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28 February 2014
File No. 39770-007

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Attention: Mr. Max Shahbazian, PG

Subject: Vapor Intrusion Evaluation Report
915 DeGuigne Drive
Sunnyvale, California

Dear Mr. Shahbazian:

Haley & Aldrich, Inc., on behalf of Advanced Micro Devices, Inc. (AMD), has prepared this Vapor Intrusion Evaluation Report for the former AMD facility located at 915 DeGuigne Drive in Sunnyvale, California in response to the 3 January 2014 request issued by the California Regional Water Quality Control Board – San Francisco Bay Region.

Please contact any of the undersigned if you have any questions, or require additional information.

Sincerely yours,
HALEY & ALDRICH, INC.

Peter Scaramella
Senior Risk Assessor

Peter Bennett, PG, CHG
Lead Hydrogeologist and Vice President

Michael Calhoun, PG, CHG
Senior Technical Specialist / Project Manager

Enclosures

cc: United States Environmental Protection Agency; Attn: Melanie Morash
Advanced Micro Devices, Inc.; Attn: Do Cao
Advanced Micro Devices, Inc.; Attn: Brett Stringer

VAPOR INTRUSION EVALUATION REPORT
915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

by

Haley & Aldrich, Inc.
Oakland, California

for

Advanced Micro Devices, Inc.
Sunnyvale, California

File No. 39770-007
28 February 2014

HALEY & ALDRICH

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VAPOR INTRUSION EVALUATION REPORT

915 DeGuigne Drive

Sunnyvale, California

1. INTRODUCTION

On behalf of Advanced Micro Devices, Inc. (AMD), Haley & Aldrich, Inc. (Haley & Aldrich) has prepared this report summarizing the vapor intrusion evaluation performed for the former AMD facilities located at 915 DeGuigne Drive in Sunnyvale, California (the Site; Figure 1). This report is submitted in response to the 3 January 2014 letter from the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board) to AMD requesting additional information to further evaluate the potential for vapor intrusion (Water Board, 2014). The Water Board letter requests AMD to submit a report comparing the methods used and conditions under which a vapor intrusion evaluation was completed previously with those methods and conditions recommended in the following United States Environmental Protection Agency (USEPA) documents:

- 2013 Office of Solid Waste and Emergency Response *External Review Draft – Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from the Subsurface to Indoor Air* (External Review Draft OSWER VI Guidance).
- 3 December 2013, *USEPA Region 9 Guidelines and Supplemental Information Needed for Vapor Intrusion Evaluations at South Bay National Priority List (NPL) Sites* ("Region 9 Guidelines").

During a 17 December 2013 meeting with AMD and Haley & Aldrich, the Water Board and USEPA Region 9 staff expressed appreciation for the vapor intrusion study AMD has already completed at the Site, but indicated that a request for additional information on the vapor intrusion work completed would be forthcoming to ensure consistency with USEPA's draft guidance and guidelines. Although the Water Board is the lead agency for the Site[1], USEPA Region 9 is providing technical assistance to Water Board staff on vapor intrusion issues.

In the following sections, a description of the Site background, an evaluation of the prior vapor intrusion work completed at the Site, an evaluation of vapor intrusion pathway with respect to the USEPA Region 9 Guidelines, and conclusions are presented.

[1] *Site Cleanup Requirements Order Number 91-101* (the Order) was issued in June 1991, by the Water Board. Although the Site is designated as a Superfund Site, U. S. EPA delegated oversight authority to the Water Board on 22 October 1987 under the Multi-Site Cooperative Agreement.

2. SITE BACKGROUND

AMD constructed a semiconductor fabrication and research and development facility at the Site in 1974 and operated it until 2003, when AMD transferred ownership of the property to Spansion LLC, a joint venture of Fujitsu and AMD. In December 2005, Spansion LLC formed Spansion, Inc. (Spansion), a corporation separate from AMD specializing in flash memory devices. On 21 January 2014, Spansion agreed to sell the 24.5 acre 915 DeGuigne Drive property to Watt Investments at Sunnyvale LLC ("Watt"). Spansion likely will vacate the Site within the year.

2.1 Current Site Use

The two large low-rise buildings connected by a hallway with a north-south orientation are shown in Figure 2. The larger of the two buildings, identified as the "main facility" in this report, is currently occupied by Spansion. The former AMD Submicron Development Center (SDC) is the smaller building on the southwest portion of the Site; it is not currently occupied.

The main facility has two floors (111,697 square feet [sf] and 102,640 sf for the first and second floors, respectively) that are occupied by office, laboratory, and mechanical space. In addition, a 44,481 sf partial basement with a concrete floor is present at the main facilty. There is one elevator that accesses the basement. The basement contains office space (13,257 sf) as well as nine basement dewatering sumps.

The SDC is a slab-on-grade building with three floors (67,729 sf, 63,233 sf, and 57,941 sf for the first, second, and third floors, respectively). The SDC building is not currently in use, although previously used equipment is stored in this building (Langan Treadwell & Rollo [T&R], 2012).

2.2 Current Site Conditions

The historical on-Site source for chemicals of concern (COCs) in groundwater beneath the Site has been reported to have been a leak from one of the three tanks comprising the PAD C acid neutralization system (ANS; Woodward-Clyde Consultants, 1983). The major COCs reported in groundwater samples above cleanup goals established in the Order are trichloroethene (TCE) and cis-dichloroethene (cDCE). The distribution of COCs in groundwater at the Site, particularly in shallow (A-zone) groundwater, is described in greater detail in Section 3.1, below. Migration beyond the Site boundary appears to be mitigated by operation of an on-Site extraction well network.

The Site hydrostratigraphy is described by Engineering Science (1988) as an alluvial sequence of thin, channel-like deposits of sand and gravel separated primarily by silty clay. The primary water-bearing units are designated the A, B1, B2, and B3 zones; although the Site hydrology is quite complex, and the depth intervals for each zone are not necessarily consistent among many of the early reports, A-zone wells are generally screened from 10 to 15 feet bgs, B1-zone wells are generally screened from 17.5 to 30 feet bgs, B2-zone wells are generally screened from 45 to 55 feet bgs, and the one B3-zone well is screened from 70 to 90 feet bgs (Engineering Science, 1984). The horizontal hydraulic gradient is generally to the north – northeast, towards the Bay.

2.3 Nearby Sites

Three nearby sites where releases of TCE have impacted groundwater south (upgradient) of the Site are: 1) the former TRW Microwave Site at 825 Stewart Drive; 2) the Philips Semiconductors Site at 811 East Arques; and 3) the former AMD 901/902 Thompson Place Site. The Companies Offsite

Operable Unit" (OOU) extends north of the Philips, TRW and the AMD 901/902 Thompson Place Sites. This area was mapped in the 1980s as a single commingled COC plume composed primarily of dissolved TCE. The area downgradient (north) of the western and central portions of the Site are encompassed by the OOU, which is being addressed in a separate vapor intrusion evaluation performed by Philips.

In addition, groundwater beneath the eastern portion of the Site has also been impacted by releases associated with the Mohawk Laboratories Site and has been impacted by releases associated with the Commercial Street Operating Unit, both of which are located south of the Site (The Source Group, 2008).

2.4 Groundwater Extraction and Treatment

The groundwater extraction and treatment system (GETS) at the Site is comprised of nine extraction wells (EW-1 through EW-9) which pump water from the A-, B1-, and B2-zones to an on-Site treatment system, where COCs are removed from the extracted water by carbon adsorption. Treated groundwater is discharged to the storm sewer; a portion of treated groundwater is re-used by Spansion[2]. Average groundwater extraction flow rates for the extraction well network range from 55 to 65 gallons per minute (gpm) (Haley & Aldrich, 2014).

In addition to the extraction wells, a network of nine basement dewatering sumps exists at the main facility on the Site (BS-1-1, BS-1-2, BS-2-1, BS-2-2, BS-3-1, BS-3-2, BS-4-1, BS-4-2, and BS-6), pumping at a combined rate of approximately 20 gpm. Groundwater samples from these sumps have been reported to contain COCs which are regional groundwater contaminants. For this reason, groundwater extracted by the sumps is treated by the on-Site treatment system prior to discharge or re-use.

[2] One extraction well (EW-3) is not currently operated due to its very low historical yield (0.05 gpm average extraction rate) and low COC concentrations (approximately 2 micrograms per liter [μg/L], Geomatrix, 2006).

3. EVALUATION OF PRIOR VAPOR INTRUSION WORK COMPLETED AT THE SITE

The main facility is the only currently occupied building overlying groundwater impacted with TCE and cDCE, and has been the focus of prior vapor intrusion work at the Site completed by AMD. Additional site characterization related to the vapor intrusion pathway has been completed throughout the Site and adjacent 936 East Duane Avenue and 943 DeGuigne Drive properties (adjacent properties) by others as part of environmental site assessments related to potential redevelopment of the Site and adjacent properties. The vapor intrusion pathway at the Site has been evaluated as part of the following groundwater, soil gas, sub-slab soil gas, and/or indoor air sampling programs:

- Annual groundwater monitoring has been performed at the Site on behalf of AMD since 1982 (Haley & Aldrich, 2014).
- An indoor air sampling program was completed at the main facility on behalf of AMD in August 2011 (AMEC, 2011).
- A Limited Phase II Environmental Site Assessment (Phase II ESA) that included soil gas, groundwater, and soil sampling was completed on behalf of Spansion at the Site and adjacent properties in November and December 2011 by Treadwell & Rollo (T&R). The results of the Limited Phase II ESA were evaluated by T&R in a Human Health Risk Assessment (HHRA). Both the Limited Phase II ESA (T&R, 2012a) and HHRA (T&R, 2012b) are included as Appendix A.
- A subsurface investigation that included soil gas and shallow soil sampling was completed on behalf of the City of Sunnyvale in April 2013 by Ground Zero Analysis, Inc. (Ground Zero). The Subsurface Investigation Report (GroundZero, 2013) is included as Appendix B.
- A Phase II ESA that included soil gas and soil sampling was completed on behalf of Watt Communities in November 2013 (ENGEO, Inc., [ENGEO], 2012). The results of the additional soil and soil gas sampling were not available at the time this report was prepared.

In the following sub-sections, the results of Site investigation and monitoring activities that relate to the evaluation of the vapor intrusion pathway with respect to current Site use are summarized. Analytical results of groundwater, indoor air, soil gas, sub-slab soil gas, and soil samples collected at the Site and adjacent properties are presented in Tables 1 through 5.

3.1 Shallow (A-zone) Groundwater Monitoring

Annual groundwater monitoring at the Site includes measuring water levels and collecting groundwater samples from Site monitoring and extraction wells. The monitoring program includes annual groundwater sampling at 11 shallow (A-zone) monitoring wells; monitoring well locations are shown on Figure 2. These concentrations are compared to groundwater screening level concentrations for assessing vapor intrusion potential.

3.1.1 Groundwater Screening Levels

In Table 1, two different sets of conservative screening level concentrations are compared to Site groundwater concentrations:

- Environmental Screening Levels (ESLs) for the evaluation of potential vapor intrusion published by Water Board (2013). Default groundwater ESLs for typical Bay Area sites (i.e., fine-coarse mix of soils) were selected since the shallow lithology at the Site contains silty clay

(to depths of about 7 to 12 feet bgs) over fine to medium sand (A-zone) (Engineering Science, 1988). ESLs are used to assess the groundwater concentration that would result in an indoor air concentration equal to a cancer risk of one-in-one million or 1×10^{-6} and non-cancer hazard quotient of 1 based on California Environmental Protection Agency toxicity criteria; and

- Vapor Intrusion Screening Levels (VISLs) published by USEPA (2013c). VISLs are developed by applying a non-chemical specific default attenuation factor (0.001) and the dimensionless Henry's Law Constant to target indoor air concentrations (e.g., indoor air Regional Screening Levels [RSLs]) (USEPA, 2013b).

The ESL and VISL screening level groundwater concentrations are different because they are derived from different assumptions used by the Water Board and the USEPA regarding:

- The amount of attenuation (concentration decrease due to dilution) that occurs during the transport of vapors from groundwater to indoor air, and
- For some COCs, there is a difference between the toxicity criteria used to develop the target indoor air concentrations that would represent an acceptable risk level for building occupants (i.e., cancer risk of one-in-one million or 1×10^{-6}; non-cancer hazard quotient of 1).

The VISLs are lower than the ESLs. If groundwater COC concentrations are below their respective ESLs or VISLs, it can be concluded that vapor intrusion from groundwater does not pose an unacceptable risk. Concentrations of COCs above their respective VISLs and ESLs do not necessarily indicate a risk is present, but suggest further evaluation is warranted.

In the recently published Region 9 Guidelines, USEPA applied a 5 μg/L TCE groundwater concentration to define the extent of vapor intrusion evaluation areas (USEPA, 2013d).

3.1.2 COC Concentrations Above ESLs

Table 1 summarizes the analytical results of groundwater samples collected from A-zone monitoring wells since 2010. The highest concentrations of TCE and cDCE reported for A-zone groundwater samples collected during the most recent sampling event, in October and November 2013, were 190 and 170 μg/L, respectively (Table 1). The maximum TCE and cDCE concentrations in 2013 were both reported in the groundwater sample from well 41-S, which is located in the southwest corner of the Site, hydraulically cross-gradient and upgradient of all known Site sources and operations. No COCs were detected in groundwater samples collected since 2010 at concentrations above their respective ESLs.

3.1.3 COC Concentrations Above VISLs

TCE and vinyl chloride (VC) were detected at concentrations above their respective VISLs. TCE was detected in groundwater samples at 7 monitoring wells (2-S, 8-S, 19-S, 31-S, 40-S, 41-S, and 49-S) at concentrations greater than the VISL (7.4 μg/L). VC was detected in groundwater samples at one monitoring well (41-S) at concentrations greater than the VISL (2.5 μg/L).

3.1.4 TCE Concentrations Above 5 μg/L

The distribution of TCE in A-zone groundwater in the vicinity of the Site is provided on Figure 3. TCE was detected at concentrations exceeding 5 μg/L in 7 monitoring wells (2-S, 8-S, 19-S, 31-S, 40-S, 41-S, and 49-S), which are located at the west side of the Site (Figure 3). The eastern portion of the Site

that is not impacted by TCE at concentrations above 5 μg/L is defined by wells 1-S, 11-S, 18-S, NMW-13, MW-09, and EW-3 (which is used as a monitoring well) (Figure 3).

3.1.5 Implications of Groundwater COC Concentrations

The ESLs and VISLs are useful for bracketing the COC concentrations which might provide a vapor intrusion concern. The COC concentrations in groundwater samples were below ESLs at all locations, indicating low potential for vapor intrusion based on these screening levels, however, the VISLs for TCE and VC were exceeded at certain locations, indicating some vapor intrusion potential based on this more conservative screening level. Other lines of evidence, including indoor air and soil gas data (Sections 3.2 and 3.3) indicate that the groundwater concentrations do not pose an unacceptable risk to the current Site use.

3.2 2011 Indoor Air Sampling at the Main Facility

Indoor air sampling was performed on behalf of AMD in August 2011 to evaluate the potential for vapor intrusion at the main facility. Indoor air samples were not collected at the SDC building since this building was not occupied at the time of the indoor air sampling program. The indoor air sampling methodology, meteorological conditions during indoor air sampling, and results of indoor air sampling are described in detail in the Report of Results – Indoor Air Sampling (AMEC, 2011), and are summarized briefly below.

3.2.1 Indoor Air Sampling Methodology

Prior to collecting indoor air samples, a building survey and site walk was conducted with Water Board and USEPA staff to identify appropriate indoor and ambient air sampling locations. In addition, field screening was conducted to evaluate potential preferential vapor intrusion pathways using a ppbRAE, a low-level photoionization detector (PID) with a reporting limit of 1 part per billion.

Spansion was asked to turn off all HVAC units for the indoor air sampling program, in order to provide a worst-case scenario of potential vapor intrusion; however, due to the presence of laboratories and other sensitive-use rooms (e.g., clean rooms), it was not possible for all HVAC units to be turned off. USEPA personnel confirmed during the 2 June 2011 site walk that it would not be necessary to adjust the HVAC settings in laboratory areas that could be negatively impacted by turning off the HVAC unit. The HVAC unit AH-43 was deactivated for approximately 36 hours prior to the collection of indoor air samples; indoor air sample IA-13 was collected in the area serviced by AH-43. The HVAC units were operating with the standard settings at the other sample locations.

Indoor air samples were collected over an approximately 12-hour sampling period on 21 August 2011. The sampling program included 5 ambient air samples, 10 breathing zone, 6 preferential pathway, and 2 duplicate samples. Sample locations are shown on figures from the Report of Results – Indoor Air Sampling (AMEC, 2011), which are included as Appendix C. Breathing zone samples were collected with an intake at approximately 3 to 5 feet above floor level, and preferential pathway samples were placed on the floor adjacent to the potential pathway intended for evaluation. All samples were collected into 6-liter Summa™ canisters fitted with designated, laboratory-supplied, 12-hour flow controllers, all of which were individually certified by the analytical laboratory to be clean and free of contamination.

3.2.2 Meteorological Conditions during Indoor Air Sampling

A meteorological data summary for measurements collected on 21 August 2011 at the nearby Moffett Field Meteorological Station, located in Moffett Field, near Mountain View, California is included at Appendix D. A summary of outside air temperatures during indoor air sampling is presented below:

Description	Temperature (degrees Fahrenheit)	Time
Start of Sampling	60.8	6:43 am, 21 August 2011
End of Sampling	63.0	7:56 pm, 21 August 2011
Minimum	60.1	6:56 am and 7:56 am, 21 August 2011
Maximum	70.0	1:56 pm, 21 August 2013

3.2.3 Results of Indoor Air Sampling

Analytical results for the 21 August 2011 indoor air investigation are presented in Table 2, which also includes applicable screening levels for each COC. Indoor air results are compared to USEPA Regional Screening Levels (RSLs) for indoor air in non-residential buildings (USEPA, 2013b). For COCs with California-modified indoor air screening levels published by DTSC (2013), indoor air results are compared to the more conservative, California-modified indoor air screening levels. The RSLs and California-modified indoor air screening levels are conservative, long-term screening levels that correspond to an acceptable risk level (i.e., cancer risk of one-in-one million or 1×10^{-6}; non-cancer hazard quotient of 1); concentrations of the constituents below their respective RSLs or California-modified indoor air screening levels can be considered to pose no significant risk. Concentrations of constituents above their respective RSLs or California-modified indoor air screening levels do not necessarily indicate a risk is present, but rather suggest that further evaluation is warranted.

With the exception of PCE, all analyzed constituents were detected in at least one indoor air sample at the Site (Table 2); PCE was not detected in any indoor or outdoor air samples. No COCs were detected at concentrations that exceeded their respective RSLs or California-modified screening levels. TCE, cDCE, and Freon 113 also were detected in outdoor ambient air samples. In some cases the concentrations of these COCs were higher in outdoor ambient air samples than in indoor air samples, indicating that external sources of these COCs likely are contributing to the indoor air results. Based on the results of the indoor air sampling program, COCs in groundwater are not impacting indoor air quality at the main facility. In addition, indoor air samples collected near the building's active basement dewatering sumps do not show higher levels of COCs than those collected near other preferential pathways; it does not appear that the basement dewatering sumps are a pathway for vapor intrusion.

3.3 Summary of Site Characterization Activities Performed by Others

A summary of the vapor intrusion evaluation completed at each the main facility and SDC buildings as part of potential Site redevelopment is summarized below.

Main Facility

The vapor intrusion pathway at the main facility has also been evaluated with the collection of soil gas samples. Ten soil gas samples were collected in November 2011 at the perimeter of the main facility as part of the Limited Phase II ESA performed by T&R, consultants to a prospective purchaser at the time. Neither TCE nor any other VOCs were detected at concentrations exceeding the commercial/industrial ESLs. TCE was detected in samples collected at three locations (320 micrograms per cubic meter [$\mu g/m^3$] at TR-01; 1,100 $\mu g/m^3$ at TR-05; and 1,300 $\mu g/m^3$ at TR-14) at concentrations exceeding its VISL (30 $\mu g/m^3$), but below its ESL (3,000 $\mu g/m^3$). In addition, benzene and chloroform also were detected at concentrations exceeding their respective VISL, but below the ESL.

SDC Building

The vapor intrusion pathway at the SDC building was evaluated with the collection of grab groundwater, soil gas, and sub-slab soil gas samples by T&R in November 2011:

- Four grab groundwater samples were collected in November 2011 at the perimeter of the SDC building and analyzed for VOCs and/or total petroleum hydrocarbons (TPH). TCE was detected in groundwater samples collected in grab groundwater locations samples (TR-27, TR-28, and TR-29) at concentrations above 5 $\mu g/L$, but at concentrations below the ESL. VC is the only other COC detected in groundwater samples collected at locations adjacent to the SDC building at a concentration above its VISL; VC was detected at a concentration of 2.6 $\mu g/L$ in the most recent groundwater sample collected at monitoring well 41-S.

- Five soil gas samples were collected at the perimeter of the SDC building. Neither TCE nor any other VOCs were detected at concentrations exceeding the commercial/industrial ESLs. TCE was detected in samples collected at four locations (1,300 $\mu g/m^3$ at TR-14, 590 $\mu g/m^3$ at TR-15, 49 $\mu g/m^3$ at TR-16, and 730 $\mu g/m^3$ at TR-24) at concentrations exceeding its VISL. In addition, benzene and chloroform also were detected at concentrations exceeding their respective VISLs.

- Eight sub-slab soil gas samples were collected at locations within the SDC building. TCE was detected at four locations, but at concentrations less than the VISL. Benzene and ethyl benzene were detected in sub-slab soil gas samples at concentrations exceeding their respective VISLs, the highest concentrations reported for the sub-slab soil gas sample collected at SS-02. Sub-slab soil gas probes SS-08 through SS-10 were installed and sampled in the vicinity of SS-02 to further evaluate concentrations of benzene and ethyl benzene. Based on the results of these sub-slab soil gas probes, impacts to sub-slab soil gas appear to be localized at SS-02.

In summary, a comparison of COC concentrations in groundwater samples collected adjacent to the SDC building with VISLs indicates that TCE and, to a lesser extent, VC may potentially impact indoor air via the vapor intrusion pathway. However, groundwater concentrations of COCs, including TCE and VC, are below their respective ESLs. TCE and VC were not detected in external or sub-slab soil gas samples collected at the SDC building at concentrations above the VISLs, indicating indoor air is unlikely to be impacted by TCE or VC via vapor intrusion. Although benzene and ethyl benzene were detected at concentrations above their respective VISLs in sub-slab soil gas samples, impacts are likely localized. Since the SDC building in not currently occupied, there are no current receptors; therefore no further action is recommended until the future building use is determined.

4. EVALUATION OF VAPOR INTRUSION PATHWAY WITH RESPECT TO USEPA REGION 9 GUIDELINES

In its letter dated 3 January 2014, Water Board requested additional evaluation of the vapor intrusion pathway for the on-property area of the Site with respect to the recently published USEPA guidelines (Water Board, 2014). As described above, the vapor intrusion evaluation was completed at the Site in general accordance with the External Review Draft OSWER VI Guidance. In this section, data collected as part of the vapor intrusion evaluation completed at the on-property area of the Site are evaluated with respect to the recently published Region 9 Guidelines (USEPA, 2013d).

Item #1 – Interim TCE Indoor Air Short-term Response Action Level

For commercial/industrial buildings with a 10-hour workday, the short-term response action level for TCE is 7μg/m^3. The maximum detected concentration of TCE in indoor air samples collected at the main facility was 2.8 μg/m^3, which was detected at the breathing zone in the conference room (IA-15) on 11 August 2011 (AMEC, 2011). Thus, the maximum detected concentration of TCE is significantly below the prompt response action level for TCE.

Item #2 – PCE Indoor Air Screening Level

As presented in Table 2, analytical results for PCE in indoor air are compared to the California-modified indoor air screening level (DTSC, 2013) for a commercial/industrial scenario (2.08 μg/m^3). PCE was not detected in any indoor air samples above the laboratory analytical detection limit of 0.14 μg/m^3.

Item #3 – Residential Building Sampling Approach – Multiple Rounds of Sampling including Colder Weather and Crawl Space

No residential buildings are located at the Site. Therefore, this guideline is not applicable to the vapor intrusion evaluation performed for the Site.

Item #4 – Commercial Building Sampling Approach – Building Ventilation System (HVAC)-Off, HVAC-On and Pathway Sampling

Indoor air samples were collected at the main facility on a Sunday, when HVAC units that do not service laboratory areas had been deactivated for approximately 36 hours. As stated previously, deactivating HVAC units that service laboratory areas is not feasible since these areas could be negatively impacted without an active HVAC. With the exception of indoor air sample IA-13 (HVAC unit AH-43), indoor air samples were collected in an area with an active HVAC system. USEPA personnel confirmed during the 2 June 2011 site walk that it would not be necessary to adjust the HVAC settings in laboratory areas that could be negatively impacted by turning off the HVAC unit (AMEC, 2011).

Eighteen indoor air samples were collected at 16 locations within the main facility. Seven of those indoor air samples were located to evaluate potential preferential pathways:

- IA-1 was located on the floor of the air handler AH-1 mechanical room.
- IA-3 was located on the floor of a storage room.
- IA-4 was located on the floor of a mechanical room with air handlers.

- IA-5 was located on the floor adjacent to an elevator shaft.
- IA-7 (primary and duplicate sample pair) was located on the floor of a mechanical room with air handlers.
- IA-16 was located at breathing zone height adjacent to an elevator shaft.

No COCs were detected in any indoor air samples, including samples located at potential preferential pathways, at concentrations exceeding their respective commercial/industrial RSLs or California-modified screening levels.

As presented in Section 3.6, based on an evaluation of groundwater, soil gas, and sub-slab soil gas data, and the fact that the building is unoccupied, further evaluation of the vapor intrusion pathway is not warranted for the SDC building.

Item #5 – On-Property Study Area Building Sampling

The on-property study area consists of two buildings, main and SDC, that overlie TCE concentrations in groundwater greater than 5 μg/L. Vapor intrusion evaluations have been completed at both of these buildings (summarized in Section 3.6). Under the Site conditions evaluated at the main and SDC buildings, potential vapor intrusion was not resulting in an unacceptable public health risk. The SDC building is currently not occupied, and although the main facility is currently occupied by Spansion, it is our understanding that Spansion is planning to discontinue use of the main facility in the near future. Further evaluation of the vapor intrusion pathway at the main and SDC buildings is not warranted until the future Site use is established.

Item #6 – Phased Approach and Clarification of Vapor Intrusion Off-Property Study Area to Include Buildings Overlying 5 μg/L TCE Shallow-Zone Groundwater Contamination

As shown on Figure 3, there are six wells that monitor shallow (A-zone) groundwater quality at the downgradient edge of the Site (1-S, 2-S, 11-S, 18-S, 19-S, and Mohawk well NMW-13). TCE was not detected, or was detected at concentrations below 5 μg/L, in four of these wells (1-S, 11-S, 18-S, and NMW-13) during the most recent sampling event conducted in 2013. These wells are located across the central and eastern portion of the property, and the results indicate that shallow groundwater downgradient (north) of the Site in these areas is not impacted by TCE above 5 μg/L. TCE was detected at concentrations above 5 μg /L in the two wells located in the western portion of the Site (2-S and 19-S); however, the off-Site area downgradient (north) of these wells is within the OOU. A separate vapor intrusion evaluation is currently being conducted for the OOU by Philips.

In summary, the vapor intrusion evaluation was completed at the on-property area of the Site in general accordance with the External Review Draft OSWER VI Guidance as well as the recently published Region 9 Guidelines.

5. CONCLUSIONS

Based on the evaluation presented above, COCs present in groundwater at the 915 DeGuigne Drive Site do not appear to be impacting indoor air at the main facility (the only currently occupied on-Site building) at levels that would pose an unacceptable health risk. All COC concentrations reported in indoor air samples were below the applicable risk-based screening levels (i.e., RSLs and California-modified screening levels). Spansion has sold the property and will likely vacate the property in the near future. Therefore, no further indoor air testing is recommended until future land use is determined.

The methodology used to complete the vapor intrusion evaluation was technically consistent with the External Review Draft OSWER VI Guidance and recently published Region 9 Guidelines. No additional sampling is necessary in response to the publication of these documents.

REFERENCES

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TABLES

TABLE I
SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW (A-ZONE) GROUNDWATER SAMPLES
915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

Concentrations reported in micrograms per liter (µg/L)

Well ID	Well Screen/ Depth Interval (feet bgs)	Sampling Date	PCE	TCE	cDCE	tDCE	VC	Freon 113	1,1,1-TCA	1,1-DCA	1,1-DCE	1,2,4-TCB	Benzene	Ethyl Benzene	Toluene	Xylenes, Total	TPHg	TPHd	TPHmo
Monitoring Well Groundwater Samples [1]																			
1-S	10 - 15	11/2/2010	<0.5 [2]	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	**0.6** [3]	<0.5	NA	-- [4]	--	--	--	--	--	--
		11/1/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	**0.6**	<0.5	<0.5	--	--	--	--	--	--	--
		10/29/2012	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	**0.6**	<0.5	<0.5	--	--	--	--	--	--	--
		10/31/2013	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	**0.6**	<0.5	<0.5	--	--	--	--	--	--	--
2-S	10 - 15	11/1/2010	<1.3	**130**	**46**	<1.3	<1.3	<5.0	<1.3	<1.3	<1.3	NA	--	--	--	--	--	--	--
		11/1/2011	<0.7	**100**	**39**	<0.7	**0.9**	<2.9	<0.7	<0.7	<0.7	<0.7	--	--	--	--	--	--	--
		10/31/2012	<1.0	**110**	**36**	<1.0	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--
		11/6/2013	<0.5	**120 J** [5]	**43**	**1**	**1.2**	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
3-S	10 - 15	11/2/2010	<0.5	<0.5	**0.7**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	NA	--	--	--	--	--	--	--
		11/1/2011	<0.5	<0.5	**1.4**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		10/29/2012	<0.5	<0.5	**7.6**	<0.5	<0.5	<2.0	<0.5	**0.6**	<0.5	<0.5	--	--	--	--	--	--	--
		10/31/2013	<0.5	<0.5	**12**	**0.6**	<0.5	<2.0	<0.5	**0.7**	<0.5	<0.5	--	--	--	--	--	--	--
8-S	10 - 15	11/2/2010	<0.5	**9.6**	**7.7**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	NA	--	--	--	--	--	--	--
		11/1/2011	<0.5	**13**	**8.8**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		10/31/2012	<0.5	**13**	**3.7**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		11/7/2013	<0.5	**12 J**	**4.8**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
11-S	10 - 15	11/2/2010	<0.5	**1.6**	**0.8**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	NA	--	--	--	--	--	--	--
		10/31/2011	<0.5	**1.4**	**0.6**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
			(<0.5) [6]	**(1.3)**	(<0.5)	(<0.5)	(<0.5)	<2.0	(<0.5)	(<0.5)	(<0.5)	(<0.5)	--	--	--	--	--	--	--
		10/29/2012	<0.5	**1.5**	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		10/31/2013	<0.5	**1.8**	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
18-S	10 - 15	11/1/2010	<0.5	**2.4**	**2.8**	**3**	<0.5	<2.0	<0.5	<0.5	<0.5	NA	--	--	--	--	--	--	--
		11/1/2011	<0.5	**2.5**	**3.6**	**3.1**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		10/31/2012	<0.5	**3.2**	**2.9**	**1.5**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		11/1/2013	<0.5	**3.3**	**2.6**	**0.8**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
19-S	9 - 14	11/1/2010	<0.5	**2**	**30**	**1.4**	<0.5	<2.0	<0.5	<0.5	<0.5	NA	--	--	--	--	--	--	--
		11/1/2011	<0.5	**3.7**	**40**	**1.7**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		10/31/2012	<0.5	**4.7**	**31**	**1**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		11/7/2013	<0.5	**8.7 J**	**40**	**1.6**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
31-S	11 - 18	11/2/2010	<0.5	**5.3**	**68**	**2**	<0.5	<2.0	<0.5	<0.5	<0.5	NA	--	--	--	--	--	--	--
		11/1/2011	<0.5	**5.8**	**97**	**0.9**	<0.5	<2.0	<0.5	**0.6**	<0.5	<0.5	--	--	--	--	--	--	--
		10/31/2012	<1.0	**7.5**	**100**	**1.6**	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--
		11/6/2013	<0.5	**6.0 J**	**86**	**0.9**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
40-S	8 - 13	11/3/2010	<2.0	**220**	**37**	<2.0	<2.0	<8.0	<2.0	<2.0	<2.0	NA	--	--	--	--	--	--	--
		11/1/2011	<1.0	**100**	**67**	**1.1**	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--
		11/1/2012	<1.0	**100**	**59**	**2.4**	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--
		11/7/2013	<0.5	**110**	**68**	**1**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
41-S	8 - 15	11/3/2010	<2.0	**210**	**190**	**2.9**	**8.2**	<8.0	<2.0	<2.0	<2.0	NA	--	--	--	--	--	--	--
		11/2/2011	**1.9**	**210**	**170**	**2.7**	**2.6**	<6.7	<1.7	<1.7	<1.7	<1.7	--	--	--	--	--	--	--
		11/1/2012	**2.4**	**240**	**150**	**2.1**	**2.3**	**2.3**	<0.5	**0.6**	**1.4**	<0.5	--	--	--	--	--	--	--
		11/8/2013	**2.3**	**190**	**170**	**1.8**	**2.6**	<4.0	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--

TABLE I
SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW (A-ZONE) GROUNDWATER SAMPLES
915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

Concentrations reported in micrograms per liter (µg/L)

Well ID	Well Screen/ Depth Interval (feet bgs)	Sampling Date	PCE	TCE	cDCE	tDCE	VC	Freon 113	1,1,1-TCA	1,1-DCA	1,1-DCE	1,2,4-TCB	Benzene	Ethyl Benzene	Toluene	Xylenes, Total	TPHg	TPHd	TPHmo
Monitoring Well Groundwater Samples [1]																			
49-S	11 - 21	11/2/2010	<0.5	**22 J**	**7**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	NA	--	--	--	--	--	--	--
		11/1/2011	<0.5	**18**	**5.1**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		10/31/2012	<0.5	**24**	**5.9**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
		11/6/2013	**0.6**	**31**	**12**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
Grab Groundwater Samples [7]																			
TR-26-GW	10.7	11/3/2011	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<50	--
TR-27-GW	11.2	12/6/2011	<1.7	**58**	**68**	<1.7	<1.7	<33	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<50	<50	<250
TR-28-GW	12.8	12/6/2011	<2.5	**39**	**82**	<2.5	<2.5	<50	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<50	<50	<250
TR-29-GW	11.1	12/6/2011	<10	**220**	**73**	<10	<10	<200	<10	<10	<10	<10	<10	<10	<10	<10	**82**	<50	<250
Maximum Detected Concentration			**2.4**	**240**	**190**	**3.1**	**8.2**	**2.3**	**ND** [8]	**0.6**	**1.4**	**ND**	**ND**	**ND**	**ND**	**ND**	**82**	**ND**	**ND**
Water Board Commercial ESL [9]			**640**	**1,300**	**26,000**	**120,000**	**18**	**NA** [10]	**NA**	**NA**	**130,000**	**NA**	**270**	**3,100**	**NA**	**NA**	**NA**	**NA**	**NA**
U.S. EPA VISL [11]			**65**	**7.4**	**NA**	**1,600**	**2.5**	**6,100**	**31,000**	**33**	**820**	**120**	**6.9**	**15**	**81,000**	**2,100**	**NA**	**NA**	**NA**

Notes
1. Groundwater samples were collected by Field Solutions, Inc., of San Jose, California, and analyzed by Curtis & Tompkins, Ltd., of Berkeley, California, for the EPA Method 8010 list with Freon 113 in accordance with EPA Method 8260B. Only detected compounds that are included in the Order are shown; for a full list of compounds analyzed, see the annual groundwater monitoring reports.
2. "<" indicates constituent not detected above the laboratory reporting limit shown.
3. Results in **bold** indicate that the analyte was detected above the laboratory reporting limit.
4. "--" indicates the compound was not a target analyte
5. "J" indicates that the analyte was positively identified in the sample; the associated numerical value is the approximate concentration of the analyte in the sample.
6. Duplicate sample results are presented in parenthesis.
7. Grab Groundwater samples were collected by Treadwell & Rollo of San Francisco, California, and analyzed by McCampbell Analytical, Inc., of Pittsburgh, California, for the USEPA Method 8260. Only the analytical results for selected compounds are presented; no other compounds were detected. For a full list of target analytes, see the laboratory reports (T&R, 2012).
8. "ND" indicates the compound was not detected.
9. Groundwater Environmental Screening Levels (ESLs) for the evaluation of potential vapor intrusion concerns, commercial/industrial land use, fine-coarse mix (Table E-1, Water Board, 2013b)
10. "NA" indicates a screening level is not available.
11. Groundwater Vapor Intrusion Screening Levels (VISLs) for commercial scenario, (U.S. EPA, 2013c).

Abbreviations
PCE = Tetrachloroethene
TCE = Trichloroethene
cDCE = cis-1,2-Dichloroethene
tDCE = trans-1,2-Dichloroethene
VC = Vinyl chloride
Freon 113 = 1,1,2-Trichloro-1,2,2-trifluoromethane
1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
1,2,4-TCB = 1,2,4-Trichlorobenzene
TPHg = Total Petroleum Hydrocarbons in the Gasoline Range
TPHd = Total Petroleum Hydrocarbons in the Diesel Range with Silica Gel Clean-Up
TPHmo = Total Petroleum Hydrocarbons in the Motor Oil Range with Silica Gel Clean-up

TABLE II
SUMMARY OF ANALYTICAL RESULTS FOR INDOOR AND OUTDOOR AIR SAMPLES
915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

Concentrations reported in micrograms per cubic meter (µg/m^3)

Sample ID	Sample Type	Location	Date Collected	PCE	TCE	cDCE	tDCE	VC	Freon 113	1,1,1-TCA	1,1-DCE	1,1-DCA
Outdoor Ambient Air Samples												
AMB-1	Ambient [1]	Parking lot	8/21/2011	<0.14 [2]	<0.027	<0.055	<0.055	<0.013	**0.67** [3]	<0.11	<0.040	<0.020
AMB-2	Ambient	Roof	8/21/2011	<0.14	**0.37**	**0.38**	<0.055	<0.013	**0.69**	<0.11	<0.040	<0.020
AMB-3	Ambient	Equipment pad	8/21/2011	<0.14	**0.11**	**0.21**	<0.056	<0.013	**0.71**	<0.11	<0.040	<0.020
AMB-4	Ambient	Equipment pad	8/21/2011	<0.14	**0.55**	**0.60**	<0.056	<0.013	**0.76**	<0.11	<0.040	<0.020
AMB-5	Ambient	Equipment pad	8/21/2011	<0.14	**0.043**	<0.055	<0.055	<0.013	**0.74**	<0.11	<0.040	<0.020
Indoor Air Samples												
IA-1	Preferential Pathway [4]	Mechanical room with AH-1	8/21/2011	<0.14	**1.6**	**10**	**0.17**	<0.013	**1.2**	**0.17**	**0.073**	**0.048**
IA-2	Breathing Zone [5]	Office Area (supplied by AH-1)	8/21/2011	<0.14	**1.4**	**9.9**	**0.15**	<0.013	**1.3**	**0.18**	**0.063**	**0.046**
IA-3	Preferential Pathway	Storage room	8/21/2011	<0.14	**0.94**	**7.9**	**0.093**	<0.013	**0.98**	<0.11	<0.040	**0.031**
IA-4	Preferential Pathway	Mechanical room with air handlers	8/21/2011	<0.14	**0.56**	**0.53**	<0.055	<0.013	**0.73**	<0.11	<0.040	<0.020
IA-5	Preferential Pathway	Adjacent to elevator shaft	8/21/2011	<0.14	**2.0**	**0.67**	<0.055	<0.013	**0.72**	<0.11	<0.040	<0.020
IA-6	Breathing Zone	Electrical test area (supplied by AH-6)	8/21/2011	<0.14	**1.9**	**0.66**	<0.056	<0.013	**0.77**	<0.11	<0.040	<0.020
IA-7	Preferential Pathway	Mechanical room with air handlers	8/21/2011	<0.14	**0.20**	**0.068**	<0.055	<0.013	**0.71**	<0.11	<0.040	<0.020
IA-70	Blind Field Duplicate [6]		8/21/2011	<0.14	**0.19**	**0.062**	<0.055	<0.013	**0.77**	<0.11	<0.040	<0.020
IA-8	Breathing Zone	Office area (supplied by AH-2)	8/21/2011	<0.14	**0.96**	**4.6**	**0.080**	<0.013	**1.0**	**0.12**	<0.040	<0.020
IA-80	Blind Field Duplicate		8/21/2011	<0.14	**0.99**	**4.7**	**0.085**	<0.013	**1.0**	**0.12**	<0.040	**0.024**
IA-9	Breathing Zone	Office area (supplied by AH-39)	8/21/2011	<0.14	**0.65**	**0.33**	<0.055	<0.013	**0.80**	<0.11	<0.040	<0.020
IA-10	Breathing Zone	Office area (supplied by AH-10)	8/21/2011	<0.14	**0.58**	**0.80**	<0.055	<0.013	**0.69**	<0.11	<0.040	<0.020
IA-11	Breathing Zone	Office area (supplied by AH-3)	8/21/2011	<0.14	**0.52**	**0.62**	<0.056	<0.013	**0.68**	<0.11	<0.040	<0.020
IA-12	Breathing Zone	Office area (supplied by AH-4)	8/21/2011	<0.14	**0.57**	**0.77**	<0.056	<0.013	**0.72**	<0.11	<0.040	<0.020
IA-13	Breathing Zone	Cafeteria (supplied by AH-43)	8/21/2011	<0.14	**1.1**	**0.36**	<0.055	<0.013	**0.74**	<0.11	<0.040	<0.020
IA-14	Breathing Zone	Office area (supplied by AH-9)	8/21/2011	<0.14	**1.0**	**0.22**	<0.055	<0.013	**0.91**	<0.11	<0.040	<0.020
IA-15	Breathing Zone	Conference room (supplied by AH-6)	8/21/2011	<0.14	**2.8**	**0.90**	<0.056	**0.018**	**0.89**	<0.11	<0.040	<0.020
IA-16	Preferential Pathway	Adjacent to elevator shaft	8/21/2011	<0.14	**1.1**	**0.48**	<0.055	<0.013	**0.83**	<0.11	<0.040	<0.020
Maximum Detected Indoor Air Concentration				**ND**	**2.8**	**10**	**0.17**	**0.018**	**1.3**	**0.18**	**0.073**	**0.048**
U.S. EPA Region 9 Regional Screening Level (RSL) for Industrial Air [7]				**2.08** [8]	**3.0**	**31** [8]	**260**	**0.16** [8]	**130,000**	**4,400** [8]	**310** [8]	**7.7**

Notes
1. Ambient samples were collected outdoors, in an approximate upwind direction of the building and/or near the intake of the building's HVAC system.
2. "<" indicates that the analyte was not detected at or above the laboratory reporting limit shown.
3. Results shown in **bold** indicate that the analyte was detected in the sample at or above the laboratory reporting limit.
4. Preferential pathway samples were collected indoors, as close as possible to a potential source. Preferential pathway sample results are not necsesarily representative of employee exposure.
5. Breathing zone samples were collected indoors from the approximate height of a seated worker.
6. Each duplicate sample was collected simultanously the associated primary sample, using a T-splitter.
7. Regional Screening Level (RSL) for Industrial Air (U.S. EPA, 2013, Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites, November).
8. California-modified indoor air screening level (California Department of Toxic Substances Control, Office of Human and Ecological Risk, 2013, HERO HHRA Note Number: 3, May 21).

Abbreviations
PCE = tetrachloroethene
TCE = trichloroethene
cDCE = cis-1,2-dichloroethene
tDCE = trans-1,2-dichloroethene
VC = vinyl chloride
Freon 113 = 1,1,2-trichloro-1,2,2-trifluoromethane
1,1,1-TCA = 1,1,1-trichloroethane
1,1-DCE = 1,1-dichloroethene
1,1-DCA = 1,1-dichloroethane
HVAC = heating, ventilation, and air conditioning
ND = not detected

TABLE III
SUMMARY OF ANALYTICAL RESULTS FOR SOIL GAS SAMPLES
915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

Concentrations reported in micrograms per cubic meter (µg/m^3)

Sample ID	Date	Depth (feet bgs)	PCE	TCE	cDCE	tDCE	VC	Freon 113	1,1,1-TCA	1,1-DCA	1,1-DCE	1,2,4-TMB	1,3,5-TMB	Acetone	Benzene	Carbon Disulfide	Chloro-form	Chloro-methane	Ethyl-benzene	4-Ethyl-toluene	Freon 11	Freon 12	MEK	MIBK	Propene	Toluene	TBA	Tetra-hydro-furan	Vinyl Acetate	Xylenes, Total	Leak Check Compounds: Isopropyl Alcohol	Leak Check Compounds: Helium (% vol)
Treadwell & Rollo Phase I I Environmental Site Assessment [1]																																
TR-01	11/2/2011	8	< 14 [2]	**320** [3]	< 8.1	< 8.1	< 5.2	**260**	< 11	< 8.2	< 8.1	< 10	< 10	< 120	**10**	**35**	< 9.9	< 4.2	**9**	< 10	< 11	< 10	< 150	**41**	< 88	**70**	< 62	< 6.0	< 180	< 27	< 50	-- [4]
TR-01 (Dup)	11/2/2011	8	<14	**290**	< 8.1	< 8.1	< 5.2	**250**	< 11	< 8.2	< 8.1	< 10	< 10	< 120	< 6.5	**92**	<9.9	< 4.2	< 8.8	< 10	**12**	< 10	< 150	**40**	< 88	**61**	< 62	< 6.0	< 180	< 27	< 50	--
TR-02	11/2/2011	8	< 14	**98**	< 8.1	< 8.1	< 5.2	**320**	< 11	< 8.2	< 8.1	< 10	< 10	< 120	**10**	**24**	< 9.9	< 4.2	< 8.8	< 10	< 11	< 10	< 150	**23**	**110**	**30**	< 62	< 6.0	< 180	< 27	< 50	--
TR-03	11/1/2011	5	< 14	< 11	< 8.1	< 8.1	< 5.2	**540**	< 11	< 8.2	< 8.1	< 10	< 10	< 120	**18**	**15**	< 9.9	< 4.2	< 8.8	< 10	< 11	< 10	< 150	**96**	< 88	**120**	**100**	< 6.0	< 180	< 27	< 50	--
TR-04	11/1/2011	5	< 14	**350**	< 8.1	< 8.1	< 5.2	**4,800**	< 11	< 8.2	< 8.1	< 10	< 10	< 120	< 6.5	< 6.3	< 9.9	< 4.2	< 8.8	< 10	< 11	< 10	< 150	**24**	< 88	< 7.7	**24**	< 6.0	< 180	< 27	< 50	--
TR-05	11/1/2011	5	**65**	**1,100**	< 8.1	< 8.1	< 5.2	**880**	< 11	< 8.2	< 8.1	< 10	< 10	< 120	**15**	**10**	**20**	< 4.2	< 8.8	< 10	< 11	< 10	< 150	**75**	< 88	**39**	< 62	< 6.0	< 180	< 27	< 50	--
TR-06	11/1/2011	7.5	< 14	< 11	< 8.1	< 8.1	< 5.2	**52**	< 11	< 8.2	< 8.1	< 10	< 10	< 120	**14**	**58**	< 9.9	< 4.2	< 8.8	< 10	< 11	< 10	< 150	**150**	< 88	**77**	< 62	< 6.0	< 180	< 27	< 50	--
TR-07	11/1/2011	5	< 14	**14**	< 8.1	< 8.1	< 5.2	**380**	**41**	< 8.2	< 8.1	< 10	< 10	< 120	< 6.5	**14**	< 9.9	< 4.2	< 8.8	< 10	< 11	**11**	< 150	**65**	< 88	**44**	< 62	< 6.0	< 180	< 27	< 50	--
TR-08	11/2/2011	5	< 14	< 11	< 8.1	< 8.1	< 5.2	**16**	< 11	< 8.2	< 8.1	< 10	< 10	< 120	< 6.5	< 6.3	< 9.9	< 4.2	< 8.8	< 10	< 11	< 10	< 150	**26**	< 88	**61**	< 62	**6.6**	< 180	**31**	< 50	--
TR-09	11/2/2011	5	**15**	**3,300**	**55**	**4.7**	< 1.3	**520**	**11**	< 2.0	< 2.0	**7.5**	< 2.5	**56**	**5.1**	**11**	**6.1**	**1.6**	**5.2**	**2.5**	**190**	< 2.5	**20**	**55**	--	**24**	--	--	< 7.0	**28.7**	--	< 0.01
TR-10	11/3/2011	6	< 4.5	< 3.6	**2.8**	< 2.7	< 1.7	< 15	< 3.7	< 2.7	< 2.7	< 9.9	< 3.3	**120**	**3.4**	**20**	< 3.3	< 1.4	**5.5**	< 3.3	< 7.5	< 3.3	**14**	**15**	--	**46**	--	--	< 9.4	**29**	--	< 0.01
TR-11	11/3/2011	8	< 3.8	**6.4**	< 2.2	< 2.2	< 1.4	**47**	**5.2**	< 2.2	< 2.2	< 8.2	< 2.7	**200**	**9.8**	**12**	< 2.7	1.5	**10**	< 2.7	< 6.2	**3.3**	**34**	**70**	--	**70**	--	--	< 7.8	**49**	--	< 0.01
TR-12	11/2/2011	5	< 5.3	< 4.2	< 3.1	< 3.1	< 2.0	< 18	< 4.3	< 3.2	< 3.1	**15**	**5.1**	**81**	**6.2**	< 9.7	< 3.8	< 1.6	**14**	**4.6**	< 8.8	< 3.9	**19**	**37**	--	**66**	--	--	< 11	**72**	--	< 0.01
TR-13	11/3/2011	5	**10**	**23**	**16**	< 2.0	< 1.3	**65**	**36**	< 2.0	< 2.0	**13**	< 2.5	**68**	**4.9**	< 6.2	< 2.4	< 1.0	**4.8**	< 2.5	**7.1**	< 2.5	**18**	**29**	--	**23**	--	--	< 7.0	**21.3**	--	< 0.01
TR-14	11/2/2011	6.5	**29**	**1,300**	**110**	**5.1**	< 1.5	**60**	< 3.1	< 2.3	**3.9**	**16**	**5.6**	**120**	**23**	**110**	< 2.8	**1.5**	**16**	**5.1**	**9.8**	**2.9**	**38**	**63**	--	**77**	--	--	< 8.0	**76**	--	< 0.01
TR-15	11/2/2011	5	**33**	**590**	**15**	< 2.0	< 1.3	**36**	**4.2**	< 2.0	< 2.0	**11**	**4.1**	**210**	**29**	**17**	**9.4**	< 1.0	**10**	**3.4**	**33**	**3.3**	**25**	**71**	--	**66**	--	--	< 7.0	**56**	--	< 0.01
TR-16	11/2/2011	5	< 14	**49**	< 8.1	< 8.1	< 5.2	< 16	< 11	< 8.2	< 8.1	**15**	< 10	< 120	< 6.5	< 6.3	< 9.9	< 4.2	**9.9**	< 10	< 11	< 10	< 150	**310**	< 88	**31**	< 62	< 6.0	< 180	**54**	< 50	< 0.01
TR-17	11/2/2011	5.5	**7.4**	**110**	**12**	**16**	< 1.3	**16**	**7.9**	< 2.1	< 2.0	**12**	**3.6**	**180**	**5.0**	**10**	< 2.5	< 1.1	**7.6**	**3.7**	< 5.8	< 2.5	**22**	**14**	--	**30**	--	--	**20**	**42**	--	< 0.01
TR-18	11/3/2011	5	< 3.6	< 2.9	**88**	**3.2**	< 1.4	**110**	**130**	**2.9**	< 2.1	**9.2**	**3.5**	**98**	**6.5**	< 6.7	**8.9**	< 1.1	**6.3**	**3.5**	**16**	**3.2**	**19**	**11**	--	**36**	--	--	< 7.5	**31.6**	--	< 0.01
TR-19	11/3/2011	5	< 4.7	< 3.8	< 2.8	< 2.8	< 1.8	**17**	**9.5**	< 2.8	< 2.8	< 10	< 3.4	**100**	**2.8**	< 8.7	< 3.4	< 1.4	**4.2**	< 3.4	< 7.9	< 3.5	**18**	**23**	--	**25**	--	--	< 9.9	**25.5**	--	< 0.01
TR-20	11/3/2011	7	< 3.4	**96**	**11,000**	**240**	**2.2**	**120**	**220**	**47**	**48**	**9.3**	**3.2**	**160**	**14**	**10**	**62**	< 1.0	**8**	**2.7**	**18**	< 2.5	**37**	**42**	--	**49**	--	--	< 7.0	**39.9**	--	< 0.01
TR-21	11/3/2011	6	< 3.8	**12**	**3.9**	< 2.2	< 1.4	**170**	**58**	< 2.2	< 2.2	< 8.2	< 2.7	**30**	**3.6**	< 6.9	< 2.7	< 1.1	**2.5**	< 2.7	**15**	**4.4**	**10**	**9.5**	--	**8.2**	--	--	< 7.8	**14.0**	--	< 0.01
TR-22	11/3/2011	6	< 3.4	**7.6**	**2.1**	< 2.0	< 1.3	**14**	**5.2**	< 2.0	< 2.0	< 7.4	< 2.5	**46**	**6.2**	**150**	**85**	< 1.0	**4.9**	< 2.5	< 5.6	< 2.5	**17**	**33**	--	**30**	--	--	< 7.0	**24.7**	--	**0.0159**
TR-23	11/3/2011	5	< 3.7	< 2.9	< 2.2	< 2.2	< 1.4	< 13	< 3.0	< 2.2	< 2.2	< 8.0	< 2.7	**66**	**2.1**	< 6.8	< 2.7	< 1.1	**4.0**	< 2.7	< 6.1	< 2.7	**17**	**20**	--	**26**	--	--	< 7.7	**24**	--	< 0.01
TR-24	11/3/2011	5	**40**	**730**	**240**	**28**	< 1.3	**100**	**19**	**3.0**	**4.5**	**25**	**6.8**	**97**	**10**	**110**	**5.9**	**1.6**	**9.2**	**5.8**	< 5.6	**3.5**	**21**	**62**	--	**53**	--	--	< 7.0	**50**	--	**1.84**
TR-25	11/3/2011	5	**62**	**1,700**	**100**	**11**	< 6.4	< 57	< 14	< 10	< 9.9	< 37	< 12	**36**	< 8.0	< 31	< 12	< 5.2	< 11	< 12	< 28	< 12	< 22	< 31	--	**18**	--	--	< 35	< 54	--	< 0.01
Ground Zero Analysis Subsurface Investigation [5]																																
GZA-1	4/16/2013	5	<14	<11	**130**	<8.1	<5.2	**17**	**44**	<8.2	<8.1	<10	<10	<120	**10**	**68**	<9.9	<4.2	<8.8	<10	<11	<10	<150	<8.3	<88	**39**	--	<6.0	<180	**28**	--	**0.0057**
GZA-2	4/16/2013	5	<14	<11	<8.1	<8.1	<5.2	<16	<11	<8.2	<8.1	**13**	<10	<120	**9.8**	<6.3	<9.9	<4.2	**13.0**	<10	<11	<10	<150	<8.3	<88	**68**	--	<6.0	<180	**61**	--	**0.012**
GZA-3	4/16/2013	5	<14	<11	<8.1	<8.1	<5.2	**80**	**45**	<8.2	<8.1	<10	<10	<120	<6.5	**27**	<9.9	<4.2	<8.8	<10	<11	<10	<150	<8.3	<88	**35**	--	<6.0	<180	<27	--	<0.005
Maximum Detected Concentration			**65**	**3,300**	**11,000**	**240**	**2**	**4,800**	**220**	**47**	**48**	**25**	**6.8**	**210**	**29**	**150**	**85**	**1.6**	**16**	**5.8**	**190**	**11**	**38**	**310**	**110**	**120**	**100**	**6.6**	**20**	**76**	**NA**	**1.84**
Water Board Commercial ESL [6]			**2,100**	**3,000**	**31,000**	**260,000**	**160**	**NA** [7]	**22,000,000**	**7,700**	**880,000**	**NA**	**NA**	**140,000,000**	**420**	**NA**	**2,300**	**390,000**	**4,900**	**NA**	**NA**	**NA**	**22,000,000**	**13,000,000**	**NA**	**1,300,000**	**NA**	**NA**	**NA**	**440,000**	**NA**	**NA**
U.S. EPA VISL [8]			**470**	**30**	**NA**	**2,600**	**28**	**1,300,000**	**220,000**	**77**	**8,800**	**310**	**NA**	**1,400,000**	**16**	**31,000**	**5.3**	**3,900**	**49**	**NA**	**31,000**	**4,400**	**220,000**	**130,000**	**130,000**	**220,000**	**NA**	**88,000**	**NA**	**4,400**	**NA**	**NA**

Notes
1. Soil gas samples were collected by Treadwell & Rollo of San Francisco, California; soil gas samples TR-01 through TR-08, and TR-16 were analyzed by McCampbell Analytical, Inc., of Pittsburgh, California, and samples TR-09 through TR-15 and TR-17 through TR-25 were analyzed by Calscience Environmental Laboratories, Inc. of Garden Grove, California, for volatile organic compounds using USEPA Method TO-15. Only the analytical results for selected compounds are presented; no other compounds were detected. For a full list of target analytes, see the laboratory reports (T&R, 2012).
2. "<" indicates constituent not detected above the laboratory reporting limit shown.
3. Results in **bold** indicate that the analyte was detected above the laboratory reporting limit.
4. "--" indicates the compound was not a target analyte
5. Soil gas samples collected by Ground Zero Analysis, Inc., of Escalon, California, and and analyzed by McCampbell Analytical, Inc., of Pittsburgh, California, for volatile organic compounds using USEPA Method TO-15.
6. Soil gas Environmental Screening Levels (ESLs) for the evaluation of potential vapor intrusion concerns, commercial/industrial land use (Table E-2, Water Board, 2013b).
7. "NA" indicates a screening level is not available.
8. Soil Gas Vapor Intrusion Screening Levels (VISLs) for commercial scenario, (U.S. EPA, 2013c).

