TECHNICAL MEMORANDUM – REVIEW OF DOCUMENTS PERTAINING TO THE LEHIGH SOUTHWEST CEMENT PERMANENTE PLANT

Lehigh Southwest Cement Permanente Plant

24001 Stevens Creek Boulevard

Cupertino, California 95014

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EXECUTIVE SUMMARY

At the request of the Town of Los Altos Hills and the City of Los Altos, Iris Environmental has reviewed documents pertaining to the Lehigh Southwest Cement Permanente Facility (Facility) to determine if there have been significant releases of chemicals of potential concern (COPCs) from the Facility. Specifically, Iris Environmental reviewed an AB 2588 Air Toxics "Hot Spots" Program Human Health Risk Assessment (HHRA) conducted at the request of the Bay Area Air Quality Management District (BAAQMD) and documents pertaining to potential releases to surrounding water bodies issued by the Regional Water Quality Control Board (Water Board).

The HHRA, conducted at the request of the BAAQMD, summarizes stationary source ambient air emissions from the Facility and associated potential human health risks. Based on a review of the HHRA, exposures to airborne emissions from the Facility are below BAAQMD public notification levels for the current and future emission scenarios. The review documented in this Technical Memorandum determined that the HHRA was adequately and sufficiently conducted. Limitations of the HHRA are documented in detail within this memorandum. It may be optimal to monitor Facility response to requirements in the HHRA on an ongoing basis to ensure the planned emission reductions incorporated into the HHRA are successfully implemented.

Historical Water Board documents indicate that the Facility has discharged sediment-laded water to Permanente Creek in violation of their stormwater permit. The Water Board is in the process of bringing the Facility into compliance under a different, more stringent permit. Firstly, the Water Board is requiring monitoring which characterizes the nature and extent of all discharges from the Facility (indirectly or directly) to Permanente Creek. Once discharges from the Facility are fully characterized, the Water Board will require the Facility to obtain the necessary discharge permit. The Facility will be subject to additional discharge restrictions and facility management practices intended to be protective of water quality in Permanente Creek. It may be optimal to monitor Facility response to these requirements on an ongoing basis to ensure the adequate and timely compliance of the Facility with these proposed actions.

In addition to the review of these documents, at the request of the Town of Los Altos Hills, Iris Environmental collected one surface water sample and one sediment sample in Permanente Creek. This single data point provides a snapshot of the potential characteristics of the creek, but does not provide a definitive characterization of discharges from the Facility. Based on this single data point, there does not appear to be excessively high levels of contaminants in the creek at the sampling location.

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1.0 INTRODUCTION

At the request of the Town of Los Altos Hills and the City of Los Altos, Iris Environmental has reviewed documents pertaining to the Lehigh Southwest Cement Permanente Facility (Facility) located at 24001 Stevens Creek Boulevard, Cupertino, California, 95014. The results of this review are summarized in detail in this Technical Memorandum. As outlined in our Proposal for Engineering Consulting Services Associated with the Review of Information Regarding the Facility dated September 2 (Iris Environmental, 2011a), Iris Environmental has reviewed these documents to determine if there have been significant releases of chemicals of potential concern (COPCs) from the Facility.

Section 2.0 identifies the COPCs that might have been released to either air or water as a result of Facility operations. Section 3.0 summarizes the review of San Francisco Bay Regional Water Quality Control Board's (Water Board's) documentation pertaining to stormwater and non-stormwater discharges from the Facility. The purpose of the review of the Water Board's documentation is to help determine if known discharges of COPCs from the Facility to nearby waterways such as Permanente Creek have occurred. Additional Water Board documentation is reviewed to determine anticipated regulatory requirements of the Facility for stormwater and non-stormwater discharges. The General Sand and Gravel Permit is also reviewed to identify possible additional requirements for stormwater and non-stormwater runoff compliance.

Section 4.0 summarizes a review of the revised health risk assessment (HRA) prepared by AMEC dated March 30, 2011 for the Facility (AMEC, 2011). The review of the HRA included a brief review of some documents cited in the HRA which are the basis for assumptions or inputs used in the HRA. The methods and key assumptions of the HRA are summarized. There is a review and critique of the estimated emissions, air dispersion modeling assumptions and inputs, toxicity assessment and risk evaluation. Ultimately an assessment of the adequacy and limitations of the HRA to evaluate potential health impacts to nearby communities is provided.

2.0 CHEMICALS OF POTENTIAL CONCERN

COPCs for this evaluation include metals, volatile organic compounds (VOCs) and other chemicals which can potentially be released to the environment by the Facility's operations. The HRA identified benzene, hexavalent chromium, and mercury as the most significant COPCs that may be released into the air as a result of Facility operations. There is limited information on the COPCs that potentially may have been released to water as a result of Facility operations. However, Permanente Creek has recently been listed by the Water Board as water quality impaired under the Clean Water Act Section 303(d) (SFBRWQCB, 2010a) due to selenium contamination. Therefore, these four COPCs are of particular focus for the review described here.

3.0 REVIEW OF STORMWATER AND NON-STORMWATER DISCHARGE ISSUES

Iris Environmental reviewed documents pertaining to stormwater and non-stormwater discharges from the Facility to nearby waterways to 1) determine if COPCs were discharged to Permanente creek and 2) identify additional potential regulatory requirements for stormwater and non-

stormwater runoff compliance of the Facility. To evaluate if COPCs were released, Iris Environmental reviewed several documents from the Water Board to the Facility including documents issued by the Water Board to the Facility to address unauthorized discharges from the Facility. Other historical documents were also briefly reviewed to develop a more detailed picture of potential discharges from the Facility. Discharges from the Facility are of potential concern due to the Facility's proximity to Permanente Creek. As noted above, there is limited information on the specific COPCs that may have been released to this water body as a result of Facility operations.

Based on the Water Board's review of the Facility, the Facility was determined to be in violation of their National Pollutant Discharge Elimination System (NPDES) General Industrial Storm Water Permit (General Industrial Storm Water Permit) due to their discharge of prohibited non-stormwater (e.g., industrial process water). As a result, the Facility is required to obtain coverage under a different NPDES General Permit: Order NO. R2-2008-0011, General Water Discharge Requirements for Discharges of Process Wastewaters from Aggregate Mining, Sand Washing, and San Offloading Facilities to Surface Waters (General Sand and Gravel Permit) (SFBRWQCB, 2008). Additionally, the Water Board indicated that in the future the Facility will likely be required to obtain an individual NPDES discharge permit (individual NPDES permit). To identify additional requirements for future stormwater and non-stormwater discharge compliance, Iris Environmental reviewed recent Water Board documentation and the General Sand and Gravel Permit. The goal of this aspect of Iris Environmental's review is to identify future permit requirements which will protect Permanente Creek from future discharges from the Facility that are potentially harmful.

3.1 Background

The primary Facility operation is cement production. Cement at the Facility is produced by mixing ground limestone, clay (containing silica, iron, and alumina) or similar raw materials with materials such as gypsum to produce cement. When this cement is mixed with aggregate materials, concrete is produced. Additional Facility operations include:

- Rock excavation, crushing, and transport;
- Waste storage;
- Raw material and water storage; and
- Wastewater treatment.

Since 1997, the stormwater discharges from the Facility have been covered under an NPDES General Permit: Industrial Storm Water General Permit Order 97-03-DWQ (General Industrial Storm Water Permit). Discharges from the Facility are of potential concern due to the Facility's proximity to Permanente Creek. Permanente Creek flows from west to east along the southern perimeter of the Facility and then cuts through the Facility as it bends to the North.

3.2 Stormwater Discharge Violations

Inspections were performed by the Water Board in the late 1990s to determine compliance with the General Industrial Storm Water Permit. The Water Board issued Cleanup and Abatement Order No. 99-018 in 1999 to the Facility to address unacceptable discharges of sediment-laden

water from various locations at the Facility to Permanente Creek which were determined to be in violation of the Basin Plan (SFBRWQCB, 1999). During inspections of the Facility, water clarity in Permanente Creek was generally observed to be significantly more turbid downstream than upstream of the Facility. The Order required the Facility to develop interim and long term measures to eliminate discharge of sediment-laden water in Permanente Creek. The Facility implemented some corrective actions following the Order. Documentation of regulatory acceptance of the corrective action measures does not appear to be available. Moreover, there is no documentation of any ongoing inspection in the years following the Cleanup and Abatement Order to ensure adequacy of the corrective actions. Note that a detailed document review of the Water Board's records is not within the scope of this technical memorandum, therefore these documents may exist but within the scope of this review they were not found.

From 2009 to 2011 the Water Board received a number of complaints regarding the operation of the Facility which requested that the Facility be investigated for compliance with water quality requirements. In response, the Water Board evaluated the status of the Facility's compliance with applicable laws and regulations, including the Federal Clean Water Act (CWA), the California Water Code (Water Code), and the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan). The evaluation necessarily included an assessment of the Facility's compliance with its then current permit, the General Industrial Storm Water Permit.

Per the requirements of the General Industrial Storm Water Permit, the Water Board required the Facility to submit of a Stormwater Pollution Prevention Plan (SWPPP) which was submitted to the Water Board on March 4, 2010. Based on inspections of the Facility and a review of the SWPPP, the Water Board issued a Notice of Violation on March 26, 2010 which contained requirements for corrective actions for violations of the General Industrial Storm Water Permit at the Facility (SFBRWQCB, 2010b). The inspector concluded the Facility and the SWPPP do not sufficiently achieve Best Management Practices (BMPs) to implement controls that reduce pollutants in stormwater discharges to the Best Available Technology Economically Achievable/Best Conventional Pollutant Control Technology (BAT/BCT). In particular, the inspector noted pollutant-laden discharges, inadequate materials storage techniques (increasing the likelihood of stormwater exposures to hydrocarbons, cleaning materials, and other chemicals), and insufficient erosion controls. These discharges were also determined to be in violation of the Basin Plan due to discharges of solid wastes into surface waters. This Notice of Violation indicates the Facility was, at a minimum, discharging stormwater containing elevated levels of sediment to Permanente Creek.

During two stormwater monitoring events in January 2010, the Facility detected concentrations of selenium in stormwater collected in the Facility in exceedance of the Freshwater Aquatic Life water quality limit from the Basin Plan and California Toxics Rule for chronic exposures (Geosyntec, 2010). Mercury was also detected at a concentration above the 4-day average water quality objective from the Water Board's Basin Plan, however, the report produced by the Facility does not mention mercury. Hexavalent chromium was also detected, but at concentrations below water quality standards. Selenium is of particular concern because the Water Board in 2009 adopted a proposal to list Permanente Creek as water quality impaired by selenium under the CWA (SFBRWQCB, 2010a). The report prepared by the Facility concluded that stormwater discharged through the quarry dewatering system could be contributing to exceedances of the water quality standards for selenium in Permanente Creek. The Facility

proposed to implement additional BMPs to control selenium concentrations in stormwater runoff. As part of the CWA, the Water Board plans to develop a Total Maximum Daily Load (TMDL) for selenium in Permanente Creek by 2021 which will limit the total amount of selenium Permanente Creek can receive in order to achieve water quality goals.

Inspections performed by the Water Board on March 29, 2011 again noted muddy water flowing into Permanente Creek from the Facility, sedimentation ponds and sediment traps overwhelmed with sediment, an over-reliance on sediment management practices, and insufficient use of erosion control (SFBRWQCB, 2011a). These violations are similar to those noted by the Water Board in 1999 and 2010 described above.

The historical documentation available indicates that the Facility discharged sediment-laded stormwater to Permanente Creek in violation of their General Industrial Storm Water Permit in 1998, 1999, 2010 and again in 2011 primarily due to inadequate stormwater management practices and erosion controls. Sediment-laded water is of concern because it potentially contains metals such as hexavalent chromium, mercury, and selenium which can occur naturally in regional soils. These discharges increase turbidity and concentrations of these chemicals in Permanente Creek waters which can result in ecological impacts. Additionally, as further discussed in the following section, stormwater discharges from the Facility have the potential to become polluted by non-naturally occurring pollutants prior to discharge due to contact with Facility operations. It appears the Facility discharged stormwater to Permanente Creek with concentrations of some COPCs such as mercury and selenium above water quality objectives.

3.3 Non-Stormwater Discharge Violations

Ongoing inspections of the Facility by the Water Board documented additional violations and determined coverage of the Facility under the General Industrial Storm Water Permit is insufficient. In particular, a pipe outfall discharging sediment-laden water to Permanente Creek on the order of hundreds of gallons per minute was observed by Water Board staff on March 29, 2011 and the discharge was classified as non-stormwater. This non-stormwater discharge to Permanente Creek is of concern because water collected by the system includes water that has come in contact with industrial operations and material. This effluent is categorized as industrial process water and its discharge, regardless of its origin as rainfall, is prohibited unless specifically covered by a permit and is considered a non-stormwater discharge. The discharge was not disclosed in the SWPPP and is prohibited under the General Industrial Storm Water Permit.

