Air Quality Modeling Protocol

Lehigh Southwest Cement Company – Permit No. A0017
Cupertino, California

Prepared for:

Lehigh Southwest Cement Company
Cupertino, California

Prepared by:

AMEC Environment & Infrastructure, Inc.

June 2013

Project No. 0111910030.01

June 5, 2013

Project 0111910030.01

Mr. Scott Lutz
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

Subject: **Air Quality Modeling Protocol**
Lehigh Southwest Cement Company – Permanente Plant - Permit No. A0017
Cupertino, California

Dear Mr. Lutz:

On behalf of Lehigh Southwest Cement Company (Permit No. A0017), AMEC Environment & Infrastructure, Inc. (AMEC) is submitting this Air Quality Modeling Protocol for your review. Air quality modeling is being conducted in support of an AB 2588 Health Risk Assessment (HRA) that your office has requested under BAAQMD Regulation 9 Rule 13 for the facility in Cupertino, California. Upon your approval of this protocol, AMEC will conduct the air dispersion modeling, prepare the Authority to Construct permit application, and document the results in the AB 2588 HRA report.

We look forward to receiving your comments on the protocol. Please don't hesitate to contact us in the interim with any questions.

Sincerely yours,
AMEC Environment & Infrastructure, Inc.

Caryn A. Kelly
Senior Toxicologist

Stephen Ochs
Chemical / Air Quality Engineer

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Attachments: Air Quality Modeling Protocol

cc: Greg Knapp, Lehigh Cement Company LLC
Robert Hull, Bay Area Air Quality Management District
Thu Bui, Bay Area Air Quality Management District

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AIR QUALITY MODELING PROTOCOL

Lehigh Southwest Cement Company – Permit No. A0017
Cupertino, California

1.0 INTRODUCTION

On behalf of Lehigh Southwest Cement Company (Lehigh), AMEC Environment & Infrastructure, Inc. (AMEC) is submitting this air quality modeling protocol to the Bay Area Air Quality Management District (BAAQMD) for approval. Lehigh is proposing to manifold the 32 individual emission points from the existing kiln into a single exhaust stack. Lehigh is also proposing to manifold the 9 individual emission points from the existing clinker cooler into a single exhaust stack. A dispersion modeling analysis and Human Health Risk Assessment (HHRA) will be conducted as required by BAAQMD Regulation 9 Rule 13 and AB 2588 for the modified stack at the Lehigh facility in Cupertino, California.

Company and Facility Name:	<u>Lehigh Southwest Cement Company</u> Permanente Plant 24001 Stevens Creek Blvd. Cupertino, CA 95014
Permit Number and Type:	A0017, Class I, Major Source

Project Information and Description:

> On September 19, 2012, Bay Area Air Quality District (BAAQMD) adopted Regulation 9 Rule 13, requiring all Portland cement manufacturing facilities in their jurisdiction to comply with emission limits, operating practices, monitoring, reporting, and recordkeeping requirements adopted in this regulation. Lehigh operates a cement plant and lime quarry in the BAAQMD's jurisdiction. Rule 13 establishes kiln and clinker cooler vent emissions limits, opacity limits for all point sources and miscellaneous operation, kiln stack continuous emissions monitoring (CEMS) requirement for NO_x, and fugitive dust mitigation control measures.

The air dispersion modeling and subsequent HHRA will address the following BAAQMD requirements:

9-13-303 Effective September 9, 2013, no person shall operate a Portland cement manufacturing facility unless emissions from the kiln are monitored as per Section 9-13-501 and enter the atmosphere from a point or points that, at maximum potential to emit, or maximum permitted emission level, when combined with other facility emissions, have been demonstrated not to exceed the notification threshold established under Air Toxics "Hot Spots" Information and Assessment Act requirements as codified in California Health and Safety Code Section 44300 et al. and the Districts' Air Toxics Hot Spots program.

9-13-404 Health Risk Assessment: Prior to construction or modification to emission points from the kiln or clinker cooler, the operator of a Portland cement manufacturing facility shall complete and submit to the District a health risk assessment, conducted according to Health Risk Assessment Guidelines adopted by Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) for use in the Air Toxics Hot Spots Program. District review of the HRA shall be conducted concurrent to review of application of authority to construct and permit to operate submitted for emission point modifications.

9-13-501 Emissions Monitoring: Any person who operates a Portland cement manufacturing facility subject to Section 9-13-301 shall provide, properly install, maintain in good working order, and operate the following emission monitoring equipment:

501.1 Continuous Emissions Monitoring: A continuous emission monitoring system (CEMS) for each emission point from the kiln, to demonstrate compliance with the provisions of this rule by measuring nitrogen oxides (NO_x), and either oxygen (O_2) or carbon dioxide (CO_2). The CEMS shall meet the requirements of the District Manual of Procedures, Volume V, Continuous Emission Monitoring, Policy and Procedures. Each CEMS shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive fifteen (15) minute period.

501.2 Parametric Monitoring: Suitable instruments to monitor continuously for each emission point from the kiln, to demonstrate compliance with the provisions of this rule by measuring ammonia (NH3), temperature for dioxins and furans (D/F), mercury (Hg), total hydrocarbon (THC), hydrochloric acid (HCl), operational integrity of PM control device, and volumetric flow. The parametric monitors shall meet the requirements specified in the most recent revision to 40 CFR, Part 60 and Appendices.

Lehigh operates a cement plant in the BAAQMD jurisdiction. In the current configuration, the kiln exhaust is passed through a dust collection system that has 32 individual emission points. In order to show compliance with Section 9-13-501, Lehigh is proposing to manifold the 32 individual emission points into a single exhaust stack. The proposed stack will be designed such that operation at the maximum capacity (1,600,000 short tons per year of cement clinker) and maximum permitted emission levels, when combined with other facility emissions, will not exceed the notification thresholds established under Air Toxics "Hot Spots" Information and

Assessment Act. The new kiln stack will be constructed to the southeast of the kiln. There will be no increase in any criteria pollutant emissions as a result of the project.

On February 12, 2013, the United States Environmental Protection Agency finalized National Emission Standards for Hazardous Air Pollutants (NESHAP) for the Portland Cement Manufacturing Industry. This regulation reduced the particulate matter (PM) emission level to 0.07 pounds (lb) PM per ton clinker for kiln and clinker cooler vent stacks. To comply with the PM standard, kiln and clinker cooler emission points require using a PM continuous parametric monitoring system (CPMS). Compliance with this regulation is required by September 9, 2015.

This report documents the protocol to be followed for the air dispersion modeling analysis in support of the HHRA required for the air quality Authority to Construct permit application for the new stacks. Section 2.0 of this report provides a discussion of the site location. Section 3.0 describes the kiln and clinker cooler stack modifications and emissions limits considered. Section 4.0 presents the protocol to be followed for the dispersion analysis. Section 5.0 presents a summary of the air modeling protocol and Section 6.0 presents references. Model inputs and outputs prepared for the purpose of this report are provided on an enclosed CDROM.