Abbreviations

% vol = percent by volume
bgs = below ground surface
PCE = Tetrachloroethene
TCE = Trichloroethene
cDCE = cis-1,2-Dichloroethene
tDCE = trans-1,2-Dichloroethene
VC = Vinyl chloride
Freon 113 = 1,1,2-Trichloro-1,2,2-trifluoromethane
1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
1,2,4-TMB = 1,2,4-Trimethylbenzene
1,3,5-TMB = 1,3,5-Trimethylbenzene
Freon 12 = dichlorodiflouromethane
Freon 11 = trichloroflouromethane
MEK = Methyl Ethyl Ketone
MIBK = Methyl Isobutyl Ketone
TBA = Tert-Butyl Alcohol

TABLE IV

SUMMARY OF ANALYTICAL RESULTS FOR SUB-SLAB SOIL GAS SAMPLES[1]

915 DEGUIGNE DRIVE

SUNNYVALE, CALIFORNIA

Concentrations reported in micrograms per cubic meter (µg/m ^{3})

Sample ID	Building	Date	Probe Depth[2] (inches bgs)	PCE	TCE	cDCE	tDCE	VC	Freon 113	1,1,1-TCA	1,1-DCA	1,1-DCE	1,2,4-TMB	1,3,5-TMB	Acetone	Benzene	Chloro-form	Chloro-methane	Cyclo-hexane	Ethanol	Ethyl acetate	Ethyl-benzene	4-Ethyl-toluene	Freon 11	Freon 12	Heptane	Hexane	MEK	MIBK	Toluene	Vinyl Acetate	Xylenes, Total	Leak Check Compounds: Isopropyl Alcohol	Leak Check Compounds: Helium
SS-01	SDC [3]	11/4/2011	8	< 3.4 [4]	**17** [5]	< 2.0	< 2.0	< 1.3	< 11	**300**	**5.8**	**240**	**19**	**5.6**	**120**	**7.7**	< 2.4	**1.6**	-- [6]	--	--	**52**	**5.3**	**12**	**2.8**	--	--	**17**	< 6.1	**26**	< 7.0	**340**	--	< 0.01
SS-02	SDC	11/4/2011	31	< 34	< 27	< 20	< 20	< 13	< 110	**390**	< 20	**210**	**170**	**140**	**1,100**	**250**	< 24	< 10	--	--	--	**130**	**60**	< 56	< 25	--	--	**61**	< 61	**580**	< 70	**870**	--	< 0.01
SS-02 [7]	SDC	11/4/2011	31	< 34	< 27	< 20	< 20	< 13	< 110	**390**	< 20	**200**	**180**	**150**	**940**	**260**	< 24	< 10	--	--	--	**150**	**64**	< 56	< 25	--	--	**65**	< 61	**630**	< 70	**920**	--	--
SS-03	SDC	11/4/2011	30	< 3.4	**19**	< 2.0	< 2.0	< 1.3	< 11	**210**	< 2.0	**260**	**51**	**38**	**820**	**55**	< 2.4	< 1.0	--	--	--	**38**	**19**	540	**3.5**	--	--	**49**	< 6.1	**170**	< 7.0	**275**	--	< 0.01
SS-04	SDC	11/4/2011	8	< 3.4	< 2.7	< 2.0	< 2.0	< 1.3	< 11	< 2.7	< 2.0	< 2.0	< 7.4	< 2.5	**110**	**4.8**	< 2.4	< 1.0	--	--	--	**4.1**	< 2.5	**77**	**2.6**	--	--	**14**	< 6.1	**13**	< 7.0	**23.8**	--	< 0.01
SS-05	SDC	11/4/2011	30	< 8.5	< 6.7	< 5.0	< 5.0	< 3.2	< 29	< 6.8	< 5.1	< 5.0	< 18	< 6.1	**410**	**19**	< 6.1	< 2.6	--	--	--	**13**	< 6.1	**29**	< 6.2	--	--	**32**	< 15	**66**	< 18	**49**	--	< 0.01
SS-05 (Dup)	SDC	11/4/2011	30	< 8.5	< 6.7	< 5.0	< 5.0	< 3.2	< 29	< 6.8	< 5.1	< 5.0	< 18	< 6.1	**460**	**12**	< 6.1	< 2.6	--	--	--	< 5.4	< 6.1	**25**	< 6.2	--	--	**27**	< 15	**50**	< 18	**33**	--	< 0.01
SS-06	943 DeGuigne	11/4/2011	8	< 3.4	**24**	< 2.0	< 2.0	< 1.3	**240**	**4.4**	< 2.0	< 2.0	< 7.4	< 2.5	**110**	**2.7**	**4.0**	< 1.0	--	--	--	**18**	< 2.5	< 5.6	< 2.5	--	--	**23**	**14**	**7.4**	< 7.0	**75**	--	**0.0194**
SS-07	943 DeGuigne	11/4/2011	8	< 3.4	2.8	< 2.0	< 2.0	< 1.3	**74**	< 2.7	< 2.0	< 2.0	< 7.4	**2.6**	**47**	**2.6**	< 2.4	<1.0	--	--	--	**2.8**	< 2.5	< 5.6	**2.5**	--	--	**8.6**	< 6.1	**6.8**	< 7.0	**17.3**	--	**0.0406**
SS-08	SDC	12/6/2011	8	< 14	< 11	< 8.1	< 8.1	< 5.2	< 16	< 11	< 8.2	< 8.1	< 10	< 10	< 120	**9.8**	< 9.9	< 4.2	< 180	**230**	**60**	< 8.8	< 10	**27**	< 10	**310**	**360**	< 150	< 8.3	**16**	< 180	< 27	< 50	**47**
SS-09	SDC	12/6/2011	30	< 14	**25**	< 8.1	< 8.1	< 5.2	< 16	< 11	< 8.2	< 8.1	< 10	< 10	< 120	**38**	< 9.9	< 4.2	**560**	**130**	**22**	**11**	< 10	**430**	< 10	**2,100**	**2,300**	< 150	< 8.3	**60**	< 180	**50**	< 50	< 20
SS-10	SDC	12/6/2011	8	< 14	**15**	< 8.1	< 8.1	< 5.2	< 16	< 11	< 8.2	< 8.1	< 10	< 10	< 120	< 6.5	< 9.9	< 4.2	< 180	**250**	**37**	< 8.8	< 10	**230**	< 10	< 210	< 180	< 150	< 8.3	**14**	< 180	< 27	< 50	< 20
Maximum Detected Concentration				**ND** [8]	**25**	**ND**	**ND**	**ND**	**240**	**390**	**5.8**	**260**	**180**	**150**	**1100**	**260**	**4**	**1.6**	**560**	**250**	**60**	**150**	**64**	**540**	**3.5**	**2100**	**2300**	**65**	**14**	**630**	**ND**	**920**	**ND**	**47**
U.S. EPA VISL [9]				**470**	**30**	**NA** [10]	**2,600**	**28**	**1,300,000**	**220,000**	**77**	**8,800**	**310**	**NA**	**1,400,000**	**16**	**5.3**	**3,900**	**260,000**	**NA**	**3,100**	**49**	**NA**	**31,000**	**4,400**	**NA**	**31,000**	**220,000**	**130,000**	**220,000**	**NA**	**4,400**	**NA**	**NA**

Notes

1. Sub-slab soil gas samples were collected by Treadwell & Rollo of San Francisco, California; sub-slab soil gas samples SS-01 through SS-07 were analyzed by Calscience Environmental Laboratories, Inc. of Garden Grove, California, and SS-08 through SS-10 by McCampbell Analytical, Inc., of Pittsburgh, California, for volatile organic compounds using USEPA Method TO-15. Only the analytical results for selected compounds are presented; no other compounds were detected. For a full list of target analytes, see the laboratory reports (T&R, 2012).
2. Sub-slab soil gas probes were installed approximately 2 inches beneath the bottom of the slab.
3. SDC indicates Submicron Development Center.
4. "<" indicates constituent not detected above the laboratory reporting limit shown.
5. Results in **bold** indicate that the analyte was detected above the laboratory reporting limit.
6. "--" indicates the compound was not a target analyte
7. Sub-slab soil gas samples SS-02 was re-analyzed.
8. "ND" indicates the compound was not detected.
9. Soil Gas Vapor Intrusion Screening Levels (VISLs) for commercial scenario, (U.S. EPA, 2013c).
10. "NA" indicates a screening level is not available.

Abbreviations

% vol = percent by volume
bgs = below ground surface
PCE = Tetrachloroethene
TCE = Trichloroethene
cDCE = cis-1,2-Dichloroethene
tDCE = trans-1,2-Dichloroethene
VC = Vinyl chloride
Freon 113 = 1,1,2-Trichloro-1,2,2-trifluoromethane
1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
1,2,4-TMB = 1,2,4-Trimethylbenzene
1,3,5-TMB = 1,3,5-Trimethylbenzene
Freon 12 = dichlorodiflouromethane
Freon 11 = trichloroflouromethane
MEK = Methyl Ethyl Ketone
MIBK = Methyl Isobutyl Ketone

TABLE V
SUMMARY OF ANALYTICAL RESULTS FOR VOCs AND TPH IN SOIL SAMPLES
915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

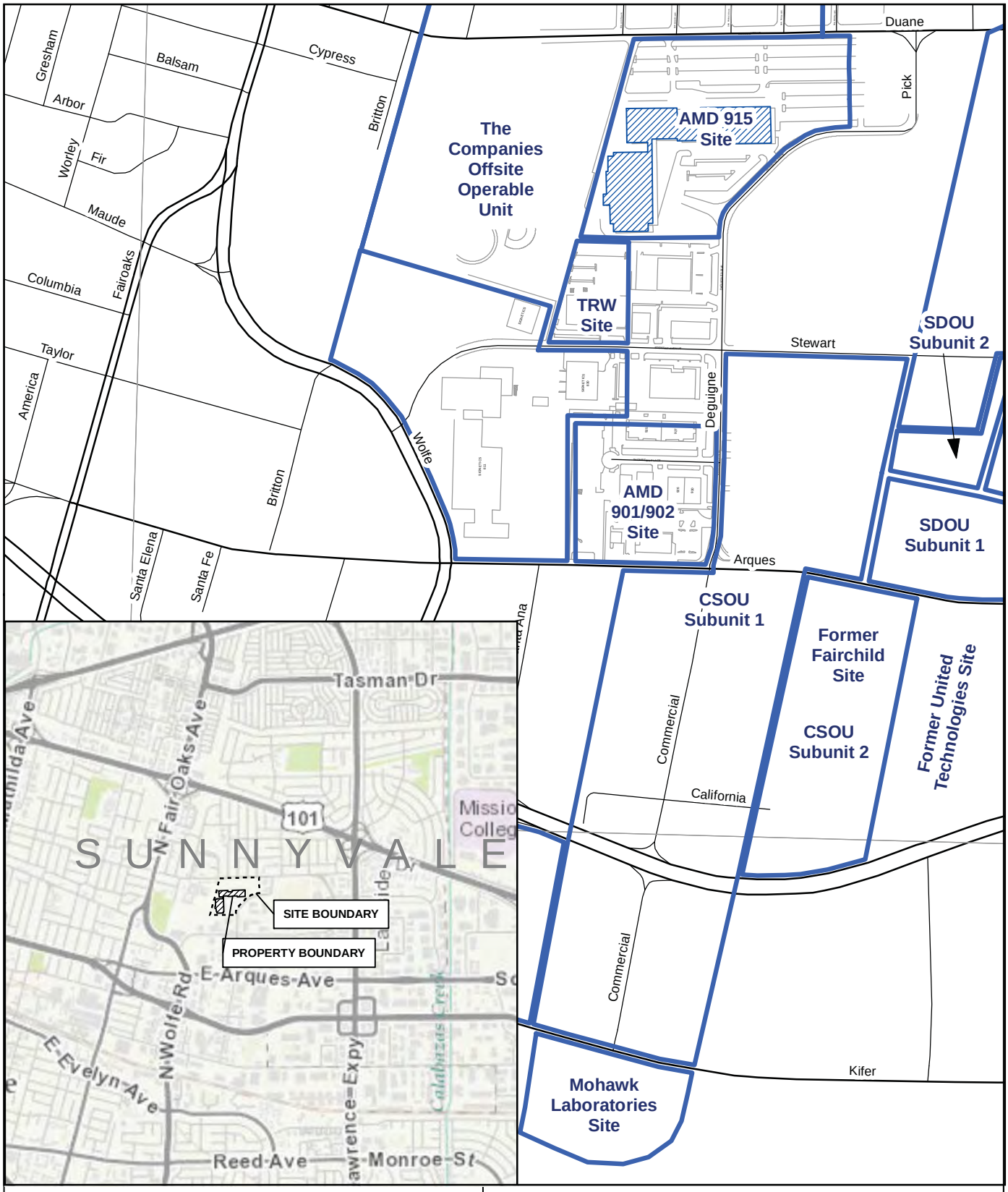
Concentrations reported in milligrams per kilogram (mg/kg)

Sample ID	Date	Depth (feet bgs)	PCE	TCE	cDCE	tDCE	VC	Acetone	TPHg	TPHd	TPHmo
Treadwell & Rollo Phase II Environmental Site Assessment [1]											
TR-03-1.5	11/1/2011	1.5	<0.005 [2]	0.013	<0.005	<0.005	<0.005	<0.05	<1.0	**1.5** [3]	**7.3**
TR-07-1.5	11/1/2011	1.5	<0.005	<0.005	<0.005	<0.005	<0.005	**0.065**	<1.0	**5.3**	**14**
TR-10-1.5	11/2/2011	1.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<1.0	**4.8**	**32**
TR-12-1.5	11/2/2011	1.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<1.0	**1.3**	-- [4]
TR-14-1.5	11/2/2011	1.5	<0.005	0.035	<0.005	<0.005	<0.005	<0.05	<1.0	<1.0	<5.0
TR-17-1.5	11/2/2011	1.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<1.0	**1.1**	<5.0
TR-27-3.5	12/6/2011	3.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<1.0	**30**	**53**
TR-27-7.5	12/6/2011	7.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<1.0	<1.0	<5.0
TR-28-3.5	12/6/2011	3.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<1.0	**16**	**22**
TR-28-7.5	12/6/2011	7.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<1.0	<1.0	<5.0
TR-29-3.5	12/6/2011	3.5	<0.005	0.012	<0.005	<0.005	<0.005	<0.05	<1.0	**2.7**	**5.5**
TR-29-7.5	12/6/2011	7.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<1.0	**5.9**	**8.8**
Ground Zero Analysis Subsurface Investigation [5]											
D2-2'	4/15/2013	0.7	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
D2-3'	4/15/2013	1.7	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
D2-4'	4/15/2013	2.7	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
D3-3.5'	4/15/2013	0.75	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
D3-4.5'	4/15/2013	1.75	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
D3-5.5'	4/15/2013	2.75	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
E2-2.5'	4/15/2013	0.6	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
E2-3.5'	4/15/2013	1.6	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
E2-4.5'	4/15/2013	2.9	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
GZA1-3.0'	4/16/2013	2.1	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
GZA1-5'	4/17/2013	4.1	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
GZA2-3.0'	4/16/2013	2.0	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
GZA2-5'	4/17/2013	4.0	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
GZA3-3.0'	4/16/2013	2.0	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--
GZA3-5'	4/17/2013	4.0	<0.0018	<0.0039	<0.0018	<0.0011	<0.0026	--	--	--	--

Notes
1. Soil samples were collected by Treadwell & Rollo of San Francisco, California and analyzed by McCampbell Analytical, Inc., of Pittsburgh, California, for volatile organic compounds using USEPA Method 8260B and total petroleum hydrocarbons using USEPA Method 8015B. Only the analytical results for selected compounds are presented; no other compounds were detected. For a full list of target analytes, see the laboratory reports (T&R, 2012).
2. "<" indicates constituent not detected above the laboratory reporting limit shown.
3. Results in **bold** indicate that the analyte was detected above the laboratory reporting limit.
4. "--" indicates the compound was not a target analyte
5. Soil samples were collected by Ground Zero Analysis, Inc, of Escalon, California and analyzed by Torrent Laboratory, Inc., of Milpitas, for volatile organic compounds using USEPA Method 8260B. Only the analytical results for selected compounds are presented; no other compounds were detected. For a full list of target analytes, see the laboratory reports (GZA, 2013).

Abbreviations
bgs = below ground surface
PCE = Tetrachloroethene
TCE = Trichloroethene
cDCE = cis-1,2-Dichloroethene
tDCE = trans-1,2-Dichloroethene
VC = Vinyl chloride
TPHg = Total Petroleum Hydrocarbons in the Gasoline Range
TPHd = Total Petroleum Hydrocarbons in the Diesel Range with Silica Gel Clean-Up
TPHmo = Total Petroleum Hydrocarbons in the Motor Oil Range with Silica Gel Clean-up

FIGURES



CSOU = Commerical Street Operable Unit
SDOU = Stewart Drive Operable Unit

N
W E
S

0 350 700
Feet

HALEY & ALDRICH

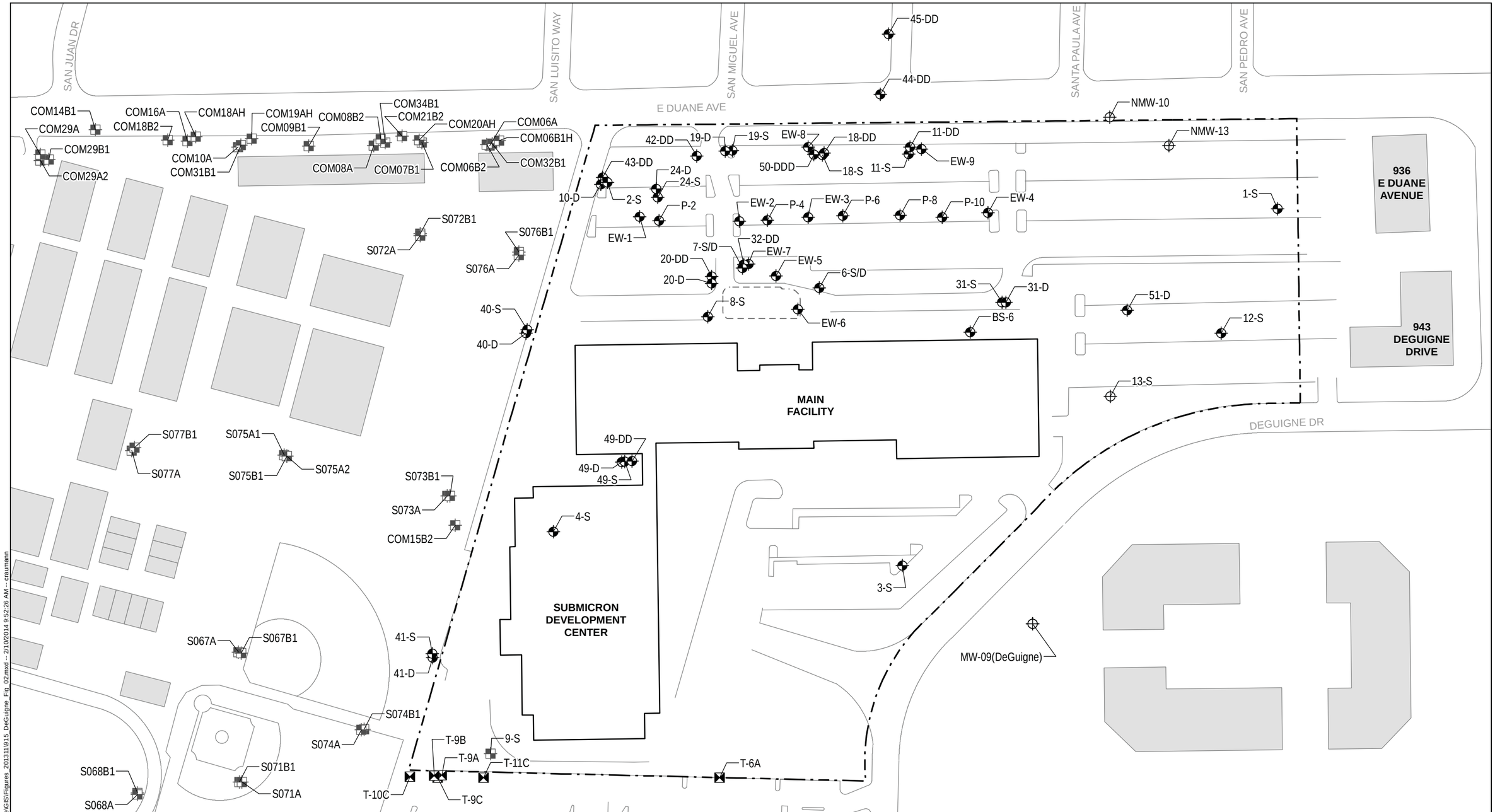
915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

SITE LOCATION MAP & VICINITY

SCALE: AS SHOWN
JANUARY 2014

FIGURE 1

G:\39770_AMD_915 DeGuigne Drive\GLOBAL\GIS\915_DeGuigne_Fig_01_011413.mxd



LEGEND

MONITORING WELLS

- AMD
- MOHAWK
- PHILIPS
- TRW MICROWAVE

- SITE BOUNDARY
- CURRENT ON-SITE BUILDING
- OTHER BUILDING
- APPROXIMATE EXTENT OF EXCAVATION AT FORMER PAD C ACID NEUTRALIZATION SYSTEM

N W E S

0 150 300

SCALE IN FEET 1 INCH = 150 FEET

HALEY & ALDRICH

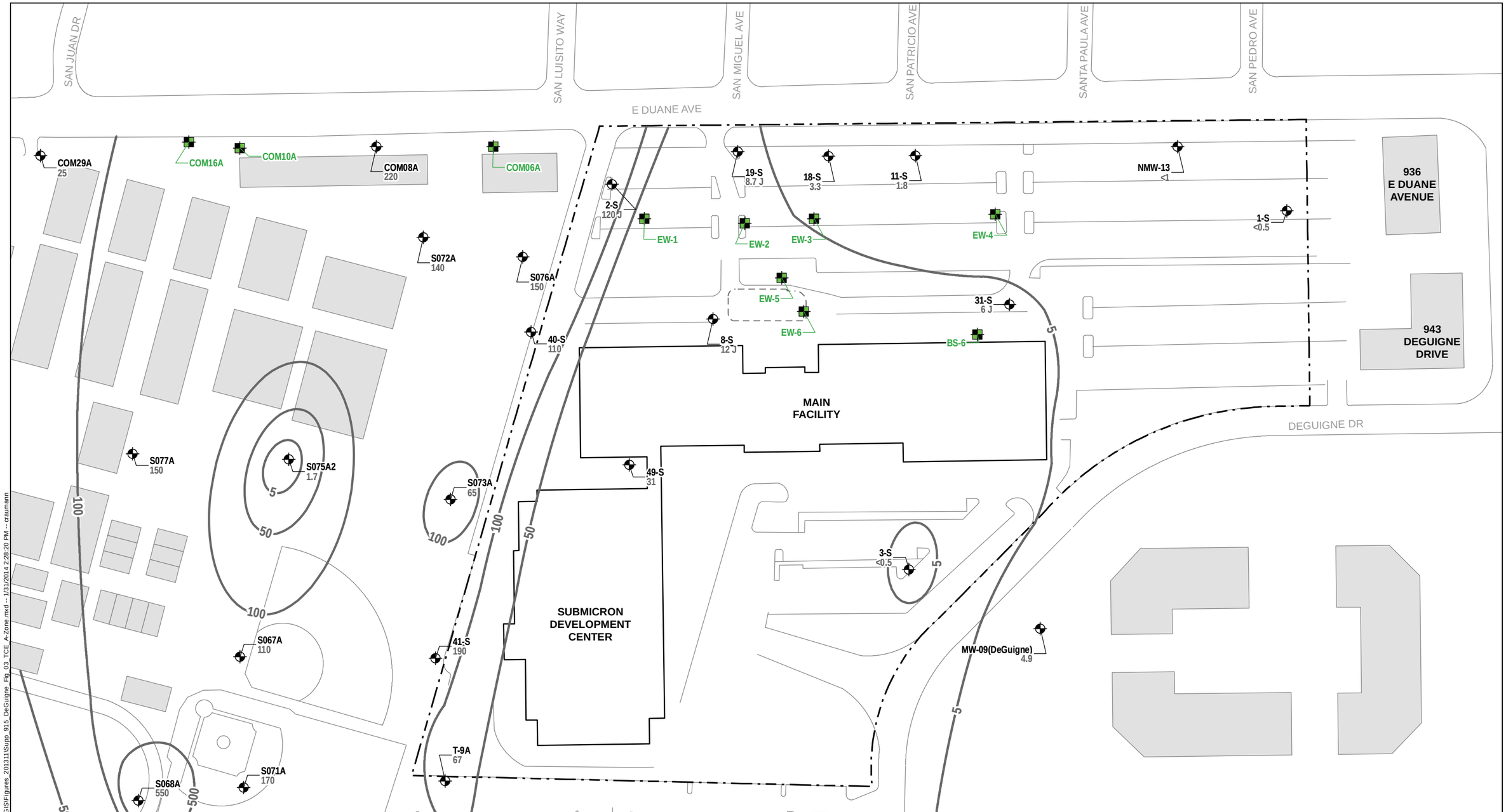
915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

SITE PLAN AND VICINITY

NOVEMBER 2013

FIGURE 2

G:\39751_AMD_Former 901-902 Thompson Place\GIS\Figures_20131\915_DeGuigne_Fig_02.mxd -- 2/10/2014 9:52:26 AM -- craumann



A-ZONE MONITORING WELL WITH TCE CONCENTRATION (µg/L)

EXTRACTION WELL

5 TCE CONCENTRATION CONTOUR

SITE BOUNDARY

CURRENT ON-SITE BUILDING

OTHER BUILDING

APPROXIMATE EXTENT OF EXCAVATION AT FORMER PAD C ACID NEUTRALIZATION SYSTEM

NOTES
1. CONTOURS ARE BASED ON INTERPRETATION OF MONITORING-WELL DATA, PREVIOUS SITE-INVESTIGATION DATA, AND CURRENT UNDERSTANDING OF HYDROGEOLOGIC CONDITIONS. THEY ARE PROVIDED FOR CLARITY AND ARE NOT INTENDED TO IMPLY CERTAINTY.
2. EW-1 THROUGH EW-6 ARE SCREENED ACROSS BOTH THE A AND B1 ZONES.

TCE = TRICHLOROETHENE
µg/L = MICROGRAMS PER LITER
J = ESTIMATED CONCENTRATION

N W E S

0 150 300
SCALE IN FEET 1 INCH = 150 FEET

HALEY & ALDRICH

915 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

A-ZONE TCE CONTOURS
OCTOBER/NOVEMBER 2013

JANUARY 2014

FIGURE 3

G:\39751_AMD_Former 901-902 Thompson Place\GIS\Figures_201311\Supp_915_DeGuigne_Fig_03_TCE_A-Zone.mxd -- 1/31/2014 2:28:20 PM -- graumann

APPENDIX A

Limited Phase II Environmental Site Assessment
(Treadwell& Rollo, 2012a) And Human Health Risk Assessment
(Treadwell & Rollo, 2012b)

LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT
915 DeGuigne Drive
Sunnyvale, California

Spansion, LLC
Sunnyvale, California

20 January 2012
Project No. 731579702

Treadwell&Rollo
A LANGAN COMPANY

Treadwell&Rollo
A LANGAN COMPANY

20 January 2012
Project 731579702

Mr. Ajay Changaran
Spansion, LLC
915 DeGuigne Drive, MS 212
Sunnyvale, CA 94088

Subject: Limited Phase II Environmental Site Assessment
915 DeGuigne Drive
Sunnyvale, California

Dear Mr. Changaran:

Treadwell & Rollo is pleased to present this *Limited Phase II Environmental Site Assessment* for the property located at 915 DeGuigne Drive in Sunnyvale, California. In performing this investigation, we have endeavored to observe that degree of care and skill generally exercised by other consultants undertaking similar studies at the same time, under similar circumstances and conditions, and in the same geographical area.

We appreciate the opportunity to assist you with this project. If you have any questions or need any information clarified, please call Josh Graber at (415) 955-5286.

Sincerely yours,
Treadwell & Rollo, A Langan Company

PROFESSIONAL GEOLOGIST
DORINDA SHIPMAN
NO. 215
CERTIFIED HYDROGEOLOGIST
STATE OF CALIFORNIA

Joshua D. Graber, REA I
Senior Project Manager

Dorinda C. Shipman, PG, CHG
Senior Associate/Vice President

731579702.03 MP

cc: Mr. Max Shahbazian, PG – California Regional Water Quality Control Board

Treadwell&Rollo
A LANGAN COMPANY

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LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT
915 DEGUIGNE DRIVE
Sunnyvale, California

1.0 INTRODUCTION

This report presents the results of Treadwell & Rollo's (T&R) *Limited Phase II Environmental Site Assessment* (ESA) for the property located at 915 DeGuigne Drive, Sunnyvale, California (Site). The Site location is illustrated on Figure 1. The limited Phase II ESA was performed by Treadwell & Rollo for Spansion, LLC (Spansion), the current property owner. The scope of the Phase II ESA was developed based on the recognized environmental conditions (RECs) noted in T&R's Phase I ESA (T&R, 2011a) to evaluate environmental conditions which may affect the potential future rezoning and development of the Site for residential land use. The Phase II ESA was facilitated by Spansion to support the potential buyer's due diligence activities. We understand that the Site is currently being evaluated for rezoning from commercial/industrial to residential land use and future development into mixed-use commercial and residential units.

This investigation was performed in accordance with the Revised Work Plan for Soil and Soil Gas Sampling and Analyses (Work Plan, T&R, 2011b) dated 28 October 2011 and approved by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) via an email on 31 October 2011. Additional investigations were completed subsequent to the Work Plan submission. The scope of the additional investigations were described to the RWQCB in email correspondences and subsequently approved by the RWQCB via emails dated 18 November 2011, 2 December 2011, and 9 December 2011.

The Site was formerly an Advanced Micro Devices (AMD) semiconductor research and fabrication facility from 1974 until 2003. In 2003, AMD transferred the ownership to Fujitsu AMD Semiconductor Ltd (FASL), a joint venture of AMD and Fujitsu Ltd. FASL became Spansion, LLC in 2005, a separate corporation from AMD specializing in flash memory devices. Spansion continues to operate at the Site today. The Site was listed on the National Priority List (NPL) in 1982 and is a United States Environmental Protection Agency (EPA) Superfund Site. Cleanup of the site commenced in 1981, and in 1982 approximately 5,570 cubic yards of contaminated soil was excavated from the former solvent UST area located to the north of the AMD 915 building (Figure 2). Cleanup of groundwater has been performed since 1982. Remedial operations at the Site are regulated by the RWQCB (with EPA oversight)

under RWQCB Order No. 91-101 (Order). This Order requires final remedies that include contaminated soil excavation and offsite disposal, groundwater extraction and treatment, and a deed restriction prohibiting the use of the upper groundwater aquifer as a drinking water source.

To assess the current environmental conditions at the Site for due diligence purposes, Treadwell & Rollo collected soil vapor, soil, and groundwater samples on the Site. The results of these samples were evaluated to assess the nature and extent of contamination at the Site as it relates to potential redevelopment. Analytical results for samples were compared with Environmental Screening Levels (ESLs) established by the RWQCB. For comparison purposes, the EPA's Regional Screening Levels for residential soil have been added to Tables 2 and 3. Soil vapor results were evaluated with respect to soil vapor ESLs for potential vapor intrusion to residential land uses. Soil results were evaluated with respect to direct exposure soil ESLs for residential land use. Groundwater samples were evaluated with respect to groundwater ESLs where groundwater is a potential concern for vapor intrusion.

2.0 BACKGROUND

2.1 Site Description

The Site location and plan are presented as Figures 1 and 2, respectively. The Site encompasses approximately 24.5 acres and is occupied by three commercial buildings, parking areas and landscaping. Two low-rise buildings, the 915 main building and former AMD Submicron Development Center (SDC) building are located in the central and southwestern portions of the Site (Figure 2). The third building, identified as 943 DeGuigne Drive, is located in the eastern portion of the Site. Currently, the AMD 915 main building is used for research and development and general corporate administration. The SDC building, which was used as a fabrication and semi-conductor manufacturing unit until 2009, is not currently in use; however, equipment previously used is currently stored in this building. The 943 DeGuigne Drive building is currently vacant and was previously utilized as a chemical storage warehouse for Spansion.

The remainder of the Site is predominantly occupied by paved parking areas and landscaping. East Duane Avenue bounds the Site to the north with residences present to the north of East Duane Avenue. Fair Oaks Park and City of Sunnyvale School District property are located to the west of the Site. Industrial and commercial properties are located immediately to the south of the Site. A residential

development is under construction to the east and northeast of Site, southeast of the intersection of DeGuigne Avenue and East Duane Avenue. Three Superfund sites (TRW Microwave Site, Former AMD 901/902 Thompson Place Site, and the Phillips Site) are located in close proximity to the Site in the hydraulically upgradient (southerly) direction and have been identified by the RWQCB as contributors to groundwater contamination on-site. There are several other Superfund sites in the vicinity that also contribute to regional groundwater contamination being cleanup by others.

Trichloroethylene (TCE), other solvents, and acids were used at the Site for cleaning and degreasing. In 2003, AMD transferred Site ownership to Spansion, a joint venture of Fujitsu and AMD. AMD is currently responsible for the environmental cleanup and monitoring at the Site.

Volatile organic chemicals (VOCs) consisting of chlorinated solvents have previously been identified in soil and the two uppermost hydrologic units (referred to as the A- and B-aquifers) at the Site due to releases from onsite underground storage tanks. Various mitigation measures have been implemented at the Site since the early-1980's, including source removal, soil excavation, groundwater extraction and treatment. Residual VOCs in groundwater are present at the Site.

2.2 Summary of Previous Investigations

AMD discovered contaminated soil and groundwater at the Site in 1981. Starting in 1981, AMD reportedly removed 27 underground storage tanks (USTs). During the removal of USTs at the Site, contamination was discovered in the vicinity of the photoresist stripper tank located north of Building 915, in the vicinity of the acid neutralization system (ANS). VOCs containing chlorinated solvents were detected in soil and groundwater samples collected from this area. In 1981, International Technology Inc. removed the leaking 1,500 gallon photoresist stripper tank and about 300 cubic yards of contaminated soil.

In 1983, an additional release was noted when the ANS, consisting of three USTs, was taken out of service. Between 1982 and 1983 approximately 5,570 cubic yards of TCE-affected soil were excavated from an area north of the main building. The dimensions of excavation were noted to be about 125 feet long by 55 feet wide (Figure 2). The depth of excavation varied, ranging in depth from approximately 15 to 28 feet below ground surface (bgs). Sand-cement cutoff walls were installed around the perimeter of the excavation depths between approximately 28 to 30 feet bgs to assist with dewatering and to provide structural support for the excavation. The target excavation depth was determined in the field by

collecting sidewall samples. All soil material containing greater than 1,000 micrograms/kilogram (µg/kg) was removed from the excavation. After reaching the target excavation depth, the excavation was backfilled with sand-cement slurry to a depth of approximately 5 feet bgs. The upper 5 feet of the excavation was backfilled with an imported sand fill.

AMD installed a groundwater extraction and treatment (GWET) system in 1982. The GWET system has undergone modifications since its inception in 1982 and continues to operate to this day. The major components of the current GWET are:

1. A network of nine on-site extraction wells, EW-1 through EW-9. Wells EW-1 through EW-6 extract groundwater from shallow aquifers A and B1. Wells EW-7, EW-8 and EW-9 extract groundwater from deeper aquifer B2.
2. Six basement dewatering sumps, with the majority of extraction performed by Sump 6, located in the easternmost portion of the AMD 915 building.
3. An on-site treatment system consisting of two packed-tower air-strippers and a 40,000 pound granular activated carbon vessel for removing VOCs (Figure 2). The air stripping/liquid phase carbon adsorption system was installed in 1984 to treat the extracted groundwater. The air stripper removes the majority of VOCs from the groundwater. After passing through the air stripper, the water is further treated using the carbon absorption system.
4. Off-site extraction wells operated by Philips, as part of the Off-Site Operable Unit (OOU), also discharge to the Site GWET system.
5. The treated groundwater is discharged to a Site storm drain, which ultimately discharges to the Calabazas Creek under a National Pollutant Discharge Elimination System (NPDES) permit (No. CA0028797).

The commingled groundwater plume originating onsite (and contributed to by the upgradient AMD Thompson Place, TRW and Phillips plumes) extends north of Duane Avenue to Highway 101, west to San Juan Drive and east to San Pedro Avenue. A baseline public health assessment including all 3 media (soil, groundwater and air) was completed for the Site by the California Department of Health Services (CDHS) under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) in 1990 under RWQCB oversight. The assessment concluded that the Site did not pose an unacceptable risk provided that groundwater was not used for drinking or domestic purposes. The

shallow groundwater beneath the site flows in a north to northeasterly direction and is not used for drinking or other purposes. The City of Sunnyvale supplies drinking water to the Site and its vicinity (EPA, 2009b).

Spansion removed a 2,500-gallon diesel UST in June 2011. The UST was located along the western side of the SDC building as shown on Figure 2 and was associated with an emergency generator. As per the report by Sierra Environmental, the tank showed no evidence of leaking and soil samples were below RWQCB ESLs for shallow soil. A groundwater sample was collected from the pit of the excavation and TPHd was detected at a concentration of 1.27 mg/L, which exceeded the RWQCB ESL for groundwater. It should be noted that the groundwater sample did not have the silica gel cleanup method run on the sample.

In October 2011, AMD completed an indoor and ambient air sampling event at the Site. The results of this indoor and ambient air sampling are detailed in *Report of Results – Indoor Air Sampling, 915 DeGuigne Drive, Sunnyvale, California* by AMEC dated October 2011. Eighteen indoor air and five ambient air samples were collected from the 915 building. Several VOCs were detected in both indoor air and ambient air samples. No compounds detected in indoor air samples exceeded the EPA Region 9 Regional Screening Levels (RSLs) for industrial use and therefore, no unacceptable risk to current Site occupants was noted (AMEC, 2011). However, TCE was detected at concentrations exceeding the RSLs for residential air in five indoor air samples (AMEC, 2011).

2.3 Geology and Hydrogeology

Subsurface conditions are based on data collected by this Phase II ESA and the numerous previous environmental investigations completed at the Site. The Site is located in the flatland area of the San Francisco Bay and is underlain by interbedded clay and sand units. Based on previous remedial investigations and well installation activities, approximately one to eight feet of clay (dark brown to black and stiff) with varying amounts of sand and silt underlie the site. A sand unit consisting of clayey/silty sand underlies the clay unit. Groundwater is present at approximately 9 to 13 feet bgs.

The soil beneath the Site exhibits a high degree of heterogeneity consisting of clay/silt and sand/gravel types horizons. Due to subsurface heterogeneity, differing vertical depth interpretations of the four water-bearing zones are common. Groundwater-bearing zones encountered beneath the Site have been historically characterized as follows:

- A-aquifer are typically screened from between 10 to 15 feet bgs;
- B1-aquifer are typically screened from between 17.5 and 30 feet bgs;
- B2-aquifer are typically screened from between 45 to 55 feet bgs; and
- B3-aquifer are typically screened from between 70 to 90 feet bgs (Geomatrix, 2008).

Groundwater is expected to flow generally northward, toward San Francisco Bay, following the area topography.

2.4 Phase II Work Plan and Addendums

Treadwell & Rollo prepared a *Work Plan for Soil and Soil Gas Sampling and Analyses, 915 DeGuigne Drive* dated 28 October 2011 (work plan) to collect additional Site data to fill the data gaps in the Site Conceptual Model that was built using data previously collected by others at the Site and based on the RECs documented in the Phase I ESA. The work plan outlined proposed soil and soil vapor sampling and analysis activities on Site. The RWQCB approved the work plan via an email sent on 31 October 2011. Field activities consisting of soil and soil vapor sampling were performed from 1 through 4 November 2011. Based upon the results of the initial soil and soil vapor sampling, additional investigations involving soil, soil vapor and groundwater sampling were performed on 15 November 2011, 6 December 2011 and 13 December 2011. Prior to performing the additional sampling and analysis, we detailed our proposed collection and analytical methods to the RWQCB and obtained approval.

3.0 OBJECTIVE AND SCOPE OF SERVICES

The objectives of the Phase II ESA included collecting soil and soil vapor samples from sub-slab and exterior locations across the Site, grab groundwater samples, and groundwater samples from the on-site monitoring wells. The samples were analyzed by State of California-certified analytical laboratories.

The scope of services included:

- Prepare a work plan and a site-specific health and safety plan;
- Collect soil vapor samples from 25 locations and sub-slab soil vapor samples at 10 locations for VOCs analysis. Soil and sub-slab vapor samples were collected in general accordance with the sampling protocol outlines in the California Department of Toxic Substances Control's (DTSC) documents titled "*Advisory – Active Soil Gas Investigation"* dated March 2010 and "*Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air"* dated October 2011;
- Collect soil samples at 28 locations for organochlorine pesticides (OCPs) analyses. Selected soil samples were also analyzed for chlorinated herbicides, California assessment manual (CAM) 17 metals; hexavalent chromium; total petroleum hydrocarbons (TPH) as gasoline (TPHg), diesel (TPHd), and motor oil (TPHmo), VOCs, and polychlorinated biphenyls (PCBs) analyses;
- Collect four grab groundwater samples for TPHg, TPHd, TPHmo and VOCs analyses;
- Collect five groundwater samples from select on-site monitoring wells for OCP analysis; and
- Prepare this report.

4.0 FIELD INVESTIGATIONS

Soil vapor, sub-slab vapor, soil, and groundwater samples were collected at the Site between 31 October and 13 December 2011. The specific analyses requested for each sample media are detailed in Sections 4.1, 4.2, and 4.3 below.

Prior to sampling, underground utilities were located and sampling locations were cleared. T&R marked each sampling location and notified Underground Services Alert (USA). In addition to notifying USA, Cruz Brothers Locators, an underground utility locator of Scott's Valley, California, performed a subsurface utility survey to clear each boring location for underground utilities. Field activities were performed on the following schedule.

- Between 1 and 4 November 2011, TEG of Northern California, of Rancho Cordova, California (TEG) advanced 25 soil borings and 7 sub-slab vapor points. Prior to drilling, sample locations outside of Site buildings were cored by Osborne Concrete Coring of

Fremont, California. Once the asphalt layer was removed, T&R hand-augered to a depth of 3 ft bgs to clear any underground utilities. Once cleared of utilities, TEG used direct-push drilling technology to facilitate the collection of various media at specified depths. Twenty-five soil borings (TR-1 through TR-25), one grab groundwater boring (TR-26), and seven sub-slab vapor points (SS-01 through SS-07) were advanced by TEG. Six soil samples, one grab groundwater sample, 25 soil vapor samples and seven sub-slab vapor samples were collected by T&R during this phase of investigation. The analyses performed on the collected samples are detailed in the sections below.

- On 15 November 2011, T&R conducted an additional phase of the investigation to assess organochlorine pesticides (OCPs) and metals concentrations in shallow soil. On 15 November 2011, Vironex, Inc. of Concord, California (Vironex) advanced 19 shallow soil borings to a depth of 3 feet bgs using direct push drilling technology. Three samples were collected from each boring.
- On 6 December 2011, TEG advanced three sub-slab vapor points (SS-08 through SS-10) for the collection of sub-slab vapor samples and three soil borings (TR-27 through TR-29) for the collection of soil at planned depths and grab groundwater samples at the SDC. These additional samples were collected to evaluate elevated benzene concentrations detected in the sub-slab vapor concentrations at location SS-02.
- On 13 November2011, T&R sampled five Site groundwater monitoring wells (03-S, 11-S, 19-S, 31-S, and 49-S). The groundwater samples were analyzed for OCPs by EPA Method 8081. Groundwater samples were collected to evaluate potential OCP impacts to groundwater at the Site.

Photographs taken during fieldwork are presented in Appendix A.

4.1 Soil Vapor and Sub-slab Vapor Sampling

Soil vapor and sub-slab vapor sampling was performed in accordance with DTSC documents titled "*Advisory—Active Soil Gas Investigation" dated March 2010 and "Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air*" dated October 2011.

Soil vapor samples were collected from 25 locations outside of Site buildings and sub-slab vapor samples were collected from 7 locations for a total of 32 samples collected between 1 and 4 November 2011. Three additional sub-slab vapor points (SS-08 through SS-10) were sampled on 6 December 2011 to further evaluate the elevated benzene concentrations detected in soil vapor collected from SS-02, which was located in the northeastern portion of the SDC building.

Vapor sampling locations were selected preferentially near areas of known impacts from past on-Site and up-gradient releases, where elevated concentrations of VOCs had reportedly been detected in groundwater. Sampling locations were also positioned across the Site to characterize soil gas concentrations in a variety of conditions and locations. All soil vapor and sub-slab sampling locations are illustrated on Figure 2.

Soil vapor sampling

Soil vapor samples were collected at outdoor locations using temporary soil vapor wells. After hand-augering to a depth of 3 feet bgs, direct push sample rods were advanced to the proposed soil vapor sample depth. The proposed sampling depth was five feet bgs; however, due to the predominant presence of clay in the upper five feet of subsurface soil, a vacuum test was used during field activities to determine the most appropriate completion depth of the soil vapor well. The vacuum test was performed by incrementally advancing a 1-inch diameter steel rod equipped with a retractable, disposable tip. The vacuum test was first conducted at five feet bgs by advancing the steel rod to five feet bgs, pulling up slightly to open the disposable tip, and applying a vacuum to the system with a syringe at a sealed connection with the top of the rods. If the vacuum test indicated that a sustainable sampling rate of 100 to 200 milliliters per minute (mL/min) could be maintained at a vacuum pressure of less than 100 inches-water, then the vapor well was installed at that depth. If the vacuum exceeded approximately 100-inches-water, the steel rod was advanced to approximately 6.5 feet bgs, and finally, to approximately eight feet bgs repeating the vacuum test at each depth. TEG then installed the vapor well at the depth with the lowest sustainable vacuum indicated by this testing. Final sample depths are shown in Table 1 and TEG field logs are included in Appendix B.

TEG constructed temporary soil vapor wells at the selected depth at each boring location. Nylaflow® tubing with a 1/8-inch inside diameter was connected to a nylon soil vapor screen with a 1.5-inch length and 3/8-inch diameter. Monterey, kiln-dried sand with 30% porosity was used to install a two foot filter

pack, based on DTSC guidance, at the bottom of the vapor well borehole. The 1.5-inch screen was placed at the midpoint of the sand filter pack. A 3-inch layer of dry bentonite chips was placed above the filter pack followed by hydrated bentonite to the ground surface. The hydrated bentonite serves to create a seal around the sample collection tubing to prevent ambient air intrusion into the soil vapor sample. A closed valve was installed at the end of the sample-collection tubing at the surface and the well system was allowed to equilibrate for at least thirty minutes before purging and sampling.