The General Industrial Storm Water Permit allows general stormwater discharge and some non-stormwater discharges. All other non-stormwater discharges are strictly prohibited, including quarry bottom water, wash-down water, and dust suppression water. The Water Board concluded the facility is in violation of the General Industrial Storm Water Permit due to inadequate erosion and sediment controls, and the discharge of industrial process waters. The Water Board required the Facility to immediately cease and desist any and all discharges of quarry bottom water, dust suppression water, and wash down water. Due to these violations the Facility was required to obtain coverage under a different NPDES General Permit: The General Sand and Gravel Permit (SFBRWQCB, 2011a). The Facility was ultimately ordered to pay penalties for the unauthorized non-stormwater discharges (SFBRWQCB, 2011b).

The Water Board reiterated these violations and placed additional requirements on the Facility in a Water Code Section 13267 Order and Notice of Violation dated June 14, 2011 (SFBRWQCB, 2011c). The Water Board put the Facility on notice that it is expected the Facility will need to apply for an individual NPDES permit in the near future. The Water Board indicated that the custom permit is likely necessary and that the General Sand and Gravel Permit, which the Facility was required to obtain by July 10, 2011 for the interim time period, is inadequate due to the various discharges and COPCs that may have been released as a result of Facility operations. The Water Board also required development of a Report of Waste Discharge intended to assist the Water Board in evaluating the nature, extent, circumstances, and impacts of discharges from the Facility to surrounding waters. Specific requirements of the Report of Waste Discharge are further discussed in the following section.

The discharge violations by the Facility noted by the Water Board clearly indicate that the Facility has discharged sediment-laden water to Permanente Creek in violation of the General Industrial Storm Water Permit. Additionally, because this water was in contact with Facility operations it is considered industrial process water and is considered non-stormwater. It is not possible to definitely ascertain neither the nature of these discharges nor the extent of impacts to beneficial uses of Permanent Creek from the available documentation. It is possible the stormwater and non-stormwater discharges contain COPCs due to contact with Facility operations. These additional pollutants may not have been sampled for previously, including VOCs including benzene. The Report of Waste Discharges required by the Water Board and discussed in detail in the following section is intended to answer these questions.

3.4 Future Regulatory Activities and Facility Requirements

As noted above, the Water Board is considering requiring the Facility to operate under an individual NPDES permit because the General Sand and Gravel Permit does not cover the full set of COPCs or the various discharges relevant to the Facility. In order to fully understand discharges from the Facility, the Water Board is requiring the Facility to submit reports which describe: 1) the nature and extent of discharges at and from the Facility; 2) the nature and extent of pollution conditions in waters of the state and United States created by the discharges; 3) the threat to public health and the environment posed by the discharges; and 4) appropriate cleanup and abatement measures. The reports are intended to enable the Water Board to determine the extent of discharges, ascertain if the condition of pollution poses a threat to human health and the environment in the vicinity of the Facility or downstream, and provide technical information to determine what cleanup and abatement measures are necessary to bring the Facility into compliance with applicable water quality standards.

Specifically, the Water Board is requiring monitoring which characterizes the nature and extent of all discharges from the Facility (indirectly or directly) to Permanente Creek. A complete list of monitoring parameters is required including COPCs such as benzene, hexavalent chromium, mercury, and selenium. Additionally, continual flow measurements at sampling locations are required to quantify discharges to Permanente Creek. This additional monitoring will greatly assist in characterizing discharges from the Facility. Additionally, the inclusion of VOCs such as benzene in the analyte list will assist in determining if stormwater and non-stormwater discharges contain pollutants which do not occur naturally due to contact with Facility operations.

3.5 Surface Water and Sediment Sampling in Permanente Creek

The results of recent sampling in Permanente Creek are used as a point of comparison for the known discharges from the Facility. At the direction of the Town of Los Altos Hills, Iris Environmental collected one surface water and one sediment sample in Permanente Creek and analyzed the samples for a full list of metals. Details of this limited sampling effort are described in a separate document which is included as Appendix A (Iris Environmental, 2011b). Of particular note, hexavalent chromium, mercury, and selenium were not detected above laboratory reporting limits in the surface water sampling. Nonetheless, strong conclusions based on these sampling results cannot be made because this sampling effort was based on a single sample. In particular it cannot be concluded whether the discharges from the Facility to Permanente Creek contain these COPCs.

3.6 Conclusions

Historical Water Board documentation regarding the Facility indicates that the Facility discharged sediment-laded water to Permanente Creek in violation of their General Industrial Storm Water Permit in 1998, 1999, 2010, and again in 2011. Sediment-laded water is of potential concern because it may contain COPCs such as hexavalent chromium, mercury, and selenium which can occur naturally in regional soils. Based on this review, it is likely the Facility has discharged stormwater to Permanente Creek containing some naturally occurring COPCs such as mercury and selenium due to inadequate stormwater and erosion management practices. Discharges from the Facility to Permanente Creek have not been fully characterized making it difficult to make conclusions regarding the impacts to Permanente Creek from these discharges.

Recent inspections of the Facility have documented non-stormwater discharges (e.g., industrial process waters) which are in violation of the General Industrial Storm Water Permit for stormwater discharges. It is possible non-stormwater discharges contain other COPCs due to contact with Facility operations. The Water Board is in the process of bringing the Facility into compliance under either the General Sand and Gravel Permit or an individual NPDES permit. Firstly, the Water Board is requiring monitoring which characterizes the nature and extent of all discharges from the Facility (indirectly or directly) to Permanente Creek. Once discharges from the Facility are fully characterized, the Water Board will require the Facility to obtain the necessary discharge permit. Characterization of the discharges will assist in assessing the threat to public health and the environment posed by these discharges.

Whether the Facility is ultimately covered under the General Sand and Gravel Permit or an individual NPDES permit, the Facility will be subject to discharge restrictions and facility management practices intended to be protective of water quality in Permanente Creek. Once in place, these additional requirements will likely allow better characterization of the discharges from the Facility to Permanente Creek, and allow for more robust conclusions regarding the potential impact of Facility operations on Permanente Creek. Requirements of the General Sand and Gravel Permit including effluent limitations and discharge specifications are summarized in Appendix B. It may be optimal to monitor Facility response to these requirements on an ongoing basis to ensure adequate and timely compliance of the Facility with these proposed actions.

4.0 REVIEW OF THE REVISED HEALTH RISK ASSESSMENT

Iris Environmental has reviewed the revised health risk assessment (HRA) prepared by AMEC dated March 30, 2011. The focus of the review is to assess the adequacy and appropriateness of the methods and key assumptions of the HRA in estimating and quantifying exposures to surrounding communities. This section is divided into three subsections (Sections 4.1, 4.2, and 4.3) focusing on a review of 1) the estimated emissions; 2) the air dispersion modeling assumptions and inputs; and 3) the toxicity assessment and risk evaluation. A screening assessment of the methods and key assumptions is made in each subsection. Additionally, a review of BAAQMD air monitoring data collected nearby the Facility is evaluated in Section 4.4 to compare to the concentrations of COPCs modeled in the HRA. Conclusions are provided in Section 4.5.

The HRA is intended to be in accordance with the AB 2588 Air Toxics "Hot Spots" Program. The BAAQMD approved a protocol for completing the HRA. The HRA included five emission scenarios: 2005, 2008/2009, 2010, 2011, and 2013. The review conducted here focuses on the 2008/2009, 2010, 2011, and 2013 scenarios described in the HRA because these are the more recent scenarios. The 2005 scenario was used as the basis for the other scenarios, and therefore emissions and modeling assumptions implicit in the 2005 scenario are considered, but the results of the 2005 scenario are not specifically a focus of this review because this scenario is older and has been superseded by the newer scenarios. The HRA focuses on three receptors: maximum exposed individual resident (MEIR), maximum exposed individual worker (MEIW), and point of maximum impact located off site (PMI). The PMI may be in a location where no permanent receptors are present. Carcinogenic risks are also estimated for sensitive receptors, such as schools, hospitals, and daycare centers. Cancer risks, chronic noncancer hazards, and acute noncancer hazards are estimated for each receptor in the 2008/2009 and 2013 scenarios. The 2010 and 2011 scenarios estimate acute noncancer hazards only because cancer risks and chronic noncancer hazards were shown to be below thresholds in the 2008/2009 scenario.

4.1 Review of Estimated Emissions

4.1.1 Sources Evaluated

4.1.1.1 Summary of Approach and Key Assumptions

Activities at the facility consist of mining raw materials and processing for the production of cement. Processes which contribute to the release of AB 2588 reportable chemicals were included in the estimation of emissions. These sources include: the 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), and plant fugitive emissions (14 volume sources). These 42 sources are included in the air dispersion model.

4.1.1.2 Assessment of Approach

All stationary point and volume sources at the Facility appear to be included in the emissions estimates. While this appropriately follows the AB 2588 methodology, mobile sources are not included in emissions estimations and these sources may impact local and regional air quality. Mobile sources such as onsite truck traffic or cement truck traffic to and from the Facility are

potentially a significant source of benzene, formaldehyde, acetaldehyde and other petroleum related VOCs. Using the AB 2588 HRA to understand the total potential impacts associated with Facility operations is limited by the absence of mobile source emissions. Assessing the impact of mobile sources on the risk conclusions presented in the HRA is not within the scope of this review. The potential contribution from mobile sources is discussed in more detail in Section 4.5.

4.1.2 Chemicals of Potential Concern

4.1.2.1 Summary of Approach and Key Assumptions

Emissions estimates were recorded in the 2008 Comprehensive Emissions Inventory Report (CEIR) (AMEC, 2009 as revised). Of the chemicals emitted from the 42 sources, 69 were identified as toxic air contaminants (TACs) regulated under the AB 2588 program. These chemicals are included in the HRA. The results of the HRA, discussed in detail below, indicate that mercury is by far the most significant COPC for chronic and acute noncancer hazard calculations and that benzene and hexavalent chromium together are by far the most significant COPCs for chronic cancer risk calculations. This review will focus in detail on these hazard and risk drivers of the HRA.

4.1.2.2 Assessment of Approach

The HRA includes all chemicals emitted from the facility which are designated as TACs under the AB 2588 program. This includes metals, VOCs, semi-volatile organic compounds (SVOCs), and polycyclic aromatic hydrocarbons (PAHs). The chemical list is sufficiently exhaustive to conservatively estimate exposures to surrounding communities.

4.1.3 Methods Used

4.1.3.1 Summary of Approach and Key Assumptions

2005 Emission Scenario

Emissions estimates were recorded in the CEIR for 2005 levels of production at the Facility. Sixty-nine chemicals regulated under AB 2588 were identified as being emitted from 42 sources at the Facility. For the cement kiln and the finish mill baghouses, TAC source test data were available, for other sources, particulate matter (PM) or TAC emissions were calculated using published emission factors incorporating assumptions for operating parameters. Mercury emissions from the kiln were calculated using a mass balance approach rather than source tests. The mass balance approach assumes all mercury contained in the processed materials is released. Annual average emissions and maximum hourly emissions were calculated. Maximum hourly emissions are controlled by production capacity, and therefore do not vary between 2005 and 2011. Annual average emissions are controlled by market conditions and vary with the demand for construction materials.

2008/2009 Emission Scenario

To develop annual average emission rates for low cement production rates in years after 2005, annual production of clinker and cement from 2008 and 2009 were compared to 2005 annual production. The average 2008 and 2009 production was divided by the 2005 annual production from the CEIR to develop a production ratio to apply to the emission estimates. Specifically, the ratio was applied to all controlled and fugitive dust emissions with the exception of those related specifically to wind erosion. Assuming facility vehicles are driven at rates proportional to production, the ratio also was applied to fuel dispensed at the fueling station and dust generated on roads by vehicles, but not to emergency diesel generators or welders.

Maximum hourly emissions were assumed to be the same for 2005 and 2008/2009 with the exception of mercury emissions from the kiln which were slightly reduced.

2010 and 2011 Emission Scenarios

Emission scenarios for 2010 and 2011 incorporate mercury emissions mitigation measures. A kiln mill dust collector conveyance system was installed in 2010 and shown to remove approximately 30 percent of mercury emissions. This reduction is included in the 2010 emission scenario. The 2011 emission scenario incorporates the injection of an activated carbon sorbent which removes approximately an additional 50 percent of mercury emissions from the kiln.

2013 Emission Scenario

A 2013 emission scenario was developed reflecting expected conditions in 2013 once planned Facility changes are completed. In particular, the kiln at the Facility will be reconfigured to emit from a single 300 foot stack rather than the 32 rooftop stacks currently in place. Additionally, the Facility will be required to meet NESHAPs which will affect emissions of hydrochloric acid and mercury. The 2013 emission scenario assumes that maximum annual clinker production of 1,600,000 tons is achieved.

4.1.3.2 Assessment of Approach

2005 Emission Scenario

A variety of methods are used to estimate emissions for each source for the 2005 base scenario. There is some uncertainty inherent in estimating emissions based on published emission factors. However, more accurate source testing data is used for two sources, the cement kiln and finish mill baghouses, including the largest source at the Facility, the cement kiln. Additionally, based on the comments by the BAAQMD, a mass balance approach is used to conservatively estimate mercury emissions by assuming that all mercury contained in the materials is emitted by the cement kiln. More accurate emissions measurements for other sources could impact estimated exposures somewhat, but are unlikely to alter the conclusions of the HRA. The methods used to estimate emissions are adequate and appropriate for the 2005 scenario.