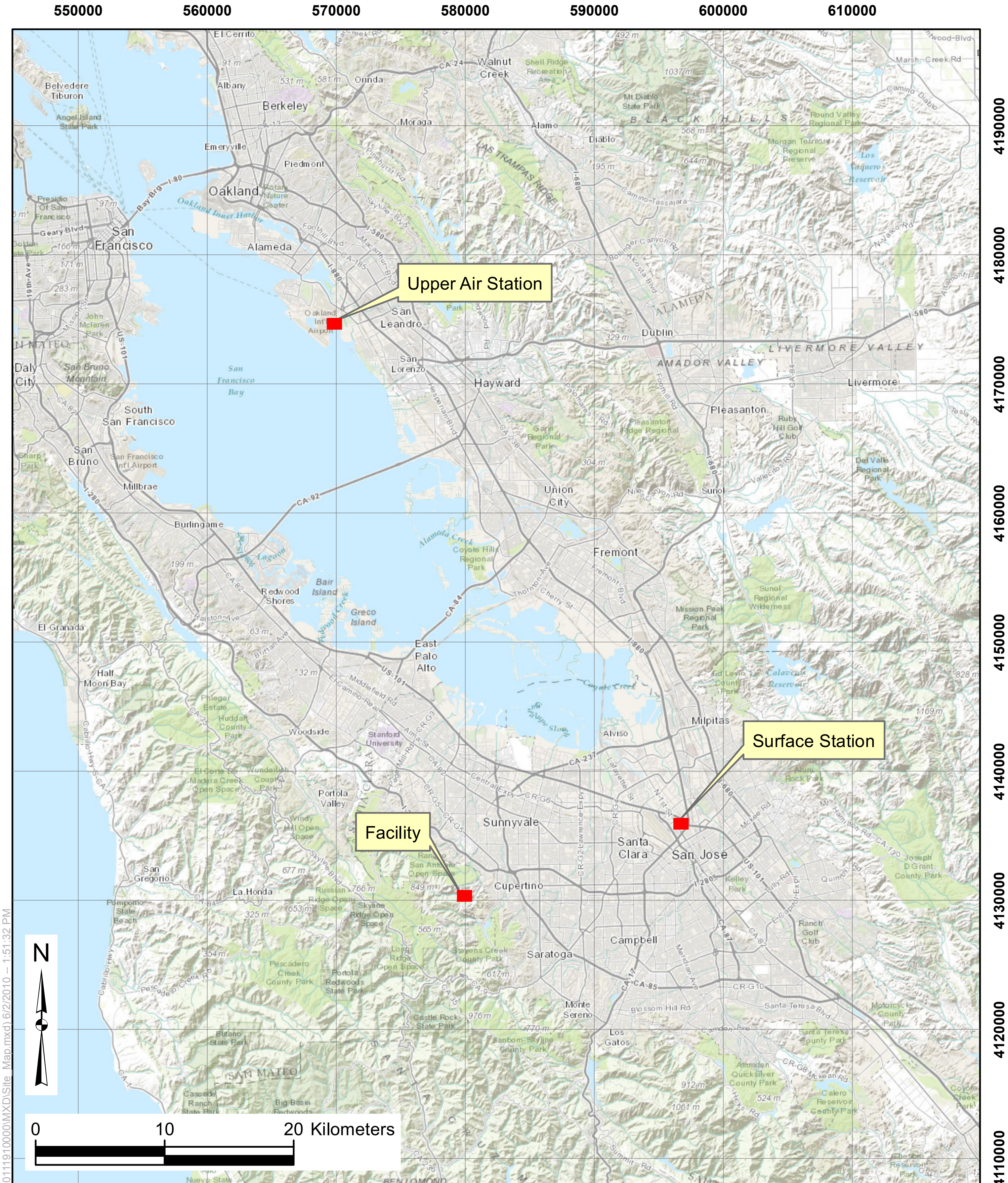
2.0 SITE LOCATION AND OPERATIONS

The Lehigh facility is located in the foothills west of the city of Cupertino, west of Interstate 280 and several miles north of Highway 9. The location of the facility is presented in Figure 1.

Elevations at the project site range from 225 to 500 meters above mean sea level (AMSL). Higher terrain is located to the west of the facility and lower terrain is located to the east of the facility. Figure 1 includes the area topography.

Figure 2 shows the proposed receptor network, which is consistent with previous modeling. Receptors were placed on various grid spacing (30 to 500 meters) covering an area approximately 14 kilometers from east to west and 16 kilometers from north to south. Residential areas are located to the north, east, and south of the facility. A 30-meter grid spacing was used in the residential area nearest the Facility, as presented in Figure 3.

The Lehigh facility consists of a mine (west), rock plant (south), and cement production facilities (north and east). Major emission sources include, a kiln, dust collectors, fugitive sources related to operations, mining operations and rock crushing, paved and unpaved roads, stockpiles, two fuel stations, emergency diesel generators, and internal combustion engines for welding equipment. HHRAs conducted under the AB 2588 program do not include air toxics emissions from mobile sources.



Map Document: (X:\Projects\0111910000\MXD\Site_Map.mxd) 6/2/2010 -- 1:51:32 PM

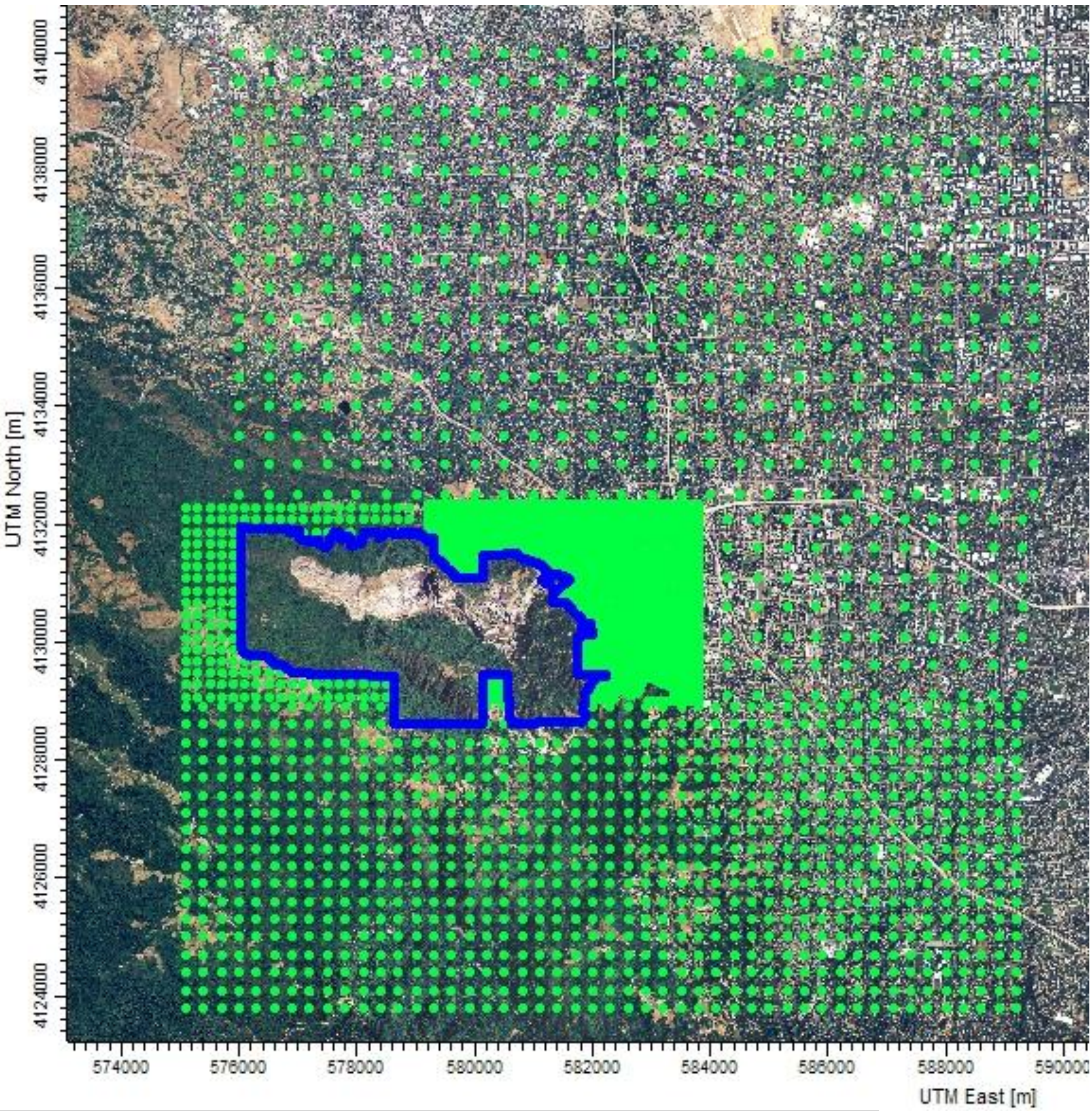
JOB NO.:	0111910030
DATE:	6/02/2010
SCALE:	1" = 10 kms
PROJ:	UTM Zone 10
DATUM:	NAD 83

The map shown here has been created with all due and reasonable care and is strictly for use with AMEC Project Number: 0111910000. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. AMEC assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.