Two types of sampling manifolds were used during this field investigation as provided by the two analytical laboratories used. The sampling manifolds consisted of 1/8-inch stainless steel or Teflon tubing, a valve for connecting a luer-lock syringe for purging, a 150 mL/min or 200 mL/min flow regulator, and two vacuum pressure gauges. One pressure gauge was installed between the flow regulator and the well head to monitor the vacuum maintained during the shut-in test and to measure the vacuum applied to the vapor well, and the other was placed after the flow regulator to measure the vacuum pressure within the sample canister. Samples were collected in 1 liter (L) Summa canisters with an initial vacuum of 30 inches-Hg. New tubing was used for each sample collection, with the exception of the duplicate samples for which the same manifold was used for both the primary and duplicate samples.

A shut-in test was performed after the construction of each sampling manifold. The shut-in test consisted of closing the valves at the vapor well head and on the Summa canister, then using a syringe to create a 14 to 20-inches-Hg vacuum within the sampling system. If the vacuum was maintained with less than 10% deviation for five minutes, then the manifold was determined to be sufficiently sealed. Following a successful shut-in test, the valve to the vapor well was placed under a helium shroud and opened.

The helium shroud allows an atmosphere of known helium content to be maintained above the vapor well, which allows for the detection of leaks of ambient air into the vapor well and sample. The helium content within the shroud was maintained at approximately 20% and monitored with a portable helium and hydrogen detector during purging and sampling. The shroud consisted of a clear plastic box with ports for connecting a helium compressed gas cylinder and the helium detector.

A single purge volume was calculated by adding the pore space volume associated with the filter pack and the volume of all of the tubing within the well and in the sampling manifold. In accordance with DTSC sampling guidelines, approximately three times the single purge volume was purged from the system, using a 60 mL luer-lock syringe. The first and last 50 mL of gas that was purged was analyzed with the portable helium detector to ensure that there were no ambient air leaks into the sampling train. The vapor samples were then collected into Summa canisters until a residual vacuum of approximately 5-inches-Hg was left. The canisters remained under the residual vacuum during transport from the sampling location to the analytical laboratory to indicate if any leaks of ambient air into the canister occurred. After sampling and closure of the Summa canister, an additional syringe of gas was pulled from the sampling train and analyzed for helium using the portable detector. Samples were delivered to the analytical laboratories under chain-of-custody (COC) protocol and were analyzed for VOCs by EPA Method TO-15. Samples were also analyzed for helium to quantify any intrusion of ambient air into the vapor well during sampling and to confirm sample integrity for quality assurance/quality control (QA/QC) purposes. One duplicate soil vapor sample was collected at TR-01 for QA/QC purposes. The soil vapor samples were analyzed for VOCs via EPA Method TO-15 by McCampbell Analytical, Inc. (McCampbell) of Pittsburgh, California.

Following sample collection, each vapor well was properly abandoned. A split-spoon sampler was used to remove the sand filter pack. The borehole was then backfilled grouted to the surface with neat cement. This abandonment procedure was based on a 26 October 2011 verbal agreement with Peter Thiemann of the Santa Clara Valley Water District (SCVWD).

Sub-slab vapor sampling

Sub-slab vapor samples were collected beneath the former SDC building and 943 DeGuigne Drive (Figure 2). A total of seven sub-slab sample locations (five in the former SDC building and two in 943 DeGuigne) were sampled between 1 and 4 November 2011. The sub-slab vapor sampling procedures were similar to those for soil vapor sampling with the following exceptions. TEG provided new sub-slab vapor points prior to installation. A hole was drilled in the concrete floor using a roto-hammer with a 5/8- or 3/4-inch drill bit at each sub-slab sampling location. The vapor sample point screen was connected to 1/8-inch nyla-flow tubing, placed approximately two inches below the bottom of the slab, and surrounded by a sand filter pack. Hydrated bentonite was placed above the filter pack to create a seal between the sampling tubing and the slab to prevent ambient air intrusion.

The slab thickness at 943 Deguigne was approximately 6-inches and at the former SDC building ranged from approximately 28- to 29-inches. The flow controllers used during sub-slab sampling were adjusted to approximately 50 mL/min by CalScience, as specified in the DTSC March 2010 guidance document. One duplicate sample was collected at vapor sample point SS-05 for QA/QC purposes. After sampling was complete, the sample point holes in the slab were patched by TEG using neat cement.

On 6 December 2011, 3 additional sub-slab vapor points (SS-08 through SS-10) were installed by TEG in the vicinity of sample location SS-02 following the procedures outlined above. The sub-slab vapor points were installed inside the SDC building in the north, south and west directions from the previous boring SS-02 to further evaluate elevated benzene concentrations detected at this location (Figure 2). The sub-slab vapor samples were analyzed for VOCs via EPA Method TO-15 by CalScience Environmental Laboratories, Inc. (CalScience) of Garden Grove, California.

4.2 Soil Sampling

Soil samples were collected between 1 and 4 November 2011 at six locations for chemical and physical analyses. Soil samples collected for chemical analyses were intended to identify compounds present in soil that would require special handling and disposal during future development at the Site. The initial soil samples were collected at approximately 1.5 feet bgs using a hand auger and/or slide hammer with new 2-inch stainless steel tubes. Once collected, the ends of the sampling tubes were covered with Teflon sheets, sealed with plastic end caps, and stored in a cooler on ice until delivery to McCampbell for analysis under COC protocol. Sampling equipment was decontaminated prior to use and between each sampling location. The soil samples were analyzed for: OCPs; chlorinated herbicides; California assessment manual (CAM) 17 metals; hexavalent chromium; total petroleum hydrocarbons (TPH) as gasoline (TPHg), diesel (TPHd), and motor oil (TPHmo); and polychlorinated biphenyls (PCBs).

Six soil samples were also collected at depths of two to three feet bgs for analysis of physical properties for potential use in Johnson-Ettinger (J/E) modeling. These analyzed properties included moisture content, bulk density, plasticity, and particle size distribution. These samples were collected using a slide hammer with 2.5-inch diameter stainless steel tubes which were then sealed with Teflon sheets and tight-fitting plastic end caps. Three samples from three locations were also collected for plasticity analysis at approximately 2.5 feet bgs. Samples for plasticity analysis were transferred from a hand auger to plastic zipper-top bags. All samples were delivered to Signet Testing Laboratories,

Hayward, California under COC protocols. The physical property analytical results associated with these samples are not discussed in this report but may be used in future documents, if J/E modeling is required (Appendix C).

On 15 November 2011, Vironex advanced 19 soil borings adjacent to exterior soil gas sample locations where soil was not previously collected. Shallow soil samples were collected from the first six inches of soil beneath the asphalt and aggregate base (1 to 1.5 feet bgs); 1.5 to 2.0 feet bgs; and 2.5 to 3.0 feet bgs. All samples were stored on ice until they were delivered to McCampbell for analysis under COC protocols. The two shallowest samples (1.5 feet and 2.0 feet) were analyzed for low level OCPs using EPA Method 8081. Select samples were also analyzed for arsenic and vanadium using EPA Method 6010. The deepest samples were placed on hold pending laboratory analytical results. After obtaining and reviewing the soil analytical results from the uppermost two samples, deep samples (3.0 feet) at locations TR-04, TR-11, TR-22, and TR-23 were analyzed for low level OCPs.

On 6 December 2011, TEG advanced three additional direct push borings, TR-27 through TR-29, for the collection of soil and grab groundwater samples in the vicinity of previously sampled location SS-02 to further evaluate elevated benzene concentrations. Two of the three borings were located to the east of SS-02 and one boring was located to the north of SS-02 (Figure 2). Soil samples were collected from 3 to 3.5 feet bgs, 4.5 to 5 feet bgs, 7 to 7.5 feet bgs and 9.5 to 10 feet bgs. All samples were stored on ice and delivered to McCampbell for analysis under COC protocols. Two soil samples from each boring were analyzed for VOCs by EPA Method 8260B and TPHg, TPHd and TPHmo by EPA Method 8015.

4.3 Groundwater Sampling

A 2,500-gallon UST containing diesel fuel was removed by Spansion in June 2011. Following the removal of the UST, a groundwater sample was collected from the pit of the excavation by Sierra Environmental. The groundwater sample contained TPHd at a concentration of 1.27 mg/L, which exceeded its associated RWQCB ESL for groundwater (T&R, 2011). The groundwater sample did not have the silica gel cleanup method run on the sample. In an effort to assess potential TPHd impacts, one grab groundwater sample (TR-26) was collected on 3 November 2011 at the former UST location. Direct-push drilling was used to reach the groundwater sampling location. The depth to groundwater of 10.7 feet bgs was measured with an interface probe. A hydropunch sampler, with a temporary ¾-inch PVC screen, was then lowered to one foot below the groundwater surface for sampling. The groundwater sample was collected using

nylon tubing with a check valve below the water surface. Following collection, the sample was stored on ice and delivered to McCampbell under COC protocols for TPHd analysis by EPA method 8015 with silica gel clean-up. After sample collection, the boring was tremie grouted with neat cement as approved by the SCVWD. All drilling and sampling equipment was decontaminated prior to use.

On 6 December 2011, T&R collected 3 grab groundwater samples from borings TR-27 through TR-29 following the procedures described above. Depth to water measured at TR-27 was 11.2 feet bgs, 12.8 feet bgs at TR-28, and 11.1 bgs at TR-29. All grab groundwater samples were stored on ice and delivered to McCampbell for analysis for VOCs by EPA Method 8260B and TPHg, TPHd and TPHmo by EPA Method 8015. Boring logs from this investigation are presented in Appendix D.

On 13 December 2011, four Site monitoring wells were sampled by T&R. The monitoring wells sampled were 3-S, 11-S, 19-S, 31-S, and 49-S. The primary objective of the groundwater sampling activities was to evaluate if OCPs are present in groundwater at the Site. Groundwater samples were collected by purging at least three casing volumes of water from each well using disposable polyethylene bailers. A Myron Ultrameter II and HACH 30D instruments were used to measure water quality parameters (temperature, conductivity, pH, dissolved oxygen, and oxidation-reduction potential) in the field. Each groundwater sample was placed into an appropriately laboratory preserved container and placed in ice cooled chest for delivery to McCampbell under COC protocols. The groundwater samples were analyzed for OCPs using EPA Method 8081. Field sampling forms are provided in Appendix E.

5.0 ANALYTICAL RESULTS AND DATA EVALUATION

The laboratory analytical results are summarized on Tables 1 through 4. Copies of the laboratory analytical reports are presented in Appendix C. The analytical results are discussed in the following sections.

5.1 Soil Gas and Sub-Slab Sample Results

Soil gas and sub-slab analytical results are summarized in Table 1. Several VOCs, including tetrachloroethylene (PCE), TCE, cis-1,2-dichloroethylene (cis-1,2-DCE), vinyl chloride, benzene, toluene, ethylbenzene, total xylenes, 2-butanone, carbon disulfide, and other VOCs were detected at concentrations above laboratory reporting limits. Detected soil gas and sub-slab vapor results were

compared to the RWQCB's shallow soil gas vapor intrusion ESLs for residential land use (Table E, RWQCB, 2008). TCE, benzene, and cis-1,2-DCE were the only compounds detected above their respective ESLs. TCE was detected above its residential ESL (1,200 µg/m^3) in TR-09, TR-14, and TR-25 at concentrations of 3,300, 1,300, and 1,700 µg/m^3, respectively. Cis-1,2-DCE was detected above its ESL (7,300 µg/m^3) in TR-20 at a concentration of 11,000 µg/m^3. Benzene was also detected above its ESL (84 µg/m^3) in SS-02 at a concentrations of 250 and 260 µg/m^3. The laboratory re-analyzed the original SS-02 sample (250 µg/m^3) to confirm the benzene result, which appeared anomalous; however, the result was confirmed. Both results have been reported. No other soil gas detections were reported at concentrations exceeding their residential ESLs during this investigation.

The presence of TCE and cis-1,2-DCE detected in the soil vapor samples is consistent with the contaminants found in the groundwater beneath the Site. The concentrations of benzene, ethylbenzene, toluene and xylenes detected in SS-02 located in the northeastern corner of the SDC building were significantly higher than the concentrations detected in the other soil vapor and sub-slab vapor samples. Benzene was not detected above its ESL of 84 µg/m^3 in the remaining soil gas and sub-slab vapor samples at the Site. Since the benzene concentration reported from location SS-02 was significantly higher when compared to the rest of the Site results. Three additional sub-slab vapor samples (SS-08 through SS-10) were collected in the vicinity of SS-02 on 6 December 2011 to further evaluate the presence of benzene in this area. Benzene was detected in SS-08 and SS-09 at concentrations of 9.8 and 38 µg/m^3, respectively. However, these concentrations do not exceed the benzene residential ESL and are within the range of other benzene results reported across the Site.

5.2 Soil Results

Analytical results associated with the soil samples collected are presented on Tables 2 and 3. No TPHg, PCBs or chlorinated herbicides were detected at concentrations exceeding laboratory reporting limits in any of the soil samples analyzed.

5.2.1 Non-Metallic Compounds

The initial six soil samples collected were analyzed for TPHg, TPHd, TPHmo, VOCs, CAM 17 Metals, OCPs, PCBs, and chlorinated herbicides. OCPs consisting of p,p-DDD, p,p-DDE, p,p-DDT, dieldrin, and endrin were detected above laboratory reporting limits in the first six samples, which were collected from borings TR-03, TR-07, TR-10, TR-12, TR-14, and TR-17 at a depth of 1.5 feet bgs. Only TR-07 had OCP

concentrations above ESLs. P,p-DDE and dieldrin were detected in TR-07 at concentrations of 1.9 and 0.077 mg/kg, respectively. TPH-g, TPHd, TPHmo, VOCs, PCBs and chlorinated herbicides were not detected above the residential ESLs in any of the initial six soil samples. TPHd was reported at concentrations ranging from less than 1.0 to 5.3 mg/kg. TPHmo was reported at concentrations ranging from less than 5.0 to 32 mg/kg. Of the VOCs detected, acetone was detected in TR-07 at a concentration of 0.065 mg/kg and TCE was detected in TR-03 and TR-14 at concentrations of 0.013 and 0.035 mg/kg, respectively.

Organochlorine pesticides (OCPs)

In order to further evaluate the presence of OCPs in soil, additional shallow soil samples were collected at 19 locations on 15 November 2011. These sampling locations were adjacent to previously sampled exterior soil gas sample locations where soil samples were not previously collected. Soil samples at each location were collected at depths of 1.5, 2.0 and 3.0 feet bgs. Initially, the 1.5- and 2.0-foot samples were analyzed for OCPs and the 3.0-foot sample was placed on hold. The 3.0-foot samples were only analyzed if the 2.0-foot sample had OCP concentrations exceeding applicable ESLs.

Sixteen of the 19 sample locations had detectable concentrations of OCPs in either the 1.5- or 2.0-foot samples (Table 2). Of these 16 sample locations, eight locations had OCP exceedances at 1.5-feet or 2-feet or both. A summary of OCP exceedances are presented below and on Figure 3.

- P,p-DDE was detected above its ESL of 1.7 mg/kg in the 1.5 foot samples at locations TR-07 (1.9 mg/kg), TR-08 (2.0 mg/kg), TR-11 (1.7 mg/kg), TR-16 (3.2 mg/kg) and in the 2.0 foot sample at TR-23 (1.7 mg/kg).

- Dieldrin was detected above its ESL of 0.034 mg/kg in the 1.5 foot samples at TR-07 (0.077 mg/kg), TR-08 (0.099 mg/kg), TR-11 (0.065 mg/kg), TR-16 (0.15 mg/kg), TR-19 (0.034 mg/kg), and TR-20 (0.071 mg/kg) and in the 2.0 foot samples at TR-04 (0.074 mg/kg) and TR-11 (0.034 mg/kg).

Based upon the shallow soil results, the deepest (3.0 foot) samples at locations TR-04, TR-11, TR-22, and TR-23 were analyzed for OCPs. None of the 3.0 foot samples had OCP detections above ESLs.

Benzene

As discussed in Section 5.1, benzene was detected in sub-slab vapor sample SS-02 at a concentration significantly higher than the rest of the Site results. In order to evaluate this detection of benzene at SS-02, additional soil samples were collected from borings TR-27, TR-28, and TR-29 at depths of 3.5 feet and 7.5 feet. These samples were analyzed for TPHg, TPHd, TPHmo and VOCs. In these six samples, TPHd, TPHmo, and TCE were the only compounds detected above reporting limits. TPHd was detected in soil borings TR-27, TR-28, and TR-29 at concentrations ranging from 2.7 and 30 mg/kg. TPHmo was detected in samples TR-27-3.5, TR-28-3.5, TR-29-3.5, and TR-29-7.5 at concentrations ranging from 5.5 to 53 mg/kg. The highest TPHd and TPHmo concentrations were reported at 3.5 feet bgs in borings TR-27 and TR-28, respectively. TCE was the only VOC detected in these soil samples. TCE was detected in TR-29-3.5 at a concentration of 0.012 mg/kg. None of these sample results exceeded shallow soil ESLs for residential land use.

5.2.2 Metals

Soil samples from TR-3, TR-7, TR-10, TR-12, TR-14, and TR-17 were analyzed for CAM 17 metals and hexavalent chromium. Metal analytical results are summarized in Table 3. Of the 17 metals analyzed, 14 were detected in Site soil, including arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, vanadium and zinc. With the exception of arsenic, chromium and vanadium, all results were below the direct exposure soil ESLs for residential land use.

The original six samples collected on 1 and 2 November 2011 had arsenic concentrations ranging from 3.4 to 11 mg/kg and vanadium concentrations ranging from 49 to 75 mg/kg. The ESLs for arsenic and vanadium are 0.39 and 16 mg/kg, respectively. All detected concentrations exceeded the applicable ESLs. Total chromium was detected in the six soil samples analyzed and ranged from 46 mg/kg to 72 mg/kg and exceeded the hexavalent chromium ESL (9.4 mg/kg) but were below the trivalent chromium ESL (23,000 mg/kg). Therefore, hexavalent chromium analysis was performed on these samples. Hexavalent chromium was not detected above 9.4 mg/kg in any of the samples analyzed and therefore, the vast majority of chromium present in Site shallow soil appears to be trivalent chromium.

In order to further evaluate the arsenic and vanadium concentrations in the shallow soil, an additional 10 samples were collected and analyzed for arsenic and vanadium from the borings TR-02, TR-08, TR-09, TR-11, TR-13, TR-16, TR-19, TR-21, TR-22, and TR-25 (Figure 2) on 15 November 2011. The additional

sample locations were selected in different areas of the Site in an effort to determine if arsenic and/or vanadium concentrations were elevated in one area of the Site or if concentrations are associated with natural background concentrations.

Arsenic and vanadium concentrations in these samples ranged from 1.2 to 12 mg/kg and 24 to 82 mg/kg, respectively. These concentrations were similar to the concentrations detected in the previous samples. Arsenic and vanadium are naturally present in soils throughout the San Francisco Bay Area at concentrations above residential ESLs. Typical mean background concentrations of arsenic and vanadium in Bay Area soils reportedly range from 1.2 to 31 mg/kg and 22 to 90 mg/kg, respectively (ERM, 2006, Table A-2). The concentrations of arsenic and vanadium detected at the Site are within these typical Bay Area background concentrations. Therefore, the arsenic and vanadium concentrations detected in the Site soils are likely representative of naturally occurring background concentrations.

5.3 Groundwater Results

Grab groundwater samples were collected directly from borings TR-26 through TR-29. Groundwater samples were also collected from existing monitoring wells 03-S, 11-S, 19-S, 31-S and 49-S. The groundwater analytical results are presented in Table 4. A grab groundwater sample was collected from the former UST location (TR-26) and analyzed for TPHd with silica gel cleanup. TPHd was not detected above the laboratory's reporting limit (50 mg/L) in the grab groundwater sample collected from TR-26.

Three grab groundwater samples were collected from borings (TR-27, TR-28, and TR-29) east and north of the former SDC building to evaluate elevated benzene concentrations in soil gas from SS-02. TPHg, cis-1,2-DCE and TCE were the only compounds detected above laboratory reporting limits in the three grab groundwater samples collected on 6 December 2011. No compounds exceeded their respective ESLs for residential vapor intrusion concerns. The concentrations of cis-1,2-DCE and TCE exceed the ESLs for groundwater but these concentrations are consistent with concentrations found in groundwater at other locations across the site.

Groundwater samples were collected for OCP analysis from monitoring wells 03-S, 11-S, 19-S, 31-S and 49-S. No OCPs were detected above laboratory reporting limits in any of the samples collected from these wells.

6.0 DISCUSSION OF RESULTS

The results of our investigation indicate that soil at the Site is primarily composed of sandy silt and clay. Depth to first groundwater at the Site currently ranges from 9 feet to 13 feet bgs. The groundwater flow is north-northeast toward the San Francisco Bay. Chemicals detected at the Site included VOCs in soil, soil vapor and groundwater; TPH in soil and groundwater; and OCPs and metals in soil.

6.1 Soil Vapor

Soil vapor samples were collected at 25 locations (TR-1 through TR-25) spatially placed in a grid-like pattern across the Site at depths between 5 and 8 feet bgs and sub-slab vapor samples were collected at 10 locations (SS-01 through SS-10) inside the SDC and 943 buildings (Figure 2). Soil vapor and sub-slab samples were analyzed for the full suite of VOCs included in EPA Method TO-15. TCE and cis-1,2-DCE were the only chlorinated VOCs detected at concentrations exceeding their respective ESLs. TCE was detected above its ESL in samples from borings TR-9, TR-14, and TR-25. Borings TR-9 and TR-14 were located along the western boundary and TR-25 was located along the southern boundary of the Site. The elevated TCE concentrations detected in soil vapor correspond to elevated concentrations detected in groundwater, due to the volatilization of these compounds from groundwater into the vadose zone. TCE concentrations in the A-zone are generally highest along the western and southern boundaries of the Site due to up- and cross-gradient plumes migrating beneath the Site as shown on Figure 6 from the 2010 annual groundwater monitoring report by AMEC. The A-zone, B1-zone and B2-zone isoconcentration contours for TCE from the 2010 annual groundwater monitoring report by AMEC are presented in Appendix F.

Cis-1,2-DCE was detected at a concentration of 11,000 $\mu g/m^3$ in soil vapor at TR-20, which is located in the eastern portion of the Site. The elevated cis-1,2-DCE soil vapor detection corresponds with the elevated levels of cis-1,2-DCE in groundwater beneath this portion of the Site. The A-zone, B1-zone and B2-zone isoconcentration contours for cis-1,2-DCE from the 2010 annual groundwater monitoring report by AMEC are presented in Appendix F.

The elevated TCE and cis-1,2-DCE detected in soil vapor is likely associated with the volatilization of VOCs in groundwater into the vadose zone. The concentrations of these VOCs in soil vapor are consistent with the relative groundwater concentrations found beneath the Site.

Benzene was detected in one sub-slab sample (SS-02) above its ESL at a concentration of 250 µg/m^3. Sample SS-02 was located inside the northeastern portion of the SDC (former sub-fab) building (Figure 2). In addition to the elevated benzene concentration, ethylbenzene, toluene and total xylenes concentrations detected in SS-02 were also significantly higher than the concentrations detected in the remaining soil vapor and sub-slab vapor samples during this investigation. Since the benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations reported from location SS-02 were significantly higher when compared to the rest of the Site results and BTEX compounds were not historically analyzed and are not included in the annual sampling, additional sub-slab vapor samples, soil and grab groundwater samples were collected in the vicinity of SS-02. None of the additional samples contained any BTEX compounds at concentrations exceeding ESLs. The lack of significant detections in additional soil gas and soil and groundwater samples in the vicinity of SS-02 indicates that the initial BTEX contamination found in soil vapor at SS-02 is localized to the vicinity of that sampling location or potentially anomalous.

6.2 Soil

Soil samples collected from the Site have been analyzed for TPH, VOCs, OCPs, PCBs, chlorinated herbicides and CAM 17 metals. No VOCs, TPHg, PCBs or chlorinated herbicides were detected at concentrations exceeding laboratory reporting limits in any of the soil samples analyzed.

OCPs were detected above reporting limits in 32 of the 48 samples collected from 25 locations placed in a grid-like pattern to provide spatial coverage across the Site. Soil samples collected from eight of the 25 locations had exceedances above direct exposure soil ESLs for residential land use. Dieldrin and p,p-DDE were detected in the shallow soils at concentrations exceeding their respective residential ESLs. The concentrations of dieldrin detected above its ESL (0.034 mg/kg) ranged from 0.034 mg/kg in TR-11-2 and TR-19-1.5 to 0.15 mg/kg in TR-16-1.5. The concentrations of p,p-DDE detected above its ESL (1.7 mg/kg) ranged from 1.7 mg/kg in TR-11-1.5 and TR-23-2 to 3.2 mg/kg in TR-16-1.5. Figure 3 presents the distribution of OCPs detected in shallow (less than 3 feet bgs) soil at the Site.

The results indicate that OCPs are found primarily in the upper 2 feet of native soil and appear to be distributed throughout the Site at varying concentrations. The specific locations of OCP detections exceeding applicable ESLs are illustrated on Figure 3. Deeper samples collected at 3.0 feet did not indicate the presence of OCPs. The OCPs were likely either directly applied or

deposited by wind on the surface of the Site prior to its development in 1974. The OCP concentrations are likely limited to the upper 2 feet of soil due to the presence of the impervious parking lot, buildings and hardscape present on the Site and due to the tendency of OCPs to remain bound to fine-grained soils.

Results of soil metals analyses indicate that all metal concentrations were either below residential ESLs or within the range of naturally occurring background concentrations.

6.3 Groundwater

The grab groundwater sample collected at the former UST location (TR-26) did not contain TPHd above laboratory reporting limit.

TPHg, TCE, and cis-1,2-DCE were the only compounds detected above laboratory reporting limits in the three grab groundwater samples collected in the vicinity of SS-02. No compounds exceeded their respective residential ESLs for vapor intrusion concerns. The concentrations of cis-1,2-DCE and TCE exceed the ESLs for groundwater but these concentrations are consistent with other concentrations found in groundwater across the Site.

Groundwater samples collected from five Site monitoring wells did not have OCPs detected above reporting limits.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Treadwell & Rollo has performed a limited Phase II ESA for the property located at 915 DeGuigne Drive in Sunnyvale, California (Site). The Site is currently listed on the National Priority List, is an EPA Superfund Site, which is regulated by the RWQCB and the EPA under RWQCB Order No. 91-101, and has an extensive history of environmental investigation and remediation completed by AMD. This Order requires final remedies that include contaminated soil excavation and offsite disposal, groundwater extraction and treatment, and a deed restriction prohibiting the use of the upper groundwater aquifer as a drinking water source.

The Phase II ESA was completed to fill data gaps left by previous Site investigations performed for other purposes to evaluate environmental conditions at the Site, as they relate to the potential future development of the Site for residential land use. To assess environmental conditions, T&R reviewed previous environmental studies conducted by others and collected and analyzed samples of soil vapor, soil, and groundwater at the Site. The analytical results of these samples were compared with ESLs established by the RWQCB. Residential soil RSLs issued by the EPA were added for comparison purposes to Tables 2 and 3. Soil vapor results were evaluated with respect to soil vapor ESLs for potential vapor intrusion to residential land uses. Soil results were evaluated with respect to direct exposure soil ESLs for residential land use. Groundwater samples were evaluated with respect to groundwater ESLs where groundwater is a potential concern for vapor intrusion.

The extent of groundwater contamination at the Site has been well documented by others and former owner AMD is currently monitoring groundwater elevations and VOC concentrations annually and with Phillips, is continuing to operate an onsite pump and treat program. Recent VOC concentrations reported in groundwater exceed applicable cleanup standards listed in the Order; however, VOC concentrations in groundwater are generally below applicable residential ESLs for vapor intrusion concerns. The use of groundwater at the Site is restricted by the established deed restriction; therefore, the exposure pathway for groundwater is incomplete and the existing groundwater contamination should not be a barrier for redevelopment.

Soil gas concentrations were detected at levels exceeding residential soil gas ESLs. VOC concentrations in soil gas exceeding residential ESLs indicate that additional risk evaluation will be required and a vapor mitigation system may be required. Because all known or suspected soil contamination was previously removed by AMD, the soil vapors originate from the contaminated groundwater at the Site.

OCPs have been detected in the upper two feet of soil at the Site, likely a result of historical agricultural practices in the region. In some limited areas of the Site, the concentrations of OCPs detected exceed the direct exposure ESLs for residential land use (Figure 3). The presence of OCPs in shallow soil will require additional evaluation to determine if special handling of soil will be required during development.

In our opinion the Site has been sufficiently characterized to evaluate the issues associated with the planned redevelopment. However, Treadwell & Rollo recommends that a Human Health Risk Assessment

(HHRA) and a Soil Management Plan (SMP) be prepared for the Site to address the impacts discussed above prior to development. The HHRA will evaluate current risk levels and long-term mitigation measures for the Site that will be health protective for future Site construction workers, future Site occupants, and the environment. The HHRA should evaluate the Site-specific risk estimates for both carcinogenic and non-carcinogenic risks associated with the VOCs in soil gas and groundwater and OCPs in soil. The results of the vapor intrusion risk evaluation will be used to determine the appropriate level of vapor mitigation system (VMS) that may be required for the Site during redevelopment.

The SMP will provide recommended measures to mitigate environmental health and safety risks associated with the presence of contamination at the Site. The SMP will address any special handling procedures required based upon the future Site development plans. Contingency plans to be implemented during soil excavation if unanticipated features or hazardous materials are encountered will also be presented.

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TABLES

Treadwell&Rollo
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Table 1
Soil Vapor Analytical Results
915 DeGuigne Drive
Sunnyvale, California
Project: 731579702

Analyte			Acetone	Benzene	2-Butanone	Carbon Disulfide	Chloro-form	Chloro-methane	Cyclohexane	Dichloro-difluoro-methane	1,1-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Ethanol	Ethyl acetate	Ethyl-benzene	4-Ethyl-toluene	Heptane
RWQCB ESL [1] (residential land use)			**660,000**	**84**	**NE**	**NE**	**460**	**19,000**	**NE**	**NE**	**1,500**	**42,000**	**7,300**	**15,000**	**NE**	**NE**	**980**	**NE**	**NE**
Sample ID	**Date**	**Depth (bgs)**	**µg/m³**																
TR-01	11/02/11	8 feet	< 120	10	< 150	35	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	9	< 10	< 210
TR-01 (Dup)	11/02/11	8 feet	< 120	< 6.5	< 150	92	<9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210
TR-02	11/02/11	8 feet	< 120	10	< 150	24	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210
TR-03	11/01/11	5 feet	< 120	18	< 150	15	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210
TR-04	11/01/11	5 feet	< 120	< 6.5	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210
TR-05	11/01/11	5 feet	< 120	15	< 150	10	20	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210
TR-06	11/01/11	7.5 feet	< 120	14	< 150	58	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210
TR-07	11/01/11	5 feet	< 120	< 6.5	< 150	14	< 9.9	< 4.2	< 180	11	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210
TR-08	11/02/11	5 feet	< 120	< 6.5	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210
TR-09	11/02/11	5 feet	56	5.1	20	11	6.1	1.6	NA	< 2.5	< 2.0	< 2.0	55	4.7	NA	NA	5.2	2.5	NA
TR-10	11/03/11	6 feet	120	3.4	14	20	< 3.3	< 1.4	NA	< 3.3	< 2.7	< 2.7	2.8	< 2.7	NA	NA	5.5	< 3.3	NA
TR-11	11/03/11	8 feet	200	9.8	34	12	< 2.7	1.5	NA	3.3	< 2.2	< 2.2	< 2.2	< 2.2	NA	NA	10	< 2.7	NA
TR-12	11/02/11	5 feet	81	6.2	19	< 9.7	< 3.8	< 1.6	NA	< 3.9	< 3.2	< 3.1	< 3.1	< 3.1	NA	NA	14	4.6	NA
TR-13	11/03/11	5 feet	68	4.9	18	< 6.2	< 2.4	< 1.0	NA	< 2.5	< 2.0	< 2.0	16	< 2.0	NA	NA	4.8	< 2.5	NA
TR-14	11/02/11	6.5 feet	120	23	38	110	< 2.8	1.5	NA	2.9	< 2.3	3.9	110	5.1	NA	NA	16	5.1	NA
TR-15	11/02/11	5 feet	210	29	25	17	9.4	< 1.0	NA	3.3	< 2.0	< 2.0	15	< 2.0	NA	ND	10	3.4	NA
TR-16	11/02/11	5 feet	< 120	< 6.5	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	9.9	< 10	< 210
TR-17	11/02/11	5.5 feet	180	5.0	22	10	< 2.5	< 1.1	NA	< 2.5	< 2.1	< 2.0	12	16	NA	NA	7.6	3.7	NA
TR-18	11/03/11	5 feet	98	6.5	19	< 6.7	8.9	< 1.1	NA	3.2	2.9	< 2.1	88	3.2	NA	NA	6.3	3.5	NA
TR-19	11/03/11	5 feet	100	2.8	18	< 8.7	< 3.4	< 1.4	NA	< 3.5	< 2.8	< 2.8	< 2.8	< 2.8	NA	NA	4.2	< 3.4	NA
TR-20	11/03/11	7 feet	160	14	37	10	62	< 1.0	NA	< 2.5	47	48	**11,000**	240	NA	NA	8	2.7	NA
TR-21	11/03/11	6 feet	30	3.6	10	< 6.9	< 2.7	< 1.1	NA	4.4	< 2.2	< 2.2	3.9	< 2.2	NA	NA	2.5	< 2.7	NA
TR-22	11/03/11	6 feet	46	6.2	17	150	85	< 1.0	NA	< 2.5	< 2.0	< 2.0	2.1	< 2.0	NA	NA	4.9	< 2.5	NA
TR-23	11/03/11	5 feet	66	2.1	17	< 6.8	< 2.7	< 1.1	NA	< 2.7	< 2.2	< 2.2	< 2.2	< 2.2	NA	NA	4.0	< 2.7	NA
TR-24	11/03/11	5 feet	97	10	21	110	5.9	1.6	NA	3.5	3.0	4.5	240	28	NA	NA	9.2	5.8	NA
TR-25	11/03/11	5 feet	36	< 8.0	< 22	< 31	< 12	< 5.2	NA	< 12	< 10	< 9.9	100	11	NA	NA	< 11	< 12	NA
SS-01	11/04/11	8 inches	120	7.7	17	< 6.2	< 2.4	1.6	NA	2.8	5.8	240	< 2.0	< 2.0	NA	NA	52	5.3	NA
SS-02	11/04/11	30 inches	1,100	**250**	61	< 62	< 24	< 10	NA	< 25	< 20	210	< 20	< 20	NA	NA	130	60	NA
SS-02*	11/04/11	30 inches	940	**260**	65	< 62	< 24	< 10	NA	< 25	< 20	200	< 20	< 20	NA	NA	150	64	NA
SS-03	11/04/11	30 inches	820	55	49	< 6.2	< 2.4	< 1.0	NA	3.5	< 2.0	260	< 2.0	< 2.0	NA	NA	38	19	NA
SS-04	11/04/11	8 inches	110	4.8	14	< 6.2	< 2.4	< 1.0	NA	2.6	< 2.0	< 2.0	< 2.0	< 2.0	NA	NA	4.1	< 2.5	NA
SS-05	11/04/11	30 inches	410	19	32	< 16	< 6.1	< 2.6	NA	< 6.2	< 5.1	< 5.0	< 5.0	< 5.0	NA	NA	13	< 6.1	NA

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Analyte			Acetone	Benzene	2-Butanone	Carbon Disulfide	Chloro-form	Chloro-methane	Cyclohexane	Dichloro-difluoro-methane	1,1-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Ethanol	Ethyl acetate	Ethyl-benzene	4-Ethyl-toluene	Heptane
RWQCB ESL [1] (residential land use)			660,000	84	NE	NE	460	19,000	NE	NE	1,500	42,000	7,300	15,000	NE	NE	980	NE	NE
Sample ID	Date	Depth (bgs)	µg/m^3																
SS-05 (Dup)	11/04/11	30 inches	460	12	27	< 16	< 6.1	< 2.6	NA	< 6.2	< 5.1	< 5.0	< 5.0	< 5.0	NA	NA	< 5.4	< 6.1	NA
SS-06	11/04/11	8 inches	110	2.7	23	< 6.2	4.0	< 1.0	NA	< 2.5	< 2.0	< 2.0	< 2.0	< 2.0	NA	NA	18	< 2.5	NA
SS-07	11/04/11	8 inches	47	2.6	8.6	< 6.2	< 2.4	<1.0	NA	2.5	< 2.0	< 2.0	< 2.0	< 2.0	NA	NA	2.8	< 2.5	NA
SS-08	12/06/11	8 inches	< 120	9.8	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	230	60	< 8.8	< 10	310
SS-09	12/06/11	30 inches	< 120	38	< 150	< 6.3	< 9.9	< 4.2	560	< 10	< 8.2	< 8.1	< 8.1	< 8.1	130	22	11	< 10	2,100
SS-10	12/06/11	8 inches	< 120	< 6.5	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	250	37	< 8.8	< 10	< 210

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Analyte			Hexane	Freon 113	MIBK	Xylenes, Total	PCE	Toluene	TCE	Trichloro-fluoro-methane	1,1,1-TCA	1,3,5-TMB	1,2,4-TMB	Vinyl Acetate	Vinyl Chloride	TBA	Propene	Tetrahydro-furan	All Other VOCs	Isopropyl Alcohol	Helium
RWQCB ESL [1] (residential land use)			**NE**	**NE**	**630,000**	**21,000**	**410**	**63,000**	**1,200**	**NE**	**460,000**	**NE**	**NE**	**NE**	**31**	**NE**	**NE**	**NE**	**NA**		
Sample ID	**Date**	**Depth (bgs)**	**µg/m³**																		**%v**
TR-01	11/02/11	8 feet	< 180	260	41	< 27	< 14	70	320	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-01 (Dup)	11/02/11	8 feet	< 180	250	40	< 27	<14	61	290	12	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-02	11/02/11	8 feet	< 180	320	23	< 27	< 14	30	98	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	110	< 6.0	ND	< 50	--
TR-03	11/01/11	5 feet	< 180	540	96	< 27	< 14	120	< 11	< 11	< 11	< 10	< 10	< 180	< 5.2	100	< 88	< 6.0	ND	< 50	--
TR-04	11/01/11	5 feet	< 180	4,800	24	< 27	< 14	< 7.7	350	< 11	< 11	< 10	< 10	< 180	< 5.2	24	< 88	< 6.0	ND	< 50	--
TR-05	11/01/11	5 feet	< 180	880	75	< 27	65	39	1,100	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-06	11/01/11	7.5 feet	< 180	52	150	< 27	< 14	77	< 11	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-07	11/01/11	5 feet	< 180	380	65	< 27	< 14	44	14	< 11	41	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-08	11/02/11	5 feet	< 180	16	26	31	< 14	61	< 11	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	6.6	ND	< 50	--
TR-09	11/02/11	5 feet	NA	520	55	28.7	15	24	**3,300**	190	11	< 2.5	7.5	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
TR-10	11/03/11	6 feet	NA	< 15	15	29	< 4.5	46	< 3.6	< 7.5	< 3.7	< 3.3	< 9.9	< 9.4	< 1.7	--	--	--	ND	--	< 0.01
TR-11	11/03/11	8 feet	NA	47	70	49	< 3.8	70	6.4	< 6.2	5.2	< 2.7	< 8.2	< 7.8	< 1.4	--	--	--	ND	--	< 0.01
TR-12	11/02/11	5 feet	NA	< 18	37	72	< 5.3	66	< 4.2	< 8.8	< 4.3	5.1	15	< 11	< 2.0	--	--	--	ND	--	< 0.01
TR-13	11/03/11	5 feet	NA	65	29	21.3	10	23	23	7.1	36	< 2.5	13	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
TR-14	11/02/11	6.5 feet	NA	60	63	76	29	77	**1,300**	9.8	< 3.1	5.6	16	< 8.0	< 1.5	--	--	--	ND	--	< 0.01
TR-15	11/02/11	5 feet	NA	36	71	56	33	66	590	33	4.2	4.1	11	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
TR-16	11/02/11	5 feet	< 180	< 16	310	54	< 14	31	49	< 11	< 11	< 10	15	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	< 0.01
TR-17	11/02/11	5.5 feet	NA	16	14	42	7.4	30	110	< 5.8	7.9	3.6	12	20	< 1.3	--	--	--	ND	--	< 0.01
TR-18	11/03/11	5 feet	NA	110	11	31.6	< 3.6	36	< 2.9	16	130	3.5	9.2	< 7.5	< 1.4	--	--	--	ND	--	< 0.01
TR-19	11/03/11	5 feet	NA	17	23	25.5	< 4.7	25	< 3.8	< 7.9	9.5	< 3.4	< 10	< 9.9	< 1.8	--	--	--	ND	--	< 0.01
TR-20	11/03/11	7 feet	NA	120	42	39.9	< 3.4	49	96	18	220	3.2	9.3	< 7.0	2.2	--	--	--	ND	--	< 0.01
TR-21	11/03/11	6 feet	NA	170	9.5	14.0	< 3.8	8.2	12	15	58	< 2.7	< 8.2	< 7.8	< 1.4	--	--	--	ND	--	< 0.01
TR-22	11/03/11	6 feet	NA	14	33	24.7	< 3.4	30	7.6	< 5.6	5.2	< 2.5	< 7.4	< 7.0	< 1.3	--	--	--	ND	--	0.0159
TR-23	11/03/11	5 feet	NA	< 13	20	24	< 3.7	26	< 2.9	< 6.1	< 3.0	< 2.7	< 8.0	< 7.7	< 1.4	--	--	--	ND	--	< 0.01
TR-24	11/03/11	5 feet	NA	100	62	50	40	53	730	< 5.6	19	6.8	25	< 7.0	< 1.3	--	--	--	ND	--	1.84
TR-25	11/03/11	5 feet	NA	< 57	< 31	< 54	62	18	**1,700**	< 28	< 14	< 12	< 37	< 35	< 6.4	--	--	--	ND	--	< 0.01
SS-01	11/04/11	8 inches	NA	< 11	< 6.1	340	< 3.4	26	17	12	300	5.6	19	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
SS-02	11/04/11	30 inches	NA	< 110	< 61	870	< 34	580	< 27	< 56	390	140	170	< 70	< 13	--	--	--	ND	--	< 0.01
SS-02*	11/04/11	30 inches	NA	< 110	< 61	920	< 34	630	< 27	< 56	390	150	180	< 70	< 13	--	--	--	ND	--	--
SS-03	11/04/11	30 inches	NA	< 11	< 6.1	275	< 3.4	170	19	540	210	38	51	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
SS-04	11/04/11	8 inches	NA	< 11	< 6.1	23.8	< 3.4	13	< 2.7	77	< 2.7	< 2.5	< 7.4	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
SS-05	11/04/11	30 inches	NA	< 29	< 15	49	< 8.5	66	< 6.7	29	< 6.8	< 6.1	< 18	< 18	< 3.2	--	--	--	ND	--	< 0.01

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RWQCB ESL [1] (residential land use)			**NE**	**NE**	**630,000**	**21,000**	**410**	**63,000**	**1,200**	**NE**	**460,000**	**NE**	**NE**	**NE**	**31**	**NE**	**NE**	**NE**	**NA**		
Sample ID	**Date**	**Depth (bgs)**	**µg/m³**																		**%v**
SS-05 (Dup)	11/04/11	30 inches	NA	< 29	< 15	33	< 8.5	50	< 6.7	25	< 6.8	< 6.1	< 18	< 18	< 3.2	--	--	--	ND	--	< 0.01
SS-06	11/04/11	8 inches	NA	240	14	75	< 3.4	7.4	24	< 5.6	4.4	< 2.5	< 7.4	< 7.0	< 1.3	--	--	--	ND	--	0.0194
SS-07	11/04/11	8 inches	NA	74	< 6.1	17.3	< 3.4	6.8	2.8	< 5.6	< 2.7	2.6	< 7.4	< 7.0	< 1.3	--	--	--	ND	--	0.0406
SS-08	12/06/11	8 inches	360	< 16	< 8.3	< 27	< 14	16	< 11	27	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	47
SS-09	12/06/11	30 inches	2,300	< 16	< 8.3	50	< 14	60	25	430	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	< 20
SS-10	12/06/11	8 inches	< 180	< 16	< 8.3	< 27	< 14	14	15	230	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	< 20

Notes:

1 - RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table E-2 - Shallow Soil Gas Screening Levels for Evaluation of Potential Vapor Intrusion Concerns Interim Final* dated November 2007 (revised May 2008).

µg/m³ - micrograms per cubic meter
bgs - below ground surface
VOCs - Volatile Organic Compounds, EPA 8260B
ND - Not detected
NE - Not established
NA - Not applicable
* - Reanalyzed
MIBK - 4-methyl-2-pentanone
PCE - tetrachloroethylene
TBA - t-butyl alcohol
TCE - trichloroethylene
cis-1,2-DCE - cis-1,2-dichloroethene
trans-1,2-DCE - trans-1,2-DCE
1,1-DCA - 1,1-dichloroethane
1,1-DCE - 1,1-dichloroethene
1,1,1-TCA - 1,1,1-trichloroethane
1,3,5-TMB - 1,3,5-trimethylbenzene
1,2,4-TMB - 1,2,4-trimethylbenzene
Freon 113 - 1,1,2-Trichloro-1,2,2-Trifluoroethane
-- Not analyzed
RWQCB - State of California Regional Water Quality Control Board
ESL - Environmental Screening Level
BOLD - Concentration detected at or above the ESL
Dup - Duplicate Sample
Three volumes were purged prior to sample collection for all samples.

Treadwell&Rollo
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Table 2
Summary of TPH, VOCs, OCPs, PCBs, and Chlorinated Herbicide Analytical Results in Soil
915 DeGuigne Drive
Sunnyvale, California
Project: 731579702

Sample ID	Depth feet	Date Sampled	Soil														
			TPH			VOCs			OCPs							All PCBs	All Chlorinated Herbicides
			TPHg	TPHd	TPHmo	Acetone	TCE	All Other VOCs	p,p-DDD [2]	p,p-DDE [2]	p,p-DDT [2]	Dieldrin	a-BHC	Endrin	All Other OCPs		
RWQCB ESL [1] (Residential)			**110**	**110**	**370**	**2,800**	**1.9**	**NA**	**2.4**	**1.7**	**1.7**	**0.034**	**NE**	**4.1**	**NA**	**NA**	**NA**
EPA RSL [3] (Residential)			**NA**	**NA**	**NA**	**61,000**	**2.8**	**NA**	**2.0**	**1.4**	**1.7**	**0.030**	**0.270**	**18.0**	**NA**	**NA**	**NA**
			(mg/kg)														
TR-01-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.0080	0.027	< 0.0080	< 0.0080	0.019 J	< 0.0080	< 0.008 to < 0.4	--	--
TR-01-2	2	11/15/11	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-02-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.040	0.39	< 0.040	< 0.040	0.097 J	< 0.040	< 0.04 to < 2	--	--
TR-02-2	2	11/15/11	--	--	--	--	--	--	< 0.040	0.37	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040 to < 2.0	--	--
TR-03-1.5	1.5	11/01/11	< 1.0	1.5	7.3	< 0.05	0.013	< 0.005 to < 0.1	< 0.002	0.018	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.002 to < 1.2	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-04-1.5	1.5	11/15/11	--	--	--	--	--	--	0.025	1.2	0.090	0.030	0.019 J	< 0.0080	< 0.008 to < 0.4	--	--
TR-04-2	2	11/15/11	--	--	--	--	--	--	0.042	1.50	0.0091 J	**0.074**	< 0.0040	< 0.0040	< 0.0040 to 1.5	--	--
TR-04-3	3	11/15/11	--	--	--	--	--	--	0.023	0.33	< 0.0040	< 0.002	< 0.0040	< 0.0040	< 0.0040 to < 0.2	--	--
TR-05-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.04 to < 2	--	--
TR-05-2	2	11/15/11	--	--	--	--	--	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20 to < 10	--	--
TR-06-1.5	1.5	11/15/11	--	--	--	--	--	--	0.034	0.59	0.055	0.018	< 0.0040	< 0.0040	< 0.004 to < 0.2	--	--
TR-06-2	2	11/15/11	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-07-1.5	1.5	11/01/11	< 1.0	5.3	14	0.065	< 0.005	< 0.005 to < 0.1	< 0.05	**1.9**	< 0.050	**0.077**	< 0.050	< 0.050	< 0.002 to < 1.2	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-08-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.020	**2.0**	0.068	**0.099**	< 0.020	< 0.020	< 0.02 to < 1	--	--
TR-08-2	2	11/15/11	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-09-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.0020	0.0058	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.002 to < 0.1	--	--
TR-09-2	2	11/15/11	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-10-1.5	1.5	11/02/11	< 1.0	4.8	32	< 0.05	< 0.005	< 0.004 to < 0.1	0.014	0.2	0.04	< 0.010	< 0.010	< 0.010	< 0.01 to <0.5	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-11-1.5	1.5	11/15/11	--	--		--	--	--	0.023, J	**1.7**	< 0.020	**0.065**	< 0.020	< 0.020	< 0.02 to < 1	--	--
TR-11-2	2	11/15/11	--	--	--	--	--	--	< 0.020	0.054	< 0.020	**0.034,J**	< 0.020	< 0.020	< 0.020 to < 1.0	--	--
TR-11-3	3	11/15/11	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.002	< 0.0040	< 0.0040	< 0.0040 to < 0.2	--	--
TR-12-1.5	1.5	11/02/11	< 1.0	1.3	--	< 0.05	< 0.005	< 0.004 to < 0.1	< 0.001	0.0091	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001 to < 0.05	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-13-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2 to < 10	--	--
TR-13-2	2	11/15/11	--	--	--	--	--	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20 to < 10.0	--	--
TR-14-1.5	1.5	11/02/11	< 1.0	< 1.0	< 5.0	< 0.05	0.035	< 0.005 to < 0.1	< 0.001	0.054	0.004	< 0.001	< 0.001	< 0.001	< 0.002 to < 1.2	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-15-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.0020	0.0033 J	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.002 to < 0.1	--	--
TR-15-2	2	11/15/11	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-16-1.5	1.5	11/15/11	--	--	--	--	--	--	0.042 J	**3.2**	0.58	**0.15**	< 0.020	0.13	< 0.02 to < 1	--	--
TR-16-2	2	11/15/11	--	--	--	--	--	--	< 0.0020	0.37	0.079	< 0.0020	< 0.0020	< 0.0020	< 0.0020 to 0.37	--	--
TR-17-1.5	1.5	11/02/11	< 1.0	1.1	< 5.0	< 0.05	< 0.005	< 0.005 to < 0.1	< 0.01	0.22	< 0.010	< 0.010	< 0.010	< 0.010	< 0.002 to < 1.2	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-18-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.04 to < 2	--	--
TR-18-2	2	11/15/11	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040 to < 2.0	--	--
TR-19-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.0040	1.3	0.14	**0.034**	< 0.0040	0.040	< 0.004 to < 0.2	--	--
TR-19-2	2	11/15/11	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040 to < 2.0	--	--

Table 2
Summary of TPH, VOCs, OCPs, PCBs, and Chlorinated Herbicide Analytical Results in Soil
915 DeGuigne Drive
Sunnyvale, California
Project: 731579702

Sample ID	Depth feet	Date Sampled	Soil														
			TPH			VOCs			OCPs							All PCBs	All Chlorinated Herbicides
			TPHg	TPHd	TPHmo	Acetone	TCE	All Other VOCs	p,p-DDD [2]	p,p-DDE [2]	p,p-DDT [2]	Dieldrin	a-BHC	Endrin	All Other OCPs		
RWQCB ESL [1] (Residential)			**110**	**110**	**370**	**2,800**	**1.9**	**NA**	**2.4**	**1.7**	**1.7**	**0.034**	**NE**	**4.1**	**NA**	**NA**	**NA**
TR-20-1.5	1.5	11/15/11	--	--	--	--	--	--	0.050	1.5	0.0097 J	**0.071**	< 0.0080	< 0.0080	< 0.008 to < 0.4	--	--
TR-20-2	2	11/15/11	--	--	--	--	--	--	< 0.040	0.65	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040 to < 2.0	--	--
TR-21-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.0004	0.0024	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004 to < 0.02	--	--
TR-21-2	2	11/15/11	--	--	--	--	--	--	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001 to < 0.05	--	--
TR-22-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.00080	0.19	0.015	0.0049	< 0.00080	< 0.00080	< 0.0008 to < 0.04	--	--
TR-22-2	2	11/15/11	--	--	--	--	--	--	0.0027	0.034	0.0030	0.0037	< 0.001	0.0021	< 0.001 to 0.034	--	--
TR-22-3	3.0	11/15/11	--	--	--	--	--	--	0.11	1.2	0.043	< 0.002	< 0.0040	< 0.0040	< 0.0040 to < 0.2	--	--
TR-23-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.040	1.4	0.054, J	< 0.040	< 0.040	< 0.040	< 0.04 to < 2	--	--
TR-23-2	2	11/15/11	--	--	--	--	--	--	< 0.0040	**1.7**	0.075	< 0.0040	< 0.0040	0.026	< 0.0040 to 1.7	--	--
TR-23-3	3	11/15/11	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.020	< 0.040	< 0.040	< 0.04 to < 2.0	--	--
TR-24-1.5	1.5	11/15/11	--	--	--	--	--	--	< 0.080	1.2	< 0.080	< 0.080	< 0.080	< 0.080	< 0.08 to < 4	--	--
TR-24-2	2	11/15/11	--	--	--	--	--	--	0.0053 J	0.087	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-25-1.5	1.5	11/15/2011	--	--	--	--	--	--	< 0.00080	0.0013 J	< 0.00080	< 0.00080	< 0.00080	< 0.00080	< 0.0008 to < 0.04	--	--
TR-25-2	2	11/15/11	--	--	--	--	--	--	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020 to < 0.10	--	--
TR-27-3.5	3.5	12/06/11	< 1.0	30	53	< 0.05	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-27-7.5	7.5	12/06/11	< 1.0	< 1.0	< 5.0	< 0.05	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-28-3.5	3.5	12/06/11	< 1.0	16	22	< 0.05	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-28-7.5	7.5	12/06/11	< 1.0	< 1.0	< 5.0	< 0.05	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-29-3.5	3.5	12/06/11	< 1.0	2.7	5.5	< 0.05	0.012	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-29-7.5	7.5	12/06/11	< 1.0	5.9	8.8	< 0.05	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--

Notes:

All units are milligrams per kilogram (mg/kg).