2008/2009 Emission Scenario

The approach used to scale the annual average emissions calculated in the high-production 2005 emission scenario to estimate emissions in the low-production 2008/2009 emission scenario is reasonable. Emissions due to wind are not scaled down. It is very reasonable to assume emissions are proportional to production for the largest source of COPCs at the Facility, the cement kiln. Overall the methods used to calculate the 2008/2009 emission scenario are adequate and appropriate.

Production at the Facility for the 2008/2009 is based on actual emission rates which are less than the maximum permitted emission rates due to market conditions. While this approach is reasonable for evaluating historical operations, emissions estimates for future scenarios should assume the maximum annual production rate.

We have the following minor specific comment regarding the maximum hourly mercury emission in the 2008/2009 scenario. The HRA is unclear as to why the maximum hourly mercury emissions in 2005 and the 2008/2009 scenario differ. Regarding the 2008/2009 maximum hourly emissions, Appendix A of the HRA mentions that "maximum hourly production is limited by permit condition on use of petroleum coke set in 2007." Appendix A does not explicitly say that this is the reason for the slight reduction in maximum hourly mercury emissions. However, if this is the case, it seems probable that maximum hourly emissions of other chemicals would also be slightly reduced. The HRA also does not explicitly provide the reason for the mercury reduction. Nonetheless, while clarity in the approach would be helpful, on the surface the approach appears conservative.

2010 and 2011 Emission Scenarios

The 2010 and 2011 emission scenarios contain mitigation measures for the cement kiln, specifically aimed at lower mercury emissions. The reduction rates assumed seem reasonable on the surface and it is conservative to assume these mitigation measures do not reduce emissions of other chemicals. However, the performance of mitigation measures should be monitored on an ongoing basis to ensure the assumed reductions are occurring. It cannot be assumed reductions observed in initial or pilot testing will continue under various operating conditions or as the systems age. These assumptions are critical in the conclusion that the acute noncancer hazard indices are below the BAAQMD public notification level of 1.0 at the MEIR and MEIW for the 2011 emission scenario.

2013 Emission Scenario

Similar to the 2010 and 2011 emission scenarios, inherent in the 2013 emission scenario is an assumption of future reductions in emissions. The 2013 emission scenario assumes that National Emission Standards for Hazardous Air Pollutants (NESHAPs) have been met and structural changes at the facility have been made. Fulfillment of these assumptions should be demonstrated for validation of the 2013 emission scenario. Failure to reduce emissions by 2013 as assumed would likely result in exceedances of BAAQMD public notification levels due to the projected increase in production at the Facility. Indeed, the HRA presents an "Optimal Production Scenario" which calculates the maximum annual production rates for clinker and

cement that would result in predicted cancer risks just below the BAAQMD public notification level of 1.0×10^{-5} for the MEIR based on current emission rates. The scenario concluded that an annual production of 951,790 tons of clinker would yield a chronic cancer risk of 9.8×10^{-6}. Therefore, if the maximum annual clinker production rate of 1,600,000 tons was implemented without achieving the anticipated emissions reductions, the chronic cancer risk would be approximately 1.6×10^{-5} and would be above the BAAQMD public notification level.

4.2 Review of Air Dispersion Model Assumptions and Inputs

Air dispersion modeling was used to estimate off-site air concentrations of chemicals associated with Facility emissions. The California Air Resources Board (CARB) Hotspots Analysis and Reporting Program (HARP) (CARB, 2010) is specifically designed for conducting AB 2588 HRAs and was used to estimate the health risks associated with Facility emissions. Air dispersion modeling was conducted in accordance with the *Air Quality Modeling Protocol,* which was approved by BAAQMD on June 21, 2010. The Lakes MPI version of AERMOD was used to predict ambient concentrations resulting from the Facility's emissions sources. Annual average and maximum 1-hour concentrations are calculated at offsite receptors to evaluate chronic and acute exposures, respectively.

4.2.1 Source Inputs

4.2.1.1 Summary of Approach and Key Assumptions

Two simplifying assumptions in particular were made in modeling the sources identified at the site. First, dust collector sources with an insignificant contribution to particulate emissions (less than 0.5 percent of PM10 emissions) were modeled as one combined source located in an average location based on the stacks it is comprised of in the main operations area of the Facility. Second, fugitive sources were assigned to one of eight volume sources or were divided between two or three volume sources if the fugitive source spanned multiple of these eight volume source areas.

Inputs for point sources were provided by the Facility, AMEC did not measure any source parameters. Stack velocities were calculated based on the stack flow. For sources which operate at ambient temperature which varies seasonally, a value of 0 °K was used for the stack emission temperature. Some source input parameters such as operating schedule, stack height, emission temperature, and stack flow were obtained from a Facility inspection report dated March 10, 2005 which AMEC received after the CEIR was prepared. The assumptions used to calculate throughputs for each source are documented in the CEIR.

The HRA does not explicitly explain how source parameters for fugitive volume sources such as operating schedule and source dimensions are obtained.

4.2.1.2 Assessment of Approach

The two simplifying assumptions used in defining point and volume sources are reasonable and unlikely to significantly affect modeled concentrations of chemicals at receptors.

The HRA notes point source input parameters used in modeling were provided to AMEC by the Facility to conduct the modeling. AMEC did not measure any source parameters. There is no documentation of third-party verification of the accuracy of these source inputs. Iris Environmental cannot verify the accuracy of the point source input parameters based on the available documentation. Additionally, the HRA does not explicitly explain how source parameters for fugitive volume sources such as operating schedule and source dimensions are obtained. This information should be specified in the HRA for clarity. However, absent a third-party review of the Facility it is impossible to definitely conclude that source input parameters are accurate and appropriate.

4.2.2 Receptor Grid

4.2.2.1 Summary of Approach and Key Assumptions

A receptor grid including elevations was input to the model. The receptor grid was a modification of the BAAQMD fine receptor grid generated for their preliminary modeling. AMEC recognized that the receptor locations provided by BAAQMD were not consistent with the property boundary provided by the Facility. Based on this review, the receptor grid was modified to exclude receptors within the Facility boundary and to add receptors in offsite areas where they were not previously present. The grid includes residential and worker receptors. Sensitive receptors such as schools, hospitals, and daycare centers are also identified within the receptor grid.

Receptors were placed on various grid spacing (30 to 500 meters) covering an area approximately 14 kilometers from east to west and 16 kilometers from north to south. A 30-meter grid spacing was used in the residential area nearest the Facility. These grid receptors were also used to define the zone of impact (ZOI) which is further discussed in Section 4.3.

4.2.2.2 Assessment of Approach

Concentrations were modeled at each location within the receptor grid and the worst-case receptor used to make conclusions. The Facility spans nearly 4,000 meters west to east, therefore, the grid spacing of 30 to 500 meters is sufficiently dense to reasonably estimate the worst-case receptor. Iris Environmental did not verify that all residential, worker, and sensitive receptors near the Facility were identified as this was outside the scope of our review.

4.2.3 Modeling Approach

4.2.3.1 Summary of Approach and Key Assumptions

Regulatory default inputs were selected for elevated terrain algorithms requiring input of terrain height data for receptors and emission sources, stack tip downwash (building downwash automatically overrides), calms processing routines, and buoyancy-induced dispersion. Increased ground level concentrations resulting from the presence of large buildings near stacks were incorporated with USEPA's Building Profile Input Program for PRIME. A rural land use was selected for modeling because the area within 3 kilometers of the Facility is only 31 percent residential and commercial land use.

4.2.3.2 Assessment of Approach

The model is a regulatory developed dispersion model and model inputs are primarily regulatory defaults. This is consistent with typical risk assessment dispersion modeling and is likely conservative. Rural land use was selected and is more conservative than urban land use. We have the following specific comment.

The HRA states, "For the year to second unit conversion in the annual emissions, HARP On-Ramp uses 8760 seconds per year, essentially assuming all processes emit constantly for the entire year and were modeled correspondingly." Assuming emissions occur continuously over the year underestimates exposures to the MEIW if the majority of emissions occur during the workday. Also, there is an obvious typo in the statement (there are 8760 hours in a year). While Tables 2 and 3 of the HRA show that many of the Facility sources operate 24 hours/day, including the cement kiln, it would be helpful to know whether this continuous operation is applicable to a low-production scenario such as the 2008/2009 emission scenario. It should be demonstrated that Facility emissions occur continuously in order to justify this year to second unit conversion in the calculation of annual emissions.

4.2.4 Meteorological Data

4.2.4.1 Summary of Approach and Key Assumptions

Selected Critical Input Parameters

USEPA AERMET tool was used to process meteorological data for use in the modeling. AERMET merges National Weather Service (NWS) surface observations and onsite meteorological data with NWS upper air observations. Wind speed and direction were collected hourly at an onsite 10-meter tower located near the southwestern Facility boundary.

Land Use Parameters (e.g., albedo, Bowen ratio, and roughness length)

USEPA's AERSURFACE tool was used to calculate the surface roughness length, albedo, and Bowen ratio inputs required by AERMET. Surface parameters were calculated for a 1 kilometer radius around the onsite meteorological tower. United States Geological Service (USGS) National Land Cover Data (NLCD) were acquired for the northern section of California and used as an input to AERSURFACE. The area was broken into six compass sectors and land use parameters were calculated for each. Surface characteristics were also broken down by month to account for seasonal variations. Average surface moisture was assumed.

Methods to Address Missing Meteorological Data

Surface observations collected by NOAA at the San Jose Airport were used to provide relative humidity, station pressure, and cloud cover data.

Source of Upper Air Data

Upper air radiosonde data were provided by BAAQMD for the Oakland NWS site. This combination of data met the USEPA completeness requirements for meteorological data.

4.2.4.2 Assessment of Approach

The use of agency recommended software for processing meteorological data is appropriate. We note that the use of meteorological data which were collected from locations not at the Facility introduces some uncertainty into the modeling. As presented in Figure 1 of the HRA, the surface station and upper air station are located at the San Jose airport and in Oakland, respectively. Because the Facility is located in a mountainous area, whereas offsite monitoring data was collected at relatively flat locations at sea-level, local meteorology may vary significantly. Additionally, wind speeds and direction are based on just one year of monitoring data. It is common and would be more robust to use five years of monitoring data in this type of modeling. This meteorological dataset was proposed in the Facility's Air Quality Monitoring Protocol dated June 8, 2010. Explicit documentation of BAAQMD approval of the protocol is not available online, however it can be inferred that BAAQMD approved of the use of this combination of meteorological datasets. Indeed, the BAAQMD provided the Facility with the upper air data to use in this modeling.

4.3 Review of Toxicity Assessment and Risk Characterization

The HRA is conducted in accordance with the AB 2588 Air Toxics "Hot Spots" Program. Risk calculations were performed using HARP, which is a software package designed by the CARB. Chronic cancer risk, chronic noncancer hazard, and acute noncancer hazard are calculated for each emission scenario and receptor based on the dispersion modeling discussed above. Overall, this approach seems reasonable.

4.3.1 Inputs

4.3.1.1 Summary of Approach and Key Assumptions

HARP incorporates the algorithms and exposure assumptions for estimating exposures for the AB 2588 program recommended by the Office of Environmental Health Hazard Assessment (OEHHA). HARP incorporates the dispersion coefficients predicted by AERMOD and emission rates to predict ground-level concentrations for each receptor. This modeling is discussed in Sections 4.1 and 4.2. 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.

Three primary emissions scenarios are considered in the HRA: 2005 based on the CEIR emissions study (AMEC, 2008), 2008/2009 based on a low production scenario, and 2013 based on estimated production expansion and structural changes at the Facility including compliance with NESHAPs. Two additional scenarios were included for the acute noncancer endpoint for 2010 and 2011 production. The 2010 scenario incorporates the implementation of a kiln mill dust collector conveyance system, which reduced emissions of mercury by 30 percent. The 2011 scenario is based on the addition of activated carbon sorbent to the flue of the kiln to remove mercury; the system is expected to remove an additional 50 percent over the 2010 scenarios for a total reduction of 65 percent from 2008/2009 emissions.

4.3.1.2 Assessment of Approach

Inputs specific to the toxicity assessment and risk characterization are agency default inputs. Inputs which are specific to the Facility are the dispersion coefficients and emission rates developed in the modeling discussed in Sections 4.1 and 4.2. It should be reiterated that ongoing monitoring of the mercury removal technologies should be conducted to ensure anticipated emissions reductions are occurring. Without ongoing monitoring, the 2010, 2011, and 2013 emission scenarios cannot be validated.

4.3.2 Exposure Assumptions

4.3.2.1 Summary of Approach and Key Assumptions

The risk assessment focuses on three receptors: MEIR, MEIW, and PMI. The PMI may be in a location where no permanent receptors are present. Carcinogenic risks are also estimated for sensitive receptors, such as schools, hospitals, and daycare centers.

Age sensitivity factors are applied for carcinogenic exposures to account for higher sensitivity of younger receptors. 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 of 3 is applied. 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.

