2014 HEALTH RISK ASSESSMENT ADDENDUM
Lehigh Southwest Cement Company
Cupertino, California

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DEFINITIONS

Acute health impacts: An adverse non-cancer health effect that occurs over a relatively short period of time (e.g., minutes or hours). The term is used to describe brief exposures and effects which appear promptly after exposure.

Cancer burden: A population-level cancer risk estimate where the population is multiplied by a cancer risk estimated for a representative location in the census tract. The result of this calculation is an estimate of the number of cancer cases expected from a 70-year exposure to estimated facility emissions.

Chronic health impacts: An adverse non-cancer health effect that develops and persists (e.g., months or years) over time after long-term exposure (greater than one year) to a substance.

Cancer health impacts: The incremental excess likelihood of developing cancer as a result of exposure to carcinogenic substances.

Prioritization Score: A score calculated for each of three health effects endpoints (cancer, chronic and acute) for use by air districts to rank facilities into high, intermediate and low priority categories and determine if a health risk assessment should be performed.

Regulatory Notification Level: The health effects threshold above which public notification would be required by the BAAQMD. The regulatory notification level for BAAQMD is 1.0×10^{-5} (one-in-one-hundred thousand) for carcinogenic risk and 1.0 for the noncarcinogenic hazard index. Higher thresholds (cancer risk of 10^{-4} and a hazard index of 10) are used by BAAQMD to determine if emission reduction plans are required.

Zone of Impact: The geographical area surrounding a facility with a predicted cancer risk estimate at or above 1×10^{-6} (one-in-a-million) as predicted by an AB2588 health risk assessment. The regulatory notification level (see above) is the level at which public notification is required.

ABBREVIATIONS AND ACRONYMS

BAAQMD	Bay Area Air Quality Management District
CARB	California Air Resources Board
CPF	Cancer Potency Factor
EF	Emission Factors
GLC	Ground Level Concentrations
HARP	Hotspots Analysis and Reporting Program
LASF	Lifetime Age Sensitivity Factor
MEIR	Maximum Exposed Individual Resident
MEIW	Maximum Exposed Individual Worker
OEHHA	Office of Environmental Health Hazard Assessment
OPF	Oral Potency Factor
PM	Particulate Matter
PMI	Point of Maximum Impact Located Off Site
REL	Reference Exposure Limit
TAC	Toxic Air Contaminant
URV	Unit Risk Value
ZOI	Zone of Impact

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1.0 INTRODUCTION

This health risk assessment addendum (HRA Addendum) was conducted by AMEC Environment & Infrastructure, Inc. (AMEC) for Lehigh Southwest Cement Company (Lehigh), Permanente Plant, in Cupertino, California (the Facility). The purpose of the HRA Addendum is to evaluate health risks from emission revisions made after completion of the 2013 HRA (AMEC, 2013). The 2013 HRA was conducted to demonstrate compliance with the Bay Area Air Quality District (BAAQMD) Regulation 9 Rule 13, which requires all Portland Cement Manufacturing facilities in their jurisdiction to comply with emission limits, operating practices, monitoring, reporting, and recordkeeping requirements, in addition to conducting an HRA. In June and July 2014, BAAQMD received public comments on the benzene kiln emissions and some fugitive dust emissions developed in the 2008 Comprehensive Emissions Inventory Report (CEIR; AMEC, 2009) and used in the 2013 HRA (AMEC, 2013). In August 2014, AMEC responded to these comments and provided revised emission factors for benzene kiln emissions, wind erosion from unpaved roads, wind erosion from stockpiles, and material handling from stockpiles (AMEC, 2014). Therefore, the objective of this 2014 HRA Addendum is to present health risk results using revised emission rates that include use of these updated emission factors.

The results of the HRA Addendum indicate that for the revised emission rates, predicted acute and chronic noncancer health effects and carcinogenic risks do not exceed notification levels set by BAAQMD (1.0×10^{-5} for carcinogens and 1.0 for noncarcinogens) at the Maximum Exposed Individual Resident (MEIR) and Maximum Exposed Individual Worker (MEIW).

1.1 OBJECTIVES OF THE 2013 AB2588 HRA AND 2014 HRA ADDENDUM

The adoption of BAAQMD Regulation 9 Rule 13 prompted the 2013 HRA (AMEC, 2013). To comply with emissions monitoring requirements in the Rule, Lehigh must redesign both the kiln and clinker cooler to emit from single, as opposed to multiple, stacks. However, an HRA is required before construction on the kiln or clinker cooler can begin, so an HRA was performed with specific design plans of the kiln stack and clinker cooler and to demonstrate compliance with Rule 13.

The HRA Addendum is consistent with the 2013 HRA with regard to the following assumptions:

- Annual average emissions were based on the maximum annual clinker production of 1,600,000 short tons per year to demonstrate potential health risks at maximum capacity.
- Maximum hourly emissions were based on either the 2008 CEIR and revisions, maximum permitted limits, or maximum measured emission rates from source testing (where applicable).
- Health risks predicted using long-term (annual) average air concentrations (chronic noncancer health effects and carcinogenic risks) were evaluated assuming combined exposure to the current facility stack configuration and the future facility stack configuration once the new clinker cooler and kiln stacks are operational.
- Health risks predicted using short-term (one-hour) air concentrations (acute noncancer health effects) were evaluated separately for the current facility stack configuration and the future facility stack configuration.

The following list presents a change in assumptions evaluated in the HRA Addendum:

- Emission changes (discussed in detail in Section 3.1.2)
  - Benzene emissions updated from source test data (annual average and maximum hourly)
  - Fugitive dust emissions updated from revisions to emission factor calculations (annual average and maximum hourly)
  - Mercury emissions from permit limits (annual average and maximum hourly)
- Revised scaling of annual average emissions to maximum production for some sources (Section 3.1.2)
- Updates to toxicity criteria published since 2013 (Section 4.0)
- Responsive to the aforementioned public comments for the purpose of alignment with emission factor estimates, health risks were estimated using the 2010 meteorological data provided by BAAQMD.

1.2 FACILITY DESCRIPTION

Raw materials are both mined and processed for the production of cement at the Facility. The location of the Facility and the general vicinity are shown on Figure 1. The plant primary operations area and the associated point sources are presented in Figure 2A, including the kiln and clinker cooler stack locations (designated “5D11_20” for the current location and “CLNKSTK” at the proposed location). Figure 2B presents a refined view of the proposed single kiln stack location (designated “kiln”) in relation to existing buildings and point sources. Figure 2C presents an expanded view of the Facility showing the mine area, point sources distant from the main operation area, and fugitive emission sources. The Facility is surrounded by undeveloped land consisting of open space preserves and county parks. The nearest residential (MEIR) is located east of the Facility and the nearest commercial/industrial (MEIW) is located northeast of the Facility (Figure 3A).

The processes contributing to the release of AB2588 reportable chemicals include:

- Cement kiln (1 point source)
- Plant baghouses (24 point sources)
- Plant baghouses (1 volume source from inside a building)
- Plant stationary internal combustion engines (2 point sources)
- Plant fugitive emissions (14 volume sources)

There are a total of 27 point sources and 15 volume sources associated with the above processes that are evaluated. 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 the emissions monitoring requirements of BAAQMD Section 9-13-501, Lehigh is proposing to install a manifold and route 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. In addition to the kiln stack, a single clinker cooler vent stack will be installed. The clinker cooler vent is currently vented through 9 individual stacks. Per communications with Lehigh, the new kiln stack will be constructed to the southeast of the kiln and will be completed in early 2015.

Source identification and emission estimates used in this report are described in more detail in Section 3.1.

1.3 REPORT OUTLINE

The remainder of this document is organized as follows:

Section 2.0: Hazard Identification - This section identifies all the substances evaluated in this HRA for the Facility.

Section 3.0: Exposure Assessment - This section describes the estimated emissions for the toxic air contaminants (TACs), the exposure pathways evaluated, and the off-site receptors evaluated.

Section 4.0: Toxicity Assessment - This section presents the toxicity criteria used to evaluate potential acute and chronic noncarcinogenic health effects and carcinogenic risk.

Section 5.0: Risk Characterization - This section presents the results of the risk assessment for the exposure scenarios evaluated. An evaluation of the zone of impact (ZOI), sensitive receptors, and population health risks are presented where appropriate.

Section 6.0: Conclusions - This section summarizes the results of the risk assessment.

Section 7.0: References - This section presents the references used in this risk assessment.

2.0 HAZARD IDENTIFICATION

The regulations that implement the requirements of AB2588 identify chemicals that may cause potential carcinogenic and/or noncarcinogenic health hazards to individuals in the community surrounding a facility. Consistent with the 2013 HRA, the HRA Addendum evaluates exposure to the emissions of 69 TACs were quantified in the 2008 CEIR prepared for the Facility (AMEC, 2009).

The summary of Facility emissions (annual average and maximum hourly) for all reported TACs is presented in Table 1.

For the purpose of understanding where these chemicals originate in the cement manufacturing process, each chemical was assigned to a primary emission category, consistent with the 2013 HRA. The categories are as follows:

- Kiln - Byproducts of combustion to heat the kiln for manufacturing and other chemicals identified during a source test of the kiln.
- Raw material - A chemical component that occurs naturally in the raw materials used to manufacture cement.
- Byproduct of manufacturing - Hexavalent chromium concentrations increase from those in the raw materials during manufacture of cement. Primary emissions occur during material handling and storage.
- Stationary sources - Emissions from combustion of fuel for stationary sources, such as emergency generators.

Most chemicals originate at the kiln with a smaller subset present naturally in raw materials. Only two chemicals were assigned to the remaining two categories: diesel particulate matter (stationary sources) and hexavalent chromium (byproduct of manufacturing).

3.0 EXPOSURE ASSESSMENT

The following sections (1) summarize and describe the source information and emission estimates used in environmental transport models; (2) describe potentially exposed receptors and exposure pathways; (3) describe the assumptions used in the exposure and risk model; and (4) present the annual average and one-hour maximum concentrations predicted for the TACs at the receptors of interest.

3.1 SOURCE IDENTIFICATION/EMISSION ESTIMATES

This section summarizes the sources of emissions at the Facility and the estimated emissions of TACs.

3.1.1 Source Identification

Multiple processes emitting TACs were evaluated for the Facility, including:

- One precalciner cement kiln.

- Permitted solid material handling equipment that emits point source and fugitive particulate matter (PM) emissions.
- Permitted stationary and portable internal combustion (IC) engines that use diesel fuel.
- Wind erosion and dust entrainment from roads, storage piles, and other volume sources that emit fugitive particulate matter (PM) emissions.
- Miscellaneous smaller sources, specifically fuel dispensing.

Sources were classified into the following two categories: point or volume sources. As described in Section 1.2, twenty-seven of the sources were identified as point sources and associated with a specific release or stack location; 15 fugitive sources were characterized as volume sources.

A Facility plot plan showing the location of emissions sources at the Facility is presented in Figure 2A for the point sources near the main operations area (with a refined view in Figure 2B) and Figure 2C for the point sources distant from the main operations area and all volume sources. Although no new dispersion modeling was conducted in this HRA Addendum, source parameters used in the air dispersion modeling, such as process description, Universal Transverse Mercator (UTM) coordinates, source height, exit velocity, and temperature of stack emissions are provided in Table 2 for point sources and Table 3 for volume sources to assist the reader.

As in the 2013 HRA, the kiln and the clinker cooler exhaust stacks were modeled using two different configurations: current and future. Both set of modeling input parameters are presented in Table 2. In the current configuration, the kiln exhaust is passed through a dust collection system that has 32 individual emission points on the kiln roof (18 meters in height). The future kiln emissions will be vented to a single exhaust stack that is 90 meters in height and located southeast of the kiln. In the current clinker cooler configuration, the emissions are vented through 9 individual horizontal stacks that are approximately 23 meters in height. The future clinker cooler emissions will be vented to a single vertical exhaust stack that is 45.7 meters in height and located slightly northeast of its current location (Figure 2A).

3.1.2 Revised Emission Estimates

The 2008 CEIR and related updates provide the basis for emissions used in both the 2013 HRA and the 2014 HRA Addendum. Specifically, the 2013 HRA used the 2008 CEIR (AMEC, 2009) and revisions (Lehigh, 2009; AMEC, 2010 and 2011a) as a baseline for emission estimates with the following exceptions:

- Annual average emissions of benzene, hexavalent chromium, and mercury from the kiln were obtained from an HRA Addendum prepared by BAAQMD (BAAQMD, 2013a).

- Maximum hourly mercury emissions from the kiln were evaluated at an interim permitted emission limit (0.064 lb/hour; Title V permit [BAAQMD, 2013b]).
- Annual average and maximum hourly emissions from feed materials and stockpiles with analytical non-detect results for hexavalent chromium, were assumed to have zero hexavalent chromium emissions. The 2008 CEIR conservatively quantified hexavalent chromium in these sources at half the laboratory analytical reporting limit. The revised analytical results for specific materials are presented in Appendix A.

The BAAQMD received comments on the emission estimates during the public review of the 2013 HRA. The following emissions were updated based on emission factors developed as a result of a review and response to those comments (AMEC, 2014):

- Annual average and maximum hourly emissions of benzene from the kiln were updated based on source test results from 2009, 2011, and 2012. An annual average emission factor of 0.0101 pounds per short tons of clinker (lb/ton clinker) was developed from the three years of source testing. A maximum hourly emission rate of 2.33 pounds per hour (lb/hr) was developed from the 2012 source testing.
- Annual average and maximum hourly emissions from wind erosion of unpaved roads, mine area, and stockpiles and material handling of stockpiles. The associated emission factor was revised by removing a wind monitoring height correction factor and using on-site meteorological data (July 1, 2010 through June 30, 2011; consistent with air dispersion modeling) for wind gust speed calculations, per BAAQMD recommendation. The wind erosion emissions were also increased from a 5-day to a 7-day operating schedule.

Other emission revisions made in the 2014 HRA Addendum are:

- Annual average and maximum hourly mercury emissions from the kiln were evaluated at a final permitted emission limit (55 lb/one million short tons of clinker; BAAQMD, 2013b) which is consistent with National Emission Standards for Hazardous Air Pollutants (NESHAPs) and BAAQMD Rule 13 requirements. The corresponding annual average (88 lb/year) and maximum hourly (0.011 lb/hr) mercury emissions were developed in a mercury emissions protocol (AMEC, 2011b).
- Material handling emissions for the coal stockpile have been decreased to zero. Although the stockpile still exists on-site and wind erosion emissions are evaluated herein, coal is no longer used as a fuel source and the pile is not used or handled.

The revised CEIR files are presented in Appendix A. Table 4A and Table 5A present annual average and maximum hourly emissions from the kiln, respectively. The tables present emissions used in both the 2013 HRA and the HRA Addendum and highlight the changes in benzene and mercury. Table 4C and Table 5C present annual average and maximum hourly emissions, respectively, from fugitive emission sources. The tables present emissions used in both the 2013 HRA and the HRA Addendum, so that the change in metals emitted from the fugitive sources affected can be compared (Sources 1, 2, 5, 6A through 6D, 7, and 8).

In order to demonstrate compliance at maximum production capacity, annual average emissions were scaled up to 1,600,000 short tons of clinker per year in both the 2013 HRA and the HRA Addendum. The scaling factor used to increase emissions differed based on the source of the baseline emissions. The emissions based on the 2008 CEIR (AMEC, 2009) or CEIR updates (Lehigh, 2009; AMEC, 2010) reflected operating conditions based on production in 2005. The annual average emissions used in the 2013 HRA and HRA Addendum that were based on 2005 production rates were increased by a ratio of 1.14. This ratio was developed by dividing the maximum potential annual production of clinker (1,600,000 tons) by the 2005 annual production from the CEIR (1,399,692 tons). The ratio of 1.14 was applied to all Facility emissions related to cement and clinker production, specifically all controlled (e.g. permitted dust collectors) and applicable fugitive dust emissions (e.g. process fugitives and dust entrainment) with the exception of those related specifically to wind erosion (e.g., stockpile emissions and unpaved roads). Exceptions are noted in Table 4A for kiln emissions that do not use the CEIR and 2005 production as a baseline. Annual average emissions of hexavalent chromium from the kiln were based on a 2013 HRA Addendum prepared by BAAQMD (BAAQMD, 2013a) and then scaled up to maximum production from the 2012 annual production used by BAAQMD (1,600,000 tons / 1,127,500 tons). Benzene and mercury were scaled up directly from emission factors developed in lb/ton clinker by multiplying by 1,600,000 tons. Assuming Facility vehicles are driven at rates proportional to production, the ratio also was applied to diesel fuel dispensed at the on-site fueling station and dust generated on roads, but not to emergency diesel generators or welders.

Based on input from Lehigh, the production scaling factor was removed in the HRA Addendum for some sources that were previously scaled in the 2013 HRA. A list of emission sources and each source's status with regard to production-based scaling is presented in Appendix B, but the changes in the HRA Addendum are summarized below:

- Plant roads dust entrainment – In the 2013 HRA, it was assumed that all driving (plant and mine area) was proportional to production. Although it is appropriate that driving in the mine area would increase based on increased production, driving on plant roads is not dependent on production. Therefore, fugitive emissions from dust entrainment at the plant are no longer scaled up from the CEIR emissions.
- Coal stockpile material handling – As noted above, the coal stockpile is no longer used, so material handling emissions are no longer applicable and are therefore, no longer scaled up to maximum production.
- Gasoline dispensing – In the 2013 HRA, it was assumed that all Facility vehicles are driven at rates proportional to production, so the ratio also was applied to both diesel and gasoline fuel dispensed at the on-site fueling station. However, although it is appropriate that diesel-based mine trucks would increase driving trips based on increased production, gasoline-based fleet vehicles for other plant uses are not dependent on production.

In summary, Tables 4A to 4C summarize annual average emissions used in the HRA Addendum as follows:

- Table 4A presents emissions from the kiln
- Table 4B presents emissions from the other point sources (dust collectors); and
- Table 4C presents emissions from volume sources and emergency diesel generators.

Maximum hourly emissions used in the HRA Addendum are presented in Tables 5A to 5C as follows:

- Table 5A presents emissions from the kiln;
- Table 5B presents emissions from the dust collector point sources; and
- Table 5C presents emissions from the volume sources and emergency diesel generators.

3.2 DESCRIPTION OF POTENTIALLY EXPOSED RECEPTORS

According to OEHHA guidance, risk assessments that utilize refined air dispersion modeling must provide a detailed analysis of the populations potentially exposed to the air emissions from the Facility. This analysis includes identification of the point of maximum impact (PMI) and maximum exposed individuals in residential and commercial/industrial areas, identification of sensitive receptors (e.g. schools, daycares, or hospitals) within the ZOI, and evaluation of potential population effects within the ZOI using census information to calculate cancer burden. Table 6 presents the model identifiers and UTM coordinates for all key receptors, including 26 census tracts intersected by the ZOI and sensitive receptors identified in the 2013 HRA. The same receptors (sensitive and grid receptors) were evaluated in both the 2013 HRA and HRA Addendum. Only the identification of one maximum exposed individual changed, the MEIW for acute effects with the future Facility stack configuration, was identified as receptor #54 (identified as #57 in the 2013 HRA), as presented in Table 6.

3.3 ENVIRONMENTAL TRANSPORT AND EXPOSURE MODELING

The HARP model (version 1.4f) developed by the California Air Resources Board (CARB, May 2012) was specifically designed for conducting AB 2588 HRAs and was used to estimate the health risks associated with Facility emissions. Two data sources are uploaded to the HARP model to estimate predicted off-site concentrations: air dispersion modeling results and chemical emission rates.

Although some facility emission rates were updated, revised AERMOD air dispersion modeling was not necessary for the HRA Addendum. All emission rates in AERMOD were set to one gram per second and period (annual) and 1-hour plot files were created for each source for use in the HARP analysis.

The HARP model uses the existing output from the air dispersion model and the revised emission rates to predict off-site air concentrations and health risks to the surrounding community. The assumptions used in HARP are discussed in more detail below.

Although no new air dispersion modeling was conducted, AERMOD modeling input and output files used in the HRA Addendum for the 2010 meteorological data are provided on the enclosed compact disk (Appendix C) for completeness and convenience.

3.3.1 HARP On-Ramp Model

Because the air dispersion modeling was performed outside of HARP, software available from CARB [CARB, 2009; HARP On-Ramp (version 1)] was used to prepare HARP-ready input files. The first file is a "source-receptor" file that contains a list of all of the sources and receptors and their corresponding coordinate locations. The second file contains the dispersion factors (X/Q) for each receptor that correlates the air concentration at each receptor (micrograms per cubic meter; $\mu g/m^3$) per the unit emission rate (1 gram per second [g/s]) from each source. The third file contains the annual average and max hourly emission rates for each chemical from every source. The HARP model predicts the ground-level concentration (GLC) using AERMOD output to estimate exposure and corresponding health risks for all receptors.

For the year to second unit conversion in the annual emissions, HARP On-Ramp uses 8760 hours per year, essentially assuming all processes emit constantly for the entire year and were modeled correspondingly. This is consistent with the operating schedule of the Facility; the operating schedule of specific sources is presented in Table 2.

3.3.2 HARP Exposure and Risk Model

HARP incorporates the algorithms and exposure assumptions provided in OEHHA's guidance (OEHHA, 2003) for estimating exposures for the AB 2588 program. HARP incorporates the dispersion coefficients predicted by AERMOD and emission rates to predict ground-level concentrations for each receptor. HARP then uses the ground-level concentrations, environmental fate assumptions, exposure parameters, and dose calculation algorithms recommended by OEHHA to estimate potential health effects for all receptors. The most recent version of HARP (version 1.4f; CARB, 2012) was used to estimate health risks in both the 2013 HRA and the HRA Addendum. Exposure assumptions used in the HRA Addendum are consistent with the 2013 HRA and are presented in Table 7. Standard default assumptions for other parameters are provided in the modeling output (Appendix D).

3.4 AIR DISPERSION MODELING RESULTS

Similar to the 2013 HRA, the HRA Addendum considers off-site impacts from two Facility configuration scenarios: current stacks and a future stack configuration which encompasses the proposed single kiln and clinker cooler stacks. The new stacks are expected to be

constructed and operational in 2015. Therefore, as recommended by BAAQMD in 2013, Lehigh agreed to estimate two years of exposure to the current Facility configuration with the remaining exposure duration evaluated for the future Facility configuration. Although the surrounding community will not be exposed to the current Facility configuration for two more years, estimated health risks in the HRA Addendum consider both exposure scenarios for consistency with the 2013 HRA. Specifically, health endpoints evaluated for long-term exposures, carcinogenic and chronic noncarcinogenic effects, are evaluated for combined exposures to both Facility configurations. After being modeled separately in HARP, off-site impacts were added after applying the following exposure adjustment factors to estimate combined 70-year or 40-year exposure to both configurations:

- Residents - 2 years / 70 years for the current stack configuration; 68 / 70 for the future stack configuration
- Workers - 2 years / 40 years for the current stack configuration and 38 / 40 for the future stack configuration

Since acute noncarcinogenic effects are evaluated over the short-term using maximum one-hour concentrations, exposure cannot be averaged, and was considered separately for each Facility configuration.

The MEIR for carcinogenic effects and chronic noncarcinogenic effects was identified as receptor #13886 (for combined current and future Facility stack configurations); the MEIR for acute noncarcinogenic effects with the current Facility stack configuration was identified as receptor #11396, and for the future Facility stack configuration was identified as receptor #12566. The MEIW for chronic and acute (current configuration) noncarcinogenic effects and carcinogenic effects was identified as receptor #65. However, the MEIW for acute noncarcinogenic effects with the future Facility stack configuration was identified as receptor #54. Predicted annual average air concentrations at the MEIW and MEIR, sensitive receptor, and census tract locations are presented in Appendix E-1. The values represent average concentrations for combined exposure because they were adjusted using the current and future adjustment factors described above. The maximum hourly air concentrations at the key receptors are presented in Appendix E-2.

HARP modeling input and output is presented in Appendix D.

4.0 TOXICITY ASSESSMENT

This section describes the toxicity criteria for chemicals evaluated in this updated AB 2588 HRA. The potential health effects associated with each AB 2588 chemical are summarized in Table 8. Of the 69 chemicals evaluated in the HRA, 23 are considered to pose potential acute noncarcinogenic hazards, 52 chemicals are considered to pose potential chronic noncarcinogenic health effects, and 52 are considered to be carcinogenic under AB 2588. The toxicity criteria used in both the 2013 HRA and the HRA Addendum represented the most

recent toxicity criteria in the HARP software and recommended by OEHHA and ARB at the time they were published. Specifically, the toxicity criteria used in the HRA Addendum are consistent with the July 3, 2014 version of the Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values (OEHHA/ARB, 2014).

4.1 NONCARCINOGENS

For chronic and acute noncarcinogenic effects, observable biological effects are thought to occur only after a threshold dose is reached. To establish noncarcinogenic health criteria, this threshold dose usually is estimated from the no-observed adverse effect level (NOAEL) or the lowest-observed adverse effect level (LOAEL) determined in animal exposure studies by applying a series of uncertainty (safety) factors. For chemicals identified for evaluation in AB 2588, OEHHA and CARB provide "reference exposure levels" (RELs) that represent levels of exposure below which adverse effects are not expected to occur with a substantial margin of safety. These RELs typically include uncertainty factors ranging from 10 to 1,000 to account for limitations in the quality or quantity of available data used to develop the RELs. RELs were published for inhalation exposure based on an acceptable air concentration (micrograms per cubic meter; µg/m^3) and for chronic, non-inhalation exposure based on an acceptable oral dose (milligrams per kilogram per day; mg/kg-day).

For the purpose of evaluating cumulative noncarcinogenic effects of chemical exposure, OEHHA has categorized end points for adverse health effects for acute and chronic exposure. Only effects of chemicals on the same health effect end point or organ system are considered additive. Potential end points for acute and chronic toxicological effects have been classified into thirteen categories in the OEHHA guidelines: alimentary (gastrointestinal and liver), bone, cardiovascular, developmental, endocrine system, eyes, hematologic, immune system, kidney, central nervous system, reproductive, respiratory, and skin. The RELs for potential chronic and acute health effects and respective toxicological end points for the chemicals emitted from the Facility are presented in Table 9. In previous HRAs (AMEC, 2011b, 2013), the REL for mercury via chronic non-inhalation exposure was eliminated based on information from OEHHA provided by BAAQMD (BAAQMD, 2010b). However, for simplicity in this HRA Addendum, mercury's contribution to non-inhalation pathways was retained for the chronic HI calculations. However, the target organs that mercury affects (reproductive/developmental system) were not the maximum impacted organ system, so the change did not impact the results.

Since the 2013 HRA was conducted, OEHHA has adopted more conservative chronic inhalation and acute RELs for benzene of 3 and 27 µg/m^3 compared to the previous values of 60 and 1300 µg/m^3, respectively.

4.2 CARCINOGENS

Regulatory guidance assumes that chemicals classified as carcinogens should be treated as if they have no threshold (U.S. EPA, 1989). This approach means that only a zero dose is assumed to result in zero risk (i.e., for all doses, some risk is assumed to be present, increasing linearly with increasing dose). Various mathematical models are used to estimate theoretically plausible responses at these low doses. For chemicals identified for evaluation in AB 2588, the OEHHA guidelines present unit risk values (URVs) that conservatively quantify the likelihood of a carcinogenic response in an individual receiving a given dose of a chemical. URVs are published for inhalation exposure as the inverse of a concentration in air $(\mu g/m^3)^{-1}$ (OEHHA/ARB, 2014). For chronic, non-inhalation exposure, oral potency factors (OPFs) were published as the inverse of grams of chemical intake per kilogram of body weight per day $(mg/kg/day)^{-1}$ (OEHHA/ARB, 2014). Unlike noncarcinogenic effects, carcinogenic effects are considered additive for all chemicals. The URVs and OPFs for chemicals emitted from the Facility are presented in Table 9.

In 2009, as part of the Technical Support Document for Cancer Potency Factors (TSD) used in the Air Toxics program, OEHHA published age sensitivity factors (OEHHA, 2009) to address potential increased susceptibility to cancer when exposed to certain chemicals as a child or adolescent. Early-in-life susceptibility to some carcinogens has been recognized by the scientific community but the data do not support applying a single factor to all carcinogens. However, the California legislature directed OEHHA to develop a methodology to address the issue. OEHHA's recommendation is to apply sensitivity factors based on age equally to all carcinogens: a 10-fold increase from the third trimester of pregnancy to 2 years of age and a 3-fold increase from 2 to 16 years of age. When these age sensitivity factors are considered over a 70-year lifetime, the average lifetime age sensitivity factor (LASF) is 1.7. For school children above the age of 2 years, the default age sensitivity factor applied is 3 (BAAQMD, 2010a). An age-specific sensitivity factor was calculated for children in child care that are potentially exposed before the age of two. More detail is described in Section 5.2.3 regarding sensitive receptors. These factors were applied to health risks calculated in the HRA outside of the HARP model because the HARP model has not yet been updated to address this change.

5.0 RISK CHARACTERIZATION

This final step of the risk assessment integrates the exposure estimates developed for the chemical emissions (Section 3.0) and the health effects data from which toxicity criteria are established (Section 4.0). The risk characterization section addresses both noncarcinogenic and carcinogenic health effects based on inhalation and non-inhalation exposure. Definition of the ZOI and identification of the PMI were based on a detailed receptor grid and fence line receptors. The MEIR and MEIW were located in residential and business areas, respectively.

The estimates of health risk are compared to AB2588 notification levels published by the BAAQMD.