Lehigh Southwest Cement Company
Cupertino Facility

Facility Location

FIGURE 1



Explanation

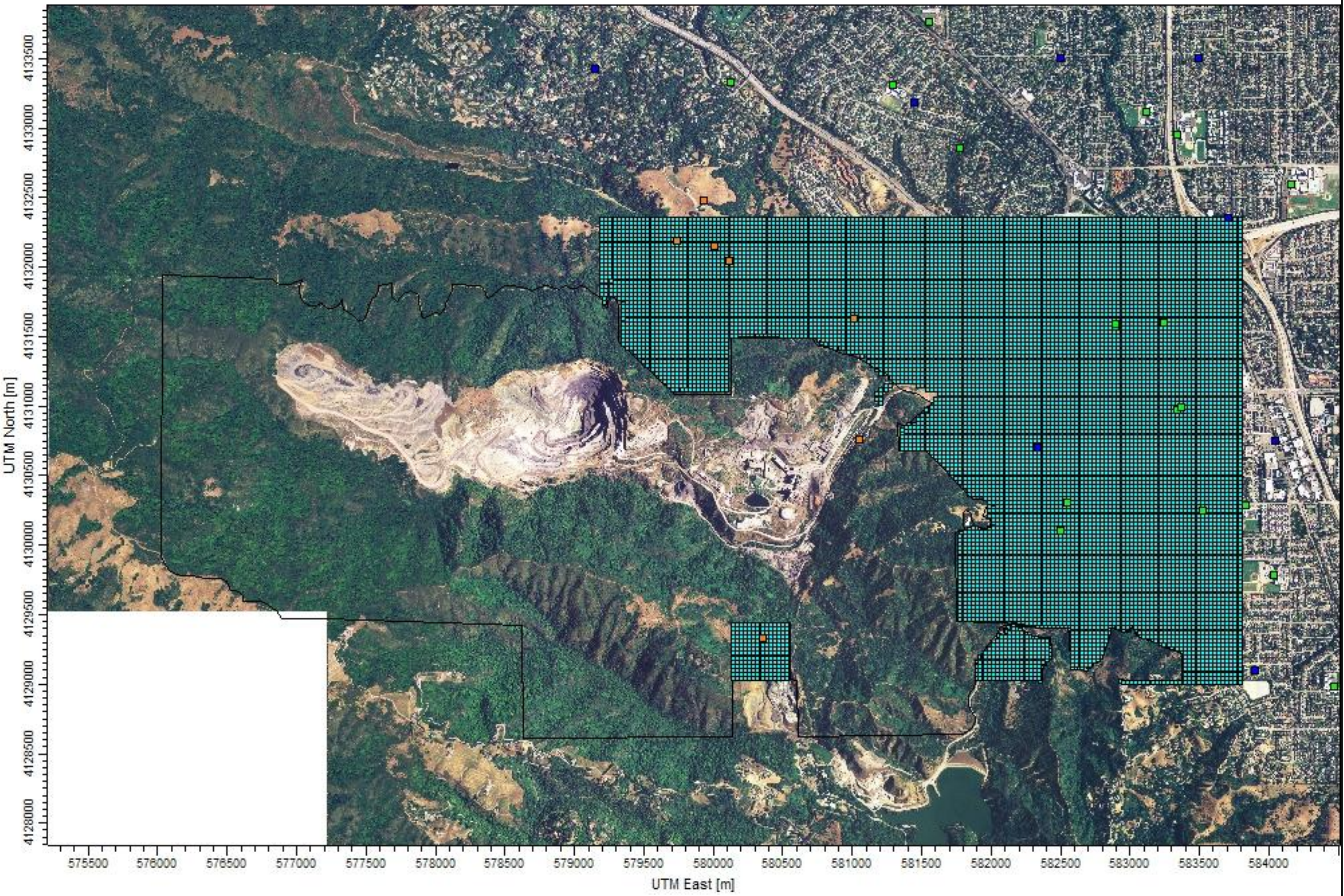
Receptor Types:

Grid

Fence line

Notes: Areas on the figure that appear solid have a high density of receptors (30 meter x 30 meter). The spacing between these receptors cannot be seen at this scale.

JOB NO. 01119100030	Lehigh Southwest Company – Cupertino Facility		amec
DESIGN: SO			
DRAWN: AMEC E&I			
DATE: 4/30/2013	Proposed Receptor Network	Figure 2	
SCALE:			



Explanation

- Residential Receptor
- Census Centroid Receptor
- Sensitive Receptors (schools, hospitals)
- Worker Receptors

JOB NO.	01119100000	Lehigh Southwest Company – Cupertino Facility	amec
DESIGN:	SO		
DRAWN:	AMEC E&I	Fine Receptor Grid	Figure 3
DATE:	4/30/13		
SCALE:			

3.0 EMISSIONS AND SOURCE CHANGES

Lehigh operates a cement plant in the BAAQMD jurisdiction and is being required by Regulation 9 Rule 13 to meet new emission requirements. Currently, the kiln vent exhaust is passed through a dust collection system that has 32 individual emission points. The future configuration will manifold the 32 individual emission points into one stack. The stack height extends vertically to a height where during operation at the maximum capacity (1,600,000 short tons per year of cement clinker) and operating at the permitted emission rates, health risk notification thresholds are not exceeded per BAAQMD Rule 13 (9-13-303).

The kiln stack will be freestanding and located approximately 29 meters to the southeast of the existing kiln dust collector building. The height of the stack, based on preliminary modeling will be approximately 90 meters (295 feet) above grade. The installation of a single kiln stack was chosen in order to comply with Sections 9-13-303, 9-13-404, and 9-13-501. Monitoring equipment would be required for each stack exhausting from the kiln and it is not economically feasible to have 32 elevated stacks and individual CEMS.

In addition to the kiln stack, a clinker cooler vent stack will be installed. The clinker cooler vent is currently vented through 9 individual stacks. Lehigh will be installing a manifold to connect all 9 stacks to one common duct to a stack. The cooler vent stack will be approximately 36 meters tall from elevation.

Emissions from the facility are based on a Comprehensive Emission Inventory Report (CEIR) prepared for emission year 2008 (AMEC, 2009) and the two CEIR Addenda (Lehigh, 2009 and AMEC, 2010). Emissions for both the plant and mine non-mobile sources are included in the CEIR. The modeled emissions will be scaled to reflect the maximum facility production rates (1,600,000 tons of clinker) and will reflect the chemical-specific emission limits for air toxics specified in Rule 13 (dioxins/furans, mercury, and hydrogen chloride). Emission calculations will be provided in the air quality permit application.

4.0 PROPOSED AIR DISPERSION MODELING APPROACH

This section presents the proposed dispersion modeling approach. The discussion includes the model selection, building downwash analysis, land use, meteorological data, receptor locations, and source parameters.

4.1 MODEL SELECTION

AERMOD (version 12345, dated 12/11/2012; USEPA, 2009a) was selected to predict ambient concentrations resulting from the facility's emissions sources. AERMOD is the recommended sequential model in USEPA's Guideline on Air Quality Models (40 CFR 51, Appendix W). AERMOD View™, an AERMOD modeling package published by Lakes Environmental, will be used. The following regulatory default options will be used in AERMOD:

- use the elevated terrain algorithms requiring input of terrain height data for receptors and emission sources,
- turn on stack tip downwash (building downwash automatically overrides),
- use the calms processing routines,
- include buoyancy-induced dispersion, and
- use the routines for missing meteorological data processing.

4.2 BUILDING DOWNWASH ANALYSIS

If a stack is sufficiently close to a large building, the plume can be entrained in the building's wake. The winds in the wake of the building cause the plume's rise to be diminished, which may result in increased ground level ambient concentrations near the building. Lehigh conducted an investigation to determine the building dimensions and heights near any stacks. There are also several large structures such as the cement silos that will also be evaluated for downwash. The collected data will be input to USEPA's Building Profile Input Program (BPIP) for PRIME (BPIPPRM, version 04274; USEPA, 2004), which will be used to compute formula GEP stack heights and to generate wind direction specific building profiles for sequential modeling.

4.3 URBAN/RURAL LAND USE ASSESSMENT

Dispersion coefficients for air quality modeling were selected based on the land use classification technique suggested by Auer (Auer, 1978), which is the preferred method of the USEPA. The classification determination involves assessing land use by Auer's categories within a 3-kilometer radius of the proposed site. Urban dispersion coefficients should be selected if greater than 50 percent of the area consists of urban land use types; otherwise, rural coefficients apply.

USEPA's AERSURFACE tool (version 13016; USEPA, 2013) was used to summarize the land use within a 3-kilometer radius of the facility. AERSURFACE was developed by USEPA to identify surface roughness length within a defined radius from a specified point. In this case, the latitude and longitude coordinates of the on-site meteorological state were input to AERSURFACE along with a 3 kilometer radius. USGS National Land Cover Data (NLCD) were acquired for the northern portion of the state of California and used as input to AERSURFACE. The area within 3-kilometers of the facility is predominately rural with residential and commercial land use comprising 31% of the total area within a 3 km radius of the onsite meteorological station. Therefore, rural dispersion coefficients were selected for the air quality modeling.