Under the Derived Adjusted Method, HARP calculates the 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. Otherwise, an average breathing rate value is used as opposed to the high-end value.

Per BAAQMD guidance, residential exposure scenarios are based on a 70 year exposure duration, commercial exposure scenarios are based on a 40 year exposure duration, and school children exposure scenarios are based on a 9 year exposure duration.

4.3.2.2 Assessment of Approach

The exposure assumptions used in the HRA are generally consistent with AB 2588 Air Toxics "Hot Spots" Program, which is a valid risk assessment methodology. Exposure assumptions vary somewhat among agency guidance regarding risk characterization. The Hot Spots Program recommendation of residential exposure duration and the incorporation of the LASF are on the conservative end of risk assessment guidance. The exposure assumptions incorporated into the risk assessment are adequate and appropriate.

We have the following specific minor comment regarding the justification for the assumed breathing rate for noncancer hazard calculations: as noted in the HRA, HARP has two options for the inhalation rate for residential exposure: the Derived OEHHA Method inhalation rate and the Derived Adjusted Inhalation rate. The HRA uses the lower, less conservative, Derived Adjusted Inhalation rate because it is "consistent with BAAQMD guidance". However, the BAAQMD guidance referenced only mentions this breathing rate when referring to estimating

cancer risks. There is no mention of recommending this breathing rate to estimate chronic or acute noncancer hazards. While it could be argued BAAQMD guidance can be extended to noncancer hazard calculations, the current justification is inaccurate. Incorporation of the higher, more conservative, inhalation rate would increase noncancer hazards via the inhalation route by approximately one-quarter and would likely change the conclusion regarding acute noncancer hazard exposures for the 2011 scenario. Conclusions for other scenarios would likely remain unchanged.

4.3.3 Toxicity

4.3.3.1 Summary of Approach and Key Assumptions

Toxicity values published by OEHHA are used in the HRA. Mercury, a primary risk-driver, is considered for the inhalation route only. The HRA states: "Based on guidance provided to BAAQMD by OEHHA (Dr. Bob Blaisdell), it has been determined that elemental mercury does not have multiple exposure pathways. It is an inhalation risk only."

Noncancer effects are considered additive only if they have the same organ/system endpoint. Potential end points for acute and chronic noncancer toxicological effects were classified into thirteen categories based on OEHHA guidelines.

4.3.3.2 Assessment of Approach

Toxicity values used in the risk assessment are those published by California Environmental Protection Agency (Cal/EPA) OEHHA for use in the AB 2588 Air Toxics "Hot Spots" Program and are in accordance with OEHHA guidance. Assuming noncancer effects are additive only if they have the same organ/system endpoint is standard Cal/EPA guidance and is appropriate for risk characterization.

Consideration of sources of toxicity values in addition to OEHHA could be more conservative, such as those promulgated by the United States Environmental Protection Agency (USEPA). Some Cal/EPA offices do recommend this approach, particularly for noncancer endpoints, notably the Cal/EPA Department of Toxic Substances Control (DTSC). Therefore, there is a bit of a gray area in Cal/EPA risk assessment guidance. Iris Environmental has not reviewed toxicity values of individual chemicals or made an assessment of the impact on the results of incorporating USEPA or other toxicity values because this is outside the scope of our review.

For mercury, the HRA considered only the inhalation route. We agree that the oral routes for exposure to elemental mercury are incomplete pathways because elemental mercury is volatile and tends to be in the vapor-phase in ambient air. However, the HHRA does not appear to demonstrate that the only form of mercury emitted by the facility is elemental mercury. Naturally occurring mercury can exist in many other inorganic and organic mercury compounds. Nonetheless, inhalation of mercury is likely to be the most significant exposure pathway for mercury and it is conservative to assume all of the mercury is in the elemental and volatile form.

4.3.4 Outputs and Results

4.3.4.1 Summary of Approach and Key Assumptions

Chronic Cancer Risk

2008/2009 Scenario

Estimated carcinogenic risks for the MEIR and MEIW are 8.5×10^{-6} and 7.9×10^{-7}, respectively, based on average 2008/2009 production rates (low production emissions). Neither of the predicted risks for the MEIR and MEIW exceeds the BAAQMD regulatory public notification level of 1.0×10^{-5}. The predicted cancer risk at the PMI is 1.2×10^{-5} for the 2008/2009 scenario, although this is above the BAAQMD regulatory public notification level, the AB 2588 program focuses on long-term exposure for residents and workers, and none are present at the PMI for the Facility. The carcinogenic risk estimates for sensitive receptors range from 3.2×10^{-7} to 1.0×10^{-6} for the 2008/2009 scenario. The cancer risk for the MEIR is higher for the 2008/2009 scenario as compared to the 2005 scenario due to the inclusion of the LASF. The COPCs contributing most significantly to predicted risk are hexavalent chromium and benzene. Hexavalent chromium contributed between 42 and 58 percent of the estimated risks. Benzene contributed between 24 and 38 percent of the estimated risks.

The cancer burden was calculated for the 21 census tracts relevant to the zone of impact (ZOI) as the product of the predicted cancer risk and the tract population. The total population cancer burden for these 21 tracts was 0.14 which is below the typical threshold of 1.0.

A ZOI based on a 1.0×10^{-6} risk level is developed. The ZOI based on average emissions in 2008/2009 extends approximately 5 kilometers east, approximately 5 kilometers north, and approximately 5 kilometers south.

2013 Scenario

A 2013 scenario was developed reflecting expected conditions in 2013 once planned Facility changes are completed. An assumption is made regarding the maximum annual rate of clinker production. Operational revisions designed to comply with NESHAPs requirements will result in changes to emission rates of mercury and hydrochloric acid. In addition, the kiln at the Facility will be reconfigured to emit from a single 300 foot stack rather than the 32 rooftop stacks currently in place.

The revised modeling predicts lower exposures for the MEIR and MEIW; however, due to the assumption of increased production at the quarry, risks for the MEIR and MEIW are estimated to be 7.0×10^{-6} and 9.3×10^{-7}, respectively. The highest predicted carcinogenic risk for the PMI was 1.7×10^{-5}, but at a location where no permanent receptors are located.

Chronic Noncancer Hazard

2008/2009 Scenario

The highest target organ-specific chronic hazard indexes for the MEIR and MEIW are 0.34 and 0.18, respectively. The predicted target organ-specific chronic hazard index at the PMI is 0.41. The chemical contributing most significantly to predicted chronic hazard indexes is mercury (85 to 97 percent), which occurs naturally in the raw materials used to make cement. All hazard indexes are below the BAAQMD regulatory public notification level of 1.0.

2013 Scenario

The highest predicted target organ-specific chronic hazard indexes for the MEIR, MEIW, and PMI are 0.078, 0.079, and 0.19. These values are well below the BAAQMD regulatory public notification level of 1.0.

Acute Noncancer Hazard

2008/2009 Scenario

The highest predicted target organ-specific acute hazard indexes for the MEIR, MEIW, and PMI are 2.1, 2.6, and 4.4, respectively, for the 2008/2009 scenario. All hazard indexes are above the BAAQMD regulatory public notification level of 1.0.

The chemical contributing most significantly to predicted acute hazard index is mercury (97 to 99 percent), which occurs naturally in the raw materials (e.g., limestone) used to make cement. Of the emission sources at the Facility, the kiln contributes most significantly to the acute hazard index (98 to 99 percent). The hazard indexes calculated for the 2008/2009 scenario are higher than the 2005 scenario because OEHHA reduced the reference exposure level (REL) for mercury by adding an additional factor of 3 to the uncertainty factor.

2010 Scenario

In 2010 the Facility began implementing a kiln mill dust conveyance system, which reduced mercury emissions by 30 percent. Emissions of other chemicals were assumed to remain equal to the 2008/2009 scenario. The highest predicted target organ-specific acute hazard indexes for the MEIR, MEIW, and PMI are 1.5, 1.9, and 3.1, respectively, for the 2010 scenario. All acute hazard indexes are above the BAAQMD regulatory public notification level of 1.0.

2011 Scenario

The Facility expected to begin operation of a system which injects powdered activated carbon sorbent into the kiln flue gas in 2011. Based on testing of the system, the system is expected to reduce maximum hourly mercury emissions by an additional 50 percent for a total 65 percent reduction of mercury emissions for the 2008/2009 scenario. The highest predicted target organ-specific acute hazard indexes for the MEIR, MEIW, and PMI are 0.76, 0.94, and 1.5, respectively, for the 2011 scenario. The acute hazard index for the PMI is above the BAAQMD regulatory public notification level of 1.0, however, the AB 2588 program focuses on exposure for residents and workers, and none are present at the PMI for the Facility.

2013 Scenario

The highest predicted target organ-specific acute hazard indexes for the MEIR, MEIW, and PMI are 0.025, 0.026, and 0.043. These values are well below the BAAQMD regulatory public notification level of 1.0.

4.3.4.2 Assessment of Approach

The HRA compares cancer risks to a threshold of 1.0×10^{-5} and cites this as the BAAQMD regulatory public notification level. The BAAQMD health risk guidance states: "Any HRSA [health risk screening analysis] shall be completed by following the procedures described in the OEHHA Health Risk Assessment Guidelines for the Air Toxics Hot Spots Program that were adopted by OEHHA on October 3, 2003 and any State risk assessment and risk management policies and guidelines in effect as of June 1, 2009." Most California risk assessment guidance uses a threshold of 1.0×10^{-6} as the *de minimis* risk level for residential exposure scenarios based on a typical risk management range of 1.0×10^{-6} to 1.0×10^{-4}. While 1.0×10^{-5} is the logarithmic midpoint of this range, we note that the Cal/EPA Department of Toxic Substances Control (DTSC) Office of Human and Ecological Risk (HERO) generally uses a point of departure for cancer risk for residential scenarios of 1.0×10^{-6}, whereby further investigation is warranted if risks are above 1.0×10^{-6}. Additionally, the Cal/EPA OEHHA publishes California Human Health Screening Levels (CHHSLs), which are conservative initial screening tools, based on a cancer risk of 1.0×10^{-6}. This is potentially significant as the estimated cancer risks under the 2008/2009 and 2013 scenarios for the MEIR are 8.5×10^{-6} and 7.0×10^{-6}, respectively. However, there are differences in the exposure assessment methodology guidance of these various agencies, which make a direct comparison between the methodologies difficult. This is a gray area in California health risk assessment guidance.

The HRA develops a ZOI to demonstrate the overall impact of the Facility to the surrounding community. The cancer burden is calculated within the ZOI based on a 1.0×10^{-6} risk level, which is the most typical method under the AB 2588 methodology. However, the Hot Spots Methodology states "some districts may prefer to use a cancer risk of 10^{-7} to define the carcinogenic ZOI." The cancer burden should quantify impacts to the entire surrounding community, therefore it may be more appropriate to calculate a cancer burden within a ZOI based on a 1.0×10^{-7} risk level. Lower risk levels over larger population sizes are significant. Given the large population in the nearby area of the Facility, it would be insightful to calculate a ZOI based on a 1.0×10^{-7} risk level.

Additionally, regarding the ZOI, we note that it is proposed in the 2013 scenario to move to a single larger and higher kiln stack. While this is intended to lower impacts at the MEIR and MEIW, the higher stack will spread the impacts over a greater area and therefore a greater population. The HRA does not calculate a ZOI for the 2013 scenario. It would be helpful to have the 2013 ZOI shown on the figures.

The HRA is inherently narrow in focus with respect to available Cal/EPA risk quantification guidance because it is intended to demonstrate compliance with the AB 2588 Air Toxics "Hot Spots" Program. The results of the HRA are only explained in the context of this program, and are done so adequately and appropriately for this purpose. A response to the comments noted here would help to more fully understand potential health impacts to surrounding communities by the Facility. Additionally, the Air Toxics Hot Spots program proposed revisions to the

technical support document for exposure assessment and stochastic analysis on November 7, 2011. The document is currently in a public review period. Future risk assessments for the facility should include updates to the guidance.

Finally, we have the following minor comment regarding Table 17: Table 17 appears to incorrectly show the bottom range of the contribution for every source as 0 percent. The 2005 and 2008/2009 scenarios have very similar results and therefore the bottom of the range should be very similar to the top.

4.4 Review of BAAQMD Air Monitoring Data

A review of air monitoring data is conducted here to compare to the concentrations modeled in the HRA. The BAAQMD has operated a special purpose air monitoring station in Cupertino located approximately 1,500 meters east of the Facility since September 2010 to determine if the residents of Cupertino are exposed to elevated pollution levels which might not be captured at other air monitoring stations in the Bay Area because of the Facility. The study measures pollutants in ambient air specific to suspected emissions from the Facility and its associated truck traffic. The maximum detected concentration of chemicals measured between September 2010 and June 2011 are summarized in Table 1 and compared to conservative screening levels published by the Water Board and USEPA. Monitoring results for gasses reported by the BAAQMD in parts per billion (ppb) units and are converted based on molecular mass to micrograms per cubic meter ($\mu g/m^3$) for comparison with agency published screening levels.