5.1 NONCARCINOGENIC HEALTH EFFECTS

Potential chronic and acute noncarcinogenic health effects associated with exposure to chemical emissions from the Facility have been evaluated using the HARP model. For acute inhalation exposure, the HARP model divides the predicted maximum hourly concentration (Appendix E-2) by the appropriate acute REL provided by OEHHA (Table 9). Non-inhalation pathways are not applicable to acute exposures under AB 2588 (OEHHA, 2003). For chronic inhalation exposures, the predicted annual average air concentration for each chemical is divided by the chronic inhalation REL. For chronic non-inhalation exposure, the predicted oral dose is divided by the chronic oral REL as appropriate. The total hazard quotient reported for a chemical with inhalation and non-inhalation effects is the sum of the individual hazard quotients for inhalation and non-inhalation exposure.

The chronic and acute hazard quotients for inhalation exposure can be described by the equation below:

$$Hazard\ Quotient_{inh} = \frac{GLC_{inh}}{REL_{inh}}$$

Where:

Hazard Quotient$_{inh}$	=	Chemical-specific hazard quotient for inhalation exposure pathways
GLC	=	Ground-level air concentration at a receptor location (µg/m^3)
REL$_{inh}$	=	Inhalation reference exposure level (µg/m^3)

Example Calculation: Chronic Hazard Quotient for Inhalation Exposure to crystalline silica at PMI (receptor #1716) (Target organ: respiratory system)

$$Hazard\ Quotient_{inh} = \frac{GLC_{crystalline\ silica}}{REL_{crystalline\ silica}}$$

Where:

Hazard Quotient$_{inh}$	=	Hazard quotient for crystalline silica for inhalation exposure pathways
GLC$_{crystalline\ silica}$	=	Ground-level air concentration of crystalline silica at receptor #1716 (0.0372 µg/m^3; Appendix E-1)
REL $_{crystalline\ silica}$	=	Inhalation reference exposure level for crystalline silica (3.0 µg/m^3; Table 9).

$$Hazard\ Quotient_{inh} = \frac{0.0372\ ug/m^3}{3.0\ ug/m^3}$$
$$= 0.012$$

Therefore, the chronic hazard quotient predicted from inhalation exposure to crystalline silica based on combined exposure to current and future stack configuration emissions at the PMI is 0.012 (Table 10) for effects on the respiratory system.

Chronic and acute noncarcinogenic health effects were also evaluated in terms of their assumed potential additive effect on target organs or systems (e.g., respiratory or reproductive system). For acute and chronic exposures, up to thirteen target organs or systems were evaluated using the HARP model (described in Section 4.1). The chemicals that may affect the same target organ or system were evaluated by summing the individual hazard quotients to calculate a target organ-specific hazard index (HI). The following sections present the results of the chronic and acute noncarcinogenic evaluations. Chronic and acute hazard indexes (HIs) less than or equal to 1.0 are considered to be without an appreciable noncarcinogenic public health impact with a substantial margin of safety, because exposure at or below the REL is not expected to pose significant adverse health hazards. Hazard indexes greater than 1.0 do not necessarily mean that adverse noncarcinogenic health effects would be expected. Rather, on a chemical-specific basis, as the HI increases above 1, the level of regulatory concern and potential need for control increases.

5.1.1 Chronic Noncarcinogenic Results

To account for exposure to TACs from both current and future stack configurations, the emissions were modeled separately, and the results were added after applying the following exposure adjustment factors to estimate combined exposure:

- Residents - 2 years / 70 years for the current stack configuration; 68 / 70 for the future stack configuration
- Workers - 2 years / 40 years for the current stack configuration and 38 / 40 for the future stack configuration.

Chemical emissions from the Facility are not expected to pose significant chronic noncarcinogenic health effects under the maximum production emission scenario evaluated. Results for chronic noncarcinogenic health effects are presented in Table 10 by chemical and in Table 11 by source. Because chronic HIs were less than 0.5 at all off-site receptors, a figure with an isopleth is not required under the AB2588 program.

The highest target organ-specific chronic HI for the MEIR (receptor #13886) was 0.15. The highest target organ-specific chronic HI for the MEIW (receptor #65) was 0.12. The organ/system endpoint with the highest HI was the respiratory system for both populations; arsenic contributed most significantly at 57 and 56 percent for the MEIR and MEIW,

respectively. Arsenic occurs naturally in the raw materials used to make cement. These chronic HIs for the MEIW and MEIR do not exceed the BAAQMD regulatory notification level of 1.0.

Predicted chronic noncarcinogenic HI at the PMI (receptor #1716) was 0.28. The organ/system endpoint with the highest chronic HI was the respiratory system. The predicted chronic noncarcinogenic HIs do not exceed the BAAQMD regulatory notification level of 1.0. The chemical contributing most significantly to predicted chronic HI at the PMI is arsenic (63 percent). The fugitive emissions from the cement facility processes (Sources 4A through 4D; Table 11) contribute most significantly to the chronic HI (20 to 43 percent, depending on the receptor).

5.1.2 Acute Noncarcinogenic Results

Because acute noncarcinogenic effects are based on the predicted maximum one-hour concentrations, combined exposure from both Facility stack configurations is not applicable. Therefore, the acute hazards are presented separately for both current and future stack configurations.

Because acute HIs were predicted above 0.5 at some off-site receptors, a figure with an isopleth is required under the AB2588 program. Results for acute noncarcinogenic health effects are presented in Table 12 by chemical and in Table 13 by source. The geographical area exceeding an acute HI of 0.5 and 1.0 is shown on Figure 4A. Figure 4B presents the same results, but focuses on the geographical area in more detail close to the Facility by providing the map on a larger scale (1 inch = 1 kilometer instead of 1 inch = 2 kilometers in Figure 4A).

The highest predicted target organ-specific acute HIs for the MEIR (receptors #11396 and #12566) were 1.0 and 0.49, respectively, based on the current and future stack configuration scenarios. The highest target organ-specific acute HIs for the MEIW (receptors #65 and #54) were 0.9 and 0.38, respectively, based on the current and future stack configuration scenarios. The organ/system endpoint with the highest HIs was the immune system. The acute HI values for the MEIW and MEIR did not exceed the BAAQMD regulatory notification level of 1.0 for both the current and future stack configurations.

Predicted acute noncarcinogenic HI at the PMI (receptor #1637) was 2.2 and 0.70, respectively, based on the current and future stack configuration scenarios. For the current stack configuration, the predicted acute noncarcinogenic HI is greater than the BAAQMD regulatory notification level of 1.0 at the PMI. The chemical contributing most significantly to predicted HI under the current stack configuration is benzene (63 percent, Table 12), which is released from the kiln. The existing kiln configuration is the source that contributes most significantly to the acute HI (67 percent, Table 13). While the HI at the PMI exceeds the

BAAQMD notification level, it is important to note that there is no specific off-site receptor at the location of the PMI, which is located in an open space area at the northern Facility fence line. The AB2588 program focuses on exposure for residents and workers, and none are present at the PMI for the Facility. In addition, for the proposed future stack configuration, the predicted acute noncarcinogenic HI of 0.70 at the PMI does not exceed the BAAQMD regulatory notification level of 1.0. The chemical contributing most significantly to the predicted (immune system) HI under the future stack configuration is nickel (approximately 100 percent), which occurs naturally in the raw materials used to make cement.

5.2 CARCINOGENIC HEALTH EFFECTS

In accordance with the OEHHA guidance, cancer risk estimates based on the theoretical upper-bound excess cancer risk should be evaluated for the maximum exposed individuals, and PMI, if different. The guidelines also require cancer risk to be evaluated for sensitive receptors and populations within the ZOI.

For inhalation exposures, the theoretical upper-bound excess cancer risk was estimated assuming that an individual is exposed continuously to the annual average air concentrations over a 70-year lifetime. Once these annual average air concentrations and a corresponding dose (amount of chemical inhaled averaged over a theoretical lifetime) are estimated for each of the receptors of interest, then the cancer risk is calculated for the carcinogenic TACs using the following equation:

$$Cancer\ Risk_{inh} = Dose_{inh} \times CPF_{inh} \times LASF$$

Where:

Cancer $Risk_{inh}$	=	Theoretical upper bound lifetime cancer risk
$Dose_{inh}$	=	Dose through inhalation (mg/kg-d)
CPF_{Inh}	=	Cancer Potency Factor for inhalation $(mg/kg\text{-}d)^{-1}$
LASF	=	Lifetime age sensitivity factor (unitless)

$$Dose_{inh} = GLC \times DBR \times AF \times EF \times ED \times 10^{-6}/AT$$

Where:

GLC	=	Ground-level Concentration ($\mu g/m^3$; Appendix E-1)
DBR	=	Daily Breathing Rate (L/kg-day)
AF	=	Inhalation Absorption Factor (unitless)
EF	=	Exposure Frequency (days/yr)

ED	=	Exposure Duration (years)
10^{-6}	=	conversion factor (mg/µg and m^3/L)
AT	=	Averaging Time for carcinogens (25,550 days)

Under the Derived Adjusted Method, HARP calculates the chemical-specific inhalation risk using a 80th percentile breathing rate estimate if inhalation is the only pathway evaluated or one of the two dominant (risk-driving) pathways evaluated for a particular chemical.

Example Calculation: Dose and Corresponding Cancer Risk for Inhalation Exposure to Arsenic at MEIR (receptor #13886)

$$Dose_{inh} = GLC \times DBR \times AF \times EF \times ED \times 10^{-6}/AT$$

Using the above equation with previously defined parameters, the inhalation dose is calculated as follows:

$$\text{Dose}_{\text{inh}} = 3.07 \times 10^{-5} \times 302 \times 350 \text{ x } 70 \times 10^{-6}/25{,}550$$
$$= 8.89 \text{ x} 10^{-9} \text{ mg/kg-d}$$

The corresponding cancer risk is estimated as follows:

$$Cancer\ Risk_{inh} = Dose_{inh} \times CPF_{arsenic} \times LASF$$

Where:

Cancer $Risk_{inh}$	=	Theoretical upper bound lifetime cancer risk associated with inhalation exposure to arsenic
$Dose_{Inh}$	=	Dose of arsenic at receptor MEIR (receptor #13886) ($8.89 \text{x} 10^{-9}$ mg/kg-d)
$CPF_{arsenic}$	=	Inhalation cancer potency factor for arsenic [12 $(\text{mg/kg-d})^{-1}$; Table 9]
LASF	=	Lifetime age sensitivity factor (1.7)

Therefore:

$$\text{Cancer Risk}_{\text{inh}} = 8.89 \text{ x} 10^{-9} (mg/kg-d) \times 12 (mg/kg-\text{d}))^{-1} \times 1.7)$$
$$= 1.81 \text{x} 10^{-7}$$

For non-inhalation exposures, the theoretical upper-bound excess cancer risk is also estimated assuming that an individual is exposed continuously to a chemical over a 70-year lifetime. Once the lifetime dose from the non-inhalation pathways is estimated, the cancer risk is calculated for each carcinogenic TAC using the following equation:

$$Cancer\ Risk_{non-inh} = Dose_{oral} \times OPF \times LASF$$

Where:

Cancer Risk$_{non-inh}$	=	Theoretical upper bound lifetime cancer risk associated with non-inhalation exposure
Dose$_{Non-inh}$	=	Non-inhalation (oral and dermal) Dose (mg/kg/day)
OPF	=	Oral Potency Factor (mg/kg/day)$^{-1}$, chemical specific
LASF	=	Lifetime Age Sensitivity Factor (unitless)

Example Calculation: <u>Cancer Risk for Non-Inhalation Exposure to Arsenic at MEIR (receptor #13886)</u>

$$Cancer\ Risk_{non-inh} = Dose_{oral-arsenic} \times OPF_{arsenic} \times LASF$$

Where:

Cancer Risk$_{non-inh}$	=	Theoretical upper bound lifetime cancer risk associated with non-inhalation exposure to arsenic
Dose$_{Non-inh-arsenic}$	=	non-inhalation dose of arsenic at MEIR (receptor #13886) (2.68x10^{-7} mg/kg/day; the sum of dermal contact, ingestion of soil, and ingestion of vegetables pathways; Appendix D)
OPF$_{arsenic}$	=	Oral potency factor for arsenic [1.5 (mg/kg/day)$^{-1}$; Table 9]
LASF	=	Lifetime age sensitivity factor (1.7)

Therefore:

$$Cancer\ Risk_{non-inh} = 2.68x10^{-7} \frac{mg}{kg-d} \times 1.5 \frac{kg-d}{mg} \times 1.7$$

$$= 6.83x10^{-7}$$

The total cancer risk for arsenic exposure is the sum of inhalation and non-inhalation exposures:

$$Cancer\ Risk_{arsenic} = Cancer\ Risk_{non-inh} + Cancer\ Risk_{inh}$$

$$= 6.83x10^{-7} + 1.81x10^{-7}$$

$$=8.6x10^{-7}$$

Therefore, the cancer risk from exposure to arsenic at the MEIR (receptor #13886) based on combined exposure to the current and future stack configurations is 8.6x10^{-7} (Table 14).

5.2.1 Identification of the Zone Of Impact

The ZOI, as defined by OEHHA, is the area within which there is a theoretical increased cancer risk of one-in-one million or greater based on a continuous, 70-year lifetime exposure to carcinogenic air emissions from the Facility. The ZOI is not the same as the regulatory notification level ($1.0x10^{-5}$) above which public notification is required by BAAQMD. The results from the HARP model for the receptor grid provides the information necessary to identify the ZOI by generating the isopleths (i.e., a geographical presentation of areas of equal risk) for the one-in-one million theoretical excess cancer risks. The isopleths are based on predicted cancer risks at the receptors and interpolation of the data between these receptors. The fact that the ZOI extends beyond the Facility boundaries (Figure 3A) does not imply that the regulatory notification level is exceeded throughout this area. In fact, the area exceeding the regulatory notification level does not extend significantly beyond the property boundary (Figure 5A). More definition closer to the property boundary is provided in Figure 5B; as presented, the regulatory notification level only extends over open space immediately north of the fence line, not to any areas that are occupied.

The modeling results indicated that the ZOI extends approximately 5 kilometers east, approximately 5 kilometers north, and approximately 5 kilometers south. The ZOI does not extend west of the Facility. The predicted carcinogenic risks for all ZOI receptors are presented in Appendix D.

5.2.2 Estimated Theoretical Cancer Risks at Maximum Exposure Locations

To account for exposure to dispersion from both current and future stack configurations, the carcinogenic risks were modeled separately, and the results were added after applying the following exposure adjustment factors to estimate combined exposure:

- Residents - 2 years / 70 years for the current stack configuration; 68 / 70 for the future stack configuration
- Workers - 2 years / 40 years for the current stack configuration and 38 / 40 for the future stack configuration

Results for carcinogenic risk are presented in Table 14 by chemical and in Table 15 by source. The zone of impact and carcinogenic risk above the BAAQMD regulatory notification level for maximum annual production are shown on Figure 5A.

The theoretical carcinogenic risk for the MEIR (receptor #13886) was $9.9 x10^{-6}$ based on the combined lifetime exposure to current and future stack configuration scenarios. The theoretical carcinogenic risk for the MEIW (receptor #65) was $9.9 x10^{-7}$. The LASF does not apply to an adult worker. The predicted risks for the MEIR and MEIW considering combined exposure to current and future stack configuration scenarios and maximum annual production do not exceed the BAAQMD regulatory notification level of $1.0x10^{-5}$.

Predicted cancer risk at the PMI (receptor #1716) was $1.8x10^{-5}$ including the LASF and was $1.1x10^{-5}$ excluding the LASF. The predicted cancer risk at the PMI for maximum annual production is slightly greater than the BAAQMD's $1.0x10^{-5}$ regulatory notification level. However, the AB2588 program focuses on long-term exposure for residents and workers, and none are present at the PMI for the Facility.

The chemicals contributing most significantly to predicted risk are hexavalent chromium (74 to 81 percent) and arsenic (9 to 14 percent). The plant process fugitive emissions (Sources 4A through 4D) contribute most significantly to the cancer risk (17 to 40 percent).

5.2.3 Sensitive Receptors

To account for exposure to dispersion from both current and future stack configurations, the carcinogenic risks were modeled separately, and the results were added after applying the following exposure adjustment factors to estimate combined exposure:

- Students and child care facilities – 2 years / 9 years for the current stack configuration and 7 / 9 for the future stack configuration

Carcinogenic risks at the sensitive receptors within the ZOI for maximum annual production are presented in Table 16. Sensitive receptors include schools and day care centers. The predicted risks using 2010 meteorological data and maximum production rates ranged from $5.2x10^{-7}$ to $1.5x10^{-6}$ and include an age-specific sensitivity factor (ASF). Consistent with BAAQMD guidance (2010a), the default ASF of 3 was used for preschool and school receptors over age 2. For the two child care facilities that serve children less than 2 years, a weighted ASF was calculated based on the specific child ages accepted at the facility (Table 16). These resulting predicted risks are below $1x10^{-5}$, the level above which notification is required under BAAQMD guidelines.

5.2.4 Population Cancer Burden

To account for exposure to dispersion from both current and future stack configurations, the carcinogenic risks were modeled separately, and the results were added after applying the following exposure adjustment factors to estimate combined exposure:

- Residents - 2 years / 70 years for the current stack configuration; 68 / 70 for the future stack configuration

Consistent with AB2588 guidance, cancer burden was estimated within the ZOI for the Facility for maximum production. Cancer burden is estimated by multiplying the population within the ZOI times the representative cancer risk for that population (# in one million exposures or $\#x10^{-6}$) to estimate the potential for increased cancer. Cancer burden estimates less than 1 indicate that no additional cases of cancer related to the exposure would likely be observed. Census tracts and census data are used for the population estimates and potential cancer risk at the census tract centroid (geographical center) is multiplied by the population of the census

tract. Grid receptor locations were chosen to represent the census tract centroids, and are approximately in the center of the tract or were chosen near more densely populated areas if the census tract was not uniformly populated (Figure 3A).

The cancer burden for a census tract is calculated in Table 17 as the product of the predicted cancer risk and the population as follows:

Census Tract Cancer Burden = Population $\times$ Predicted Risk at Census Tract Location

The total population cancer burden is the sum of the cancer burden across all census tract locations within the ZOI. There are 26 census tracts relevant to the ZOI for the Facility with a residential population of 130,216. Using this population and the cancer risk predicted at the centroid for the census tract, the cancer burden estimated for the ZOI of the Facility was 0.2 based on 2010 meteorological data and maximum production rates. Values less than one indicate that over a 70-year period under the worst-case exposure assumptions, there is less than a one-in-a-million chance that a member of the community would be expected to contract cancer based on exposure to Facility emissions.

6.0 CONCLUSIONS

Off-site impacts from maximum Facility production rates were evaluated for two stack configurations (current and future). For consistency with the 2013 HRA and since the proposed kiln and clinker cooler stacks are not yet constructed, cancer and chronic noncancer hazards were evaluated for combined exposure to the current and future stack configurations, while acute hazards were evaluated for both stack configurations. Based on the information provided for this HRA, the following conclusions can be made regarding the chemical emissions from the Facility.

Chronic Noncarcinogenic Health Hazards

The highest target organ-specific chronic HIs for the MEIR (receptor #13886) and MEIW (receptor #65) were 0.15 and 0.12 respectively, based on the combine exposure to current and future stack configuration scenarios. The organ/system endpoint with the highest chronic HI was the respiratory system. These values for the MEIW and MEIR are below the BAAQMD regulatory notification level of 1.0.

The predicted chronic noncarcinogenic HI at the PMI (receptor #1716) was 0.28. The organ/system endpoint with the highest chronic HI for the PMI was the respiratory system. The predicted chronic noncarcinogenic HI is below the BAAQMD regulatory notification level of 1.0. The chemical contributing most significantly to predicted chronic HI is arsenic (63 percent), which occurs naturally in the raw materials used to make cement. The fugitive emissions from the cement plant processes contribute most significantly to the chronic HI (20 to 43 percent).

Acute Noncarcinogenic Health Hazards

Current stack configuration

Under the current stack configuration scenario, the highest predicted target organ-specific acute HI for the MEIR receptor #11396 was 1.0. The highest target organ-specific acute HI for the MEIW receptor #65 was 0.90. The organ/system endpoint with the highest HIs was the immune system. The values for the MEIW and MEIR do not exceed the BAAQMD regulatory notification level of 1.0 for the current stack configuration. The predicted acute noncarcinogenic HI at the PMI (receptor #1637) under the current stack configuration scenario was 2.2. This is greater than the BAAQMD regulatory notification level of 1.0; however, there is no specific off-site receptor at this location, which is in open space on the northern Facility fence line. The chemical contributing most significantly to the acute HI at the PMI is benzene (63 percent). The kiln contributes most significantly to the acute HI (67 percent). The AB2588 program focuses on exposure for residents and workers, and none are present at the PMI for the Facility.

Future stack configuration

Under the future stack configuration scenario the highest predicted target organ-specific acute HI for the MEIR receptor #12566 was 0.49. The highest target organ-specific acute HI for the MEIW receptor #54 was 0.38. The organ/system endpoint with the highest HIs was the immune system. The values for the MEIW and MEIR do not exceed the BAAQMD regulatory notification level of 1. The predicted acute noncarcinogenic HI at the PMI (receptor #1637) was 0.70. Therefore, based on the future stack configuration scenario, all receptors, including the fence line PMI, do not exceed the BAAQMD regulatory notification level of 1.0 for acute hazards.

Potential Carcinogenic Risks

The theoretical carcinogenic risk for the MEIR (receptor #13886) was 9.9×10^{-6} based on the combine exposure to current and future stack configuration scenarios. The theoretical carcinogenic risk for the MEIW (receptor #65) was 9.9×10^{-7}. To account for early in life sensitivity to carcinogens, a lifetime age sensitivity factor (LASF) of 1.7, was applied to the carcinogenic risk according to BAAQMD guidance (BAAQMD, 2010a). The LASF does not apply to an adult worker. The predicted risks for the MEIR and MEIW considering combined exposure to current and future stack configuration scenarios and maximum annual production do not exceed the BAAQMD regulatory notification level of 1.0×10^{-5}.

Predicted cancer risk at the PMI (receptor #1716) was 1.8×10^{-5} including the LASF and was 1.1×10^{-5} excluding the LASF. The predicted cancer risk at the PMI for maximum annual production is slightly greater than the BAAQMD's 1.0×10^{-5} regulatory notification level.

However, the AB2588 program focuses on long-term exposure for residents and workers, and none are present at the PMI for the Facility.

The chemicals contributing most significantly to predicted risk are hexavalent chromium (74 to 81 percent) and arsenic (9 to 14 percent). The emissions from cement plant process fugitives (Sources 4A through 4D) contribute most significantly to the cancer risk (17 to 40 percent).

Sensitive Receptors

The carcinogenic risk estimated for the sensitive receptors ranged from $5.2x10^{-7}$ to $1.5x10^{-6}$ based on maximum Facility production rates and combined exposure to current and future stack configuration scenarios; these estimates do not exceed the BAAQMD regulatory notification level ($1.0x10^{-5}$). Sensitive receptors include schools, day care centers, and hospitals, although no hospitals were identified within the ZOI.

Population Cancer Burden

The predicted excess cancer burden was 0.2 based on maximum Facility production. These results are lower than 1, indicating that over a 70-year period under the worst-case exposure assumptions, there is less than a one-in-a-million chance that a member of the community would be expected to contract cancer based on exposure to Facility emissions. Therefore, the cancer burden calculations indicate that the community as a whole would not have an increased incidence of cancer from emissions at the maximum production evaluated.

The conclusions presented in this report are professional opinions based solely upon the data described in this report. They are intended exclusively for the purpose outlined herein and the site location and project indicated.

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TABLE 1
TOTAL ANNUAL AVERAGE AND MAXIMUM HOURLY EMISSION RATES
Lehigh Southwest Cement Company
Cupertino Facility

CAS No.	Chemical	Annual Average Emissions (lbs/yr)	Maximum Hourly Emissions (lbs/hr)
75070	Acetaldehyde	1.32E+03	1.68E-01
107028	Acrolein	5.13E+01	6.51E-03
7440382	Arsenic	2.73E+00	5.21E-04
56553	Benz[a]anthracene	1.50E-02	1.90E-06
71432	Benzene	1.61E+04	1.40E+00
50328	Benzo[a]pyrene	3.37E-04	4.27E-08
205992	Benzo[b]fluoranthene	2.14E-03	2.71E-07
207089	Benzo[k]fluoranthene	3.37E-04	4.27E-08
100447	Benzyl chloride	1.16E+02	1.47E-02
7440417	Beryllium	8.88E-01	1.64E-04
106990	1,3-Butadiene	1.05E+02	1.33E-02
7440439	Cadmium	1.28E+00	2.53E-04
56235	Carbon tetrachloride	7.04E+01	8.94E-03
108907	Chlorobenzene	6.33E+02	8.04E-02
67663	Chloroform	3.28E+01	4.16E-03
18540299	Chromium VI	2.56E+00	3.91E-04
218019	Chrysene	4.42E-02	5.60E-06
7440508	Copper	1.85E+01	3.82E-03
1175	Crystalline silica	1.47E+03	4.04E-01
53703	Dibenz[a,h]anthracene	3.37E-04	4.27E-08
106467	p-Dichlorobenzene	6.73E+01	8.54E-03
75343	1,1-Dichloroethane	2.27E+01	2.87E-03
78875	1,2-Dichloropropane	3.10E+01	3.94E-03
542756	1,3-Dichloropropene	1.27E+02	1.61E-02
9901	Diesel Particulate Matter	2.47E+01	9.73E-01
75003	Ethyl chloride	4.43E+01	5.62E-03
100414	Ethylbenzene	1.10E+03	1.39E-01
106934	Ethylene dibromide	6.88E+01	8.73E-03
107062	Ethylene dichloride	2.72E+01	3.45E-03
50000	Formaldehyde	7.21E+01	9.15E-03
35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.10E-05	1.40E-09
67562394	1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.34E-06	6.77E-10

TABLE 1
TOTAL ANNUAL AVERAGE AND MAXIMUM HOURLY EMISSION RATES
Lehigh Southwest Cement Company
Cupertino Facility

CAS No.	Chemical	Annual Average Emissions (lbs/yr)	Maximum Hourly Emissions (lbs/hr)
55673897	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.38E-06	1.75E-10
39227286	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	3.07E-06	3.90E-10
57653857	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	3.03E-06	3.85E-10
19408743	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	3.14E-06	3.98E-10
70648269	1,2,3,4,7,8-Hexachlorodibenzofuran	4.65E-06	5.90E-10
57117449	1,2,3,6,7,8-Hexachlorodibenzofuran	4.35E-06	5.52E-10
72918219	1,2,3,7,8,9-Hexachlorodibenzofuran	1.47E-06	1.86E-10
60851345	2,3,4,6,7,8-Hexachlorodibenzofuran	2.68E-06	3.40E-10
7647010	Hydrochloric acid	5.35E+04	7.75E+00
193395	Indeno[1,2,3-c,d] pyrene	2.50E-04	3.17E-08
7439921	Lead	2.30E+00	4.13E-04
7439965	Manganese	4.56E+00	5.79E-04
7439976	Mercury	8.84E+01	6.41E-02
74839	Methyl bromide	7.15E+02	9.07E-02
71556	Methyl chloroform (1,1,1-Trichlorethane)	3.66E+01	4.65E-03
75092	Methylene chloride	1.48E+02	1.87E-02
91203	Naphthalene	1.58E+02	2.01E-02
7440020	Nickel	6.12E+01	1.10E-02
3268879	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	2.31E-05	2.92E-09
39001020	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	5.27E-06	6.69E-10
40321764	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	2.71E-06	3.44E-10
57117416	1,2,3,7,8-Pentachlorodibenzofuran	2.10E-05	2.66E-09
57117314	2,3,4,7,8-Pentachlorodibenzofuran	3.14E-05	3.98E-09
127184	Perchloroethylene	6.07E+01	7.70E-03
7782492	Selenium	6.31E+00	9.50E-04
100425	Styrene	2.78E+02	3.52E-02
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin	2.66E-06	3.38E-10
51207319	2,3,7,8-Tetrachlorodibenzofuran	1.32E-04	1.67E-08
79345	1,1,2,2-Tetrachloroethane	4.61E+01	5.85E-03
108883	Toluene	9.88E+03	1.25E+00
79005	1,1,2-Trichloroethane	6.11E+01	7.75E-03
79016	Trichloroethylene	4.81E+01	6.10E-03

TABLE 1
TOTAL ANNUAL AVERAGE AND MAXIMUM HOURLY EMISSION RATES
Lehigh Southwest Cement Company
Cupertino Facility

CAS No.	Chemical	Annual Average Emissions (lbs/yr)	Maximum Hourly Emissions (lbs/hr)
1314621	Vanadium	1.72E+02	3.04E-02
75014	Vinyl chloride	1.62E+02	2.06E-02
75354	Vinylidene chloride	4.44E+01	5.64E-03
95476	o-Xylene	1.56E+03	1.97E-01
1330207	Xylenes (mixed)	7.94E+03	1.01E+00

Abbreviations
lbs/yr = pounds per year
lbs/hr = pounds per hour

TABLE 2
POINT SOURCE INPUT PARAMETERS [1]
Lehigh Southwest Cement Company
Cupertino Facility

