67E-03	3.96E-04	2.04E-04	2.04E-04	5.14E-03	4.26E-03	7.56E-05	7.01E-01
2	Bulldozing, Scraping, and Grading	0.00	9.95E-06	4.97E-06	3.10E-03	2.98E-06	4.97E-06	9.55E-05	2.55E-05	5.57E-05	5.17E-06	7.96E-07	9.95E-06	9.15E-05	9.95E-06	5.17E-06	5.17E-06	7.56E-05	9.95E-05	3.98E-07	1.48E-02
	Material Handling	0.00	9.22E-06	4.61E-06	2.88E-03	2.76E-06	4.61E-06	8.85E-05	2.36E-05	5.16E-05	4.79E-06	7.37E-07	9.22E-06	8.48E-05	9.22E-06	4.79E-06	4.79E-06	7.00E-05	9.22E-05	3.69E-07	1.37E-02
	Unpaved Road Dust Entrainment	0.02	8.30E-05	4.15E-05	3.32E-02	2.49E-05	4.15E-05	1.36E-03	3.25E-04	8.30E-04	7.63E-05	4.65E-06	8.30E-05	1.79E-03	8.30E-05	4.15E-05	4.15E-05	2.75E-03	1.13E-03	6.31E-05	2.36E-01
	Wind Erosion-Disturbed Areas	0.05	2.28E-04	1.14E-04	7.13E-02	6.85E-05	1.14E-04	2.19E-03	5.85E-04	1.28E-03	1.19E-04	1.83E-05	2.28E-04	2.10E-03	2.28E-04	1.19E-04	1.19E-04	1.74E-03	2.28E-03	9.14E-06	3.39E-01
	Total - Phase 2	0.07	3.31E-04	1.65E-04	1.10E-01	9.92E-05	1.65E-04	3.74E-03	9.59E-04	2.22E-03	2.05E-04	2.45E-05	3.31E-04	4.07E-03	3.31E-04	1.70E-04	1.70E-04	4.64E-03	3.60E-03	7.30E-05	6.03E-01

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
Project Phase	Component	Hourly PM_{10} (pounds/hr)	Hourly Toxic Air Contaminant Emissions (pounds/hour)																		
1	Bulldozing, Scraping, and Grading	0.12	3.11E-07	1.55E-07	9.70E-05	9.32E-08	1.55E-07	2.98E-06	7.96E-07	1.74E-06	1.55E-07	2.49E-08	3.11E-07	2.86E-06	3.11E-07	1.55E-07	1.55E-07	2.36E-06	3.11E-06	1.24E-08	4.62E-04
	Material Handling	0.49	1.21E-06	6.06E-07	3.78E-04	3.64E-07	6.06E-07	1.16E-05	3.10E-06	6.79E-06	6.06E-07	9.70E-08	1.21E-06	1.12E-05	1.21E-06	6.06E-07	6.06E-07	9.22E-06	1.21E-05	4.85E-08	1.80E-03
	Unpaved Road Dust Entrainment	0.87	2.18E-06	1.09E-06	8.73E-04	6.55E-07	1.09E-06	3.58E-05	8.56E-06	2.18E-05	2.01E-06	1.22E-07	2.18E-06	4.72E-05	2.18E-06	1.09E-06	1.09E-06	7.25E-05	2.97E-05	1.66E-06	6.20E-03
	Wind Erosion-Disturbed Areas	2.60	6.51E-06	3.26E-06	2.03E-03	1.95E-06	3.26E-06	6.25E-05	1.67E-05	3.65E-05	3.26E-06	5.21E-07	6.51E-06	5.99E-05	6.51E-06	3.26E-06	3.26E-06	4.95E-05	6.51E-05	2.60E-07	9.67E-03
	Total - Phase 1	4.09	1.02E-05	5.11E-06	3.38E-03	3.07E-06	5.11E-06	1.13E-04	2.91E-05	6.68E-05	6.03E-06	7.65E-07	1.02E-05	1.21E-04	1.02E-05	5.11E-06	5.11E-06	1.34E-04	1.10E-04	1.98E-06	1.81E-02
2	Bulldozing, Scraping, and Grading	0.12	3.11E-07	1.55E-07	9.70E-05	9.32E-08	1.55E-07	2.98E-06	7.96E-07	1.74E-06	1.55E-07	2.49E-08	3.11E-07	2.86E-06	3.11E-07	1.55E-07	1.55E-07	2.36E-06	3.11E-06	1.24E-08	4.62E-04
	Material Handling	0.15	3.84E-07	1.92E-07	1.20E-04	1.15E-07	1.92E-07	3.69E-06	9.83E-07	2.15E-06	1.92E-07	3.07E-08	3.84E-07	3.53E-06	3.84E-07	1.92E-07	1.92E-07	2.92E-06	3.84E-06	1.54E-08	5.70E-04
	Unpaved Road Dust Entrainment	1.38	3.46E-06	1.73E-06	1.38E-03	1.04E-06	1.73E-06	5.67E-05	1.36E-05	3.46E-05	3.18E-06	1.94E-07	3.46E-06	7.47E-05	3.46E-06	1.73E-06	1.73E-06	1.15E-04	4.70E-05	2.63E-06	9.82E-03
	Wind Erosion-Disturbed Areas	3.54	8.84E-06	4.42E-06	2.76E-03	2.65E-06	4.42E-06	8.49E-05	2.26E-05	4.95E-05	4.42E-06	7.07E-07	8.84E-06	8.13E-05	8.84E-06	4.42E-06	4.42E-06	6.72E-05	8.84E-05	3.54E-07	1.31E-02
	Total - Phase 2	5.20	1.30E-05	6.50E-06	4.36E-03	3.90E-06	6.50E-06	1.48E-04	3.80E-05	8.80E-05	7.95E-06	9.56E-07	1.30E-05	1.62E-04	1.30E-05	6.50E-06	6.50E-06	1.87E-04	1.42E-04	3.01E-06	2.40E-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

Table E-12a. Permanente Creek Reclamation Area - Off-Road Diesel Equipment Combustion Emissions (Phase 1).

Phase 1 Emissions - Annual (Tons per Year).

Equipment	Model	Model Year	Horse-power	Hours per Year	Load Factor	Emissions (tons/year)								Emissions (metric tons/year)			
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Crawler Tractor	D8T	2009	310	16	0.64	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	1.80	0.00	0.00	1.82
Excavator	345D	2009	380	24	0.57	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	2.95	0.00	0.00	2.98
Grader	14M	2009	259	--	0.61	--	--	--	--	--	--	--	--	--	--	--	--
Loader	950H	2009	216	16	0.54	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.06	0.00	0.00	1.07
Haul Truck	740	2003	415	38	0.57	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.00	5.11	0.00	0.00	5.15
Crane	HTC-8640	2009	365	40	0.43	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	3.57	0.00	0.00	3.60
Concrete Truck	Paystar 5600	2009	360	--	0.50	--	--	--	--	--	--	--	--	--	--	--	--
Concrete Pump	B20	2009	110	--	0.74	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Truck	Paystar 5600	2009	360	28	0.20	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.15	0.00	0.00	1.16
Hydroseeder Pump	T330	2009	115	28	0.50	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.91	0.00	0.00	0.92
Total Off-Road Equipment Emissions:						0.01	0.01	0.04	0.15	0.01	0.01	0.00	0.00	16.56	0.00	0.00	16.70
Diesel PM Emissions:											0.01						

Conversion Factors:
453.59 grams/pound
2,000 pounds/ton
1,000,000 grams/metric ton

Phase 1 Emissions - Daily (Pounds per Day).