4.4 RECEPTORS

AMEC proposes using the receptor grids evaluated in the 2011 AB 2588 HHRA. The initial grid was generated by BAAQMD and has been expanded by AMEC. Receptors from the worker exposure analysis and sensitive receptor exposure analysis were added so all receptors of interest are captured in a single model run. Figures 2 and 3 present the receptor network with residential, worker, and sensitive receptors that will be used for the modeling analysis.

Receptor elevations were assigned by using USEPA's AERMAP (version 11103; USEPA, 2009b) software tool, which is designed to extract elevations from USGS Digital Elevation Model (DEM) files, USGS National Elevation Dataset (NED) files, and Shuttle Radar Topography Mapping (STRM) files. AERMAP is the terrain preprocessor for AERMOD and uses the following procedure to assign elevations to a receptor:

- For each receptor, the program searches through the terrain input files to determine the two profiles (longitudes or eastings) that straddle this receptor.
- For each of these two profiles, the program then searches through the nodes in the terrain input files to determine which two rows (latitudes or northings) straddle the receptor.
- The program then calculates the coordinates of these four points and reads the elevations for these four points.

A 2-dimensional distance-weighted interpolation is used to determine the elevation at the receptor location based on the elevations at the four nodes determined above.

Shuttle Terrain Radar Mapping (STRM) elevation data with a resolution of 1 arc-second (roughly 30 meters) were used as inputs to AERMAP. Although National Elevation (NED) data is preferred, the USGS has dropped the AERMAP compatible Geotiff format from their national mapping website. The STRM data were obtained from the USGS EROS website and covers the modeling domain area. This domain is sufficient to properly account for terrain that would factor into the critical hill height calculations. AERMAP input and output files are provided on CDROM per the nomenclature described in Appendix A.

4.5 METEOROLOGICAL DATA

USEPA's AERMET tool (version 12345, dated 12/10/2012; USEPA, 2006) will be used to process meteorological data for use with AERMOD. AERMET merges National Weather Service (NWS) surface observations and onsite meteorological data with NWS upper air observations and performs calculations of meteorological parameters required by AERMOD. In addition to the meteorological observations, AERMET further requires the inclusion of land use surface characteristics that are calculated by USEPA's AERSURFACE tool.

The meteorological data used in the sequential modeling consists of on-site hourly surface observations collected by Lehigh from a 10-meter tower located near the southwestern property boundary. For consistency with the 2011 AB 2588 HHRA, the meteorological data used in the modeling will cover 2006, with the raw on-site data provided by Lehigh.

The meteorological instruments were installed at an elevation of 10 meters above ground level (AGL). The tower was equipped with the following instrumentation:

- Wind speed, wind direction, standard deviation of horizontal wind, and ambient temperature at 10 meters. Relative humidity was also measured by the tower; however, AERMET is not able to use the onsite relative humidity data.

Concurrent surface observations collected by NOAA at the San Jose Airport were used to substitute for missing on-site wind and temperature values and to provide relative humidity, station pressure, and cloud cover data. BAAQMD provided the data in AERMET-ready format.

Concurrent upper air radiosonde data were provided by BAAQMD for the Oakland NWS site (WBAN 23230). The data obtained were in FSL format. The Oakland site is located at latitude 37.75 and longitude -122.22 with an elevation of 6 meters (19.68 feet) according to the RAOB NOAA website and the FSL file header.

Both the surface station and upper air station locations are shown in Figure 1.

USEPA's AERSURFACE tool was used to calculate the surface roughness length, albedo, and Bowen ratio inputs required by AERMET. AERSURFACE was developed by USEPA to identify these parameters within a defined radius from a specified point. In this case, the latitude and longitude of the on-site meteorological tower and the surface meteorological station were input to AERSURFACE along with a 1 kilometer radius per USEPA guidance. USGS National Land Cover Data (NLCD) were acquired for the northern section of California and used as input to AERSURFACE. The parameters were calculated for 12 compass sectors broken down as follows:

- Sector 1: 0° to 30°
- Sector 2: 30° to 60°
- Sector 3: 60° to 90°
- Sector 4: 90° to 120°
- Sector 5: 120° to 150°
- Sector 6: 150° to 180°
- Sector 7: 180° to 210°
- Sector 8: 210° to 240°
- Section 9: 240° to 270°
- Section 10: 270° to 300°
- Section 11: 300° to 330°
- Section 12: 330° to 360°

The sectors are the maximum number allowed by AERSURFACE. The surface characteristics were also broken down by month. Seasonal categories were assigned as follows per BAAQMD guidance (2007):

- Late autumn after frost and harvest, or winter with no snow: January, November and December;

- Winter with continuous snow on the ground: No months;
- Transitional spring (partial green coverage, short annuals): February and March;
- Midsummer with lush vegetation: April, May, June and July; and
- Autumn with unharvested cropland: August, September and October.

Average surface moisture was assumed. AERSURFACE input and output files are provided on CDROM per the nomenclature described in Appendix A.

The Lehigh on-site data, San Jose surface data, Oakland upper air data, and AERSURFACE land use data for the onsite meteorological tower and the surface station were processed with the AERMET meteorological processor. AERMET input and output files are provided on CDROM per the nomenclature described in Appendix A.

Based on the above approach, the data completeness is 95.92% with 1790 missing hours. The data meets the USEPA completeness criteria of 90%.

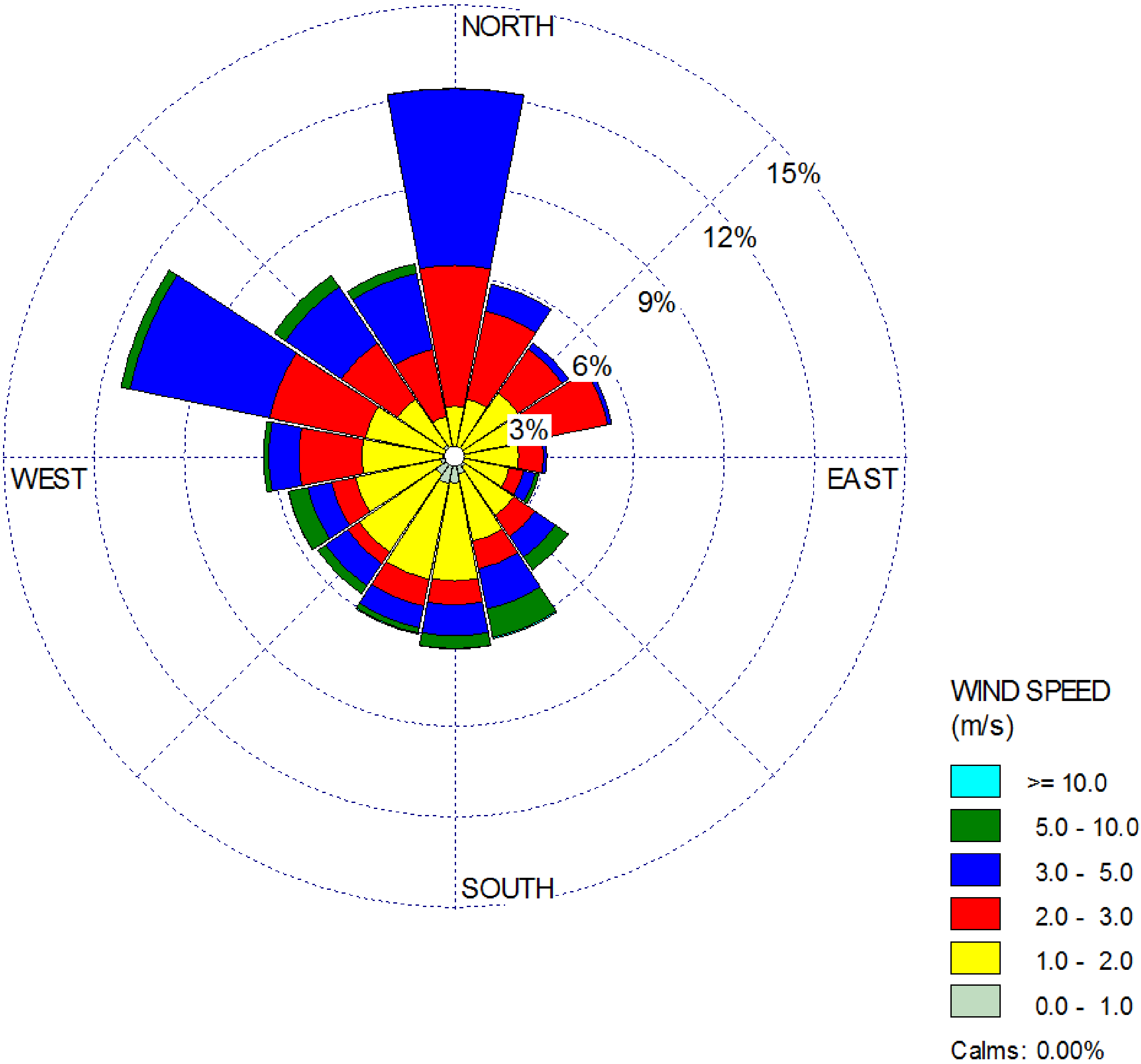
A wind rose for the meteorological data is provided in Figure 4. The annual wind rose demonstrates that wind direction frequency is generally aligned with the orientation of the nearby mountain ridges and valleys and is predominantly a northerly wind; however, there are significant occurrences of west-northwest winds as well.