Of note is that mercury was detected at low concentrations, with a maximum detection of mercury of 0.00005 $\mu g/m^3$ and a maximum detection of total atmospheric mercury of 0.005 $\mu g/m^3$. These concentrations are at least two orders of magnitude lower than the maximum hourly concentrations modeled in the HRA. These concentrations are similar to the annual average concentrations modeled in the HRA. One would expect the maximum 24-hour measurements made by the BAAQMD to be higher than annual average concentrations, particularly given the inclusion of any background concentrations in the BAAQMD measurements. This suggests that either the emission or the modeling assumptions contained in the HRA regarding mercury could be conservative, if this station is appropriately located to correctly capture emissions from the Facility.

Benzene, formaldehyde, and acetaldehyde were all detected above conservative residential screening levels at concentrations two to three orders of magnitude higher than those modeled in the HRA. Diesel truck traffic due to the Facility could explain these elevated concentrations. The HRA does not include mobile sources, such as diesel truck traffic, and therefore there is a gap in the HRA. However, these chemicals are generally present in ambient air in the Bay Area due to regional vehicular traffic and therefore it cannot be concluded that these concentrations are solely due to the Facility. Indeed, the maximum concentrations of these chemicals measured by the BAAQMD in ambient air in San Jose in 2009 are higher than those measured in Cupertino (BAAQMD, 2011). Mobile sources could be included in a separate analysis to definitely conclude if operations at the Facility are resulting in harmful exposures.

4.5 Summary and Conclusions

Iris Environmental has reviewed the assumptions, methodology, and conclusions of the AB 2588 HRA conducted for the Facility. Our efforts focused on a review of 1) the estimated emissions; 2) the air dispersion modeling assumptions and inputs; and 3) the toxicity assessment and risk evaluation. Specific critiques of the approach taken in the HRA are contained above. Overall the conclusions of the HRA appear reasonable. We do have the following observations.

The cancer risks and chronic noncancer hazards estimated in the HRA for the 2008/2009 and 2013 scenarios are below the BAAQMD public notification levels of 1.0×10^{-5} and 1.0, respectively. However, the estimated cancer risks are above the Cal/EPA *de minimis* risk level of 1.0×10^{-6}. The impact to the overall communities was quantified via a cancer burden assessment over the entire zone of impact (ZOI) and was determined to be less than the typical threshold of 1.0. Production at the Facility for the most recent scenario (2008/2009) is assumed to be low due to market conditions. If the Facility was currently operating at maximum production, cancer risks would be above 1.0×10^{-5}. The permit the Facility currently operates under is inadequate in ensuring Facility operations will not pose cancer risks above 1.0×10^{-5} in the surrounding communities unless the Facility undertakes all the proposed mitigation measures and structural changes.

Acute hazard indices are above the public notification level of 1.0 for the 2008/2009 scenario due predominantly to emissions of mercury. The Facility has implemented several mitigation measures which are intended to reduce mercury emissions such that the acute hazard indices are below 1.0 by 2011 as demonstrated in the 2011 scenario. The performance of these mitigation measures should be monitored on an ongoing basis to ensure the assumed reduction in mercury emissions is occurring. It cannot be assumed reductions observed in initial or pilot testing will continue under various operating conditions or as the systems age. Nonetheless, based on a review of BAAQMD air monitoring data it appears that the assumptions contained in the HRA regarding mercury emissions may be conservative, should this station be appropriately located to correctly capture emissions from the Facility.

The HRA contains a 2013 scenario in which production occurs at the maximum rate and exposure levels are shown to be below BAAQMD public notification levels due to mitigation measures and structural changes to the Facility. However, it is unclear if the NESHAPs or other regulations which currently require the Facility to reduce emissions by 2013 will remain in effect. It may be optimal to monitor Facility response to these requirements on an ongoing basis to ensure the planned emission reductions incorporated into the HHRA are implemented. Additionally, the structural changes to the Facility's cement kiln exhaust stack will result in lower exposures to nearby receptors but may spread the exposures over a larger area and population. Conducting a cancer burden assessment for the 2013 scenario would ensure this is not of concern.

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Table 1. Summary of BAAQMD Monitoring Data at the Cupertino Station

Chemical of Potential Concern	Maximum[4] (μg/m^3)	Agency-Published Screening Levels: Residential RSL[2] (μg/m^3)	Agency-Published Screening Levels: Residential ESL[3] (μg/m^3)
Gasses			
Benzene	**1.1**	0.31	0.084
Chloride	< 0.14	NA	NA
1,3-Butadiene	**< 0.13**	0.081	NA
Acetone	22	32000	660
Methyl Ethyl Ketone	2.6	5200	1,000
Toluene	3.4	5200	63
Ethylbenzene	0.43	0.97	0.98
m,p-Xylene	1.7	100	21
o-Xylene	0.69	100	21
Trichlorofluoromethane	1.5	730	NA
Methylene Chloride	1.1	5.2	5.2
1,2-Trichlorotrifluoroethane	0.54	31000	NA
Chloroform	**0.39**	0.11	0.46
Ethylene Dichloride	**< 0.40**	0.094	0.094
Methyl Chloroform	< 0.16	5200	460
Carbon Tetrachloride	**0.82**	0.41	0.019
Trichloroethylene	0.16	1.2	1.2
Ethylene Dibromide	**< 0.077**	0.0041	0.0041
Perchloroethylene	0.14	0.41	0.41
Formaldehyde	**5.7**	0.19	NA
Acetaldehyde	**3.2**	1.1	NA
Metals			
Aluminum	0.078	5.2	NA
Silicon	0.28	NA	NA
Phosphorus	0.0030	NA	NA
Sulfur	0.092	NA	NA
Chlorine	**0.34**	0.15	NA
Potassium	0.037	NA	NA
Calcium	0.13	NA	NA
Titanium	0.010	NA	NA
Vanadium	0.00069	NA	NA

Table 1. Summary of BAAQMD Monitoring Data at the Cupertino Station

Chemical of Potential Concern	Maximum[4] (μg/m^3)	Agency-Published Screening Levels: Residential RSL[2] (μg/m^3)	Agency-Published Screening Levels: Residential ESL[3] (μg/m^3)
Chromium	0.00053	NA	NA
Manganese	0.0025	NA	NA
Iron	0.13	NA	NA
Cobalt	**0.00076**	0.00027	NA
Nickel	0.00031	0.0094	NA
Copper	0.0017	NA	NA
Zinc	0.0025	NA	NA
Arsenic	0.000050	0.00057	NA
Selenium	0.00012	21	NA
Bromine	0.00086	NA	NA
Rubidium	0.00017	NA	NA
Strontium	0.00081	NA	NA
Yttrium	0.000070	NA	NA
Molybdenum	< 0.000060	NA	NA
Tin	0.00052	NA	NA
Antimony	0.00069	NA	NA
Barium	0.0046	0.52	NA
Mercury	0.000050	0.31	0.019
Lead	0.00041	NA	NA
Total Atmospheric Mercury	0.0050	0.31	0.019

Notes:

(1) "NA" indicates that a screening level for this chemical is not available.

(2) Residential air screening level from the USEPA's Regional Screening Level (RSL) Summary Table June 2011.

(3) Residential indoor air screening levels developed by the SFBRWQCB as part of the November 2008 Enviornmental Screening Levels (ESL) Tables.

(4) Concentrations measured between September 2010 and June 2011 at the BAAQMD air monitoring station in Cupertino (BAAQMD, 2011).

(5) Concentrations in exceedance of conservative screening levels are bolded and highlighted gray.

Appendix A

Surface Water and Sediment Sampling in Permanente Creek (Iris Environmental, 2011b)

IRIS ENVIRONMENTAL

Via Email

November 18, 2011

Ms. Debbie Pedro
Planning Director
Town of Los Altos Hills
26379 Fremont Road
Los Altos Hills, CA 94022

Re: Surface Water and Sediment Sampling in Permanente Creek
Permanente Creek, Rancho San Antonio County Park, California

Dear Debbie:

At your request, Iris Environmental collected one surface water and one sediment sample in Permanente Creek. The purpose of this evaluation is to provide a screening evaluation of the potential characteristics of discharges from the Lehigh Southwest Cement Permanente Plant (the Facility) to Permanente Creek. This sampling effort and the results are briefly summarized in this letter.

Sampling Efforts

Iris Environmental conducted sampling efforts on October 28, 2011 in Permanente Creek at a location in Permanente Creek within Rancho San Antonio County Park identified by the Town of Los Altos Hills and shown on the attached map. As you requested, the samples were delivered to Test America Laboratories and analyzed for Title 22 Metals (CAM 17) plus mercury and hexavalent chromium. Soil results were reported on a dry-weight basis to be consistent with agency-published soil screening levels. Analytical results are summarized in Table 1.

Sampling Results

Table 1 presents a summary of the analytical results. Chemicals shown in bold were detected. Of the 18 chemicals analyzed for, three chemicals were detected in surface water sampling: barium, molybdenum, and vanadium. Additionally, eleven chemicals were detected in sediment sampling: arsenic, barium, hexavalent chromium, total chromium, cobalt, copper, lead, mercury, nickel, vanadium, and zinc.

Detections of chemicals in surface water and soil are compared to potentially applicable Environmental Screening Levels (ESLs) published by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), see Table 1. Detections in exceedance of ESLs are bolded and highlighted gray in Table 1. One chemical was detected above ESLs in surface water sampling: molybdenum. Two chemicals were detected above ESLs in sediment sampling: arsenic and vanadium.

Observations

The detection of arsenic in sediment sampling is two orders of magnitude above the ESLs. The detection of a high level of arsenic in sediment suggests discharges from the Facility may be a source of arsenic in Permanente Creek. However, background concentrations of arsenic are commonly found in soils throughout California. A background study would be required to determine if arsenic concentrations in sediment are elevated above regional background levels. A background study is not within the scope of this sampling effort.

The detection of hexavalent chromium in sediment sampling is somewhat unusual and potentially suggests a source of hexavalent chromium from the Facility. Indeed, emissions of hexavalent chromium to air is a significant pathway in the HRA conducted for the Facility. However, portions of California have been shown to exhibit background concentrations of hexavalent chromium. A background study and/or a detailed source/receptor study would be required to determine if the detection of hexavalent chromium is related to the Facility. These studies are not within the scope of this sampling effort.

Of the chemicals which were including in the sampling, barium, cobalt, and molybdenum are not included in the recent Health Risk Assessment (HRA) (Amec, 2011) nor are these chemicals analytes in the monitoring of discharge waters required as part of the Notice of Violation (NOV) issued by the SFBRWQCB on June 14, 2011. Therefore, these chemicals are potentially not of concern in evaluating discharges from the Facility.

Limitations

Iris Environmental has not reviewed the nature and extent of this sampling to determine if it is adequate to draw robust risk-based conclusions about the characteristics of the discharges to Permanente Creek. This would likely require additional samples and multiple rounds of sampling. Moreover, nondetects do not necessarily provide a definitive conclusion that there are no discharges of this chemical to Permanente Creek. Finally no background analysis was conducted. In sum, we collected samples at a location provided by you and are reporting the results; the ability to draw strong conclusions regarding the meaning of the results may be limited.

Please don’t hesitate to call us at (510) 834-4747 if you have any questions regarding this summary.