Dust Collector BAAQMD Permit #	DC ID	Model ID	Source Description	Material	Operating Schedule [2]			UTM NAD83 Coordinates		Modeled Elevation (meters)	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)	(^{o}F)	(K)	(acfm)	(m/s)
A-114	1-DC-4	1D4	Additive Bin Transfer Facilities Area 1	Additive	52	7	24	580519.84	4130340.0	198.4	P114	75	22.9	H	Rect	16	18	1.6	0.49	Ambient[6]		8,000	20.32
A-121	2-DC-1	2D1	Tertiary Scalping Screen/ Tertiary Crusher	56% High Grade 44% Mid Grade	52	7	16	580100.0	4130360	265.176	P121	98	29.9	H	Rect	25	22	2.2	0.67	Ambient[6]		16,500	21.95
A-131	3-DC-1	3D1	Rock Sampling System Area 3	56% High Grade 44% Mid Grade	52	7	16	580463.6	4130288.8	216.713	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	Preblend Storage Bin	5% Additive 95% All Grade Limestone	52	7	24	580526.71	4130340.81	198.425	P134	98	29.9	H	Rect	16	18	1.6	0.49	Ambient[6]		8,000	20.32
A-135	3-DC-5	3D5	High-grade Storage Bins	High Grade Limestone	52	7	24	580527.83	4130344.70	198.425	P135	98	29.9	H	Rect	16	18	1.6	0.49	Ambient[6]		8,000	20.32
A-141	4-DC-7/22	Kiln	Raw Mill/Kiln	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580559.2	4130330.4	199.034	P141	60	18.3	V	Rect	25	22	2.2	0.67	320	433.2	12,000	15.96
A-142	4-DC-23/38										P142												
Pending	4-DC-7 to 4-DC-38	Kiln						580605.94	4130307.33	200.924	--	295	90	V	Round	--	--	15	4.57	312	428.7	631,800	18.16
A-143	4-DC-3	4D3	Raw Mill 1 Separator System	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580576.59	4130371.43	188.366	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	Raw Mill 2 Separator System	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580565.99	4130352.64	188.976	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	Homogenizer	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580580.90	4130398.80	187.147	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	Homogenizer	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580592.91	4130382.67	188.366	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	Kiln Feed System	5% Additive 53% High Grade 42% Mid Grade	52	7	24	580567.70	4130405.68	186.233	P153	195	59.4	H	Rect	28	25	2.5	0.76	180	355.4	18,000	18.81
A-161	5-DC-11/20	5D11_20	Clinker Cooler	Clinker	52	7	24	580600.00	4130480.00	176.784	P161	75	22.9	H	Rect	25	22	2.2	0.67	425	491.5	135,000	179.6
Pending	5-DC-11/20	CLNKSTK						580603.77	4130492.05	178.003	--	117	35.7	V	Round	--	--	7.0	2.13	392	473.2	177,000	23.3
A-164	5-DC-23	5D23	Clinker Silo B	Clinker	52	7	24	580578.70	4130502.97	177.394	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	Clinker Transfer System	Clinker	52	7	24	580545.00	4130450.00	176.174	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	202.997			24.4	H	Round	--	--	1.1	0.33				22.04
A-171	5-DC-5	5D5	Kiln/Kiln Coal System	Coke	52	7	24	580581.17	4130366.90	188.366	P171	60	18.3	H	Round	--	--	2.5	0.76	140	333.2	24,000	24.84
A-172	5-DC-6	5D6	Kiln/Precalciner Coal Mill	Coke	52	7	24	580604.44	4130354.86	188.366	P172	60	18.3	H	Round	--	--	2.5	0.76	140	333.2	24,000	24.84

TABLE 2
POINT SOURCE INPUT PARAMETERS [1]
Lehigh Southwest Cement Company
Cupertino Facility

Dust Collector BAAQMD Permit #	DC ID	Model ID	Source Description	Material	Operating Schedule [2]			UTM NAD83 Coordinates		Modeled Elevation (meters)	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)	(^{o}F)	(K)	(acfm)	(m/s)
A-13	6-DC-1	6D1	Roll Press Clinker Surge Bin and Feeder	Clinker	52	7	24	580237.77	4130623.27	222.199	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	Finish Mill 6-GM-1	Cement	52	7	21	580265.00	4130620.00	220.675	P210	17	5.2	H	Round	--	--	2.5	0.76	230	383.2	20,000	20.70
A-211	6-DC-12/18	6D12	Separator 6-SE-2	Cement	52	7	21	580295.54	4130619.71	220.066	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	6-GM-1 Air Separator, Finish Mill 6GM3	Cement	52	7	21	580299.17	4130640.77	220.066	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	6-GM-2 Mill and Peripherals	Cement	52	7	21	580247.4	4130599.7	201.778	--	107	32.6	H	Rect	28.5	24	2.5	0.75	220	377.6	17,000	18.18
A-230	6-DC-2	6D2	Roller Press and Peripherals	Cement	52	7	21	580236.6	4130621.2	222.2	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	Rock Plant 2 Conveyors/Rock Plant 2 Screens - 16 & 17	Low Grade Limestone	50	5	8	580404.9	4129863.4	205.496	P184	25	7.6	V	Round	--	--	2.5	0.76	Ambient[6]		17,000	17.59
S501	--	S501	Emergency Diesel Generator	Diesel fuel	20 hours/yr			580323.8	4130432.7	204.521	P443	12	3.7	H	Round	--	--	1.1	0.34	120	322.0	5350	28.60
S502	--	S502	Emergency Diesel Generator	Diesel fuel	20 hours/yr			580497.3	4130398.5	185.318	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	185.93	--	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. Includes both current and future configuration parameters for the kiln and clinker cooler.
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
Pending = Proposed future kiln and clinker cooler parameters that are not yet permitted.
Rect = Rectangular
UTM NAD 83 = Universal Transverse Mercator; North American Datum 1983

TABLE 3
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)	Modeled Elevation (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	518.72	640.48	148.95	7
1 / 2	Blasting	12A		52	7	10						
1 / 2	Bulldozing	12A		52	7	10	578895.69	4130829.41	455.55	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	375.73	670.78	156	7
4 (4A-4D)[4]	Cement facility process fugitives	7A	Various	52	7	24	580221.0	4130972.3	268.331	199.1	46.3	7
	Natural Gypsum Stockpile (located in a covered bldg)	11	Natural Gypsum	52	7	24	580435.6 580204.2	4130989.4 4130759.2	242.539 245.59	230.0 230.0	53.5 53.5	
	Pozzolan Stockpile (located in a covered bldg)	11	Pozzolan	52	7	24	580434.9	4130759.2	216.88	230.0	53.5	
5	Rock plant process fugitives	7C	Low grade	52	7	24	579904.89	4130218.23	218.76	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	580242.4	4130486.5	207.999	306.0	71.16	7
	Dust entrainment from paved roads	10	Paved road dust	52	7	10	580549.0	4130486.9	189.5	306.0	71.16	
	Wind erosion from unpaved roads	10	Unpaved road dust	52	7	24	580241.5	4130179.4	249.29	306.0	71.16	
	Bauxite Stockpile	11	Bauxite	52	7	24	580548.6	4130180.3	211.671	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	196.39	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
5 / 7 / 8	Quarry Overburden Stockpile	11	Quarry overburden (low grade)	52	7	24	multiple					7

TABLE 3
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)	Modeled Elevation (meters)	side length	initial lateral dimension	release height
8	Slag Stockpile	11	Slag	52	7	24	580731.26	4130822.35	210.04	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	179.65	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: 15%).
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

TABLE 4A
ANNUAL AVERAGE EMISSION RATES FOR THE KILN
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per year (lbs/yr)

		2013 HRA				2014 HRA Addendum	
CAS No.	Chemical	2005 Production (2008 CEIR)	BAAQMD May 2013 HRA Addendum	Maximum Production Emissions[1] - Used in HRA	Source of Emissions[2]	Maximum Production Emissions - Used in HRA	Source of Emissions[2]
75070	Acetaldehyde	1.16E+03	--	1.32E+03	2008 CEIR	1.32E+03	2008 CEIR
107028	Acrolein	4.49E+01	--	5.13E+01	2008 CEIR	5.13E+01	2008 CEIR
7440382	Arsenic	7.60E-01	--	8.69E-01	2008 CEIR	8.69E-01	2008 CEIR
56553	Benz[a]anthracene	1.31E-02	--	1.50E-02	2008 CEIR	1.50E-02	2008 CEIR
71432	Benzene	9.65E+03	4.67E+03	7.47E+03	BAAQMD, 2013	1.61E+04	AMEC, 2014
50328	Benzo[a]pyrene	2.95E-04	--	3.37E-04	2008 CEIR	3.37E-04	2008 CEIR
205992	Benzo[b]fluoranthene	1.87E-03	--	2.14E-03	2008 CEIR	2.14E-03	2008 CEIR
207089	Benzo[k]fluoranthene	2.95E-04	--	3.37E-04	2008 CEIR	3.37E-04	2008 CEIR
100447	Benzyl chloride	1.01E+02	--	1.16E+02	2008 CEIR	1.16E+02	2008 CEIR
7440417	Beryllium	3.80E-01	--	4.35E-01	2008 CEIR	4.35E-01	2008 CEIR
106990	1,3-Butadiene	9.18E+01	--	1.05E+02	2008 CEIR	1.05E+02	2008 CEIR
7440439	Cadmium	3.80E-01	--	4.35E-01	2008 CEIR	4.35E-01	2008 CEIR
56235	Carbon tetrachloride	6.16E+01	--	7.04E+01	2008 CEIR	7.04E+01	2008 CEIR
108907	Chlorobenzene	5.54E+02	--	6.33E+02	2008 CEIR	6.33E+02	2008 CEIR
67663	Chloroform	2.87E+01	--	3.28E+01	2008 CEIR	3.28E+01	2008 CEIR
18540299	Chromium VI	3.36E-01	3.18E-01	4.51E-01	BAAQMD, 2013	4.51E-01	BAAQMD, 2013
218019	Chrysene	3.86E-02	--	4.42E-02	2008 CEIR	4.42E-02	2008 CEIR
7440508	Copper	4.24E+00	--	4.85E+00	2008 CEIR	4.85E+00	2008 CEIR
1175	Crystalline silica	--	--	--	--	--	--
53703	Dibenz[a,h]anthracene	2.95E-04	--	3.37E-04	2008 CEIR	3.37E-04	2008 CEIR
106467	p-Dichlorobenzene	5.89E+01	--	6.73E+01	2008 CEIR	6.73E+01	2008 CEIR
75343	1,1-Dichloroethane	1.98E+01	--	2.27E+01	2008 CEIR	2.27E+01	2008 CEIR
78875	1,2-Dichloropropane	2.71E+01	--	3.10E+01	2008 CEIR	3.10E+01	2008 CEIR
542756	1,3-Dichloropropene	1.11E+02	--	1.27E+02	2008 CEIR	1.27E+02	2008 CEIR
9901	Diesel PM	--	--	--	--	--	--
75003	Ethyl chloride	3.87E+01	--	4.43E+01	2008 CEIR	4.43E+01	2008 CEIR
100414	Ethylbenzene	9.59E+02	--	1.10E+03	2008 CEIR	1.10E+03	2008 CEIR
106934	Ethylene dibromide	6.02E+01	--	6.88E+01	2008 CEIR	6.88E+01	2008 CEIR
107062	Ethylene dichloride	2.38E+01	--	2.72E+01	2008 CEIR	2.72E+01	2008 CEIR
50000	Formaldehyde	6.31E+01	--	7.21E+01	2008 CEIR	7.21E+01	2008 CEIR
35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	9.63E-06	--	1.10E-05	2008 CEIR	1.10E-05	2008 CEIR
67562394	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.67E-06	--	5.34E-06	2008 CEIR	5.34E-06	2008 CEIR

TABLE 4A
ANNUAL AVERAGE EMISSION RATES FOR THE KILN
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per year (lbs/yr)

CAS No.	Chemical	2013 HRA				2014 HRA Addendum	
		2005 Production (2008 CEIR)	BAAQMD May 2013 HRA Addendum	Maximum Production Emissions[1] - Used in HRA	Source of Emissions[2]	Maximum Production Emissions - Used in HRA	Source of Emissions[2]
55673897	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.20E-06	--	1.38E-06	2008 CEIR	1.38E-06	2008 CEIR
39227286	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.69E-06	--	3.07E-06	2008 CEIR	3.07E-06	2008 CEIR
57653857	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	2.65E-06	--	3.03E-06	2008 CEIR	3.03E-06	2008 CEIR
19408743	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.75E-06	--	3.14E-06	2008 CEIR	3.14E-06	2008 CEIR
70648269	1,2,3,4,7,8-Hexachlorodibenzofuran	4.07E-06	--	4.65E-06	2008 CEIR	4.65E-06	2008 CEIR
57117449	1,2,3,6,7,8-Hexachlorodibenzofuran	3.81E-06	--	4.35E-06	2008 CEIR	4.35E-06	2008 CEIR
72918219	1,2,3,7,8,9-Hexachlorodibenzofuran	1.28E-06	--	1.47E-06	2008 CEIR	1.47E-06	2008 CEIR
60851345	2,3,4,6,7,8-Hexachlorodibenzofuran	2.34E-06	--	2.68E-06	2008 CEIR	2.68E-06	2008 CEIR
7647010	Hydrochloric acid	1.07E+05	--	5.35E+04	AMEC, 2011a	5.35E+04	AMEC, 2011a
193395	Indeno[1,2,3-c,d] pyrene	2.19E-04	--	2.50E-04	2008 CEIR	2.50E-04	2008 CEIR
7439921	Lead	8.86E-01	--	1.01E+00	2008 CEIR	1.01E+00	2008 CEIR
7439965	Manganese	3.99E+00	--	4.56E+00	2008 CEIR	4.56E+00	2008 CEIR
7439976	Mercury	1.28E+03	1.19E+02	1.68E+02	BAAQMD, 2013	8.80E+01	AMEC, 2011a
74839	Methyl bromide	6.25E+02	--	7.15E+02	2008 CEIR	7.15E+02	2008 CEIR
71556	Methyl chloroform	3.21E+01	--	3.66E+01	2008 CEIR	3.66E+01	2008 CEIR
75092	Methylene chloride	1.29E+02	--	1.48E+02	2008 CEIR	1.48E+02	2008 CEIR
91203	Naphthalene	1.39E+02	--	1.58E+02	2008 CEIR	1.58E+02	2008 CEIR
7440020	Nickel	6.53E+00	--	7.46E+00	2008 CEIR	7.46E+00	2008 CEIR
3268879	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	2.02E-05	--	2.31E-05	2008 CEIR	2.31E-05	2008 CEIR
39001020	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	4.61E-06	--	5.27E-06	2008 CEIR	5.27E-06	2008 CEIR
40321764	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	2.37E-06	--	2.71E-06	2008 CEIR	2.71E-06	2008 CEIR
57117416	1,2,3,7,8-Pentachlorodibenzofuran	1.83E-05	--	2.10E-05	2008 CEIR	2.10E-05	2008 CEIR
57117314	2,3,4,7,8-Pentachlorodibenzofuran	2.74E-05	--	3.14E-05	2008 CEIR	3.14E-05	2008 CEIR
127184	Perchloroethylene	5.31E+01	--	6.07E+01	2008 CEIR	6.07E+01	2008 CEIR
7782492	Selenium	4.25E+00	--	4.86E+00	2008 CEIR	4.86E+00	2008 CEIR
100425	Styrene	2.43E+02	--	2.78E+02	2008 CEIR	2.78E+02	2008 CEIR
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin	2.33E-06	--	2.66E-06	2008 CEIR	2.66E-06	2008 CEIR
51207319	2,3,7,8-Tetrachlorodibenzofuran	1.15E-04	--	1.32E-04	2008 CEIR	1.32E-04	2008 CEIR
79345	1,1,2,2-Tetrachloroethane	4.03E+01	--	4.61E+01	2008 CEIR	4.61E+01	2008 CEIR
108883	Toluene	8.65E+03	--	9.88E+03	2008 CEIR	9.88E+03	2008 CEIR
79005	1,1,2-Trichloroethane	5.34E+01	--	6.11E+01	2008 CEIR	6.11E+01	2008 CEIR
79016	Trichloroethylene	4.21E+01	--	4.81E+01	2008 CEIR	4.81E+01	2008 CEIR

TABLE 4A
ANNUAL AVERAGE EMISSION RATES FOR THE KILN
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per year (lbs/yr)

CAS No.	Chemical	2013 HRA				2014 HRA Addendum	
		2005 Production (2008 CEIR)	BAAQMD May 2013 HRA Addendum	Maximum Production Emissions[1] - Used in HRA	Source of Emissions[2]	Maximum Production Emissions - Used in HRA	Source of Emissions[2]
1314621	Vanadium	3.80E+00	--	4.35E+00	2008 CEIR	4.35E+00	2008 CEIR
75014	Vinyl chloride	1.42E+02	--	1.62E+02	2008 CEIR	1.62E+02	2008 CEIR
75354	Vinylidene chloride	3.89E+01	--	4.44E+01	2008 CEIR	4.44E+01	2008 CEIR
95476	o-Xylene	1.36E+03	--	1.56E+03	2008 CEIR	1.56E+03	2008 CEIR
1330207	Xylenes (mixed)	6.94E+03	--	7.94E+03	2008 CEIR	7.94E+03	2008 CEIR

Notes:

1. HRA emissions were estimated (scaled up) for the maximum permitted clinker production of 1,600,000 tons per year) from the following production factors:
   1.14 = 1,600,000 / 1,399,692 (2008 CEIR - 2005 clinker production)
   1.60 = 1,600,000 / 999,774 (Average 2009, 2011, and 2012 clinker production: BAAQMD, 2013; only benzene)
   1.42 = 1,600,000 / 1,127,500 (2012 clinker production; BAAQMD, 2013; hexavalent chromium and mercury)
2. Emissions were scaled up from the 2008 CEIR unless amended or revised in the BAAQMD HRA Addendum as noted.
   Shaded values were updated in the 2014 HRA Addendum.

References:

AMEC, 2011a, Final Revised Protocol for Revisions to Mercury Emissions and Development of a 2013 Production Scenario, Lehigh Southwest Cement Company, Cupertino, California, February 18.

AMEC, 2014, *Response to Questions About Lehigh Cupertino HRA* , Letter to Mr. Robert Hull of the Bay Area Air Quality Management District, dated August 20, 2014.

BAAQMD, 2013, Addendum to Health Risk Assessment, Evaluation of Toxic Air Contaminant Impacts, AB2588 Air Toxics Hot Spots Program, Lehigh Southwest Cement Company, Plant #17, May 2013

TABLE 4B
ANNUAL AVERAGE EMISSION RATES BY SOURCE GROUP FOR DUST COLLECTORS
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per year (lbs/yr)

		Maximum Production [1]																							
CAS No.	Chemical	1D4	2D1	3D1	3D4	3D5	4D3	4D4	5D1	5D2	5D3	5D5	5D6	5D11_20 / CLNKSTK	5D23	5D27	5D28	6D17	6D19	6D2	6D12	6D1	6D8	7PD7	8D31	999DC
7440382	Arsenic	7.23E-02	4.14E-02	1.91E-02	2.07E-02	1.98E-02	2.64E-02	2.70E-02	3.43E-02	3.43E-02	6.18E-02	3.22E-02	3.18E-02	1.80E-01	3.13E-02	8.23E-03	8.23E-03	3.48E-02	3.92E-02	3.51E-02	2.16E-02	3.72E-02	2.29E-02	1.74E-02	6.91E-03	2.02E-01
7440417	Beryllium	7.75E-03	6.73E-03	3.11E-03	3.28E-03	3.16E-03	4.10E-03	4.18E-03	5.32E-03	5.32E-03	9.58E-03	1.93E-02	1.91E-02	2.92E-02	5.07E-03	1.33E-03	1.33E-03	5.97E-03	6.72E-03	6.02E-03	3.70E-03	6.02E-03	3.93E-03	2.99E-03	4.15E-03	3.10E-02
7440439	Cadmium	1.29E-02	1.70E-02	7.82E-03	1.12E-02	5.27E-03	1.00E-02	1.02E-02	1.30E-02	1.30E-02	2.34E-02	3.22E-02	3.18E-02	4.86E-02	8.45E-03	2.22E-03	2.22E-03	9.95E-03	1.12E-02	1.00E-02	6.17E-03	1.00E-02	6.56E-03	4.98E-03	6.91E-03	5.78E-02
18540299	Chromium VI	0.00E+00	3.50E-03	1.62E-03	3.51E-03	0.00E+00	1.94E-03	1.98E-03	2.52E-03	2.52E-03	4.53E-03	0.00E+00	0.00E+00	4.66E-01	8.11E-02	2.13E-02	2.13E-02	1.37E-01	1.55E-01	1.38E-01	8.52E-02	9.63E-02	9.05E-02	6.87E-02	0.00E+00	4.36E-01
7440508	Copper	3.15E-01	3.09E-01	1.43E-01	1.51E-01	1.43E-01	1.86E-01	1.90E-01	2.42E-01	2.42E-01	4.35E-01	1.65E-01	1.63E-01	7.51E-01	1.31E-01	3.43E-02	3.43E-02	1.77E-01	1.99E-01	1.79E-01	1.10E-01	1.55E-01	1.17E-01	8.86E-02	7.74E-02	1.08E+00
1175	Crystalline silica	1.69E+00	1.08E+01	5.00E+00	6.20E+00	3.96E+00	6.06E+00	6.18E+00	7.87E+00	7.87E+00	1.42E+01	2.63E-01	2.60E-01	3.96E-01	6.89E-02	1.81E-02	1.81E-02	4.87E-01	5.48E-01	4.91E-01	3.02E-01	8.18E-02	3.21E-01	2.44E-01	2.05E+01	1.79E+01
7439921	Lead	3.51E-02	1.62E-02	7.46E-03	1.13E-02	5.27E-03	1.07E-02	1.09E-02	1.39E-02	1.39E-02	2.50E-02	3.22E-02	3.18E-02	1.36E-01	2.37E-02	6.21E-03	6.21E-03	2.47E-02	2.78E-02	2.49E-02	1.53E-02	2.81E-02	1.63E-02	1.23E-02	7.19E-03	1.27E-01
7439976	Mercury	2.22E-03	2.82E-03	1.30E-03	2.30E-03	5.06E-04	1.67E-03	1.70E-03	2.16E-03	2.16E-03	3.90E-03	1.01E-01	9.93E-02	3.89E-04	6.76E-05	1.78E-05	1.78E-05	7.96E-05	8.96E-05	8.02E-05	4.94E-05	8.02E-05	5.24E-05	3.98E-05	1.11E-03	4.25E-03
7440020	Nickel	2.22E+00	3.85E-01	1.78E-01	2.99E-01	1.48E-01	3.24E-01	3.31E-01	4.21E-01	4.21E-01	7.58E-01	9.80E+00	9.68E+00	2.92E+00	5.07E-01	1.33E-01	1.33E-01	8.56E-01	9.63E-01	8.62E-01	5.31E-01	6.02E-01	5.64E-01	4.28E-01	1.27E-01	5.28E+00
7782492	Selenium	2.58E-02	2.24E-02	1.04E-02	1.09E-02	1.05E-02	1.37E-02	1.39E-02	1.77E-02	1.77E-02	3.19E-02	6.45E-02	6.37E-02	9.72E-02	1.69E-02	4.44E-03	4.44E-03	1.99E-02	2.24E-02	2.01E-02	1.23E-02	2.01E-02	1.31E-02	9.95E-03	1.38E-02	1.07E-01
1314621	Vanadium	6.71E+00	1.82E+00	8.38E-01	9.82E-01	9.28E-01	1.34E+00	1.37E+00	1.74E+00	1.74E+00	3.13E+00	2.84E+01	2.80E+01	1.58E+01	2.75E+00	7.22E-01	7.22E-01	2.87E+00	3.22E+00	2.89E+00	1.78E+00	3.26E+00	1.89E+00	1.43E+00	1.05E-01	1.71E+01

Notes:
1. Production-based emissions from the 2008 CEIR were scaled up to the maximum permitted clinker production of 1,600,000 tons per year from the 2005 production of 1,399,692 tons/year used in the 2008 CEIR; the factor is 1.14 (1,600,000 / 1,399,692).

TABLE 4C
ANNUAL AVERAGE EMISSION RATES BY SOURCE GROUP FOR FUGITIVE AND OTHER POINT SOURCES
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per year (lbs/yr)

2014 HRA Addendum [1]

CAS No.	Chemical	Maximum Production [2]															
		S501	S502	1	2	3	4A	4B	4C	4D	5	6A	6B	6C	6D	7	8
7440382	Arsenic	-	-	1.03E-01	1.03E-01	1.23E-01	5.33E-02	5.33E-02	5.33E-02	5.33E-02	7.60E-02	3.68E-02	3.68E-02	3.68E-02	3.68E-02	1.48E-02	1.80E-02
71432	Benzene	-	-	-	-	-	-	-	-	-	-	2.28E-03	2.28E-03	2.28E-03	2.28E-03	1.54E-04	-
7440417	Beryllium	-	-	3.78E-02	3.78E-02	3.08E-02	7.80E-03	7.80E-03	7.80E-03	7.80E-03	3.67E-02	1.38E-02	1.38E-02	1.38E-02	1.38E-02	8.86E-03	1.71E-02
7440439	Cadmium	-	-	6.30E-02	6.30E-02	6.61E-02	1.89E-02	1.89E-02	1.89E-02	1.89E-02	7.73E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02	1.48E-02	1.73E-02
18540299	Chromium VI	-	-	3.34E-03	3.34E-03	9.09E-03	3.73E-02	3.73E-02	3.73E-02	3.73E-02	-	3.22E-02	3.22E-02	3.22E-02	3.22E-02	-	-
7440508	Copper	-	-	1.16E+00	1.16E+00	1.01E+00	3.64E-01	3.64E-01	3.64E-01	3.64E-01	8.15E-01	4.71E-01	4.71E-01	4.71E-01	4.71E-01	1.65E-01	1.77E-01
1175	Crystalline silica	-	-	2.84E+02	2.84E+02	9.94E+01	9.11E+00	9.11E+00	9.11E+00	9.11E+00	1.79E+02	9.73E+01	9.73E+01	9.73E+01	9.73E+01	4.38E+01	4.47E+01
9901	Diesel PM	3.14E+00	6.28E+00	-	-	-	-	-	-	-	3.83E+00	2.30E+00	2.30E+00	2.30E+00	2.30E+00	2.30E+00	-
7439921	Lead	-	-	6.30E-02	6.30E-02	6.51E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	6.33E-02	5.59E-02	5.59E-02	5.59E-02	5.59E-02	1.54E-02	1.78E-02
7439976	Mercury	-	-	1.44E-02	1.44E-02	1.10E-02	1.84E-02	1.84E-02	1.84E-02	1.84E-02	1.02E-02	2.67E-03	2.67E-03	2.67E-03	2.67E-03	2.36E-03	4.31E-03
7440020	Nickel	-	-	1.98E+00	1.98E+00	1.38E+00	6.99E-01	6.99E-01	6.99E-01	6.99E-01	1.15E+00	1.26E+00	1.26E+00	1.26E+00	1.26E+00	2.72E-01	2.85E-01
7782492	Selenium	-	-	1.26E-01	1.26E-01	1.03E-01	2.85E-02	2.85E-02	2.85E-02	2.85E-02	1.22E-01	3.22E-02	3.22E-02	3.22E-02	3.22E-02	2.95E-02	3.45E-02
108883	Toluene	-	-	-	-	-	-	-	-	-	-	9.17E-03	9.17E-03	9.17E-03	9.17E-03	6.17E-03	-
1314621	Vanadium	-	-	2.32E+00	2.32E+00	4.66E+00	2.96E+00	2.96E+00	2.96E+00	2.96E+00	2.79E+00	2.91E+00	2.91E+00	2.91E+00	2.91E+00	2.24E-01	2.74E-01
1330207	Xylenes (mixed)	-	-	-	-	-	-	-	-	-	-	1.49E-02	1.49E-02	1.49E-02	1.49E-02	5.60E-02	-

2013 HRA

CAS No.	Chemical	Maximum Production [2]															
		S501	S502	1	2	3	4A	4B	4C	4D	5	6A	6B	6C	6D	7	8
7440382	Arsenic	-	-	8.90E-02	8.90E-02	1.23E-01	5.32E-02	5.32E-02	5.32E-02	5.32E-02	3.42E-02	3.21E-02	3.21E-02	3.21E-02	3.21E-02	2.84E-03	4.26E-03
71432	Benzene	-	-	-	-	-	-	-	-	-	-	2.60E-03	2.60E-03	2.60E-03	2.60E-03	1.54E-04	-
7440417	Beryllium	-	-	3.36E-02	3.36E-02	3.08E-02	7.73E-03	7.73E-03	7.73E-03	7.73E-03	1.98E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.70E-03	6.11E-03
7440439	Cadmium	-	-	5.60E-02	5.60E-02	6.61E-02	1.88E-02	1.88E-02	1.88E-02	1.88E-02	3.41E-02	1.82E-02	1.82E-02	1.82E-02	1.82E-02	2.84E-03	4.09E-03
18540299	Chromium VI	-	-	3.07E-03	3.07E-03	9.09E-03	3.73E-02	3.73E-02	3.73E-02	3.73E-02	-	2.52E-02	2.52E-02	2.52E-02	2.52E-02	-	-
7440508	Copper	-	-	1.03E+00	1.03E+00	1.01E+00	3.59E-01	3.59E-01	3.59E-01	3.59E-01	3.79E-01	3.86E-01	3.86E-01	3.86E-01	3.86E-01	3.18E-02	3.59E-02
1175	Crystalline silica	-	-	2.57E+02	2.57E+02	9.94E+01	9.06E+00	9.06E+00	9.06E+00	9.06E+00	9.77E+01	6.91E+01	6.91E+01	6.91E+01	6.91E+01	8.43E+00	8.64E+00
9901	Diesel PM	3.14E+00	6.28E+00	-	-	-	-	-	-	-	3.83E+00	2.30E+00	2.30E+00	2.30E+00	2.30E+00	2.30E+00	-
7439921	Lead	-	-	5.60E-02	5.60E-02	6.51E-02	2.71E-02	2.71E-02	2.71E-02	2.71E-02	3.43E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	2.95E-03	4.20E-03
7439976	Mercury	-	-	1.28E-02	1.28E-02	1.10E-02	1.82E-02	1.82E-02	1.82E-02	1.82E-02	5.31E-03	2.22E-03	2.22E-03	2.22E-03	2.22E-03	4.54E-04	1.49E-03
7440020	Nickel	-	-	1.77E+00	1.77E+00	1.38E+00	6.99E-01	6.99E-01	6.99E-01	6.99E-01	6.09E-01	1.05E+00	1.05E+00	1.05E+00	1.05E+00	5.22E-02	5.67E-02
7782492	Selenium	-	-	1.12E-01	1.12E-01	1.03E-01	2.82E-02	2.82E-02	2.82E-02	2.82E-02	6.59E-02	2.09E-02	2.09E-02	2.09E-02	2.09E-02	5.68E-03	8.17E-03
108883	Toluene	-	-	-	-	-	-	-	-	-	-	1.03E-02	1.03E-02	1.03E-02	1.03E-02	6.17E-03	-
1314621	Vanadium	-	-	2.04E+00	2.04E+00	4.66E+00	2.96E+00	2.96E+00	2.96E+00	2.96E+00	6.36E-01	2.63E+00	2.63E+00	2.63E+00	2.63E+00	4.31E-02	6.44E-02
1330207	Xylenes (mixed)	-	-	-	-	-	-	-	-	-	-	1.50E-02	1.50E-02	1.50E-02	1.50E-02	5.60E-02	-

Notes:

1. Emissions based on revised emission factors presented in AMEC, 2014, Response to Questions About Lehigh Cupertino HRA, Letter to Mr. Robert Hull of the Bay Area Air Quality Management District, dated August 20, 2014.
2. Production-based (not wind-based) emissions from the 2008 CEIR were scaled up to the maximum permitted clinker production of 1,600,000 tons per year.