4.6 SOURCE PARAMETERS

Source input parameters are provided in Tables 1 and 2 for point and volume sources, respectively. With the exception of the updated kiln and clinker cooler stack parameters, the sources presented are consistent with those modeled in the 2011 AB 2588 HHRA.

Figure 5 presents the point sources that will be evaluated. Figure 6 presents a refined view of the proposed single kiln stack location (designated “kiln”) in relation to existing buildings and point sources. A number of point sources at the facility have a horizontal stack orientation. These point sources will be set up in AERMOD in accordance with USEPA guidance (Model Clearinghouse Memo 93-II-09). AERMOD View™ has incorporated the USEPA guidance into their model as a nonregulatory option. Capped or horizontal stacks not subject to building downwash will have their exit velocity set to 0.001 meters per second to account for suppression of vertical momentum for the plume and will use an effective stack diameter that maintains the actual flow rate of the plume.

Fugitive emissions were calculated and are being aggregated into several volume sources throughout the facility. This approach simplifies the modeling by reducing the number of sources to model. However, if more refined analysis is required once initial modeling is conducted, AMEC will further define individual fugitive sources such as storage piles. A summary of the fugitive modeled sources is provided in Table 2 and the proposed fugitive volume source layout is provided in Figure 7.



JOB NO.	01119100030	Lehigh Southwest Company – Cupertino Facility	amec
DESIGN:	SO		
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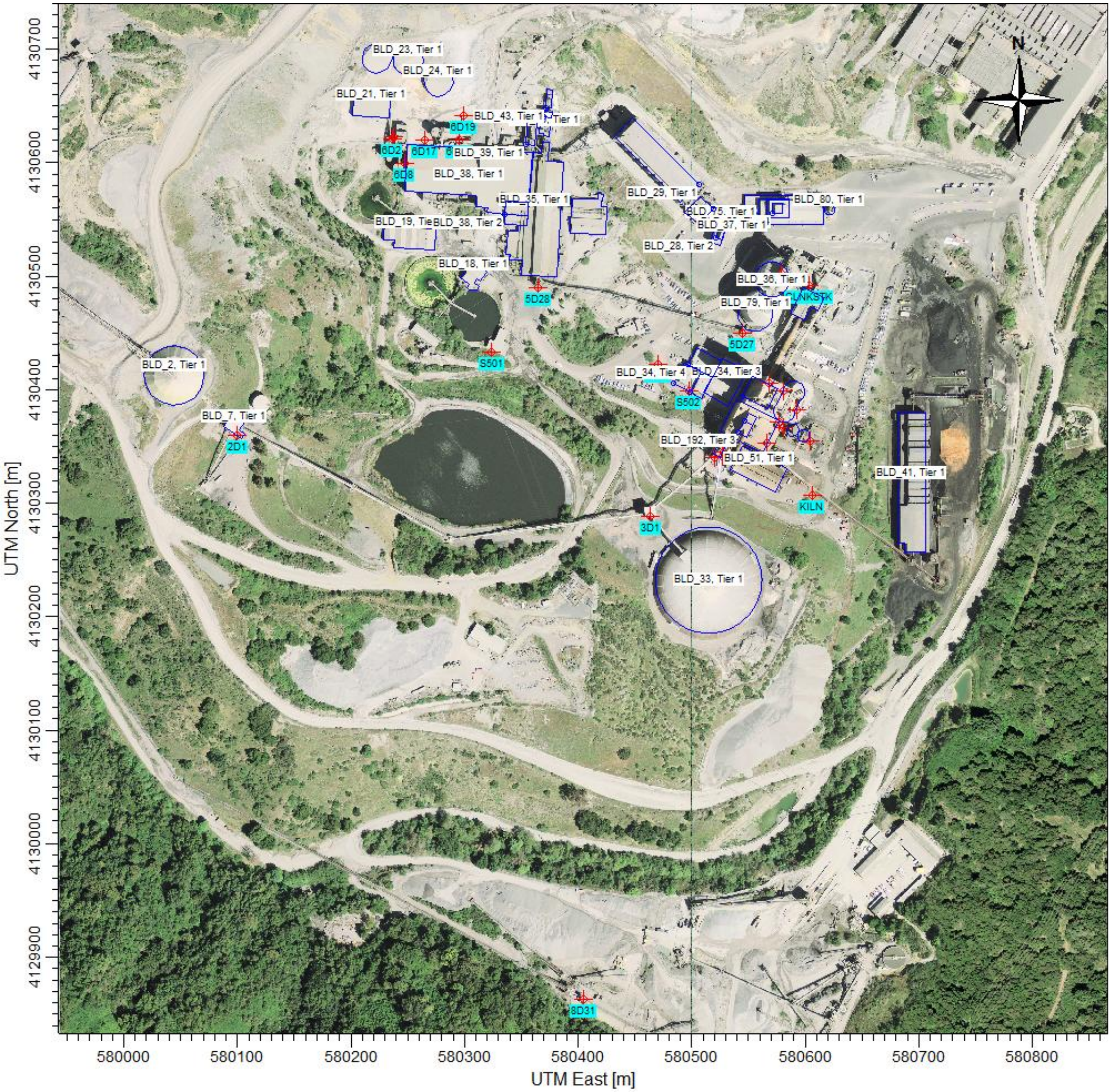
DATE:	4/30/2013	Wind Rose from AERMET Surface File	Figure 4
SCALE:			



Explanation

Point Sources

Building Outline

JOB NO.	01119100030
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DATE:	6/3/2013
SCALE:	