Sincerely,

IRIS ENVIRONMENTAL

Robert Balas
Principal

John McLaughlin
Senior Scientist

Attachments: Table 1. Summary of Surface Water and Sediment Sampling in Permanente Creek

Map of Sampling Location in Rancho San Antonio County Park

Test America Analytical Report, Job Number 720-38386-1

Table 1. Summary of Surface Water and Sediment Sampling in Permanente Creek

Chemical of Potential Concern	Water Sampling Evaluation			Sediment Sampling Evaluation		
	Analytical Result (mg/L)	Water ESL[1] (mg/L)	Water ESL[2] (mg/L)	Analytical Result (mg/kg)	Soil ESL[3] (mg/kg)	Soil ESL[4] (mg/kg)
Antimony	< 0.01	6.0E-03	6.0E-03	< 2.4	6.3E+00	6.3E+00
Arsenic	< 0.01	1.4E-04	5.0E-02	**49**	3.9E-01	3.9E-01
Barium	**0.07**	1.0E+00	1.0E+00	**140**	7.5E+02	3.0E+03
Beryllium	< 0.002	2.7E-03	4.0E-03	< 0.49	4.0E+00	3.1E+01
Cadmium	< 0.0025	2.5E-04	5.0E-03	< 0.61	1.7E+00	1.7E+00
Chromium, hexavalent	< 0.01	1.1E-02	2.1E-02	**2.7**	8.0E+00	9.4E+00
Chromium, total	< 0.01	5.0E-02	5.0E-02	**42**	NA	NA
Cobalt	< 0.002	3.0E-03	1.4E-01	**5.9**	4.0E+01	2.8E+02
Copper	< 0.02	9.0E-03	1.3E+00	**220**	2.3E+02	6.3E+03
Lead	< 0.005	2.5E-03	1.5E-02	**3.8**	2.0E+02	2.6E+02
Mercury	< 0.0002	2.5E-05	2.0E-03	**0.032**	1.3E+00	1.3E+00
Molybdenum	**0.14**	3.5E-02	3.5E-02	< 2.4	4.0E+01	7.8E+01
Nickel	< 0.01	5.2E-02	1.0E-01	**48**	1.5E+02	3.0E+02
Selenium	< 0.02	5.0E-03	5.0E-02	< 4.9	1.0E+01	7.8E+01
Silver	< 0.005	3.4E-04	3.5E-02	< 1.2	2.0E+01	7.8E+01
Thallium	< 0.01	2.0E-03	2.0E-03	< 2.4	1.3E+00	1.3E+00
Vanadium	**0.015**	1.5E-02	1.5E-02	**32**	1.6E+01	1.6E+01
Zinc	< 0.02	1.2E-01	5.0E+00	**28**	6.0E+02	4.7E+03

Notes:

(1) SFBRWQCB Environmental Screening Levels (ESLs), Surface Water Bodies, Surface Water

(2) SFBRWQCB Summary of Drinking Water Screening Levels

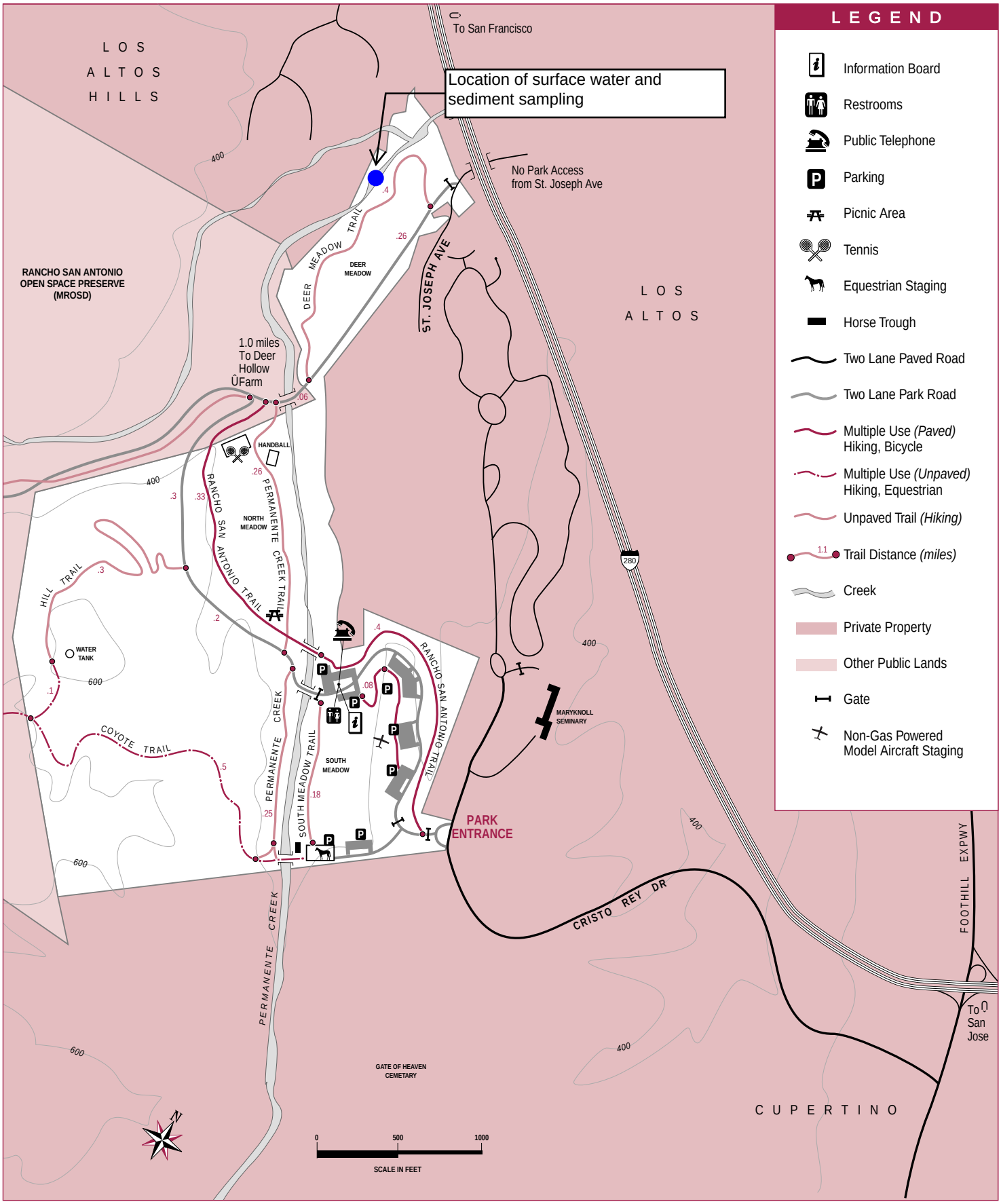
(3) SFBRWQCB Environmental Screening Levels (ESLs), Shallow Soils (<3m bgs), Groundwater is Current or Potential Source of Drinking Water, Residential Landuse

(4) SFBRWQCB direct Exposure Soil Screening Levels, Residential Exposure Scenario

(5) "NA" indicates there is no available screening level.

(6) Detections of chemicals are shown in **bold**. Detections of chemicals which are above screening levels are highlighted gray.

Rancho San Antonio County Park



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica San Francisco
1220 Quarry Lane
Pleasanton, CA 94566
Tel: (925)484-1919

TestAmerica Job ID: 720-38386-1
Client Project/Site: Los Altos Hills Planning

For:
Iris Environmental
1438 Webster Street
Suite 302
Oakland, California 94612

Attn: John McLaughlin

Authorized for release by:
11/4/2011 2:59:50 PM

Dimple Sharma
Project Manager I
dimple.sharma@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Job ID: 720-38386-1

Laboratory: TestAmerica San Francisco

Narrative

Job Narrative
720-38386-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

Metals
No analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Detection Summary

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Client Sample ID: 0221401T — Lab Sample ID: 720-38386-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	49		4.9		mg/Kg	4	☼	6010B	Total/NA
Barium	140		2.4		mg/Kg	4	☼	6010B	Total/NA
Chromium	42		2.4		mg/Kg	4	☼	6010B	Total/NA
Cobalt	5.9		0.97		mg/Kg	4	☼	6010B	Total/NA
Copper	220		7.3		mg/Kg	4	☼	6010B	Total/NA
Lead	3.8		2.4		mg/Kg	4	☼	6010B	Total/NA
Nickel	48		2.4		mg/Kg	4	☼	6010B	Total/NA
Vanadium	32		2.4		mg/Kg	4	☼	6010B	Total/NA
Zinc	28		7.3		mg/Kg	4	☼	6010B	Total/NA
Mercury	0.032		0.012		mg/Kg	1	☼	7471A	Total/NA
Chromium, hexavalent	2.7		1.2		mg/Kg	1	☼	7196A	Total/NA

Client Sample ID: 0221401T — Lab Sample ID: 720-38386-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.070		0.0050		mg/L	1		6010B	Total/NA
Molybdenum	0.14		0.010		mg/L	1		6010B	Total/NA
Vanadium	0.015		0.010		mg/L	1		6010B	Total/NA

Client Sample Results

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Client Sample ID: 0221401T

Date Collected: 10/28/11 12:45
Date Received: 10/28/11 18:00

Lab Sample ID: 720-38386-1

Matrix: Solid
Percent Solids: 75.3

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		2.4		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Arsenic	**49**		4.9		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Barium	**140**		2.4		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Beryllium	ND		0.49		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Cadmium	ND		0.61		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Chromium	**42**		2.4		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Cobalt	**5.9**		0.97		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Copper	**220**		7.3		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Lead	**3.8**		2.4		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Molybdenum	ND		2.4		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Nickel	**48**		2.4		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Selenium	ND		4.9		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Silver	ND		1.2		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Thallium	ND		2.4		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Vanadium	**32**		2.4		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4
Zinc	**28**		7.3		mg/Kg	☼	11/02/11 08:49	11/02/11 15:10	4

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.032**		0.012		mg/Kg	☼	11/01/11 13:35	11/02/11 14:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hexavalent	**2.7**		1.2		mg/Kg	☼	11/02/11 18:15	11/03/11 11:42	1
Percent Moisture	**25**		0.10		%			11/02/11 11:05	1

Client Sample Results

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Client Sample ID: 0221401T

Date Collected: 10/28/11 12:45
Date Received: 10/28/11 18:00

Lab Sample ID: 720-38386-2

Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.010		mg/L		11/01/11 08:08	11/01/11 19:07	1
Arsenic	ND		0.010		mg/L		11/01/11 08:08	11/01/11 19:07	1
Barium	**0.070**		0.0050		mg/L		11/01/11 08:08	11/01/11 19:07	1
Beryllium	ND		0.0020		mg/L		11/01/11 08:08	11/01/11 19:07	1
Cadmium	ND		0.0025		mg/L		11/01/11 08:08	11/01/11 19:07	1
Chromium	ND		0.010		mg/L		11/01/11 08:08	11/01/11 19:07	1
Cobalt	ND		0.0020		mg/L		11/01/11 08:08	11/01/11 19:07	1
Copper	ND		0.020		mg/L		11/01/11 08:08	11/01/11 19:07	1
Lead	ND		0.0050		mg/L		11/01/11 08:08	11/01/11 19:07	1
Molybdenum	**0.14**		0.010		mg/L		11/01/11 08:08	11/01/11 19:07	1
Nickel	ND		0.010		mg/L		11/01/11 08:08	11/01/11 19:07	1
Selenium	ND		0.020		mg/L		11/01/11 08:08	11/01/11 19:07	1
Silver	ND		0.0050		mg/L		11/01/11 08:08	11/01/11 19:07	1
Thallium	ND		0.010		mg/L		11/01/11 08:08	11/01/11 19:07	1
Vanadium	**0.015**		0.010		mg/L		11/01/11 08:08	11/01/11 19:07	1
Zinc	ND		0.020		mg/L		11/01/11 08:08	11/01/11 19:07	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020		mg/L		11/02/11 11:25	11/02/11 16:18	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	ND		0.010		mg/L			10/28/11 22:21	1

QC Sample Results

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 720-102037/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 102094 — **Prep Batch: 102037**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.010		mg/L		11/01/11 08:08	11/01/11 18:09	1
Arsenic	ND		0.010		mg/L		11/01/11 08:08	11/01/11 18:09	1
Barium	ND		0.0050		mg/L		11/01/11 08:08	11/01/11 18:09	1
Beryllium	ND		0.0020		mg/L		11/01/11 08:08	11/01/11 18:09	1
Cadmium	ND		0.0025		mg/L		11/01/11 08:08	11/01/11 18:09	1
Chromium	ND		0.010		mg/L		11/01/11 08:08	11/01/11 18:09	1
Cobalt	ND		0.0020		mg/L		11/01/11 08:08	11/01/11 18:09	1
Copper	ND		0.020		mg/L		11/01/11 08:08	11/01/11 18:09	1
Lead	ND		0.0050		mg/L		11/01/11 08:08	11/01/11 18:09	1
Molybdenum	ND		0.010		mg/L		11/01/11 08:08	11/01/11 18:09	1
Nickel	ND		0.010		mg/L		11/01/11 08:08	11/01/11 18:09	1
Selenium	ND		0.020		mg/L		11/01/11 08:08	11/01/11 18:09	1
Silver	ND		0.0050		mg/L		11/01/11 08:08	11/01/11 18:09	1
Thallium	ND		0.010		mg/L		11/01/11 08:08	11/01/11 18:09	1
Vanadium	ND		0.010		mg/L		11/01/11 08:08	11/01/11 18:09	1
Zinc	ND		0.020		mg/L		11/01/11 08:08	11/01/11 18:09	1

Lab Sample ID: LCS 720-102037/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 102094 — **Prep Batch: 102037**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	1.00	1.01		mg/L		101	80 - 120
Arsenic	1.00	0.982		mg/L		98	80 - 120
Barium	1.00	1.02		mg/L		102	80 - 120
Beryllium	1.00	1.01		mg/L		101	80 - 120
Cadmium	1.00	0.964		mg/L		96	80 - 120
Chromium	1.00	0.999		mg/L		100	80 - 120
Cobalt	1.00	1.03		mg/L		103	80 - 120
Copper	1.00	0.992		mg/L		99	80 - 120
Lead	1.00	1.01		mg/L		101	80 - 120
Molybdenum	1.00	1.03		mg/L		103	80 - 120
Nickel	1.00	0.993		mg/L		99	80 - 120
Selenium	1.00	0.950		mg/L		95	80 - 120
Silver	0.500	0.504		mg/L		101	80 - 120
Thallium	1.00	1.01		mg/L		101	80 - 120
Vanadium	1.00	1.02		mg/L		102	80 - 120
Zinc	1.00	1.01		mg/L		101	80 - 120