1 - RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table K-1 - Direct Exposure Soil Screening Levels, Residenital Exposure Scenarios,* Interim Final dated November 2007 (revised May 2008).

2 - The Total Threshold Limit Concentration (TTLC) of the sum of p,p-DDD, p,p-DDE, and p,p-DDT is equal to 1 mg/kg. The sum of these compounds in excess of 1 mg/kg denotes a hazardous waste.

3 - Environmental Protection Agency (EPA) Regional Screening Levels for Residential Soil
PCBs - Poly chlorinated Biphenyls
OCPs - Organochlorine pesticides
TPH - Total Petroleum Hydrocarbons
TPHg - TPH as Gasoline with Silica Gel Clean-up, EPA Method 8015M
TPHd - TPH as Diesel Range with Silica Gel Clean-up, EPA Method 8015M
TPHmo - TPH as Motor Oil with Silica Gel Clean-up, EPA Method 8015M
TCE - trichloroethene
a-BHC - α-Hexachlorocyclohexane (also known as benzene hexachloride)
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
VOCs - Volatile Organic Compounds, EPA 8260B
NE - Not Established
NA - Not Applicable
mg/kg - milligrams per kilogram
BOLD - Concentration detected at or above the ESL
J - analyte detected below quantitation limits
-- Not analyzed

Table 3
Summary of Metals Analytical Results in Soil
Spansion LLC
Sunnyvale, California
Project: 731579702

Sample ID	Depth interval feet	Date Sampled	Antimony	Arsenic	Barium	Beryllium	Cadmium	Total Chromium	Hexavalent Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
RWQCB ESL [1] (residential land use)			**6.3**	**0.39**	**3,000**	**31**	**1.7**	**23,000 [2]**	**9.4**	**280**	**6,300**	**260**	**1.3**	**78**	**300**	**78**	**78**	**1.3**	**16**	**600**
EPA RSL [3] (residential land use)			**31.0**	**0.39**	**15,000**	**160**	**70.0**	**280.0**	**39.0**	**23**	**3,100**	**400**	**6.7**	**390**	**NA**	**390**	**390**	**NA**	**550**	**23,000**
Background Concentration Ranges [4]			**1.5–7.1**	**1.2–31**	**41–411**	**0.29–1.1**	**0.27–3.3**	**10–142**	**NE**	**6.5–25.5**	**5.4–100**	**4.8–65**	**0.07–0.6**	**0.33–11.4**	**16–144**	**<0.25–7**	**0.2–2.2**	**<0.25–42.5**	**22–90**	**33–282**
			(mg/kg)																	
TR-02-2	2	11/15/11	--	7.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	80	--
TR-03-1.5	1.5	11/01/11	< 0.5	6.1	270	0.8	< 0.25	70	< 8	14	38	9.1	< 0.05	< 0.5	74	< 0.5	< 0.5	< 0.5	72	71
TR-07-1.5	1.5	11/01/11	< 0.5	11	220	0.68	0.32	61	< 8	12	42	12	< 0.05	< 0.5	63	0.5	< 0.5	< 0.5	62	66
TR-08-2	2	11/15/11	--	2.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	--
TR-09-2	2	11/15/11	--	4.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	82	--
TR-10-1.5	1.5	11/02/11	< 0.5	4.0	500	0.73	< 0.25	71	< 8	12	32	7.8	0.064	< 0.5	66	< 0.5	< 0.5	< 0.5	69	64
TR-11-2	2	11/15/11	--	6.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	64	--
TR-12-1.5	1.5	11/02/11	< 0.5	5.5	230	0.66	< 0.25	63	< 8	12	32	6.7	0.051	< 0.5	65	< 0.5	< 0.5	< 0.5	59	62
TR-13-2	2	11/15/11	--	2.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	--
TR-14-1.5	1.5	11/02/11	< 0.5	6.8	270	0.82	< 0.25	72	< 8	14	42	12	0.052	0.57	77	< 0.5	< 0.5	< 0.5	75	76
TR-16-2	2	11/15/11	--	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	73	--
TR-17-1.5	1.5	11/02/11	< 0.5	3.4	190	< 0.5	< 0.25	46	< 8	8.5	22	5.4	0.067	< 0.5	44	0.73	< 0.5	< 0.5	49	41
TR-19-2	2	11/15/11	--	6.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	65	--
TR-21-2	2	11/15/11	--	1.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	--
TR-22-2	2	11/15/11	--	7.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	60	--
TR-25-2	2	11/15/11	--	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	24	--

Notes:
All units are milligrams per kilogram (mg/kg).

1 - RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table K-1 - Direct Exposure Soil Screening Levels, Residenital Exposure Scenarios,* Interim Final dated November 2007 (revised May 2008).

2 - ESL for total chromium is the ESL listed for Chromium III (750 mg/kg) as hexavalent chromium was not detected.

3 - Environmental Protection Agency (EPA) Regional Screening Levels for Residential Soil

4 - Background Concentration Ranges were taken from *Feasibility Study, Hookston Station, Pleasant Hill, California, Appendix A - Additional Soil Arsenic Sampling, Table A-2 - Comparison of Background Concentrations of Metals in Bay Area Soils,* by Environmental Resources Management, dated 10 July 2006.

< 0.5 - Analyte was not detected above the laboratory reporting limit (i.e. 0.5 mg/kg).

-- Not Analyzed

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Table 4
Groundwater Analytical Results
915 DeGuigne Drive
Sunnyvale, California
Project: 731579702

Sample ID	Depth interval	Date Sampled	VOCs			TPH			OCPs
			cis-1,2-DCE	TCE	All Other VOCs	TPHg	TPHd	TPHmo	
RWQCB ESL [1] (residential land use)			6,200	530	--	10,000	10,000	NE	
			(µg/L)						
Grab Groundwater Samples									
TR-26-GW	10.7	11/03/11	NA	NA	NA	NA	< 50	NA	NA
TR-27-GW	11.2	12/06/11	68	58	< 0.67 to < 33	< 50	< 50	< 250	NA
TR-28-GW	12.8	12/06/11	82	39	< 1.0 to < 50	< 50	< 50	< 250	NA
TR-29-GW	11.1	12/06/11	73	220	< 4.0 to < 200	82	< 50	< 250	NA
Monitoring Well Samples									
03-S	--	12/13/11	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5
31-S	--	12/13/11	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5
11-S	--	12/13/11	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5
19-S	--	12/13/11	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5
49-S	--	12/13/11	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5

Notes:

All units are micrograms per Liter (µg/L).

1 - RWQCB ESLs were taken from *Screening for Enivornmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table E-1 - Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion Concerns, Interim Final* dated November 2007 (revised May 2008).

VOCs - Volatile Organic Hydrocarbons

OCPs - organochlorine pesticides

cis-1,2-DCE - cis-1,2-Dichloroethene

TCE - Trichloroethene

TPH - Total Petroleum Hydrocarbons

TPHg - Total Petroleum Hydrocarbons in the Gasoline Range

TPHd - Total Petroleum Hydrocarbons in the Diesel Range with Silica Gel Clean-up

TPHmo - Total Petroleum Hydrocarbons in the Motor Oil Range with Silica Gel Clean-up

NA - Not Analyzed

NE - Not Established

< 50 - Analyte was not detected above the laboratory reporting limit (50 µg/L).

Treadwell&Rollo
A LANGAN COMPANY

FIGURES

Base map: Google Earth Pro, 2011.

0 400 Feet

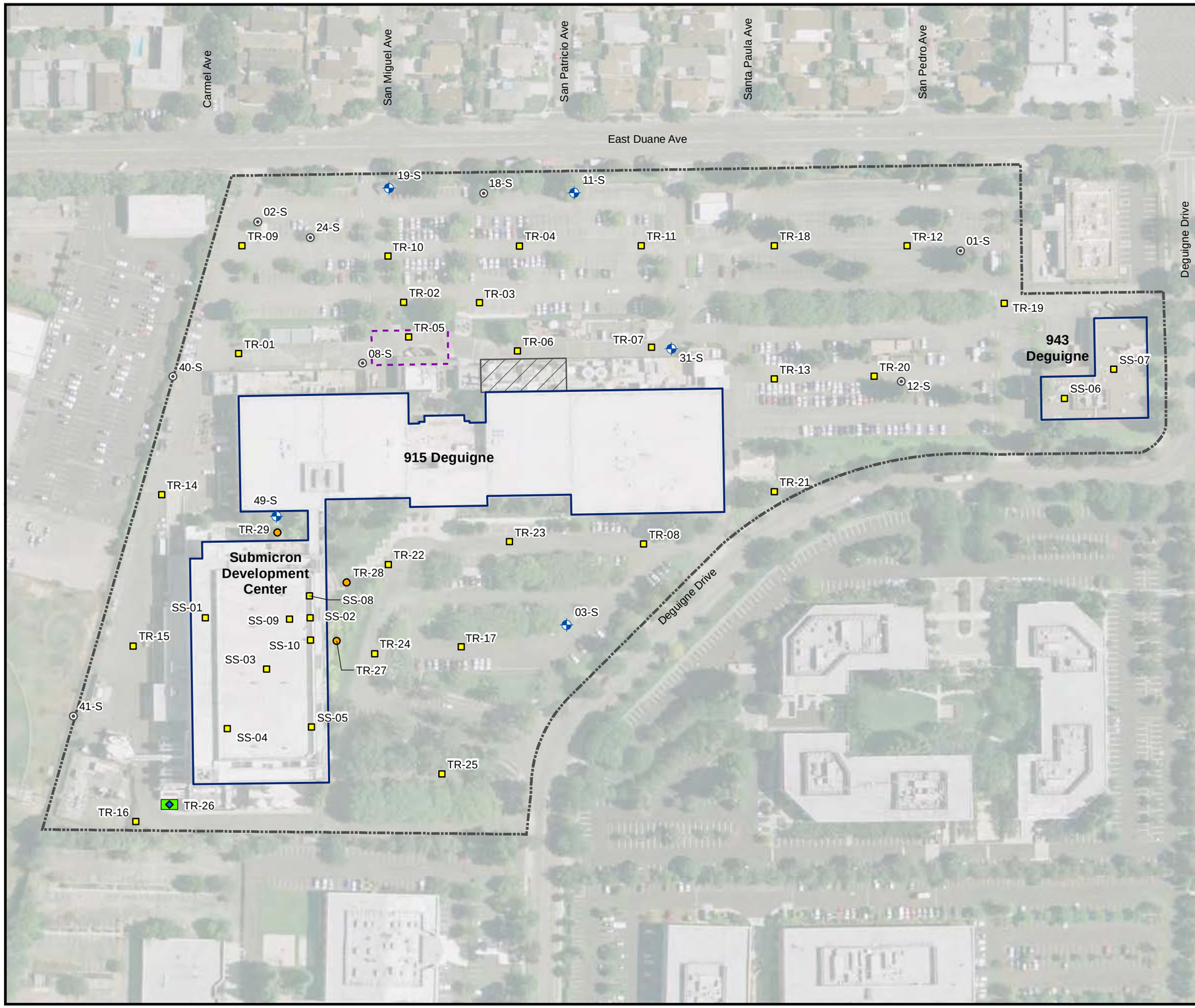
Approximate scale

915 DEGUIGNE DRIVE
Sunnyvale, California

SITE LOCATION MAP

Treadwell&Rollo
A LANGAN COMPANY

Date 01/03/12	Project No. 731579702	Figure 1



Legend

Completed Sample Location

- Soil and Soil Gas
- Soil and Grab Groundwater
- Grab Groundwater

Shallow Monitoring Well

- Proposed for OCP Sampling
- Not Proposed for OCP Sampling
- Approximate Site Boundary
- Approximate Extent of Excavation at Former Pad C Acid Neutralization System
- Approximate Location of Treatment System
- Approximate Underground Storage Tank Location
- Building Footprint

Notes:

1. Aerial photo from Digital Globe, June 2009.
2. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 75 150 300
Feet

915 DEGUIGNE DRIVE
Sunnyvale, California

SITE PLAN WITH SAMPLING LOCATIONS

Date 1/3/2012	Project 731579702	Figure 2

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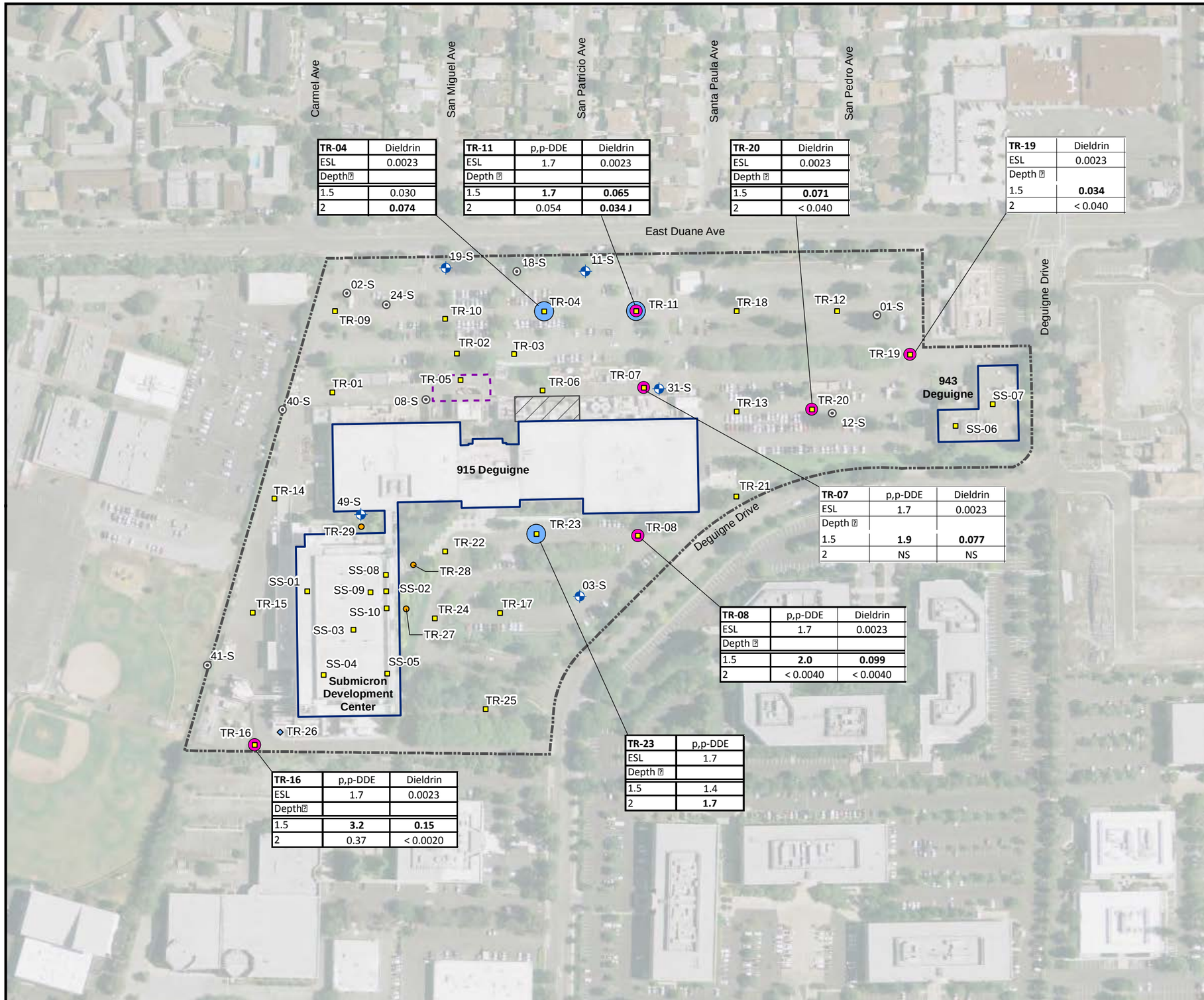
\\langan.com\data\SF\data7\731579701\ArcGIS\MXD_MapDocuments\Site Plan with Sampling Locations 2011-12.mxd



TR-04	Dieldrin
ESL	0.0023
Depth	
1.5	0.030
2	**0.074**

TR-11	p,p-DDE	Dieldrin
ESL	1.7	0.0023
Depth		
1.5	**1.7**	**0.065**
2	0.054	**0.034 J**

TR-20	Dieldrin
ESL	0.0023
Depth	
1.5	**0.071**
2	< 0.040

TR-19	Dieldrin
ESL	0.0023
Depth	
1.5	**0.034**
2	< 0.040

TR-07	p,p-DDE	Dieldrin
ESL	1.7	0.0023
Depth		
1.5	**1.9**	**0.077**
2	NS	NS

TR-08	p,p-DDE	Dieldrin
ESL	1.7	0.0023
Depth		
1.5	**2.0**	**0.099**
2	< 0.0040	< 0.0040

TR-23	p,p-DDE
ESL	1.7
Depth	
1.5	1.4
2	**1.7**

TR-16	p,p-DDE	Dieldrin
ESL	1.7	0.0023
Depth		
1.5	**3.2**	**0.15**
2	0.37	< 0.0020

N

Legend

- OCP ESL Exceedance at 1.5 ft bgs
- OCP ESL Exceedance at 2 ft bgs
- OCP ESL Exceedance at both 1.5 and 2 ft bgs

Shallow Monitoring Well

- Proposed for OCP Sampling
- Not Proposed for OCP Sampling

Sample Location

- Soil and Soil Gas
- Soil and Grab Groundwater
- Grab Groundwater
- Approximate Site Boundary
- Approximate Extent of Excavation at Former Pad C Acid Neutralization System
- Approximate Location of Treatment System
- Building Footprint

Notes:

1. Aerial photo from Digital Globe, June 2009.
2. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.
3. ESL = Residential Environmental Screening Level (Regional Water Quality Control Board, 2008).
4. OCP = Organochlorine Pesticides.

0 100 200 400
Feet

915 DEGUIGNE DRIVE
Sunnyvale, California

SITE MAP SHOWING SAMPLING LOCATIONS AND OCP ESL EXCEEDANCES IN SHALLOW SOIL

Date 1/3/2012	Project 731579702	Figure 3

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HUMAN HEALTH RISK ASSESSMENT
915 DeGuigne Drive
Sunnyvale, California

Prometheus Real Estate Group, Inc.
Sunnyvale, California

10 February 2012
Project No. 731579707

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10 February 2012
Project 731579707

Mr. John Millham
Prometheus Real Estate Group, Inc.
201 North Civic Drive, Suite 140
Walnut Creek, California 94596

Subject: Human Health Risk Assessment
915 DeGuigne Drive
Sunnyvale, California

Dear Mr. Millham:

Treadwell & Rollo is pleased to present this *Human Health Risk Assessment* (HHRA) for the property located at 915 DeGuigne Drive in Sunnyvale, California (Site). This HHRA has been prepared for submission to the Regional Water Quality Control Board (RWQCB) on behalf of the Prometheus Real Estate Group (Prometheus). The RWQCB required Prometheus to submit a HHRA for the Site in a letter dated 8 December 2011.

If you have any questions or need any information clarified, please call Mike Chendorain at (415) 955-5251.

Sincerely yours,
Treadwell & Rollo, A Langan Company

Michael D. Chendorain, PE
Senior Project Engineer

REGISTERED PROFESSIONAL ENGINEER
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Senior Associate/Vice President

PROFESSIONAL GEOLOGIST
DORINDA SHIPMAN
NO. 215
CERTIFIED HYDROGEOLOGIST
STATE OF CALIFORNIA

731579707.04 MDC

cc: Max Shahbazian – RWQCB
Ajay Changaran – Spansion, LLC.
Jon K. Wactor – Wactor & Wick LLP
Robert Scofield – Exponent (on behalf of the Water Board)

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HUMAN HEALTH RISK ASSESSMENT
915 DEGUIGNE DRIVE
Sunnyvale, California

1.0 INTRODUCTION

Treadwell & Rollo, a Langan Company (T&R) has prepared this human health risk assessment (HHRA) for the property located at 915 DeGuigne Drive, Sunnyvale (Site, Figure 1). The San Francisco Bay Regional Water Quality Control Board (RWQCB) requested a HHRA report for the Site in a letter to Spansion and the Prometheus Real Estate Group dated 8 December 2011 (RWQCB, 2011). T&R prepared a work plan for the HHRA, which was submitted to the RWQCB on 13 January 2012 (T&R, 2012a). T&R subsequently met with the RWQCB to discuss the work plan on 24 January 2012. T&R submitted a revised HHRA work plan dated 9 February 2012 which incorporated comments from the RWQCB received on 2 February 2012 via email. The purpose of the HHRA is to evaluate potential health risks associated with chemicals of potential concern (COPCs) present on-Site, and evaluate the potential need for mitigation measures for the proposed residential redevelopment. We understand that the Site is currently being evaluated for rezoning from commercial/industrial to residential land use. If the rezoning is approved the Site will continue to be evaluated for future development into single family detached, clustered townhome and multifamily apartment residential units. The methodology used to perform the HHRA is consistent with the following RWQCB, California Environmental Protection Agency (Cal/EPA) and United States Environmental Protection Agency (EPA) risk assessment guidance documents:

- Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater (RWQCB, 2008);
- Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Department of Toxic Substances Control-Cal/EPA, 2011); and
- Risk Assessment Guidance for Superfund. Volume I – Human Health Evaluation Manual (Part A) (USEPA, 1989).

1.1 Report Organization

The organization of this HHRA report is as follows:

- Section 2.0 Site Background and History – This section presents a description of the Site and background information.

- Section 3.0 Hazard Identification and Screening Methodology – This section presents the soil, soil gas, and groundwater analytical data that will be evaluated in the HHRA. This section also describes the screening methodology that was used to select COPCs in each media.
- Section 4.0 Exposure Assessment – This section identifies incomplete and potentially complete routes of exposure and potential receptor populations, as well as the exposure assumptions to estimate chemical intake of COPCs. This section also presents a Conceptual Site Model (CSM) to graphically illustrate the chemical sources, receptors, and complete exposure pathways. A discussion of fate and transport modeling of chemicals to estimate the concentration of volatile chemicals and particulates in air that result in exposure to potential receptors is also included in this section.
- Section 5.0 Toxicity Assessment – This section identifies the toxicity criteria for carcinogens and noncarcinogens evaluated in the HHRA.
- Section 6.0 Risk Characterization – This section combines results of the exposure assessment and toxicity assessment to estimate risk. The methodology for the calculation of cancer risk and non-cancer hazards to estimate excess lifetime cancer risk and chronic non-cancer hazard and risk estimates are presented.
- Section 7.0 Uncertainty Assessment – This section discusses the uncertainties inherent in performing this HHRA.
- Section 8.0 Summary and Conclusions – This section summarizes and presents the conclusions of this HHRA.
- References – This section provides the references used in the development of this HHRA.

2.0 SITE BACKGROUN AND HISTORY

2.1 Regulatory Background

The Site was formerly an Advanced Micro Devices (AMD) semiconductor research and fabrication facility from 1974 until 2003. The Site is currently on the National Priority List (NPL) and is a Superfund Site, which is regulated by the RWQCB and the EPA under RWQCB Order No. 91-101 (Order). This Order required final remedies that include groundwater extraction and treatment, and a deed restriction prohibiting the use of the upper groundwater aquifer as a drinking water source. These remedies have been implemented at the Site (EPA, 2009; AMD, 1992).

2.2 Current Site Conditions

The Site encompasses approximately 24.5 acres of land and is currently occupied by three commercial and industrial buildings (totaling approximately 400,000 square feet of space), parking areas and landscaping. Two low-rise buildings, the 915 main building and former AMD Submicron Development Center (SDC) building, are located in the central and southwestern portions of the Site (Figure 2). The third building, a warehouse, identified as 943 DeGuigne Drive, is located in the eastern portion of the Site. The AMD 915 building is a two-story above grade structure with a basement under approximately 34% of the floor space approximately 12 to 14 feet in depth. Currently, the 915 building is about 50% occupied and is used for research and development and general corporate administration for Spansion Inc. (Spansion). A subsidiary, Spansion LLC is the current property owner. The SDC building, which was used for fabrication and semi-conductor manufacturing from 1974 through 2009 is vacant .
The 943 DeGuigne Drive building is currently vacant and was previously utilized as a chemical storage warehouse for Spansion and AMD. The remainder of the Site is predominantly occupied by paved parking areas and landscaping.

2.3 Site History

Prior to the construction of the AMD 915 building in 1974, the Site was primarily used for agricultural purposes (T&R, 2011). AMD utilized the Site as a semiconductor fabrication and research development facility from 1974 to 2003. In 2003, AMD transferred ownership of the property to Spansion LLC, a joint venture of Fujitsu and AMD. In December 2005, Spansion LLC became Spansion, Inc. (Spansion), a corporation specializing in flash memory devices (EPA, 2009). At present, Spansion continues to operate the 915 Building as an office building; however, manufacturing processes are no longer being conducted at the Site.

Chlorinated volatile organic compounds (CVOCs) containing chlorinated solvents (trichloroethene [TCE] and daughter products, cis-1,2-dichlorothene [cis-1,2-DCE] and vinyl chloride) were detected in both soil and groundwater during underground storage tank (UST) removal activities in 1981. A photoresist stripper tank and one of the acid neutralization system's (ANS) tanks located to the north of the 915 building were reportedly leaking. The leaking tanks had impacted the soils in the area to the north of the 915 building which, in turn, impacted the shallow groundwater beneath the Site. The maximum TCE concentration observed in this area ("source area") was 280 milligrams per kilogram (mg/kg) in the soil. Between 1982 and 1983 approximately 5,570 cubic yards of CVOC-affected soil was excavated from the

source area. The contaminated soil was transported offsite to a regulated hazardous waste disposal facility. Sand cement containment walls were installed surrounding the excavation area to facilitate the dewatering of the excavation. The excavation area, shown on Figure 2, was backfilled with a sand-cement slurry up to a depth of 5 feet below ground surface (bgs) from the bottom of the excavation. The remaining upper 5 feet was then backfilled with clean sand.

To address the groundwater impacts, AMD installed a groundwater extraction and treatment (GWET) system in 1982 to treat the CVOCs in groundwater. The GWET system has undergone modifications since its inception in 1982 and continues to operate to this day. The current GWET system consists of a network of nine (9) extraction wells, thirty four (34) monitoring wells and nine (9) dewatering sump pumps. The extracted groundwater is pumped into an on-Site treatment system consisting of two (2) packed tower air strippers and a 40,000 pound granular activated carbon (GAC) vessel. The treated groundwater is discharged into an on-Site storm drain which ultimately discharges to the Calabasas creek. Locations of on-Site extraction wells and shallow groundwater monitoring wells are shown on Figure 2.

On July 1, 1991, the RWQCB issued order 91-101 to AMD for the Site which described COPCs, remedial actions, cleanup goals, and risks associated with cleanup standards. The order specified actions to be taken, which included continuing the operation of the GWET and to document remedial activities. Order 91-101 also rescinded the previous order 89-080. COPCs related to groundwater specified in the current order include the following;

- Arsenic,
- Benzene,
- Chromium (III),
- Chromium (VI),
- Chloroform,
- Dichlorodiflouromethane (Freon 12),
- 1,1-Dichloroethane (1,1-DCA),
- 1,1-Dichloroethene (1,1-DCE),
- Cis-1,2-DCE,
- Trans-1,2-Dichlorothene (trans-1,2-DCE),
- Ethylbenzene,

- 1,1,2-Trichloro-1,2,2-trifluoroethane, (Freon 113),
- Tetrachloroethene (PCE),
- Toluene,
- 1,2,4-Trichlorobenzene (1,2,4-TCB),
- 1,1,1-Trichloroethane,
- TCE,
- Trichlorofluoromethane (Freon 11), and
- Xylenes (total).

Although arsenic was included as a COPC, the order stated that "arsenic was not present at concentrations or in frequency of occurrence that could be considered to be significantly different from background levels of arsenic. Therefore, no cleanup standard for arsenic is included in this order" (RWQCB, 1991). These COCPCs related to order 91-101 were considered when evaluating chemicals to be retained for evaluation as part of this HHRA, as described in Section 3.2.2.

In order to evaluate whether CVOCs were volatilizing from the known groundwater contaminants and migrating into the indoor breathing space, AMD completed an indoor and ambient air sampling event in the 915 Building in late 2011. Eighteen indoor air and five ambient (outside) air samples were collected from the 915 building and analyzed for select CVOCs related to tetrachloroethene (PCE) and TCE . Several CVOCs were detected in both indoor air and ambient air samples. No compounds detected in indoor air samples exceeded the EPA Region 9 Regional Screening Levels (RSLs) for commercial/industrial use and therefore, no unacceptable risk to the building occupants was noted (AMEC, 2011b). However, TCE was detected at concentrations exceeding the RSLs for residential air in five indoor air samples. Of these five samples, four were from the basement area and one was from the first floor. It is well established that the presence of a basement creates a preferential transport mechanism for subsurface vapors to migrate to indoor spaces (DTSC, 2011).

A separate plume originating from three upgradient NPL sites located immediately south-southwest of the Site crosses a portion of the Site. Each of these three sites has its own source of contamination, but the off-site contaminated groundwater plumes have merged and the sites are now treated by the EPA as one unit, known as the Companies Offsite Operable Unit. This offsite groundwater contamination plume has also commingled with the on-site plume, and the commingled contamination flows offsite to the northeast. Groundwater contour maps related to this plume prepared by AMD's consultant AMEC for

their 2011 monitoring event are provided in Appendix A (AMEC, 2011). There are several other Superfund sites in the vicinity that also contribute to regional groundwater contamination. The off-site COPCs primarily consist of TCE and cis-1,2-DCE. These Sites are currently being remediated under orders by the RWQCB and under the oversight of the EPA.

To assess the current environmental conditions at the Site for due diligence purposes, T&R conducted a Phase I Environmental Site Assessment (ESA) and a Limited Phase II ESA in 2011 (T&R, 2011 and T&R, 2012a). The Phase II ESA was completed to evaluate environmental conditions at the Site, as they relate to the potential future development of the Site for residential land use. To assess environmental conditions, T&R reviewed previous environmental studies conducted by others and collected and analyzed samples of soil gas, sub-slab vapor, soil, and groundwater at the Site. The analytical results of these samples were compared with Environmental Screening Levels (ESLs) established by the RWQCB and RSLs established by the EPA Region 9. The results of the Phase I and Phase II ESAs and the evaluation of the previous environmental studies indicate that the groundwater, soil gas, sub-slab vapor, and/or soil at the Site contain CVOCs (predominantly TCE and its degradation product cis-1,2-DCE), benzene, ethylbenzene, xylenes, 1,2,4-trimethylbenzene (1,2,4-TMB), organochlorine pesticides (OCPs), arsenic, and vanadium. Benzene, ethylbenzene, xylenes, and 1,2,4-TMB are commonly associated with gasoline and are thus likely fuel related. However, no known fuel-related releases have been documented at the Site. The arsenic and vanadium detections are due to natural background conditions and are described further in Section 3. The presence of OCPs is likely a result of the historical agricultural use of the Site (T&R, 2011).

Tables 1 through 5 provide the results of recent sampling performed by T&R and AMEC (T&R, 2012; AMEC, 2012). Figures 3 through 6 illustrate distributions of detected chemicals in soil gas, sub-slab vapor, and soil, respectively. Appendix A provides plume maps from 2011 groundwater monitoring performed by AMEC (AMEC, 2012). Section 3 discusses the current distribution of chemical impacts on-Site.

2.4 Geology and Hydrogeology

Subsurface conditions are based on T&R's Phase II ESA (T&R, 2012) and other previous environmental investigations completed at the Site. The Site is located in the flatland area of the San Francisco Bay and is underlain by interbedded clay and sand units. Based on previous remedial investigations and well installation activities, approximately one to eight feet of clay (dark brown to black and stiff) with varying

amounts of sand and silt underlie the site. A sand unit consisting of clayey/silty sand underlies the clay unit and acts as the shallow water bearing unit. Groundwater is present at approximately 9 to 13 feet bgs. The only significant deviation is the area of the former source area described above where excavated impacted soil to depths ranging between 15 and 28 feet bgs was replaced with a sand cement slurry and clean sand. Sand cement containment walls were installed to line the excavation area. The location of the excavation area is shown on Figure 2.

The saturated soil beneath the Site exhibits a high degree of heterogeneity consisting of clay/silt and sand/gravel types horizons. Due to subsurface heterogeneity, differing vertical depth interpretations of the four water-bearing zones are common. Groundwater-bearing zones encountered beneath the Site have been historically characterized as follows:

- A-aquifer zone between 10 to 15 feet bgs;
- B1-aquifer zone between 17.5 and 30 feet bgs;
- B2-aquifer zone between 45 to 55 feet bgs; and
- B3-aquifer zone between 70 to 90 feet bgs (Geomatrix, 2008).

Groundwater flow beneath the Site is generally northward, toward the San Francisco Bay, following the area topography (AMEC, 2010).

3.0 HAZARD IDENTIFICATION

The hazard identification step identifies the data that will be quantitatively assessed in this HHRA, based upon the extensive number of samples that have been collected to date (T&R, 2012). Chemicals detected at the Site include VOCs in soil, soil gas, sub-slab vapor, and groundwater; total petroleum hydrocarbons (TPH) in soil and groundwater; and OCPs and metals (including arsenic) in soil. Of these detected constituents, detections of metals are within natural background concentrations for Bay Area soils (Table 6). In addition, there are no known releases of metals at the Site (T&R, 2011).

The available data were evaluated for its appropriateness to be used in this HHRA. This evaluation was based on the following:

- The number of samples and quality of available data to adequately describe both overall site conditions and characterize Site hot-spot and source areas.

- Comparison of laboratory reporting limits to screening levels to ensure the reporting limits are below screening levels.

Based on this evaluation, the available data set is appropriate for use in this HHRA.

3.1 Screening Evaluation

This section summarizes the current extent of chemical impacts on-Site and identifies those COPCs that will be quantitatively assessed in this HHRA. In order to evaluate the potential risk to future receptors and for the purpose of selecting COPCs for the quantitative evaluation of risk, detected chemicals are conservatively compared to screening levels for residential use. Screening levels were selected based on the following hierarchy:

- Screening levels related to residential use were selected for all media.
- For soil screening levels, the more conservative value between the RWQCB ESLs for direct exposure (Table K-1, RWQCB, 2008) or the EPA RSLs were used (USEPA, 2011).
- For soil gas screening levels, the RWQCB ESLs were used (Table E, RWQCB, 2008). For compounds without ESLs and for TCE, the screening level was calculated by dividing the indoor air RSL by the RWQCB recommended soil gas to indoor air attenuation factor of 0.001 (DTSC, 2011). TCE was calculated using the indoor air RSL due to the more conservative toxicity values used to establish the indoor air RSL (USEPA, 2011a).
- For sub-slab screening levels, the screening level was calculated by dividing the more conservative of the indoor air ESL or RSL by the DTSC recommended sub-slab to indoor air attenuation factor of 0.05 (DTSC, 2011).
- For groundwater, the RWQCB groundwater ESL for vapor intrusion was used (RWQCB, 2008). Screening levels related to groundwater ingestion were not selected due to the Site's deed restriction which prohibits the use of groundwater for drinking water purposes (AMD, 1992).

3.1.1 Chemicals in Soil

During the recent Phase II ESA, 54 soil samples were collected from 28 locations (Figure 2). Soil samples were collected from depths ranging from 1.5 to 3 feet bgs and analyzed for CAM-17 metals, VOCs, semivolatile organic compounds (SVOCs), OCPs, polychlorinated biphenyls (PCBs), chlorinated herbicides,

and TPH as gasoline, diesel, and motor oil. OCPs were broadly distributed in the upper two feet of soil at the Site, likely a result of historical agricultural practices in the region. Dieldrin, p,p-Dichlorodiphenyl-dichloroethylene (p,p-DDE) and α-Hexachlorocyclohexane (α-BHC) were detected at concentrations in the shallow soils some of which exceed their respective residential direct contact screening levels (Table 1). Dieldrin, p,p-DDE, and α-BHC ranged in concentration from below laboratory detection limits to 3.2, 0.15, and 0.097 mg/kg, respectively. Arsenic and vanadium were detected at concentrations which exceed their respective direct exposure screening levels but are within the natural background concentrations (Table 2). Arsenic and vanadium ranged in concentration from 1.2 to 12 and 24 to 82 mg/kg, respectively. Local background concentrations for arsenic range from below detection limits to 11 mg/kg (Scott, 1991). Bay Area background concentrations range up to 31 mg/kg for arsenic and up to 90 mg/kg for vanadium (Table 6).

Distributions of OCP detections are shown on Figure 3 and indicate that the locations of OCPs are not constrained to a specific area of the Site or "hot-spots". Figure 4 shows the distribution of arsenic and vanadium concentrations and similarly indicates no spatial correlation of "hot-spot" areas.

3.1.2 Chemicals in Soil Gas and Sub-slab Vapor

During the Phase II ESA, samples were collected from the soil gas and sub-slab vapor media. Soil gas samples are samples collected within the vadose zone soil and represent volatile chemical concentrations that must migrate through the vadose zone soil and then through the underlying building slab before moving into the indoor air space. Sub-slab samples are samples collected directly beneath the building slab and represent volatile chemical concentrations that, before moving into the indoor air space must migrate through the underlying building slab. Soil gas samples were collected at 25 locations throughout the Site in a grid-like pattern at depths between 5 and 8 feet bgs. Sub-slab vapor samples were collected at 10 locations inside the SDC and 943 buildings (Figure 2, Table 3).

3.1.2.1 Chemicals in Soil Gas

While CVOCs were detected in all of the 5-foot and 8-foot soil gas samples, TCE and cis-1,2-DCE were the only CVOCs detected at concentrations exceeding their respective screening levels in either depth. Cis-1,2-DCE was detected at a maximum concentration of 11,000 micrograms per cubic meter (μg/m^3) in a sample collected from the eastern portion of the Site at a depth of 7-feet bgs (Figure 5) and represents its only screening level exceedance. TCE concentrations range from below laboratory detection limits to

1,700 µg/m^3 (Table 3). The majority of TCE exceedances at depths 5 and 6.5 feet bgs are located on the western portion of the Site, as illustrated on Figure 5. Therefore, detected soil gas vapor concentrations are likely due to volatilization from impacted groundwater.

3.1.2.2 Chemicals in Sub-slab Vapor at the SDC Building

Chemicals detected in the SDC building sub-slab vapor environment that exceeded screening levels included TCE, benzene, ethylbenzene, xylenes, and 1,2,4-TMB. TCE ranged in concentration from below laboratory detection limits to 25 µg/m^3. As shown on Figure 6, the highest benzene, ethylbenzene, xylenes, and 1,2,4-TMB concentrations were found at location SS-02 in the northeastern portion of the SDC building. Benzene was detected at concentrations ranging from less than laboratory detection limits to 260 µg/m^3. Ethylbenzene was detected at concentrations ranging from 4.1 to 150 µg/m^3. Xylenes were detected at concentrations ranging from less than laboratory detection limits to 920 µg/m^3. 1,2,4-TMB was only detected at a concentration exceeding its screening level at SS-02 (at 180 µg/m^3). While no known fuel-related release occurred in this area and no UST is known to be present in this area, limited impacts have been found. In addition, a grab-groundwater sample from boring TR-29 had low level detection of 82 micrograms per liter (µg/L) of TPH as gasoline (TPHg) and is located approximately 130 feet north and in the downgradient direction of sampling location SS-02 (Table 5).

3.1.2.3 Chemicals in Sub-slab Vapor at the 943 DeGuigne Building (Area 4)

Chemicals detected above screening levels in sub-slab vapor samples at the 943 DeGuigne building included TCE and benzene. TCE ranged in concentration from 2.8 to 24 µg/m^3. Benzene was detected at concentrations ranging from 2.6 to 2.7 µg/m^3. At this building benzene concentrations are likely related to ambient benzene concentrations in outdoor air. These benzene vapor concentrations are within the range of ambient outdoor air detected at the California Air Resources Board (CARB) air monitoring station in San Jose within 10 miles from the Site. At the CARB San Jose ambient air sampling station, the most recent available results (from 2010) showed that the ambient air had benzene concentrations ranging from 0.22 to 3.2 µg/m^3 (CARB, 2012).

3.1.3 Chemicals in Groundwater

An extensive groundwater sampling program has been established at the Site to monitor groundwater concentrations, the effectiveness of the implemented groundwater extraction and treatment system, and verify to the containment of the plume. Water elevations and CVOC concentrations are measured

annually in a set of 27 monitoring wells and 9 extraction wells at the Site (AMEC 2012). As noted in Table 4, no 2011 CVOC concentrations exceeded the vapor intrusion groundwater screening level. However while the vapor intrusion screening levels were not exceeded, TCE, cis-1,2-DCE, and vinyl chloride concentrations continued to exceed the Superfund cleanup goals (i.e. maximum contaminant levels [MCLs] for drinking water or other drinking water based cleanup goals) across the Site. In addition, the only vapor intrusion related groundwater screening level exceedances observed in 2010 were related to vinyl chloride concentrations on the western edge of the property at wells 40-S and 41-S (AMEC, 2011a).

As part of the Phase II ESA, four grab groundwater samples were collected from borings at depths ranging from 10.7 to 12.8 feet bgs. These samples contained TPHg, TCE, and cis-1,2-DCE above laboratory reporting limits (Table 5). TPHg was detected at TR-29, located north of the SDC building, below its screening level. TCE and cis-1,2-DCE were detected at all borings they were analyzed for at concentrations consistent with the overall TCE and cis-1,2-DCE impacts for the area. The concentrations of cis-1,2-DCE and TCE exceeded their respective MCLs for drinking water, but were below the screening levels relative to vapor intrusion.

Groundwater samples were also collected in late 2011 and analyzed for OCPs from existing shallow monitoring wells 03-S, 11-S, 19-S, 19-S, and 49-S which are distributed across the Site (Figure 3). No OCPs were detected in any groundwater samples (Table 5). The lack of OCPs in groundwater and deeper soil indicates that the OCPs detected in shallow soil is not leaching into groundwater at the Site since the mid 1970's when agricultural activities ceased.

3.2 Selection of COPCs

A chemical was considered a COPC if it was detected at least once exceeding its screening level and is not associated with natural background conditions. As an exception, even though they did not exceed natural background levels, arsenic and vanadium were retained as COPCs. Arsenic and vanadium were retained at the RWQCB's request and to illustrate the incremental risk relative to other COPCs and relative to natural background conditions. Table 7 lists chemicals with screening level exceedances and thus were retained as COPCs for the quantitative risk evaluation.

The hierarchy for the selection of screening levels is described in Section 3.1. The screening levels for carcinogens and suspected carcinogens are equivalent to chemical concentrations representing an excess

lifetime cancer risk of 1 x 10^{-6} derived using conservative modeling assumptions for residential receptors exposed to chemicals in soil, soil gas, sub-slab vapor and groundwater. These modeling assumptions are considered conservative in that they overestimate exposure assumptions such as chemical intake rate, and frequency and duration of exposure. Section 7 provides a qualitative discussion on the conservative nature of risk quantitation. The screening levels for non-carcinogens are concentrations calculated to represent a noncancer Hazard Quotient (HQ) of 0.2 (for screening levels based on ESLs) or 1 (for screening levels based on RSLs) using similarly conservative modeling assumptions for residential receptors exposed to chemicals in soil, soil gas, sub-slab vapor, and groundwater.

The following provides a summary of screening level exceedances detected at the Site. A more detailed description of the extent of chemical impacts is provided in Sections 3.1.1, 3.1.2, and 3.1.3.

- In shallow soil, arsenic and vanadium were detected at concentrations exceeding screening levels, but below naturally-occurring background concentrations.
- In shallow soil, the OCPs (p,p DDE, dieldrin and α-BHC) were detected at concentrations exceeding screening levels. These exceedances were detected at depths of 1.5 and 2 feet bgs and were distributed across the Site as shown on Figure 3. No OCPs were detected above screening levels at 3 feet bgs.
- In soil gas at depths ranging from 5 to 7 feet bgs, TCE was detected at concentrations exceeding its screening level at TR-05, TR-09, TR-14, TR-15, TR-20, TR-24, and TR-25. Cis-1,2-DCE was detected at concentrations exceeding its screening level at TR-20 at 7 feet bgs in soil gas (Figure 5).
- In sub-slab vapor, screening level exceedances related to benzene, ethylbenzene, TCE, xylenes and/or 1,2,4-TMB were detected at all sampling locations (Figures 5 and 6).
- In groundwater, no chemicals exceeded vapor intrusion screening levels.

3.2.1 Arsenic and Vanadium

Arsenic and vanadium were detected at concentrations in shallow soil within 1.2 to 12 and 24 to 82 mg/kg, respectively, during the recent Phase II ESA investigation (Table 2). The maximum arsenic concentration in on-Site soil was 12 mg/kg in sample TR-16 and the maximum vanadium concentration of

82 mg/kg was found in sample TR-09. However, both arsenic and vanadium are naturally present in soils throughout the San Francisco Bay Area at concentrations above residential ESLs (Table 6). Typical background concentrations of arsenic and vanadium in Bay Area soils range from less than laboratory detection limits to 31 mg/kg and from 22 to 90 mg/kg, respectively (Table 6). Hence, concentrations of arsenic and vanadium detected at the Site are within these typical Bay Area background concentrations. In addition, the local background concentration for arsenic ranges up to 11 mg/kg (Table 6). Therefore, the arsenic and vanadium concentrations detected in the Site soils are representative of naturally-occurring background concentrations. However, arsenic and vanadium were retained to illustrate the incremental risk due to the presence of these constituents on-Site relative to other COPCs and relative to natural background conditions. Additionally, neither arsenic nor vanadium have been known to have been used on-Site (T&R, 2011).

3.2.2 COPCs Retained for Quantitative HHRA

The following 11 compounds were retained as COPCs for the quantification of risk at the Site based on their presence above screening levels in limited areas proposed for development (Table 7):

- Soil
  - p,p-DDE
  - Dieldrin
  - α-BHC
  - Arsenic
  - Vanadium
- Soil gas
  - cis-1,2-DCE
  - TCE
- Subslab Vapor
  - Benzene
  - Ethylbenzene
  - TCE
  - Xylenes
  - 1,2,4-trimethylbenzene (1,2,4-TMB)

No groundwater COPCs were chosen based on the lack of vapor intrusion screening level exceedances. In the RWQCB's order 91-101, 19 chemicals were listed as groundwater COPCs. Of these 19 chemicals, only arsenic, benzene, cis-1,2-DCE, ethylbenzene, TCE, and xylenes (total) are included in the HHRA as indicated above for soil, soil gas and sub-slab vapor. The following chemicals from the RWQCB's order

91-101 were excluded as COPCs since they were not detected at concentrations exceeding their relevant screening levels: chromium (III), chromium (VI), chloroform, Freon 12, 1,1-DCA, 1,1-DCE, trans-1,2-DCE, Freon 113, PCE, toluene, 1,2,4-TCB, 1,1,1-TCA, and Freon 11.

4.0 EXPOSURE ASSESSMENT

In evaluating the potential human health risks posed by a Site, it is necessary to identify the populations that may potentially be exposed to the chemicals present, and to select the pathways by which these exposures may occur. Identification of the potentially exposed populations requires evaluating the human activity and anticipated land-use at the Site.

Once the potentially exposed populations are identified, the complete exposure pathways by which individuals in each of these potentially exposed populations may contact chemicals present in the soil gas, sub-slab vapor, groundwater, and soil at the Site are selected. An exposure pathway is defined as "the course a chemical or pollutant takes from a source to an exposed organism" (USEPA, 1989). An exposure route is "the way a chemical or physical agent comes in contact with an organism (e.g., by inhalation, ingestion, dermal contact)" (USEPA, 1989). A complete exposure pathway requires the following four key elements:

- Chemical source;
- Migration route (i.e., environmental transport);
- An exposure point for contact (e.g., soil, air, or water); and
- Human exposure route (e.g., inhalation).

An exposure pathway is not complete unless all four elements are present.

A conceptual site model (CSM) for potential exposure pathways is used to show the relationship between a chemical source, exposure pathway, and potential receptor at a site. The CSM identifies all potential or suspected chemical sources, potentially impacted media, and potential receptors. It also identifies the potential human exposure routes for contacting impacted media. These source-pathway-receptor relationships provide the basis for the quantitative exposure assessment as only those complete source-pathway-receptor relationships are included in the quantitative risk evaluation. The risk assessment CSM for the Site is shown on Figure 7.

4.1 Potentially Exposed Populations

Planned future land use for the Site includes residential use. According to the current plan, the residential development will consist of three-story single-family homes, three-story townhomes and four-to-six story apartment buildings. A four-to-six story open-air parking garage will be located at the center of the property with apartment buildings surrounding it. All buildings are currently proposed to be slab-on grade construction. The townhomes will have landscaped areas and a recreational park with an area around 1.5 acres is also planned as part of the future development. Based on the planned future use, potentially exposed populations include on-Site residents, commercial workers, construction workers (including trench workers), and park recreational visitors. All receptors considered in this HHRA are hypothetical since the HHRA is performed for the anticipated future Site use.

4.2 Relevant Exposure Pathways

4.2.1 Soil

All potentially exposed populations considered in this HHRA could be exposed directly to chemicals in soil. The outdoor residential and commercial workers are assumed to be exposed to shallow soil from 0 to 2 feet bgs. Potential routes of exposure for surface soils would include incidental ingestion, dermal contact, and inhalation of particulates due to wind erosion and atmospheric dispersion. Therefore, for shallow soil, incidental ingestion, dermal contact and inhalation pathways are assumed to be complete and are evaluated in this HHRA. In addition, since the Site is currently covered with buildings and capped with asphalt, shallow soil data (0 to 10 feet bgs) is used to represent the surface soil conditions in this HHRA. Residential and construction worker exposure to deeper soil (greater than 10 feet bgs) was not evaluated because the OCP impacted soil is present only in the upper two feet (Table 1) and anticipated development activities will not access deeper soils.

4.2.2 Soil Gas and Sub-slab Vapor

Exposures resulting from the inhalation of soil gas or sub-slab vapors were quantified in this HHRA for all potentially exposed populations. Residents could potentially be exposed to VOCs migrating from soil gas and sub-slab vapor into indoor air via the inhalation pathway. Therefore, the indoor air inhalation pathway is assumed to be potentially complete. In addition, risks associated with indoor air inhalation will be protective of the ambient (outdoor) air inhalation pathway. Therefore, the ambient air exposure pathway was not evaluated in this HHRA.

4.2.3 Groundwater

Depth to first (shallow) groundwater at the Site ranges between approximately 9 and 13 feet bgs. Therefore, residents, commercial workers, and park recreational visitors are not expected to come into direct contact with groundwater. Based on the proposed construction, construction workers are also not expected to have direct contact with groundwater at these depths. In addition, according to the recorded Land Use Restrictions (Covenant) for the Site, groundwater is prohibited from being a source of drinking water (AMD, 1992). Therefore, exposure to chemicals through direct contact or ingestion of groundwater is not considered complete and these exposure pathways were not evaluated in this HHRA. Since groundwater sample results indicate no vapor intrusion-related screening level exceedances, risks associated with the vapor intrusion pathway based on groundwater concentrations will not be quantified; as soil gas and sub-slab vapor concentrations will be used.

