INTEROFFICE MEMORANDUM
October 26, 2011

TO: **Plant File, Lehigh Southwest Cement** **Via:** **Brian Bateman** BB
Scott Lutz SBL

FROM: **Ted Hull** TH

SUBJECT: **Review of Revised AB2588 Health Risk Assessment (March 2011) for Lehigh Southwest Cement, BAAQMD Plant #17.**

SUMMARY: I have reviewed the modeling and health risk results from the Revised AB2588 Health Risk Assessment for Lehigh Southwest Cement prepared by AMEC Geomatrix and submitted to the BAAQMD on March 30, 2011. Based on the source mass emissions and release point characteristics provided in the report, I agree with their conclusion that the current and projected health risks from stationary sources at Lehigh are below the public notification levels of significance established by the BAAQMD for the AB2588 Toxic Hot Spots program.

The results of the AMEC report were checked through separate, independent AERMOD modeling runs. Source locations and parameters were verified, a new receptor grid was created, and an alternate methodology for assigning risk values to modeled pollutant concentrations was employed. In addition, refined modeling runs were performed in an effort to more accurately represent the plume characteristics from the kiln stacks. The focus of the review was the current (2011) emissions scenario, which includes a reduction of Mercury emissions from the Calcining Kiln resulting from a recent process modification.

EMISSIONS: Toxic air contaminant (TAC) emissions used by the BAAQMD to verify the HRA are based on 2010 production and were provided in the AMEC report. The difference between 2010 and 2011 emissions is a reduction of Mercury emissions from the Kiln from a recently implemented sorbent injection operation. Mercury emissions have been reduced from 546 lb/yr and 0.129 lb/hr to 261 lb/yr and 0.064 lb/hr. The reduction of Mercury is verifiable and has been made a condition of the permit to operate

MODELING: The AERMOD air dispersion computer model was used to estimate annual average and maximum 1-hour average ambient air concentrations for receptors in the area of the source. Model runs were made with onsite surface meteorological data and local land use data for calendar year 2006. Cloud cover data for the same time period was were taken from the San Jose International Airport ASOS station. Upper air data for the same time period was taken from the closest representative NWS radiosonde station that met the USEPA required 90% data recovery rate, the Oakland International Airport radiosonde station. Land use at the facility was divided into 5 sectors: 347°-50°, 50°-230°, 230°-273°, 273°-312°, and 312°-347°. The model is referenced in NAD 83 UTM coordinates and uses terrain data from San Mateo and Santa Clara West 10m NED files. The model assumes rural land use.

Source emissions were modeled either as individual emissions points (point sources); or as aggregations of fugitive emissions from a number of related sources (volume sources). The largest contributing source, the Kiln consists of 32 separate stacks, 30 of which are capable of operating at any given time. For simplicity, the Kiln was modeled as a single stack, with the actual dimensions and flow characteristics of one of the 32 Kiln stacks. All pollutant flow was assigned to this single point source. This is a conservative approach because the modeled plume rise does not benefit from the buoyancy that a much larger volume of heated gas would have.

RISK ASSESSMENT: TAC emissions entered into the model were adjusted for toxicity and assumed exposure levels, to derive a risk based emission factor adjustment for each receptor category. Using this approach, the model calculates increased Cancer Risk (in terms of chances in a million), Chronic Hazard Index (HI), and Acute HI directly. Dose and risk values for each category were obtained using the HARP 1.4a computer program. Cancer and chronic noncancer risk estimates include exposure from both inhalation and oral pathways. The Chronic and Acute hazard indices (HI) are based on the highest impacted targets organ systems for each category. For Chronic HI, the most impacted organ system is Respiratory, while for Acute HI it is the Developmental organ system.

Estimates of residential risk assume potential exposure to annual average TAC concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Cancer risk adjustment factors (CRAFs) were used to calculate all cancer risk estimates. The CRAFs are age-specific weighting factors used in calculating cancer risks from exposures of infants, children and adolescents, to reflect their anticipated special sensitivity to carcinogens. The estimated maximum potential health impacts found by BAAQMD modeling are presented in Table 1 below.

Table 1: 2011 Modeled Impacts

Receptor Type	Cancer Risk	Non-cancer Hazard Index (HI)	Max. Acute Non-cancer HI
MEI	9.1 in a million	0.120	N/A
PMI	N/A	N/A	1.5

As shown in Table 1, the maximally exposed individual (MEI) receptor is below the AB2588 notification levels (10.0 in a million, 1.0 HI) for Cancer Risk and Chronic HI. However, the point of maximum impact (PMI) receptor for Acute HI is above the notification level (1.0).

DISCUSSION OF ACUTE HI: As stated above, the PMI for the Acute HI is above the notification level. However, this modeled value occurs for one hour around midnight on a rugged, uninhabited ridge top just outside the Lehigh property line, so it is highly improbable that any actual health impact would occur. For the modeled scenario as discussed above, a total of 10 hours (out of 8,760) have at least one receptor that has an Acute HI above 1.0. All of these instances occur between the hours of 10:00pm and 7:00am and are not in locations that are likely to be occupied during those hours, if at all. All receptors over 1.0 are in rugged terrain near the plant boundary.

Additional Scenarios:
The Kiln is by far the largest contributor to the Acute HI. As previously discussed, the one stack methodology used to model the Kiln generates conservative risk estimates due to reduced plume rise. Therefore, additional modeling was performed in an attempt to refine the results. Two valid alternate scenarios were modeled as discussed below.

In the first alternate scenario, all 32 stacks associated with the Kiln baghouses were included and placed in the model in approximation of their actual locations. The parameters for each of these stacks was kept the same as the originally modeled one stack scenario, but the total emissions to each of them was 1/32 of the total. This scenario has no impact on plume rise, but does spread the emissions out somewhat.

In the second alternate scenario, stacks within 3 diameters of each other were combined to create a virtual stack handling the combined flow rates of the actual stacks, but with diameter adjustments to retain the same exhaust velocity. Based on the actual stack configuration, the 32 actual stacks were combined to become 14 virtual stacks. This method has a positive effect on plume rise due to the greater amount of heated gas now in consideration. This is an accepted technique for combining plumes of nearby stacks.

A summary of the results of the different modeling scenarios for Acute HI impacts is given in Table 2 below.

Table 2: Alternate Acute HI Scenarios – Kiln Stack Configuration

Number of Stacks	Stack Diameter (actual/virtual)	Fraction of Total Flow per Stack	Acute HI at PMI	Total hrs/yr Acute HI > 1.0
1 (initial scenario)	actual	1/30	1.5	10
32 (first alt.)	actual	1/30	1.4	7
14 (second alt.)	virtual	1/14	1.2	3

As demonstrated in Table 2 above, the two modeling refinements made for the Kiln result in successive decreases to the Acute HI at the PMI and to the total number of hours per year that the HI is above 1.0. This adds further evidence that the potential for actual human exposure to an Acute HI impact at or above 1.0 is very remote.