Lehigh Southwest Company – Cupertino Facility

Point Sources and Buildings Used in the Air Dispersion Modeling

Figure 5

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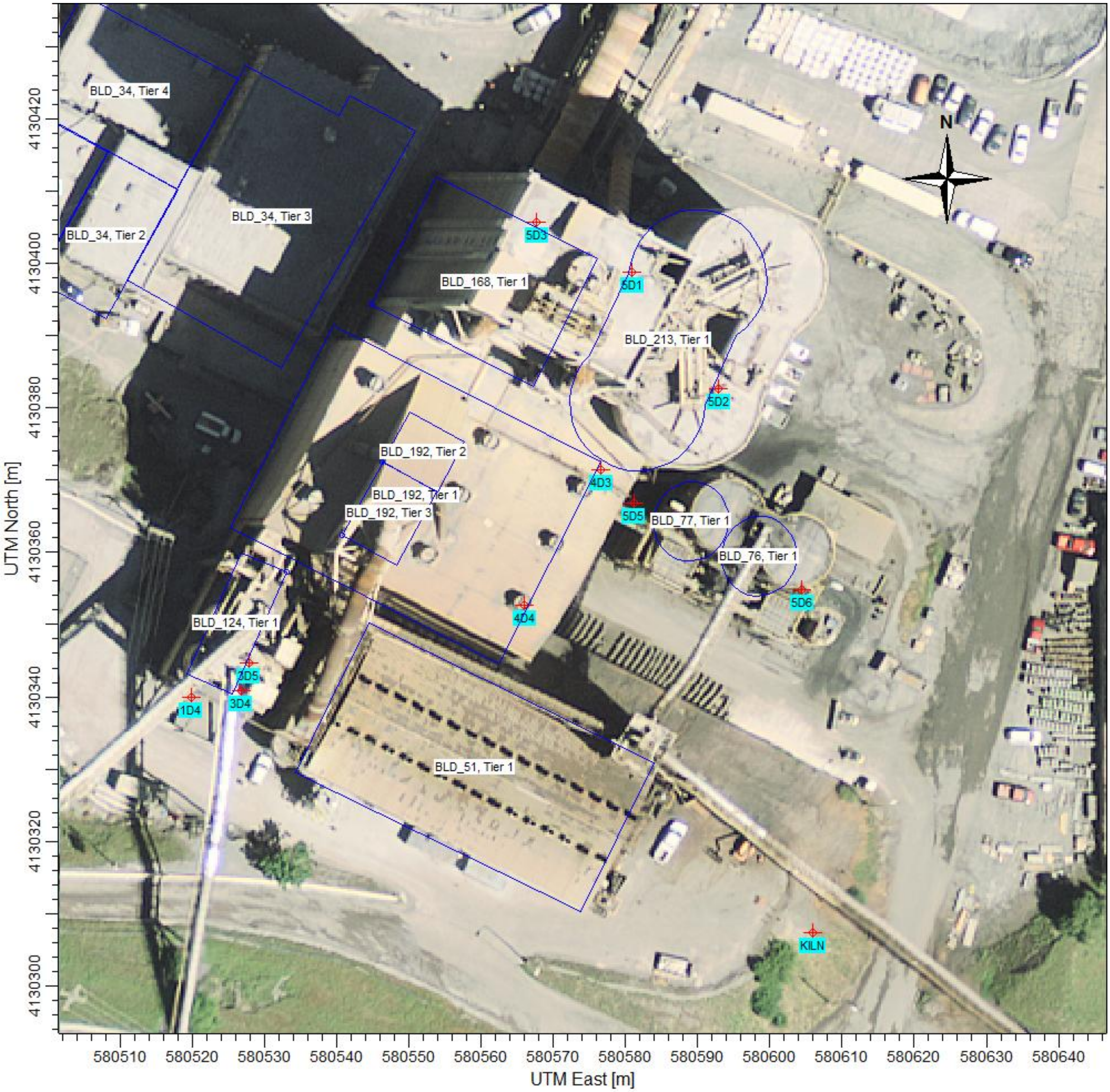

Explanation

⊕ Point Sources

Building Outline

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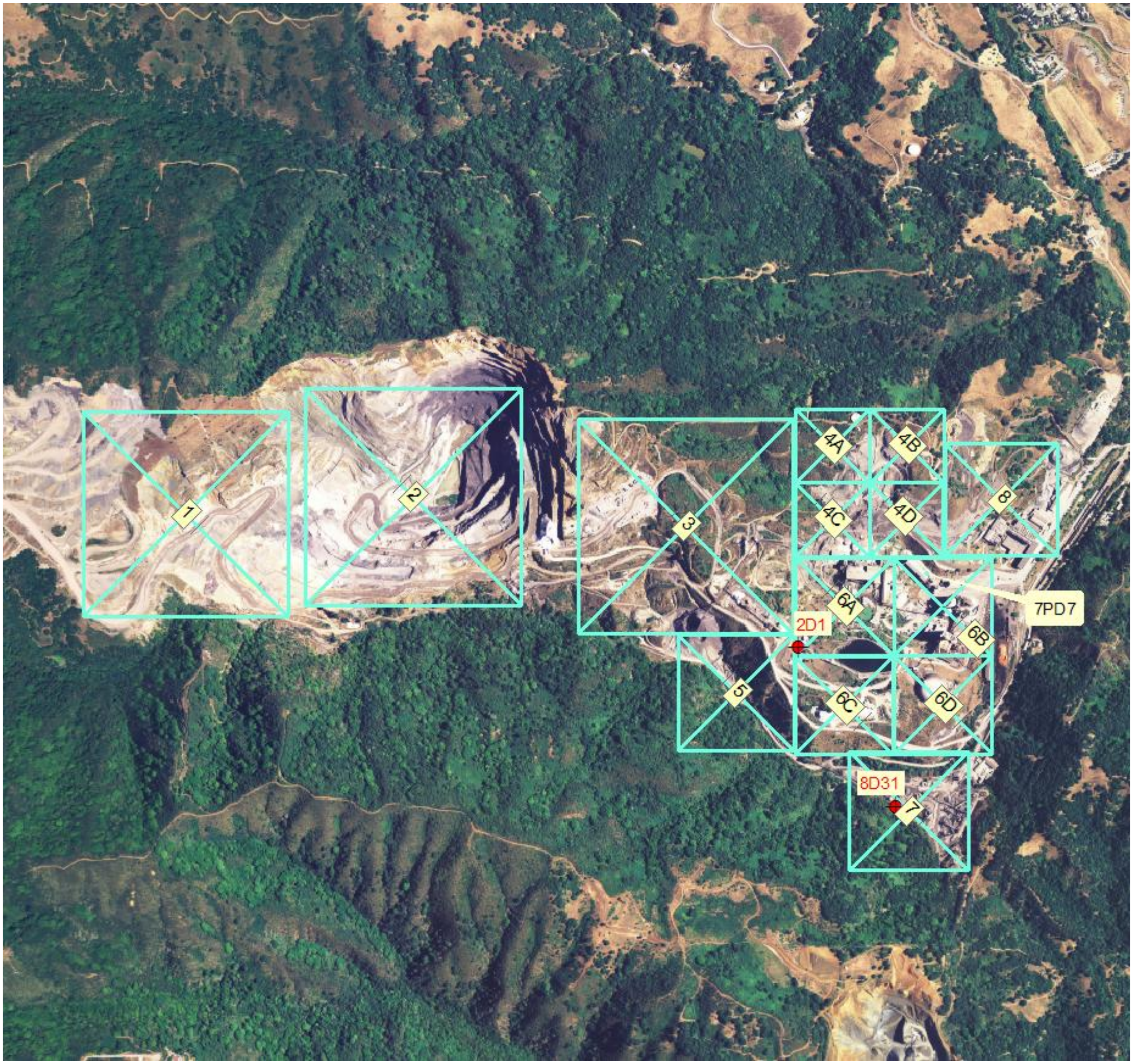
SCALE:	NA

Lehigh Southwest Company – Cupertino Facility

Point Sources and Buildings Near Kiln Used in the Air Dispersion Modeling

Figure 6

amec



Explanation

2D1 and 8D31 Point Sources

Volume Sources including 7PD7

JOB NO. 01119100000	Lehigh Southwest Company – Cupertino Facility		amec
DESIGN: SO			
DRAWN: AMEC E&I			
DATE: 4/30/2013	Volume Fugitive Sources and Other Point Sources Used in the Air Dispersion Modeling	Figure 7	
SCALE:			

5.0 SUMMARY

Air dispersion modeling to support an AB 2588 HHRA is being conducted for the Lehigh facility to meet the requirements of Regulation 9 Rule 13. Air toxic emission rates will be calculated, source parameters are presented, and wind-direction specific building dimensions will be calculated with USEPA's BPIPPRM computer program. This modeling protocol describes the selected dispersion model, land use, receptor grids and meteorological data to be used.

The proposed modeling analysis was completed using BAAQMD, OEHHA, CARB, and USEPA guidance as specified herein. Dispersion modeling will be performed for terrain processed with the most recent version of AERMAP. The predicted concentrations will be used in the Hotspots Analysis Reporting Program (HARP) model, version 1.4f to predict potential residential, sensitive receptor, and worker health risks related to emission sources at the facility.

6.0 REFERENCES

40 CFR 51, Appendix W. Guideline on Air Quality Models.

AMEC Geomatrix, Inc., 2009, Comprehensive Emission Inventory Report (CEIR) for Lehigh Southwest Cement Company, Facility #A0017, March.

AMEC, 2010, Revisions to CEIR for 2008, Lehigh Southwest Cement Company, Cupertino, California, August 18.

AMEC, 2011, Revised AB2588 Health Risk Assessment for 2005, Average 2008/2009, and 2013 Production Scenarios, Lehigh Southwest Cement Company, Cupertino, California, March 30.

Auer, A. H., 1978. "Correlation of Land Use and Cover with Meteorological Anomalies", JAM, Volume 17.

Bay Area Air Quality Management District, 2007, Permit Modeling Guidance, June <<http://www.baaqmd.gov/~/media/Files/Engineering/Air%20Toxics%20Programs/pmt _ modeling guidance.ashx>>.