4.3 Summary of Potentially Complete Exposure Pathways and Receptors

4.3.1 Residential Receptors

The residential receptors considered in this HHRA include adults and children. The potential exposure media for the on-Site residents are indoor and ambient (outdoor) air inhalation, and contact (i.e. dermal contact, ingestion, and inhalation of atmospherically deposited particulates) with shallow soil. Therefore, risks associated with vapor inhalation and contact with shallow soil were evaluated for residential receptors.

4.3.2 Commercial Receptors

The commercial workers considered in this HHRA are the on-Site workers who spend all or most of their workday outdoors such as maintenance and/or landscape workers. The risk evaluated for residential receptors considers exposures to sensitive receptors such as children and the elderly and will, therefore, be protective of the commercial receptors. Nevertheless, risks associated with the commercial receptor were calculated.

4.3.3 Construction/Trench Worker Receptors

The construction/trench worker receptor includes individuals who may come in contact with soil and soil gas during construction, trenching, and redevelopment activities.

4.3.4 Park Recreational Visitor

The park recreation visitor receptor includes individuals who may come in contact with soil. Risks associated with residential receptors are assumed to be protective of this receptor.

4.4 Fate and Transport of COPCs

Fate and transport modeling is used to predict the concentration of volatile chemicals and particulates in air that results in exposure to potential receptors. This section discusses the sources, transport, and eventual fate of the COPCs indicated in Table 7.

The presence of OCPs in soil is likely associated with the historical agricultural land use of the Site. There are no other known sources of OCPs on-Site. The OCPs are present only in the shallow (upper two feet) of soil and are distributed across the Site without any apparent significant source area (Figure 3). These OCPs can therefore potentially come in direct contact with the residents, commercial workers, and park recreational visitors via dermal contact, ingestion and particulate inhalation. Based on groundwater sampling results (Table 5), detected OCPs have not leached into groundwater in over more than 35 years since agricultural activities ceased in the mid 1970's.

The presence of CVOCs in soil gas, sub-slab vapor originate from contaminated groundwater at the Site, which has been undergoing remediation since 1982. Due to the presence of the naturally-occurring low-permeability clay layer from approximately 2 to 8 feet bgs across the Site or the sand-cement slurry located in the former source area (described in Section 2.3), the migration of CVOCs from groundwater to the indoor air space will likely be very slow. Therefore, the source of CVOCs which might migrate to indoor air on-Site is related to the residual concentrations of CVOCs in soil gas and sub-slab vapor. CVOCs in soil gas are predominantly found on the western portion of the property, with an increased number of screening level exceedances in soil gas and sub-slab vapor in the southwestern portion of the property, as illustrated on Figure 5. However, there are a couple of screening level exceedances in soil gas and sub-slab vapor on the eastern portion of the property as well (Figure 5). The presence of cis-1,2-DCE and vinyl chloride in groundwater on-Site and off-site indicates that natural attenuation of the TCE plume is occurring. Despite the cleanup efforts, with upgradient sources still present, CVOCs are likely to remain on-Site in soil gas and sub-slab vapor at concentrations found in recent investigations for some time.

Elevated benzene, ethylbenzene, total xylenes, and 1,2,4-TMB concentrations detected in sub-slab vapors beneath the northeastern corner of the SDC building are likely fuel-related, although the source is not currently known. Additionally, benzene vapor detections in the sub-slab vapor at the 943 building also exceeded the screening level but at significantly lower concentrations (Table 3, Figure 6). Benzene detections at the 943 building of 2.6 and 2.7 $\mu g/m^3$ are more likely associated with outdoor ambient air levels. These subslab vapor concentrations are within the range detected at the CARB air monitoring station in San Jose within 10 miles from the Site. At the CARB San Jose ambient air sampling station, the most recent available results (from 2010) showed that the ambient air had benzene concentrations ranging from 0.22 to 3.2 $\mu g/m^3$ (CARB, 2012). These fuel-related chemicals tend to naturally degrade overtime in aerobic environments.

5.0 TOXICITY ASSESSMENT

This section identifies toxicity criteria for COPCs at the Site. The toxicity assessment examines the potential for a chemical to cause adverse health effects in exposed individuals. It also presents the relationship between the magnitude of exposure and potential for adverse effects. Toxicity values used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the dose-response task within the risk assessment process.

The hierarchy of sources for the toxicity criteria used in this assessment is consistent with those recommended by the Cal/EPA and EPA for risk assessments as follows:

- CalEPA OEHHA Toxicity Criteria Database (CalEPA, 2012). The Toxicity Criteria Database is an online database that contains CalEPA-approved oral and inhalation toxicity values.
- EPA's Integrated Risk Information System (IRIS) (USEPA, 2012). IRIS is an on-line database that contains USEPA-approved oral and inhalation toxicity values.
- EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) (USEPA, 2011b). PPRTVs are interim toxicity values developed by the Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (as cited in USEPA, 2011a)
- The Agency for Toxic Substances and Disease Registry (ATSDR, 2009) minimal risk levels (MRLs)

Table 8 presents the unit risk factors (URFs), cancer slope factors (CSFs), reference concentrations (RfCs) and reference doses (RfDs) used in this HHRA. Specific dermal route CSFs and RfDs have not yet been developed for any COPCs as noted in Table 8. Consistent with Cal/EPA and USEPA guidance, potential health effects associated with dermal exposure are calculated using the oral toxicity factors.

6.0 RISK CHARACTERIZATION

Risk characterization is the process of quantifying the significance of residual chemicals in the environment in terms of its potential to cause adverse health effects. The quantitative estimates are expressed in terms of a probability statement for the potential theoretical incremental cancer risks and Hazard Indices (HIs) for the likelihood of adverse non-cancer health effects, using conservative modeling assumptions.

Excess lifetime cancer risks associated with exposure to COPCs classified by the EPA as carcinogens are characterized as an estimate of the probability (risk) that an individual will develop cancer over a lifetime (USEPA, 1989) using conservative modeling assumptions. This estimated theoretical lifetime incremental risk is expressed as a unitless probability. For example, an incremental cancer risk of 1×10^{-5} indicates an individual has a one-in-one hundred thousand chance of developing cancer during a 70-year lifetime as a result of the assumed exposure conditions. For the purposes of this HHRA and consistent with the National Contingency Plan (NCP), cancer risks exceeding 10^{-4} are considered to be unsatisfactory and could require mitigative action. Conversely, cancer risk at or below 10^{-6} is generally considered to be acceptable and no mitigative action need be considered. Cancer risks between 10^{-4} and 10^{-6} are considered to be within the risk management range[1].

6.1 Methodology for Quantitative Risk Evaluation

Cancer risk and Hazard Indices (and Hazard Quotients [HQs] for individual COPCs) are compared to screening criteria to evaluate whether there cancer risk or noncancer hazard is greater than threshold values. For this HHRA, cancer risk is evaluated by comparison to individual chemical screening levels set to 1×10^{-6} risk and HI's are compared to a target of 1. However, as described below, screening levels for individual non-carcinogenic COPCs are developed based on HQs of either 0.2 (when developed from soil gas or indoor air ESLs) or 1 (from other sources).

[1] The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), (U.S. EPA, Code of Federal Regulations, Title 40, Part 300.430[e][2]).

In general, risks for individual COPCs were estimated by first selecting target screening levels relevant to the receptor (i.e., residential or commercial/industrial) and the target risk or target quotient. Then, for each COPC an exposure point concentration (EPC) was selected for each relevant media. An EPC is the concentration at which a COPC's risk is quantified. Section 6.1.2 describes the method used to select EPCs for each COPC. Risks were calculated using a ratio method. The following equations summarize the calculation method for carcinogens and noncarcinogens, respectively:

$$\text{COPC-risk} = \text{EPC} \times \text{TR} / \text{Ca-SL}$$

For carcinogens, COPC-risk is the cancer risk (unitless),

EPC is the exposure concentration for the relevant media,
TR is the target risk (assumed to 1×10^{-6}),
Ca-SL is the carcinogenic target screening level relevant to the receptor,

$$\text{COPC-HQ} = \text{EPC} \times \text{THQ} / \text{NC-SL}$$

For noncarcinogens, NC-SL is the noncancer target screening level relevant to the receptor,

EPC is the exposure concentration for the relevant media,
THQ is the target Hazard Quotient (0.2 for soil gas and sub-slab vapor target screening levels based on ESLs; 1 for all other target screening levels as described in Section 6.1.4).

Once the individual COPC risks have been calculated, cumulative risks are calculated by summing the individual risks for chemical. Similarly, Hazard Indices (HIs) are calculated by summing the individual HQs for each chemical. For soil gas, cumulative cancer risks and HIs were calculated for residential and commercial receptors. For sub-slab vapor, cumulative cancer risks and HIs were calculated for residential and commercial receptors. For soil, cumulative cancer risks and HIs were calculated for residential, commercial receptors, and construction worker receptors.

6.1.1 Calculation and Selection of Exposure Point Concentrations

The calculation and selection of exposure point concentrations (EPCs) are described in this section. The selected EPCs along with the basis for selecting each EPC and general statistics for each COPC are

presented in Table 9. Initially, the dataset for a COPC was reviewed in order to note hotspot areas which may skew risk estimates for overall Site conditions. Then an upper confidence level (UCL) was calculated for each COPC using the EPA software, ProUCL (version 4.1.01, USEPA, 2011c). A UCL represents the upper limit of the mean of a data distribution where the UCL is also specified with a percentage of confidence (generally at 95% confidence). Where the number of detections was insufficient to evaluate a UCL for a COPC (i.e. less than 10 detections), the maximum detected concentration was selected as the EPC. For COPCs that were analyzed but not detected in any sample for a particular media, one half of the maximum detection limit was used as the EPC.

6.1.1.1 Estimation of UCLs

ProUCL was used to evaluate data distributions using both parametric and non-parametric methods and to make recommendations for an appropriate UCL. In addition, ProUCL was used to evaluate the nondetected results (i.e. detection limits). The 95 percent (%) UCL was used for all chemicals with more than ten detections, with the exception of cis-1,2-DCE in soil gas, for which a 99% UCL was selected[2], as recommended by ProUCL. Further, the results of the evaluation were reviewed to ensure that the estimates produced reasonable EPCs.

6.1.1.2 Duplicate Samples

Prior to calculating the UCLs, data from duplicate samples were reviewed and the maximum result between the primary and duplicate sample was used.

6.1.1.3 EPC Selection for TCE, Benzene, Ethylbenzne, Xylenes, and 1,2,4-TMB, in Sub-slab Vapor.

Risks related to sub-slab vapor sampling were separately quantified at the SDC and 943 Buildings. Selected EPCs for both areas noted in Table 9. Maximum concentrations were generally selected as EPCs, since the number of detections is below 10 in both areas. For the SDC building, concentrations at location SS-02 were excluded since there are significantly elevated related to other SDC building results; and the area around SS-02 has been well delineated (by samples SS-08, SS-09, and SS-10, Figure 6). The incremental risk in this area related to detections at SS-02 have been handled separately are discussed in Section 6.2.1.

[2] A 99% UCL was selected for cis-1,2-DCE in soil gas as recommended by ProUCL. A 99% UCL represents a greater degree of confidence that the mean of the data distribution is within this mean. Also this is a more conservative estimate of the mean upper limit.

6.1.2 Selection of Exposure Pathway Specific Target Screening Levels.

Risks related to the EPCs summarized in Table 9 were estimated by comparison to exposure pathway specific target screening levels. These target screening levels are presented in Tables 10, 11, and 13 for soil gas, sub-slab vapor, and soil, respectively. The target screening levels were selected using the following methodology:

- A target screening level was selected for each media quantitatively evaluated (i.e. soil gas, sub-slab vapor, and soil) for carcinogenic and noncarcinogenic risks for each relevant receptor.
- For most soil gas target screening levels, ESLs from Table E-2 were used. However, for TCE and 1,2,4-TMB, target screening levels were calculated by dividing the relevant indoor air RSLs (USEPA, 2011a) by the RWQCB-recommended soil gas to indoor air attenuation factor of 0.001 for residential receptors and 0.0005 for commercial receptors (DTSC, 2011). TCE was calculated using the indoor air RSLs rather than the ESLs due to the more conservative toxicity values (USEPA, 2011d) used to establish the indoor air RSLs (USEPA, 2011a).
- Similar to soil gas, ESLs from Table E-2 were used for most COPCs for sub-slab vapor. However, for TCE and 1,2,4-TMB target screening levels were calculated by dividing the relevant indoor air RSLs (USEPA, 2011a) by the DTSC-recommended sub-slab vapor to indoor air attenuation factor of 0.05 (DTSC, 2011). TCE was calculated using the indoor air RSLs rather than the ESLs due to the more conservative toxicity values (USEPA, 2011d) used to establish the indoor air RSLs (USEPA, 2011a).
- For soil screening levels, ESLs from Tables K-1, K-2, and K-3 were used as target screening levels for the residential, commercial, and construction/trench worker receptors, respectively, for most COPCs (RWQCB, 2008). For TCE, 1,2,4-TMB, and α-BHC, USEPA RSLs were used for residential and commercial receptors (USEPA, 2011a). For construction workers, no screening levels have been established for 1,2,4-TMB and α-BHC. In addition, the construction worker ESLs for TCE are not reflective of the most current toxicity data. Therefore, the on-line USEPA Region IX screening level calculator was used to estimate construction worker risk for these three compounds (USEPA, 2012). A site-specific version of the calculator was employed using EPA default values with the following exceptions where RWQCB exposure assumptions were used:
    - An exposure frequency of 250 day per year,
    - An exposure duration of 1 year,

- A soil ingestion rate of 480 milligrams per kilogram-day (mg/kg-day),
- A soil inhalation rate of 20 cubic meters per day (m^3/day), and
- A soil adherence factor of 0.3 milligrams per centimeters squared (cm^2).

6.1.3 Relationship of THQ to Target Screening Level

As mentioned in the Section 5.0, a THQ of 0.2 or 1 was used to calculate individual COPC HQs depending on the source of the target screening level. For target screening levels for soil gas and sub-slab vapor based on ESLs, the target screening levels are equivalent to a THQ of 0.2. All other target screening levels are based on a THQ of 1.

6.1.4 Calculation of Risk at Elevated ConcentrationAreas

Three areas were identified at the Site where elevated concentrations were detected relative to overall Site conditions. Risks were considered separately from the overall Site risk:

- Area 1 is the area impacted by elevated benzene, ethylbenzene, xylenes, and 1,2,4-TMB concentrations in sub-slab vapor at the SDC building (i.e. at location SS-02).
- Area 2 is in the northwestern portion of the Site where the maximum TCE concentration was detected in soil gas (i.e. at location TR-09).
- Area 3 is on the eastern portion of the Site where the maximum cis-1,2-DCE concentration was detected in soil gas (i.e. at location TR-20).

Based on the data evaluation described in Section 3.1.2, the benzene, ethylbenzene, xylenes, and 1,2,4-TMB concentrations from Area 1 were excluded from the calculation of risk at the SDC building. To calculate the risk in Area 1, the maximum concentration (i.e. from location SS-02) were used in place of the SDC building area EPCs for slub-slab vapor for benzene, ethylbenzene, xylenes, and 1,2,4-TMB. Similarly for the Area 2 and Area 3 locations, the respective maximum concentration was used in place of the Site-wide EPC to calculate cumulative risk. The EPCs used for evaluation of these areas are listed in Table 13.

6.2 Risk Estimation Results

Summaries of cancer risks and non-cancer hazard indices are presented in this section for the residential, commercial worker, and construction worker exposure scenarios. A summary of total risks and hazards for each receptor as a result of COPCs in soil gas, sub-slab vapor, and soil are presented in Tables 10, 11, and 12, respectively. Consistent with the DTSC 2011 Vapor Intrusion Guidance document, volatile compounds from soil were not evaluated in lieu of data in soil gas and sub-slab vapor (DTSC, 2011). As described in Section 4.0, the estimate of hazards and risks presented in this section are based on future residential and recreational land use at the Site.

6.2.1 Risk Related to Vapor Intrusion

Both soil gas and sub-slab vapor samples were separately used to evaluate carcinogenic risks and non-cancer hazards posed by COPCs through the vapor intrusion pathway to residential, recreational and commercial/industrial receptors.

6.2.1.1 Overall Site Risk from Soil Gas

The cumulative Site-wide lifetime excess cancer risk associated with the COPCs due to soil gas concentrations were calculated to be $2x10^{-6}$ for residents and $1x10^{-7}$ for commercial/industrial workers. The major contributor to these risks is TCE. The hazard indices associated with COPCs in soil gas concentrations are 0.1 for residents and 0.05 for commercial/industrial workers with the majority of the contribution from cis-1,2-DCE. The calculated cumulative lifetime incremental cancer risks were calculated to be at or below 10^{-6} and the calculated HIs are both below 1 for the residential and commercial/industrial receptors and thus are less than respective target risk values.

6.2.1.2 Risk from Sub-slab Vapor at the SDC Building

The cumulative lifetime excess cancer risk associated with the COPCs due to sub-slab vapor concentrations were calculated to be $4x10^{-5}$ for residents and $2x10^{-6}$ for commercial/industrial workers. The major contributor to these risks is from benzene. The hazard indices associated with COPCs in soil gas concentrations are 0.7 for residents and 0.4 for commercial/industrial workers with the majority of the contribution from TCE and xylenes. The calculated total lifetime incremental cancer risks are at 10^{-5} for residents and 10^{-6} for commercial/industrial receptors. The calculated HIs are both below 1 for the residential and commercial/industrial receptors.

To understand the relative risk contributed by benzene in sub-slab vapor at the SDC building, the risk related to the presence of benzene in the outdoor ambient air was also calculated. This was done using the method described in Section 6.1.4 where an EPC of 3.2 $\mu g/m^3$ for benzene was used (i.e. the upper measured benzene concentration in outdoor air from the CARB San Jose monitoring station, Section 3.1.2). The quantified risk due to benzene in outdoor ambient air for residential receptors is $4x10^{-5}$ (cancer risk) and 0.1 (HQ) and for commercial/industrial receptors is $2x10^{-5}$ (cancer risk) and 0.07 (HQ). Table 11 present the risks due to benzene in ambient outdoor air. These cancer risks due to the inhalation of ambient air are equivalent to the risk levels calculated for the SDC building.

6.2.1.3 Risk from Sub-slab Vapor at the 943 Building

The cumulative lifetime excess cancer risk associated with the COPCs due to sub-slab vapor concentrations were calculated to be $5x10^{-6}$ for residents and $1x10^{-6}$ for commercial/industrial workers. The major contributor to these risks is from benzene and TCE. The hazard indices associated with COPCs in soil gas concentrations are 0.2 for residents and 0.2 for commercial/industrial workers with the majority of the contribution from TCE. These risks are significantly less than the calculated risk due to the presence of benzene in the outdoor ambient air (Table 11).

6.2.1.4 Incremental Risk at Area 1

Area 1 is the portion of the site currently occupied by the SDC building at SS-02 where relatively elevated sub-slab vapor concentrations of benzene, ethylbenzene, xylenes, and 1,2,4-TMB were detected. This area is defined by results at SS-02 and is delineated by results from SS-08, SS-09, and SS-10 (Table 3). The impacted area is relatively small, approximately 40 by 40 feet (1,600 square feet in area). Sub-slab vapor samples at this location were collected from a 30-inch thick slab which is significantly thicker than the default 4-inch thick slab used in the Johnson/Ettinger model to develop the RWQCB's ESLs (RWQCB, 2008, Johnson and Ettinger, 2008). Therefore sampled sub-slab vapors at this location are significantly deeper than where sub-slab vapors would normally be sampled (by around 2 feet). Using the conservative DTSC recommended slab attenuation factor of 0.05 to model these conditions would overestimate risk to indoor occupants due to the unusually deep location of the sampled sub-slab vapors and due to the thickness of the 30-inch slab. The USEPA developed a database in 2008 consisting of 1,584 slab attenuation factors. The majority of these factors ranged from 0.001 to 0.01 with a median of 0.005 (USEPA, 2008). Therefore risk estimates at Area 1 were calculated using the median attenuation factor of 0.005 and also a range of 0.001 to 0.05 (i.e. the DTSC default value). The carcinogenic risk

estimate due to these elevated concentrations at Area 1 based on the USEPA median slab attenuation factor is $4x10^{-5}$ and $1x10^{-6}$ for residential and commercial/industrial receptors, respectively. The cancer risk estimates using lower and upper end attenuation factors of 0.001 and 0.05 range from $6x10^{-6}$ to $2x10^{-4}$ for residential receptors and from is $5x10^{-7}$ to $6x10^{-6}$ for commercial/industrial receptors. The HI due to these elevated concentrations at Area 1 based on the USEPA median slab attenuation factor is 0.5 and 0.3 for residential and commercial/industrial receptors, respectively. The HI's using lower and upper end attenuation factors of 0.001 and 0.05 range from 0.4 to 2 for residential receptors and from 0.2 to 0.9 for commercial/industrial receptors.

6.2.1.5 Incremental Risk at Area 2

Area 2 is located in the northwestern portion of the Site where the maximum TCE concentration in soil gas was detected (at TR-09). The cumulative carcinogenic risk due to the elevated TCE at this location is $8x10^{-6}$ and $6x10^{-7}$ for residential and commercial/industrial receptors, respectively. The hazard indices in this area are 0.7 for residents and 0.1 for commercial/industrial workers. The calculated total lifetime incremental cancer risks are at or below 10^{-6} and the calculated HIs are both below 1 for the residential and commercial/industrial receptors.

6.2.1.6 Incremental Risk at Area 3

Area 2 is located in the eastern portion of the Site where the maximum cis-1,2-DCE concentration in soil gas was detected (at TR-20). The carcinogenic risk due to the elevated cis-1,2-DCE concentration is $2x10^{-6}$ and $1x10^{-7}$ for residential and commercial/industrial receptors, respectively. The hazard indices in this area are 0.6 for residents and 0.2 for commercial/industrial workers. The calculated total lifetime incremental cancer risks are at or below 10^{-6} and the calculated HIs are both below 1 for the residential and commercial/industrial receptors and are less than respective target risk values.

6.2.2 Risk Related to Soil Exposure

The carcinogenic risks and non-cancer HIs were calculated for direct exposure to soil including dermal contact, incidental ingestion, and inhalation of particulates for residential, commercial/industrial worker, and construction/trench worker receptors.

6.3.2.1 Overall Site Risk Excluding Arsenic and Vanadium

The cumulative lifetime incremental cancer risks due to assumed exposures to COPCs in soil (excluding arsenic and vanadium) for residential, commercial/industrial, and construction/trench worker receptors are $3x10^{-6}$, $8x10^{-7}$, and $8x10^{-8}$ respectively. The hazard indices (excluding arsenic and vanadium) are 0.05, 0.004, and 0.003 for residents and commercial/industrial and construction workers respectively. The calculated cancer risks are at or below 10^{-6} and the HI are below 1 indicating acceptable risk levels.

6.3.2.2 Relative Risk Due to Presence of Arsenic and Vanadium

The risk due to the presence of arsenic and vanadium were evaluated as it impacts the overall Site risk and as it compares to arsenic and vanadium risk attributed to the natural background conditions (Table 14). A comparison of risk between local and on-Site maximum arsenic and vanadium concentrations indicates similar risk levels (Table 14). Based on this evaluation and based on the fact that no hot-spot arsenic or vanadium areas were found (Figure 4), on-Site arsenic and vanadium concentrations are within local background concentrations. Table 14 also indicates the relative risk in soil due to arsenic and vanadium relative to other COPCs. The risk due to arsenic is generally an order of magnitude greater than the cumulative risk of other COPCs (including vanadium). This result is further evidence that risks due to the presence of OCPs, CVOCs, and fuel related VOCs are within acceptable levels.

7.0 UNCERTAINITY ASSESSMENT

The process of estimating risk has inherent uncertainties associated with the calculations and assumptions used. The approach used in this HHRA has been conservative and thus overestimates exposures. Consequently, the risk assessment also overestimates risk associated with those exposures. A discussion of the key uncertainties used in this risk assessment is presented below.

7.1 Data Evaluation

Over time, certain chemicals in soil, soil gas, and groundwater (i.e. petroleum hydrocarbons, VOCs, and pesticides) are likely to be biodegraded and decreased in concentration. Natural attenuation was not accounted for in the modeling for this assessment. Therefore, the calculated risks likely represent an overestimate of the actual the long-term risks to future populations.

The risk assessment included inorganic chemicals in soil that are present at naturally-occurring concentrations. In particular, arsenic at concentrations typical of background soils up to 11 mg/kg, is known to result in elevated cancer risk. The inclusion of inorganic chemicals in soil that are consistent with Site background concentrations cause an overestimate of risk related to anthropogenic sources.

7.2 Exposure Assessment

Numerous assumptions must be made in order to estimate human exposure to chemicals. These assumptions include parameters such as daily breathing rates, soil ingestion rates, skin surface area exposed to soil, human activity patterns, and many others. Most of the exposure assumptions used in the calculation of risk for this assessment are recommended by Cal/EPA and USEPA, and are often the upper 90th or 95th percentile values. The use of 90th or 95th percentile values, when available, is recommended by the USEPA in order to estimate the "Reasonable Maximum Exposure" that may occur at a site, rather than the reasonable average exposure or actual exposure. In addition, the combination of several upper-bound estimates used as exposure parameters will likely substantially overestimate chemical intake. Thus, the risks estimated in this assessment are likely much higher than would be expected to exist.

Direct contact with surface soil is not likely for residents, outdoor commercial workers, and recreational visitors based on planned Site development. Grading, importing soil, and new park construction will cover or remove and replace surface soil, thereby greatly reducing exposures to COPCs that have been detected in shallow soil at the Site prior to the redevelopment. The rest of the Site will be paved or covered with buildings, thus eliminating any direct contact with surface soil.

For the construction worker, it was assumed that no personal protective equipment (PPE) would be worn and that workers would be directly exposed to soil during development activities. Because some chemical concentrations are known to exceed screening levels, and in some cases, acceptable target risk levels, workers will be required under the State of California Occupational Safety and Health Administration (OSHA) regulations to wear PPE, which would reduce their risk . Further, during site redevelopment, dust control measures will be required under applicable Federal, State, and local laws which will significantly lower the possible inhalation of COPCs. Consequently, the estimated risks to the construction worker were overestimated.

7.3 Fate and Transport Modeling

Uncertainty is associated with modeling any physical process. The magnitude of this uncertainty, the sensitivity of the model to uncertain parameters, and the model objectives affect how the results can be used. Two types of uncertainty exist in simulating subsurface flow and transport processes: model uncertainty and parameter uncertainty. Each type of uncertainty is discussed further below.

Model uncertainty relates to the computational methods and simplifying assumptions employed by the model code to simulate the physical system. The Johnson and Ettinger model (used to simulate soil gas to indoor air attenuation factors) has been shown to predict field-measured conditions (RWQCB, 2008; USEPA, 2004; DTSC, 2011). The code was developed under contract to the USEPA from a model previously published in a peer-reviewed journal (USEPA, 2004; Johnson and Ettinger, 1991).

Parameter uncertainty includes measurement errors inherent in field studies as a result of equipment limitations, measurement errors, and incomplete knowledge of surface and subsurface conditions. These parameter uncertainties manifest themselves in the model as uncertainties in boundary conditions, flow parameters, and transport parameters. These in turn produce uncertainty in the model results, such as soil gas migration rates and chemical migration rates.

The uncertainties in the calculated indoor air concentrations are mostly associated with the assumed parameters and structure of a residential home. First and most importantly, the attenuation through the slab of a house or commercial structure is difficult to characterize since actual attenuation through a building slab is difficult to measure. Factors that influence it include the degree of cracking of the slab, the permeability of the soil underlying the slab, and building construction.

Uncertainty associated with mixing height can occur if ventilation within the indoor space is good. For this model, a default residential mixing height of eight feet was chosen, which is appropriate for a one-story home and conservative for a three-story home or a home with good ventilation between the first floor and an attic. The effect of a change in mixing height is a simple linear extrapolation on the corresponding transfer factor. If the mixing height were doubled, the transfer factors would be reduced by a factor of two and decrease the risks by a factor of two.

Sensitivity in air exchange rate is also easily calculated, in that a doubled exchange rate reduces the transfer factors by two resulting in decreased risks by a factor of two. The air exchange rate can be

different depending on whether ventilation in the building is aided by windows or doors being open or closed; the range of residential air exchange rates has been estimated to be between 0.21/hour and 1.48/hour (USEPA, 2004b). The values were used to develop the soil gas to indoor air attenuation factors used in this HHRA are within that range at one per hour for residential homes. This value was assumed in the absence of actual air exchange rates for the future developments. However, if the air exchange rates in future homes are greater, the risks would be lower than presented here. Similarly, if future homes have lower air exchange rates, the risks would be higher than those presented in this HHRA.

The uncertainties in the calculated emission flux of chemicals are associated with the limitations of the Johnson and Ettinger model and a number of assumptions made during these calculations. First, there are inherent limitations in the model, which introduce uncertainties in the calculated flux. In particular, the Johnson and Ettinger model assumes vertical homogeneity in soil characteristics within each horizon in the vadose zone. In reality, there is variation in soil characteristics within each horizon in the vadose zone. Due to the nature of vertical variation in soil along the vadose zone, this constraint may result in either an overestimate or underestimate of the calculated flux and the resulting risks. Further, the model also does not account for horizontal transport of chemicals within the vadose zone. If presence of VOCs is highly localized (i.e., impacted area is surrounded by a clean area), horizontal transport tends to dilute the localized source of VOCs and decrease the flux of chemicals to the atmosphere. For this case, the true flux could be lower than presented in this HHRA and therefore, the calculated risks would be higher than may be required to be protective of human health.

7.4 Toxicity Assessment

Available scientific information is insufficient to provide a thorough understanding of all the toxic properties of each of the chemicals to which humans may be exposed. It is generally necessary, therefore, to infer these properties by extrapolating them from data obtained under other conditions of exposure, generally in laboratory animals. Although reliance on experimental animal data has been widely used in general risk assessment practices, chemical absorption, metabolism, excretion, and toxic responses may differ between humans and the species for which experimental toxicity data are available. Uncertainties in using animal data to predict potential effects in humans are introduced when routes of exposure in animal studies differ from human exposure routes, when the exposures in animal studies are short-term or subchronic, and when effects seen at relatively high exposure levels in animal studies are

used to predict effects at the much lower exposure levels found in the environment. Uncertainties in the toxicological assessments for carcinogens and noncarcinogens are discussed below.

7.4.1 Carcinogens

The use of animal data presents an uncertainty in predicting carcinogenicity in humans. While many substances are carcinogenic in one or more animal species, only a small number of substances are known to be human carcinogens, raising the possibility that not all animal carcinogens are human carcinogens and that not all human carcinogens are animal carcinogens. To prevent the underestimation of carcinogenic risk, regulatory agencies generally assume that humans are at least as sensitive to carcinogens as the most sensitive animal species.

The development of cancer slope factors (CSFs) for carcinogens is predicated on the assumption generally made by regulatory agencies that no threshold exists for carcinogens (i.e., that there is some risk of cancer at all exposure levels above zero). The no-threshold hypothesis for carcinogens, however, may not be valid for all substances.

7.4.2 Mutagenic Mode of Action

The EPA released a guidance document titled *Supplemental Guidance for Assessing Susceptibility from Early-life Exposure to Carcinogens* ("Supplemental Guidance"), which prescribed methods for addressing the increased susceptibility to children exposed to carcinogens. These methodologies are intended to specifically address "early-life exposures that may result in the occurrence of cancer during childhood and early-life exposures that may contribute to cancers later in life" (USEPA, 2005). To account for the increased susceptibility, cancer risks were weighted by a factor of ten for exposures occurring the first two years of life, a factor of three from age two years to less than 16 years of age, and no adjustment for ages 16 years and up (USEPA, 2005). For this project, TCE is the only chemical that the EPA has identified as a carcinogen by a mutagenic mode of action. EPA has concluded, by a weight-of-evidence evaluation, that TCE is carcinogenic by a mutagenic mode of action for induction of kidney tumors (2005). These methodologies have been formally adopted in the development of EPA, Region IX's RSLs. However, the methods in the Supplemental Guidance have not been formally adopted by Cal/EPA's RWQCB or DTSC for the evaluation of contaminated sites. Therefore, application of the EPA's Supplemental Guidance in this HHRA may result in an increase in the cancer risk estimates for chemicals with a mutagenic mode of action. However, for the TCE, target screening levels used to calculate risk

related to soil gas, sub-slab vapor, and soil were based on EPA RSLs and therefore incorporate this methodology.

7.4.3 Noncarcinogens

In order to adjust for uncertainties that arise from the use of animal data, regulatory agencies often base the RfD for noncarcinogenic effects on the most sensitive animal species (i.e., the species that experiences adverse effects at the lowest dose). These doses are then adjusted via the use of safety or uncertainty factors. The adjustment compensates for the lack of knowledge regarding interspecies extrapolation, and guards against the possibility of humans being more sensitive than the most sensitive experimental animal species tested. The use of uncertainty factors is considered to be protective of health. In addition, when route-specific toxicity data were lacking, RfDs were extrapolated from one route to another (i.e., oral to inhalation and inhalation to oral). Due to the absence of contrary data, equal absorption rates were assumed for both routes.

7.5 Uncertainties in Risk

The EPA (1989) notes that the conservative assumptions used in risk assessments are intended to assure that the estimated risks do not underestimate the actual risks posed by a site and that the estimated risks do not necessarily represent actual risks experienced by population at or near a site.

This HHRA was conducted using a series of conservative assumptions. The use of conservative assumptions tends to produce upper-bound estimates of risk. Although it is difficult to quantify the uncertainties associated with all the assumptions used in this assessment, the use of conservative assumptions results in a substantial overestimate of exposure, and hence, risk.

8.0 SUMMARY AND CONCLUSIONS

The purpose of this HHRA was to evaluate potential human exposures and health risks associated with a proposed residential development at 915 DeGuigne Drive in Sunnyvale, California. Current Site plans include slab-on-grade residential development in addition to a parking facility and an open recreation area.

During a Phase II ESA performed by T&R (2012a), soil, soil vapor, sub-slab vapor, and groundwater samples were collected and analyzed to characterize the nature and extent of impacts at the Site. The

Phase II ESA revealed that groundwater and soil gas at the Site have been impacted by VOCs, predominantly TCE, cis-1,2-DCE, benzene, ethylbenzene, xylenes, and 1,2,4-TMB. Results of the Phase II ESA also showed that shallow soil at the Site has been impacted by arsenic, vanadium, and OCPs. The data collected as part of the Phase II ESA provide the basis for this HHRA in addition to groundwater monitoring results provided by AMEC.

Based on planned future Site use, potential receptors at the Site include residents, commercial workers, construction workers, and park recreational visitors. Exposure pathways for these receptors potentially include vapor intrusion from soil vapor and sub-slab vapor and direct soil exposure consisting of dermal contact, incidental ingestion, and inhalation of soil particles. The risks evaluated for residential receptors are considered the most sensitive. While groundwater concentrations exceed drinking water standards (i.e. MCLs) for some chemicals, ingestion of groundwater was considered an incomplete exposure pathway due to the presence of a deed restriction which prohibits the use of groundwater for drinking water purposes.

COPCs were identified by comparison of analytical data to applicable screening levels. Screening levels included RWQCB ESLs (RWQCB, 2008) and USEPA RSLs (USEPA, 2011). Soil gas screening levels were taken directly from ESLs for vapor intrusion concerns from shallow soil gas where available. For compounds without available ESLs, and for TCE (due to recent changes to toxicity parameters), RSLs were adapted to soil gas screening levels by dividing by an attenuation factor of 0.001 (DTSC, 2011). Similarly sub-slab vapor screening levels were calculated from ESLs (or RSLs where ESLs were not available and for TCE) for indoor air using a DTSC default slab attenuation factor (DTSC, 2011). Soil screening levels were selected from ESLs for direct soil exposure and RSLs, with the most conservative value between the two sources for each chemical used as the screening level. If the maximum detected concentration of a chemical exceeded the screening level it was retained as a COPC. COPCs from soil gas and sub-slab vapor were benzene, ethylbenzene, cis-1,2-DCE, TCE, xylenes, and 1,2,4-TMB. Soil COPCs were p,p-DDE, dieldrin, α-BHC, arsenic, and vanadium. Arsenic and vanadium, although detected within their respective natural background concentration range, were retained as COPCs to compare estimated Site risks to natural background risks.

Risks were estimated for each human receptor category using calculated EPCs for each COPC in each media. Risks were calculated for COPCs using a ratio approach that assumed a target cancer risk and non-cancer HQ for selected carcinogen and noncarcinogen screening levels. EPCs for each chemical in

each medium were calculated with the method dictated by the number of detections for the COPC in a particular medium. If a COPC had ten or more detections, then a UCL was calculated using ProUCL and the UCL was used as the EPC. If a COPC was detected in at least one but less than ten samples then the maximum detected concentration was used as the COPC, and if a COPC was not detected, then one half of the maximum detection limit was used.

Cumulative risks for each receptor category in each media were calculated by summing all of the individual COPC risks for each receptor category. For the residential receptor, the overall site cancer risk (due to soil concentrations other than arsenic and vanadium) was $3x10^{-6}$ with a HI of 0.04. The risks related to commercial/industrial and construction workers (due to soil concentrations other than arsenic and vandium) were below 10^{-6} and below a HI of 1. For the residential receptor, the overall estimated vapor intrusion cancer risk (due to soil gas concentrations) was $2x10^{-6}$ with a HI of 0.5. The risks related to commercial/industrial and workers were below 10^{-6} and below a HI of 1. Since these risks are at or below 10^{-6} (for cancer risk) and below an HI of 1, they are considered acceptable.

At the SDC Building residential cancer risks related to vapor intrusion from sub-slab vapor impacts were at levels equivalent to outdoor ambient air inhalation risks (i.e. $4x10^{-5}$). At the 943 Building, residential cancer risks related to vapor intrusion from sub-slab vapor impacts were at $5x10^{-6}$ and therefore less than outdoor ambient air risks. At both buildings and in the outdoor air, estimated risks were predominantly due to the presence of benzene, although TCE also contributed to the estimated risk at the 943 Building; and ethylbenzene and TCE contributed to the risk at the SDC building. The benzene in outdoor ambient air is due to the background concentrations present in the area. Commercial/Industrial risks were at or below 10^{-6} and below HIs of 1 for both the 943 and SDC buildings. These results indicate that vapor intrusion risks due to sub-slab vapor impacts are at or below ambient conditions (due to the presence of benzene in the outdoor ambient air).

At three locations at the Site, vapor intrusion risks were calculated due to elevated chemical concentrations relative to other sample locations. At the SDC building, a small area of approximately 40 feet by 40 feet was evaluated separately due to elevated concentrations of benzene, ethylbenzene, xylenes, and 1,2,4-TMB in sub-slab vapor (Area 1). At Area 1, a lower slab attenuation factor (0.005) was used due to the significantly thicker slab found in this area of 30-inches. The residential cancer risk estimate due to vapor intrusion was $4x10^{-5}$ with a HI of 0.5 and the commercial/industrial cancer risk estimate due to vapor intrusion was $1x10^{-6}$ with a HI of 0.3. Risk estimate ranges representing lower end

and conservative upper end slab attenuation factors were also calculated. Cancer risk estimates for the vapor intrusion pathway range from $6x10^{-6}$ to $2x10^{-4}$ for residential receptors and from $5x10^{-7}$ to $6x10^{-6}$ for commercial/industrial receptors. The HI's range from 0.4 to 2 for residential receptors and from is 0.2 to 0.9 for commercial/industrial receptors.

The area, located in the northwest portion of the Site at TR-09, where the maximum TCE concentration in soil gas was detected was also considered separately (Area 2). At Area 2, the residential cancer risk due to vapor intrusion was estimated to be $8x10^{-6}$ with a HI of 0.7 and the commercial/industrial cancer risk due to vapor intrusion was estimated to be $6x10^{-7}$ with a HI of 0.1.

The third area (Area 3) considered separately was the area in the eastern portion of the Site where the maximum cis-1,2-DCE concentration in soil gas was detected (at TR-20). At Area 3, the residential cancer risk due to vapor intrusion was estimated to be $2x10^{-6}$ with a HI of 0.6 and the commercial/industrial cancer risk due to vapor intrusion was estimated to be $1x10^{-7}$ with a HI of 0.1.

The contribution of arsenic and vanadium to overall Site risk were evaluated. The results of this evaluation indicate that on-Site arsenic and vanadium risk is comparable to the natural background arsenic and vanadium risk. In addition, the local background arsenic risk is an order of magnitude greater than the on-Site risk due to OCPs and vanadium in soils.

9.0 LIMITATIONS

In performing this HHRA, T&R has endeavored to observe that degree of care and skill generally exercised by other consultants undertaking similar studies at the same time, under similar circumstances and conditions, and in the same geographical area. This HHRA was based on assumptions for the proposed future development. If those assumptions change, or the actual development is different from the assumptions used to develop this HHRA, then it may be necessary to re-evaluate risks to future Site receptors.

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TABLES

Treadwell&Rollo
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Table 1
Summary of TPH, VOCs, OCPs, PCBs, and Chlorinated Herbicide Analytical Results in Soil
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Sample ID	Depth feet	Date Sampled	Soil																			
			TPH			VOCs								OCPs								
			TPHg	TPHd	TPHmo	Acetone	TCE	Benzene	Ethyl-benzene	cis-1,2-DCE	Xylenes	1,2,4-TMB	All Other VOCs	p,p-DDD [2]	p,p-DDE [2]	p,p-DDT [2]	Dieldrin	a-BHC	Endrin	All Other OCPs	All PCBs	All Chlorinated Herbicides
RWQCB ESL [1] (Residential land use)			**110**	**110**	**370**	**2,800**	**1.9**	**0.12**	**2.3**	**6.5**	**31**	**NE**	**NA**	**2.4**	**1.7**	**1.7**	**0.034**	**NE**	**4.1**	**NA**	**NA**	**NA**
EPA RSL [3] (Residential land use)			**NA**	**NA**	**NA**	**61,000**	**2.8**	**1.1**	**5.4**	**160**	**630**	**62**	**NA**	**2.0**	**1.4**	**1.7**	**0.030**	**0.077**	**18.0**	**NA**	**NA**	**NA**
			(mg/kg)																			
TR-01-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0080	0.027	< 0.0080	< 0.0080	0.019 J	< 0.0080	< 0.008 to < 0.4	--	--
TR-01-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-02-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	0.39	< 0.040	< 0.040	**0.097 J**	< 0.040	< 0.04 to < 2	--	--
TR-02-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	0.37	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040 to < 2.0	--	--
TR-03-1.5	1.5	11/01/11	< 1.0	1.5	7.3	< 0.05	0.013	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	< 0.002	0.018	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.002 to < 1.2	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-04-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.025	1.2	0.090	**0.030**	0.019 J	< 0.0080	< 0.008 to < 0.4	--	--
TR-04-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.042	1.50	0.0091 J	**0.074**	< 0.0040	< 0.0040	< 0.0040 to 1.5	--	--
TR-04-3	3	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.023	0.33	< 0.0040	< 0.002	< 0.0040	< 0.0040	< 0.0040 to < 0.2	--	--
TR-05-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.04 to < 2	--	--
TR-05-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20 to < 10	--	--
TR-06-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.034	0.59	0.055	0.018	< 0.0040	< 0.0040	< 0.004 to < 0.2	--	--
TR-06-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-07-1.5	1.5	11/01/11	< 1.0	5.3	14	0.065	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	< 0.05	**1.9**	< 0.050	**0.077**	< 0.050	< 0.050	< 0.002 to < 1.2	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-08-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.020	**2.0**	0.068	**0.099**	< 0.020	< 0.020	< 0.02 to < 1	--	--
TR-08-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-09-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0020	0.0058	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.002 to < 0.1	--	--
TR-09-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-10-1.5	1.5	11/02/11	< 1.0	4.8	32	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004 to < 0.1	0.014	0.2	0.04	< 0.010	< 0.010	< 0.010	< 0.01 to <0.5	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-11-1.5	1.5	11/15/11	--	--		--	--	--	--	--	--	--	--	0.023, J	**1.7**	< 0.020	**0.065**	< 0.020	< 0.020	< 0.02 to < 1	--	--
TR-11-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.020	0.054	< 0.020	**0.034,J**	< 0.020	< 0.020	< 0.020 to < 1.0	--	--
TR-11-3	3	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.002	< 0.0040	< 0.0040	< 0.0040 to < 0.2	--	--
TR-12-1.5	1.5	11/02/11	< 1.0	1.3	--	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004 to < 0.1	< 0.001	0.0091	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001 to < 0.05	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-13-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2 to < 10	--	--
TR-13-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20 to < 10.0	--	--
TR-14-1.5	1.5	11/02/11	< 1.0	< 1.0	< 5.0	< 0.05	0.035	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	< 0.001	0.054	0.004	< 0.001	< 0.001	< 0.001	< 0.002 to < 1.2	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-15-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0020	0.0033 J	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.002 to < 0.1	--	--
TR-15-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-16-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.042 J	**3.2**	0.58	**0.15**	< 0.020	0.13	< 0.02 to < 1	--	--
TR-16-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0020	0.37	0.079	< 0.0020	< 0.0020	< 0.0020	< 0.0020 to 0.37	--	--
TR-17-1.5	1.5	11/02/11	< 1.0	1.1	< 5.0	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	< 0.01	0.22	< 0.010	< 0.010	< 0.010	< 0.010	< 0.002 to < 1.2	< 0.1 to < 2.5	< 0.05 to < 5.0
TR-18-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.04 to < 2	--	--
TR-18-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040 to < 2.0	--	--
TR-19-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0040	1.3	0.14	**0.034**	< 0.0040	0.040	< 0.004 to < 0.2	--	--
TR-19-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040 to < 2.0	--	--

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Table 1
Summary of TPH, VOCs, OCPs, PCBs, and Chlorinated Herbicide Analytical Results in Soil
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Sample ID	Depth feet	Date Sampled	Soil																			
			TPH			VOCs								OCPs							All PCBs	All Chlorinated Herbicides
			TPHg	TPHd	TPHmo	Acetone	TCE	Benzene	Ethyl-benzene	cis-1,2-DCE	Xylenes	1,2,4-TMB	All Other VOCs	p,p-DDD [2]	p,p-DDE [2]	p,p-DDT [2]	Dieldrin	a-BHC	Endrin	All Other OCPs		
RWQCB ESL [1] (Residential land use)			**110**	**110**	**370**	**2,800**	**1.9**	**0.12**	**2.3**	**6.5**	**31**	**NE**	**NA**	**2.4**	**1.7**	**1.7**	**0.034**	**NE**	**4.1**	**NA**	**NA**	**NA**
EPA RSL [3] (Residential land use)			**NA**	**NA**	**NA**	**61,000**	**2.8**	**1.1**	**5.4**	**160**	**630**	**62**	**NA**	**2.0**	**1.4**	**1.7**	**0.030**	**0.077**	**18.0**	**NA**	**NA**	**NA**
TR-20-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.050	1.5	0.0097 J	**0.071**	< 0.0080	< 0.0080	< 0.008 to < 0.4	--	--
TR-20-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	0.65	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040 to < 2.0	--	--
TR-21-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0004	0.0024	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004 to < 0.02	--	--
TR-21-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001 to < 0.05	--	--
TR-22-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.00080	0.19	0.015	0.0049	< 0.00080	< 0.00080	< 0.0008 to < 0.04	--	--
TR-22-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.0027	0.034	0.0030	0.0037	< 0.001	0.0021	< 0.001 to 0.034	--	--
TR-22-3	3.0	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.11	1.2	0.043	< 0.002	< 0.0040	< 0.0040	< 0.0040 to < 0.2	--	--
TR-23-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	1.4	0.054, J	< 0.040	< 0.040	< 0.040	< 0.04 to < 2	--	--
TR-23-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0040	**1.7**	0.075	< 0.0040	< 0.0040	0.026	< 0.0040 to 1.7	--	--
TR-23-3	3	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.040	< 0.040	< 0.040	< 0.020	< 0.040	< 0.040	< 0.04 to < 2.0	--	--
TR-24-1.5	1.5	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.080	1.2	< 0.080	< 0.080	< 0.080	< 0.080	< 0.08 to < 4	--	--
TR-24-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	0.0053 J	0.087	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040 to < 0.20	--	--
TR-25-1.5	1.5	11/15/2011	--	--	--	--	--	--	--	--	--	--	--	< 0.00080	0.0013 J	< 0.00080	< 0.00080	< 0.00080	< 0.00080	< 0.0008 to < 0.04	--	--
TR-25-2	2	11/15/11	--	--	--	--	--	--	--	--	--	--	--	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020 to < 0.10	--	--
TR-27-3.5	3.5	12/06/11	< 1.0	30	53	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-27-7.5	7.5	12/06/11	< 1.0	< 1.0	< 5.0	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-28-3.5	3.5	12/06/11	< 1.0	16	22	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-28-7.5	7.5	12/06/11	< 1.0	< 1.0	< 5.0	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-29-3.5	3.5	12/06/11	< 1.0	2.7	5.5	< 0.05	0.012	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--
TR-29-7.5	7.5	12/06/11	< 1.0	5.9	8.8	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005 to < 0.1	--	--	--	--	--	--	--	--	--

Notes:

All units are milligrams per kilogram (mg/kg).

[1] - RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table K-1 - Direct Exposure Soil Screening Levels, Residential Exposure Scenarios,* Interim Final dated November 2007 (revised May 2008).

[2] - The Total Threshold Limit Concentration (TTLC) of the sum of p,p-DDD, p,p-DDE, and p,p-DDT is equal to 1 mg/kg. The sum of these compounds in excess of 1 mg/kg denotes a hazardous waste.

[3] - Environmental Protection Agency (EPA) Regional Screening Levels for Residential Soil (November 2011).

VOCs - Volatile Organic Compounds, EPA 8260B
PCBs - Polychlorinated Biphenyls
OCPs - Organochlorine pesticides
TPH - Total Petroleum Hydrocarbons
TPHg - TPH as Gasoline with Silica Gel Clean-up, EPA Method 8015M
TPHd - TPH as Diesel Range with Silica Gel Clean-up, EPA Method 8015M
TPHmo - TPH as Motor Oil with Silica Gel Clean-up, EPA Method 8015M
TCE - trichloroethene
a-BHC - α-Hexachlorocyclohexane (also known as benzene hexachloride)
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
NE - Not Established
NA - Not Applicable
mg/kg - milligrams per kilogram
BOLD - Concentration detected at or above the ESL
J - analyte detected below quantitation limits
-- Not analyzed

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Table 2
Summary of Metals Analytical Results in Soil
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Sample ID	Depth interval feet	Date Sampled	Antimony	Arsenic	Barium	Beryllium	Cadmium	Total Chromium	Hexavalent Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
RWQCB ESL [1] (residential land use)			**6.3**	**0.39**	**3,000**	**31**	**1.7**	**23,000 [2]**	**9.4**	**280**	**6,300**	**260**	**1.3**	**78**	**300**	**78**	**78**	**1.3**	**16**	**600**
EPA RSL [3] (residential land use)			**31.0**	**0.39**	**15,000**	**160**	**70.0**	**280**	**39**	**23**	**3,100**	**400**	**6.7**	**390**	**NA**	**390**	**390**	**NA**	**550**	**23,000**
Background Concentration Ranges [4]			**1.5–7.1**	**<0.2-31**	**41–411**	**0.29–1.1**	**0.27–3.3**	**10–142**	**NE**	**6.5–25.5**	**5.4–100**	**4.8–65**	**0.07–0.6**	**0.33–11.4**	**16–144**	**<0.25–7**	**0.2–2.2**	**<0.25–42.5**	**22–90**	**33–282**
			(mg/kg)																	
TR-02-2	2	11/15/11	--	**7.1**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**80**	--
TR-03-1.5	1.5	11/01/11	< 0.5	**6.1**	270	0.8	< 0.25	70	< 8	14	38	9.1	< 0.05	< 0.5	74	< 0.5	< 0.5	< 0.5	**72**	71
TR-07-1.5	1.5	11/01/11	< 0.5	**11**	220	0.68	0.32	61	< 8	12	42	12	< 0.05	< 0.5	63	0.5	< 0.5	< 0.5	**62**	66
TR-08-2	2	11/15/11	--	**2.2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**50**	--
TR-09-2	2	11/15/11	--	**4.9**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**82**	--
TR-10-1.5	1.5	11/02/11	< 0.5	**4.0**	500	0.73	< 0.25	71	< 8	12	32	7.8	0.064	< 0.5	66	< 0.5	< 0.5	< 0.5	**69**	64
TR-11-2	2	11/15/11	--	**6.4**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**64**	--
TR-12-1.5	1.5	11/02/11	< 0.5	**5.5**	230	0.66	< 0.25	63	< 8	12	32	6.7	0.051	< 0.5	65	< 0.5	< 0.5	< 0.5	**59**	62
TR-13-2	2	11/15/11	--	**2.9**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**49**	--
TR-14-1.5	1.5	11/02/11	< 0.5	**6.8**	270	0.82	< 0.25	72	< 8	14	42	12	0.052	0.57	77	< 0.5	< 0.5	< 0.5	**75**	76
TR-16-2	2	11/15/11	--	**12**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**73**	--
TR-17-1.5	1.5	11/02/11	< 0.5	**3.4**	190	< 0.5	< 0.25	46	< 8	8.5	22	5.4	0.067	< 0.5	44	0.73	< 0.5	< 0.5	**49**	41
TR-19-2	2	11/15/11	--	**6.4**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**65**	--
TR-21-2	2	11/15/11	--	**1.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**35**	--
TR-22-2	2	11/15/11	--	**7.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**60**	--
TR-25-2	2	11/15/11	--	**1.2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**24**	--

Notes:
All units are milligrams per kilogram (mg/kg).
[1] - RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table K-1 - Direct Exposure Soil Screening Levels, Residential Exposure Scenarios,* Interim Final dated November 2007 (revised May 2008).
[2] - ESL for total chromium is the ESL listed for Chromium III (750 mg/kg) because hexavalent chromium was not detected.
[3] - USEPA Region 9 Regional Screening Levels (RSLs) for residential soil exposure, November 2011.
[4] - Background Concentration Ranges were taken from sources cited in Table 6.
< 0.5 - Analyte was not detected above the laboratory reporting limit (i.e. 0.5 mg/kg)
-- Not Analyzed
BOLD - Detected concentration at or above the ESL.