TABLE 5A
MAXIMUM HOURLY EMISSION RATES FOR THE KILN
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per hour (lbs/hr)

CAS No.	Chemical	2013 HRA		2014 HRA Addendum	
		Maximum Hourly	Source of Emissions[1]	Maximum Hourly	Source of Emissions[1]
75070	Acetaldehyde	1.68E-01	2008 CEIR	1.68E-01	2008 CEIR
107028	Acrolein	6.51E-03	2008 CEIR	6.51E-03	2008 CEIR
7440382	Arsenic	1.10E-04	2008 CEIR	1.10E-04	2008 CEIR
56553	Benz[a]anthracene	1.90E-06	2008 CEIR	1.90E-06	2008 CEIR
71432	Benzene	1.40E+00	2008 CEIR	2.33E+00	AMEC, 2014
50328	Benzo[a]pyrene	4.27E-08	2008 CEIR	4.27E-08	2008 CEIR
205992	Benzo[b]fluoranthene	2.71E-07	2008 CEIR	2.71E-07	2008 CEIR
207089	Benzo[k]fluoranthene	4.27E-08	2008 CEIR	4.27E-08	2008 CEIR
100447	Benzyl chloride	1.47E-02	2008 CEIR	1.47E-02	2008 CEIR
7440417	Beryllium	5.52E-05	2008 CEIR	5.52E-05	2008 CEIR
106990	1,3-Butadiene	1.33E-02	2008 CEIR	1.33E-02	2008 CEIR
7440439	Cadmium	5.52E-05	2008 CEIR	5.52E-05	2008 CEIR
56235	Carbon tetrachloride	8.94E-03	2008 CEIR	8.94E-03	2008 CEIR
108907	Chlorobenzene	8.04E-02	2008 CEIR	8.04E-02	2008 CEIR
67663	Chloroform	4.16E-03	2008 CEIR	4.16E-03	2008 CEIR
18540299	Chromium VI	4.87E-05	2008 CEIR	4.87E-05	2008 CEIR
218019	Chrysene	5.60E-06	2008 CEIR	5.60E-06	2008 CEIR
7440508	Copper	6.15E-04	2008 CEIR	6.15E-04	2008 CEIR
1175	Crystalline silica	0.00E+00	--	0.00E+00	--
53703	Dibenz[a,h]anthracene	4.27E-08	2008 CEIR	4.27E-08	2008 CEIR
106467	p-Dichlorobenzene	8.54E-03	2008 CEIR	8.54E-03	2008 CEIR
75343	1,1-Dichloroethane	2.87E-03	2008 CEIR	2.87E-03	2008 CEIR
78875	1,2-Dichloropropane	3.94E-03	2008 CEIR	3.94E-03	2008 CEIR
542756	1,3-Dichloropropene	1.61E-02	2008 CEIR	1.61E-02	2008 CEIR
9901	Diesel PM	0.00E+00	--	--	--
75003	Ethyl chloride	5.62E-03	2008 CEIR	5.62E-03	2008 CEIR
100414	Ethylbenzene	1.39E-01	2008 CEIR	1.39E-01	2008 CEIR
106934	Ethylene dibromide	8.73E-03	2008 CEIR	8.73E-03	2008 CEIR
107062	Ethylene dichloride	3.45E-03	2008 CEIR	3.45E-03	2008 CEIR
50000	Formaldehyde	9.15E-03	2008 CEIR	9.15E-03	2008 CEIR
35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.40E-09	2008 CEIR	1.40E-09	2008 CEIR
67562394	1,2,3,4,6,7,8-Heptachlorodibenzofuran	6.77E-10	2008 CEIR	6.77E-10	2008 CEIR
55673897	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.75E-10	2008 CEIR	1.75E-10	2008 CEIR

TABLE 5A
MAXIMUM HOURLY EMISSION RATES FOR THE KILN
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per hour (lbs/hr)

CAS No.	Chemical	2013 HRA		2014 HRA Addendum	
		Maximum Hourly	Source of Emissions[1]	Maximum Hourly	Source of Emissions[1]
39227286	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	3.90E-10	2008 CEIR	3.90E-10	2008 CEIR
57653857	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	3.85E-10	2008 CEIR	3.85E-10	2008 CEIR
19408743	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	3.98E-10	2008 CEIR	3.98E-10	2008 CEIR
70648269	1,2,3,4,7,8-Hexachlorodibenzofuran	5.90E-10	2008 CEIR	5.90E-10	2008 CEIR
57117449	1,2,3,6,7,8-Hexachlorodibenzofuran	5.52E-10	2008 CEIR	5.52E-10	2008 CEIR
72918219	1,2,3,7,8,9-Hexachlorodibenzofuran	1.86E-10	2008 CEIR	1.86E-10	2008 CEIR
60851345	2,3,4,6,7,8-Hexachlorodibenzofuran	3.40E-10	2008 CEIR	3.40E-10	2008 CEIR
7647010	Hydrochloric acid	7.75E+00	AMEC, 2011a	7.75E+00	AMEC, 2011a
193395	Indeno[1,2,3-c,d] pyrene	3.17E-08	2008 CEIR	3.17E-08	2008 CEIR
7439921	Lead	1.28E-04	2008 CEIR	1.28E-04	2008 CEIR
7439965	Manganese	5.79E-04	2008 CEIR	5.79E-04	2008 CEIR
7439976	Mercury	6.40E-02	Title V permit limit	1.10E-02	AMEC, 2011a
74839	Methyl bromide	9.07E-02	2008 CEIR	9.07E-02	2008 CEIR
71556	Methyl chloroform	4.65E-03	2008 CEIR	4.65E-03	2008 CEIR
75092	Methylene chloride	1.87E-02	2008 CEIR	1.87E-02	2008 CEIR
91203	Naphthalene	2.01E-02	2008 CEIR	2.01E-02	2008 CEIR
7440020	Nickel	9.46E-04	2008 CEIR	9.46E-04	2008 CEIR
3268879	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	2.92E-09	2008 CEIR	2.92E-09	2008 CEIR
39001020	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	6.69E-10	2008 CEIR	6.69E-10	2008 CEIR
40321764	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	3.44E-10	2008 CEIR	3.44E-10	2008 CEIR
57117416	1,2,3,7,8-Pentachlorodibenzofuran	2.66E-09	2008 CEIR	2.66E-09	2008 CEIR
57117314	2,3,4,7,8-Pentachlorodibenzofuran	3.98E-09	2008 CEIR	3.98E-09	2008 CEIR
127184	Perchloroethylene	7.70E-03	2008 CEIR	7.70E-03	2008 CEIR
7782492	Selenium	6.17E-04	2008 CEIR	6.17E-04	2008 CEIR
100425	Styrene	3.52E-02	2008 CEIR	3.52E-02	2008 CEIR
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin	3.38E-10	2008 CEIR	3.38E-10	2008 CEIR
51207319	2,3,7,8-Tetrachlorodibenzofuran	1.67E-08	2008 CEIR	1.67E-08	2008 CEIR
79345	1,1,2,2-Tetrachloroethane	5.85E-03	2008 CEIR	5.85E-03	2008 CEIR
108883	Toluene	1.25E+00	2008 CEIR	1.25E+00	2008 CEIR
79005	1,1,2-Trichloroethane	7.75E-03	2008 CEIR	7.75E-03	2008 CEIR
79016	Trichloroethylene	6.10E-03	2008 CEIR	6.10E-03	2008 CEIR
1314621	Vanadium	5.52E-04	2008 CEIR	5.52E-04	2008 CEIR
75014	Vinyl chloride	2.06E-02	2008 CEIR	2.06E-02	2008 CEIR

TABLE 5A
MAXIMUM HOURLY EMISSION RATES FOR THE KILN
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per hour (lbs/hr)

CAS No.	Chemical	2013 HRA		2014 HRA Addendum	
		Maximum Hourly	Source of Emissions[1]	Maximum Hourly	Source of Emissions[1]
75354	Vinylidene chloride	5.64E-03	2008 CEIR	5.64E-03	2008 CEIR
95476	o-Xylene	1.97E-01	2008 CEIR	1.97E-01	2008 CEIR
1330207	Xylenes (mixed)	1.01E+00	2008 CEIR	1.01E+00	2008 CEIR

Notes:

1. Emissions were selected from the 2008 CEIR unless amended, as noted.
   Shaded values were updated in the 2014 HRA Addendum.

References:

AMEC, 2011a, Final Revised Protocol for Revisions to Mercury Emissions and Development of a 2013 Production Scenario, Lehigh Southwest Cement Company, Cupertino, California, February 18.

AMEC, 2014, *Response to Questions About Lehigh Cupertino HRA,* Letter to Mr. Robert Hull of the Bay Area Air Quality Management District, dated August 20, 2014.

BAAQMD, 2013, Addendum to Health Risk Assessment, Evaluation of Toxic Air Contaminant Impacts, AB2588 Air Toxics Hot Spots Program, Lehigh Southwest Cement Company, Plant #17, May 2013

TABLE 5B
MAXIMUM HOURLY EMISSION RATES BY SOURCE GROUP FOR DUST COLLECTORS
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per hour (lbs/hr)

		Maximum Hourly [1]																							
CAS No.	Chemical	1D4	2D1	3D1	3D4	3D5	4D3	4D4	5D1	5D2	5D3	5D5	5D6	5D11_20 / CLNKSTK	5D23	5D27	5D28	6D17	6D19	6D2	6D12	6D1	6D8	7PD7	8D31	999DC
7440382	Arsenic	9.60E-06	6.33E-06	2.37E-06	3.41E-06	3.22E-06	4.36E-06	4.36E-06	4.36E-06	4.36E-06	7.84E-06	4.13E-06	4.13E-06	2.28E-05	3.97E-06	1.59E-06	1.59E-06	4.50E-06	5.06E-06	5.63E-06	3.60E-06	5.96E-06	3.83E-06	2.25E-06	1.82E-06	4.16E-05
7440417	Beryllium	1.03E-06	1.03E-06	3.86E-07	5.40E-07	5.14E-07	6.75E-07	6.75E-07	6.75E-07	6.75E-07	1.22E-06	2.48E-06	2.48E-06	3.70E-06	6.43E-07	2.57E-07	2.57E-07	7.71E-07	8.68E-07	9.64E-07	6.17E-07	9.64E-07	6.56E-07	3.86E-07	1.09E-06	6.36E-06
7440439	Cadmium	1.71E-06	2.59E-06	9.71E-07	1.84E-06	8.57E-07	1.65E-06	1.65E-06	1.65E-06	1.65E-06	2.96E-06	4.13E-06	4.13E-06	6.16E-06	1.07E-06	4.29E-07	4.29E-07	1.29E-06	1.45E-06	1.61E-06	1.03E-06	1.61E-06	1.09E-06	6.43E-07	1.82E-06	1.15E-05
18540299	Chromium VI	0.00E+00	5.35E-07	2.01E-07	5.78E-07	0.00E+00	3.19E-07	3.19E-07	3.19E-07	3.19E-07	5.75E-07	0.00E+00	0.00E+00	5.92E-05	1.03E-05	4.11E-06	4.11E-06	1.77E-05	2.00E-05	2.22E-05	1.42E-05	1.54E-05	1.51E-05	8.87E-06	0.00E+00	8.28E-05
7440508	Copper	4.18E-05	4.72E-05	1.77E-05	2.49E-05	2.33E-05	3.07E-05	3.07E-05	3.07E-05	3.07E-05	5.52E-05	2.11E-05	2.11E-05	9.53E-05	1.66E-05	6.63E-06	6.63E-06	2.29E-05	2.57E-05	2.86E-05	1.83E-05	2.49E-05	1.95E-05	1.14E-05	2.04E-05	2.15E-04
1175	Crystalline silica	2.24E-04	1.66E-03	6.21E-04	1.02E-03	6.43E-04	9.98E-04	9.98E-04	9.98E-04	9.98E-04	1.80E-03	3.37E-05	3.37E-05	5.03E-05	8.74E-06	3.50E-06	3.50E-06	6.29E-05	7.08E-05	7.87E-05	5.04E-05	1.31E-05	5.35E-05	3.15E-05	5.41E-03	3.77E-03
7439921	Lead	4.66E-06	2.47E-06	9.26E-07	1.86E-06	8.57E-07	1.76E-06	1.76E-06	1.76E-06	1.76E-06	3.17E-06	4.13E-06	4.13E-06	1.73E-05	3.00E-06	1.20E-06	1.20E-06	3.19E-06	3.59E-06	3.99E-06	2.55E-06	4.50E-06	2.71E-06	1.59E-06	1.89E-06	2.61E-05
7439976	Mercury	2.95E-07	4.30E-07	1.61E-07	3.80E-07	8.23E-08	2.75E-07	2.75E-07	2.75E-07	2.75E-07	4.94E-07	1.29E-05	1.29E-05	4.93E-08	8.57E-09	3.43E-09	3.43E-09	1.03E-08	1.16E-08	1.29E-08	8.23E-09	1.29E-08	8.74E-09	5.14E-09	2.91E-07	1.30E-06
7440020	Nickel	2.95E-04	5.89E-05	2.21E-05	4.93E-05	2.40E-05	5.34E-05	5.34E-05	5.34E-05	5.34E-05	9.61E-05	1.25E-03	1.25E-03	3.70E-04	6.43E-05	2.57E-05	2.57E-05	1.11E-04	1.24E-04	1.38E-04	8.85E-05	9.64E-05	9.40E-05	5.53E-05	3.35E-05	1.11E-03
7782492	Selenium	3.43E-06	3.43E-06	1.29E-06	1.80E-06	1.71E-06	2.25E-06	2.25E-06	2.25E-06	2.25E-06	4.05E-06	8.25E-06	8.25E-06	1.23E-05	2.14E-06	8.57E-07	8.57E-07	2.57E-06	2.89E-06	3.21E-06	2.06E-06	3.21E-06	2.19E-06	1.29E-06	3.64E-06	2.17E-05
1314621	Vanadium	8.91E-04	2.78E-04	1.04E-04	1.62E-04	1.51E-04	2.20E-04	2.20E-04	2.20E-04	2.20E-04	3.97E-04	3.63E-03	3.63E-03	2.00E-03	3.49E-04	1.39E-04	1.39E-04	3.70E-04	4.17E-04	4.63E-04	2.96E-04	5.23E-04	3.15E-04	1.85E-04	2.77E-05	3.58E-03

Notes:
1. Consistent with emissions reported in the 2008 CEIR.

TABLE 5C
MAXIMUM HOURLY EMISSION RATES BY SOURCE GROUP FOR FUGITIVE AND OTHER POINT SOURCES
Lehigh Southwest Cement Company
Cupertino Facility
Emissions reported in pounds per hour (lbs/hr)

2014 HRA Addendum [1]

CAS No.	Chemical	Maximum Hourly															
		S501	S502	1	2	3	4A	4B	4C	4D	5	6A	6B	6C	6D	7	8
7440382	Arsenic	-	-	3.77E-05	3.77E-05	9.69E-06	1.99E-05	1.99E-05	1.99E-05	1.99E-05	3.36E-05	9.55E-06	9.55E-06	9.55E-06	9.55E-06	5.39E-06	6.64E-06
71432	Benzene	-	-	-	-	-	-	-	-	-	-	9.10E-07	9.10E-07	9.10E-07	9.10E-07	5.40E-08	-
7440417	Beryllium	-	-	1.37E-05	1.37E-05	2.43E-06	3.02E-06	3.02E-06	3.02E-06	3.02E-06	1.70E-05	2.45E-06	2.45E-06	2.45E-06	2.45E-06	3.24E-06	6.51E-06
7440439	Cadmium	-	-	2.29E-05	2.29E-05	5.22E-06	7.28E-06	7.28E-06	7.28E-06	7.28E-06	3.41E-05	4.04E-06	4.04E-06	4.04E-06	4.04E-06	5.39E-06	6.38E-06
18540299	Chromium VI	-	-	1.20E-06	1.20E-06	7.17E-07	1.04E-05	1.04E-05	1.04E-05	1.04E-05	-	5.11E-06	5.11E-06	5.11E-06	5.11E-06	-	-
7440508	Copper	-	-	4.22E-04	4.22E-04	7.98E-05	1.38E-04	1.38E-04	1.38E-04	1.38E-04	3.64E-04	8.77E-05	8.77E-05	8.77E-05	8.77E-05	6.04E-05	6.49E-05
1175	Crystalline silica	-	-	1.03E-01	1.03E-01	7.84E-03	3.90E-03	3.90E-03	3.90E-03	3.90E-03	8.35E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.60E-02	1.63E-02
9901	Diesel PM	2.99E-01	5.98E-01	-	-	-	-	-	-	-	1.90E-02	1.14E-02	1.14E-02	1.14E-02	1.14E-02	1.14E-02	-
7439921	Lead	-	-	2.29E-05	2.29E-05	5.13E-06	9.50E-06	9.50E-06	9.50E-06	9.50E-06	2.94E-05	1.29E-05	1.29E-05	1.29E-05	1.29E-05	5.61E-06	6.60E-06
7439976	Mercury	-	-	5.25E-06	5.25E-06	8.69E-07	3.20E-06	3.20E-06	3.20E-06	3.20E-06	4.68E-06	4.97E-07	4.97E-07	4.97E-07	4.97E-07	8.63E-07	1.64E-06
7440020	Nickel	-	-	7.18E-04	7.18E-04	1.09E-04	2.63E-04	2.63E-04	2.63E-04	2.63E-04	5.31E-04	2.82E-04	2.82E-04	2.82E-04	2.82E-04	9.93E-05	1.04E-04
7782492	Selenium	-	-	4.58E-05	4.58E-05	8.09E-06	1.05E-05	1.05E-05	1.05E-05	1.05E-05	5.67E-05	2.69E-06	2.69E-06	2.69E-06	2.69E-06	1.08E-05	1.28E-05
108883	Toluene	-	-	-	-	-	-	-	-	-	-	3.59E-06	3.59E-06	3.59E-06	3.59E-06	2.16E-06	-
1314621	Vanadium	-	-	8.48E-04	8.48E-04	3.67E-04	1.08E-03	1.08E-03	1.08E-03	1.08E-03	1.09E-03	8.20E-04	8.20E-04	8.20E-04	8.20E-04	8.20E-05	1.01E-04
1330207	Xylenes (mixed)	-	-	-	-	-	-	-	-	-	-	5.25E-06	5.25E-06	5.25E-06	5.25E-06	1.96E-05	-

2013 HRA

CAS No.	Chemical	Maximum Hourly [2]															
		S501	S502	1	2	3	4A	4B	4C	4D	5	6A	6B	6C	6D	7	8
7440382	Arsenic	-	-	3.22E-05	3.22E-05	9.69E-06	1.98E-05	1.98E-05	1.98E-05	1.98E-05	1.88E-05	8.76E-06	8.76E-06	8.76E-06	8.76E-06	1.12E-06	1.68E-06
71432	Benzene	-	-	-	-	-	-	-	-	-	-	9.10E-07	9.10E-07	9.10E-07	9.10E-07	5.40E-08	-
7440417	Beryllium	-	-	1.21E-05	1.21E-05	2.43E-06	2.99E-06	2.99E-06	2.99E-06	2.99E-06	1.10E-05	2.33E-06	2.33E-06	2.33E-06	2.33E-06	6.71E-07	2.43E-06
7440439	Cadmium	-	-	2.01E-05	2.01E-05	5.22E-06	7.23E-06	7.23E-06	7.23E-06	7.23E-06	1.88E-05	3.86E-06	3.86E-06	3.86E-06	3.86E-06	1.12E-06	1.62E-06
18540299	Chromium VI	-	-	1.61E-06	1.61E-06	9.60E-07	1.06E-05	1.06E-05	1.06E-05	1.06E-05	1.47E-06	5.03E-06	5.03E-06	5.03E-06	5.03E-06	8.95E-08	1.29E-07
7440508	Copper	-	-	3.69E-04	3.69E-04	7.98E-05	1.36E-04	1.36E-04	1.36E-04	1.36E-04	2.10E-04	8.57E-05	8.57E-05	8.57E-05	8.57E-05	1.25E-05	1.42E-05
1175	Crystalline silica	-	-	9.19E-02	9.19E-02	7.84E-03	3.88E-03	3.88E-03	3.88E-03	3.88E-03	5.45E-02	9.96E-03	9.96E-03	9.96E-03	9.96E-03	3.32E-03	3.40E-03
9901	Diesel PM	2.99E-01	5.98E-01	-	-	-	-	-	-	-	1.90E-02	1.14E-02	1.14E-02	1.14E-02	1.14E-02	1.14E-02	-
7439921	Lead	-	-	2.01E-05	2.01E-05	5.13E-06	9.21E-06	9.21E-06	9.21E-06	9.21E-06	1.91E-05	1.23E-05	1.23E-05	1.23E-05	1.23E-05	1.16E-06	1.66E-06
7439976	Mercury	-	-	4.61E-06	4.61E-06	8.69E-07	3.14E-06	3.14E-06	3.14E-06	3.14E-06	2.95E-06	4.95E-07	4.95E-07	4.95E-07	4.95E-07	1.79E-07	5.94E-07
7440020	Nickel	-	-	6.36E-04	6.36E-04	1.09E-04	2.63E-04	2.63E-04	2.63E-04	2.63E-04	3.39E-04	2.62E-04	2.62E-04	2.62E-04	2.62E-04	2.06E-05	2.24E-05
7782492	Selenium	-	-	4.02E-05	4.02E-05	8.09E-06	1.05E-05	1.05E-05	1.05E-05	1.05E-05	3.67E-05	2.32E-06	2.32E-06	2.32E-06	2.32E-06	2.24E-06	3.23E-06
108883	Toluene	-	-	-	-	-	-	-	-	-	-	3.59E-06	3.59E-06	3.59E-06	3.59E-06	2.16E-06	-
1314621	Vanadium	-	-	7.34E-04	7.34E-04	3.67E-04	1.08E-03	1.08E-03	1.08E-03	1.08E-03	3.30E-04	7.56E-04	7.56E-04	7.56E-04	7.56E-04	1.70E-05	2.55E-05
1330207	Xylenes (mixed)	-	-	-	-	-	-	-	-	-	-	5.25E-06	5.25E-06	5.25E-06	5.25E-06	1.96E-05	-

Note:

1. Emissions based on revised emission factors presented in AMEC, 2014, Response to Questions About Lehigh Cupertino HRA, Letter to Mr. Robert Hull of the Bay Area Air Quality Management District, dated August 20, 2014.
2. Consistent with emissions reported in the 2008 CEIR.

TABLE 6
LOCATION OF KEY OFF-SITE RECEPTORS
Lehigh Southwest Cement Company
Cupertino Facility

Model ID#	Receptor Type	Description	Elevation (meters)	UTM Coordinates[1]
1	Census Location	Census Tract 510100	78.67	581455.28 , 4133175.3
2	Census Location	Census Tract 507805	85.9	583712.23 , 4132349.8
3	Census Location	Census Tract 507703	124.36	582339.32 , 4130693.2
4	Census Location	Census Tract 507701	100.17	584046.13 , 4130743.2
5	Census Location	Census Tract 507807	88.63	585016.92 , 4130016.4
6	Census Location	Census Tract 507702	125.44	583904.0 , 4129096.1
7	Census Location	Census Tract 507808	97.04	585157.51 , 4128925.4
8	Census Location	Census Tract 507600	267.43	583844.05 , 4126181.2
9	Census Location	Census Tract 509902	50.54	582500 , 4136000
10	Census Location	Census Tract 510002	70.67	582500 , 4133500
11	Census Location	Census Tract 508301	70.74	583500 , 4133500
12	Census Location	Census Tract 508401	55.46	583500 , 4135500
13	Census Location	Census Tract 511701	141.38	577500 , 4136000
14	Census Location	Census Tract 510200	58.69	579500 , 4136000
15	Census Location	Census Tract 507806	76.6	585300 , 4131600
16	Census Location	Census Tract 507906	80.03	586900 , 4128800
17	Census Location	Census Tract 507905	81	586300 , 4128800
18	Census Location	Census Tract 510001	60.96	581500 , 4135000
19	Census Location	Census Tract 509901	50.52	581000 , 4136000
29527	Census Location	Census Tract 508303	64.4	584541 , 4133479
30151	Census Location	Census Tract 507401	91.36	587321 , 4127009
30292	Census Location	Census Tract 508001	71.45	586821 , 4130009
30451	Census Location	Census Tract 508304	60.67	585321 , 4133509
30513	Census Location	Census Tract 508403	52.78	584821 , 4134509
30954	Census Location	Census Tract 511703	143.72	579150.38 , 4133424.4
30955	Census Location	Census Tract 511702	95.04	580171.62 , 4134226.7
20	Daycare	De Anza College Child Development Center 21250 Stevens Creek Boulevard, Cupertino 95014	91.53	584608 , 4130709
21	Daycare	Kindercare Learning Center 1515 S. De Anza Boulevard	92.22	585720.8 , 4128214.5

TABLE 6
LOCATION OF KEY OFF-SITE RECEPTORS
Lehigh Southwest Cement Company
Cupertino Facility

Model ID#	Receptor Type	Description	Elevation (meters)	UTM Coordinates[1]
22	Preschool	Children's House of Los Altos 770 Berry Avenue, Los Altos 94024	59.09	580371.2 , 4135348.2
23	Preschool	Foothill Preschool 2100 Woods Lane, Los Altos 94024	84.23	581783.8 , 4132851.4
24	Preschool	Los Altos Christian Preschool 625 Magdalena Avenue, Los Altos 94024	60.44	579699 , 4135147.9
25	Preschool	Los Altos United Methodist Children's Center 655 Magdalena Avenue, Los Altos 94024	59.67	579789.9 , 4135231.1
26	Preschool	Play & Learn Preschool Daycare 10067 Byrne Avenue, Cupertino 95014	103.18	583372.6 , 4130990.7
27	School-Age Care	Happy Childhood Education 1091 S. DeAnza Boulevard, San Jose 95129	82.16	585749.2 , 4129341.2
28	School	Blach Intermediate School 1120 Covington Rd, Los Altos 94024	54.45	581289 , 4135590
29	School	Creekside Private School 10300 Creston Dr. Cupertino 95014	76.73	583251 , 4132945
30	School	Cupertino Junior High School 1650 S. Bernardo Ave, Sunnyvale 94087	77.93	583348 , 4132945
31	School	Garden Gate Elementary School 10500 Ann Arbor Avenue, Cupertino 95014	79.87	584603 , 4132007
32	School	Homestead High School 21370 Homestead Rd, Cupertino 95014	78.03	584167 , 4132593
33	School	Kennedy Middle School 821 Bubb Rd, Cupertino 95014	107.03	584043 , 4129779
34	School	Lincoln Elementary School 21710 McClellan Road, Cupertino 95014	107.17	583832.3 , 4130282.4
35	School	Loyola School 770 Berry Avenue, Los Altos 94024	59.72	580364 , 4135237
36	School	Meyerholz Elementary School 6990 Melvin Drive, San Jose 95129	76.93	586259.71 , 4129392.5

TABLE 6
LOCATION OF KEY OFF-SITE RECEPTORS
Lehigh Southwest Cement Company
Cupertino Facility