Equipment	Model	Model Year	Horse-power	Hours per Day	Load Factor	Emissions (pounds/day)											
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Crawler Tractor	D8T	2009	310	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
Excavator	345D	2009	380	8	0.57	0.96	0.80	3.93	16.50	0.55	0.55	0.51	0.02	2,171.01	0.12	0.05	2,190.16
Grader	14M	2009	259	--	0.61	--	--	--	--	--	--	--	--	--	--	--	--
Loader	950H	2009	216	8	0.54	0.54	0.46	2.19	9.79	0.30	0.30	0.27	0.01	1,169.10	0.07	0.03	1,179.41
Haul Truck	740	2003	415	8	0.57	1.70	1.42	4.75	21.98	0.76	0.76	0.70	0.02	2,370.98	0.13	0.06	2,391.89
Crane	HTC-8640	2009	365	--	0.43	--	--	--	--	--	--	--	--	--	--	--	--
Concrete Truck	Paystar 5600	2009	360	--	0.50	--	--	--	--	--	--	--	--	--	--	--	--
Concrete Pump	B20	2009	110	--	0.74	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Truck	Paystar 5600	2009	360	--	0.20	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Pump	T330	2009	115	--	0.50	--	--	--	--	--	--	--	--	--	--	--	--
Total Off-Road Equipment Emissions:						3.19	2.68	10.87	48.27	1.61	1.61	1.48	0.05	5,711.09	0.32	0.14	5,761.46
Diesel PM Emissions:	(pounds/day)										1.61						
	(pounds/hour)										0.20						

Conversion Factors:
453.59 grams/pound
8 hours/day

Table E-12a. Permanente Creek Reclamation Area - Off-Road Diesel Equipment Combustion Emissions (Phase 1).

Phase 1 Off-Road Equipment Emission Factors.

		Model	Horse-	Calculation	Cumul.	Emission Factors (grams/brake horsepower-hour)										
Vehicle Type	Model	Year	Power	Year	Hours	THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O
Crawler Tractor	D8T	2009	310	2012	6,000	0.250	0.210	1.029	4.318	0.143	0.143	0.132	0.0054	568.3	0.032	0.014
Excavator	345D	2009	380	2012	6,000	0.250	0.210	1.029	4.318	0.143	0.143	0.132	0.0054	568.3	0.032	0.014
Grader	14M	2009	259	2012	6,000	0.250	0.210	1.029	4.318	0.143	0.143	0.132	0.0054	568.3	0.032	0.014
Loader	950H	2009	216	2012	6,000	0.264	0.221	1.066	4.760	0.145	0.145	0.134	0.0054	568.3	0.032	0.014
Haul Truck	740	2003	415	2012	12,000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
Crane	HTC-8640	2009	365	2012	6,000	0.250	0.210	1.029	4.318	0.143	0.143	0.132	0.0054	568.3	0.032	0.014
Concrete Truck	Paystar 5600	2009	360	2012	6,000	0.250	0.210	1.029	4.318	0.143	0.143	0.132	0.0054	568.3	0.032	0.014
Concrete Pump	B20	2009	110	2012	6,000	0.353	0.296	3.583	5.457	0.346	0.346	0.319	0.0054	568.3	0.032	0.014
Hydroseeder Truck	Paystar 5600	2009	360	2012	6,000	0.250	0.210	1.029	4.318	0.143	0.143	0.132	0.0054	568.3	0.032	0.014
Hydroseeder Pump	T330	2009	115	2012	6,000	0.353	0.296	3.583	5.457	0.346	0.346	0.319	0.0054	568.3	0.032	0.014

Notes:

1. Per the document, *Overview: OFFROAD Model* , California Air Resources Board, November 2006 (available at www.arb.ca.gov/msei/offroad/offroad.htm), THC, CO, NOx, PM, and CO_2 emission factors are determined by the following equation:
   EF = ZH + dr * CHrs, where
   EF = emission factor, in grams per hoursepower-hour (g/bhp-hr)
   ZH = zero-hour emission rate or when the equipment is new (g/bhp-hr)
   dr = deterioration rate or the increase in ZH emissions as the equipment is used ($g/bhp\text{-}hr^2$)
   CHrs = cumulative hours or total number of hours accumulated on the equipment
2. Values utilized in the above emission factor table for ZH and dr are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided.)
3. ROG = 83.82% THC, PM10 = 100% PM, and PM2.5 = 92.29% PM. Source: *2008 Estimated Annual Average Emissions – Statewide* , California Air Resources Board, data for Off-Road Equipment, sorted for diesel-fueled vehicles, available at http://www.arb.ca.gov/ei/emissiondata.htm (accessed February 25, 2011).
4. Per the document, *Overview: OFFROAD Model* (op cit.) and the OFFROAD2007 emfac.csv file, the SO_2 emission factor is based on fuel sulfur content and brake-specific fuel consumption. Per *Title 13 California Code of Regulations* sec. 2281 (Sulfur Content of Fuel), as of June 2006 diesel sulfur content in diesel fuel is limited to 15 parts per million. Per the October 2010 CARB Staff Report (op cit.), CARB staff used BSFC values from EPA's NONROAD emissions model, as documented in the report, *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition* (EPA Report No. EPA420-P-04-009/NR-009C), U.S. Environmental Protection Agency, April 2004. Table A2 of the EPA report (pages A5-A8) documents that for diesel engines up to 100 hp, a brake specific fuel consumption (BSFC) value of 0.408 lb/hp-hr is used. For diesel engines larger than 100 hp, a BSFC value of 0.367 lb/hp-hr is used. The above factors assume a BSFC value of 0.4 lb/hp-hr. The SO_2 emission factor is calculated as follows:
   EF_{SO2} = (Parts S in fuel/million) * (MW_{SO2}/MW_S) * BSFC (lb/hp-hr) * 453.6 g/lb
   = (15 parts S/million) * (64 g/g-mole SO_2/32 g/g-mole S) * 0.4 lb/hp-hr * 453.6 g/lb
   = 0.0054 g SO_2/hp-hr
5. CH_4 and N_2O factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Table 13.6 (Default CH_4 and N_2O Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles. 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 higher heating value of 137,000 Btu/gallon for diesel and 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), Tables 5 (Default Fuel Properties) and 6 (Default Engine Specifications - diesel turbocharged engines), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.
6. 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 Climate Registry *General Reporting Protocol* (op cit.), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
7. Cumulative hours for each equipment item assumes that each item accumulates 2,000 hours of operation each year. Per the document, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements,* California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28, CARB staff now assumes emission factors deteriorate only up to a maximum of 12,000 hours.
8. Annual and daily activity data documented separately.
9. Equipment load factors from *Offroad2007* (Version 2.0.1.2), op cit. The hydroseeder truck is assumed to have the same load profile (0.20) as a water truck. The hydroseeder pump is assigned a 0.50 load factor applicable to diesel sprayers. The concrete truck is assigned a 0.50 factor to reflect its expected load while offloading cement to the cement pump.

Table E-12b. Permanente Creek Reclamation Area - Off-Road Diesel Equipment Combustion Emissions (Phase 2).

Phase 2 Emissions - Annual (Tons per Year).

Equipment	Model	Model Year	Horse-power	Hours per Year	Load Factor	Emissions (tons/year)								Emissions (metric tons/year)			
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Crawler Tractor	D8T	2009	310	16	0.64	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	1.80	0.00	0.00	1.82
Excavator	345D	2009	380	24	0.57	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	2.95	0.00	0.00	2.98
Grader	14M	2009	259	16	0.61	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.44	0.00	0.00	1.45
Loader	950H	2009	216	--	0.54	--	--	--	--	--	--	--	--	--	--	--	--
Haul Truck	740	2003	415	24	0.57	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	3.23	0.00	0.00	3.25
Crane	HTC-8640	2009	365	--	0.43	--	--	--	--	--	--	--	--	--	--	--	--
Concrete Truck	Paystar 5600	2009	360	2	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.21
Concrete Pump	B20	2009	110	2	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.09
Hydroseeder Truck	Paystar 5600	2009	360	11	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.45
Hydroseeder Pump	T330	2009	115	11	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Total Off-Road Equipment Emissions:						0.01	0.01	0.03	0.10	0.00	0.00	0.00	0.00	10.53	0.00	0.00	10.62
Diesel PM Emissions:											0.00						

Conversion Factors:
453.59 grams/pound
2,000 pounds/ton
1,000,000 grams/metric ton

Phase 2 Emissions - Daily (Pounds per Day).