Lehigh Southwest Cement Company, 2009, A0017 Submitted 2008 CEIR: AB2588 Update – BAAQMD requested addendum, August 31.

USEPA, 2004. *User's Guide to the Building Profile Input Program*, EPA-454/R-93-038. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. Revised April 21, 2004.

USEPA, 2006. *User's Guide for the AERMOD Meteorological Preprocessor (AERMET)*, EPA-454/B-03-002, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, December 2006.

USEPA, 2009a. *User's Guide for the AMS/EPA Regulatory Model – AERMOD*, EPA-454/B-03-001. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. October 2009.

USEPA, 2009b. *User's Guide for the AERMOD Terrain Preprocessor (AERMAP)*, EPA-454/B-03-003. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. February 2009.

USEPA, 2013. *AERSURFACE User's Guide*, EPA-454/B-08-001, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, January 2008, (Revised 01/16/2013).

TABLES

TABLE 1

POINT SOURCE INPUT PARAMETERS [1]
Lehigh Southwest Cement Company
Cupertino Facility

Dust Collector BAAQMD Permit #	DC ID	Model ID	Equipment Description	Source Description	Material	Operating Schedule [2] weeks/ year	days/ week	hours/ day	UTM NAD83 Coordinates X (meters)	Y (meters)	Stack ID	Stack Height [2] (ft)	Stack Height [2] (m)	Stack Orientation [3] (V/H)	Stack Shape (Round / Rect)	Stack Dimensions (in)	(in)	Stack Diameter [4] (ft)	(m)	Temp [2] (°F)	(K)	Stack Flow [2] (acfm)	Exit Velocity [5] (m/s)
A-114	1-DC-4	1D4	Dust Collector - Mikro-Pulsaire Model 1F3 8,000 cfm	Additive Bin Transfer Facilities Area	Additive	52	7	24	580519.84	4130340.0	P114	75	22.9	H	Rect	16	18	1.6	0.49	Ambient[6]		8,000	20.32
A-121	2-DC-1	2D1	Dust Collector - Mikro-Pulsaire Model 1F5 16,000 cfm	Tertiary Scalping Screen/ Tertiary Crusher	56% High Grade 44% Mid Grade	52	7	16	580100.0	4130360	P121	98	29.9	H	Rect	25	22	2.2	0.67	Ambient[6]		16,500	21.95
A-131	3-DC-1	3D1	Dust Collector - Mikro-Pulsaire Model 1F2 6,000 cfm	Rock Sampling System Area 3	56% High Grade 44% Mid Grade	52	7	16	580463.6	4130288.8	P131	75	22.9	H	Rect	16.5	14	1.4	0.44	Ambient[6]		6,000	19.00
A-134	3-DC-4	3D4	Dust Collector - Mikro-Pulsaire Model 1F3 8,000 cfm	Preblend Storage Bin	5% Additive 95% All Grade Limestone	52	7	24	580526.71	4130340.81	P134	98	29.9	H	Rect	16	18	1.6	0.49	Ambient[6]		8,000	20.32
A-135	3-DC-5	3D5	Dust Collector - Mikro-Pulsaire Model 1F3 8,000 cfm	High-grade Storage Bins	High Grade Limestone	52	7	24	580527.83	4130344.70	P135	98	29.9	H	Rect	16	18	1.6	0.49	Ambient[6]		8,000	20.32
Pending	4-DC-7 to 4-DC-38	Kiln	10 individual fans, single stack design	Raw Mill/Kiln	5% Additive 53% High Grade	52	7	24	580605.94	4130307.33	--	295	90	V	Round	--	--	15	4.6	312	428.7	631,800	18.16
A-143	4-DC-3	4D3	Dust Collector - Mikro-Pulsaire Model 1F3 10,000 cfm	Raw Mill 1 Separator System	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580576.59	4130371.43	P143	80	24.4	H	Rect	25	22	2.2	0.67	210	372.0	10,000	13.30
A-144	4-DC-4	4D4	Dust Collector - Mikro-Pulsaire Model 1F3 10,000 cfm	Raw Mill 2 Separator System	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580565.99	4130352.64	P144	80	24.4	H	Rect	25	22	2.2	0.67	210	372.0	10,000	13.30
A-151	5-DC-1	5D1	Dust Collector - Mikro-Pulsaire Model 1F3 10,000 cfm	Homogenizer	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580580.90	4130398.80	P151	135	41.1	H	Rect	22	20	2.0	0.60	180	355.4	20,000	33.25
A-152	5-DC-2	5D2	Dust Collector - Mikro-Pulsaire Model 1F3 10,000 cfm	Homogenizer	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580592.91	4130382.67	P152	135	41.1	H	Rect	28	25	2.5	0.76	180	355.4	20,000	20.90
A-153	5-DC-3	5D3	Dust Collector - Mikro-Pulsaire Model 2G3 18,000 cfm	Kiln Feed System	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580567.70	4130405.68	P153	195	59.4	H	Rect	28	25	2.5	0.76	180	355.4	18,000	18.81
Pending	5-DC-11/20	CLNKSTK	Dust Collector - Kaiser Design glass bag 135,000 cfm	Clinker Cooler	Clinker	52	7	24	580603.77	4130492.05	--	117	35.7	V	Round	--	--	7.0	2.1	392	473.2	177,000	23.4
A-164	5-DC-23	5D23	Dust Collector - Mikro-Pulsaire Model 1F3 10,000 cfm	Clinker Silo B	Clinker	52	7	24	580578.70	4130502.97	P164	80	24.4	H	Rect	20	23	2.0	0.61	120	322.0	10,000	15.90
A-165	5-DC-27	5D27	Dust Collector - Mikro-Pulsaire Model 1F3 8,000 cfm	Clinker Transfer System	Clinker	52	7	24	580545.00	4130450.00	P165	80	24.4	H	Rect	11	13	1.1	0.34	120	322.0	4,000	20.46
	5-DC-28	5D28							580365.00	4130490.00			24.4	H	Round	--	--	1.1	0.33				22.04
A-171	5-DC-5	5D5	Baghouse, Pulse Jet Dust Collector - Mikro-Pulsaire Model 2D5 24,000 cfm	Kiln/Kiln Coal System	Coke	52	7	24	580581.17	4130366.90	P171	60	18.3	H	Round	--	--	2.5	0.76	140	333.2	24,000	24.84
A-172	5-DC-6	5D6	Baghouse, Pulse Jet Dust Collector - Mikro-Pulsaire Model 2D5 24,000 cfm	Kiln/Precalciner Coal Mill	Coke	52	7	24	580604.44	4130354.86	P172	60	18.3	H	Round	--	--	2.5	0.76	140	333.2	24,000	24.84
A-13	6-DC-1	6D1	Dust Collector - Reese 4 unit x 49 Bags	Roll Press Clinker Surge Bin and Feeder	Clinker	52	7	24	580237.77	4130623.27	P14	10	3.0	H	Rect	13	14.5	1.3	0.39	80	299.8	5,000	19.40
A-210	6-DC-17	6D17	Dust Collector (6-D-1) - Carter Day Model 376RF10 Clamshell 20,000 cfm	Finish Mill 6-GM-1	Cement	52	7	21	580265.00	4130620.00	P210	17	5.2	H	Round	--	--	2.5	0.76	230	383.2	20,000	20.70
A-211	6-DC-12/18	6D12	Dust Collector (6-D-1) - Carter Day -4- Model 376RF10 80,000 cfm	Separator 6-SE-2	Cement	52	7	21	580295.54	4130619.71	P211	8	2.4	H (45 deg)	Rect	39	39	3.7	1.12	168	348.7	80,000	38.48
A-218	6-DC-19	6D19	Dust Collector - Mikro-Pulsaire Model 2-1200T-12 150,000 ACFM	6-GM-1 Air Separator, Finish Mill 6GM3	Cement	52	7	21	580299.17	4130640.77	P218	15	4.6	H	Rect	65	73	6.5	1.97	200	366.5	150,000	23.12
A-220	6-DC-8	6D8	Dust Collector - Mikro-Pulsaire Model 289S/10, 17000 ACFM	6-GM-2 Mill and Peripherals	Cement	52	7	21	580247.4	4130599.7	--	107	32.6	H	Rect	28.5	24	2.5	0.75	220	377.6	17,000	18.18