Model ID#	Receptor Type	Description	Elevation (meters)	UTM Coordinates[1]
37	School	Miramonte School 1175 Altamead Drive, Los Altos 94024	55.16	581344 , 4135423
38	School	Montclaire Elementary and School-Age Child Development Center 1160 St. Joseph Avenue, Los Altos 94024	79.15	581300.9 , 4133301.3
39	School	Mountain View High School 3535 Truman Avenue, Mountain View 94040	58.18	582475.84 , 4135015.5
40	School	Oak Elementary School 1501 Oak Avenue, Los Altos 94024	59.29	582218 , 4134902
41	School	Regnart Elementary and CDC 1180 Yorkshire Drive, Cupertino 95014	113.78	584472 , 4128982.4
42	School	South Peninsula Hebrew Day School 1030 Astoria Drive, Sunnyvale 94087	64.35	583463.85 , 4134098.5
43	School	St. Francis High School 1885 Miramonte Avenue, Mountain View 94040	48.25	581051.67 , 4136201
44	School	St. Simon Elementary School 1840 Grant Road, Los Altos 94024	71.06	581553 , 4133763
45	School	Stevens Creek Elementary School 10300 Ainsworth Drive, Cupertino 95014	99.48	582896 , 4131568
46	School	Stratford School 1196 Lime Drive, Sunnyvale 94087	57.71	583735.67 , 4134738.1
47	School	Waldorf School-Peninsula 11311 Mora Drive, Los Altos 94024	100.27	580133 , 4133320
48	School	West Valley Elementary School 1635 Belleville Way, Sunnyvale 94087	73.89	583118 , 4133107
63	Residence	MROSD Ranger Residence/Facility (Rancho San Antonio)	123.62	580014 , 4132099
30956	Residence	MROSD Ranger Residence east of Stevens Creek Canyon Road	126.81	582006 , 4129129
11396	MEIR - Acute Current	Residential area near west end of El Cerrito Road	264.15	581871 , 4129749

TABLE 6
LOCATION OF KEY OFF-SITE RECEPTORS
Lehigh Southwest Cement Company
Cupertino Facility

Model ID#	Receptor Type	Description	Elevation (meters)	UTM Coordinates[1]
12566	MEIR - Acute Future	Residential area near west end of San Felipe Road	165.16	581961 , 4130184
13886	MEIR - Cancer/chronic	Residential area near west end of Voss Avenue	200.47	581556 , 4130679
65	MEIW - Cancer/chronic and Acute Current	County Buildings on St. Joseph Avenue (North of Permanente Rd.)	151.08	581334 , 4131199
54	MEIW - Acute Future Only	MROSD Preserve Facility (Rancho San Antonio)	119.19	580104 , 4131979
1637	PMI - Acute	Fenceline	193.92	580615 , 4131492
1716	PMI - Cancer/chronic	Fenceline	249.7	580124 , 4131191

Note
1. Universal Transverse Mercator Coordinate System

Abbreviations
MEIW = Maximum Exposed Individual Worker
MEIR = Maximum Exposed Individual Resident
MROSD = Midpenisula Regional Open Space District
PMI = Point of Maximum Impact

TABLE 7
HARP RISK MODELING AND EXPOSURE ASSESSMENT OPTIONS
Lehigh Southwest Cement Company
Cupertino Facility

Parameter Description	Assumption	Rationale
Residential Cancer (70-year) Exposure - Inhalation	Use 80th percentile breathing rate - (302 L/kg-day or 21 m^3/day for a 70-kilogram adult)	Derived Adjusted[1] Method per CARB, 2003 and BAAQMD, 2010
Chronic (70-year) Exposure - Inhalation	Use 95th percentile breathing rate - (393 L/kg-day or 28 m^3/day for a 70-kilogram adult)	Derived OEHHA Method per BAAQMD, 2010
Residential Cancer and Chronic Exposure (70-year) - Breathing Rate (Inhalation is not a dominant pathway)	271 L/kg-day (19 m^3/day for a 70-kilogram adult)	Average Daily Breathing Rate per OEHHA, 2003
Student Cancer and Chronic (9-year) Exposure - Inhalation	Use 95th percentile breathing rate - (581 L/kg-day for a 15-kilogram child)	Derived OEHHA Method 9-year Child Resident per BAAQMD, 2010
Worker Cancer and Chronic Exposure - Inhalation	149 L/kg-day (10.4 m^3/day for a 70-kilogram adult)	OEHHA, 2003; corresponds to 1.3 m^3/hr for an 8-hour day[2]
Worker Exposure for Carcinogenic and Chronic Exposure - Exposure Frequency/Duration	49 wks/yr, 5 days/wk, 8 hrs/day, 40 yrs	HARP Model default worker schedule; OEHHA, 2003
Deposition Rate	0.02 m/s	Controlled sources; OEHHA, 2003
Fraction of Homegrown produce ingested	0.052	Default urban per OEHHA, 2003

Notes
1. Uses maximum predicted exposure for two most significant exposure pathways and average exposure for remaining pathways.
2. OEHHA guidance provides only a point estimate (the value presented) for worker exposure, unlike the range of inhalation rates provided for residential exposure.

Abbreviations
BAAQMD = Bay Area Air Quality Management District
CARB = California Air Resouces Board
HARP = Hotspots Analysis Reporting Program
hours/yr = hours per year
L/kg-day = liter per kilogram bodyweight per day
m^3/day = cubic meters per day
m/s = meters per second
OEHHA = Office of Environmental Health Hazard Assessment

TABLE 8
HEALTH EFFECT CATEGORIES FOR CHEMICALS EMITTED FROM THE FACILITY
Lehigh Southwest Cement Company
Cupertino Facility

CAS Number	CHEMICAL	Primary Emission Category[1]	Carcinogenic Risk	Chronic Noncarcinogenic	Acute Noncarcinogenic
75070	Acetaldehyde	Kiln	•	•	•
107028	Acrolein	Kiln		•	•
7440382	Arsenic	Raw material	•	•	•
56553	Benz[a]anthracene	Kiln	•		
71432	Benzene	Kiln	•	•	•
50328	Benzo[a]pyrene	Kiln	•		
205992	Benzo[b]fluoranthene	Kiln	•		
207089	Benzo[k]fluoranthene	Kiln	•		
100447	Benzyl chloride	Kiln	•		•
7440417	Beryllium	Raw material	•	•	
106990	1,3-Butadiene	Kiln	•	•	•
7440439	Cadmium	Raw material	•	•	
56235	Carbon tetrachloride	Kiln	•	•	•
108907	Chlorobenzene	Kiln		•	
67663	Chloroform	Kiln	•	•	•
18540299	Chromium, hexavalent	Byproduct of manufacturing	•	•	
218019	Chrysene	Kiln	•		
7440508	Copper	Raw material			•
1175	Crystalline silica (respirable)	Raw material		•	
53703	Dibenz[a,h]anthracene	Kiln	•		
106467	p-Dichlorobenzene	Kiln	•	•	
75343	1,1-Dichloroethane	Kiln	•		
78875	1,2-Dichloropropane	Kiln	•		
542756	1,3-Dichloropropene	Kiln	•		
9901	Diesel PM	Stationary sources	•	•	
75003	Ethyl chloride (Chloroethane)	Kiln		•	
100414	Ethyl benzene	Kiln	•	•	
106934	Ethylene dibromide (EDB)	Kiln	•	•	
107062	Ethylene dichloride (EDC)	Kiln	•	•	
50000	Formaldehyde	Kiln	•	•	•
35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Kiln	•	•	
67562394	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Kiln	•	•	
55673897	1,2,3,4,7,8,9-Heptachlorodibenzofuran	Kiln	•	•	
39227286	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	Kiln	•	•	

TABLE 8
HEALTH EFFECT CATEGORIES FOR CHEMICALS EMITTED FROM THE FACILITY
Lehigh Southwest Cement Company
Cupertino Facility

CAS Number	CHEMICAL	Primary Emission Category[1]	Carcinogenic Risk	Chronic Noncarcinogenic	Acute Noncarcinogenic
57653857	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	Kiln	•	•	
19408743	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	Kiln	•	•	
70648269	1,2,3,4,7,8-Hexachlorodibenzofuran	Kiln	•	•	
57117449	1,2,3,6,7,8-Hexachlorodibenzofuran	Kiln	•	•	
72918219	1,2,3,7,8,9-Hexachlorodibenzofuran	Kiln	•	•	
60851345	2,3,4,6,7,8-Hexachlorodibenzofuran	Kiln	•	•	
7647010	Hydrochloric acid	Kiln		•	•
193395	Indeno[1,2,3-cd]pyrene	Kiln	•		
7439921	Lead	Raw material	•		
7439965	Manganese	Raw material		•	
7439976	Mercury	Raw material		•	•
74839	Methyl bromide (Bromomethane)	Kiln		•	•
71556	Methyl chloroform (1,1,1-Trichloroethane)	Kiln		•	•
75092	Methylene chloride (Dichloromethane)	Kiln	•	•	•
91203	Naphthalene	Kiln	•	•	
7440020	Nickel	Raw material	•	•	•
3268879	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	Kiln	•	•	
39001020	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	Kiln	•	•	
40321764	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Kiln	•	•	
57117416	1,2,3,7,8-Pentachlorodibenzofuran	Kiln	•	•	
57117314	2,3,4,7,8-Pentachlorodibenzofuran	Kiln	•	•	
127184	Perchloroethylene (Tetrachloroethene)	Kiln	•	•	•
7782492	Selenium	Raw material		•	
100425	Styrene	Kiln		•	•
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin	Kiln	•	•	
51207319	2,3,7,8-Tetrachlorodibenzofuran	Kiln	•	•	
79345	1,1,2,2-Tetrachloroethane	Kiln	•		
108883	Toluene	Kiln		•	•
79005	1,1,2-Trichloroethane	Kiln	•		
79016	Trichloroethylene	Kiln	•	•	
1314621	Vanadium	Raw material			•
75014	Vinyl chloride	Kiln	•		•
75354	Vinylidene chloride	Kiln		•	

TABLE 8
HEALTH EFFECT CATEGORIES FOR CHEMICALS EMITTED FROM THE FACILITY
Lehigh Southwest Cement Company
Cupertino Facility

CAS Number	CHEMICAL	Primary Emission Category[1]	Carcinogenic Risk	Chronic Noncarcinogenic	Acute Noncarcinogenic
95476	o-Xylene	Kiln		•	•
1330207	Xylenes (mixed)	Kiln		•	•

Notes

1. An emission category is presented for each chemical to provide information on where the chemicals originate in the cement
   Kiln - Byproducts of natural gas combustion to heat the kiln for the manufacture of cement and other chemicals identified during a source test of the kiln.
   Raw material - A chemical that occurs naturally in the raw materials used to manufacture cement.
   Byproduct of manufacturing - Hexavalent chromium concentrations increase from those in the raw materials during manufacture of cement.
   Stationary sources - Emissions from combustion of fuel for stationary sources, such as emergency generators and welding equipment.
2. Indicates that a chemical is evaluated for exposure pathways in addition to inhalation because of potential accumulation on the ground. Applicable exposure pathways include ingestion of soil, dermal absorption, ingestion of mother's milk, and ingestion of homegrown produce.

TABLE 9
TOXICITY CRITERIA FOR CHEMICALS EMITTED FROM THE FACILITY [1]
Lehigh Southwest Cement Company
Cupertino Facility

CAS Number	CHEMICAL	Primary Emission Category [2]	Multiple Pathway [3]	Inhalation Cancer Unit Risk Value $(\mu g/m^3)^{-1}$	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Oral Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Inhalation Chronic REL ug/m^3	Oral Chronic REL mg/kg-d	Acute REL ug/m^3
75070	Acetaldehyde	Kiln		2.9E-06	1.0E-02	*	1.4E+02	*	4.7E+02
107028	Acrolein	Kiln		*	*	*	3.5E-01	*	2.5E+00
7440382	Arsenic	Raw material	X	3.4E-03	1.2E+01	1.5E+00	1.5E-02	3.5E-06	2.0E-01
56553	Benz[a]anthracene	Kiln	X	1.1E-04	3.9E-01	1.2E+00	*	*	*
71432	Benzene	Kiln		2.9E-05	1.0E-01	*	3.0E+00	*	2.7E+01
50328	Benzo[a]pyrene	Kiln	X	1.1E-03	3.9E+00	1.2E+01	*	*	*
205992	Benzo[b]fluoranthene	Kiln	X	1.1E-04	3.9E-01	1.2E+00	*	*	*
207089	Benzo[k]fluoranthene	Kiln	X	1.1E-04	3.9E-01	1.2E+00	*	*	*
100447	Benzyl chloride	Kiln		4.9E-05	1.7E-01	*	*	*	2.4E+02
7440417	Beryllium	Raw material	X	2.4E-03	8.4E+00	*	7.0E-03	2.0E-03	*
106990	1,3-Butadiene	Kiln		1.7E-04	6.0E-01	*	2.0E+00	*	6.6E+02
7440439	Cadmium	Raw material	X	4.3E-03	1.5E+01	*	2.0E-02	5.0E-04	*
56235	Carbon tetrachloride	Kiln		4.3E-05	1.5E-01	*	4.0E+01	*	1.9E+03
108907	Chlorobenzene	Kiln		*	*	*	1.0E+03	*	*
67663	Chloroform	Kiln		5.4E-06	1.9E-02	*	3.0E+02	*	1.5E+02
18540299	Chromium, hexavalent	Byproduct of manufacturing	X	1.5E-01	5.1E+02	5.0E-01	2.0E-01	2.0E-02	*
218019	Chrysene	Kiln	X	1.1E-05	3.9E-02	1.2E-01	*	*	*
7440508	Copper	Raw material		*	*	*	*	*	1.0E+02
1175	Crystalline silica (respirable)	Raw material		*	*	*	3.0E+00	*	*
53703	Dibenz[a,h]anthracene	Kiln	X	1.2E-03	4.1E+00	4.1E+00	*	*	*
106467	p-Dichlorobenzene	Kiln		1.1E-05	4.0E-02	*	8.0E+02	*	*
75343	1,1-Dichloroethane	Kiln		1.6E-06	5.7E-03	*	*	*	*
78875	1,2-Dichloropropane	Kiln		1.8E-05	6.3E-02	*	*	*	*
542756	1,3-Dichloropropene	Kiln		1.6E-05	5.5E-02	*	*	*	*
9901	Diesel PM	Stationary sources		3.1E-04	1.1E+00	*	5.0E+00	*	*

TABLE 9
TOXICITY CRITERIA FOR CHEMICALS EMITTED FROM THE FACILITY [1]
Lehigh Southwest Cement Company
Cupertino Facility

CAS Number	CHEMICAL	Primary Emission Category [2]	Multiple Pathway [3]	Inhalation Cancer Unit Risk Value $(\mu g/m^3)^{-1}$	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Oral Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Inhalation Chronic REL ug/m^3	Oral Chronic REL mg/kg-d	Acute REL ug/m^3
75003	Ethyl chloride (Chloroethane)	Kiln		*	*	*	3.0E+04	*	*
100414	Ethyl benzene	Kiln		2.5E-06	8.7E-03	*	2.0E+03	*	*
106934	Ethylene dibromide (EDB)	Kiln		7.1E-05	2.5E-01	*	8.0E-01	*	*
107062	Ethylene dichloride (EDC)	Kiln		2.1E-05	7.2E-02	*	4.0E+02	*	*
50000	Formaldehyde	Kiln		6.0E-06	2.1E-02	*	9.0E+00	*	5.5E+01
35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Kiln	X	3.7E-01	1.3E+03	1.3E+03	4.0E-03	1.0E-06	*
67562394	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Kiln	X	3.7E-01	1.3E+03	1.3E+03	4.0E-03	1.0E-06	*
55673897	1,2,3,4,7,8,9-Heptachlorodibenzofuran	Kiln	X	3.7E-01	1.3E+03	1.3E+03	4.0E-03	1.0E-06	*
39227286	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	Kiln	X	3.7E+00	1.3E+04	1.3E+04	4.0E-04	1.0E-07	*
57653857	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	Kiln	X	3.7E+00	1.3E+04	1.3E+04	4.0E-04	1.0E-07	*
19408743	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	Kiln	X	3.7E+00	1.3E+04	1.3E+04	4.0E-04	1.0E-07	*
70648269	1,2,3,4,7,8-Hexachlorodibenzofuran	Kiln	X	3.7E+00	1.3E+04	1.3E+04	4.0E-04	1.0E-07	*
57117449	1,2,3,6,7,8-Hexachlorodibenzofuran	Kiln	X	3.7E+00	1.3E+04	1.3E+04	4.0E-04	1.0E-07	*
72918219	1,2,3,7,8,9-Hexachlorodibenzofuran	Kiln	X	3.7E+00	1.3E+04	1.3E+04	4.0E-04	1.0E-07	*
60851345	2,3,4,6,7,8-Hexachlorodibenzofuran	Kiln	X	3.7E+00	1.3E+04	1.3E+04	4.0E-04	1.0E-07	*
7647010	Hydrochloric acid	Kiln		*	*	*	9.0E+00	*	2.1E+03
193395	Indeno[1,2,3-cd]pyrene	Kiln	X	1.1E-04	3.9E-01	1.2E+00	*	*	*
7439921	Lead	Raw material	X	1.2E-05	4.2E-02	8.5E-03	*	*	*
7439965	Manganese	Raw material		*	*	*	9.0E-02	*	*

TABLE 9
TOXICITY CRITERIA FOR CHEMICALS EMITTED FROM THE FACILITY [1]
Lehigh Southwest Cement Company
Cupertino Facility

CAS Number	CHEMICAL	Primary Emission Category [2]	Multiple Pathway [3]	Inhalation Cancer Unit Risk Value $(\mu g/m^3)^{-1}$	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Oral Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Inhalation Chronic REL ug/m^3	Oral Chronic REL mg/kg-d	Acute REL ug/m^3
7439976	Mercury	Raw material	X	*	*	*	3.0E-02	1.60E-04	6.0E-01
74839	Methyl bromide (Bromomethane)	Kiln		*	*	*	5.0E+00	*	3.9E+03
71556	Methyl chloroform (1,1,1-Trichloroethane)	Kiln		*	*	*	1.0E+03	*	6.8E+04
75092	Methylene chloride (Dichloromethane)	Kiln		1.0E-06	3.5E-03	*	4.0E+02	*	1.4E+04
91203	Naphthalene	Kiln		3.4E-05	1.2E-01	*	9.0E+00	*	*
7440020	Nickel	Raw material	X	2.6E-04	9.1E-01	*	1.4E-02	1.1E-02	2.0E-01
3268879	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	Kiln	X	1.1E-02	3.9E+01	3.9E+01	1.3E-01	3.3E-05	*
39001020	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	Kiln	X	1.1E-02	3.9E+01	3.9E+01	1.3E-01	3.3E-05	*
40321764	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Kiln	X	3.7E+01	1.3E+05	1.3E+05	4.0E-05	1.0E-08	*
57117416	1,2,3,7,8-Pentachlorodibenzofuran	Kiln	X	1.1E+00	3.9E+03	3.9E+03	1.3E-03	3.3E-07	*
57117314	2,3,4,7,8-Pentachlorodibenzofuran	Kiln	X	1.1E+01	3.9E+04	3.9E+04	1.3E-04	3.3E-08	*
127184	Perchloroethylene (Tetrachloroethene)	Kiln		6.0E-06	2.1E-02	*	3.5E+01	*	2.0E+04
7782492	Selenium	Raw material	X [4]	*	*	*	2.0E+01	* [4]	*
100425	Styrene	Kiln		*	*	*	9.0E+02	*	2.1E+04
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin	Kiln	X	3.7E+01	1.3E+05	1.3E+05	4.0E-05	1.0E-08	*
51207319	2,3,7,8-Tetrachlorodibenzofuran	Kiln	X	3.7E+00	1.3E+04	1.3E+04	4.0E-04	1.0E-07	*
79345	1,1,2,2-Tetrachloroethane	Kiln		5.7E-05	2.0E-01	*	*	*	*

TABLE 9
TOXICITY CRITERIA FOR CHEMICALS EMITTED FROM THE FACILITY [1]
Lehigh Southwest Cement Company
Cupertino Facility

CAS Number	CHEMICAL	Primary Emission Category [2]	Multiple Pathway [3]	Inhalation Cancer Unit Risk Value $(\mu g/m^3)^{-1}$	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Oral Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Inhalation Chronic REL ug/m^3	Oral Chronic REL mg/kg-d	Acute REL ug/m^3
108883	Toluene	Kiln		*	*	*	3.0E+02	*	3.7E+04
79005	1,1,2-Trichloroethane	Kiln		1.6E-05	5.7E-02	*	*	*	*
79016	Trichloroethylene	Kiln		2.0E-06	7.0E-03	*	6.0E+02	*	*
1314621	Vanadium	Raw material		*	*	*	*	*	3.0E+01
75014	Vinyl chloride	Kiln		7.7E-05	2.7E-01	*	*	*	1.8E+05
75354	Vinylidene chloride	Kiln		*	*	*	7.0E+01	*	*
95476	o-Xylene	Kiln		*	*	*	7.0E+02	*	2.2E+04
1330207	Xylenes (mixed)	Kiln		*	*	*	7.0E+02	*	2.2E+04

Notes

1. Consistent with the Consolidated Table of OEHHA / ARB Approved Risk Assessment Health Values, July 3, 2014.
2. An emission category is presented for each chemical to provide information on where the chemicals originate in the cement manufacturing process. The same chemical may originate from different parts of the manufacturing process, but only the primary source of the chemical is provided.
   Kiln - Byproducts of natural gas combustion to heat the kiln for the manufacture of cement and other chemicals identified during a source test of the
   Raw material - A chemical that occurs naturally in the raw materials used to manufacture cement.
   Byproduct of manufacturing - Hexavalent chromium concentrations increase from those in the raw materials during manufacture of cement. Primary emissions occur during material handling and storage.
   Stationary sources - Emissions from combustion of fuel for stationary sources, such as emergency generators and welding equipment.
3. Indicates that a chemical is evaluated for exposure pathways in addition to inhalation because of potential accumulation on the ground. Applicable exposure pathways include ingestion of soil, dermal absorption, ingestion of mother's milk, and ingestion of homegrown produce.
4. HARP software does not yet evaluate selenium as a multipathway chemical.

Abbreviations

* = Not applicable

TABLE 10
POTENTIAL CHRONIC HAZARD INDEXES AT THE PMI, MEIW AND MEIR BY CHEMICAL
THE RESPIRATORY SYSTEM HEALTH EFFECTS ENDPOINT [1,2]
Lehigh Southwest Cement Company
Cupertino Facility

Chemical	CAS	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
		HI	% Cont.	HI	% Cont.	HI	% Cont.
Acetaldehyde	75070	4.4E-06	0.0%	2.4E-06	0.0%	2.8E-06	0.0%
Acrolein	107028	6.8E-05	0.0%	3.8E-05	0.0%	4.3E-05	0.0%
Arsenic	7440382	1.8E-01	63%	8.2E-02	56%	6.2E-02	53%
Benz[a]anthracene	56553	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Benzene	71432	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Benzo[a]pyrene	50328	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Benzo[b]fluoranthene	205992	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Benzo[k]fluoranthene	207089	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Benzyl chloride	100447	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Beryllium	7440417	1.9E-03	0.7%	1.2E-03	0.8%	1.1E-03	0.9%
1,3-Butadiene	106990	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Cadmium	7440439	1.4E-03	0.5%	7.5E-04	0.5%	6.6E-04	0.6%
Carbon tetrachloride	56235	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Chlorobenzene	108907	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Chloroform	67663	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Chromium, hexavalent	18540299	2.9E-04	0.1%	1.6E-04	0.1%	1.2E-04	0.1%
Chrysene	218019	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Copper	7440508	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Crystalline silica	1175	1.2E-02	4.4%	1.1E-02	7.2%	9.1E-03	7.7%
Dibenz[a,h]anthracene	53703	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
p-Dichlorobenzene	106467	3.9E-08	0.0%	2.2E-08	0.0%	2.5E-08	0.0%
1,1-Dichloroethane	75343	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
1,2-Dichloropropane	78875	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
1,3-Dichloropropene	542756	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Diesel PM	9901	1.0E-04	0.0%	1.3E-04	0.1%	1.3E-04	0.1%
Ethyl chloride (Chloroethane)	75003	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Ethyl benzene	100414	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Ethylene dibromide (EDB)	106934	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Ethylene dichloride (EDC)	107062	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Formaldehyde	50000	3.7E-06	0.0%	2.1E-06	0.0%	2.4E-06	0.0%

TABLE 10
POTENTIAL CHRONIC HAZARD INDEXES AT THE PMI, MEIW AND MEIR BY CHEMICAL
THE RESPIRATORY SYSTEM HEALTH EFFECTS ENDPOINT [1,2]
Lehigh Southwest Cement Company
Cupertino Facility

Chemical	CAS	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
		HI	% Cont.	HI	% Cont.	HI	% Cont.
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822469	1.5E-08	0.0%	8.2E-09	0.0%	5.6E-09	0.0%
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562394	7.2E-09	0.0%	4.0E-09	0.0%	2.7E-09	0.0%
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673897	1.9E-09	0.0%	1.0E-09	0.0%	7.0E-10	0.0%
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227286	4.1E-08	0.0%	2.3E-08	0.0%	1.6E-08	0.0%
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653857	4.1E-08	0.0%	2.2E-08	0.0%	1.5E-08	0.0%
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408743	4.2E-08	0.0%	2.3E-08	0.0%	1.6E-08	0.0%
1,2,3,4,7,8-Hexachlorodibenzofuran	70648269	6.2E-08	0.0%	3.5E-08	0.0%	2.4E-08	0.0%
1,2,3,6,7,8-Hexachlorodibenzofuran	57117449	5.8E-08	0.0%	3.2E-08	0.0%	2.2E-08	0.0%
1,2,3,7,8,9-Hexachlorodibenzofuran	72918219	2.0E-08	0.0%	1.1E-08	0.0%	7.5E-09	0.0%
2,3,4,6,7,8-Hexachlorodibenzofuran	60851345	3.6E-08	0.0%	2.0E-08	0.0%	1.4E-08	0.0%
Hydrochloric acid	7647010	2.8E-03	1.0%	1.5E-03	1.0%	1.7E-03	1.5%
Indeno[1,2,3-cd]pyrene	193395	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Lead	7439921	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Manganese	7439965	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Mercury	7439976	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Methyl bromide (Bromomethane)	74839	6.7E-05	0.0%	3.7E-05	0.0%	4.2E-05	0.0%
Methyl chloroform (1,1,1-Trichloroethane)	71556	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Methylene chloride (Dichloromethane)	75092	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Naphthalene	91203	8.2E-06	0.0%	4.6E-06	0.0%	5.2E-06	0.0%
Nickel	7440020	8.7E-02	31%	5.0E-02	34%	4.3E-02	36%
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268879	9.4E-10	0.0%	5.2E-10	0.0%	3.6E-10	0.0%
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001020	2.1E-10	0.0%	1.2E-10	0.0%	8.1E-11	0.0%
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321764	3.6E-07	0.0%	2.0E-07	0.0%	1.4E-07	0.0%
1,2,3,7,8-Pentachlorodibenzofuran	57117416	8.6E-08	0.0%	4.7E-08	0.0%	3.2E-08	0.0%
2,3,4,7,8-Pentachlorodibenzofuran	57117314	1.3E-06	0.0%	7.1E-07	0.0%	4.8E-07	0.0%
Perchloroethylene (Tetrachloroethene)	127184	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Selenium	7782492	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Styrene	100425	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	3.6E-07	0.0%	2.0E-07	0.0%	1.4E-07	0.0%
2,3,7,8-Tetrachlorodibenzofuran	51207319	1.8E-06	0.0%	9.8E-07	0.0%	6.7E-07	0.0%

TABLE 10
POTENTIAL CHRONIC HAZARD INDEXES AT THE PMI, MEIW AND MEIR BY CHEMICAL
THE RESPIRATORY SYSTEM HEALTH EFFECTS ENDPOINT [1,2]
Lehigh Southwest Cement Company
Cupertino Facility

Chemical	CAS	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
		HI	% Cont.	HI	% Cont.	HI	% Cont.
1,1,2,2-Tetrachloroethane	79345	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Toluene	108883	1.5E-05	0.0%	8.5E-06	0.0%	9.7E-06	0.0%
1,1,2-Trichloroethane	79005	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Trichloroethylene	79016	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Vanadium	1314621	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Vinyl chloride	75014	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Vinylidene chloride	75354	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
o-Xylene	95476	1.0E-06	0.0%	5.7E-07	0.0%	6.6E-07	0.0%
Xylenes (mixed)	1330207	5.3E-06	0.0%	2.9E-06	0.0%	3.3E-06	0.0%
Total Hazard Index [3]		2.8E-01	100%	1.5E-01	100%	1.2E-01	100%

Notes

1. Maximum chronic hazard index was highest for the respiratory system.
2. The hazards from combined exposure to both stack configurations is presented; 2/70 years (MEIR) and 2/40 years (MEIW) for the current stack configuration and 68/70 years (MEIR) and 38/40 years (MEIW) for the future stack configuration.
3. Chronic hazard indexes for the MEIR and MEIW are below 1, the regulatory notification level.