Equipment	Model	Model Year	Horse-power	Hours per Day	Load Factor	Emissions (pounds/day)											
						THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Crawler Tractor	D8T	2009	310	--	0.64	--	--	--	--	--	--	--	--	--	--	--	--
Excavator	345D	2009	380	8	0.57	1.53	1.28	4.35	17.71	0.67	0.67	0.62	0.02	2,171.01	0.12	0.05	2,190.16
Grader	14M	2009	259	8	0.61	1.11	0.93	3.17	12.92	0.49	0.49	0.45	0.02	1,583.56	0.09	0.04	1,597.52
Loader	950H	2009	216	--	0.54	--	--	--	--	--	--	--	--	--	--	--	--
Haul Truck	740	2003	415	8	0.57	1.70	1.42	4.75	21.98	0.76	0.76	0.70	0.02	2,370.98	0.13	0.06	2,391.89
Crane	HTC-8640	2009	365	--	0.43	--	--	--	--	--	--	--	--	--	--	--	--
Concrete Truck	Paystar 5600	2009	360	2	0.50	0.32	0.27	0.90	3.68	0.14	0.14	0.13	0.00	451.04	0.03	0.01	455.02
Concrete Pump	B20	2009	110	2	0.74	0.18	0.15	1.46	2.12	0.16	0.16	0.15	0.00	203.97	0.01	0.01	205.77
Hydroseeder Truck	Paystar 5600	2009	360	--	0.20	--	--	--	--	--	--	--	--	--	--	--	--
Hydroseeder Pump	T330	2009	115	--	0.50	--	--	--	--	--	--	--	--	--	--	--	--
Total Off-Road Equipment Emissions:						4.84	4.06	14.64	58.41	2.23	2.23	2.06	0.06	6,780.56	0.38	0.17	6,840.36
Diesel PM Emissions:	(pounds/day)										2.23						
	(pounds/hour)										0.28						

Conversion Factors:
453.59 grams/pound
8 hours/day

Table E-12b. Permanente Creek Reclamation Area - Off-Road Diesel Equipment Combustion Emissions (Phase 2).

Phase 2 Off-Road Equipment Emission Factors.

		Model	Horse-	Calculation	Cumul.	Emission Factors (grams/brake horsepower-hour)										
Vehicle Type	Model	Year	Power	Year	Hours	THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O
Crawler Tractor	D8T	2009	310	2025	12,000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Excavator	345D	2009	380	2025	12,000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Grader	14M	2009	259	2025	12,000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Loader	950H	2009	216	2025	12,000	0.408	0.342	1.212	5.140	0.179	0.179	0.166	0.0054	568.3	0.032	0.014
Haul Truck	740	2003	415	2025	12,000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014
Crane	HTC-8640	2009	365	2025	12,000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Concrete Truck	Paystar 5600	2009	360	2025	12,000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Concrete Pump	B20	2009	110	2025	12,000	0.515	0.432	4.075	5.904	0.451	0.451	0.416	0.0054	568.3	0.032	0.014
Hydroseeder Truck	Paystar 5600	2009	360	2025	12,000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Hydroseeder Pump	T330	2009	115	2025	12,000	0.515	0.432	4.075	5.904	0.451	0.451	0.416	0.0054	568.3	0.032	0.014

Notes:

1. Per the document, *Overview: OFFROAD Model* , California Air Resources Board, November 2006 (available at www.arb.ca.gov/msei/offroad/offroad.htm), THC, CO, NOx, PM, and CO_2 emission factors are determined by the following equation:
   EF = ZH + dr * CHrs, where
   EF = emission factor, in grams per hoursepower-hour (g/bhp-hr)
   ZH = zero-hour emission rate or when the equipment is new (g/bhp-hr)
   dr = deterioration rate or the increase in ZH emissions as the equipment is used ($g/bhp\text{-}hr^2$)
   CHrs = cumulative hours or total number of hours accumulated on the equipment
2. Values utilized in the above emission factor table for ZH and dr are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided.)
3. ROG = 83.82% THC, PM10 = 100% PM, and PM2.5 = 92.29% PM. Source: *2008 Estimated Annual Average Emissions – Statewide* , California Air Resources Board, data for Off-Road Equipment, sorted for diesel-fueled vehicles, available at http://www.arb.ca.gov/ei/emissiondata.htm (accessed February 25, 2011).
4. Per the document, *Overview: OFFROAD Model* (op cit.) and the OFFROAD2007 emfac.csv file, the SO_2 emission factor is based on fuel sulfur content and brake-specific fuel consumption. Per *Title 13 California Code of Regulations* sec. 2281 (Sulfur Content of Fuel), as of June 2006 diesel sulfur content in diesel fuel is limited to 15 parts per million. Per the October 2010 CARB Staff Report (op cit.), CARB staff used BSFC values from EPA's NONROAD emissions model, as documented in the report, *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition* (EPA Report No. EPA420-P-04-009/NR-009C), U.S. Environmental Protection Agency, April 2004. Table A2 of the EPA report (pages A5-A8) documents that for diesel engines up to 100 hp, a brake specific fuel consumption (BSFC) value of 0.408 lb/hp-hr is used. For diesel engines larger than 100 hp, a BSFC value of 0.367 lb/hp-hr is used. The above factors assume a BSFC value of 0.4 lb/hp-hr. The SO_2 emission factor is calculated as follows:
   EF_{SO2} = (Parts S in fuel/million) * (MW_{SO2}/MW_S) * BSFC (lb/hp-hr) * 453.6 g/lb
   = (15 parts S/million) * (64 g/g-mole SO_2/32 g/g-mole S) * 0.4 lb/hp-hr * 453.6 g/lb
   = 0.0054 g SO_2/hp-hr
5. CH_4 and N_2O factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Table 13.6 (Default CH_4 and N_2O Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles. 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 higher heating value of 137,000 Btu/gallon for diesel and 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), Tables 5 (Default Fuel Properties) and 6 (Default Engine Specifications - diesel turbocharged engines), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.
6. 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 Climate Registry *General Reporting Protocol* (op cit.), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
7. Cumulative hours for each equipment item assumes that each item accumulates 2,000 hours of operation each year. Per the document, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements,* California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28, CARB staff now assumes emission factors deteriorate only up to a maximum of 12,000 hours.
8. Annual and daily activity data documented separately.
9. Equipment load factors from *Offroad2007* (Version 2.0.1.2), op cit. The hydroseeder truck is assumed to have the same load profile (0.20) as a water truck. The hydroseeder pump is assigned a 0.50 load factor applicable to diesel sprayers. The concrete truck is assigned a 0.50 factor to reflect its expected load while offloading cement to the cement pump.

Table E-13. Permanente Creek Reclamation Area - Assumed Activity Data.

Off-Road Diesel Equipment Activity (Hours).