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Table 3
Soil Vapor Analytical Results
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Analyte			Acetone	Benzene	MEK	Carbon Disulfide	Chloro-form	Chloro-methane	Cyclohexane	Freon 12	1,1-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Ethanol	Ethyl acetate	Ethyl-benzene	4-Ethyl-toluene	Heptane	Hexane
Soil Gas RWQCB ESL [1] (residential land use)			**660,000**	**84**	**1,000,000***	**NE**	**460**	**19,000**	**6,300,000***	**100,000***	**1,500**	**42,000**	**7,300**	**15,000**	**NE**	**NE**	**980**	**NE**	**NE**	**730,000***
Sample ID	**Date**	**Depth (bgs)**	**µg/m³**																	
TR-01	11/02/11	8 feet	< 120	10	< 150	35	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	9	< 10	< 210	< 180
TR-01 (Dup)	11/02/11	8 feet	< 120	< 6.5	< 150	92	<9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210	< 180
TR-02	11/02/11	8 feet	< 120	10	< 150	24	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210	< 180
TR-03	11/01/11	5 feet	< 120	18	< 150	15	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210	< 180
TR-04	11/01/11	5 feet	< 120	< 6.5	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210	< 180
TR-05	11/01/11	5 feet	< 120	15	< 150	10	20	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210	< 180
TR-06	11/01/11	7.5 feet	< 120	14	< 150	58	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210	< 180
TR-07	11/01/11	5 feet	< 120	< 6.5	< 150	14	< 9.9	< 4.2	< 180	11	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210	< 180
TR-08	11/02/11	5 feet	< 120	< 6.5	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	< 8.8	< 10	< 210	< 180
TR-09	11/02/11	5 feet	56	5.1	20	11	6.1	1.6	NA	< 2.5	< 2.0	< 2.0	55	4.7	NA	NA	5.2	2.5	NA	NA
TR-10	11/03/11	6 feet	120	3.4	14	20	< 3.3	< 1.4	NA	< 3.3	< 2.7	< 2.7	2.8	< 2.7	NA	NA	5.5	< 3.3	NA	NA
TR-11	11/03/11	8 feet	200	9.8	34	12	< 2.7	1.5	NA	3.3	< 2.2	< 2.2	< 2.2	< 2.2	NA	NA	10	< 2.7	NA	NA
TR-12	11/02/11	5 feet	81	6.2	19	< 9.7	< 3.8	< 1.6	NA	< 3.9	< 3.2	< 3.1	< 3.1	< 3.1	NA	NA	14	4.6	NA	NA
TR-13	11/03/11	5 feet	68	4.9	18	< 6.2	< 2.4	< 1.0	NA	< 2.5	< 2.0	< 2.0	16	< 2.0	NA	NA	4.8	< 2.5	NA	NA
TR-14	11/02/11	6.5 feet	120	23	38	110	< 2.8	1.5	NA	2.9	< 2.3	3.9	110	5.1	NA	NA	16	5.1	NA	NA
TR-15	11/02/11	5 feet	210	29	25	17	9.4	< 1.0	NA	3.3	< 2.0	< 2.0	15	< 2.0	NA	ND	10	3.4	NA	NA
TR-16	11/02/11	5 feet	< 120	< 6.5	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	< 96	< 7.3	9.9	< 10	< 210	< 180
TR-17	11/02/11	5.5 feet	180	5.0	22	10	< 2.5	< 1.1	NA	< 2.5	< 2.1	< 2.0	12	16	NA	NA	7.6	3.7	NA	NA
TR-18	11/03/11	5 feet	98	6.5	19	< 6.7	8.9	< 1.1	NA	3.2	2.9	< 2.1	88	3.2	NA	NA	6.3	3.5	NA	NA
TR-19	11/03/11	5 feet	100	2.8	18	< 8.7	< 3.4	< 1.4	NA	< 3.5	< 2.8	< 2.8	< 2.8	< 2.8	NA	NA	4.2	< 3.4	NA	NA
TR-20	11/03/11	7 feet	160	14	37	10	62	< 1.0	NA	< 2.5	47	48	**11,000**	240	NA	NA	8	2.7	NA	NA
TR-21	11/03/11	6 feet	30	3.6	10	< 6.9	< 2.7	< 1.1	NA	4.4	< 2.2	< 2.2	3.9	< 2.2	NA	NA	2.5	< 2.7	NA	NA
TR-22	11/03/11	6 feet	46	6.2	17	150	85	< 1.0	NA	< 2.5	< 2.0	< 2.0	2.1	< 2.0	NA	NA	4.9	< 2.5	NA	NA
TR-23	11/03/11	5 feet	66	2.1	17	< 6.8	< 2.7	< 1.1	NA	< 2.7	< 2.2	< 2.2	< 2.2	< 2.2	NA	NA	4.0	< 2.7	NA	NA
TR-24	11/03/11	5 feet	97	10	21	110	5.9	1.6	NA	3.5	3.0	4.5	240	28	NA	NA	9.2	5.8	NA	NA
TR-25	11/03/11	5 feet	36	< 8.0	< 22	< 31	< 12	< 5.2	NA	< 12	< 10	< 9.9	100	11	NA	NA	< 11	< 12	NA	NA

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Table 3
Soil Vapor Analytical Results
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Analyte			Freon 113	MIBK	Xylenes, Total	PCE	Toluene	TCE	Freon 11	1,1,1-TCA	1,3,5-TMB	1,2,4-TMB	Vinyl Acetate	Vinyl Chloride	TBA	Propene	Tetrahydro-furan	All Other VOCs	Isopropyl Alcohol	Helium
Soil Gas RWQCB ESL [1] (residential land use)			**31,000,000***	**630,000**	**21,000**	**410**	**63,000**	**430**	**730,000***	**460,000**	**NE**	**7,300***	**210,000***	**31**	**NE**	**3,100,000***	**NE**	**NA**	**NA**	**NA**
Sample ID	**Date**	**Depth (bgs)**	**µg/m³**																	
TR-01	11/02/11	8 feet	260	41	< 27	< 14	70	320	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-01 (Dup)	11/02/11	8 feet	250	40	< 27	<14	61	290	12	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-02	11/02/11	8 feet	320	23	< 27	< 14	30	98	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	110	< 6.0	ND	< 50	--
TR-03	11/01/11	5 feet	540	96	< 27	< 14	120	< 11	< 11	< 11	< 10	< 10	< 180	< 5.2	100	< 88	< 6.0	ND	< 50	--
TR-04	11/01/11	5 feet	4,800	24	< 27	< 14	< 7.7	350	< 11	< 11	< 10	< 10	< 180	< 5.2	24	< 88	< 6.0	ND	< 50	--
TR-05	11/01/11	5 feet	880	75	< 27	65	39	**1,100**	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-06	11/01/11	7.5 feet	52	150	< 27	< 14	77	< 11	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-07	11/01/11	5 feet	380	65	< 27	< 14	44	14	< 11	41	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	--
TR-08	11/02/11	5 feet	16	26	31	< 14	61	< 11	< 11	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	6.6	ND	< 50	--
TR-09	11/02/11	5 feet	520	55	28.7	15	24	**3,300**	190	11	< 2.5	7.5	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
TR-10	11/03/11	6 feet	< 15	15	29	< 4.5	46	< 3.6	< 7.5	< 3.7	< 3.3	< 9.9	< 9.4	< 1.7	--	--	--	ND	--	< 0.01
TR-11	11/03/11	8 feet	47	70	49	< 3.8	70	6.4	< 6.2	5.2	< 2.7	< 8.2	< 7.8	< 1.4	--	--	--	ND	--	< 0.01
TR-12	11/02/11	5 feet	< 18	37	72	< 5.3	66	< 4.2	< 8.8	< 4.3	5.1	15	< 11	< 2.0	--	--	--	ND	--	< 0.01
TR-13	11/03/11	5 feet	65	29	21.3	10	23	23	7.1	36	< 2.5	13	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
TR-14	11/02/11	6.5 feet	60	63	76	29	77	**1,300**	9.8	< 3.1	5.6	16	< 8.0	< 1.5	--	--	--	ND	--	< 0.01
TR-15	11/02/11	5 feet	36	71	56	33	66	**590**	33	4.2	4.1	11	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
TR-16	11/02/11	5 feet	< 16	310	54	< 14	31	49	< 11	< 11	< 10	15	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	< 0.01
TR-17	11/02/11	5.5 feet	16	14	42	7.4	30	110	< 5.8	7.9	3.6	12	20	< 1.3	--	--	--	ND	--	< 0.01
TR-18	11/03/11	5 feet	110	11	31.6	< 3.6	36	< 2.9	16	130	3.5	9.2	< 7.5	< 1.4	--	--	--	ND	--	< 0.01
TR-19	11/03/11	5 feet	17	23	25.5	< 4.7	25	< 3.8	< 7.9	9.5	< 3.4	< 10	< 9.9	< 1.8	--	--	--	ND	--	< 0.01
TR-20	11/03/11	7 feet	120	42	39.9	< 3.4	49	96	18	220	3.2	9.3	< 7.0	2.2	--	--	--	ND	--	< 0.01
TR-21	11/03/11	6 feet	170	9.5	14.0	< 3.8	8.2	12	15	58	< 2.7	< 8.2	< 7.8	< 1.4	--	--	--	ND	--	< 0.01
TR-22	11/03/11	6 feet	14	33	24.7	< 3.4	30	7.6	< 5.6	5.2	< 2.5	< 7.4	< 7.0	< 1.3	--	--	--	ND	--	0.0159
TR-23	11/03/11	5 feet	< 13	20	24	< 3.7	26	< 2.9	< 6.1	< 3.0	< 2.7	< 8.0	< 7.7	< 1.4	--	--	--	ND	--	< 0.01
TR-24	11/03/11	5 feet	100	62	50	40	53	**730**	< 5.6	19	6.8	25	< 7.0	< 1.3	--	--	--	ND	--	1.84
TR-25	11/03/11	5 feet	< 57	< 31	< 54	62	18	**1,700**	< 28	< 14	< 12	< 37	< 35	< 6.4	--	--	--	ND	--	< 0.01

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Table 3
Soil Vapor Analytical Results
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Analyte			Acetone	Benzene	MEK	Carbon Disulfide	Chloro-form	Chloro-methane	Cyclohexane	Freon 12	1,1-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Ethanol	Ethyl acetate	Ethyl-benzene	4-Ethyl-toluene	Heptane	Hexane
Sub-slab Vapor Screening Level [2] (residential land use)			**13,000**	**1.7**	**20,000**	**14,600**	**9.2**	**380**	**126,000**	**2,000**	**30**	**840**	**150**	**300**	**NE**	**NE**	**20**	**NE**	**NE**	**14,600**
Sample ID	**Date**	**Slab Thickness (bgs)**	**µg/m³**																	
SS-01	11/04/11	8 inches	120	**7.7**	17	< 6.2	< 2.4	1.6	NA	2.8	5.8	240	< 2.0	< 2.0	NA	NA	**52**	5.3	NA	NA
SS-02	11/04/11	30 inches	1,100	**250**	61	< 62	< 24	< 10	NA	< 25	< 20	210	< 20	< 20	NA	NA	**130**	60	NA	NA
SS-02*	11/04/11	30 inches	940	**260**	65	< 62	< 24	< 10	NA	< 25	< 20	200	< 20	< 20	NA	NA	**150**	64	NA	NA
SS-03	11/04/11	30 inches	820	**55**	49	< 6.2	< 2.4	< 1.0	NA	3.5	< 2.0	260	< 2.0	< 2.0	NA	NA	**38**	19	NA	NA
SS-04	11/04/11	8 inches	110	**4.8**	14	< 6.2	< 2.4	< 1.0	NA	2.6	< 2.0	< 2.0	< 2.0	< 2.0	NA	NA	4.1	< 2.5	NA	NA
SS-05	11/04/11	30 inches	410	**19**	32	< 16	< 6.1	< 2.6	NA	< 6.2	< 5.1	< 5.0	< 5.0	< 5.0	NA	NA	13	< 6.1	NA	NA
SS-05 (Dup)	11/04/11	30 inches	460	**12**	27	< 16	< 6.1	< 2.6	NA	< 6.2	< 5.1	< 5.0	< 5.0	< 5.0	NA	NA	< 5.4	< 6.1	NA	NA
SS-06	11/04/11	8 inches	110	**2.7**	23	< 6.2	4.0	< 1.0	NA	< 2.5	< 2.0	< 2.0	< 2.0	< 2.0	NA	NA	18	< 2.5	NA	NA
SS-07	11/04/11	8 inches	47	**2.6**	8.6	< 6.2	< 2.4	<1.0	NA	2.5	< 2.0	< 2.0	< 2.0	< 2.0	NA	NA	2.8	< 2.5	NA	NA
SS-08	12/06/11	8 inches	< 120	**9.8**	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	230	60	< 8.8	< 10	310	360
SS-09	12/06/11	30 inches	< 120	**38**	< 150	< 6.3	< 9.9	< 4.2	560	< 10	< 8.2	< 8.1	< 8.1	< 8.1	130	22	11	< 10	2,100	2,300
SS-10	12/06/11	8 inches	< 120	< 6.5	< 150	< 6.3	< 9.9	< 4.2	< 180	< 10	< 8.2	< 8.1	< 8.1	< 8.1	250	37	< 8.8	< 10	< 210	< 180

Analyte			Freon 113	MIBK	Xylenes, Total	PCE	Toluene	TCE	Freon 11	1,1,1-TCA	1,3,5-TMB	1,2,4-TMB	Vinyl Acetate	Vinyl Chloride	TBA	Propene	Tetrahydro-furan	All Other VOCs	Isopropyl Alcohol	Helium
Sub-slab Vapor Screening Level [2] (residential land use)			**620,000**	**13,000**	**420**	**8.2**	**1,300**	**8.6**	**14,600**	**9,200**	**NE**	**146**	**4,200**	**0.62**	**NE**	**62,000**	**NE**	**NA**	**NA**	**NA**
Sample ID	**Date**	**Slab Thickness (bgs)**	**µg/m³**																	
SS-01	11/04/11	8 inches	< 11	< 6.1	340	< 3.4	26	**17**	12	300	5.6	19	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
SS-02	11/04/11	30 inches	< 110	< 61	**870**	< 34	580	< 27	< 56	390	140	**170**	< 70	< 13	--	--	--	ND	--	< 0.01
SS-02*	11/04/11	30 inches	< 110	< 61	**920**	< 34	630	< 27	< 56	390	150	**180**	< 70	< 13	--	--	--	ND	--	--
SS-03	11/04/11	30 inches	< 11	< 6.1	275	< 3.4	170	**19**	540	210	38	51	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
SS-04	11/04/11	8 inches	< 11	< 6.1	23.8	< 3.4	13	< 2.7	77	< 2.7	< 2.5	< 7.4	< 7.0	< 1.3	--	--	--	ND	--	< 0.01
SS-05	11/04/11	30 inches	< 29	< 15	49	< 8.5	66	< 6.7	29	< 6.8	< 6.1	< 18	< 18	< 3.2	--	--	--	ND	--	< 0.01
SS-05 (Dup)	11/04/11	30 inches	< 29	< 15	33	< 8.5	50	< 6.7	25	< 6.8	< 6.1	< 18	< 18	< 3.2	--	--	--	ND	--	< 0.01
SS-06	11/04/11	8 inches	240	14	75	< 3.4	7.4	**24**	< 5.6	4.4	< 2.5	< 7.4	< 7.0	< 1.3	--	--	--	ND	--	0.0194
SS-07	11/04/11	8 inches	74	< 6.1	17.3	< 3.4	6.8	2.8	< 5.6	< 2.7	2.6	< 7.4	< 7.0	< 1.3	--	--	--	ND	--	0.0406
SS-08	12/06/11	8 inches	< 16	< 8.3	< 27	< 14	16	< 11	27	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	47
SS-09	12/06/11	30 inches	< 16	< 8.3	50	< 14	60	**25**	430	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	< 20
SS-10	12/06/11	8 inches	< 16	< 8.3	< 27	< 14	14	**15**	230	< 11	< 10	< 10	< 180	< 5.2	< 62	< 88	< 6.0	ND	< 50	< 20

Notes:
[1] - RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table E-2 - Shallow Soil Gas Screening Levels for Evaluation of Potential Vapor Intrusion Concerns Interim Final* dated November 2007 (revised May 2008). In the absence of a RWQCB ESL, the indoor air RSL was used to calculate a screening level by dividing by the RWQCB recommended screening level of 0.001 (RWQCB, 2008; DTSC, 2011).
[2] - Sublab vapor screening levels developed using indoor air RWQCB ESLs (Table E-2) or USEPA regional screening levels (RSLs) where RSLs are more conservative and then calculating sub-slab screening levels by dividing the indoor air screening level by the DTSC recommended default attenuation factor of 0.05.

µg/m³ - micrograms per cubic meter
bgs - below ground surface
VOCs - Volatile Organic Compounds, EPA 8260B
ND - Not detected
NE - Not established
NA - Not applicable
* - Reanalyzed
-- Not analyzed
RWQCB - State of California Regional Water Quality Control Board
ESL - Environmental Screening Level
BOLD - Concentration detected at or above the ESL
Dup - Duplicate Sample
Three volumes were purged prior to sample collection for all samples.
Freon 11 - trichloroflouromethane
All samples analyzed by TO-15
MIBK - 4-methyl-2-pentanone
PCE - tetrachloroethylene
TBA - t-butyl alcohol
1,2,4-TMB - 1,2,4-trimethylbenzene
Freon 113 - 1,1,2-Trichloro-1,2,2-Trifluoroethane
TCE - trichloroethylene
cis-1,2-DCE - cis-1,2-dichloroethene
trans-1,2-DCE - trans-1,2-dichloroethene
1,1-DCA - 1,1-dichloroethane
1,1-DCE - 1,1-dichloroethene
1,1,1-TCA - 1,1,1-trichloroethane
1,3,5-TMB - 1,3,5-trimethylbenzene
Freon 12 - dichlorodiflouromethane

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Table 4
Groundwater Monitoring Well Analytical Results
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Well ID	Aquifer Zone	Date Sampled	PCE	TCE	cDCE	tDCE	VC	Freon 113	1,1,1-TCA	1,1-DCA	1,1-DCE	1,2,4-TCB
RWQCB ESL for Vapor Intrusion[1] (Residential land use)			**120**	**530**	**6,200**	**6,700**	**3.8**	**NE**	**130,000**	**1,000**	**6,300**	**2,500**
BS-6	A	11/2/2011	<1.0	**5.0**	**150**	**2.3**	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0
EW-1	A/B1	11/2/2011	<0.5	95	40	**0.8**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
EW-2	A/B1	11/2/2011	<1.0	**130**	**39**	<1.0	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0
EW-3	A/B1	11/2/2011	<0.5	**0.8**	**0.8**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
EW-4	A/B1	11/2/2011	<1.3	**5.6**	**240**	**3.6**	<1.3	<5.0	<1.3	<1.3	<1.3	<1.3
EW-5	A/B1	11/2/2011	**0.6**	**67**	**150**	**2.1**	<0.5	39	**0.9**	**0.7**	**0.6**	**140**
EW-6	A/B1	11/2/2011	**0.8**	**56**	**69**	**1.4**	<0.5	<2.0	**0.6**	<0.5	<0.5	**83**
EW-6 (Dup)	A/B1	11/2/2011	**0.8**	**54**	**70**	**1.4**	<0.5	<2.0	**0.5**	<0.5	<0.5	**85**
EW-7	B2	11/2/2011	<1.0	**120**	**11**	<1.0	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0
EW-8	B2	11/2/2011	<0.5	**84**	**9.7**	<0.5	<0.5	**4.4**	<0.5	<0.5	**0.5**	<0.5
EW-9	B2	11/2/2011	<0.5	**29**	**13**	<0.5	<0.5	**2.7**	<0.5	<0.5	<0.5	<0.5
1-S	A	11/1/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	**0.6**	<0.5	<0.5
2-S	A	11/1/2011	<0.7	**100**	**39**	<0.7	**0.9**	<2.9	<0.7	<0.7	<0.7	<0.7
3-S	A	11/1/2011	<0.5	<0.5	**1.4**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
8-S	A	11/1/2011	<0.5	**13**	**8.8**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
11-S	A	10/31/2011	<0.5	**1.4**	**0.6**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
11-S (Dup)	A	10/31/2011	<0.5	**1.3**	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
18-S	A	11/1/2011	<0.5	**2.5**	**3.6**	**3.1**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
19-S	A	11/1/2011	<0.5	**3.7**	**40**	**1.7**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
31-S	A	11/1/2011	<0.5	**5.8**	**97**	**0.9**	<0.5	<2.0	<0.5	**0.6**	<0.5	<0.5
40-S	A	11/1/2011	<1.0	**100**	**67**	**1.1**	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0
41-S	A	11/2/2011	**1.9**	**210**	**170**	**2.7**	**2.6**	<6.7	<1.7	<1.7	<1.7	<1.7
49-S	A	11/1/2011	<0.5	**18**	**5.1**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
10-D	B1	11/2/2011	<2.5	**39**	**340**	**2.9**	<2.5	<10	<2.5	<2.5	<2.5	<2.5
10-D (Dup)	B1	11/2/2011	<2.5	**37**	**350**	**2.9**	<2.5	<10	<2.5	<2.5	<2.5	<2.5
19-D	B1	11/1/2011	<0.5	**4.6**	**27**	**0.7**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
20-D	B1	11/1/2011	**2.0**	**130**	**50**	**1.0**	<0.5	<6.7	<0.5	<0.5	**0.6**	<0.5
40-D	B1	11/1/2011	<0.5	**80**	**44**	**0.8**	**0.8**	<2.0	<0.5	<0.5	<0.5	<0.5
41-D	B1	11/2/2011	<1.7	220	190	3.8	3.7	<6.7	<1.7	<1.7	<1.7	<1.7
49-D	B1	10/31/2011	<0.5	**0.9**	**1.6**	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
51-D	B1	10/31/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
11-DD	B2	11/1/2011	<0.5	**17**	**12**	**0.5**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
18-DD	B2	11/1/2011	<0.5	**10**	**3.3**	**0.8**	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
20-DD	B2	11/1/2011	<1.0	**160**	**67**	**1.7**	<1.0	<4.0	<1.0	<1.0	<1.0	<1.0
32-DD	B2	11/2/2011	<1.0	**140**	**56**	<1.0	<1.0	4.0	<1.0	<1.0	<1.0	<1.0
42-DD	B2	11/2/2011	<2.5	**11**	**320**	**5.6**	<2.5	<10	<2.5	<2.5	<2.5	<2.5
43-DD	B2	11/1/2011	<0.5	**2.7**	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
45-DD	B2	10/31/2011	<0.5	**0.8**	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
49-DD	B2	10/31/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
50-DDD	B3	10/31/2011	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5

Notes

All units are micrograms per liter (µg/L).

Groundwater samples were collected by Field Solutions, Inc., of San Jose, California, and analyzed by Curtis & Tompkins, Ltd., of Berkeley, California, for the U.S. EPA Method 8010 list with Freon 113 and 1,2,4-TCB in accordance with EPA Method 8260B.

[1] - RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table E-1 - Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion Concerns, Interim Final* dated November 2007 (revised May 2008).

< 1.0 - Analyte was not detected above the laboratory reporting limit (i.e. 1.0 mg/L).

Bold indicates that the analyte was detected at or above the laboratory reporting limit.

Data taken from AMEC, 2012. 2011 Annual Groundwater Monitoring Report, 915 DeGuigne Drive, Sunnyvale, California. January.

TCE - Trichloroethene
cDCE - cis-1,2-Dichloroethene
1,1,1-TCA - 1,1,1-Trichloroethane
1,1-DCA - 1,1-Dichloroethane
1,1-DCE - 1,1-Dichloroethene

tDCE - trans-1,2-Dichloroethene
VC - Vinyl Chloride
Dup - duplicate sample
Freon 113 - 1,1,2-Trichloro-1,2,2-trifluoromethane

PCE - Tetrachloroethene
1,2,4-TCB - 1,2,4-trichlorobenzene

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Table 5
Grab-Groundwater Monitoring Results
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Sample ID	Depth interval feet	Date Sampled	VOCs							TPH			OCPs
			cis-1,2-DCE	TCE	Benzene	Ethyl-benzene	1,2,4-TMB	Xylenes	All Other VOCs	TPHg	TPHd	TPHmo	
RWQCB ESL [1] (residential land use)			6,200	530	540	170,000	NE	160,000	--	10,000	10,000	NE	--
			(µg/L)										
Grab Groundwater Samples													
TR-26-GW	10.7	11/03/11	NA	NA	NA	NA	NA	NA	NA	NA	< 50	NA	NA
TR-27-GW	11.2	12/06/11	68	58	< 1.7	< 1.7	< 1.7	< 1.7	< 0.67 to < 33	< 50	< 50	< 250	NA
TR-28-GW	12.8	12/06/11	82	39	< 2.5	< 2.5	< 2.5	< 2.5	< 1.0 to < 50	< 50	< 50	< 250	NA
TR-29-GW	11.1	12/06/11	73	220	< 10	< 10	< 10	< 10	< 4.0 to < 200	82	< 50	< 250	NA
Monitoring Well Samples													
03-S	--	12/13/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5
31-S	--	12/13/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5
11-S	--	12/13/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5
19-S	--	12/13/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5
49-S	--	12/13/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.001 - < 0.5

Notes:
All units are micrograms per Liter (µg/L).

[1] - RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table E-1 - Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion Concerns, Interim Final* dated November 2007 (revised May 2008).

VOCs - Volatile Organic Hydrocarbons

OCPs - organochlorine pesticides

cis-1,2-DCE - cis-1,2-Dichloroethene

TCE - Trichloroethene

TPH - Total Petroleum Hydrocarbons

TPHg - Total Petroleum Hydrocarbons in the Gasoline Range

TPHd - Total Petroleum Hydrocarbons in the Diesel Range with Silica Gel Clean-up

TPHmo - Total Petroleum Hydrocarbons in the Motor Oil Range with Silica Gel Clean-up

NA - Not Analyzed
NE - Not Established
< 50 - Analyte was not detected above the laboratory reporting limit (50 µg/L).

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Table 6
Comparison of Background Concentrations of Arsenic and Vanadium in Bay Area Soils
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Study	Number of Samples	Formation	Calculation	Arsenic (mg/kg)	Vanadium (mg/kg)
LBNL, 1995	498 *	--	95% UCL	19.1	74.3
	97	Colluvium & Fill	95% UCL	14	78.2
	97	Great Valley Group	95% UCL	31	69.3
	101	Moraga Formation	95% UCL	9.3	90.1
	184	Orinda Formation	95% UCL	17.8	69.3
	13	San Pablo Group	95% UCL	15.7	36.2
BMWC, 1994	< 150	Fill	Geometric mean	4.32	22.19
		Fill	Geometric std. dev.	1.83	1.54
Scott, 1991	~150	Alluvium	Range	< 0.2–11	--
MLH, 1991	--	Off-Site Background	Arithmetic mean	8.3	--
	23	On-Site	Arithmetic mean	< 4.1	--
D&M, 1989a	4	Up-gradient	Arithmetic mean	5.15	35
D&M, 1989b	26	Up-gradient	Arithmetic mean	1.9	36.2
SECD, 1992	5	Clay / Loam	Arithmetic mean	8.48	46.9
PRC, 1996	20	Fill	95% UCL	8.4	70
			Background Concentration Ranges	**< 0.2 – 31**	**22 – 90**

Notes:
mg/kg - milligrams per kilogram
BMWC, 1994 - Burns and McDonnell Waste Consultants, Inc. *San Francisco International Airport Background Metals Concentrations in Soil.* December 1994.
D&M, 1989a - Dames and Moore, Inc. *Report - Phase II Remedial Investigation, 1455 Factor Avenue Site, San Leandro, California.* 3 August 1989.
D&M, 1989b - Dames and Moore, Inc. *Report - Phase II Remedial Investigation, 750 139th Avenue Site, San Leandro, California.* 13 October 1989.
LBNL, 1995 - Lawrence Berkeley National Laboratory, University of California, Environmental Restoration Program. *Protocol for Determining Background Concentrations of Metals in Soil at Lawrence Berkeley National Laboratory.* August 1995.
MLH, 1991 - McLaren-Hart. *Remedial Investigation Report - Hercules Properties, Inc., Hercules, California.* 15 March 1991.
PRC, 1996 - PRC Environmental Management. *Final Remedial Investigation Report - Fleet and Industrial Supply Center Oakland, Alameda Facility / Alameda Annex Site, Alameda California.* January 1996.
Scott, 1991 - Scott, Christina Marie. *Background Metals Concentrations in Northern Santa Clara County, California. Master's Thesis, University of San Francisco.* December 1991.
SECD, 1992 - SEC Donahue Environment and Infrastructure. *Site-wide Remedial Investigation, Pacific States Steel Corporation, Union City, California.* 3 December 1992.
UCL - Upper confidence level
* Represents results from entire LBNL Study Area

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Table 7
Summary of Screening Levels Exceedances and Chemicals of Concern
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

		Environmental Media			
Chemical	**CAS #**	**Soil Gas**	**Sub-slab Vapor**	**Soil**	**Groundwater**
Volatile Organic Compounds (VOCs)					
Benzene	71-43-2	NE	X	NE	NE
Ethylbenzene	100-41-4	NE	X	NE	NE
cis-1,2-DCE	156-59-2	X	NE	NE	NE
TCE	79-01-6	X	X	NE	NE
Xylenes	1330-20-7	NE	X	NE	NE
1,2,4-TMB	95-63-6	NE	X	NE	NE
Pesticides					
p,p-DDE	72-55-9	NA	NA	X	ND
Dieldrin	60-57-1	NA	NA	X	ND
a-BHC	319-84-6	NA	NA	X	ND
Metals					
Arsenic	7440-38-2	NA	NA	X	NA
Vanadium	7440-62-2	NA	NA	X	NA

Notes:
NA - not analyzed
ND - not detected
COPC - chemical of potential concern
cis-1,2-DCE - cis-1,2-dichloroethene
TCE - Trichloroethene
1,2,4-TMB - 1,2,4-trimethylbenzene
DDE - dichlorodiphenyldichloroethene
a-BHC - α-Hexachlorocyclohexane (also known as benzene hexachloride)
NE - not detected at a concentration exceeding the screening level
Although arsenic and vanadium were retained as COPC for this risk assessment, the detected on-Site concentrations are within the natural background.

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Table 8
Toxicity Assessment Parameters
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Chemical	Toxicity Values							
	Carcinogenic Toxicity Values				Noncarcinogenic Toxicity Values			
	Inhalation Unit Risk ($\mu g/m^3)^{-1}$		Oral CSF $(mg/kg\text{-}day)^{-1}$		RfC ($\mu g/m^3$)		Oral RfD (mg/kg-day)	
Volatile Organic Compounds (VOCs)								
Benzene	2.9E-05	CalEPA 2009	1.0E-01	CalEPA 2009	6.0E+01	CalEPA 2008	4.0E-03	IRIS
Ethylbenzene	2.5E-06	CalEPA 2009	1.1E-02	CalEPA 2009	2.0E+03	CalEPA 2008	1.0E-01	IRIS
cis-1,2-DCE	NC	NA	NC	NA	--	--	2.0E-03	IRIS
TCE	4.1E-06	IRIS	4.6E-02	IRIS	2.0E-03	IRIS	5.0E-04	IRIS
1,2,4-Trimethylbenzene	NC	NA	NC	NA	7.0E+00	PPRTV	--	--
Xylenes (total)	NC	NA	NC	NA	7.0E+02	CalEPA 2008	2.0E-01	IRIS
Pesticides								
p,p-DDE	9.7E-05	CalEPA 2009	3.4E-01	CalEPA 2009	--	--	5.00E-04	IRIS
Dieldrin	4.6E-03	CalEPA 2009	1.6E+01	CalEPA 2009	--	--	5.0E-05	IRIS
α-BHC	7.7E-04	CalEPA 2009	2.7E+00	CalEPA 2009	--	--	8.0E-03	ASTDR
Metals								
Arsenic	3.3E-03	CalEPA 2009	1.5E+00	CalEPA 2009	1.5E-02	CalEPA 2008	3.0E-04	IRIS
Vanadium	--	--	--	--	--	--	5.0E-03	IRIS[1]

Notes:

$\mu g/m^3$ - micrograms per cubic meter

mg/kg-day - milligrams per kilogram per day

CSF - Cancer Slope Factor

RfD - Reference Dose

RfC - Reference Concentration

-- Toxicity data is unavailable

NC - Noncarcinogen

NA - Not applicable

ATSDR - Agency for Toxic Substances and Disease Registry (ATSDR 2010)

CalEPA - California Environmental Protection Agency

IRIS - Integrated Risk Information System (USEPA)

PPRTV - Provisional Peer Reviewed Toxicity Values (cited in USEPA 2011)

TCE - Trichloroethylene

cis-1,2-DCE - cis-1,2-dichloroethene

1,2,4-TMB - 1,2,4-trimethylbenzene

α-BHC - α-Hexachlorocyclohexane (also known as benzene hexachloride)

DDE - dichlorodiphenyldichloroethene

[1] - The vanadium RfD is derived from the IRIS RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion. (USEPA, 2011).

Oral RFD for p,p-DDE taken from Oral RFD for dichlorodiphenyltrichloroethane (DDT).

Sources:

Agency for Toxic Substances and Disease Registry (ATSDR). 2010. *Minimal Risk Levels.* December.

California Environmental Protection Agency (Cal/EPA). 2001. *OEHHA Memorandum, Proposed Notification Levels for 1,2,4-Trimethylbenzene and 1,3,5-Trimethylbenzene.* May 24.

Cal/EPA. 2008. *All Chronic Reference Exposure Levels Adopted by Office of Environmental Health Hazard Assessment (OEHHA).* December 18.

Cal/EPA. 2009. *Toxicity Criteria Database OEHHA Cancer Potency Values, Adopted by the Office of Environmental Health Hazard Assessment, July 21.*

California Regional Water Quality Control Board San Francisco Bay Region (RWQCB). 2008. *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Table J - Physical-Chemical and Toxicity Values Used in Models,* Interim Final November 2007 (Revised May 2008).

United States Environmental Protection Agency (USEPA). *Integrated Risk Information System (IRIS)*. Online database Maintained by the USEPA. Accessed January 2012.

USEPA. 2011. *Regional Screening Levels for Chemical Contaminants at Superfund Sites*. November.

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Table 9
Exposure Point Concentration Selection Methods
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

Detected Compounds	Number of Detections	Number of Samples	Maximum Concentration	Distribution	Method	EPC
Soil Gas (µg/m^3)						
Arsenic	NA	NA	NA	--	--	--
Benzene	16	25	29	Nonparametric	95% KM (BCA)	11.38
cis-1,2-DCE	12	25	11,000	None	99% KM (Chebyshev)	4,937
Ethylbenzene	16	25	16	Nonparametric	95% KM (Percentile Bootstrap)	8.136
Xylenes, Total	17	25	76	Nonparametric	95% KM (t)	40.02
TCE	17	25	3,300	Nonparametric	95% KM (BCA)	668.6
1,2,4-TMB	9	25	6.8	None	Maximum	25
p,p-DDE	NA	NA	NA	--	--	--
Dieldrin	NA	NA	NA	--	--	--
a-BHC	NA	NA	NA	--	--	--
Vanadium	NA	NA	NA	--	--	--
Sub-slab Vapor (µg/m^3) at the SDC Building						
Arsenic	NA	NA	NA	--	--	--
Benzene*	7	8	260	None	Maximum	55
cis-1,2-DCE	0	8	NA	None	½ Maximum DL	10
Ethylbenzene*	5	8	150	None	Maximum	52
Xylenes, Total*	6	8	920	None	Maximum	340
TCE	4	8	25	None	Maximum	25
1,2,4-TMB*	3	8	180	None	Maximum	51
p,p-DDE	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
a-BHC	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	--	--	--
Sub-slab Vapor (µg/m^3) at the 943 Building						
Arsenic	NA	NA	NA	--	--	--
Benzene*	2	2	260	None	Maximum	2.7
cis-1,2-DCE	0	2	NA	None	½ Maximum DL	1.0
Ethylbenzene*	2	2	150	None	Maximum	18
Xylenes, Total*	2	2	920	None	Maximum	75
TCE	2	2	25	None	Maximum	24
1,2,4-TMB*	0	2	180	None	½ Maximum DL	3.6
p,p-DDE	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
a-BHC	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	--	--	--
Soil (mg/kg)						
Arsenic	16	16	12	Normal	95% Student's-t	6.9
Benzene	0	12	NA	None	½ Maximum DL	0.0025
cis-1,2-DCE	0	12	NA	None	½ Maximum DL	0.0025
Ethylbenzene	0	12	NA	None	½ Maximum DL	0.0025
Xylenes, Total	0	12	NA	None	½ Maximum DL	0.0025
TCE	3	12	NA	None	Maximum	0.035
1,2,4-TMB	0	12	NA	None	½ Maximum DL	0.0025
p,p-DDE	25	48	3.2	Nonparametric	95% KM (BCA)	0.673
Dieldrin	11	48	0.15	Nonparametric	95% KM (Percentile Bootstrap)	0.0364
α-BHC	2	48	0.097	None	Maximum	0.097
Vanadium	16	16	82	Normal	95% Student's-t	67

Notes:

µg/m^3 - micrograms per cubic meter
mg/kg - milligrams per kilogram
DL - Reporting Limit
TCE - trichloroethylene
α-BHC - α-Hexachlorocyclohexane (also known as benzene hexachloride)
DDE - dichlorodiphenyldichloroethene
cis-1,2-DCE - cis-1,2-dichloroethene
EPC - exposure point concentration
UCL - upper confidence level
NA - not analyzed
1,2,4-TMB - 1,2,4-trimethylbenzene

Maximum concentration taken as the EPC when the number of detections is less than 10.
One-half of the maximum reporting limit taken as the EPC when the COC was not detected in any sample.
UCL selected based on recommended UCL using ProUCL version 4.1.0.
* The selected maximum concentration for benzene, ethylbenzne, xylenes, and 1,2,4-TMB in sub-slab vapor assumes that concentrations from sampling point SS-02 is not reflective of conditions at the SDC building. Concentrations detected at SS-02 are evaluated separately (See Table 13).

For details on methods used to estimate UCL refer to USEPA, 2010, ProUCL Version 4.1.00, Technical Guide (DRAFT). May.

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Table 10
Estimated Risk for Vapor Intrusion Pathway from Soil Gas Impacts
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

	Target Screening Levels				EPC	Risk			
	Residential		Commercial/Industrial			Residential		Commercial/Industrial	
	Carcinogenic Effect	Noncarcinogenic Effect	Carcinogenic Effect	Noncarcinogenic Effect		Cancer	HQ	Cancer	HQ
Chemicals of Concern	($\mu g/m^3$)								
Benzene	84	6,300	280	18,000	11	1.4E-07	0.00036	4.1E-08	0.00013
Ethylbenzene	980	210,000	3,300	580,000	8.1	8.3E-09	0.0000077	2.5E-09	0.0000028
cis-1,2-DCE	NC	7,300	NC	20,000	4,937	NA	0.14	NA	0.049
TCE**	430	2,100	6,000	17,600	669	1.6E-06	0.32	1.1E-07	0.0380
1,2,4-TMB**	NC	7,300	NC	62,000	25	NA	0.0034	NA	0.00040
Xylenes, Total	NC	21,000	NC	58,000	40	NA	0.00038	NA	0.00014
Cumulative Carcinogenic Risk						**2E-06**		**1E-07**	
Cumulative Hazard Index							**0.5**		**0.1**

Notes:

$\mu g/m^3$ - micrograms per cubic meter

Target sceening levels were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table E-2 - Shallow Soil Gas Screening Levels for Evaluation of Potential Vapor Intrusion Concerns Interim Final* dated November 2007 (revised May 2008) except where noted.

* Screening levels have been calculated based on UESPA Region 9 Regional Screening Levels (RSLs) and the RWQCB recommended soil gas to indoor air attenuation factor of 0.001 (for residential) and 0.0005 (for commercial/industrial).

Screening levels are based on a target cancer risk of $1x10^{-6}$ and a hazard quotient of 0.2 (for ESL based target screening levels) and a hazard quotient of 1 (for RSL based target screening levels).

HQ - Hazard Quotient

NA - Not applicable

NC - noncarcinogen

TCE - trichloroethylene

cis-1,2-DCE - cis-1,2-dichloroethene

1,2,4-TMB - 1,2,4-trimethylbenzene

RWQCB - State of California Regional Water Quality Control Board

ESL - Environmental Screening Level

Target carcinogenic risk = 1×10^{-6}

Target noncarcinogenic hazard index = 1

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Table 11
Estimated Risks for Vapor Intrusion Pathway from Sub-slab Vapor Impacts
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

	Target Screening Levels				EPC	Risk			
	Residential		Commercial/Industrial			Residential		Commercial/Industrial	
	Carcinogenic Effect	Noncarcinogenic Effect	Carcinogenic Effect	Noncarcinogenic Effect		Cancer	HQ	Cancer	HQ
Chemicals of Concern	($\mu g/m^3$)								
SDC Building									
Benzene†	1.7	130	280	180	55	3.3E-05	0.085	2.0E-07	0.061
Ethylbenzene	20	4,200	32	5,800	52	2.7E-06	0.0025	1.6E-06	0.0018
cis-1,2-DCE‡	NC	150	NC	200	10	NA	0.013	NA	0.010
TCE*	8.6	42	60	176	25	2.9E-06	0.12	4.2E-07	0.14
1,2,4-TMB*	NC	146	NC	620	51	NA	0.35	NA	0.082
Xylenes, Total	NC	420	NC	580	340	NA	0.16	NA	0.12
Cumulative Carcinogenic Risk						**4E-05**		**2E-06**	
Cumulative Hazard Index							**0.7**		**0.4**
943 Building									
Benzene	1.7	130	280	180	2.7	1.6E-06	0.004	9.6E-09	0.003
Ethylbenzene	20	4,200	32	5,800	18	9.2E-07	0.0009	5.6E-07	0.0006
cis-1,2-DCE‡	NC	150	NC	200	1.0	NA	0.001	NA	0.001
TCE*	8.6	42	60	176	24	2.8E-06	0.11	4.0E-07	0.14
1,2,4-TMB* ‡	NC	146	NC	620	3.6	NA	0.02	NA	0.006
Xylenes, Total	NC	420	NC	580	75	NA	0.04	NA	0.03
Cumulative Carcinogenic Risk						**5E-06**		**1E-06**	
Cumulative Hazard Index							**0.2**		**0.2**
Ambient Outdoor Air									
Benzene**	0.084	6.3	0.14	8.8	3.2	**4E-05**	**0.1**	**2E-05**	**0.07**

Notes:

$\mu g/m^3$ - micrograms per cubic meter

Sub-slab target screening levels calculated from RWQCB ESLs for indoor air using a slab attenuation factor of 0.05 (DTSC, 2011) except where noted.

* USEPA Region 9 Regional Screening Levels (RSLs) for indoor air were used to estimate sub-slab vapor screening levels using a slab attenuation factor of 0.05 (DTSC, 2011).

RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Table E-3 - Ambient and Indoor Air Screening Levels Interim Final* dated November 2007 (revised May 2008).

**Ambient outdoor air target screening levels for benzene also taken from Table E-3 (RWQCB, 2008).

Screening levels are based on a target cancer risk of 1x10-6 and a hazard quotient of 0.2 (for ESL based target screening levels) and a hazard quotient of 1 (for RSL based target screening levels).

HQ - Hazard Quotient

NA - Not applicable

NC - noncarcinogenic

TCE - trichloroethylene

cis-1,2-DCE - cis-1,2-dichloroethene

1,2,4-TMB - 1,2,4-trimethylbenzene

RWQCB - State of California Regional Water Quality Control Board

ESL - Environmental Screening Level

Target carcinogenic risk = 1×10^{-6}

Target noncarcinogenic hazard index = 1

† The EPCs for benzene, ethylbenzene, xylenes, and 1,2,4-TMB are the maximum value detected excluding location SS-02. The elevated risk due to dectections at SS-02 is presented in Table 13.

‡ Compound was not detected in any sub-slab vapor sample, the EPC is equal to one-half of the maximum detection limit for that compound.

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Table 12
Estimated Risk for Direct Contact, Ingestion, and Inhalation of Atmospherically Dispersed Soil Particulates
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

	Target Screening Levels						EPC	Risk					
	Residential		Commercial/Industrial		Construction/Trench Worker			Residential		Commercial/Industrial		Construction Worker	
	Carcinogenic Effect	Noncarcinogenic Effect	Carcinogenic Effect	Noncarcinogenic Effect	Carcinogenic Effect	Noncarcinogenic Effect		Cancer	HQ	Cancer	HQ	Cancer	HQ
Chemicals of Concern	(mg/kg)												
Benzene‡ *	0.12	24	0.27	82	12	970	0.0025	2.1E-08	0.00010	9.3E-09	0.000030	2.1E-10	0.0000026
Ethylbenzene‡ *	2.3	1,200	5.0	4,300	210	49,000	0.0025	1.1E-09	0.0000021	5.0E-10	0.00000058	1.2E-11	0.000000051
cis-1,2-DCE‡	NC	32	NC	110	NC	1,300	0.0025	NA	0.000078	NA	0.000023	NA	0.0000019
TCE*	0.91	2.0	6.4	20	120	17	0.035	3.8E-08	0.0175	5.5E-09	0.0018	2.9E-10	0.0021
1,2,4-TMB*‡ *	NC	62	NC	260	NC	260	0.0025	NA	0.000040	NA	0.000010	NA	0.000010
Xylenes‡ *	NC	150	NC	510	NC	6,300	0.035	NA	0.00023	NA	0.000069	NA	0.0000056
p,p-DDE*	1.7	36	7	430	87	1,500	0.67	3.9E-07	0.019	9.6E-08	0.0016	7.7E-09	0.00045
Dieldrin *	0.034	3.4	0.13	38	1.6	130	0.036	1.1E-06	0.011	2.8E-07	0.00095	2.3E-08	0.00028
α-BHC*	0.077	490	0.27	4,900	1.90	1,400	0.097	1.3E-06	0.00020	3.6E-07	0.000020	5.1E-08	0.000069
Cumulative Carcinogenic Risk								**3E-06**		**7E-07**		**8E-08**	
Cumulative Hazard Index									**0.05**		**0.004**		**0.003**

Notes:

mg/kg - milligrams per kilogram

RWQCB ESLs were taken from *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, RWQCB - San Francisco Bay Region, Tables K-1, K-2, K-3, Direct Exposure Soil Screening Levels for Residential, Commercial, and Construction/Trench Worker Exposure Scenarios, respectively. Interim Final dated November 2007 (revised May 2008).*

* USEPA Region 9 Regional Screening Levels (RSLs) have been used when no ESL is available or when the RSL is more conservative than the ESL. In addition, construction/trench worker target screening levels for 1,2,4-TMB, α-BHC, and TCE were calculated using the USEPA on-line screening calculator with RWQCB construction/trench work exposure assumptions.

Screening levels are based on a target cancer risk of 1x10-6 and a hazard quotient of 0.2 (for ESL based target screening levels) and a hazard quotient of 1 (for RSL based target screening levels).

RWQCB - State of California Regional Water Quality Control Board

ESL - Environmental Screening Level

HQ - Hazard Quotient

EPC - exposure point concentration

TCE - Trichloroethene

α-BHC - α-Hexachlorocyclohexane (also known as benzene hexachloride)

DDE - dichlorodiphenyldichloroethene

NA - Not Applicable

NC - noncarcinogen

Target carcinogenic risk = 1×10^{-6}

Target noncarcinogenic hazard index = 1

‡ Compound was not detected in any soil sample, the EPC is equal to one-half of the maximum detection limit for that compound.

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Table 13
Estimated Risk at Areas with Relatively Elevated Concentrations in Soil Gas and Sub-slab Vapor
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

	Hot Spot EPC	Residential		Commercial/Industrial	
		Cancer	HQ	Cancer	HQ
SDC Building Incremental Risk from Location SS-02*					
Benzene[1]	260	1.5E-05 (3.1E-06 - 1.5E-04)	0.040 (0.0080 - 0.40)	9.3E-08 (1.9E-08 - 9.3E-07)	0.0289 (0.0058 - 0.29)
Ethylbenzene[1]	150	7.7E-07 (1.5E-07 - 7.7E-06)	0.00071 (0.00014 - 0.007)	4.7E-07 (9.4E-08 - 4.7E-06)	0.00052 (0.00010 - 0.005)
Xylenes[1]	920	NA	0.044 (0.0088 - 0.44)	NA	0.0317 (0.0063 - 0.32)
1,2,4-TMB[1]	180	NA	0.025 (0.0049 - 0.25)	NA	0.00581 (0.0012 - 0.058)
Cumulative Cancer Risk		**2E-05** (6E-06 - 2E-04)		**1E-06** (5E-07 - 6E-06)	
Cumulative Hazard Index			**0.5** (0.4 - 2)		**0.3** (0.2 - 0.9)
Incremental Risk at Location TR-09					
TCE[2]	3,300	7.7E-06	0.3143	5.5E-07	0.0375
Cumulative Cancer Risk		**8E-06**		**6E-07**	
Cumulative Hazard Index			**0.7**		**0.1**
Incremental Risk at Location TR-20					
cis-1,2-DCE[2]	11,000	NA	0.30	NA	0.11
Cumulative Cancer Risk		**2E-06**		**1E-07**	
Cumulative Hazard Index			**0.6**		**0.1**

Notes:

EPC concentrations in units of micrograms per cubic meter ($\mu g/m^3$).
[1] - The EPCs for benzene, ethylbenzne, xylenes, and 1,2,4-TMB are the concentrations from sampling point SS-02.
[2] - The cis-1,2-DCE and TCE EPCs are based on their maximum detected soil gas concentrations.
* Risks are based on a slab attenuation factor of 0.005 and risk ranges in parenthesis are based on slab attenuation factors ranging from 0.001 to 0.05. The 0.005 and 0.001 values are based on the median and lower end estimate, respectively, of slab attenuation factors from the USEPA's Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors, 4 March 2008. The 0.05 value is based on the recommended attenuation factor by the DTSC (DTSC, 2011).
HQ - Hazard Quotient
EPC - Exposure Point Concentration (equal to the maximum detected concentration)
NE - Screening level not established
NA - Not applicable
NC - noncarcinogen
1,2,4-TMB - 1,2,4-trimethylbenzene
TCE - trichloroethylene
cis-1,2-DCE - cis-1,2-dichloroethene
Target carcinogenic risk = 1×10^{-6}
Target noncarcinogenic hazard index = 1

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Table 14
Estimated Natural Background and On-Site Risk related to Arsenic
915 DeGuigne Drive
Sunnyvale, CA
Project: 731579707

	EPC (mg/kg)	Risk					
		Residential		Commercial/Industrial		Construction Worker	
		Cancer	HQ	Cancer	HQ	Cancer	HQ
Arsenic							
Local Maximum Background Risk due to Arsenic	11	2.8E-05	0.50	6.9E-06	0.042	7.3E-07	0.012
On-Site Maximum Risk due to Arsenic	12	3.1E-05	0.55	7.5E-06	0.046	8.0E-07	0.013
On-Site Risk due to Arsenic	6.9	1.8E-05	0.31	4.3E-06	0.027	4.6E-07	0.0075
Total On-Site Risk Excluding Arsenic		3E-06	0.04	7E-07	0.004	8E-08	0.003
Total On-Site Risk Including Arsenic		2E-05	0.4	5E-06	0.03	5E-07	0.01
Vanadium							
Local Maximum Background Risk due to Vanadium	90	NA	1.2	NA	0.090	NA	0.023
On-Site Maximum Risk due to Vanadium	82	NA	1.1	NA	0.082	NA	0.021
On-Site Risk due to Vanadium	67	NA	0.87	NA	0.067	NA	0.017
Total On-Site Risk Excluding Vanadium		3E-06	0.04	7E-07	0.004	8E-08	0.003
Total On-Site Risk Including Vanadium		3E-06	0.9	7E-07	0.07	8E-08	0.02
Total On-Site Risk Including Arsenic and Vanadium		**2.0E-05**	**1.2**	**5.1E-06**	**0.098**	**5.4E-07**	**0.028**

Notes:
mg/kg - milligrams per kilogram
HQ - Hazard Quotient
EPC - Exposure Point Concentration (equal to the maximum detected concentration)
Target carcinogenic risk = 1×10^{-6}
Target noncarcinogenic hazard index = 1
On-Site calculated risk based on an EPC equivalent to the UCL shown on Table 9.
NA - Not Applicable because vanadium is a noncarcinogen
NC - noncarcinogen

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FIGURES

Base map: Google Earth Pro, 2011.