Abbreviations

Cont. = contribution
HI = hazard index

TABLE 11
POTENTIAL CHRONIC HAZARD INDEXES
AT THE PMI, MEIW AND MEIR BY SOURCE AND PATHWAY -
THE RESPIRATORY HEALTH EFFECTS ENDPOINT [1,2]

Lehigh Southwest Cement Company
Cupertino Facility

Source Name	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
	HI	% Cont.	HI	% Cont.	HI	% Cont.
KILN	4.3E-03	1.5%	2.4E-03	1.6%	2.6E-03	2.2%
Point Source (Dust Collectors and Emergency Diesel Generators)						
1D4	3.2E-03	1.1%	2.6E-03	1.8%	1.9E-03	1.6%
2D1	1.7E-03	0.6%	7.2E-04	0.5%	4.8E-04	0.4%
3D1	8.4E-04	0.3%	3.9E-04	0.3%	3.5E-04	0.3%
3D4	6.5E-04	0.2%	4.7E-04	0.3%	3.3E-04	0.3%
3D5	5.3E-04	0.2%	3.8E-04	0.3%	2.7E-04	0.2%
4D3	9.5E-04	0.3%	4.9E-04	0.3%	3.9E-04	0.3%
4D4	1.0E-03	0.4%	5.1E-04	0.3%	4.0E-04	0.3%
5D1	1.3E-03	0.5%	5.5E-04	0.4%	4.4E-04	0.4%
5D11_20	2.5E-03	0.9%	1.9E-03	1.3%	1.1E-03	0.9%
5D2	1.2E-03	0.4%	5.5E-04	0.4%	4.3E-04	0.4%
5D23	1.1E-03	0.4%	1.0E-03	0.7%	8.0E-04	0.7%
5D27	2.5E-04	0.1%	3.3E-04	0.2%	2.1E-04	0.2%
5D28	5.3E-04	0.2%	3.0E-04	0.2%	1.9E-04	0.2%
5D3	1.2E-03	0.4%	9.4E-04	0.6%	7.5E-04	0.6%
5D5	7.9E-03	2.8%	4.3E-03	2.9%	3.7E-03	3.1%
5D6	7.8E-03	2.7%	4.0E-03	2.8%	3.8E-03	3.3%
6D1	6.3E-03	2.2%	5.9E-03	4.0%	3.9E-03	3.3%
6D12	4.8E-03	1.7%	1.9E-03	1.3%	1.4E-03	1.2%
6D17	6.6E-03	2.3%	2.7E-03	1.8%	1.6E-03	1.4%
6D19	2.9E-03	1.0%	2.0E-03	1.4%	1.1E-03	0.9%
6D2	5.2E-03	1.8%	2.2E-03	1.5%	1.2E-03	1.0%
6D8	1.5E-03	0.5%	7.2E-04	0.5%	4.1E-04	0.4%
8D31	1.4E-04	0.0%	1.1E-03	0.7%	6.2E-04	0.5%
999D	1.1E-02	3.8%	1.2E-02	8.3%	7.9E-03	6.8%
S501	2.1E-05	0.0%	7.0E-06	0.0%	8.1E-06	0.0%
S502	3.7E-05	0.0%	2.6E-05	0.0%	5.1E-05	0.0%

TABLE 11
POTENTIAL CHRONIC HAZARD INDEXES
AT THE PMI, MEIW AND MEIR BY SOURCE AND PATHWAY -
THE RESPIRATORY HEALTH EFFECTS ENDPOINT [1,2]

Lehigh Southwest Cement Company
Cupertino Facility

Source Name	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
	HI	% Cont.	HI	% Cont.	HI	% Cont.
Fugitive/Volume Sources						
1	7.6E-03	2.7%	3.8E-03	2.6%	3.4E-03	2.9%
2	1.5E-02	5.2%	5.6E-03	3.8%	5.0E-03	4.3%
3	4.2E-02	14.7%	9.1E-03	6.2%	8.0E-03	6.9%
4A	6.0E-02	21.2%	6.1E-03	4.2%	6.3E-03	5.4%
4B	3.0E-02	10.5%	7.7E-03	5.2%	8.6E-03	7.3%
4C	3.0E-02	10.5%	6.3E-03	4.3%	5.4E-03	4.6%
4D	3.5E-03	1.2%	9.1E-03	6.2%	7.3E-03	6.2%
5	3.7E-03	1.3%	7.0E-03	4.8%	5.6E-03	4.8%
6A	2.1E-03	0.7%	7.8E-03	5.3%	5.7E-03	4.9%
6B	1.2E-03	0.4%	9.9E-03	6.8%	7.9E-03	6.7%
6C	1.2E-02	4.0%	5.5E-03	3.7%	4.6E-03	3.9%
6D	1.5E-03	0.5%	8.7E-03	5.9%	5.8E-03	4.9%
7PD7	3.4E-04	0.1%	8.8E-04	0.6%	4.3E-04	0.4%
7	2.4E-04	0.1%	2.4E-03	1.6%	1.4E-03	1.2%
8	6.7E-04	0.2%	6.5E-03	4.4%	5.5E-03	4.7%
Total Hazard Index [3]	2.8E-01	100%	1.5E-01	100%	1.2E-01	100%

Notes

1. Maximum chronic hazard index was highest for the respiratory system
2. The hazards from combined exposure to both stack configurations is presented; 2/70 years (MEIR) and 2/40 years (MEIW) for the current stack configuration and 68/70 years (MEIR) and 38/40 years (MEIW) for the future stack configuration.
3. Chronic hazard indexes for the MEIR and MEIW are below 1, the regulatory notification level.

Abbreviations

Cont. = contribution
HI = hazard index

TABLE 12
POTENTIAL ACUTE HAZARD INDEXES AT THE PMI, MEIW AND MEIR BY CHEMICAL
- IMMUNE SYSTEM HEALTH EFFECTS ENDPOINTS [1]
Lehigh Southwest Cement Company
Cupertino Facility

Chemical [2]	CAS Number	Point of Maximum Impact (PMI)				Maximum Exposed Individual Resident (MEIR)				Maximum Exposed Individual Worker (MEIW)			
		Current		Future		Current		Future		Current		Future	
		Receptor #1637				Receptor #11396		Receptor #12566		Receptor #65		Receptor #54	
		HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.
Acetaldehyde	75070	--	--	--	--	--	--	--	--	--	--	--	--
Acrolein	107028	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	7440382	--	--	--	--	--	--	--	--	--	--	--	--
Benz[a]anthracene	56553	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	71432	1.4E+00	63%	4.6E-03	0.7%	6.6E-01	64%	3.0E-03	0.6%	5.0E-01	56%	3.7E-03	1.0%
Benzo[a]pyrene	50328	--	--	--	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	205992	--	--	--	--	--	--	--	--	--	--	--	--
Benzo[k]fluoranthene	207089	--	--	--	--	--	--	--	--	--	--	--	--
Benzyl chloride	100447	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	7440417	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Butadiene	106990	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	7440439	--	--	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	56235	--	--	--	--	--	--	--	--	--	--	--	--
Chlorobenzene	108907	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform	67663	--	--	--	--	--	--	--	--	--	--	--	--
Chromium, hexavalent	18540299	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	218019	--	--	--	--	--	--	--	--	--	--	--	--
Copper	7440508	--	--	--	--	--	--	--	--	--	--	--	--
Crystalline silica (respirable)	1175	--	--	--	--	--	--	--	--	--	--	--	--
Dibenz[a,h]anthracene	53703	--	--	--	--	--	--	--	--	--	--	--	--
p-Dichlorobenzene	106467	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	75343	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	78875	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichloropropene	542756	--	--	--	--	--	--	--	--	--	--	--	--
Diesel PM	9901	--	--	--	--	--	--	--	--	--	--	--	--
Ethyl chloride {Chloroethane}	75003	--	--	--	--	--	--	--	--	--	--	--	--
Ethyl benzene	100414	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene dibromide {EDB}	106934	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene dichloride {EDC}	107062	--	--	--	--	--	--	--	--	--	--	--	--
Formaldehyde	50000	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822469	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562394	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 12
POTENTIAL ACUTE HAZARD INDEXES AT THE PMI, MEIW AND MEIR BY CHEMICAL
- IMMUNE SYSTEM HEALTH EFFECTS ENDPOINTS [1]
Lehigh Southwest Cement Company
Cupertino Facility

Chemical [2]	CAS Number	Point of Maximum Impact (PMI)				Maximum Exposed Individual Resident (MEIR)				Maximum Exposed Individual Worker (MEIW)			
		Current		Future		Current		Future		Current		Future	
		Receptor #1637				Receptor #11396		Receptor #12566		Receptor #65		Receptor #54	
		HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673897	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227286	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653857	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408743	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran	70648269	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran	57117449	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran	72918219	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran	60851345	--	--	--	--	--	--	--	--	--	--	--	--
Hydrochloric acid	7647010	--	--	--	--	--	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	193395	--	--	--	--	--	--	--	--	--	--	--	--
Lead	7439921	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	7439965	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	7439976	--	--	--	--	--	--	--	--	--	--	--	--
Methyl bromide {Bromomethane}	74839	--	--	--	--	--	--	--	--	--	--	--	--
Methyl chloroform {1,1,1-Trichloroethane}	71556	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride {Dichloromethane}	75092	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	91203	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	7440020	8.2E-01	37%	6.9E-01	99%	3.7E-01	36%	4.9E-01	99%	4.0E-01	44%	3.8E-01	99%
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268879	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001020	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321764	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran	57117416	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran	57117314	--	--	--	--	--	--	--	--	--	--	--	--
Perchloroethylene {Tetrachloroethene}	127184	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	7782492	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	100425	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	--	--	--	--	--	--	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran	51207319	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	79345	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	108883	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	79005	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethylene	79016	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 12
POTENTIAL ACUTE HAZARD INDEXES AT THE PMI, MEIW AND MEIR BY CHEMICAL
- IMMUNE SYSTEM HEALTH EFFECTS ENDPOINTS [1]
Lehigh Southwest Cement Company
Cupertino Facility

Chemical [2]	CAS Number	Point of Maximum Impact (PMI)				Maximum Exposed Individual Resident (MEIR)				Maximum Exposed Individual Worker (MEIW)			
		Current		Future		Current		Future		Current		Future	
		Receptor #1637				Receptor #11396		Receptor #12566		Receptor #65		Receptor #54	
		HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.
Vanadium pentoxide	1314621	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	75014	--	--	--	--	--	--	--	--	--	--	--	--
Vinylidene chloride	75354	--	--	--	--	--	--	--	--	--	--	--	--
o-Xylene	95476	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes (mixed)	1330207	--	--	--	--	--	--	--	--	--	--	--	--
Total Hazard Index [3]		**2.2E+00**	100.0%	7.0E-01	100.0%	1.0E+00	100.0%	4.9E-01	100.0%	9.0E-01	100.0%	3.8E-01	100.0%

Notes
1. Maximum acute hazard index was highest for immune system effects for all results
2. All evaluated toxic air contaminants (TACs) presented; not all have acute noncancer effects on the immune system; TACs without acute effects on the applicable target organ system are designated with a "--".
3. **Bold** acute hazard indexes are above 1, the regulatory notification level for the AB2588 program.

Abbreviations
Cont. = contribution
HI = hazard index

TABLE 13
POTENTIAL ACUTE HAZARD INDEXES AT THE PMI, MEIW AND MEIR BY SOURCE -
IMMUNE SYSTEM HEALTH EFFECTS ENDPOINT (2014) [1]
Lehigh Southwest Cement Company
Cupertino Facility

	Point of Maximum Impact (PMI)				Maximum Exposed Individual Resident (MEIR)				Maximum Exposed Individual Worker (MEIW)			
	Current		Future		Current		Future		Current		Future	
	Receptor #1637				Receptor #11396		Receptor #12566		Receptor #65		Receptor #54	
Source ID	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.	HI	% Cont.
KILN	**1.5E+00**	67%	4.8E-03	0.7%	6.9E-01	68%	3.2E-03	0.6%	5.3E-01	59%	3.9E-03	1.0%
Point Sources (Dust Collectors and Emergency Diesel Generators)												
1D4	2.9E-02	1.3%	2.9E-02	4.2%	1.2E-02	1.1%	1.6E-02	3.3%	9.7E-03	1.1%	6.3E-03	1.7%
2D1	2.0E-03	0.1%	2.0E-03	0.3%	6.4E-04	0.1%	1.7E-03	0.3%	2.3E-03	0.3%	1.5E-03	0.4%
3D1	1.7E-03	0.1%	1.7E-03	0.2%	5.3E-04	0.1%	5.1E-04	0.1%	6.7E-04	0.1%	9.6E-04	0.3%
3D4	4.6E-03	0.2%	4.6E-03	0.7%	2.0E-03	0.2%	2.7E-03	0.6%	1.6E-03	0.2%	1.0E-03	0.3%
3D5	2.3E-03	0.1%	2.3E-03	0.3%	9.3E-04	0.1%	1.3E-03	0.3%	7.8E-04	0.1%	4.8E-04	0.1%
4D3	6.2E-03	0.3%	6.2E-03	0.9%	3.0E-03	0.3%	4.1E-03	0.8%	1.7E-03	0.2%	1.5E-03	0.4%
4D4	5.9E-03	0.3%	5.9E-03	0.9%	3.0E-03	0.3%	3.5E-03	0.7%	1.7E-03	0.2%	1.3E-03	0.3%
5D1	6.2E-03	0.3%	6.2E-03	0.9%	2.8E-03	0.3%	3.8E-03	0.8%	1.7E-03	0.2%	1.5E-03	0.4%
5D11_20	5.7E-02	2.6%	2.5E-03	0.4%	9.3E-03	0.9%	2.1E-03	0.4%	1.6E-02	1.7%	1.1E-03	0.3%
5D2	5.7E-03	0.3%	5.7E-03	0.8%	3.0E-03	0.3%	3.8E-03	0.8%	1.7E-03	0.2%	1.3E-03	0.3%
5D23	8.6E-03	0.4%	8.6E-03	1.2%	1.5E-03	0.1%	3.4E-03	0.7%	3.6E-03	0.4%	1.2E-03	0.3%
5D27	3.7E-03	0.2%	3.7E-03	0.5%	6.2E-04	0.1%	1.3E-03	0.3%	4.7E-04	0.1%	9.0E-04	0.2%
5D28	1.3E-03	0.1%	1.3E-03	0.2%	5.1E-04	0.0%	4.7E-04	0.1%	1.2E-03	0.1%	9.0E-04	0.2%
5D3	8.4E-03	0.4%	8.4E-03	1.2%	3.9E-03	0.4%	4.0E-03	0.8%	2.7E-03	0.3%	2.1E-03	0.5%
5D5	1.5E-01	6.8%	1.5E-01	22%	7.0E-02	6.8%	1.0E-01	20%	4.2E-02	4.6%	3.5E-02	9.3%
5D6	1.4E-01	6.1%	1.4E-01	20%	7.4E-02	7.2%	1.0E-01	21%	4.2E-02	4.7%	3.1E-02	8.2%
6D1	1.2E-02	0.5%	1.2E-02	1.7%	8.8E-03	0.9%	1.5E-02	3.0%	8.5E-03	0.9%	8.3E-03	2.2%
6D12	1.0E-02	0.4%	1.0E-02	1.4%	4.1E-03	0.4%	5.6E-03	1.1%	5.1E-03	0.6%	6.4E-03	1.7%
6D17	6.5E-03	0.3%	6.5E-03	0.9%	4.9E-03	0.5%	6.3E-03	1.3%	4.9E-03	0.5%	5.1E-03	1.3%
6D19	5.2E-03	0.2%	5.2E-03	0.8%	2.6E-03	0.3%	2.4E-03	0.5%	2.4E-03	0.3%	2.1E-03	0.5%
6D2	5.2E-03	0.2%	5.2E-03	0.7%	5.0E-03	0.5%	5.8E-03	1.2%	3.8E-03	0.4%	5.3E-03	1.4%
6D8	1.8E-03	0.1%	1.8E-03	0.3%	1.4E-03	0.1%	9.6E-04	0.2%	1.4E-03	0.2%	1.3E-03	0.3%
8D31	8.8E-04	0.0%	8.8E-04	0.1%	3.9E-04	0.0%	6.9E-04	0.1%	7.4E-04	0.1%	1.4E-03	0.4%
999D	5.7E-02	2.5%	5.7E-02	8.1%	5.6E-02	5.4%	6.8E-02	14%	4.8E-02	5.3%	4.9E-02	13%
S501	--	--	--	--	--	--	--	--	--	--	--	--
S502	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 13
POTENTIAL ACUTE HAZARD INDEXES AT THE PMI, MEIW AND MEIR BY SOURCE -
IMMUNE SYSTEM HEALTH EFFECTS ENDPOINT (2014) [1]
Lehigh Southwest Cement Company
Cupertino Facility

	Point of Maximum Impact (PMI)				Maximum Exposed Individual Resident (MEIR)				Maximum Exposed Individual Worker (MEIW)			
	Current		Future		Current		Future		Current		Future	
	Receptor #1637				Receptor #11396		Receptor #12566		Receptor #65		Receptor #54	
Source ID	**HI**	**% Cont.**	**HI**	**% Cont.**	**HI**	**% Cont.**	**HI**	**% Cont.**	**HI**	**% Cont.**	**HI**	**% Cont.**
Fugitive/Volume Sources												
1	1.5E-02	0.7%	1.5E-02	2.1%	6.4E-03	0.6%	2.5E-02	5.0%	4.7E-03	0.5%	1.3E-02	3.5%
2	2.1E-02	0.9%	2.1E-02	3.0%	4.5E-03	0.4%	2.1E-02	4.3%	5.9E-03	0.7%	2.8E-02	7.3%
3	6.8E-03	0.3%	6.8E-03	1.0%	9.4E-04	0.1%	3.1E-03	0.6%	3.5E-03	0.4%	2.2E-03	0.6%
4A	1.6E-02	0.7%	1.6E-02	2.3%	3.9E-03	0.4%	3.3E-03	0.7%	9.8E-03	1.1%	2.5E-02	6.5%
4B	1.9E-02	0.9%	1.9E-02	2.8%	7.6E-03	0.7%	3.8E-03	0.8%	1.7E-02	1.9%	1.2E-02	3.2%
4C	1.6E-02	0.7%	1.6E-02	2.3%	8.8E-03	0.9%	4.2E-03	0.9%	1.6E-02	1.8%	2.4E-02	6.4%
4D	8.5E-03	0.4%	8.5E-03	1.2%	2.2E-03	0.2%	4.2E-03	0.9%	1.3E-02	1.4%	1.2E-02	3.1%
5	1.6E-02	0.7%	1.6E-02	2.3%	4.1E-03	0.4%	1.3E-02	2.6%	2.2E-02	2.4%	2.7E-02	7.1%
6A	8.5E-03	0.4%	8.5E-03	1.2%	1.5E-03	0.1%	1.8E-02	3.6%	1.5E-02	1.6%	2.2E-02	5.8%
6B	4.7E-02	2.1%	4.7E-02	6.7%	1.7E-03	0.2%	1.6E-02	3.3%	2.5E-02	2.8%	8.7E-03	2.3%
6C	4.1E-03	0.2%	4.1E-03	0.6%	1.7E-02	1.6%	6.5E-03	1.3%	1.6E-02	1.7%	2.1E-02	5.4%
6D	2.3E-02	1.0%	2.3E-02	3.3%	2.4E-03	0.2%	8.4E-03	1.7%	6.5E-03	0.7%	7.9E-03	2.1%
7PD7	8.2E-04	0.0%	8.2E-04	0.1%	1.3E-04	0.0%	5.0E-04	0.1%	6.2E-04	0.1%	4.7E-04	0.1%
7	6.0E-03	0.3%	6.0E-03	0.9%	8.3E-04	0.1%	2.6E-03	0.5%	2.2E-03	0.2%	3.9E-03	1.0%
8	8.8E-03	0.4%	8.8E-03	1.3%	6.8E-04	0.1%	1.9E-03	0.4%	1.0E-02	1.1%	2.0E-03	0.5%
Total Hazard Index [2]	**2.2E+00**	100%	7.0E-01	100%	1.0E+00	100%	4.9E-01	100%	9.0E-01	100%	3.8E-01	100%

Notes:
1. Maximum acute hazard index was highest for immune system effects for current and future facility stack configurations.
2. **Bold** acute hazard indexes are above 1, the regulatory notification level for the AB2588 program.

Abbreviations:
HI = Hazard Index
-- = Not applicable to emergency generators; diesel does not have acute noncancer effects on the immune system.

TABLE 14

POTENTIAL CARCINOGENIC RISK AT THE PMI, MEIW AND MEIR BY CHEMICAL [1]

Lehigh Southwest Cement Company

Cupertino Facility

Chemical	CAS Number	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
		Risk	% Cont.	Risk	% Cont.	Risk	% Cont.
Acetaldehyde	75070	3.0E-09	0.0%	1.7E-09	0.0%	2.2E-10	0.0%
Acrolein	107028	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Arsenic	7440382	1.9E-06	10%	8.6E-07	8.7%	1.4E-07	14%
Benz[a]anthracene	56553	4.0E-11	0.0%	2.2E-11	0.0%	2.7E-12	0.0%
Benzene	71432	3.7E-07	2.0%	2.0E-07	2.1%	2.7E-08	2.7%
Benzo[a]pyrene	50328	9.0E-12	0.0%	5.0E-12	0.0%	6.0E-13	0.0%
Benzo[b]fluoranthene	205992	5.7E-12	0.0%	3.1E-12	0.0%	3.8E-13	0.0%
Benzo[k]fluoranthene	207089	9.0E-13	0.0%	5.0E-13	0.0%	6.0E-14	0.0%
Benzyl chloride	100447	4.5E-09	0.0%	2.5E-09	0.0%	3.3E-10	0.0%
Beryllium	7440417	5.6E-08	0.3%	3.6E-08	0.4%	3.6E-09	0.4%
1,3-Butadiene	106990	1.4E-08	0.1%	8.0E-09	0.1%	1.1E-09	0.1%
Cadmium	7440439	2.1E-07	1.1%	1.1E-07	1.1%	1.1E-08	1.2%
Carbon Tetrachloride	56235	2.4E-09	0.0%	1.3E-09	0.0%	1.8E-10	0.0%
Chlorobenzene	108907	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Chloroform	67663	1.4E-10	0.0%	7.9E-11	0.0%	1.0E-11	0.0%
Chromium VI	18540299	1.5E-05	81%	8.0E-06	81%	7.3E-07	74%
Chrysene	218019	1.2E-11	0.0%	6.5E-12	0.0%	7.8E-13	0.0%
Copper	7440508	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Crystalline silica	1175	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Dibenz[a,h]anthracene	53703	3.3E-12	0.0%	1.8E-12	0.0%	2.2E-13	0.0%
p-Dichlorobenzene	106467	6.2E-10	0.0%	3.4E-10	0.0%	4.5E-11	0.0%
1,1-Dichloroethane	75343	3.0E-11	0.0%	1.6E-11	0.0%	2.2E-12	0.0%
1,2-Dichloropropane	78875	4.5E-10	0.0%	2.5E-10	0.0%	3.3E-11	0.0%
1,3-Dichloropropene	542756	1.6E-09	0.0%	8.9E-10	0.0%	1.2E-10	0.0%
Diesel PM	9901	2.7E-07	1.5%	3.5E-07	3.5%	4.2E-08	4.2%
Ethyl Chloride	75003	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Ethylbenzene	100414	2.2E-09	0.0%	1.2E-09	0.0%	1.6E-10	0.0%
Ethylene dibromide	106934	3.9E-09	0.0%	2.2E-09	0.0%	2.9E-10	0.0%
Ethylene dichloride	107062	4.5E-10	0.0%	2.5E-10	0.0%	3.3E-11	0.0%
Formaldehyde	50000	3.5E-10	0.0%	1.9E-10	0.0%	2.5E-11	0.0%
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822469	3.2E-11	0.0%	1.8E-11	0.0%	2.6E-12	0.0%
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562394	1.6E-11	0.0%	8.6E-12	0.0%	1.3E-12	0.0%
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673897	4.0E-12	0.0%	2.2E-12	0.0%	3.3E-13	0.0%
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227286	8.9E-11	0.0%	4.9E-11	0.0%	7.3E-12	0.0%
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653857	8.8E-11	0.0%	4.9E-11	0.0%	7.2E-12	0.0%
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408743	9.1E-11	0.0%	5.0E-11	0.0%	7.5E-12	0.0%
1,2,3,4,7,8-Hexachlorodibenzofuran	70648269	1.3E-10	0.0%	7.5E-11	0.0%	1.1E-11	0.0%
1,2,3,6,7,8-Hexachlorodibenzofuran	57117449	1.3E-10	0.0%	7.0E-11	0.0%	1.0E-11	0.0%
1,2,3,7,8,9-Hexachlorodibenzofuran	72918219	4.3E-11	0.0%	2.4E-11	0.0%	3.5E-12	0.0%
2,3,4,6,7,8-Hexachlorodibenzofuran	60851345	7.8E-11	0.0%	4.3E-11	0.0%	6.4E-12	0.0%
Hydrochloric acid	7647010	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%

TABLE 14

POTENTIAL CARCINOGENIC RISK AT THE PMI, MEIW AND MEIR BY CHEMICAL [1]

Lehigh Southwest Cement Company

Cupertino Facility

Chemical	CAS Number	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
		Risk	% Cont.	Risk	% Cont.	Risk	% Cont.
Indeno[1,2,3-c,d]pyrene	193395	6.7E-13	0.0%	3.7E-13	0.0%	4.4E-14	0.0%
Lead	7439921	3.5E-09	0.0%	2.1E-09	0.0%	3.0E-10	0.0%
Manganese	7439965	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Mercury	7439976	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Methyl Bromide	74839	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Methyl chloroform	71556	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Methylene chloride	75092	1.2E-10	0.0%	6.6E-11	0.0%	8.7E-12	0.0%
Naphthalene	91203	4.4E-09	0.0%	2.4E-09	0.0%	3.2E-10	0.0%
Nickel	7440020	5.5E-07	3.0%	3.2E-07	3.2%	3.1E-08	3.1%
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268879	2.0E-12	0.0%	1.1E-12	0.0%	1.7E-13	0.0%
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001020	4.6E-13	0.0%	2.5E-13	0.0%	3.8E-14	0.0%
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321764	7.9E-10	0.0%	4.4E-10	0.0%	6.4E-11	0.0%
1,2,3,7,8-Pentachlorodibenzofuran	57117416	1.8E-10	0.0%	1.0E-10	0.0%	1.5E-11	0.0%
2,3,4,7,8-Pentachlorodibenzofuran	57117314	2.7E-09	0.0%	1.5E-09	0.0%	2.2E-10	0.0%
Perchloroethylene	127184	2.9E-10	0.0%	1.6E-10	0.0%	2.1E-11	0.0%
Selenium	7782492	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Styrene	100425	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	7.7E-10	0.0%	4.3E-10	0.0%	6.3E-11	0.0%
2,3,7,8-Tetrachlorodibenzofuran	51207319	3.8E-09	0.0%	2.1E-09	0.0%	3.1E-10	0.0%
1,1,2,2-Tetrachloroethane	79345	2.1E-09	0.0%	1.2E-09	0.0%	1.6E-10	0.0%
Toluene	108883	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
1,1,2-Trichloroethane	79005	8.0E-10	0.0%	4.4E-10	0.0%	5.9E-11	0.0%
Trichloroethylene	79016	7.7E-11	0.0%	4.3E-11	0.0%	5.7E-12	0.0%
Vanadium	1314621	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Vinyl chloride	75014	1.0E-08	0.1%	5.5E-09	0.1%	7.4E-10	0.1%
Vinylidene chloride	75354	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
xylene,o-	95476	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Xylenes (mixed)	1330207	0.0E+00	0.0%	0.0E+00	0.0%	0.0E+00	0.0%
Inhalation Pathways		1.6E-05	90.9%	9.2E-06	92.2%	8.5E-07	86.0%
Non-inhalation Pathways		1.7E-06	9.1%	7.8E-07	7.8%	1.4E-07	14.1%
Total Risk (Including LASF) [2]		1.8E-05	100.0%	9.9E-06	100.0%	--	--
Total Risk (Excluding LASF) [2]		1.1E-05	--	--	--	9.9E-07	100.0%

Notes

1. The risk from combined exposure to both stack configurations is presented; 2/70 years (MEIR) and 2/40 years (MEIW) for the current stack configuration and 68/70 years (MEIR) and 38/40 years (MEIW) for the future stack configuration.
2. The LASF (1.7) incorporates the potential increased sensitivity of children to carcinogens compared to adults averaged over a 70-year lifetime. LASF not applicable to adult workers such as the MEIW.