					Phase 1 Activity (occuring in 2012)							Phase 2 Activity (occurring in 2025)			
Category	Manufacturer	Model	Year	HP	Subarea 3	Subarea 4	Subarea 5	Subarea 6	Subarea 7	Total Hours	Hours/ Day	Subarea 1	Subarea 2	Total Hours	Hours/ Day
Crawler Tractor	Caterpillar	D8T	2009	310	16	--	--	--	--	16	--	--	16	16	--
Excavator	Caterpillar	345D	2009	380	--	--	24	--	--	24	8	24	--	24	8
Grader	Caterpillar	14M	2009	259	--	--	--	--	--	--	--	16	--	16	8
Loader	Caterpillar	950H	2009	216	--	--	16	--	--	16	8	--	--	--	--
Haul Truck	Caterpillar	740	2003	415	--	--	38	--	--	38	8	24	--	24	8
Crane	Linkbelt	HTC-8640	2009	365	--	--	--	40	--	40	--	--	--	--	--
Concrete Truck	International	Paystar 5600	2009	360	--	--	--	--	--	--	--	2	--	2	2
Concrete Pump	Reed	B20	2009	110	--	--	--	--	--	--	--	2	--	2	2
Hydroseeder Truck	International	Paystar 5600	2009	360	7	7	5	2	7	28	--	3	8	11	--
Hydroseeder Pump	Finn	T330	2009	115	7	7	5	2	7	28	--	3	8	11	--

Notes:

1. Permanente Creek Reclamation Subarea activities for Subareas 3 through 7 are assumed to occur in 2012, in Phase 1 of the overall project. Reclamation activities for Subareas 1 and 2 are assumed to occur in 2025, in Phase 2 of the overall project.
2. Activity data reflect the extimated work effort necessary to complete Permanente Creek reclamation treatments in each designated subarea.
3. Even though the hydroseeder and concrete trucks are on-road heavy duty trucks, for calculation purposes they are conservatively assumed to be off-road trucks.
4. During Phase 1, peak daily activity will occur during work for Subarea 5; therefore peak hours/day are shown only for Subarea 5. During Phase 2, peak daily activity will occur during work for Subarea 1; therefore, peak hours/day are shown only for Subarea 1. Hydroseeding is assumed to follow site treatment work and therefore are not reflected in peak hours/day.
5. The above data do not reflect travel by supervisory personnel (medium-duty vehicles) or employees (passenger vehicles. These hours are accomodated within the peak on-road in-plant and employee commute vehicle activity reflected in Table D-14 of the *Air Quality Technical Analysis* .

Material Handling and Haul Truck Travel Activity.

	Phase 1 Activity (2012)						Phase 2 Activity (2025)		
Category	Subarea 3	Subarea 4	Subarea 5	Subarea 6	Subarea 7	Total	Subarea 1	Subarea 2	Total
40-ton Loads	--	--	200	--	--	200	40	--	40
Material Handling:									
Total Tons (U.S.)	--	--	8,000	--	--	8,000	1,600	--	1,600
Tons/Day	--	--	1,684	--	--	1,684	533	--	533
Tons/Hour	--	--	211	--	--	211	67	--	67
Haul Truck Travel:									
1-Way Travel	--	--	1,000	--	--	--	5,000	--	--
Total Miles (2-way)	--	--	76	--	--	76	76	--	76
Miles/Day	--	--	16	--	--	16	25	--	25
Miles/Hour	--	--	2	--	--	2	3	--	3

Notes:

1. Conversion factors:
   8 hours/day
   5,280 feet/mile

Mechanically Disturbed Areas (Acres).

	Phase 1 (2012)							Phase 2 (2025)			
Category	Subarea 3	Subarea 4	Subarea 5	Subarea 6	Subarea 7	Average	Maximum	Subarea 1	Subarea 2	Average	Maximum
Total Acres	4.25	3.96	2.58	0.90	4.26	**********	**********	1.42	5.77	**********	**********
Mechanically Disturbed Areas	4.25	--	2.58	--	--	**********	**********	1.42	5.77	**********	**********
Disturbed at Any One Time	2.13	--	1.29	--	--	1.53	2.13	0.71	2.89	1.33	2.89
Disturbance Days	2	--	5	--	--	7	2	5	2	7	2

Notes:

1. Based on the anticipated reclamation treatment for each Subarea, Subareas 4, 6, and 7 are not anticipated to have any mechanical disturbance. (For Subarea 6, the crane will operate from the unpaved road above the area, which has already been assumed to be disturbed.)
2. Assumes that 50% of an area's acreage is disturbed at any one time.
3. Disturbance days for each phase reflects the value for the area with the maximum disturbed acres.

Table E-14. Permanente Creek Reclamation Area - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	1	15	1994	1.5	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	10	0.00E+00	G/HP-HR	1	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	1999	1.05	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	9.35	0.00E+00	G/HP-HR	0.57	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2004	0.68	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	6.08	0.00E+00	G/HP-HR	0.47	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2007	0.49	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	4.37	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2040	0.49	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	4.37	0.00E+00	G/HP-HR	0.19	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	1994	1.84	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	6.92	0.00E+00	G/HP-HR	0.76	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	1999	0.9	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	6.92	0.00E+00	G/HP-HR	0.57	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2004	0.64	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	5.79	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2007	0.57	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	4.57	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2040	0.57	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	4.57	0.00E+00	G/HP-HR	0.19	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	1987	1.84	2.35E-04	G/HP-HR	5	5.13E-04	G/HP-HR	7	1.05E-04	G/HP-HR	0.76	5.89E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	1998	1.8	2.30E-04	G/HP-HR	5	5.13E-04	G/HP-HR	6.9	1.04E-04	G/HP-HR	0.76	5.89E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2003	1.45	1.85E-04	G/HP-HR	4.1	4.20E-04	G/HP-HR	5.55	1.03E-04	G/HP-HR	0.6	4.65E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2004	0.64	9.80E-05	G/HP-HR	3.27	3.34E-04	G/HP-HR	5.1	9.33E-05	G/HP-HR	0.43	3.36E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2005	0.37	6.90E-05	G/HP-HR	3	3.05E-04	G/HP-HR	4.95	9.67E-05	G/HP-HR	0.38	2.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2007	0.24	5.45E-05	G/HP-HR	2.86	2.90E-04	G/HP-HR	4.88	9.83E-05	G/HP-HR	0.35	2.72E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2012	0.1	4.00E-05	G/HP-HR	2.72	2.76E-04	G/HP-HR	4.8	1.00E-04	G/HP-HR	0.16	1.20E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2040	0.1	4.00E-05	G/HP-HR	2.72	2.76E-04	G/HP-HR	2.9	6.00E-05	G/HP-HR	0.01	1.20E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	1987	1.44	6.66E-05	G/HP-HR	4.8	1.27E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.84	6.11E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	1997	0.99	4.58E-05	G/HP-HR	3.49	9.23E-05	G/HP-HR	8.75	2.02E-04	G/HP-HR	0.69	5.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2003	0.99	4.58E-05	G/HP-HR	3.49	9.23E-05	G/HP-HR	6.9	1.60E-04	G/HP-HR	0.69	5.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2004	0.46	3.33E-05	G/HP-HR	3.23	8.55E-05	G/HP-HR	5.64	1.03E-04	G/HP-HR	0.39	2.85E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2005	0.28	2.92E-05	G/HP-HR	3.14	8.33E-05	G/HP-HR	5.22	8.40E-05	G/HP-HR	0.29	2.12E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2007	0.19	2.71E-05	G/HP-HR	3.09	8.21E-05	G/HP-HR	5.01	7.45E-05	G/HP-HR	0.24	1.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2011	0.1	2.50E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.89	3.80E-05	G/HP-HR	0.2	8.58E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2012	0.09	2.31E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.53	3.38E-05	G/HP-HR	0.07	4.30E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2014	0.09	2.31E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.53	3.38E-05	G/HP-HR	0.01	1.04E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2040	0.07	1.74E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	1.4	1.88E-05	G/HP-HR	0.01	1.04E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1969	1.32	6.11E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	14	3.24E-04	G/HP-HR	0.77	5.60E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1971	1.1	5.09E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.66	4.80E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1979	1	4.63E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	12	2.78E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1984	0.94	4.35E-05	G/HP-HR	4.3	1.14E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1987	0.88	4.07E-05	G/HP-HR	4.2	1.11E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1996	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	8.17	1.89E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2002	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	6.9	1.60E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2003	0.33	2.79E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	5.26	9.64E-05	G/HP-HR	0.24	1.70E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2004	0.22	2.63E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	4.72	7.52E-05	G/HP-HR	0.19	1.35E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2006	0.16	2.57E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	4.44	6.46E-05	G/HP-HR	0.16	1.18E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2011	0.1	2.50E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	2.45	3.20E-05	G/HP-HR	0.14	1.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2014	0.09	2.17E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	2.27	2.88E-05	G/HP-HR	0.01	5.00E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2040	0.05	1.17E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	5.00E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR

Table E-14. Permanente Creek Reclamation Area - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	176	250	1969	1.32	6.11E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	14	3.24E-04	G/HP-HR	0.77	5.60E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1971	1.1	5.09E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.66	4.80E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1979	1	4.63E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	12	2.78E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1984	0.94	4.35E-05	G/HP-HR	4.3	1.14E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1987	0.88	4.07E-05	G/HP-HR	4.2	1.11E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1995	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	8.17	1.89E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2002	0.32	1.48E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	6.25	1.45E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2003	0.19	2.09E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	5	9.05E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2004	0.14	2.30E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	4.58	7.23E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2006	0.12	2.40E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	4.38	6.33E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2010	0.1	2.50E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.59E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2013	0.07	1.83E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2040	0.05	1.17E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1995	0.68	2.37E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2000	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2001	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2002	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2004	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2005	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2013	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1995	0.68	2.37E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2001	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2002	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2003	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2005	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2013	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR

Table E-14. Permanente Creek Reclamation Area - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	751	1000	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1999	0.68	1.12E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2005	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2006	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2007	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2009	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.08	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2014	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.06	2.50E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.02	1.00E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1999	0.68	1.12E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2005	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2006	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2007	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2009	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.08	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2014	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.06	2.50E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.02	1.00E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR

Notes:

1. The above factors are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided).
2. The above factors are consistent with the factors used by CARB staff to estimate off-road diesel equipment emissions, as documented in *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements*, California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), Attachment D (Diesel Emission Factors (g/bhp-hr)).

Appendix F

Permanente Creek Long-Term Restoration (Phase 3) Emission Calculations

Permanente Creek Long-Term Restoration (Phase 3) Emission Calculations.

Table F-1. Permanente Creek Long-Term Restoration (Phase 3) - Total Criteria Pollutant Emissions (tons).

Emission Source Category	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Material Handling	0.03	0.00	--	--	--	--
Unpaved Road Dust Entrainment	0.28	0.03	--	--	--	--
Wind Erosion - Disturbed Areas	0.07	0.01	--	--	--	--
Off-Road Diesel Equipment	0.03	0.03	0.16	0.71	0.05	0.00
Subtotal - Phase 3	0.41	0.07	0.16	0.71	0.05	0.00

Table F-2. Permanente Creek Long-Term Restoration (Phase 3) - Daily Criteria Pollutant Emissions (pounds/day).

Emission Source Category	PM_{10}	$PM_{2.5}$	CO	NOx	ROG	SOx
Material Handling	2.76	0.41	--	--	--	--
Unpaved Road Dust Entrainment	51.21	5.12	--	--	--	--
Wind Erosion - Disturbed Areas	8.74	1.31	--	--	--	--
Off-Road Diesel Equipment	2.96	2.73	18.60	83.65	5.54	0.09
Subtotal - Phase 3	65.67	9.58	18.60	83.65	5.54	0.09

Table F-3. Permanente Creek Long-Term Restoration (Phase 3) - Total Toxic Air Contaminant Emissions (pounds).

Emission Source Category	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Material Handling	--	1.30E-04	6.48E-05	4.04E-02	3.89E-05	6.48E-05	1.24E-03	3.32E-04	7.26E-04	6.74E-05	1.04E-05	1.30E-04	1.19E-03	1.30E-04	6.74E-05	6.74E-05	9.85E-04	1.30E-03	5.18E-06	1.92E-01
Unpaved Road Dust Entrainment	--	1.42E-03	7.11E-04	5.69E-01	4.27E-04	7.11E-04	2.33E-02	5.58E-03	1.42E-02	1.31E-03	7.97E-05	1.42E-03	3.07E-02	1.42E-03	7.11E-04	7.11E-04	4.72E-02	1.93E-02	1.08E-03	4.04E+00
Wind Erosion - Disturbed Areas	--	3.53E-04	1.77E-04	1.10E-01	1.06E-04	1.77E-04	3.39E-03	9.05E-04	1.98E-03	1.84E-04	2.83E-05	3.53E-04	3.25E-03	3.53E-04	1.84E-04	1.84E-04	2.69E-03	3.53E-03	1.41E-05	5.25E-01
Off-Road Diesel Equipment	50.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Phase 3	50.34	1.91E-03	9.53E-04	7.20E-01	5.72E-04	9.53E-04	2.80E-02	6.81E-03	1.69E-02	1.56E-03	1.18E-04	1.91E-03	3.52E-02	1.91E-03	9.62E-04	9.62E-04	5.09E-02	2.42E-02	1.10E-03	4.76E+00

Table F-4. Permanente Creek Long-Term Restoration (Phase 3) - Hourly Toxic Air Contaminant Emissions (pounds/hour).

Emission Source Category	Diesel PM	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Hexavalent Chromium	Crystalline Silica
Material Handling	--	8.64E-07	4.32E-07	2.70E-04	2.59E-07	4.32E-07	8.29E-06	2.21E-06	4.84E-06	4.32E-07	6.91E-08	8.64E-07	7.95E-06	8.64E-07	4.32E-07	4.32E-07	6.57E-06	8.64E-06	3.46E-08	1.28E-03
Unpaved Road Dust Entrainment	--	1.60E-05	8.00E-06	6.40E-03	4.80E-06	8.00E-06	2.62E-04	6.27E-05	1.60E-04	1.47E-05	8.96E-07	1.60E-05	3.46E-04	1.60E-05	8.00E-06	8.00E-06	5.31E-04	2.18E-04	1.22E-05	4.54E-02
Wind Erosion - Disturbed Areas	--	2.73E-06	1.37E-06	8.52E-04	8.19E-07	1.37E-06	2.62E-05	6.99E-06	1.53E-05	1.37E-06	2.18E-07	2.73E-06	2.51E-05	2.73E-06	1.37E-06	1.37E-06	2.08E-05	2.73E-05	1.09E-07	4.06E-03
Off-Road Diesel Equipment	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal - Phase 3	0.37	1.96E-05	9.80E-06	7.52E-03	5.88E-06	9.80E-06	2.97E-04	7.19E-05	1.80E-04	1.65E-05	1.18E-06	1.96E-05	3.79E-04	1.96E-05	9.80E-06	9.80E-06	5.59E-04	2.54E-04	1.23E-05	5.08E-02

Table F-5. Permanente Creek Long-Term Restoration (Phase 3) - Greenhouse Gas Emissions (metric tons).

Emission Source Category	CO_2	CH_4	N_2O	CO_2e
Material Handling	--	--	--	--
Unpaved Road Dust Entrainment	--	--	--	--
Wind Erosion - Disturbed Areas	--	--	--	--
Off-Road Diesel Equipment	71.74	0.00	0.00	72.38
Subtotal - Phase 3	71.74	0.00	0.00	72.38

Table F-6. Permanente Creek Long-Term Restoration (Phase 3) - Material Handling.

Project Phase	Emission Factor Reference	Emission Factors		Process Rates			Transfer Points	Control Efficiency	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$	Tons/Year	Tons/Day	Tons/Hour			(tons/yr)	(lb/day)	(lb/hr)	(tons/yr)	(lb/day)	(lb/hr)
3	MDAQMD Guidance, Sec. VI.E, AP-42 13.2.4.3, Eqn 1	1.15E-03 lb/ton	1.73E-04 lb/ton	22,500 tons	1,200 tons	150 tons	2	0%	0.03	2.76	0.35	0.00	0.41	0.05

Notes:
1. Activity based on Assumed Activity Data (documented separately).
2. Assumed Control: None
3. 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*

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

Table F-7. Permanente Creek Long-Term Restoration (Phase 3) - Unpaved Road Dust Entrainment.