Lab Sample ID: LCSD 720-102037/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 102094 — **Prep Batch: 102037**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony	1.00	0.988		mg/L		99	80 - 120	2	20
Arsenic	1.00	0.962		mg/L		96	80 - 120	2	20
Barium	1.00	1.00		mg/L		100	80 - 120	2	20
Beryllium	1.00	0.980		mg/L		98	80 - 120	3	20
Cadmium	1.00	0.937		mg/L		94	80 - 120	3	20
Chromium	1.00	0.960		mg/L		96	80 - 120	4	20

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCSD 720-102037/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 102094 — **Prep Batch: 102037**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cobalt	1.00	1.01		mg/L		101	80 - 120	2	20
Copper	1.00	0.967		mg/L		97	80 - 120	3	20
Lead	1.00	0.992		mg/L		99	80 - 120	2	20
Molybdenum	1.00	1.02		mg/L		102	80 - 120	2	20
Nickel	1.00	0.973		mg/L		97	80 - 120	2	20
Selenium	1.00	0.927		mg/L		93	80 - 120	2	20
Silver	0.500	0.497		mg/L		99	80 - 120	1	20
Thallium	1.00	0.990		mg/L		99	80 - 120	2	20
Vanadium	1.00	0.987		mg/L		99	80 - 120	3	20
Zinc	1.00	0.985		mg/L		98	80 - 120	2	20

Lab Sample ID: 720-38386-2 MS — **Client Sample ID: 0221401T**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102102 — **Prep Batch: 102037**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	ND		1.00	1.02		mg/L		102	75 - 125
Arsenic	ND		1.00	1.02		mg/L		102	75 - 125
Barium	0.070		1.00	1.08		mg/L		101	75 - 125
Beryllium	ND		1.00	0.978		mg/L		98	75 - 125
Cadmium	ND		1.00	0.943		mg/L		94	75 - 125
Chromium	ND		1.00	0.966		mg/L		96	75 - 125
Cobalt	ND		1.00	0.977		mg/L		98	75 - 125
Copper	ND		1.00	0.958		mg/L		96	75 - 125
Lead	ND		1.00	0.960		mg/L		96	75 - 125
Molybdenum	0.14		1.00	1.16		mg/L		103	75 - 125
Nickel	ND		1.00	0.948		mg/L		94	75 - 125
Selenium	ND		1.00	0.967		mg/L		96	75 - 125
Silver	ND		0.500	0.500		mg/L		100	75 - 125
Thallium	ND		1.00	0.938		mg/L		94	75 - 125
Vanadium	0.015		1.00	1.04		mg/L		102	75 - 125
Zinc	ND		1.00	0.984		mg/L		98	75 - 125

Lab Sample ID: 720-38386-2 MSD — **Client Sample ID: 0221401T**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102102 — **Prep Batch: 102037**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony	ND		1.00	0.999		mg/L		100	75 - 125	2	20
Arsenic	ND		1.00	0.990		mg/L		99	75 - 125	3	20
Barium	0.070		1.00	1.06		mg/L		99	75 - 125	2	20
Beryllium	ND		1.00	0.948		mg/L		95	75 - 125	3	20
Cadmium	ND		1.00	0.917		mg/L		92	75 - 125	3	20
Chromium	ND		1.00	0.933		mg/L		93	75 - 125	3	20
Cobalt	ND		1.00	0.957		mg/L		96	75 - 125	2	20
Copper	ND		1.00	0.932		mg/L		93	75 - 125	3	20
Lead	ND		1.00	0.937		mg/L		94	75 - 125	2	20
Molybdenum	0.14		1.00	1.14		mg/L		101	75 - 125	2	20
Nickel	ND		1.00	0.924		mg/L		92	75 - 125	3	20
Selenium	ND		1.00	0.939		mg/L		93	75 - 125	3	20

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: 720-38386-2 MSD — **Client Sample ID: 0221401T**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102102 — **Prep Batch: 102037**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Silver	ND		0.500	0.491		mg/L		98	75 - 125	2	20
Thallium	ND		1.00	0.917		mg/L		92	75 - 125	2	20
Vanadium	0.015		1.00	1.01		mg/L		99	75 - 125	3	20
Zinc	ND		1.00	0.961		mg/L		96	75 - 125	2	20

Lab Sample ID: MB 720-102124/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102162 — **Prep Batch: 102124**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.50		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Arsenic	ND		1.0		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Barium	ND		0.50		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Beryllium	ND		0.10		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Cadmium	ND		0.13		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Chromium	ND		0.50		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Cobalt	ND		0.20		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Copper	ND		1.5		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Lead	ND		0.50		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Molybdenum	ND		0.50		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Nickel	ND		0.50		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Selenium	ND		1.0		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Silver	ND		0.25		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Thallium	ND		0.50		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Vanadium	ND		0.50		mg/Kg		11/02/11 08:49	11/02/11 13:56	1
Zinc	ND		1.5		mg/Kg		11/02/11 08:49	11/02/11 13:56	1

Lab Sample ID: LCS 720-102124/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102162 — **Prep Batch: 102124**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	50.0	46.6		mg/Kg		93	80 - 120
Arsenic	50.0	48.2		mg/Kg		96	80 - 120
Barium	50.0	49.4		mg/Kg		99	80 - 120
Beryllium	50.0	49.8		mg/Kg		100	80 - 120
Cadmium	50.0	48.7		mg/Kg		97	80 - 120
Chromium	50.0	49.5		mg/Kg		99	80 - 120
Cobalt	50.0	50.2		mg/Kg		100	80 - 120
Copper	50.0	49.7		mg/Kg		99	80 - 120
Lead	50.0	49.7		mg/Kg		99	80 - 120
Molybdenum	50.0	51.4		mg/Kg		103	80 - 120
Nickel	50.0	49.9		mg/Kg		100	80 - 120
Selenium	50.0	46.5		mg/Kg		93	80 - 120
Silver	25.0	23.9		mg/Kg		96	80 - 120
Thallium	50.0	49.8		mg/Kg		100	80 - 120
Vanadium	50.0	49.3		mg/Kg		99	80 - 120
Zinc	50.0	48.6		mg/Kg		97	80 - 120

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCSD 720-102124/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102162 — **Prep Batch: 102124**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony	50.0	46.7		mg/Kg		93	80 - 120	0	20
Arsenic	50.0	48.0		mg/Kg		96	80 - 120	0	20
Barium	50.0	49.8		mg/Kg		100	80 - 120	1	20
Beryllium	50.0	49.7		mg/Kg		99	80 - 120	0	20
Cadmium	50.0	48.4		mg/Kg		97	80 - 120	1	20
Chromium	50.0	49.2		mg/Kg		98	80 - 120	1	20
Cobalt	50.0	49.9		mg/Kg		100	80 - 120	1	20
Copper	50.0	49.5		mg/Kg		99	80 - 120	0	20
Lead	50.0	49.6		mg/Kg		99	80 - 120	0	20
Molybdenum	50.0	51.6		mg/Kg		103	80 - 120	0	20
Nickel	50.0	49.5		mg/Kg		99	80 - 120	1	20
Selenium	50.0	46.6		mg/Kg		93	80 - 120	0	20
Silver	25.0	23.8		mg/Kg		95	80 - 120	1	20
Thallium	50.0	49.4		mg/Kg		99	80 - 120	1	20
Vanadium	50.0	49.2		mg/Kg		98	80 - 120	0	20
Zinc	50.0	48.4		mg/Kg		97	80 - 120	0	20

Lab Sample ID: LCSSRM 720-102124/17-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102162 — **Prep Batch: 102124**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	105	72.0		mg/Kg		69	11 - 101
Arsenic	79.4	73.4		mg/Kg		92	69 - 119
Barium	391	374		mg/Kg		96	61 - 117
Beryllium	304	299		mg/Kg		98	56 - 102
Cadmium	48.3	40.9		mg/Kg		85	67 - 118
Chromium	171	155		mg/Kg		91	67 - 121
Cobalt	59.2	53.4		mg/Kg		90	64 - 133
Copper	327	289		mg/Kg		88	68 - 126
Lead	181	155		mg/Kg		86	62 - 113
Molybdenum	156	149		mg/Kg		95	62 - 128
Nickel	76.0	65.5		mg/Kg		86	65 - 117
Selenium	76.9	66.3		mg/Kg		86	63 - 126
Silver	29.1	25.9		mg/Kg		89	51 - 130
Thallium	192	160		mg/Kg		83	64 - 124
Vanadium	213	201		mg/Kg		95	67 - 123
Zinc	256	233		mg/Kg		91	62 - 110

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 720-102138/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 102179 — **Prep Batch: 102138**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020		mg/L		11/02/11 11:25	11/02/11 16:03	1

Method: 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: LCS 720-102138/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 102179 — **Prep Batch: 102138**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.0100	0.0100		mg/L		100	85 - 115

Lab Sample ID: LCSD 720-102138/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 102179 — **Prep Batch: 102138**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.0100	0.0100		mg/L		100	85 - 115	0	20

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 720-102065/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102166 — **Prep Batch: 102065**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.010		mg/Kg		11/01/11 13:35	11/02/11 14:27	1

Lab Sample ID: LCS 720-102065/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102166 — **Prep Batch: 102065**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.833	0.740		mg/Kg		89	80 - 120

Lab Sample ID: LCSD 720-102065/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102166 — **Prep Batch: 102065**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.833	0.728		mg/Kg		87	80 - 120	2	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 720-101921/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 101921

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	ND		0.010		mg/L			10/28/11 22:21	1

Lab Sample ID: LCS 720-101921/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 101921

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.250	0.268		mg/L		107	85 - 115

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: LCSD 720-101921/4 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 101921

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cr (VI)			0.250	0.253		mg/L		101	85 - 115	6	20

Lab Sample ID: 720-38386-2 MS — **Client Sample ID: 0221401T**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 101921

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Cr (VI)	ND		0.250	0.253		mg/L		101	85 - 115		

Lab Sample ID: 720-38386-2 MSD — **Client Sample ID: 0221401T**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 101921

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cr (VI)	ND		0.250	0.249		mg/L		99	85 - 115	2	20

Lab Sample ID: MB 500-131252/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 131397 — **Prep Batch: 131252**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hexavalent	ND		1.0		mg/Kg		11/02/11 18:15	11/03/11 11:41	1

Lab Sample ID: LCS 500-131252/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 131397 — **Prep Batch: 131252**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hexavalent			10.0	8.78		mg/Kg		88	80 - 120		

Lab Sample ID: LCS 500-131252/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 131397 — **Prep Batch: 131252**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hexavalent			734	710		mg/Kg		97	80 - 120		

Method: Moisture - Percent Moisture

Lab Sample ID: 720-38386-1 DU — **Client Sample ID: 0221401T**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 102135

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	25			25		%				0.8	20

QC Association Summary

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Metals

Prep Batch: 102037

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-2	0221401T	Total/NA	Water	3010A	
720-38386-2 MS	0221401T	Total/NA	Solid	3010A	
720-38386-2 MSD	0221401T	Total/NA	Solid	3010A	
LCS 720-102037/2-A	Lab Control Sample	Total/NA	Water	3010A	
LCSD 720-102037/3-A	Lab Control Sample Dup	Total/NA	Water	3010A	
MB 720-102037/1-A	Method Blank	Total/NA	Water	3010A	

Prep Batch: 102065

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-1	0221401T	Total/NA	Solid	7471A	
LCS 720-102065/2-A	Lab Control Sample	Total/NA	Solid	7471A	
LCSD 720-102065/3-A	Lab Control Sample Dup	Total/NA	Solid	7471A	
MB 720-102065/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 102094

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 720-102037/2-A	Lab Control Sample	Total/NA	Water	6010B	102037
LCSD 720-102037/3-A	Lab Control Sample Dup	Total/NA	Water	6010B	102037
MB 720-102037/1-A	Method Blank	Total/NA	Water	6010B	102037

Analysis Batch: 102102

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-2	0221401T	Total/NA	Water	6010B	102037
720-38386-2 MS	0221401T	Total/NA	Solid	6010B	102037
720-38386-2 MSD	0221401T	Total/NA	Solid	6010B	102037

Prep Batch: 102124

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-1	0221401T	Total/NA	Solid	3050B	
LCS 720-102124/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 720-102124/3-A	Lab Control Sample Dup	Total/NA	Solid	3050B	
LCSSRM 720-102124/17-A	Lab Control Sample	Total/NA	Solid	3050B	
MB 720-102124/1-A	Method Blank	Total/NA	Solid	3050B	

Prep Batch: 102138

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-2	0221401T	Total/NA	Water	7470A	
LCS 720-102138/2-A	Lab Control Sample	Total/NA	Water	7470A	
LCSD 720-102138/3-A	Lab Control Sample Dup	Total/NA	Water	7470A	
MB 720-102138/1-A	Method Blank	Total/NA	Water	7470A	

Analysis Batch: 102162

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-1	0221401T	Total/NA	Solid	6010B	102124
LCS 720-102124/2-A	Lab Control Sample	Total/NA	Solid	6010B	102124
LCSD 720-102124/3-A	Lab Control Sample Dup	Total/NA	Solid	6010B	102124
LCSSRM 720-102124/17-A	Lab Control Sample	Total/NA	Solid	6010B	102124
MB 720-102124/1-A	Method Blank	Total/NA	Solid	6010B	102124