Abbreviations

Cont. = contribution
LASF = Lifetime age sensitivity factor
-- = not applicable

TABLE 15
POTENTIAL CARCINOGENIC RISK AT THE PMI, MEIW AND MEIR BY SOURCE AND PATHWAY [1]
Lehigh Southwest Cement Company
Cupertino Facility

Source Name	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
	Risk	% Cont.	Risk	% Cont.	Risk	% Cont.
KILN	5.0E-07	2.8%	2.8E-07	2.8%	3.7E-08	3.8%
Point Sources (Dust Collectors and Emergency Diesel Generators)						
1D4	2.9E-08	0.2%	2.3E-08	0.2%	2.9E-09	0.3%
2D1	2.8E-08	0.2%	1.2E-08	0.1%	1.3E-09	0.1%
3D1	1.4E-08	0.1%	6.5E-09	0.1%	9.6E-10	0.1%
3D4	1.4E-08	0.1%	1.0E-08	0.1%	1.1E-09	0.1%
3D5	5.5E-09	0.03%	3.9E-09	0.04%	5.3E-10	0.1%
4D3	1.5E-08	0.1%	7.5E-09	0.1%	1.0E-09	0.1%
4D4	1.5E-08	0.1%	7.7E-09	0.1%	1.0E-09	0.1%
5D1	2.0E-08	0.1%	8.3E-09	0.1%	1.1E-09	0.1%
5D11_20	4.5E-07	2.5%	3.3E-07	3.4%	2.6E-08	2.7%
5D2	1.9E-08	0.1%	8.3E-09	0.1%	1.1E-09	0.1%
5D23	2.0E-07	1.1%	1.9E-07	1.9%	1.9E-08	1.9%
5D27	4.5E-08	0.3%	5.9E-08	0.6%	5.0E-09	0.5%
5D28	3.1E-10	0.0%	5.4E-08	0.5%	4.6E-09	0.5%
5D3	1.9E-08	0.1%	1.4E-08	0.1%	1.9E-09	0.2%
5D5	5.6E-08	0.3%	3.0E-08	0.3%	3.4E-09	0.3%
5D6	5.5E-08	0.3%	2.9E-08	0.3%	3.5E-09	0.4%
6D1	1.1E-06	6.3%	1.0E-06	10.6%	9.3E-08	9.4%
6D12	1.1E-06	6.2%	4.5E-07	4.5%	4.1E-08	4.2%
6D17	1.5E-06	8.5%	6.3E-07	6.3%	5.0E-08	5.0%
6D19	6.7E-07	3.7%	4.6E-07	4.7%	3.4E-08	3.4%
6D2	1.2E-06	6.6%	5.0E-07	5.1%	3.6E-08	3.7%
6D8	3.4E-07	1.9%	1.7E-07	1.7%	1.2E-08	1.3%
8D31	1.3E-09	0.01%	9.6E-09	0.10%	9.6E-10	0.1%
999D	1.4E-06	7.6%	1.6E-06	16%	1.3E-07	13%
S501	5.8E-08	0.3%	1.9E-08	0.2%	2.5E-09	0.3%
S502	1.0E-07	0.6%	7.1E-08	0.7%	1.6E-08	1.6%
Fugitive/Volume Sources						
1	7.7E-08	0.4%	3.8E-08	0.4%	5.7E-09	0.6%
2	1.5E-07	0.8%	5.6E-08	0.6%	8.5E-09	0.9%
3	6.3E-07	3.5%	1.4E-07	1.4%	2.0E-08	2.0%
4A	3.5E-06	19%	3.5E-07	3.6%	5.1E-08	5.2%
4B	1.7E-06	9.6%	4.5E-07	4.5%	7.0E-08	7.1%

TABLE 15
POTENTIAL CARCINOGENIC RISK AT THE PMI, MEIW AND MEIR BY SOURCE AND PATHWAY [1]
Lehigh Southwest Cement Company
Cupertino Facility

Source Name	Point of Maximum Impact (PMI) Receptor #1716		Maximum Exposed Individual Resident (MEIR) Receptor #13886		Maximum Exposed Individual Worker (MEIW) Receptor #65	
	Risk	% Cont.	Risk	% Cont.	Risk	% Cont.
4C	1.7E-06	9.6%	3.7E-07	3.7%	4.4E-08	4.5%
4D	2.0E-07	1.1%	5.3E-07	5.3%	5.9E-08	6.0%
5	5.6E-08	0.3%	1.1E-07	1.1%	1.3E-08	1.4%
6A	1.0E-07	0.6%	3.9E-07	3.9%	3.8E-08	3.8%
6B	5.7E-08	0.3%	5.0E-07	5.0%	5.2E-08	5.3%
6C	5.7E-07	3.2%	2.7E-07	2.8%	3.0E-08	3.1%
6D	7.4E-08	0.4%	4.3E-07	4.4%	3.8E-08	3.8%
7PD7	7.9E-08	0.4%	2.0E-07	2.1%	1.3E-08	1.3%
7	6.0E-09	0.03%	6.1E-08	0.61%	4.8E-09	0.5%
8	6.5E-09	0.04%	6.2E-08	0.63%	9.0E-09	0.9%
Inhalation Pathways	1.6E-05	91%	9.2E-06	92%	8.5E-07	86%
Non-inhalation Pathways	1.7E-06	9%	7.8E-07	8%	1.4E-07	14%
Total (including LASF) [2]	1.8E-05	100%	9.9E-06	100%	--	--
Total (excluding LASF) [2]	1.1E-05	--	--	--	9.9E-07	100%

Notes

1. The risk from combined exposure to both stack configurations is presented; 2/70 years (MEIR) and 2/40 years (MEIW) for the current stack configuration and 68/70 years (MEIR) and 38/40 years (MEIW) for the future stack configuration.
2. The LASF (1.7) incorporates the potential increased sensitivity of children to carcinogens compared to adults averaged over a 70-year lifetime. LASF not applicable to adult workers such as the MEIW.

Abbreviations

Cont. = contribution
LASF = Lifetime age sensitivity factor
-- = not applicable

TABLE 16
POTENTIAL CARCINOGENIC RISK AT THE SENSITIVE RECEPTORS
Lehigh Southwest Cement Company
Cupertino Facility

Receptor Number	UTM Coordinates [1]	Receptor Type [2,3]	Description	Inhalation Pathways	Non-Inhalation Pathways	Total [4]
20	584608 , 4130709	Daycare (18 months - 5 yrs)	De Anza College Child Development Center 21250 Stevens Creek Boulevard, Cupertino 95014	5.2E-07	6.5E-08	5.8E-07
21	585721 , 4128215	Daycare (6 wks - 4 yrs)	Kindercare Learning Center 1515 S. De Anza Boulevard	4.7E-07	6.2E-08	5.3E-07
22	580371 , 4135348	Preschool	Children's House of Los Altos 770 Berry Avenue, Los Altos 94024	5.9E-07	7.7E-08	6.6E-07
23	581784 , 4132851	Preschool	Foothill Preschool 2100 Woods Lane, Los Altos 94024	1.3E-06	1.7E-07	1.5E-06
24	579699 , 4135148	Preschool	Los Altos Christian Preschool 625 Magdalena Avenue, Los Altos 94024	5.9E-07	8.0E-08	6.7E-07
25	579790 , 4135231	Preschool	Los Altos United Methodist Children's Center 655 Magdalena Avenue, Los Altos 94024	5.6E-07	7.7E-08	6.4E-07
26	583373 , 4130991	Preschool	Play & Learn Preschool Daycare 10067 Byrne Avenue, Cupertino 95014	1.2E-06	1.5E-07	1.3E-06
27	585749 , 4129341	School-Age Care	Happy Childhood Education 1091 S. DeAnza Boulevard, San Jose 95129	6.1E-07	7.6E-08	6.9E-07
28	581289 , 4135590	School	Blach Intermediate School 1120 Covington Rd, Los Altos 94024	5.6E-07	7.1E-08	6.3E-07
29	583251 , 4132945	School	Creekside Private School 10300 Creston Dr. Cupertino 95014	7.7E-07	9.9E-08	8.7E-07
30	583348 , 4132945	School	Cupertino Junior High School 1650 S. Bernardo Ave, Sunnyvale 94087	7.5E-07	9.7E-08	8.4E-07
31	584603 , 4132007	School	Garden Gate Elementary School 10500 Ann Arbor Avenue, Cupertino 95014	5.8E-07	7.7E-08	6.6E-07
32	584167 , 4132593	School	Homestead High School 21370 Homestead Rd, Cupertino 95014	6.3E-07	8.1E-08	7.1E-07
33	584043 , 4129779	School	Kennedy Middle School 821 Bubb Rd, Cupertino 95014	1.1E-06	1.4E-07	1.3E-06
34	583832 , 4130282	School	Lincoln Elementary School 21710 McClellan Road, Cupertino 95014	1.2E-06	1.5E-07	1.4E-06
35	580364 , 4135237	School	Loyola School 770 Berry Avenue, Los Altos 94024	5.9E-07	7.9E-08	6.7E-07
36	586260 , 4129393	School	Meyerholz Elementary School 6990 Melvin Drive, San Jose 95129	5.6E-07	7.0E-08	6.3E-07

TABLE 16
POTENTIAL CARCINOGENIC RISK AT THE SENSITIVE RECEPTORS
Lehigh Southwest Cement Company
Cupertino Facility

Receptor Number	UTM Coordinates [1]	Receptor Type [2,3]	Description	Inhalation Pathways	Non-Inhalation Pathways	Total [4]
37	581344 , 4135423	School	Miramonte School 1175 Altamead Drive, Los Altos 94024	5.7E-07	7.3E-08	6.4E-07
38	581301 , 4133301	School	Development Center 1160 St. Joseph Avenue, Los Altos 94024	1.2E-06	1.5E-07	1.4E-06
39	582476 , 4135016	School	Mountain View High School 3535 Truman Avenue, Mountain View 94040	5.7E-07	7.3E-08	6.4E-07
40	582218 , 4134902	School	Oak Elementary School 1501 Oak Avenue, Los Altos 94024	6.2E-07	7.9E-08	7.0E-07
41	584472 , 4128982	School	Regnart Elementary and CDC 1180 Yorkshire Drive, Cupertino 95014	7.3E-07	9.3E-08	8.2E-07
42	583464 , 4134099	School	South Peninsula Hebrew Day School 1030 Astoria Drive, Sunnyvale 94087	5.8E-07	7.5E-08	6.6E-07
43	581052 , 4136201	School	St. Francis High School 1885 Miramonte Avenue, Mountain View 94040	4.6E-07	6.0E-08	5.2E-07
44	581553 , 4133763	School	St. Simon Elementary School 1840 Grant Road, Los Altos 94024	9.4E-07	1.2E-07	1.1E-06
45	582896 , 4131568	School	Stevens Creek Elementary School 10300 Ainsworth Drive, Cupertino 95014	1.2E-06	1.5E-07	1.3E-06
46	583736 , 4134738	School	Stratford School 1196 Lime Drive, Sunnyvale 94087	4.8E-07	6.2E-08	5.4E-07
47	580133 , 4133320	School	Waldorf School-Peninsula 11311 Mora Drive, Los Altos 94024	1.3E-06	1.7E-07	1.4E-06
48	583118 , 4133107	School	West Valley Elementary School 1635 Belleville Way, Sunnyvale 94087	7.8E-07	1.0E-07	8.8E-07

Notes
1. Universal Transverse Mercator Coordinate System
2. Per BAAQMD guidance (2010), receptors at schools and daycares are modeled in HARP using the 9-yr child resident Derived OEHHA option.
3. Per BAAQMD guidance (2010), cancer risks for student receptors over the age of 2 years (schools and preschools) are multiplied by an ASF of 3; risks at daycare locations that serve children under 2 years are multiplied by an age-weighted ASF as follows:
   ASF of 1.9 for 18 months to 5 years = [duration under 2 yrs (0.5yr / 9yr) x 10 ASF] + [duration above 2 yrs (4yr / 9yr) x 3 ASF]
   ASF of 3.2 for 6 weeks to 4 years = [duration under 2 yrs (2yr / 9yr) x 10 ASF] + [duration above 2 yrs (3yr / 9yr) x 3 ASF]
4. The 9-yr cancer risk presented combines two years of exposure under the current stack configuration and seven years under the future stack configuration.

Abbreviation:
ASF = Age-Specific Sensitivity Factor

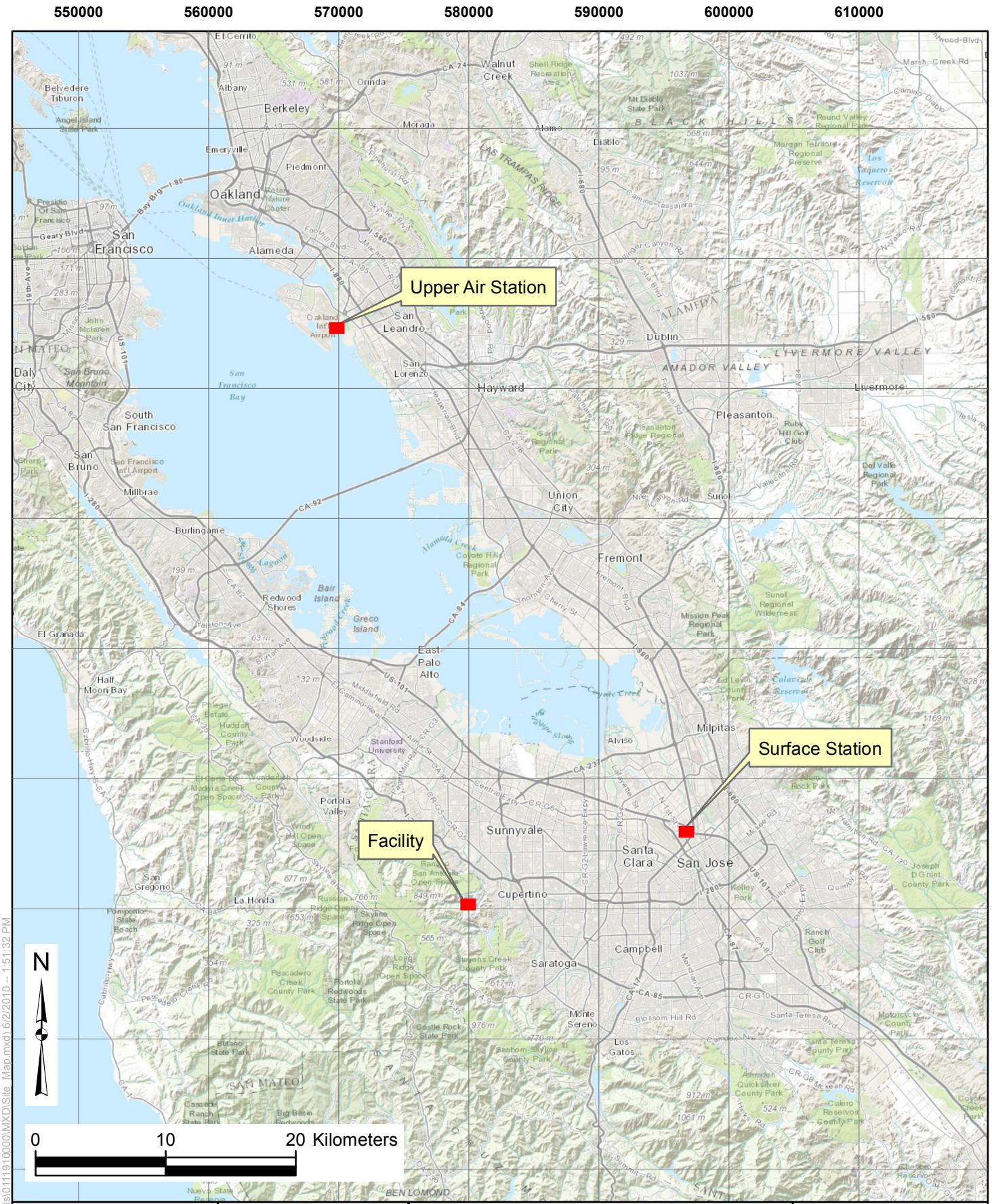
TABLE 17
ESTIMATE OF EXCESS CANCER BURDEN
FOR CENSUS TRACTS IN ZONE OF IMPACT[1]
Lehigh Southwest Cement Company
Cupertino Facility

Description	Model ID #[2]	Residential Cancer Risk [3,4]	Resident Population	Residential Cancer Burden [5]
Census Tract 507401	30151	5.8E-07	5624	3.3E-03
Census Tract 507600	8	5.8E-07	5563	3.2E-03
Census Tract 507701	4	2.1E-06	4039	8.5E-03
Census Tract 507702	6	1.8E-06	6126	1.1E-02
Census Tract 507703	3	4.9E-06	7706	3.7E-02
Census Tract 507805	2	1.7E-06	5397	9.0E-03
Census Tract 507806	15	1.1E-06	5889	6.8E-03
Census Tract 507807	5	1.7E-06	3219	5.6E-03
Census Tract 507808	7	1.3E-06	5508	7.0E-03
Census Tract 507905	17	9.8E-07	5784	5.7E-03
Census Tract 507906	16	9.2E-07	4460	4.1E-03
Census Tract 508001	30292	1.0E-06	7377	7.7E-03
Census Tract 508301	11	1.4E-06	4410	6.3E-03
Census Tract 508303	29527	1.0E-06	2562	2.7E-03
Census Tract 508304	30451	8.8E-07	7957	7.0E-03
Census Tract 508401	12	9.4E-07	6834	6.4E-03
Census Tract 508403	30513	8.6E-07	2817	2.4E-03
Census Tract 509901	19	1.1E-06	1934	2.1E-03
Census Tract 509902	9	9.4E-07	4838	4.5E-03
Census Tract 510001	18	1.4E-06	6116	8.4E-03
Census Tract 510002	10	1.9E-06	3553	6.7E-03
Census Tract 510100	1	2.7E-06	2948	8.0E-03
Census Tract 510200	14	9.6E-07	4328	4.2E-03
Census Tract 511701	13	8.0E-07	4017	3.2E-03
Census Tract 511702	30955	1.9E-06	2684	5.1E-03
Census Tract 511703	30954	2.2E-06	8526	1.8E-02
Total			130216	2E-01

Notes

1. The boundaries of some census tracts extend beyond zone of impact, making cancer burden estimate conservative.
2. Receptor identifier in the HARP model.
3. A Lifetime Age Sensitivity Factor (LASF) of 1.7 was applied to residential cancer risk from each census tract centroid.
4. Risk is composed of contribution from 2 years under the current stack configuration and 68 years under the future stack configuration.
5. A cancer burden less than one indicates that over a 70-year period under the worst-case exposure assumptions, no member of the community would be expected to contract cancer based on exposure to Facility emissions.

FIGURES



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.

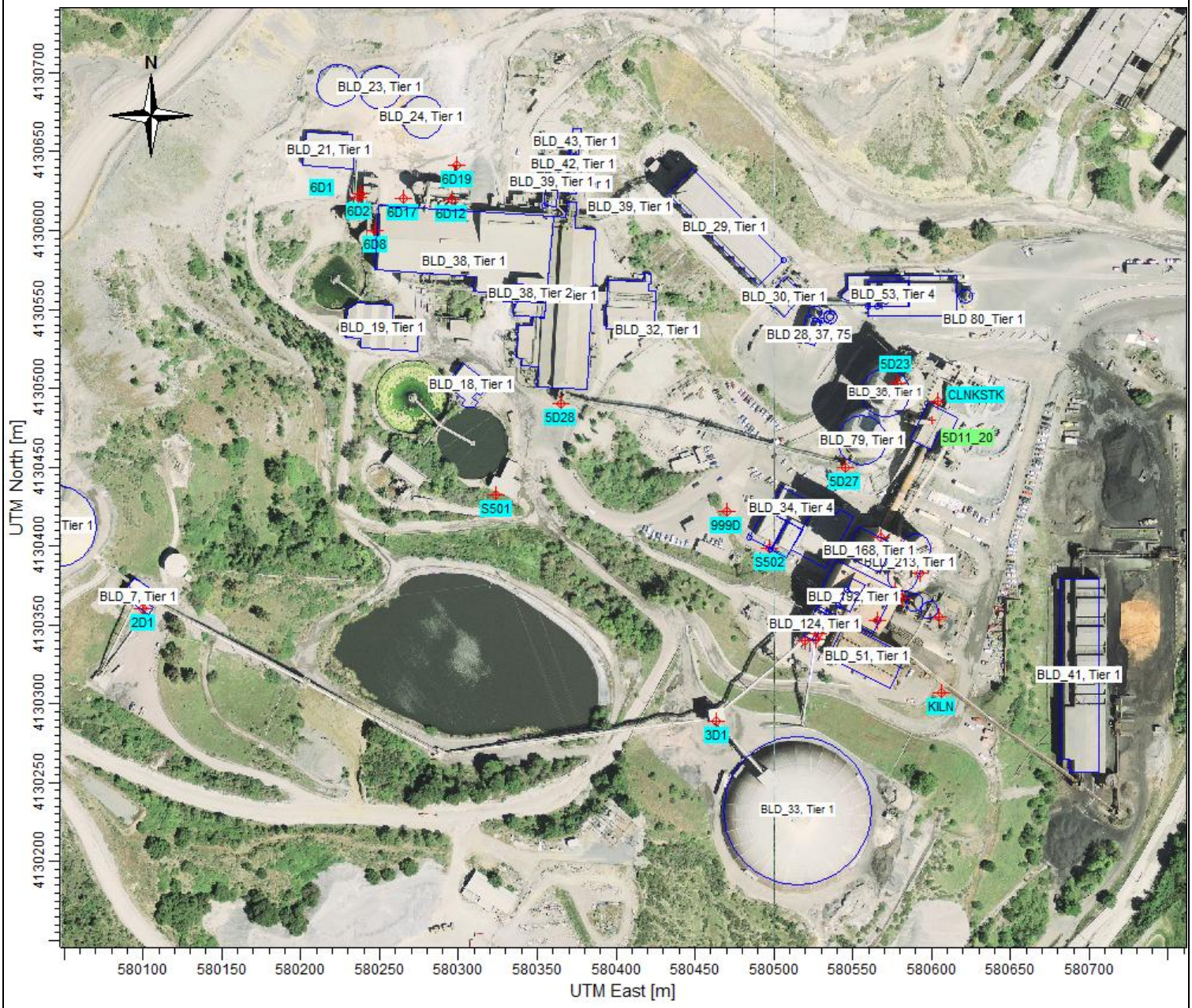
Lehigh Southwest Cement Company
Cupertino Facility

Facility Location

FIGURE 1

amec

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

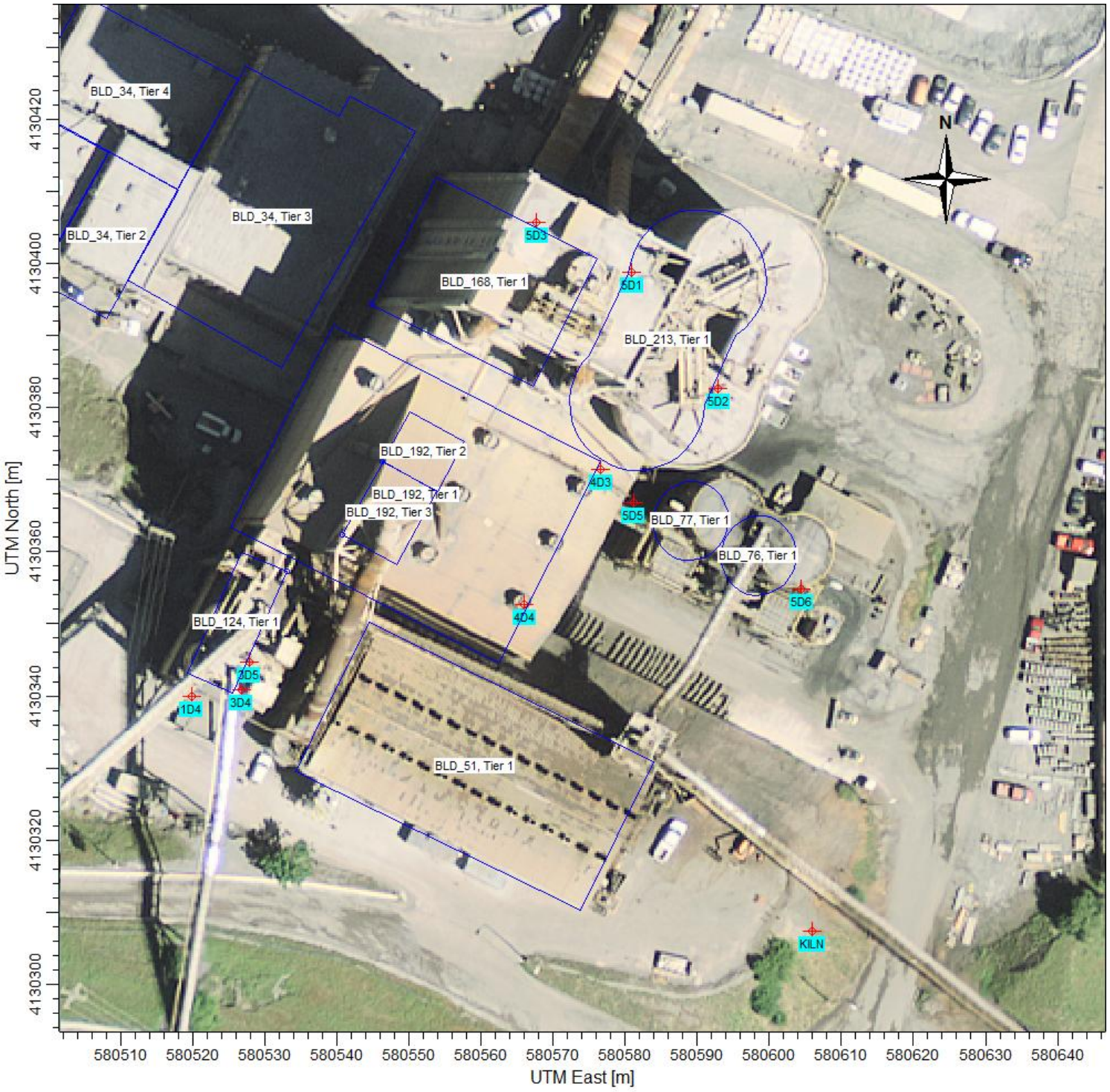


Explanation

Point Sources

Building Outline

JOB NO.	01119100030	Lehigh Southwest Company – Cupertino Facility	
DESIGN:	SO		
DRAWN:	AMEC E&I		
DATE:	12/09/2013	Point Sources and Buildings Used in the Air Dispersion Modeling	Figure 2A
SCALE:			

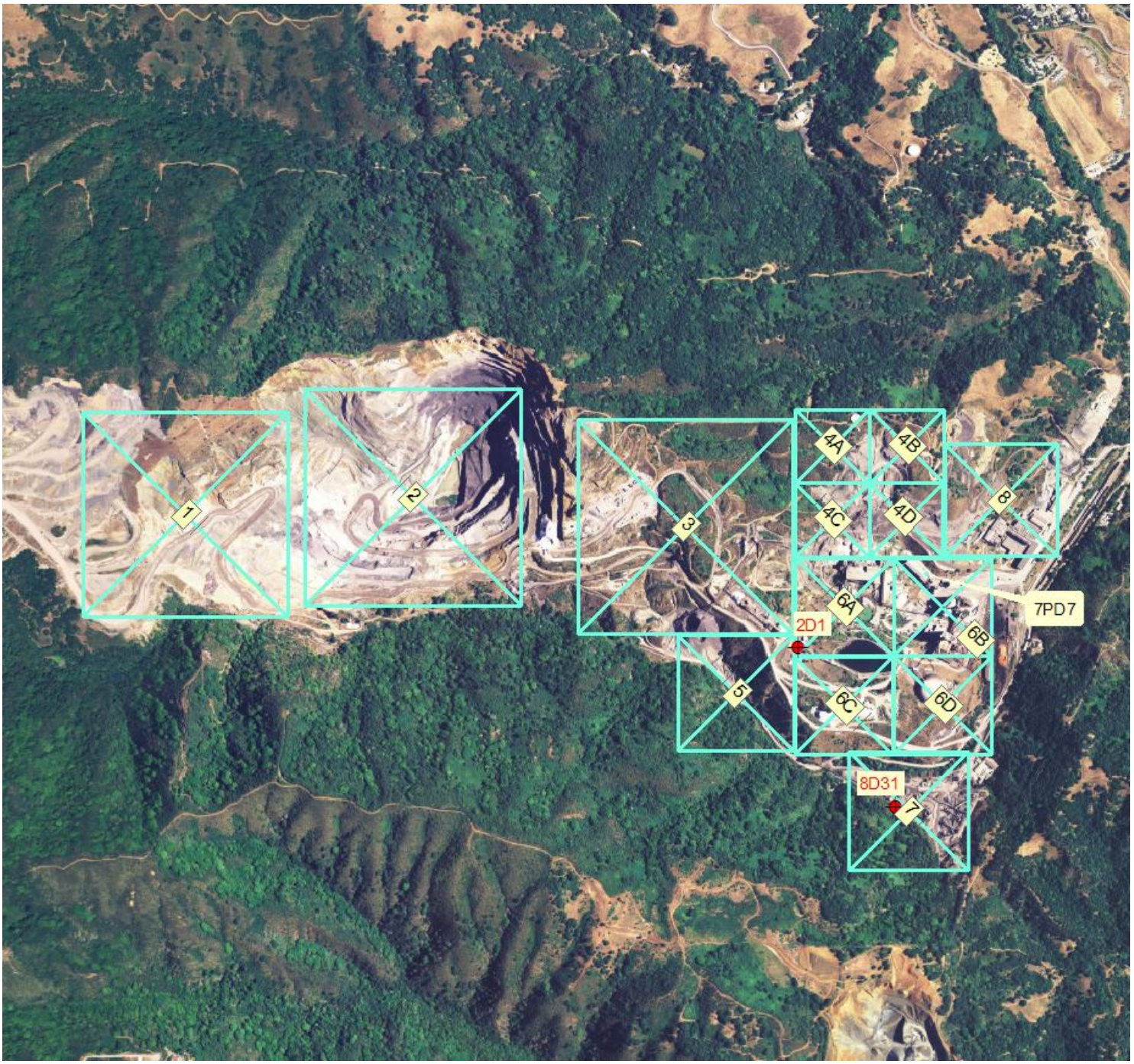


Explanation

Point Sources

Building Outline

JOB NO.	01119100030	Lehigh Southwest Company – Cupertino Facility	
DESIGN:	SO		
DRAWN:	AMEC E&I		
DATE:	6/3/2013	Point Sources and Buildings Near Kiln Used in the Air Dispersion Modeling	Figure 2B
SCALE:	NA		