Project Phase	Emission Factor Reference	Emission Factors		Activity			Control Efficiency	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$	Miles/Year	Miles/Day	Miles/Hour		(tons/yr)	(lb/day)	(lb/hr)	(tons/yr)	(lb/day)	(lb/hr)
3	AP-42 13.2.2, Eqn 1a	1.75E+00 lb/mile	1.75E-01 lb/mile	1,299 miles	117 miles	15 miles	75%	0.28	51.21	6.40	0.03	5.12	0.64

Notes:

1. Activity based on Assumed Activity Data (documented separately).
2. Assumed Control: 75% control associated with watering of unpaved roads.
3. 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 - Entire Facility (see updated Air Quality Technical Analysis)	W	83.7	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*

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

Table F-8. Permanente Creek Long-Term Restoration (Phase 3) - Wind Erosion.

Project Phase	Emission Factor Reference	Emission Factors		Disturbed Area			Control Efficiency	PM_{10} Emissions			$PM_{2.5}$ Emissions		
		PM_{10}	$PM_{2.5}$	Ave. Acres	Total Days	Max. Acres		(tons/yr)	(lb/day)	(lb/hr)	(tons/yr)	(lb/day)	(lb/hr)
1	AP-42 13.2.5, Eqn 2	1.79E+00 ton/acre-yr	2.68E-01 ton/acre-yr	0.8 acres	19 days	0.9 acres	0%	0.07	8.74	1.09	0.01	1.31	0.16

Notes:

1. Activity based on Assumed Activity Data (documented separately).
2. Annual wind erosion emissions are based on acres disturbed over a one-year period. Therefore, average disturbed acres (for each phase) are multiplied by total days of area disturbance (for each phase) and divided by 365 days per year to calculate annual emissions. Daily and hourly emissions are based on the maximum acreage disturbed in a single day.
3. Assumed Control: None
4. Conversion factors:
   2,000 lb = 1 ton
   8 hours/day
   365 days/year

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*	*$g/(m^2\text{-}yr)$*

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

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

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

Table F-9. Permanente Creek Long-Term Restoration (Phase 3) - Toxic Air Contaminants.

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	1.3	0.2	2.5	23	2.5	1.3	1.3	19	25	0.1	3712.8
Unpaved Roads TAC Emis. 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
Component	PM_{10} (tons/year)	Toxic Air Contaminant Emissions (pounds)																		
Material Handling	0.03	1.30E-04	6.48E-05	4.04E-02	3.89E-05	6.48E-05	1.24E-03	3.32E-04	7.26E-04	6.74E-05	1.04E-05	1.30E-04	1.19E-03	1.30E-04	6.74E-05	6.74E-05	9.85E-04	1.30E-03	5.18E-06	1.92E-01
Unpaved Road Dust Entrainment	0.28	1.42E-03	7.11E-04	5.69E-01	4.27E-04	7.11E-04	2.33E-02	5.58E-03	1.42E-02	1.31E-03	7.97E-05	1.42E-03	3.07E-02	1.42E-03	7.11E-04	7.11E-04	4.72E-02	1.93E-02	1.08E-03	4.04E+00
Wind Erosion-Disturbed Areas	0.07	3.53E-04	1.77E-04	1.10E-01	1.06E-04	1.77E-04	3.39E-03	9.05E-04	1.98E-03	1.84E-04	2.83E-05	3.53E-04	3.25E-03	3.53E-04	1.84E-04	1.84E-04	2.69E-03	3.53E-03	1.41E-05	5.25E-01
Total - Phase 3	0.38	1.91E-03	9.53E-04	7.20E-01	5.72E-04	9.53E-04	2.80E-02	6.81E-03	1.69E-02	1.56E-03	1.18E-04	1.91E-03	3.52E-02	1.91E-03	9.62E-04	9.62E-04	5.09E-02	2.42E-02	1.10E-03	4.76E+00

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 Emis. 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
Component	Hourly PM_{10} (pounds/hr)	Hourly Toxic Air Contaminant Emissions (pounds/hour)																		
Material Handling	0.35	8.64E-07	4.32E-07	2.70E-04	2.59E-07	4.32E-07	8.29E-06	2.21E-06	4.84E-06	4.32E-07	6.91E-08	8.64E-07	7.95E-06	8.64E-07	4.32E-07	4.32E-07	6.57E-06	8.64E-06	3.46E-08	1.28E-03
Unpaved Road Dust Entrainment	6.40	1.60E-05	8.00E-06	6.40E-03	4.80E-06	8.00E-06	2.62E-04	6.27E-05	1.60E-04	1.47E-05	8.96E-07	1.60E-05	3.46E-04	1.60E-05	8.00E-06	8.00E-06	5.31E-04	2.18E-04	1.22E-05	4.54E-02
Wind Erosion-Disturbed Areas	1.09	2.73E-06	1.37E-06	8.52E-04	8.19E-07	1.37E-06	2.62E-05	6.99E-06	1.53E-05	1.37E-06	2.18E-07	2.73E-06	2.51E-05	2.73E-06	1.37E-06	1.37E-06	2.08E-05	2.73E-05	1.09E-07	4.06E-03
Total - Phase 3	7.84	1.96E-05	9.80E-06	7.52E-03	5.88E-06	9.80E-06	2.97E-04	7.19E-05	1.80E-04	1.65E-05	1.18E-06	1.96E-05	3.79E-04	1.96E-05	9.80E-06	9.80E-06	5.59E-04	2.54E-04	1.23E-05	5.08E-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

Table F-10. Permanente Creek Long-Term Restoration (Phase 3) - Off-Road Diesel Equipment Combustion Emissions.

Phase 3 Emissions - Annual (Tons per Year).

Equipment	Model	Model Year	Horse-power	Hours per Year	Load Factor	Emissions (tons/year) THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	Emissions (metric tons/year) CO_2	CH_4	N_2O	CO_2e
Excavator	345D	2009	380	150	0.57	0.01	0.01	0.04	0.17	0.01	0.01	0.01	0.00	18.46	0.00	0.00	18.63
Haul Trucks	740	2003	415	396	0.57	0.04	0.04	0.12	0.54	0.02	0.02	0.02	0.00	53.28	0.00	0.00	53.75
Total Off-Road Equipment Emissions:						0.06	0.05	0.16	0.71	0.03	0.03	0.02	0.00	71.74	0.00	0.00	72.38
Diesel PM Emissions:											0.03						

Conversion Factors:
453.59 grams/pound
2,000 pounds/ton
1,000,000 grams/metric ton

Phase 3 Emissions - Daily (Pounds per Day).

Equipment	Model	Model Year	Horse-power	Hours per Day	Load Factor	Emissions (pounds/day) THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Excavator	345D	2009	380	8	0.57	1.53	1.28	4.35	17.71	0.67	0.67	0.62	0.02	2,171.01	0.12	0.05	2,190.16
Haul Trucks	740	2003	415	24	0.57	5.09	4.26	14.25	65.94	2.28	2.28	2.11	0.07	7,112.93	0.40	0.18	7,175.66
Total Off-Road Equipment Emissions:						6.61	5.54	18.60	83.65	2.96	2.96	2.73	0.09	9,283.94	0.52	0.23	9,365.82
Diesel PM Emissions:	(pounds/day)										2.96						
	(pounds/hour)										0.37						

Conversion Factors:
453.59 grams/pound
8 hours/day

Phase 3 Off-Road Equipment Emission Factors.