Analysis Batch: 102166

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-1	0221401T	Total/NA	Solid	7471A	102065

Metals (Continued)

Analysis Batch: 102166 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 720-102065/2-A	Lab Control Sample	Total/NA	Solid	7471A	102065
LCSD 720-102065/3-A	Lab Control Sample Dup	Total/NA	Solid	7471A	102065
MB 720-102065/1-A	Method Blank	Total/NA	Solid	7471A	102065

Analysis Batch: 102179

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-2	0221401T	Total/NA	Water	7470A	102138
LCS 720-102138/2-A	Lab Control Sample	Total/NA	Water	7470A	102138
LCSD 720-102138/3-A	Lab Control Sample Dup	Total/NA	Water	7470A	102138
MB 720-102138/1-A	Method Blank	Total/NA	Water	7470A	102138

General Chemistry

Analysis Batch: 101921

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-2	0221401T	Total/NA	Water	7196A	
720-38386-2 MS	0221401T	Total/NA	Solid	7196A	
720-38386-2 MSD	0221401T	Total/NA	Solid	7196A	
LCS 720-101921/3	Lab Control Sample	Total/NA	Water	7196A	
LCSD 720-101921/4	Lab Control Sample Dup	Total/NA	Water	7196A	
MB 720-101921/1	Method Blank	Total/NA	Water	7196A	

Analysis Batch: 102135

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-1	0221401T	Total/NA	Solid	Moisture	
720-38386-1 DU	0221401T	Total/NA	Solid	Moisture	

Prep Batch: 131252

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-1	0221401T	Total/NA	Solid	3060A	
LCS 500-131252/2-A	Lab Control Sample	Total/NA	Solid	3060A	
LCS 500-131252/3-A	Lab Control Sample	Total/NA	Solid	3060A	
MB 500-131252/1-A	Method Blank	Total/NA	Solid	3060A	

Analysis Batch: 131397

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
720-38386-1	0221401T	Total/NA	Solid	7196A	131252
LCS 500-131252/2-A	Lab Control Sample	Total/NA	Solid	7196A	131252
LCS 500-131252/3-A	Lab Control Sample	Total/NA	Solid	7196A	131252
MB 500-131252/1-A	Method Blank	Total/NA	Solid	7196A	131252

Lab Chronicle

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Client Sample ID: 0221401T — Lab Sample ID: 720-38386-1

Date Collected: 10/28/11 12:45 — **Matrix: Solid**
Date Received: 10/28/11 18:00 — **Percent Solids: 75.3**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			102124	11/02/11 08:49	ET	TAL SF
Total/NA	Analysis	6010B		4	102162	11/02/11 15:10	CAM	TAL SF
Total/NA	Prep	7471A			102065	11/01/11 13:35	ET	TAL SF
Total/NA	Analysis	7471A		1	102166	11/02/11 14:35	EFH	TAL SF
Total/NA	Prep	3060A			131252	11/02/11 18:15	CLM	TAL CHI
Total/NA	Analysis	7196A		1	131397		CLM	TAL CHI
						(Start) 11/03/11 11:42		
						(End) 11/03/11 11:43		
Total/NA	Analysis	Moisture		1	102135	11/02/11 11:05	DAF	TAL SF

Client Sample ID: 0221401T — Lab Sample ID: 720-38386-2

Date Collected: 10/28/11 12:45 — **Matrix: Water**
Date Received: 10/28/11 18:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			102037	11/01/11 08:08	ET	TAL SF
Total/NA	Analysis	6010B		1	102102	11/01/11 19:07	BA	TAL SF
Total/NA	Prep	7470A			102138	11/02/11 11:25	ET	TAL SF
Total/NA	Analysis	7470A		1	102179	11/02/11 16:18	EFH	TAL SF
Total/NA	Analysis	7196A		1	101921	10/28/11 22:21	EYT	TAL SF

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL SF = TestAmerica San Francisco, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Certification Summary

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica San Francisco	California	State Program	9	2496
TestAmerica Chicago	ACLASS	DoD ELAP		ADE-1429
TestAmerica Chicago	ACLASS	ISO/IEC 17025		AT-1428
TestAmerica Chicago	Alabama	State Program	4	40461
TestAmerica Chicago	California	NELAC	9	01132CA
TestAmerica Chicago	Florida	NELAC	4	E871072
TestAmerica Chicago	Georgia	Georgia EPD	4	N/A
TestAmerica Chicago	Georgia	State Program	4	939
TestAmerica Chicago	Hawaii	State Program	9	N/A
TestAmerica Chicago	Illinois	NELAC	5	100201
TestAmerica Chicago	Indiana	State Program	5	C-IL-02
TestAmerica Chicago	Iowa	State Program	7	82
TestAmerica Chicago	Kansas	NELAC	7	E-10161
TestAmerica Chicago	Kentucky	Kentucky UST	4	66
TestAmerica Chicago	Kentucky	State Program	4	90023
TestAmerica Chicago	Louisiana	NELAC	6	30720
TestAmerica Chicago	Massachusetts	State Program	1	M-IL035
TestAmerica Chicago	Mississippi	State Program	4	N/A
TestAmerica Chicago	North Carolina	North Carolina DENR	4	291
TestAmerica Chicago	Oklahoma	State Program	6	8908
TestAmerica Chicago	South Carolina	State Program	4	77001
TestAmerica Chicago	Texas	NELAC	6	T104704252-09-TX
TestAmerica Chicago	USDA	USDA		P330-09-00027
TestAmerica Chicago	Virginia	NELAC Secondary AB	3	460142
TestAmerica Chicago	Wisconsin	State Program	5	999580010
TestAmerica Chicago	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

Method Summary

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL SF
7470A	Mercury (CVAA)	SW846	TAL SF
7471A	Mercury (CVAA)	SW846	TAL SF
7196A	Chromium, Hexavalent	SW846	TAL CHI
7196A	Chromium, Hexavalent	SW846	TAL SF
Moisture	Percent Moisture	EPA	TAL SF

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL SF = TestAmerica San Francisco, 1220 Quarry Lane, Pleasanton, CA 94566, TEL (925)484-1919

Sample Summary

Client: Iris Environmental
Project/Site: Los Altos Hills Planning

TestAmerica Job ID: 720-38386-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
720-38386-1	0221401T	Solid	10/28/11 12:45	10/28/11 18:00
720-38386-2	0221401T	Water	10/28/11 12:45	10/28/11 18:00

720-38386

134595

IRIS ENVIRONMENTAL **CHAIN-OF-CUSTODY**

1438 Webster Street, Suite 302
Oakland, California 94612
(510) 834-4747 tel
(510) 834-4199 fax

Date: 10/28/2011 Page: 1 of 1 № 3152

Sampler Name(s): Kevin Cook

Signature(s):

	Sample ID	Date	Time	Matrix	Pres.	CAM 17 metals EPA 6010/7470/7471	Hex Chrome EPA 7196	Number of Containers
1	0221401T	10-28-11	12:45	Soil	none	X	X	
2	↓	↓	↓	H_2O	HNO_3	X		
	↓	↓	↓	H_2O	none		X	
3	Trip Blank							

PROJECT INFORMATION

Project Name: Los Altos Hills Planning

Project Number:

Contact Person: Mike Montag

E-mail: mmontag@irisenv.com

Contact Telephone: 510.834.4747 x 37

Report: Routine (Level 2) Level 3 Level 4 EDD

TAT: 10-day 5-day 72-hr 48-hr 24-hr Other:

Special Instructions/Comments:

Please Report soil as dry results

1.4°c

RELINQUISHED BY:	RECEIVED BY:
Printed Name: Kevin Cook	Printed Name: T. Stitt
Signature:	Signature:
Company: Iris Environmental	Company: TASF
Time/Date: 10-28-11 15:00	Time/Date: 1500 10/28/11

RELINQUISHED BY:	RECEIVED BY:
Printed Name: T. Stitt	Printed Name: Mullen
Signature:	Signature:
Company: TASF 1800	Company: Amrin
Time/Date: 10/28/11	Time/Date: 10-28-11 1800

Login Sample Receipt Checklist

Client: Iris Environmental

Job Number: 720-38386-1

Login Number: 38386

List Source: TestAmerica San Francisco

List Number: 1

Creator: Mullen, Joan

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Iris Environmental

Job Number: 720-38386-1

Login Number: 38386
List Number: 1
Creator: Kelsey, Shawn M

List Source: TestAmerica Chicago
List Creation: 11/01/11 11:33 AM

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

Appendix B

General Sand and Gravel Permit Requirements

1.0 SAND AND GRAVEL PERMIT REQUIREMENTS

Iris Environmental reviewed Order NO. R2-2008-0011, General Water Discharge Requirements for Discharges of Process Wastewaters from Aggregate Mining, Sand Washing, and San Offloading Facilities to Surface Waters (General Sand and Gravel Permit) (SFBRWQCB, 2008). As discussed in detail in Section 3.0 of the main report, is presently required to obtain coverage under the Sand and Gravel Permit and may in the future be required to obtain coverage under the an individual National Pollutant Discharge Elimination System (NPDES) permit (individual NPDES permit). This Appendix provides a brief summary of the requirements of the General Sand and Gravel Permit and is not intended to be exhaustive of all permit requirements.

The General Sand and Gravel Permit order was adopted February 13, 2008, and became effective on May 1, 2008, and will expire on April 30, 2013. This permit regulates discharges from aggregate mining, sand washing, and sand offloading facilities. Requirements of the order are also discussed in detail below.

1.1 General Requirements

Industrial stormwater discharges are required to obtain an NPDES permit for discharging stormwater from the facility to state water and to implement Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to control pollutants in industrial stormwater discharges.

A Discharger is required to submit a Best Managements Practices (BMP) plan with the Notice of Intent (NOI) to obtain coverage under this permit up to 30 days prior to its operation or commencement of discharge. This allows the Discharger to develop a BMP plan that is specific to its operation and to better identify which areas of the facility operation need improved BMPs. Dischargers must update the BMP plan annually to control and abate the discharge of pollutants from the facility to surface waters and to achieve compliance with the BAT or BCT requirement and with applicable water standards.

BMP's must address all specific means of controlling the discharge of pollutants from the facility, and shall submit annual updates to its BMP plan to the Regional Water Board (RWB). A schedule must be submitted for any modifications or maintenance of the facility that may result in violation of effluent limitations or alterations of the outfall location(s).

1.2 Effluent Limitations and Discharge Specifications

The Order includes technology-based effluent limitations, which are based on the San Francisco Bay Region Basin Plan, Effluent Limitations Guidelines for the Mineral Mining and Processing Point Source Category, and best professional judgment (BPJ) pursuant to the CWA and NPDES regulations.

Individual pollutant restrictions consist of technology-based effluent restrictions and water quality-based effluent limitations. The technology-based effluent limitations consist of restrictions on total suspended solids (TSS) and settleable matter. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect

beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. The Order lists effluent limitations for aggregate mining facilities for TSS, turbidity, settable matter, pH, total dissolved solids (TDS), chloride, total chlorine residue, and acute toxicity. Representative samples of the discharge at the discharge points must pass a 96-hour bioassay of undiluted effluent in a single-sample maximum with a survival rate of at least 70%. Restrictions on individual pollutants in this Order are no more stringent than required by the federal CWA.

The Order requires that existing quality of waters be maintained unless degradation is justified based on specific findings. Further details regarding this requirement are contained in Appendix F of the Order. The discharge is required to not cause adverse conditions to occur at any place, cause a nuisance or adversely affect the beneficial uses of the receiving water, exceed limits for dissolved oxygen, dissolved sulfide, pH, TDS, chlorides, or turbidity, and cause a violation of any particular water quality standard. All NPDES permits specify requirements for recording and reporting monitoring results. See Attachment E of the Order for further details.

The discharge shall not cause the following conditions to exist at any place in receiving surface water:

- Floating, suspended, or deposited macroscopic particulate matter or foam in concentrations that cause nuisance or adversely affect beneficial uses;
- Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;
- Alterations of temperature, turbidity, or apparent color beyond present natural background levels;
- Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
- Toxic or other deleterious substances to be present in concentrations or quantities that can cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or that can render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

The Order lists triggers for accelerated monitoring and additional investigation for toxic pollutants. They are not effluent limitations and should not be construed as such. Instead, they are levels at which additional investigation is warranted to determine whether a numeric limit for a particular constituent is necessary.

If any constituent in an effluent exceeds the corresponding trigger, the Discharger shall take three monthly samples (three influent, if applicable, and three effluent) for each exceeded constituent following the exceedance. The Discharger must submit a report of the exceedance within 24 hours after awareness of the exceedance. A written notification needs to be submitted within 5 business days following the report; the Discharger shall also indicate the past and on-going efforts in the written notification.

The Discharger shall submit a Feasibility Analysis that describes if methods to control levels of pollutant(s) of concern are feasible, and if so, describes the selected methods of control to ensure that levels of pollutant(s) of concern in effluent will not be discharged at levels exceeding

applicable water quality objectives. If there is no feasible control method, the Discharger's Feasibility Study shall document the possibility of relocating the discharge to land, or to a sanitary sewer system.