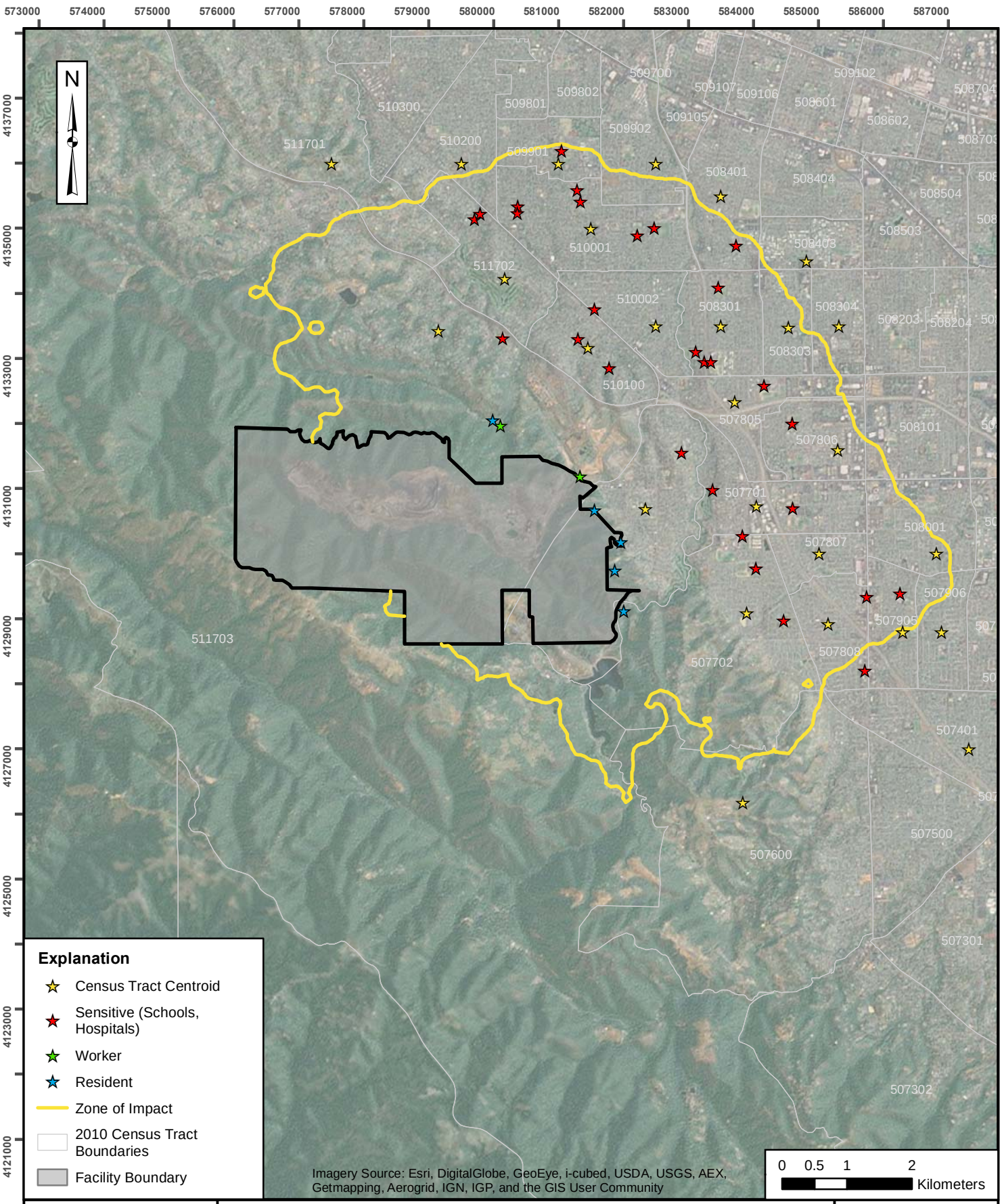


Explanation

2D1 and 8D31 Point Sources

Volume Sources including 7PD7

JOB NO.	01119100030	Lehigh Southwest Company – Cupertino Facility	
DESIGN:	SO		
DRAWN:	AMEC E&I		
DATE:	4/30/2013	Volume Fugitive Sources and Other Point Sources Used in the Air Dispersion Modeling	Figure 2C
SCALE:			



JOB NO.	SA14166070
DESIGN:	SO
DRAWN:	AMEC GIS
DATE:	10/23/2014
SCALE:	1" = 2 km

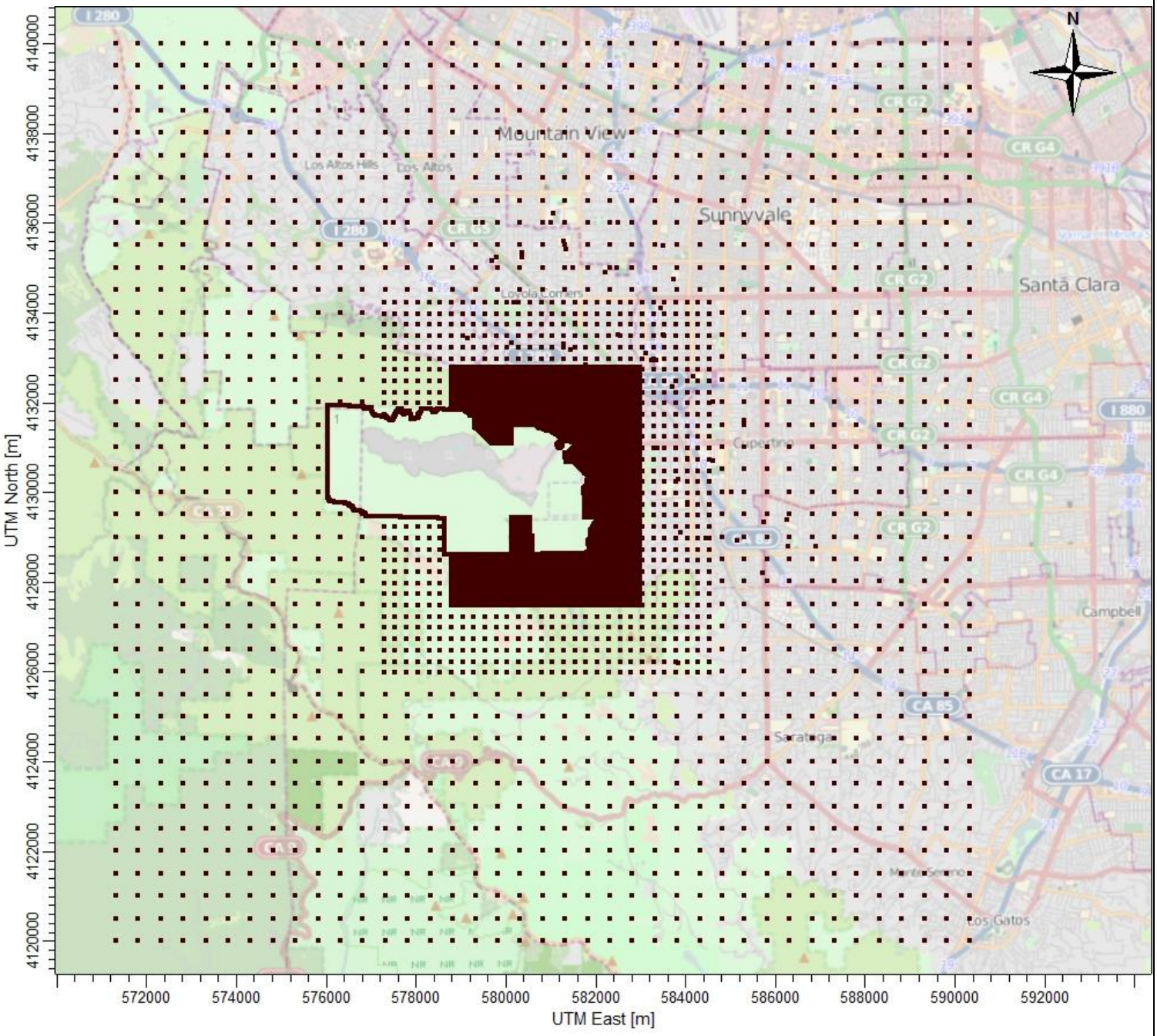
Lehigh Southwest Company - Cupertino Facility

Receptors Used in Air Dispersion Modeling
Key Receptors, Sensitive Receptors, Centroid Receptors

Figure 3A

amec

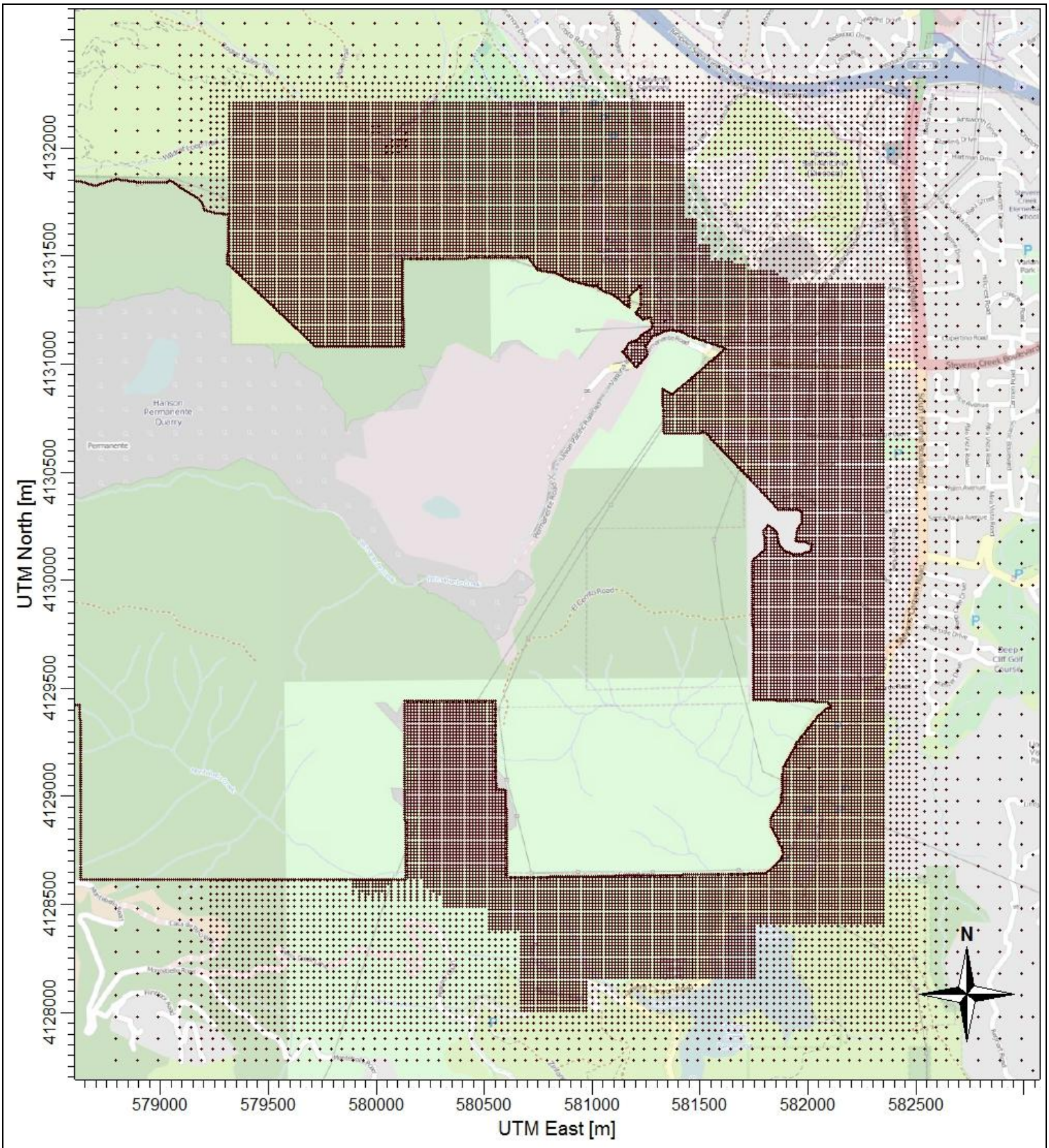
Path: S:\SA14\166070.01\14_1022_afu_Figure3A.mxd



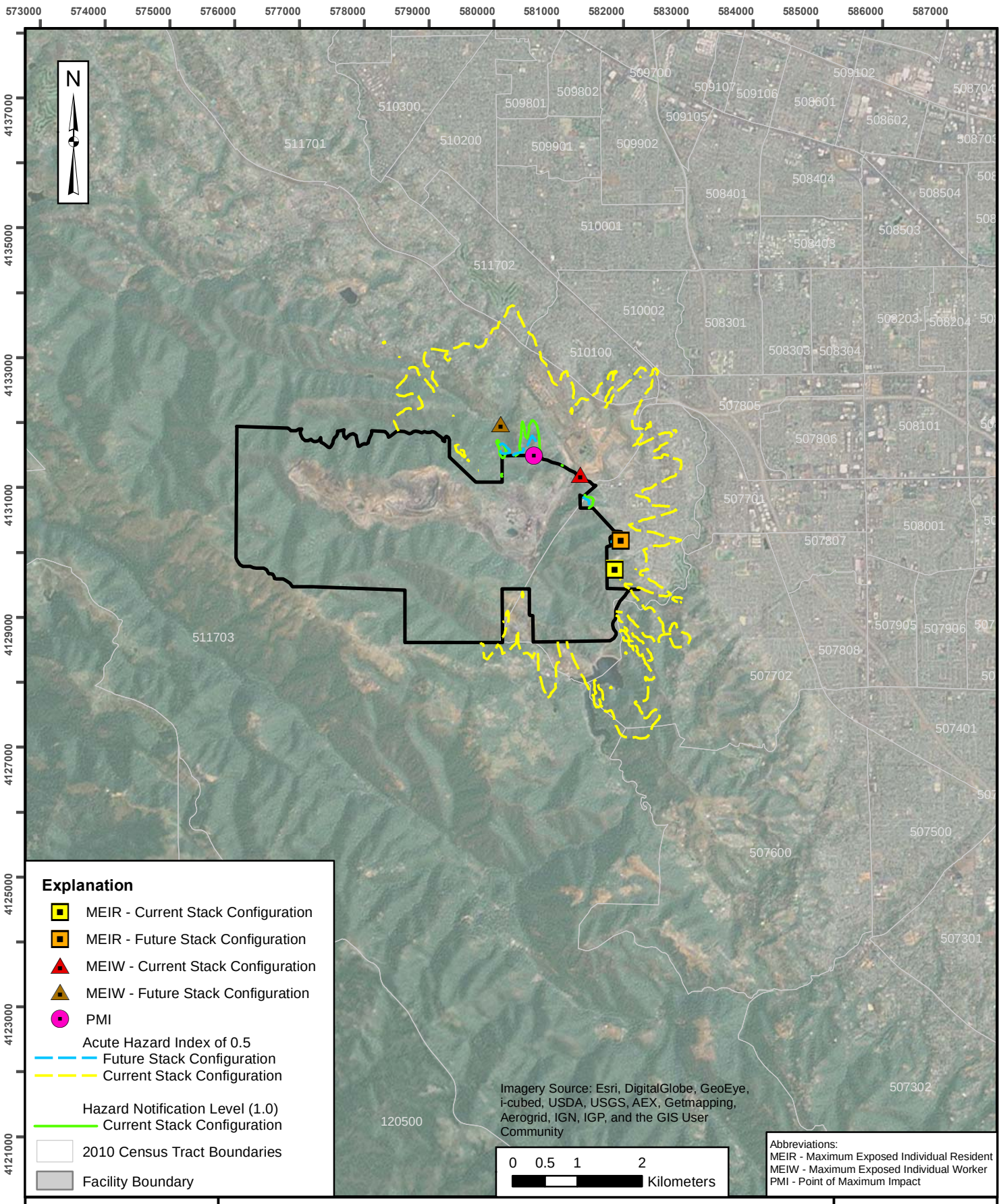
Explanation

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

JOB NO.	01119100030	Lehigh Southwest Company – Cupertino Facility	
DESIGN:	SO		
DRAWN:	AMEC E&I		
DATE:	12/06/2013	Proposed Receptor Network	Figure 3B
SCALE:			



JOB NO.	01119100000	Lehigh Southwest Company – Cupertino Facility	
DESIGN:	SO		
DRAWN:	AMEC E&I		
DATE:	12/06/2013	Fine Receptor Grid	Figure 3C
SCALE:			



JOB NO.	SA14166070
DESIGN:	SO
DRAWN:	AMEC GIS
DATE:	10/23/2014
SCALE:	1" = 2 km

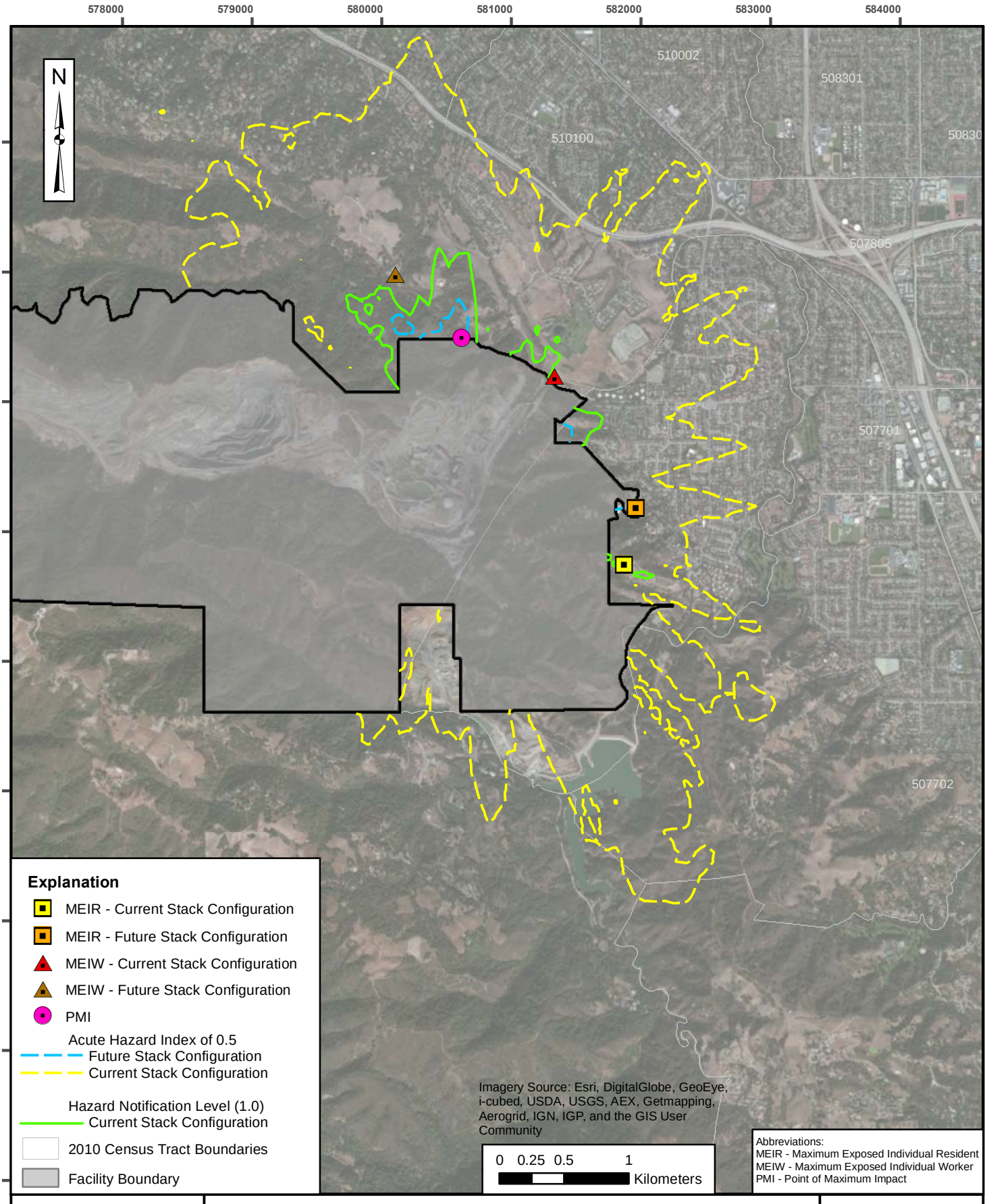
Lehigh Southwest Company - Cupertino Facility

Acute Noncarcinogenic Hazard Isopleths for Immune System Health Effects

Figure 4A

amec

Path: S:\SA14\166070.01\14_1022_afu_Figure4A.mxd



JOB NO.	SA14166070
DESIGN:	SO
DRAWN:	AMEC GIS
DATE:	10/23/2014
SCALE:	1" = 1 km

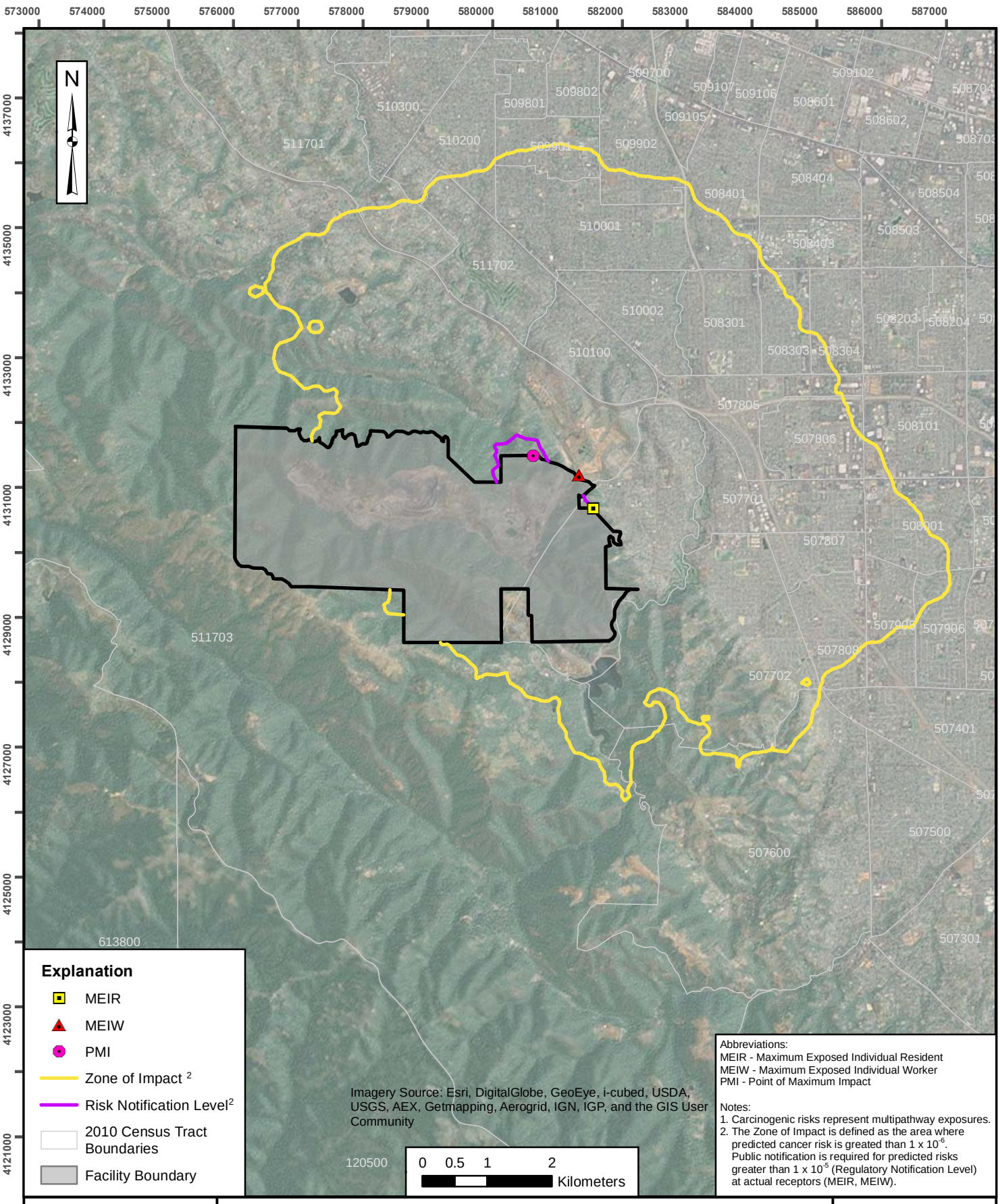
Lehigh Southwest Company - Cupertino Facility

Acute Noncarcinogenic Hazard Isopleths within Approximately 2 Kilometers of Facility

Figure 4B

amec

Path: S:\SA14\166070.01\14_1022_afu_Figure4B_1-0.mxd



JOB NO.	SA14166070
DESIGN:	SO
DRAWN:	AMEC GIS
DATE:	10/23/2014
SCALE:	1" = 2 km

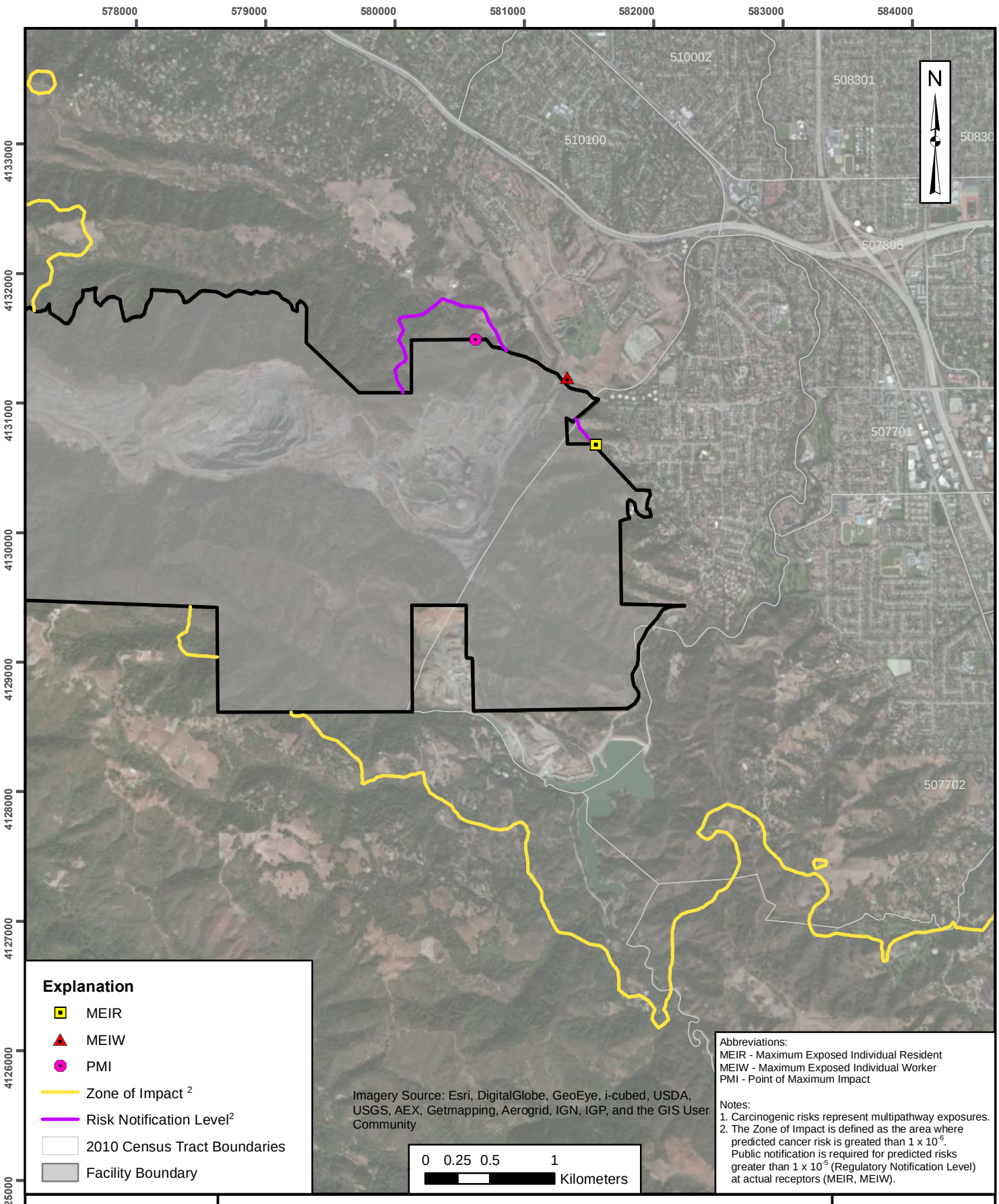
Lehigh Southwest Company - Cupertino Facility

Carcinogenic Risk Isopleths[1]

Figure 5A

amec

Path: S:\SA14\166070.01\14_1022_afu_Figure5A.mxd



JOB NO.	SA14166070
DESIGN:	SO
DRAWN:	AMEC GIS
DATE:	10/23/2014
SCALE:	1" = 1 km

Lehigh Southwest Company - Cupertino Facility

Carcinogenic Risk Isopleths[1]
within Approximately 2 Kilometers of Facility

Figure 5B

amec

Path: S:\SA14\166070.01\14_1022_afu_Figure5B.mxd

APPENDICES (ON CD)

Appendix A – CEIR Revisions
Appendix B – Summary of Annual Emission Rate Scaling
Appendix C – AERMOD Modeling Input and Output Files
Appendix D – HARP Modeling Input and Output Files
Appendix E – Summary of Concentrations at Key Off-Site Receptors