N

0 400 Feet

Approximate scale

915 DEGUIGNE DRIVE
Sunnyvale, California

SITE LOCATION MAP

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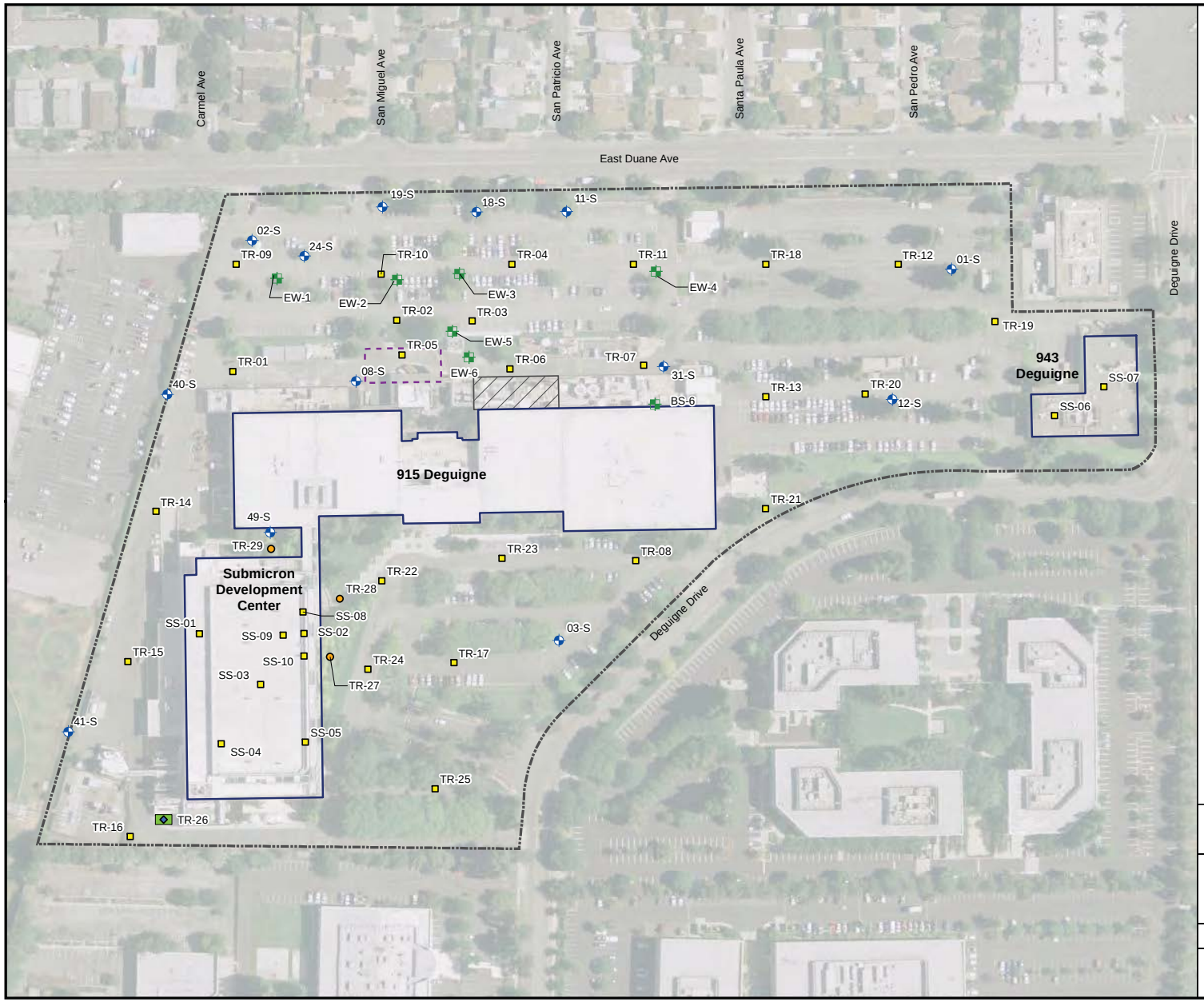
Date 01/03/12	Project No. 731579707	Figure 1



Legend

- Soil and Soil Gas
- Soil and Grab Groundwater
- Grab Groundwater
- Shallow Groundwater Monitoring Well
- Shallow Groundwater Extraction Wells
- Approximate Site Boundary
- Approximate Extent of Excavation at Former Pad C Acid Neutralization System
- Approximate Location of Treatment System
- Approximate Underground Storage Tank Location
- Building Footprint

Notes:

1. Aerial photo from Digital Globe, June 2009.
2. Map displayed in California State Plane Coordinate System , Zone III, North American Datum of 1983 (NAD83) , US Survey Feet.

0 75 150 300
Feet

915 DEGUIGNE DRIVE
Sunnyvale, California

SITE PLAN WITH SAMPLING AND WELL LOCATIONS

Date 1/25/2012	Project 731579707	Figure 2

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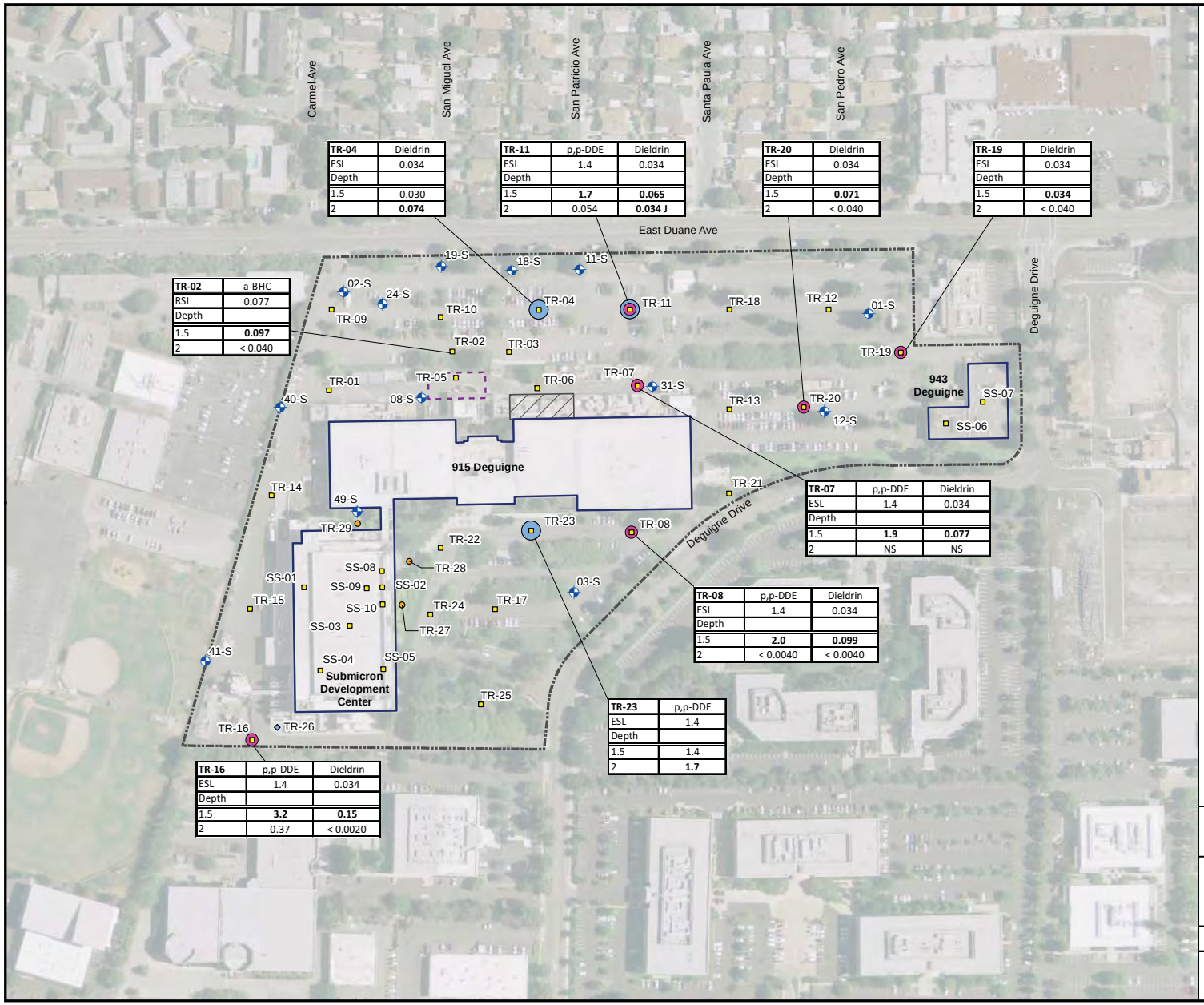

TR-04	Dieldrin
ESL	0.034
Depth	
1.5	0.030
2	**0.074**

TR-11	p,p-DDE	Dieldrin
ESL	1.4	0.034
Depth		
1.5	**1.7**	**0.065**
2	0.054	**0.034 J**

TR-20	Dieldrin
ESL	0.034
Depth	
1.5	**0.071**
2	< 0.040

TR-19	Dieldrin
ESL	0.034
Depth	
1.5	**0.034**
2	< 0.040

TR-02	a-BHC
RSL	0.077
Depth	
1.5	**0.097**
2	< 0.040

TR-07	p,p-DDE	Dieldrin
ESL	1.4	0.034
Depth		
1.5	**1.9**	**0.077**
2	NS	NS

TR-08	p,p-DDE	Dieldrin
ESL	1.4	0.034
Depth		
1.5	**2.0**	**0.099**
2	< 0.0040	< 0.0040

TR-23	p,p-DDE
ESL	1.4
Depth	
1.5	1.4
2	**1.7**

TR-16	p,p-DDE	Dieldrin
ESL	1.4	0.034
Depth		
1.5	**3.2**	**0.15**
2	0.37	< 0.0020

N

Legend

- OCP ESL Exceedance at 1.5 ft bgs
- OCP ESL Exceedance at 2 ft bgs
- OCP ESL Exceedance at both 1.5 and 2 ft bgs
- Shallow Groundwater Monitoring Well
- Soil and Soil Gas
- Soil and Grab Groundwater
- Grab Groundwater
- Approximate Site Boundary
- Approximate Extent of Excavation at Former Pad C Acid Neutralization System
- Approximate Location of Treatment System
- Building Footprint

Notes:

1. Concentrations and screening levels presented in milligrams per kilogram (mg/kg).
2. Bolded values indicate a concentration detected at or above screening level.
3. ESL = Residential Environmental Screening Level (Regional Water Quality Control Board, 2008).
4. OCP = Organochlorine Pesticides.
5. RSL = Residential Regional Screening Level (USEPA, November 2011).
6. NS = Not sampled.
7. < 0.040 – Analyte not detected at concentration exceeding reporting limit.
8. Aerial photo from Digital Globe, June 2009.
9. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 100 200 400
Feet

915 DEGUIGNE DRIVE
Sunnyvale, California

SITE MAP WITH SAMPLING LOCATIONS AND OCP SCREENING LEVEL EXCEEDANCES IN SHALLOW SOIL

Date 2/1/2012	Project 731579707	Figure 3

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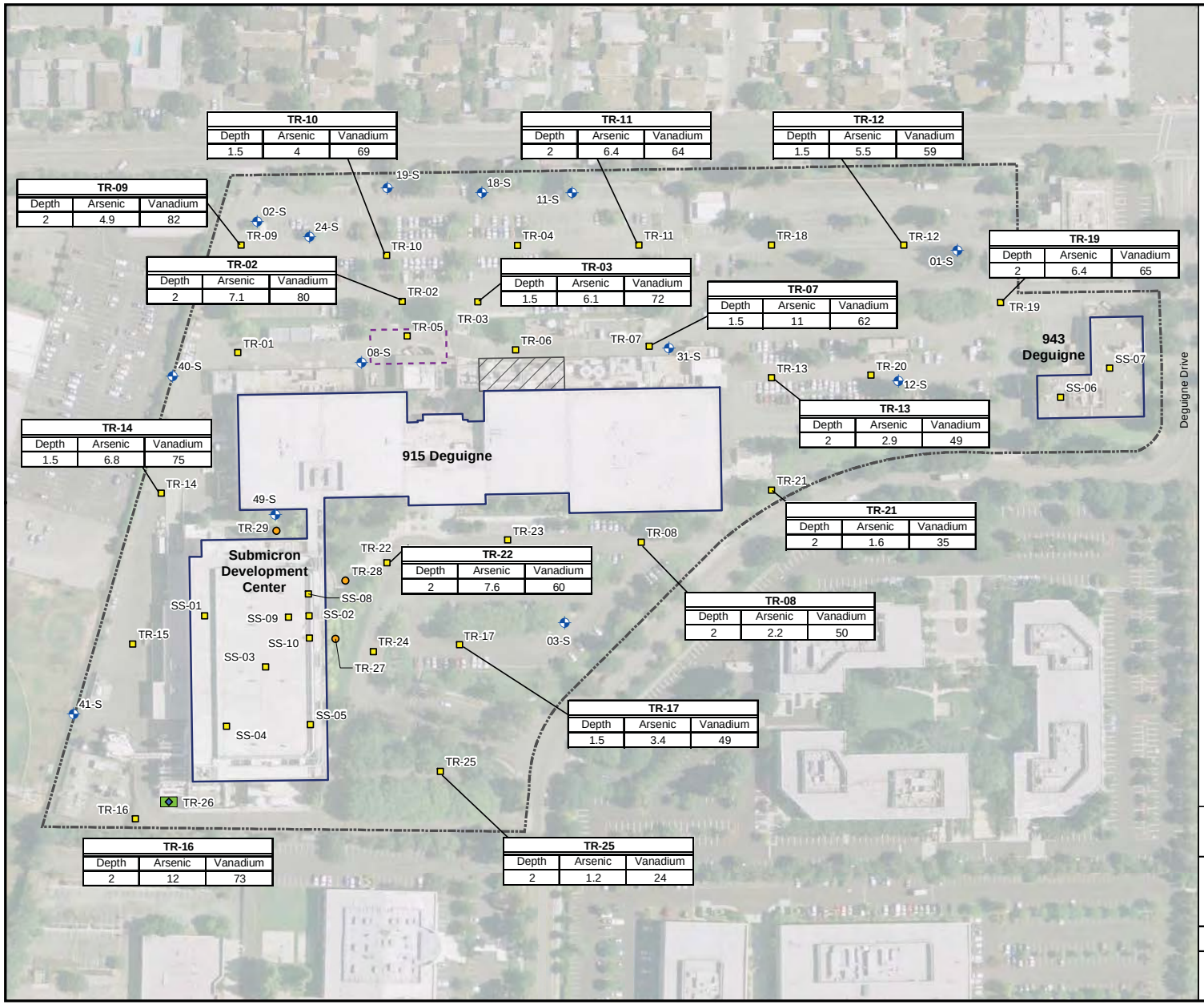

Legend

- Soil and Soil Gas
- Soil and Grab Groundwater
- Grab Groundwater
- Shallow Groundwater Monitoring Well
- Approximate Site Boundary
- Approximate Extent of Excavation at Former Pad C Acid Neutralization System
- Approximate Location of Treatment System
- Approximate Underground Storage Tank Location
- Building Footprint

Residential Screening Levels (mg/kg)		
Description	**Arsenic**	**Vanadium**
Screening Level	0.3	16
Bay Area Background Range	< 0.2–31	22–90
Local Background Range	< 0.2–11	NA

Notes:

1. Aerial photo from Digital Globe, June 2009.
2. Soil gas screening levels taken from the California Regional Water Quality Control Board's Residential Environmental Screening Levels (ESL), May 2008.
3. Arsenic and Vanadium Concentrations are in milligrams/kilogram (mg/kg).
4. NA=Not Available.
5. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 75 150 300
Feet

915 DEGUIGNE DRIVE
Sunnyvale, California

SITE PLAN WITH SAMPLING LOCATIONS AND ARSENIC AND VANADIUM CONCENTRATIONS IN SHALLOW SOIL

Date 2/3/2012	Project 731579707	Figure 4

Treadwell&Rollo
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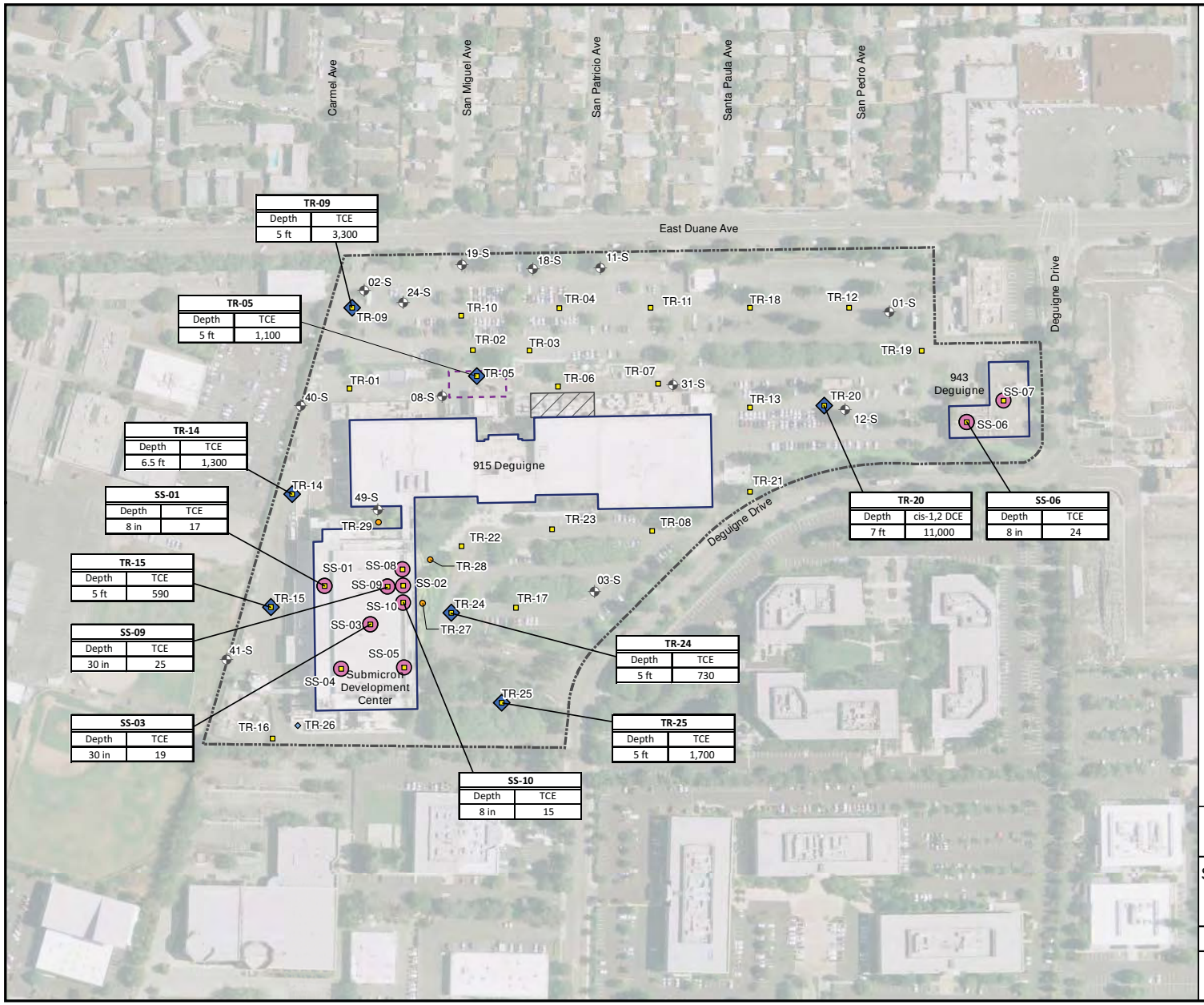

Legend

- Shallow Groundwater Monitoring Well
- Soil and Soil Gas
- Soil and Grab Groundwater
- Grab Groundwater
- Soil Gas Screening Level Exceedance
- Sub Slab Vapor Screening Level Exceedance
- Approximate Site Boundary
- Approximate Extent of Excavation at Former Pad C Acid Neutralization System
- Approximate Location of Treatment System
- Building Footprint

Residential Screening Levels ($\mu g/m^3$)		
Compound	Soil Gas	Sub Slab Vapor
TCE	430 (RSL)	8.6 (RSL)
cis-1,2-DCE	7,300	150

Notes:

1. Concentrations and screening levels presented in micrograms per cubic meter ($\mu g/m^3$).
2. Soil gas screening levels taken from the California Regional Water Quality Control Board's Residential Environmental Screening Levels (ESL), May 2008.
3. RSL = Residential Regional Screening Level (USEPA, November 2011).
4. Sub-slab vapor screening level estimated by dividing the indoor air residential ESL by the default recommended slab attenuation factor of 0.05 (DTSC, 2011)
5. CVOC = Chlorinated Volatile Organic Compound.
6. Aerial photo from Digital Globe, June 2009.
7. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 100 200 400
Feet

915 DEGUIGNE DRIVE
Sunnyvale, California

SITE PLAN WITH SAMPLING LOCATIONS AND CVOC SCREENING LEVEL EXCEEDANCES SOIL GAS AND SUB-SLAB VAPOR

Date 2/10/2012	Project 731579707	Figure 5

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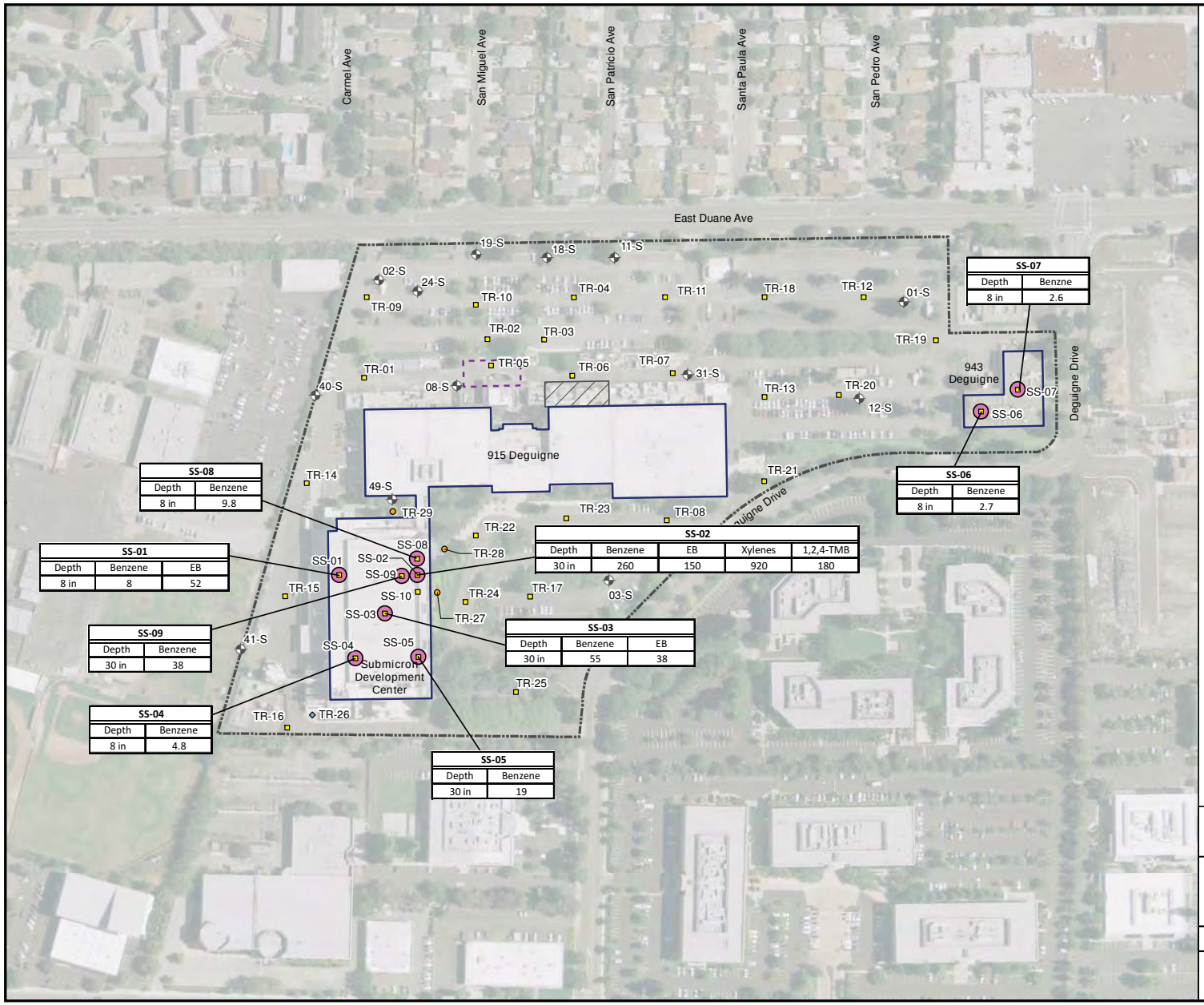

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Legend

- Shallow Groundwater Monitoring Well
- Soil and Soil Gas
- Soil and Grab Groundwater
- Grab Groundwater
- Soil Gas Screening Level Exceedance
- Sub Slab Vapor Screening Level Exceedance
- Approximate Site Boundary
- Approximate Extent of Excavation at Former Pad C Acid Neutralization System
- Approximate Location of Treatment System
- Building Footprint

Residential Screening Levels ($\mu g/m^3$)		
Compound	Soil Gas	Sub Slab Vapor
Benzene	84	1.7
Ethylbenzene	980	20
Xylenes (total)	21,000	420
1,2,4-TMB	7,300	146 (RSL)

Notes:

1. Concentrations and screening levels presented in micrograms per cubic meter ($\mu g/m^3$).
2. Soil gas screening levels taken from the California Regional Water Quality Control Board's Residential Environmental Screening Levels (ESL), May 2008.
3. Sub-slab vapor screening level estimated by dividing the indoor air residential ESL by the default recommended slab attenuation factor of 0.05 (DTSC, 2011)
4. RSL = Residential Regional Screening Level (USEPA, November 2011).
5. EB = Ethylbenzene
6. 1,2,4-TMB = 1,2,4-Trimethylbenzne.
7. VOC = Volatile Organic Compound.
8. Map displayed in California State Plane Coordinate System, Zone III, North American Datum of 1983 (NAD83), US Survey Feet.

0 100 200 400
Feet

915 DEGUIGNE DRIVE
Sunnyvale, California

SAMPLING LOCATIONS AND OTHER VOC SCREENING LEVEL EXCEEDANCES SOIL GAS AND SUB-SLAB VAPOR

Date 2/3/2012	Project 731579707	Figure 6

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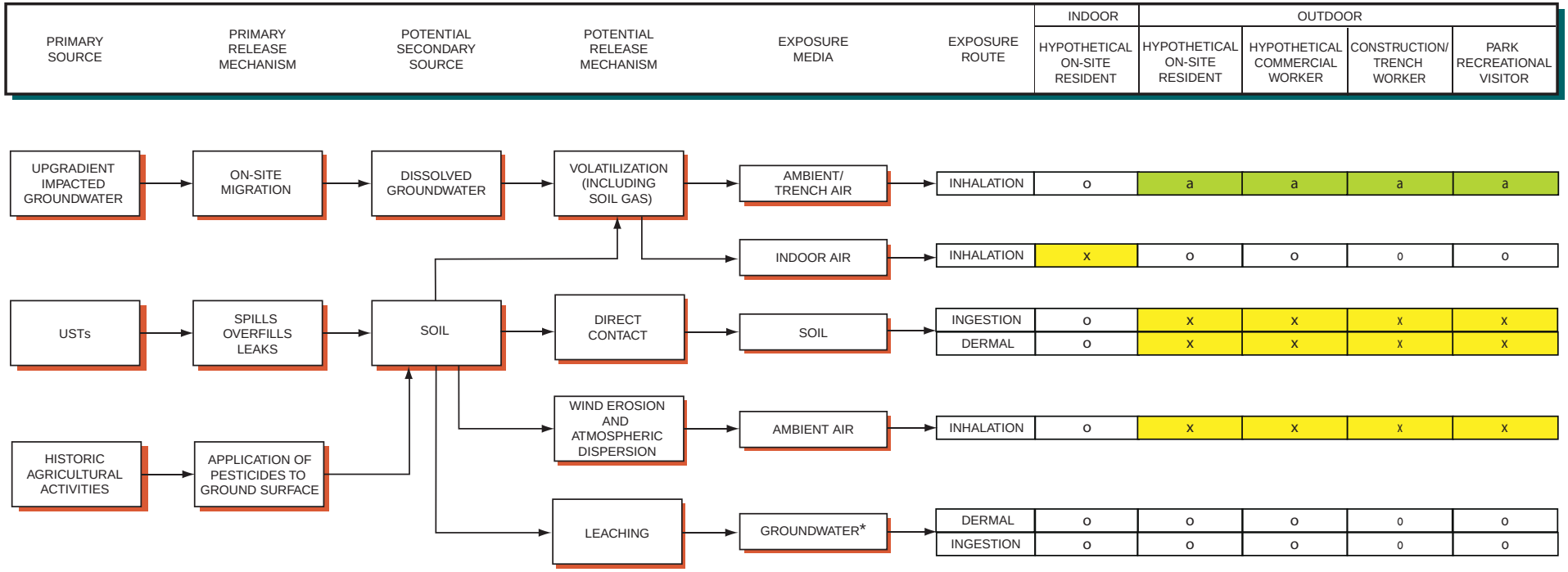

Notes:

- x — Potentially complete exposure pathway evaluated in risk assessment
- o — Incomplete exposure pathway; not evaluated in risk assessment
- a — Assumes that the indoor residential vapor inhalation pathway is protective of ambient outdoor exposures; therefore, ambient outdoor pathways are not evaluated for exposures to volatile chemicals
- UST — Underground Storage Tank

*Depth to shallow groundwater is at 9 to 13 feet below ground surface and exposure to receptors is not anticipated; also groundwater is not a source of potable water as stated in the Land Use Covenant for the property.

915 DEGUIGNE DRIVE
Sunnyvale, California

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CONCEPTUAL SITE MODEL WITH EXPOSURE PATHWAYS AND EXPOSED RECEPTORS

Date 02/03/12 | Project No. 731579707 | Figure 7

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APPENDIX A
TCE and cis-1,2-DCE Groundwater Contours (AMEC, 2012)

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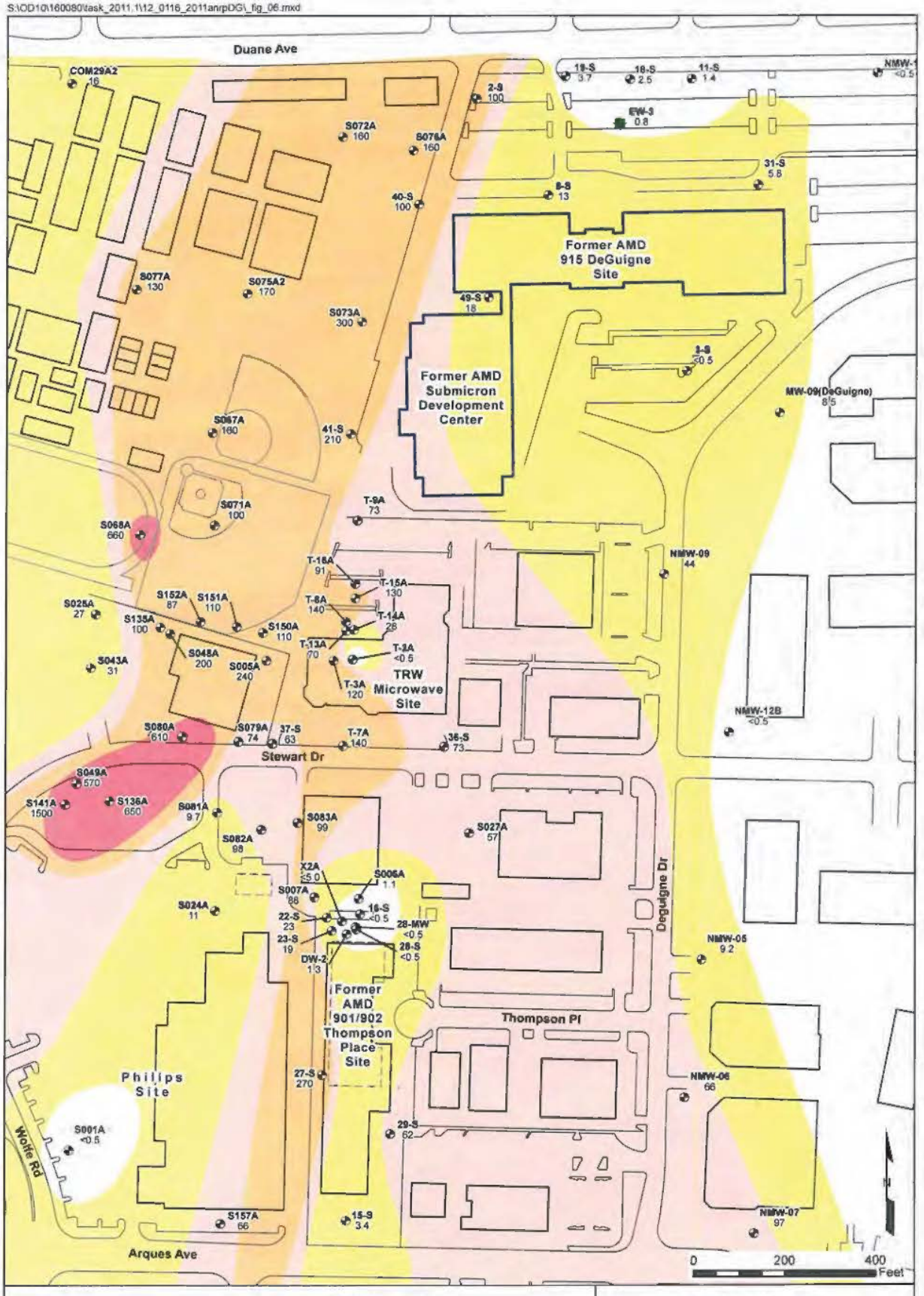

Explanation

- Extraction well
- Monitoring Well
- 62 TCE concentration in micrograms per liter (µg/L)
  - > 5 µg/L
  - > 100 µg/L
  - > 50 µg/L
  - > 500 µg/L

TCE = Trichloroethene

Notes:

1. Contours are based on interpretation of monitoring well data collected in October/November 2011, grab groundwater sample data collected in November 2007 as part of the Subsurface Investigation Report (Geomatrix, 2008), and current understanding of hydrogeologic conditions. They are provided for clarity and are not intended to imply certainty.
2. EW-3 is screened across both the A and B1 zones.

A-ZONE TCE CONTOURS
OCTOBER – NOVEMBER 2011
915 DeGuigne Drive
Sunnyvale, California

By: MC	Date: 01/30/2012	Project No. OD10180080
amec		Figure 6

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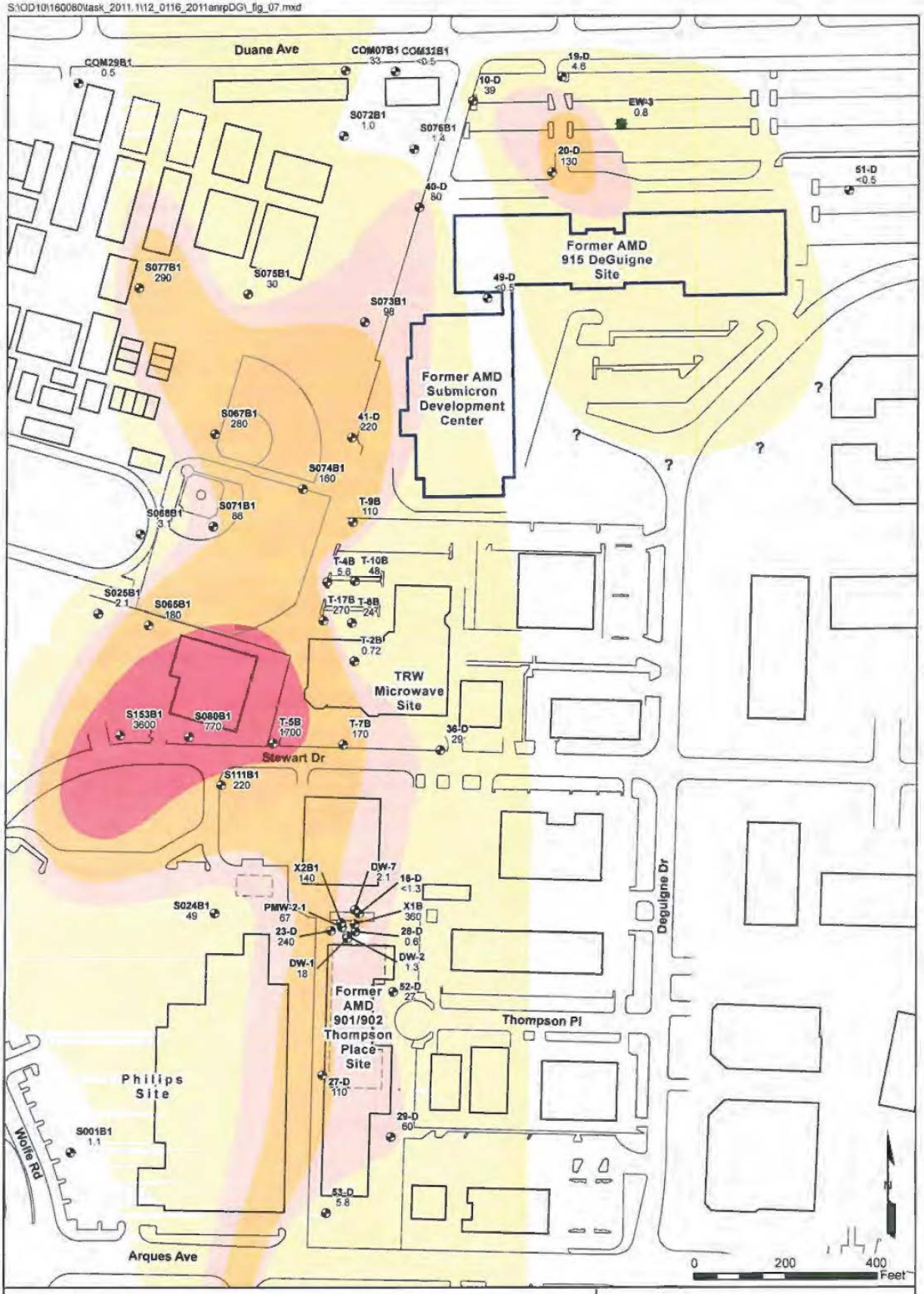


Explanation

- Extraction well
- Monitoring Well
- 36 TCE concentration in micrograms per liter (µg/L)
- > 5 µg/L
- > 100 µg/L
- > 50 µg/L
- > 500 µg/L

TCE = Trichloroethene

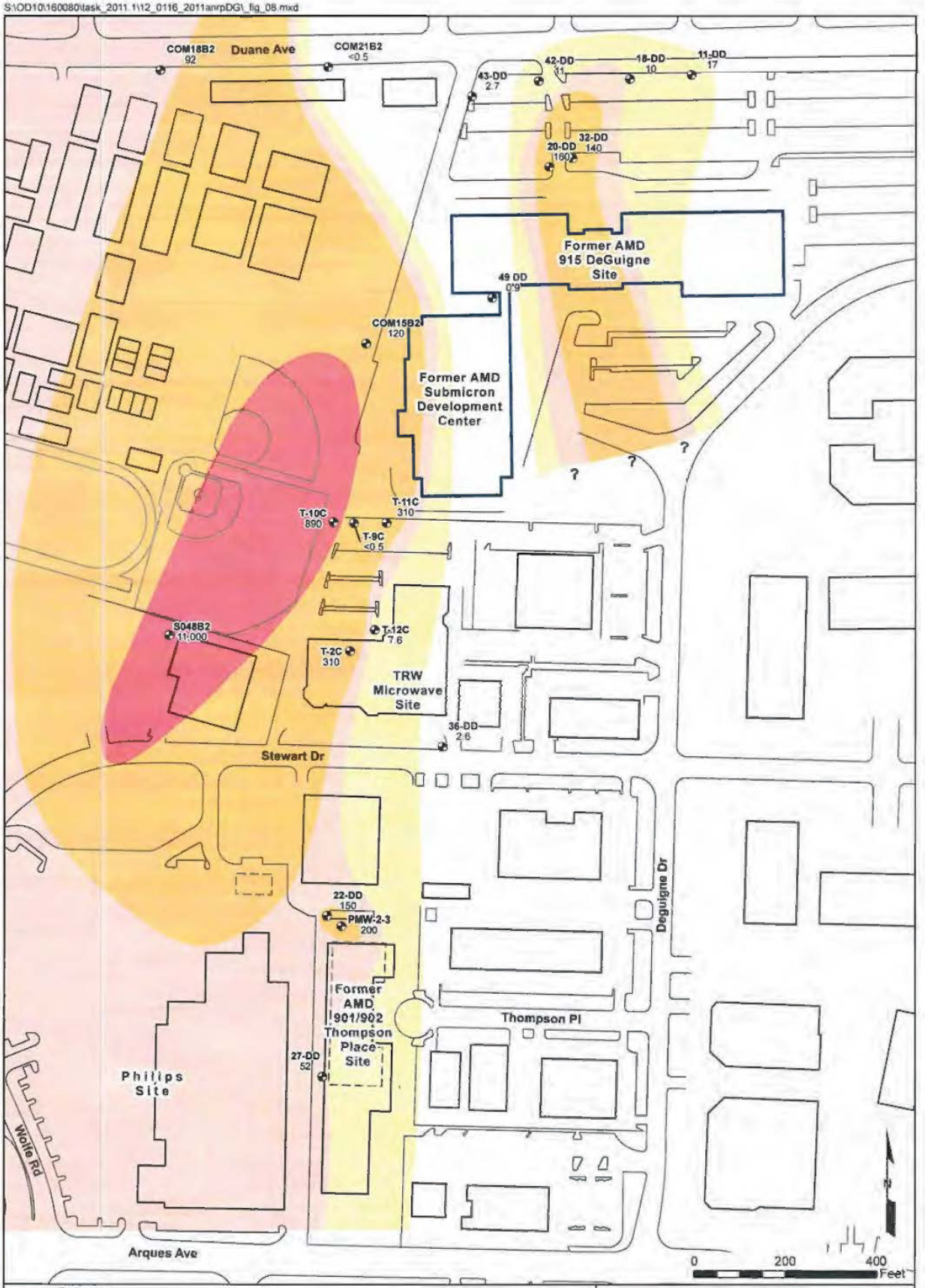
Notes:

1. Contours are based on interpretation of monitoring well data collected in October/November 2011, grab groundwater sample data collected in November 2007 as part of the Subsurface Investigation Report (Geomatrix, 2008), and current understanding of hydrogeologic conditions. They are provided for clarity and are not intended to imply certainty.
2. EW-3 is screened across both the A and B1 zones.

B1-ZONE TCE CONTOURS
OCTOBER – NOVEMBER 2011
915 DeGuigne Drive
Sunnyvale, California

By: MC	Date: 01/30/2012	Project No. OD10100000
amec		Figure 7

S:\OD10\160080\task_2011.1\12_0116_2011anrpDG_fig_08.mxd



Explanation

- Extraction well
- Monitoring Well
- 52 TCE concentration in micrograms per liter (µg/L)
- > 5 µg/L
- > 100 µg/L
- > 50 µg/L
- > 500 µg/L

TCE = Trichloroethene

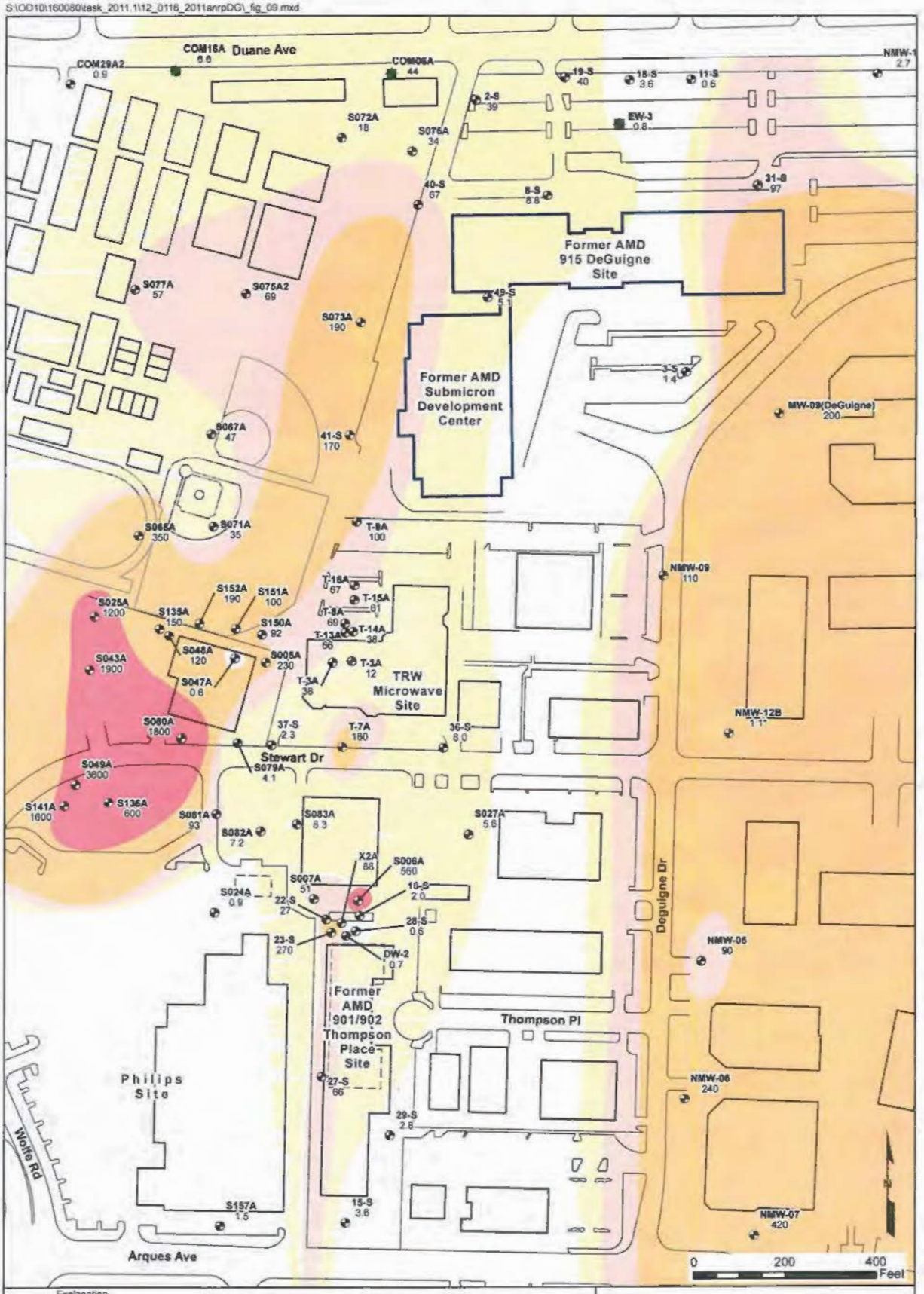
Note:

1. Contours are based on interpretation of monitoring well data collected in October/November 2011, grab groundwater sample data collected in November 2007 as part of the Subsurface Investigtion Report (Geomatrix, 2008), and current understanding of hydrogeologic conditions. They are provided for clarity and are not intended to imply certainty.