Vehicle Type	Model	Model Year	Horse-Power	Calculation Year	Cumul. Hours	Emission Factors (grams/brake horsepower-hour) THC	ROG	CO	NOx	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O
Excavator	345D	2009	380	2026	12,000	0.400	0.335	1.138	4.636	0.177	0.177	0.163	0.0054	568.3	0.032	0.014
Haul Trucks	740	2003	415	2026	12,000	0.406	0.341	1.138	5.268	0.182	0.182	0.168	0.0054	568.3	0.032	0.014

Notes:

1. Per the document, *Overview: OFFROAD Model*, California Air Resources Board, November 2006 (available at www.arb.ca.gov/msei/offroad/offroad.htm), THC, CO, NOx, PM, and CO_2 emission factors are determined by the following equation:
   EF = ZH + dr * CHrs, where
   EF = emission factor, in grams per hoursepower-hour (g/bhp-hr)
   ZH = zero-hour emission rate or when the equipment is new (g/bhp-hr)
   dr = deterioration rate or the increase in ZH emissions as the equipment is used (g/bhp-hr^2)
   CHrs = cumulative hours or total number of hours accumulated on the equipment
2. Values utilized in the above emission factor table for ZH and dr are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided.)
3. ROG = 83.82% THC, PM10 = 100% PM, and PM2.5 = 92.29% PM. Source: *2008 Estimated Annual Average Emissions – Statewide*, California Air Resources Board, data for Off-Road Equipment, sorted for diesel-fueled vehicles, available at http://www.arb.ca.gov/ei/emissiondata.htm (accessed February 25, 2011).
4. Per the document, *Overview: OFFROAD Model* (op cit.) and the OFFROAD2007 emfac.csv file, the SO_2 emission factor is based on fuel sulfur content and brake-specific fuel consumption. Per *Title 13 California Code of Regulations* sec. 2281 (Sulfur Content of Fuel), as of June 2006 diesel sulfur content in diesel fuel is limited to 15 parts per million. Per the October 2010 CARB Staff Report (op cit.), CARB staff used BSFC values from EPA's NONROAD emissions model, as documented in the report, *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition* (EPA Report No. EPA420-P-04-009/NR-009C), U.S. Environmental Protection Agency, April 2004. Table A2 of the EPA report (pages A5-A8) documents that for diesel engines up to 100 hp, a brake specific fuel consumption (BSFC) value of 0.408 lb/hp-hr is used. For diesel engines larger than 100 hp, a BSFC value of 0.367 lb/hp-hr is used. The above factors assume a BSFC value of 0.4 lb/hp-hr. The SO_2 emission factor is calculated as follows:
   EF_{SO2} = (Parts S in fuel/million) * (MW_{SO2}/MW_S) * BSFC (lb/hp-hr) * 453.6 g/lb
   = (15 parts S/million) * (64 g/g-mole SO_2/32 g/g-mole S) * 0.4 lb/hp-hr * 453.6 g/lb

Table F-10. Permanente Creek Long-Term Restoration (Phase 3) - Off-Road Diesel Equipment Combustion Emissions.

= 0.0054 g SO_2/hp-hr

5. CH_4 and N_2O factors in grams/gallon are from the Climate Registry, *General Reporting Protocol* Version 1.1 (May 2008), Table 13.6 (Default CH_4 and N_2O Emission Factors for Non-Highway Vehicles), factors for diesel-fueled construction vehicles. 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 higher heating value of 137,000 Btu/gallon for diesel and 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), Tables 5 (Default Fuel Properties) and 6 (Default Engine Specifications - diesel turbocharged engines), available at http://www.sbcapcd.org/eng/spice/sbcapcdicerefdoc.pdf.
6. 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 Climate Registry *General Reporting Protocol* (op cit.), Table B.1. $CO_2e = 1 * CO_2 + 21 * CH_4 + 310 * N_2O$.
7. Cumulative hours for each equipment item assumes that each item accumulates 2,000 hours of operation each year. Per the document,*Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements,* California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28, CARB staff now assumes emission factors deteriorate only up to a maximum of 12,000 hours.
8. Annual and daily activity data documented separately.

Table F-11. Permanente Creek Long-Term Restoration (Phase 3) - Assumed Activity Data.

Off-Road Diesel Equipment Activity (Hours).

Category	Manufacturer	Model	Year	HP	Upper Area (Reaches 17/18) Removed Mat'l (Yds^3/Year)	Upper Area (Reaches 17/18) Estimated Hours/Year	Lower Area (Reaches 12/13) Removed Mat'l (Yds^3/Year)	Lower Area (Reaches 12/13) Estimated Hours/Year	Total Hours/Year	Maximum Hours/Day
Excavator	Caterpillar	345D	2009	380	11,000	91.67	7,000	58.33	150.00	8
Haul Trucks	Caterpillar	740	2003	415		183.33		175.00	396.33	24

Notes:

1. Assumes the following conversion factors and operating equipment specifications:
   - 4.0 cubic yard excavator bucket capacity
   - 2.0 minutes per excavator bucket load
   - 60 minutes per hour
   - 2 haul trucks per excavator for the Upper Area
   - 3 haul trucks per excavator for the Lower Area
2. Estimated activity data reflects the work effort necessary to complete Permanente Creek long-term restoration in each designated area.
3. The number of haul trucks required per excavator assumes a material density of 2,500 pounds/cubic yard, and a normal haul weight of 35 tons/truck. Based on this information, the average excavator load will be 5 tons/bucket, and each truck will require 7 bucket loads. Assuming 2 minutes per bucket load, each truck load cycle will average 14 minutes per truck load. The average trip length for the Upper Area is assumed to be 3,000 feet one-way, or 6,000 feet round trip (1.14 miles round trip). At an average speed of 13 miles per hour (4.62 minutes/mile), the haul truck round trip will require 5.24 minutes + 5 minutes to offload, for a haul truck travel cycle of 10.24 minutes/trip, and a total truck cycle time of 24.24 minutes.load. The average trip length for the Lower Area is assumed to be 9,000 feet one-way, or 18,000 feet round trip (3.41 miles round trip). At an average speed of 13 miles per hour, the haul truck round trip will require 15.73 minutes + 5 minutes to offload, for a haul truck travel cycle of 20.73 minutes/trip, and a total truck cycle time of 34.73 minutes/load.

Material Handling and Haul Truck Travel Activity.

Category	Upper Area	Lower Area	Total
Material Handling:			
Cubic Yards	11,000	7,000	18,000
Total Tons (U.S.)	13,750	8,750	22,500
Maximum Tons/Day	1,200	1,200	1,200
Tons/Hour	150	150	150
Haul Truck Travel:			
40-ton Truck Loads			
Total Loads	392.9	250.0	642.9
Loads/Hour	4.3	4.3	4.3
1-Way Travel	3,000	9,000	--
Total Miles (2-way)	446	852	1,299
Maximum Miles/Day	39	117	117
Maximum Miles/Hour	5	15	15

Notes:

1. Conversion factors:
   - 2,500 pounds/cubic yard
   - 2,000 pounds/ton
   - 8 hours/day
   - 5,280 feet/mile
   - 35 tons/load normal haul weight

Mechanically Disturbed Areas (Acres).

Category	Upper Area	Lower Area	Average	Maximum
Total Acres	1.78	1.15		
Mechanically Disturbed Areas	1.78	1.15		
Disturbed at Any One Time	0.89	0.58	0.77	0.89
Disturbance Days	11.46	7.29	18.75	11.46

Notes:

1. Assumes that 50% of an area's acreage is disturbed at any one time.

Table F-12. Permanente Creek Long-Term Restoration (Phase 3) - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	1	15	1994	1.5	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	10	0.00E+00	G/HP-HR	1	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	1999	1.05	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	9.35	0.00E+00	G/HP-HR	0.57	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2004	0.68	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	6.08	0.00E+00	G/HP-HR	0.47	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2007	0.49	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	4.37	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1	15	2040	0.49	0.00E+00	G/HP-HR	3.47	0.00E+00	G/HP-HR	4.37	0.00E+00	G/HP-HR	0.19	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	1994	1.84	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	6.92	0.00E+00	G/HP-HR	0.76	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	1999	0.9	0.00E+00	G/HP-HR	5	0.00E+00	G/HP-HR	6.92	0.00E+00	G/HP-HR	0.57	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2004	0.64	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	5.79	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2007	0.57	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	4.57	0.00E+00	G/HP-HR	0.38	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	16	25	2040	0.57	0.00E+00	G/HP-HR	2.34	0.00E+00	G/HP-HR	4.57	0.00E+00	G/HP-HR	0.19	0.00E+00	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	1987	1.84	2.35E-04	G/HP-HR	5	5.13E-04	G/HP-HR	7	1.05E-04	G/HP-HR	0.76	5.89E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	1998	1.8	2.30E-04	G/HP-HR	5	5.13E-04	G/HP-HR	6.9	1.04E-04	G/HP-HR	0.76	5.89E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2003	1.45	1.85E-04	G/HP-HR	4.1	4.20E-04	G/HP-HR	5.55	1.03E-04	G/HP-HR	0.6	4.65E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2004	0.64	9.80E-05	G/HP-HR	3.27	3.34E-04	G/HP-HR	5.1	9.33E-05	G/HP-HR	0.43	3.36E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2005	0.37	6.90E-05	G/HP-HR	3	3.05E-04	G/HP-HR	4.95	9.67E-05	G/HP-HR	0.38	2.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2007	0.24	5.45E-05	G/HP-HR	2.86	2.90E-04	G/HP-HR	4.88	9.83E-05	G/HP-HR	0.35	2.72E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2012	0.1	4.00E-05	G/HP-HR	2.72	2.76E-04	G/HP-HR	4.8	1.00E-04	G/HP-HR	0.16	1.20E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	26	50	2040	0.1	4.00E-05	G/HP-HR	2.72	2.76E-04	G/HP-HR	2.9	6.00E-05	G/HP-HR	0.01	1.20E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	1987	1.44	6.66E-05	G/HP-HR	4.8	1.27E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.84	6.11E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	1997	0.99	4.58E-05	G/HP-HR	3.49	9.23E-05	G/HP-HR	8.75	2.02E-04	G/HP-HR	0.69	5.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2003	0.99	4.58E-05	G/HP-HR	3.49	9.23E-05	G/HP-HR	6.9	1.60E-04	G/HP-HR	0.69	5.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2004	0.46	3.33E-05	G/HP-HR	3.23	8.55E-05	G/HP-HR	5.64	1.03E-04	G/HP-HR	0.39	2.85E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2005	0.28	2.92E-05	G/HP-HR	3.14	8.33E-05	G/HP-HR	5.22	8.40E-05	G/HP-HR	0.29	2.12E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2007	0.19	2.71E-05	G/HP-HR	3.09	8.21E-05	G/HP-HR	5.01	7.45E-05	G/HP-HR	0.24	1.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2011	0.1	2.50E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.89	3.80E-05	G/HP-HR	0.2	8.58E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2012	0.09	2.31E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.53	3.38E-05	G/HP-HR	0.07	4.30E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2014	0.09	2.31E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	2.53	3.38E-05	G/HP-HR	0.01	1.04E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	51	120	2040	0.07	1.74E-05	G/HP-HR	3.05	8.10E-05	G/HP-HR	1.4	1.88E-05	G/HP-HR	0.01	1.04E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1969	1.32	6.11E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	14	3.24E-04	G/HP-HR	0.77	5.60E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1971	1.1	5.09E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.66	4.80E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1979	1	4.63E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	12	2.78E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1984	0.94	4.35E-05	G/HP-HR	4.3	1.14E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1987	0.88	4.07E-05	G/HP-HR	4.2	1.11E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	1996	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	8.17	1.89E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2002	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	6.9	1.60E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2003	0.33	2.79E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	5.26	9.64E-05	G/HP-HR	0.24	1.70E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2004	0.22	2.63E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	4.72	7.52E-05	G/HP-HR	0.19	1.35E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2006	0.16	2.57E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	4.44	6.46E-05	G/HP-HR	0.16	1.18E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2011	0.1	2.50E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	2.45	3.20E-05	G/HP-HR	0.14	1.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2014	0.09	2.17E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	2.27	2.88E-05	G/HP-HR	0.01	5.00E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	121	175	2040	0.05	1.17E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	5.00E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR

Table F-12. Permanente Creek Long-Term Restoration (Phase 3) - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	176	250	1969	1.32	6.11E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	14	3.24E-04	G/HP-HR	0.77	5.60E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1971	1.1	5.09E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	13	3.01E-04	G/HP-HR	0.66	4.80E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1979	1	4.63E-05	G/HP-HR	4.4	1.16E-04	G/HP-HR	12	2.78E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1984	0.94	4.35E-05	G/HP-HR	4.3	1.14E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1987	0.88	4.07E-05	G/HP-HR	4.2	1.11E-04	G/HP-HR	11	2.54E-04	G/HP-HR	0.55	4.00E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	1995	0.68	3.15E-05	G/HP-HR	2.7	7.14E-05	G/HP-HR	8.17	1.89E-04	G/HP-HR	0.38	2.76E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2002	0.32	1.48E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	6.25	1.45E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2003	0.19	2.09E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	5	9.05E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2004	0.14	2.30E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	4.58	7.23E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2006	0.12	2.40E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	4.38	6.33E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2010	0.1	2.50E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.59E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2013	0.07	1.83E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	176	250	2040	0.05	1.17E-05	G/HP-HR	0.92	2.43E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	1995	0.68	2.37E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2000	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2001	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2002	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2004	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2005	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2013	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	251	500	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	1995	0.68	2.37E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2001	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2002	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2003	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2005	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.45	3.18E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2013	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	1.36	1.75E-05	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	501	750	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	0.27	3.75E-06	G/HP-HR	0.01	3.75E-07	G/HP-HR	568.3	0.00E+00	G/HP-HR

Table F-12. Permanente Creek Long-Term Restoration (Phase 3) - Emission Zero Hour and Deterioration Rate Emission Factors for Off-Road Diesel Equipment.

Fuel	Min HP	Max HP	Year	THCzh	THCdr	THCunits	COzh	COdr	COunits	NOXzh	NOXdr	NOXunits	PMzh	PMdr	PMunits	CO2zh	CO2dr	CO2units
D	751	1000	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	1999	0.68	1.12E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2005	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2006	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2007	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2009	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.08	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2014	0.07	1.83E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.06	2.50E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	751	1000	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.02	1.00E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1969	1.26	4.39E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	14	2.33E-04	G/HP-HR	0.74	3.93E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1971	1.05	3.66E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	13	2.16E-04	G/HP-HR	0.63	3.34E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1979	0.95	3.31E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	12	2.00E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1984	0.9	3.14E-05	G/HP-HR	4.2	8.32E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1987	0.84	2.93E-05	G/HP-HR	4.1	8.12E-04	G/HP-HR	11	1.83E-04	G/HP-HR	0.53	2.81E-05	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	1999	0.68	1.12E-05	G/HP-HR	2.7	5.35E-05	G/HP-HR	8.17	1.36E-04	G/HP-HR	0.38	2.02E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2005	0.32	1.12E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	6.25	1.04E-04	G/HP-HR	0.15	7.96E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2006	0.19	1.95E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.95	7.34E-05	G/HP-HR	0.12	6.51E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2007	0.14	2.22E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.51	6.32E-05	G/HP-HR	0.11	6.03E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2009	0.12	2.36E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.29	5.81E-05	G/HP-HR	0.11	5.79E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2010	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	4.08	5.30E-05	G/HP-HR	0.11	5.55E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2014	0.1	2.50E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.06	2.50E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR
D	1001	9999	2040	0.05	1.17E-05	G/HP-HR	0.92	1.82E-05	G/HP-HR	2.36	3.00E-05	G/HP-HR	0.02	1.00E-06	G/HP-HR	568.3	0.00E+00	G/HP-HR

Notes:

1. The above factors are derived from *Offroad2007* (Version 2.0.1.2), California Air Resources Board, December 15, 2006, data from emfac.csv data file, lines 41-149 (default exhaust emission factors for off-road diesel equipment for which specific factors are not provided).
2. The above factors are consistent with the factors used by CARB staff to estimate off-road diesel equipment emissions, as documented in *Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements*, California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), Attachment D (Diesel Emission Factors (g/bhp-hr)).