TABLE 1

POINT SOURCE INPUT PARAMETERS [1]
Lehigh Southwest Cement Company
Cupertino Facility

Dust Collector BAAQMD Permit #	DC ID	Model ID	Equipment Description	Source Description	Material	Operating Schedule [2]			UTM NAD83 Coordinates		Stack ID	Stack Height [2] (ft)	Stack Height [2] (m)	Stack Orientation [3] (V/H)	Stack Shape (Round / Rect)	Stack Dimensions		Stack Diameter [4]		Temp [2]		Stack Flow [2]	Exit Velocity [5]
						weeks/ year	days/ week	hours/ day	X (meters)	Y (meters)						(in)	(in)	(ft)	(m)	(^oF)	(K)	(acfm)	(m/s)
A-230	6-DC-2	6D2	Dust Collector - Mikro-Pulsaire Model 289S/10, 15000 ACFM	Roller Press and Peripherals	Cement	52	7	21	580236.6	4130621.2	P230	34	10.4	H	Rect	21	25	2.2	0.66	150	338.7	15,000	20.90
A-384	8-DC-31	8D31	Baghouse 8-DC-31	Rock Plant 2 Conveyors/Rock Plant 2 Screens - 16 & 17	Low Grade Limestone	50	5	8	580404.9	4129863.4	P184	25	7.6	V	Round	--	--	2.5	0.76	Ambient[6]		17,000	17.59
S501	--	S501	Caterpillar D349	Emergency Diesel Generator	Diesel fuel	20 hours/yr			580323.8	4130432.7	P443	12	3.7	H	Round	--	--	1.1	0.34	120	322.0	5350	28.60
S502	--	S502	Caterpillar D3516	Emergency Diesel Generator	Diesel fuel	20 hours/yr			580497.3	4130398.5	P444	3	0.9	H	Round	--	--	1	0.30	180	355.4	15,000	97.02
--	999-DC	999D	--	Pseudo Stack for Remaining Dust Collector Emissions [7]	--	--	--	--	580446.50	4130451.60	--	58	17.6	H	--	--	--	--	0.35	100	310.9	4270	7.80

Notes

1. Input parameters were provided by the facility; AMEC has not measured any source parameters.
2. Information obtained from Hanson Permanente Cement Inspection Report #562, March 10, 2005.
3. Vertical (V) or horizontal (H) orientation of the stack.
4. Provided by facility personnel; if stack is rectangular, equivalent diameter is calculated from stack dimensions as follows: Diameter (ft) = 2 x (Stack dimensions (in x in) / 144 in/ft / pi)$^{1/2}$
5. If stack orientation is horizontal, stack is modeled with a 0.001 meter per second (m/s) velocity. Other stack velocities calculated as follows: Stack flow (acfm or ft^3/min) x 0.02832 ft^3/m^3 / stack area (m^2) / 60 sec/min; the model assumes all point source stacks are round, therefore, the stack area was calculated as follows: Stack area (m^2) = pi (3.14) x (stack diameter (m) / 2)^2
6. Sources operate at ambient temperature which varies seasonally. A value of 0 K was entered into the model for these sources.
7. Dust collector sources with an insignificant contribution to particulate (dust) emissions were not modeled individually (per the HRA Protocol, AMEC, 2010). Instead, related emissions were combined and modeled from a single representative stack with average parameters in a central facility location.

Abbreviations
-- = not applicable
DC = Dust collector
ft = feet
in = inches
Rect = Rectangular
UTM NAD 83 = Universal Transverse Mercator; North American Datum 1983

TABLE 2

FUGITIVE VOLUME SOURCE INPUT PARAMETERS
Lehigh Southwest Cement Company
Cupertino Facility

Modeled Volume Source Group[1]	Source[2]	CEIR Table	Material	Operating Schedule			UTM NAD83 Coordinates[3]		Dimensions (meters)		
				weeks/ year	days/ week	hours/ day	X (meters)	Y (meters)	side length	initial lateral dimension	release height
1 / 2	Material Handling	12A	Primary crushed limestone (medium grade)	52	7	10	578187.53	4130775.88	640.48	148.95	7
1 / 2	Blasting	12A		52	7	10					
1 / 2	Bulldozing	12A		52	7	10	578895.69	4130829.41	674.83	156.94	
1 / 2	Grading	12A		52	7	10					
1 / 2	Dust Entrainment - Unpaved Roads	12B	Unpaved road dust in mine (sample 015)	52	7	10					
1 / 2	Wind Erosion - Unpaved Roads	12B	Unpaved road dust in mine (sample 015)	52	7	24					
1 / 2	Wind Erosion - Mine Area	12C	Primary crushed limestone (medium grade)	52	7	24					
3	Crushing and screening process fugitives	7B	27% High Grade 25% All Grade 48% Low Grade	52	7	24	579745.28	4130737.49	670.78	156	7
4 (4A-4D)[4]	Cement facility process fugitives	7A	Various	52	7	24	580319.09	4130874.87	199.1	46.3	7
	Natural Gypsum Stockpile (located in a covered bldg)	11	Natural Gypsum	52	7	24			230.0 230.0	53.5 53.5	
	Pozzolan Stockpile (located in a covered bldg)	11	Pozzolan	52	7	24			230.0	53.5	
5	Rock plant process fugitives	7C	Low grade	52	7	24	579904.89	4130218.23	359.64	83.64	7
5	Primary Crushed Limestone Stockpile (High Grade)	11	Primary crushed limestone (high grade)	52	7	24					
5	Primary Crushed Limestone Stockpile (Medium Grade)	11	Primary crushed limestone (medium grade)	52	7	24					
6 (6A-6D)[4]	Dust entrainment from unpaved roads	10	Unpaved road dust	52	7	10	580395.86	4130333.39	306.0	71.16	7
	Dust entrainment from paved roads	10	Paved road dust	52	7	10			306.0	71.16	
	Wind erosion from unpaved roads	10	Unpaved road dust	52	7	24			306.0	71.16	
	Bauxite Stockpile	11	Bauxite	52	7	24			306.0	71.16	
	Iron Ore Stockpile	11	Iron Ore	52	7	24					
	Coal Stockpile	11	Coal	52	7	24					
	Coke Stockpile	11	Coke	52	7	24					
	Clinker Stockpile	11	Clinker	52	7	24					
	Gasoline dispensing	8	--	2,500 hours/year							
6 / 7[5]	Diesel dispensing	8	--	2,500 hours/year			580441.3	412849.5	371.69	86.46	7
5 / 6 / 7	Gasoline welding stationary IC engines	9B	--	100 hours/year			multiple				7
5 / 6 / 7	Diesel welding stationary IC engines	9B	--	202 hours/year			multiple				7

TABLE 2

FUGITIVE VOLUME SOURCE INPUT PARAMETERS

Lehigh Southwest Cement Company
Cupertino Facility

Modeled Volume Source Group[1]	Source[2]	CEIR Table	Material	Operating Schedule			UTM NAD83 Coordinates[3]		Dimensions (meters)		
				weeks/ year	days/ week	hours/ day	X (meters)	Y (meters)	side length	initial lateral dimension	release height
5 / 7 / 8	Quarry Overburden Stockpile	11	Quarry overburden (low grade)	52	7	24	multiple				7
8	Slag Stockpile	11	Slag	52	7	24	580731.26	4130822.35	351.56	81.76	7
8	Low Grade Limestone Stockpile (Non-Process)	B	Primary crushed limestone (medium grade)	52	7	24					
7PD7	East Silo Top Cement Distribution Tower (A-435; 7-PDC-7)	6A	Cement	52	7	24	580498.7	4130590.8	4.00	0.93	32

Notes

1. Emissions for sources which overlap multiple areas are shared equally between volume sources with the exception of the welding equipment (Group 5: 25%; Group 6: 60%; Group 7:
2. Stockpile emissions include that from wind erosion and material handling.
3. The coordinates provided correspond to the center of the volume source.
4. Source 4 and 6 were divided into four volume sources A through D.
5. Values for volume source 7 are presented.

Source Group Descriptions

1	Mine Operations
2	Mine Operations
3	Rock Crushing Operations
4	Cement Processing
5	Rock Plant
6	Plant Operations
7	Quarry Operations
8	Non-Process Storage

Abbreviations

-- = not applicable
UTM NAD 83 = Universal Transverse Mercator; North American Datum 1983

APPENDIX A

Dispersion Modeling Files

AERMAP Files

AESURFACE Files

AERMET Files

(Included on CD)