B2-ZONE TCE CONTOURS
OCTOBER – NOVEMBER 2011
915 DeGuigne Drive
Sunnyvale, California

By: MC	Date: 01/30/2012	Project No. OD10160080
amec		Figure 8

S:\OD10\160080\task_2011.1\12_0116_2011anrpDG_fig_09.mxd



Explanation

- Extraction well
- Monitoring Well
- 60 cDCE concentration in micrograms per liter (µg/L)
- 1.1* Concentration not used for contouring
- > 5 µg/L
- > 100 µg/L
- > 50 µg/L
- > 500 µg/L

cDCE = cis-1,2-dichloroethene

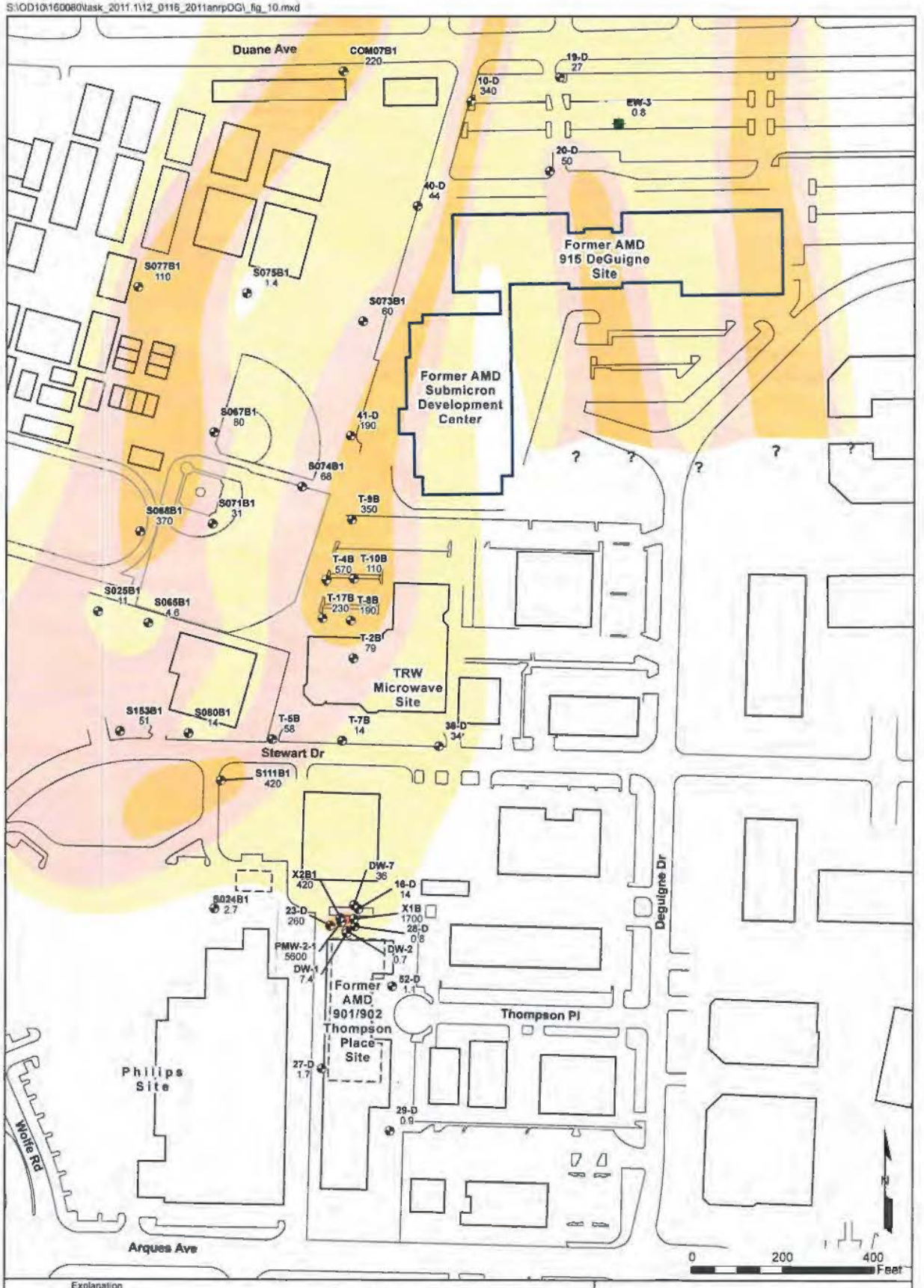
Notes:

1. Contours are based on interpretation of monitoring well data collected in October/November 2011, grab groundwater sample data collected in November 2007 as part of the Subsurface Investigation Report (Geomatrix, 2006), and current understanding of hydrogeologic conditions. They are provided for clarity and are not intended to imply certainty.
2. EW-3 is screened across both the A and B1 zones

A-ZONE cDCE CONTOURS
OCTOBER – NOVEMBER 2011
915 DeGuigne Drive
Sunnyvale, California

By: MC	Date: 01/30/2012	Project No: OD10160080
amec		Figure 9

S:\OD10\160080\task_2011.1\12_0116_2011anrpDG_fig_10.mxd



Explanation

- Extraction well
- Monitoring Well
- 14 cDCE concentration in micrograms per liter (µg/L)
- > 5 µg/L
- > 100 µg/L
- > 50 µg/L
- > 500 µg/L

cDCE = cis-1,2-dichloroethene

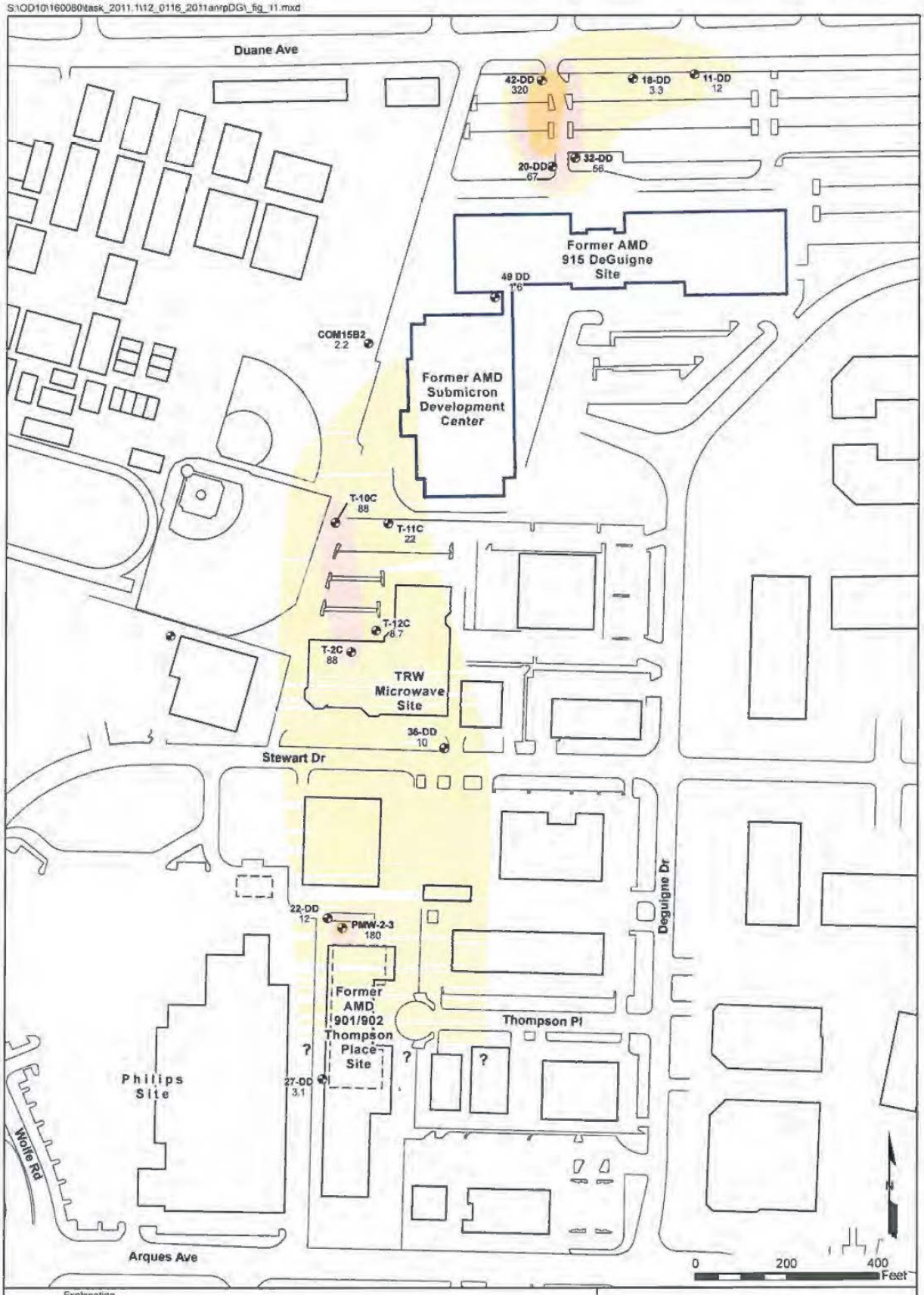
Notes:

1. Contours are based on interpretation of monitoring well data collected in October/November 2011, grab groundwater sample data collected in November 2007 as part of the Subsurface Investigtion Report (Geomatrix, 2008), and current understanding of hydrogeologic conditions. They are provided for clarity and are not intended to imply certainty.
2. EW-3 is screened across both the A and B1 zones.

B1-ZONE cDCE CONTOURS
OCTOBER – NOVEMBER 2011
915 DeGuigne Drive
Sunnyvale, California

By: MC	Date: 01/30/2012	Project No. OD10160080
amec		Figure 10

S:\OD10\160080\task_2011.1\12_0116_2011anrpDG_fig_11.mxd



Explanation

Extraction well

Monitoring Well

12 cDCE concentration in micrograms per liter (µg/L)

> 5 µg/L > 100 µg/L

> 50 µg/L > 500 µg/L

cDCE = cis-1,2-dichloroethene

Note:
Contours are based on interpretation of monitoring well data collected in October/November 2011, grab groundwater sample data collected in November 2007 as part of the Subsurface Investigtion Report (Geomatrix, 2008), and current understanding of hydrogeologic conditions. They are provided for clarity and are not intended to imply certainty.

B2-ZONE cDCE CONTOURS
OCTOBER – NOVEMBER 2011
915 DeGuigne Drive
Sunnyvale, California

By: MC	Date: 01/30/2012	Project No. OD10160080
amec		Figure 11

APPENDIX B

Subsurface Investigation Report (Groundzero, 2013)

GROUND ZERO ANALYSIS, INC.

1714 Main Street
Escalon, California 95320
Telephone: (209) 838-9888
Facsimile: (209) 838-9883

May 29, 2013

Mr. Max Shahbazian
California Regional Water Quality Control Board,
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: **Subsurface Investigation Report**
Proposed Spansion Park Dedication, 915/943 DeGuigne Dr., Sunnyvale, CA
RWQCB Case No. 2020423

Dear Mr. Shahbazian:

The following Report is submitted by Ground Zero Analysis, Inc. (Ground Zero) on behalf of the City of Sunnyvale to present the results of an additional shallow soil and soil vapor investigation conducted at the subject site. Site activities were conducted in response to electronic correspondence from the California Regional Water Quality Control Board (RWQCB), dated March 11, 2013, requesting further investigation of the extent of volatile organic compounds (VOCs) in soil and soil vapor in the vicinity of Treadwell & Rollo vapor sampling point TR-20.

Site activities were conducted in accordance with the *Workplan for Soil and Soil Vapor Sampling* dated April 5, 2013 and included the installation and sampling of three temporary soil vapor monitoring wells to investigate the extent and potential source of the elevated level of cis-1,2-dichloroethene (cis-1,2-DCE) and other VOCs in soil vapor, as previously identified at sampling point TR-20; the advancement of twelve shallow soil borings to verify the concentrations of organochlorine pesticides (OCPs) in shallow soil beneath the subject site and to determine if VOCs are present at levels greater than applicable screening levels in soil beneath and adjacent to the 943 DeGuigne building. The location of the subject site is shown on Figure 1. The immediate site vicinity is shown on Figure 2.

BACKGROUND

Reference is made to the *Park Study Area Site Assessment Report, 915/943 DeGuigne Drive* (Treadwell & Rollo [T&R], February 6, 2013). That report summarizes the site investigations conducted in 2011 and 2013 by T&R on behalf of Spansion, LLC and Prometheus Real Estate Group in anticipation of development of the "AMD 915 DeGuigne Site" (aka "Spansion Site", Figure 1). As part of the redevelopment plans, the project proponent intends to dedicate approximately 5.8 acres of the total 24.5 acre project to the City of Sunnyvale for a public park (Figure 2).

The Spansion Site is an approximate 24.5 acre property currently owned by Spansion, LLC. Advanced Micro Devices ("AMD") and its successor Spansion, Inc. have operated on the property since 1974, researching and manufacturing computer chips and flash drives. Prior to 1974 the property was in agricultural production.

Soil and groundwater contamination was discovered at the Spansion Site in 1981. This contamination consisted primarily of VOCs used in the manufacturing process. As a result of this, the Spansion Site was classified as a "Superfund Site" and cleanup is ongoing. Cleanup of soil has been completed to the regulatory agencies' standards. The final remedial action approved for the Spansion Site under RWQCB Order 91-101 and the 1991 US EPA Record of Decision is groundwater extraction and treatment along with a deed restriction prohibiting the use of shallow groundwater. Groundwater cleanup is ongoing and is likely to continue for many years.

The general vicinity of the Spansion Site has been utilized for many years by companies engaged in research and manufacture for the semi-conductor and other tech industries. Numerous contamination sites, with VOCs as the principal contaminant of concern, are located in the Site vicinity. Groundwater beneath the site is contaminated with VOCs both from the Spansion operations and from upgradient properties.

T&R's 2011 and 2013 investigations determined that shallow soil beneath the proposed park site contains certain OCPs (principally Dieldrin and dichlorodiphenyldichloroethene [DDE]) above applicable "residential direct exposure" screening levels. The OCPs are artifacts of past agricultural property use.

In addition, one soil vapor sampling location (TR-20) contained cis-1,2-DCE at a concentration above "soil gas to indoor air" residential screening levels. This was attributed by T&R to volatilization from the underlying shallow groundwater (depth approximately 10 feet) which is contaminated with the VOC plume associated with the upgradient Mohawk Laboratories site.

Based on T&R's sampling results, further investigation was necessary.

SITE ACTIVITIES

Fieldwork Preparation

The proposed soil and soil vapor boring locations were marked in the field a week prior to the proposed site activities for utility clearance by Underground Service Alert and by the private utility locating service Cruz Brothers Locators.

Shallow Soil Sampling

A total of twelve (12) soil borings were advanced throughout the 5.8 acre Park parcel on April 15 and 16, 2013, by a geologist and a technician from Ground Zero, at the locations shown on Figure 3. The borings were located in the approximate center of half-acre grids measuring approximately 150 feet square, following the recommendations in the Department of Toxics Substances Control (DTSC) document *Interim Guidance for Sampling Agricultural Properties* (Third Revision August 2008). Some of the borings were moved slightly off-center to accommodate utility and traffic considerations. Two of the boring locations were beneath the foundation of the 943 DeGuigne building.

Prior to advancing any soil borings a jackhammer was used to remove the asphalt surface for the borings located in the parking lot (A1, A2, A3, B1, B2, B3, C1, C2, C3 and D2) and the concrete surface for the borings located in the warehouse (D3 and E2). The shallow soil borings were all advanced with a hand auger and soil samples were collected with a drive sampling device containing a six-inch long clean brass sample tube. Soil samples were collected at depths of approximately one, two and three feet into native soil. The roadbase beneath the paved surface was not sampled.

After sample collection, the soil samples were submitted, under chain-of-custody protocol, to State-Certified Torrent Laboratories ([Torrent] ELAP #1991) for analysis. All soil samples collected from one and two feet were analyzed for OCPs by EPA Method 8081A. If at any particular sampling point the 2-foot sample contained OCPs above appropriate State or Federal screening levels, then the 3-foot sample at that location was also analyzed for OCPs. The laboratory was instructed to achieve detection limits that are lower than applicable screening levels. All soil samples from the three boring locations beneath and immediately adjacent to the 943 DeGuigne building (D2, D3 and E2) were also analyzed for VOCs by EPA Method 8260B.

Following the completion of soil sample collection, the borings were backfilled with cuttings and the surface pavement restored. Field notes from the shallow soil investigation are included in Attachment A.

TR-20 Soil and Soil Vapor Investigation

In order to investigate the anomalous level of cis-1,2-DCE detected in soil vapor at location TR-20, three temporary soil vapor wells (GZA-1, GZA-2 and GZA-3) were constructed in close proximity and surrounding TR-20 (Figure 3). Soil vapor monitoring well installation and sampling was conducted in general accordance with the DTSC and RWQCB guidelines put forth in their report *Advisory – Active Soil Gas Investigations* (DTSC and RWQCB, April 2012).

Prior to installation, the temporary soil vapor well borings were cleared to a depth of three feet using a hand auger. Soil samples were collected, in a similar fashion as described above, at the three foot depth for subsequent analysis. Beginning at a depth of three feet Transglobal Environmental Geochemistry (TEG) of Northern California (C-57 license #706568) advanced 1-inch diameter direct-push sample rods to a depth of 5 feet. A vapor flow test was performed to determine if the soil would yield vapor flow at a rate of 100 – 200 milliliters per minute at a vacuum less than 100 inches of water column.

TEG constructed the three temporary vapor wells in the borings using eighth-inch diameter Nylaflow tubing and nylon screen. The screen was placed in the middle of a 1-foot #30 Monterey sand filter pack. The filter pack was overlain with six inches of dry bentonite chips followed by hydrated bentonite to the surface. Prior to purging and sampling, the wells were allowed to sit for two hours to equilibrate and then a shut-in test was performed to ensure that no leaks were present in the sample train. The wells were then purged of three casing volumes (a casing volume includes the volume of the filter pack and the well tubing) and sampled using Summa canisters under a helium shroud. Following the completion of vapor sample collection, the well materials were retrieved and TEG collected additional soil samples at total depth using the direct-push rig. The borings were then backfilled with bentonite and the pavement surface restored.

The soil vapor samples were submitted, under chain-of-custody protocol, to State Certified McCampbell Laboratory ([McCampbell] ELAP #1644) for analysis of VOCs by EPA Method TO-15 and for helium by ASTM D 1946-90. The soil samples collected at three feet and five feet were analyzed by Torrent for VOCs by EPA Method 8260B. Field notes from the soil vapor investigation are included in Attachment A.

RESULTS OF INVESTIGATION

OCPS and VOCs in Shallow Soil

The material column beneath the parking lot was found to consist of between 5 and 6 inches of asphalt overlying approximately 6 to 9 inches of imported roadbase. Native soil beneath the roadbase was primarily dark, organic-rich clay. The unique soil sample names refer to the grid from which the sample was collected and the top of the six-inch sample interval measured from the ground surface; for example sample A1-1.5' was collected in grid A1 at a depth of 1.5 feet below the ground surface. The depths indicated in the sample ID do not, therefore, coincide with the depth into native soil from which they were collected; the depth into native soil of the top of each 6-inch sample is indicated on Table 1.

Beneath the 7-inch thick concrete foundation of the 943 DeGuigne building was between 16 and 26 inches of sand/gravel fill underlain by native clay. As described above, the unique soil sample names refer to the grid from which the sample was collected and the top of the six-inch sample interval measured from the ground surface.

OCPs

All samples collected from the upper two feet of native soil in the twelve grids were analyzed for OCPs. One sample from below two feet was also analyzed. Low levels of DDD, DDE, DDT, Dieldrin and Endrin were detected in one or more of the shallow soil samples. No other OCPs were detected. Dieldrin was the only analyte that exceeded State or Federal Residential Direct Exposure Screening Levels (RWQCB *ESLs*, DTSC *CHHSLS*, EPA Region 9 *RSLs*). Dieldrin exceeded screening levels in four samples collected between 0.5 to 1.0 foot into native soil and in one sample collected between 1.25 to 1.75 feet into native soil. Results are summarized in Table 1. Laboratory reports are included in Attachment B.

VOCs

All samples from grids D2, D3 and E2, collected beneath or adjacent to the 943 DeGuigne building were analyzed for VOCs. The soil samples collected from the three vapor borings were also analyzed for VOCs. No VOCs were detected in any sample. Results are summarized in Table 1. Laboratory reports are included in Attachment B.

VOCs in Soil Vapor

Low levels of several fuel components were detected in one or more of the three vapor samples. These included benzene, toluene, ethylbenzene and xylenes (BTEX), and 1,2,4-trimethylbenzene. Carbon disulfide was detected in two samples and Freon 113 was detected in the same two samples.

The only chlorinated VOCs that were detected were cis-1,2-DCE in sample GZA-1 and 1,1,1-trichloroethane (1,1,1 TCA) in samples GZA-1 and GZA-3.

None of the detected VOCs exceeded Residential Shallow Soil Gas Screening Levels (RWQCB *ESLs*, DTSC *CHHSLs*). Results are summarized in Table 2. Laboratory reports are included in Attachment C.

CONCLUSIONS

The results of this phase of investigation, combined with the previous work of Treadwell & Rollo, confirm that the upper foot of native soil beneath the proposed Park Dedication site is impacted with OCPs as a result of historic agricultural pesticide application. The concentrations of Dieldrin and, to a lesser extent, DDE exceed Residential Direct Exposure Screening Levels.

VOCs were not detected in any soil sample during this investigation. Treadwell & Rollo detected only a trace of diesel and acetone in the samples they analyzed. VOCs in soil are not a concern.

The soil vapor sample results from this investigation did not replicate the detection of 11,000 micrograms per cubic meter ($\mu g/m^3$) of cis-1,2-DCE in the sample from vapor well TR-20 during Treadwell & Rollo's November 2011 investigation. Vapor wells GZA-1, GZA-2 and GZA-3 were installed approximately 20 feet northeast, southeast and west of TR-20 and the only concentration of cis-1,2-DCE that was detected was 130 $\mu g/m^3$ in well GZA-1. No indication of a local soil source for the cis-1,2-DCE was found in the soil samples collected during this phase of investigation.

Please contact us at your earliest convenience if you have any questions or comments regarding this report.

Respectfully,
Ground Zero Analysis, Inc.

For

Joseph L. Vasquez,
Staff Geologist

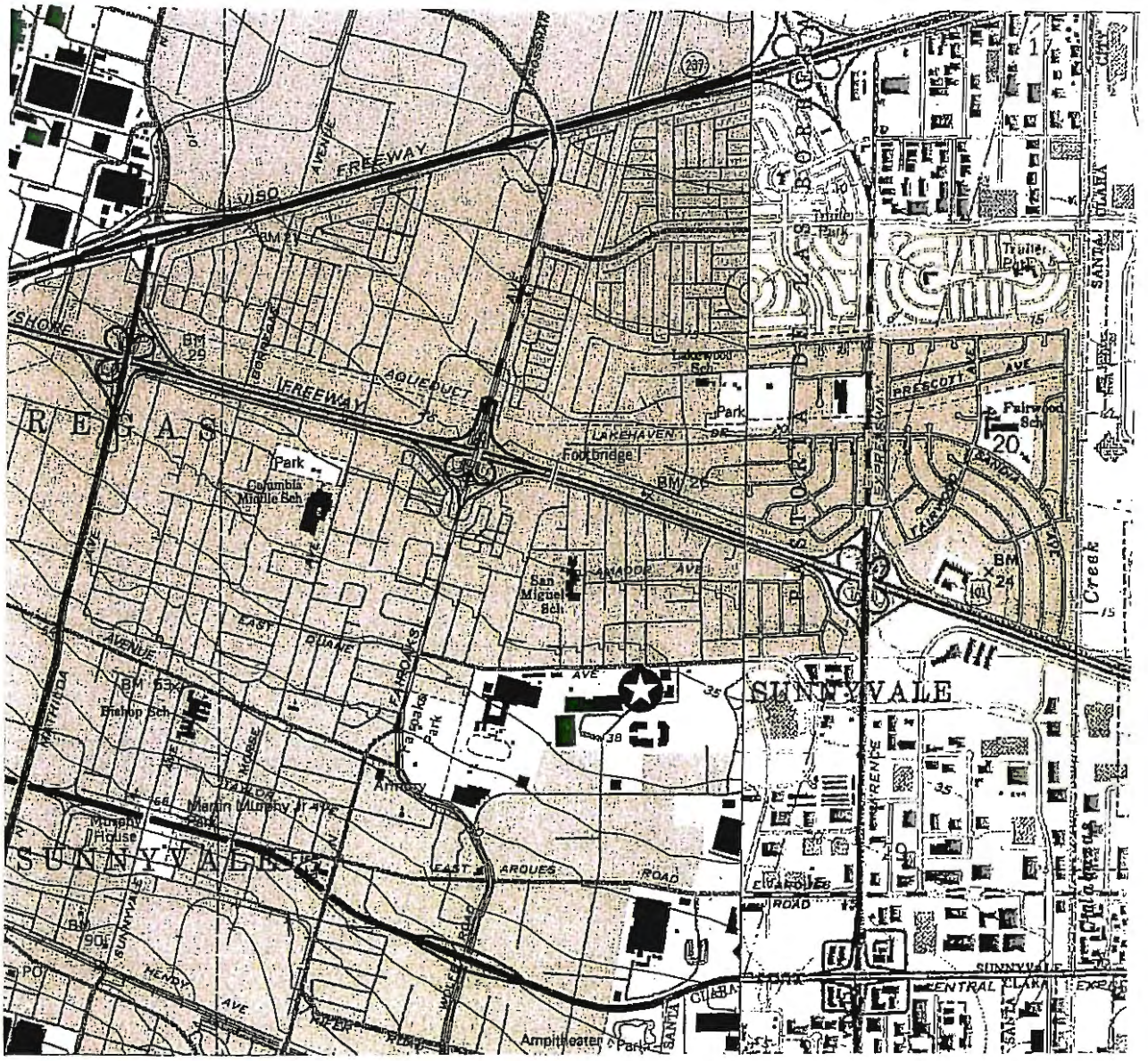
Gregory P. Stahl, PG No. 5023
CA Certified Hydrogeologist No. 264

PROFESSIONAL GEOLOGIST
GREGORY P. STAHL
No. 5023
STATE OF CALIFORNIA

Attachments

cc: Ms. Kathy Berry, City of Sunnyvale
Mr. Kent Steffens, City of Sunnyvale
Mr. Manual Pineda, City of Sunnyvale
Mr. Ajay Changaran, Spansion, LLC
Ms. Patricia Castillo, Castillo & Castillo

FIGURES



SCALE 1:24000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

LEGEND:

SITE LOCATION

CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES: MOUNTAIN VIEW/MILPITAS, CA

GROUND ZERO ANALYSIS, INC.

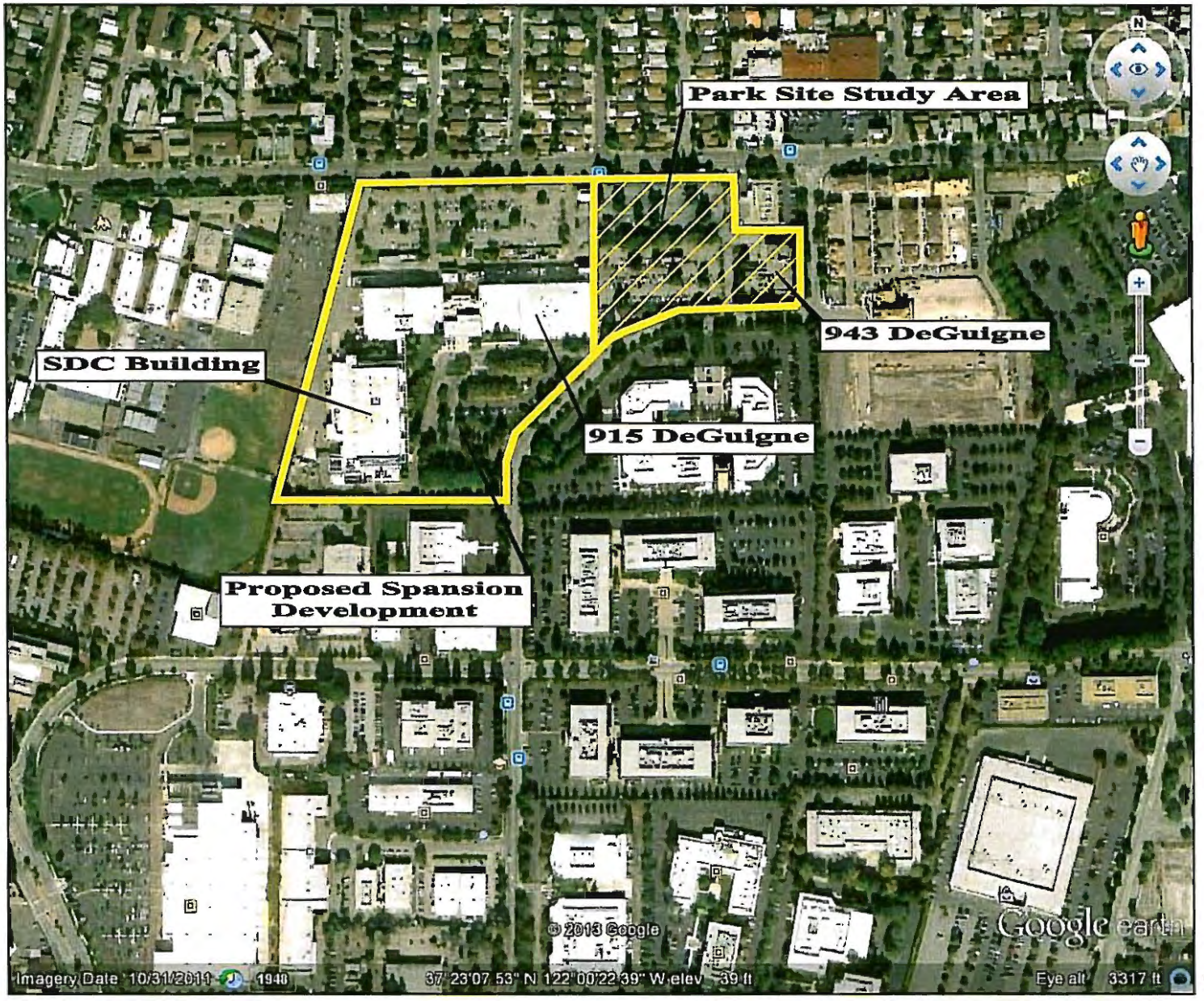
SITE LOCATION MAP

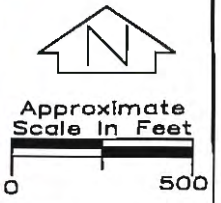
SPANSION PARK SITE
915/943 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

FIGURE

1

FN 0313/SITELOC





GROUND ZERO ANALYSIS, INC.

SITE VICINITY MAP

SPANSION PARK SITE
915/943 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

FIGURE

2

FN: 0313/922s2

LEGEND:

- PROPOSED PARK BOUNDARY
- TR-20 VAPOR SAMPLING LOCATION (T&R NOVEMBER 2011)
- SOIL BORING LOCATIONS
- SOIL VAPOR SAMPLING LOCATIONS

N

Approximate Scale In Feet

0 100

GROUND ZERO ANALYSIS, INC.

SITE MAP
SHOWING SOIL BORING & SOIL VAPOR SAMPLING LOCATIONS
APRIL 15, 16 & 17, 2013
SPANSION PARK SITE
915/943 DEGUIGNE DRIVE
SUNNYVALE, CALIFORNIA

FIGURE

3

FN: 0413/922s

TABLES

TABLE 1
ANALYTICAL RESULTS - SOIL SAMPLES
Spansion Park Dedication
915-943 DeGuigue Drive
Sunnyvale, CA
(in mg/kg)

Date	Sample ID	Depth Into native soil (feet)	Organochlorine Pesticides (OCPs)							Volatile Organic Compounds (VOCs)				
			p,p-DDD	p,p-DDE	p,p-DDT	Sum of DDTs	Dieldrin	Endrin	All Other OCPs	PCE	TCE	cis-1,2-DCE	VC	All Other VOCs
04/16/13	A1-1.5'	0.5	<0.00076	0.0066	<0.00067	0.008	<0.00058	<0.00086	ND	--	--	--	--	--
	A1-2.5'	1.5	<0.00076	<0.00051	<0.00067	0.002	<0.00058	<0.00086	ND	--	--	--	--	--
	A1-3.5'	2.5	--	--	--	--	--	--	--	--	--	--	--	--
04/16/13	A2-1.5'	0.5	0.027	0.690	0.041	0.758	0.030	<0.0034	ND	--	--	--	--	--
	A2-2.5'	1.5	<0.003	0.061	<0.0027	0.067	0.0023[J]	<0.0034	ND	--	--	--	--	--
	A2-3.5'	2.5	--	--	--	--	--	--	--	--	--	--	--	--
04/15/13	A3-1.5'	0.5	0.012	1.00	0.120	1.13	0.043	0.018	ND	--	--	--	--	--
	A3-2.5'	1.5	<0.003	0.058	0.0048[J]	0.066	0.0031[J]	<0.0034	ND	--	--	--	--	--
	A3-3.5'	2.5	--	--	--	--	--	--	--	--	--	--	--	--
04/16/13	B1-1.5'	0.5	0.0082	0.880	0.046	0.934	0.037	0.017	ND	--	--	--	--	--
	B1-2.5'	1.5	<0.003	0.240	0.026	0.269	0.0063[J]	<0.0034		--	--	--	--	--
	B1-3.5'	2.5	--	--	--	--	--	--	--	--	--	--	--	--
04/15/13	B2-1.5'	0.4	0.014	0.200	0.002	0.216	0.020	<0.00086	ND	--	--	--	--	--
	B2-2.5'	1.25	0.025	0.300	0.010	0.335	0.030	<0.00086	ND	--	--	--	--	--
	B2-3.5'	2.25	<0.00076	0.0031	<0.00067	0.005	<0.00058	<0.00086	ND	--	--	--	--	--
04/16/13	B3-1.0'	0.5	0.058	0.680	0.0078	0.746	0.044	<0.00086	ND	--	--	--	--	--
	B3-2.0'	1.5	0.015	0.400	0.0056	0.425	0.019	<0.00086	ND	--	--	--	--	--
	B3-3.0'	2.5	--	--	--	--	--	--	--	--	--	--	--	--
04/16/13	C1-1.5'	0.6	<0.00076	0.0036	<0.00067	0.005	<0.00058	<0.00086	ND	--	--	--	--	--
	C1-2.5'	1.6	<0.00076	<0.00051	<0.00067	0.002	<0.00058	<0.00086	ND	--	--	--	--	--
	C1-3.5'	2.6	--	--	--	--	--	--	--	--	--	--	--	--
04/15/13	C2-1.5'	0.5	<0.003	0.0076[J]	<0.0027	0.013	<0.0023	<0.0034	ND	--	--	--	--	--
	C2-2.5'	1.5	<0.003	0.016	<0.0027	0.022	<0.0023	<0.0034	ND	--	--	--	--	--
	C2-2.5'	2.5	--	--	--	--	--	--	--	--	--	--	--	--
04/15/13	C3-1.5'	0.6	<0.00076	<0.00051	<0.00067	0.002	<0.00058	<0.00086	ND	--	--	--	--	--
	C3-2.5'	1.6	0.0032[J]	0.050	<0.0027	0.056	<0.0023	<0.0034	ND	--	--	--	--	--
	C3-3.5'	2.6	--	--	--	--	--	--	--	--	--	--	--	--
04/15/13	D2-2'	0.7	<0.003	0.092	0.0066[J]	0.102	0.0043[J]	<0.0034	ND	<0.0018	<0.0039	<0.0018	<0.0026	ND
	D2-3'	1.7	<0.0076	<0.0051	<0.0067	0.002	<0.0058	<0.0086	ND	<0.0018	<0.0039	<0.0018	<0.0026	ND
	D2-4'	2.7	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
04/15/13	D3-3.5'	0.75	<0.00076	<0.00051	<0.00067	0.002	<0.00058	<0.00086	ND	<0.0018	<0.0039	<0.0018	<0.0026	ND
	D3-4.5'	1.75	<0.00076	0.0058	<0.00067	0.007	<0.00058	<0.00086	ND	<0.0018	<0.0039	<0.0018	<0.0026	ND
	D3-5.5'	2.75	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
04/15/13	E2-2.5'	0.6	<0.00076	0.150	0.0089	0.160	<0.00058	<0.00086	ND	<0.0018	<0.0039	<0.0018	<0.0026	ND
	E2-3.5'	1.6	<0.00076	0.022	0.0028	0.026	<0.00058	<0.00086	ND	<0.0018	<0.0039	<0.0018	<0.0026	ND
	E2-4.5'	2.6	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
04/16/13	GZA1-3.0'	2.1	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
04/17/13	GZA1-5'	4.1	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
04/16/13	GZA2-3.0'	2.0	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
04/17/13	GZA2-5'	4.0	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
04/16/13	GZA3-3.0'	2.0	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
04/17/13	GZA3-5'	4.0	--	--	--	--	--	--	--	<0.0018	<0.0039	<0.0018	<0.0026	ND
Screening Levels	ESL	--	2.4	1.7	1.7	--	0.034	4.1	--	0.37	1.9	6.5	0.022	--
	CHHSL	--	2.3	1.6	1.6	--	0.035	21	--	NE	NE	NE	NE	--
	RSL	--	2.0	1.4	1.7	--	0.030	18	--	22	0.91	160	0.060	--

NOTES:

p,p-DDD = Dichlorodiphenyldichloroethane
p,p-DDE = Dichlorodiphenyldichloroethene
p,p-DDT = Dichlorodiphenyltrichloroethane
PCE = Tetrachloroethene
TCE = Trichloroethene
cis-1,2-DCE = cis-1,2-Dichloroethene
VC = Vinyl Chloride
J =Indicates a value between MDL and PQL

ESL = Residential Direct Exposure Environmental Screening Level (RWQCB, 2008)
CHHSL = Residential Direct Exposure Californian Human Health Screening Level (DTSC, 2005)
RSL = Residential Direct Exposure Regional Screening Level (US EPA Region 9, November 2012)
NE = Not Established
-- = Not Analyzed
< = Less than indicated detection limit (not detected)
ND = Not Detected (see lab reports for individual detection limits)
= Sample concentration at or above one or more screening levels
= Sum of DDT and daughter products exceed Total Threshold Limit Concentration

TABLE 2
ANALYTICAL RESULTS - SOIL VAPOR SAMPLES
Spansion Park Dedication
915-943 DeGuigne Drive
Sunnyvale, CA
(in ug/m^3 unless otherwise specified)

Date	Sample ID	Depth (mm surface feet)	Volatile Organic Compounds (VOCs)										Leak Detection
			Benzene	Carbon Disulfide	cis-1,2-DCE	Ethylbenzene	Freon 113	Toluene	1,1,1-TCA	1,2,4-TMB	Xylenes	All Other VOCs	Helium (%)
04/16/13	GZA-1	5.0	10	68	130	<8.8	17	35	44	<10	28	ND	0.0057
	GZA-2	5.0	9.8	<6.3	<8.1	13	<16	68	<11	13	61	ND	0.012
	GZA-3	5.0	<6.5	27	<8.1	<8.8	80	35	45	<10	<27	ND	<0.005
Screening Levels	ESL	NA	84	NE	7,300	980	NE	63,000	463,000	NE	21,000	NA	NA
	CHHSL	NA	36.2	NE	15,900	NE	NE	135,000	991,000	NE	315,000	NA	NA

NOTES:

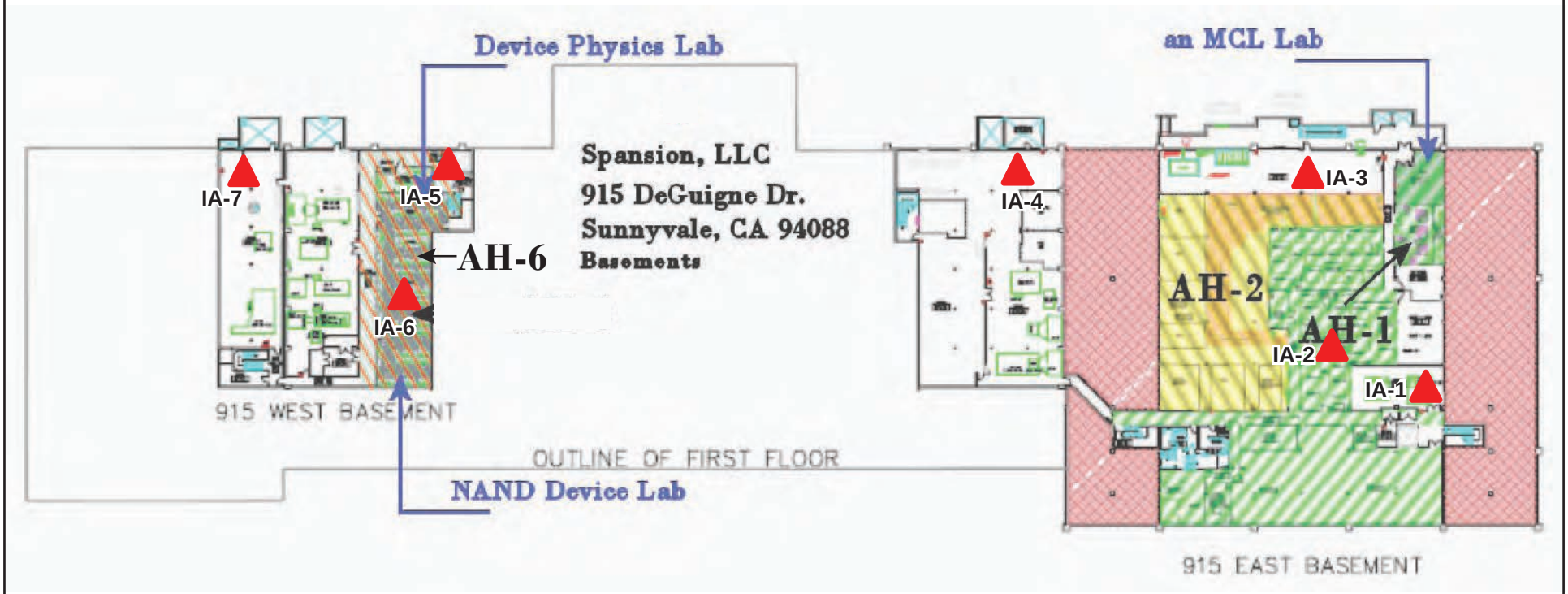
cis-1,2-DCE = cis-1,2-dichloroethene
1,1,1-TCA = 1,1,1-trichloroethane
1,2,4-TMB = 1,2,4-trimethylbenzene
ug/m^3 = micrograms per cubic meter

ESL = Residential Shallow Soil Gas Environmental Screening Level (RWQCB, 2008)
CHHSL = Residential Shallow Soil Gas California Human Health Screening Level (DTSC, 2005)
NA = Not Applicable
NE = Not Established
— = Not Analyzed
< = Less than indicated detection limit (not detected)
ND = Not Detected (see lab reports for individual detection limits)

APPENDIX C

Select Figures from *Report of Results – Indoor Air Sampling* (Amec, 2011)

S:\OD10\160090\task_2011.3\11_0913_deGuigne_fig_04.ai



EXPLANATION

IA-7 Approximate indoor air sample location

AH-6 Air handler servicing area

Note:
1. Building plan and air handler information provided by Spansion.

SAMPLE LOCATION MAP, BASEMENT
915 Deguigne Drive
Sunnyvale, California

By: AWP	Date: 09/26/2011	Project No.	OD10160090
amec		Figure	4

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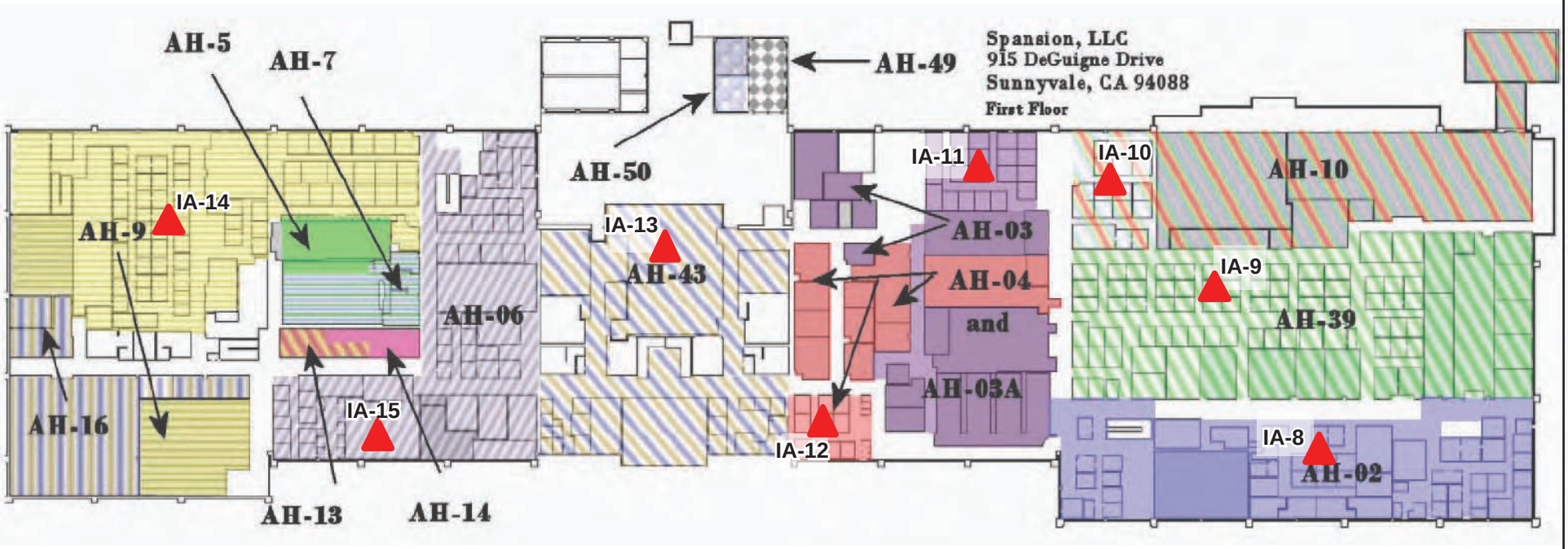

EXPLANATION

IA-15 Approximate indoor air sample location

AH-13 Air handler servicing area

Note:
1. Building plan and air handler information provided by Spansion.

SAMPLE LOCATION MAP, FIRST FLOOR
915 Deguigne Drive
Sunnyvale, California

By: AWP	Date: 09/26/2011	Project No.	OD10160090
amec		Figure	5

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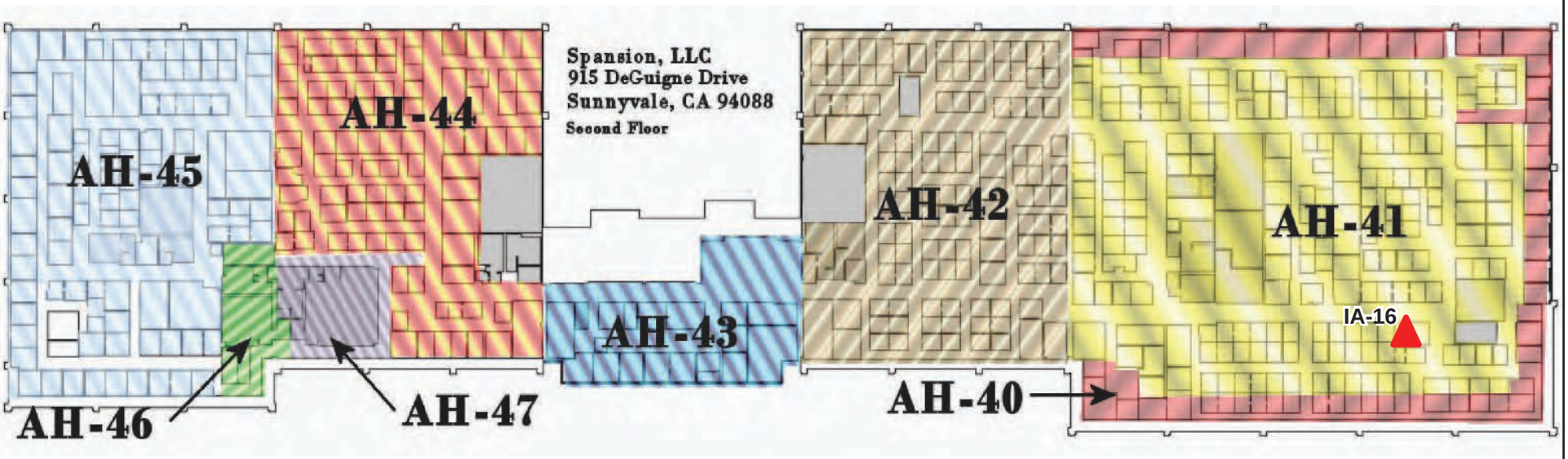

EXPLANATION

IA-16 Approximate indoor air sample location

AH-46 Air handler servicing area

Note:
1. Building plan and air handler information provided by Spansion.

SAMPLE LOCATION MAP, SECOND FLOOR
915 Deguigne Drive
Sunnyvale, California

By: AWP	Date: 09/26/2011	Project No.	OD10160090
amec		Figure	6

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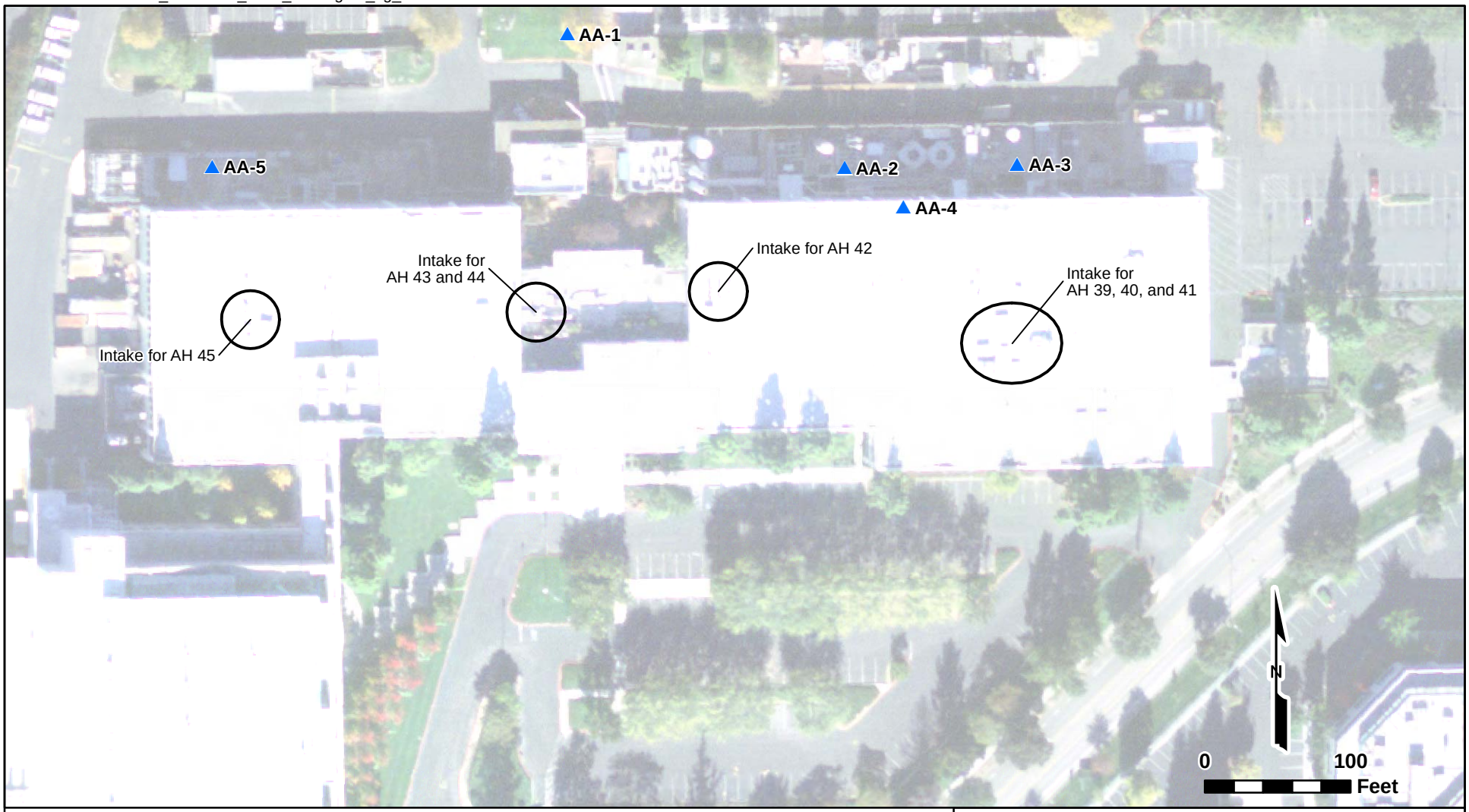


Explanation

▲ Approximate outdoor air sample location

Note:
Aerial photo - USGS High Resolution Orthoimage,
San Francisco-Oakland, CA, 2004

SAMPLE LOCATION MAP, AMBIENT AIR
915 DeGuigne Drive
Sunnyvale, California

By: AWP	Date: 09/27/2011	Project No. OD10160090
amec		Figure 7

APPENDIX D

Weather Report for 21 August 2011 Sampling Event

Weather History for Moffett NAS, CA

Sunday, August 21, 2011

Sunday, August 21, 2011

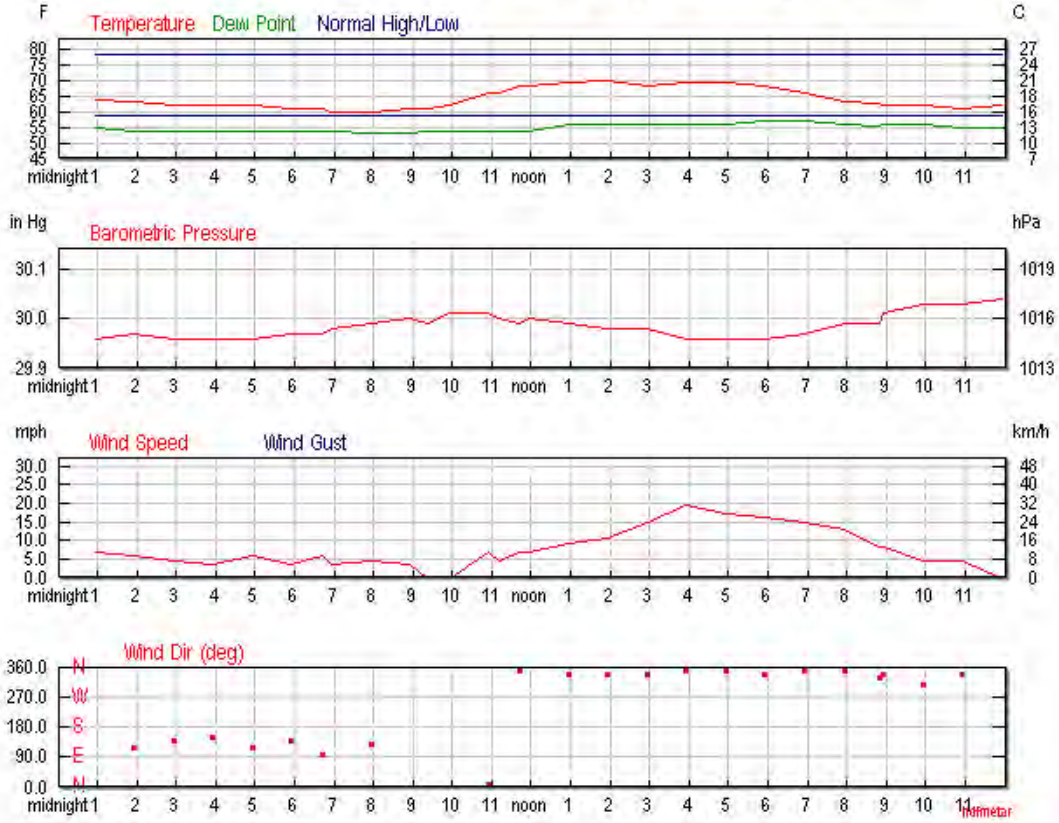
« Previous Day | August | 21 | 2011 | View | Next Day »

Daily | Weekly | Monthly | Custom

	Actual	Average	Record
Temperature			
Mean Temperature	66 °F	68 °F	
Max Temperature	71 °F	78 °F	87 °F (1993)
Min Temperature	60 °F	59 °F	51 °F (1954)
Degree Days			
Heating Degree Days	0		
Month to date heating degree days	1		
Since 1 June heating degree days	80		
Since 1 July heating degree days	10		
Cooling Degree Days	1		
Month to date cooling degree days	33		
Year to date cooling degree days	195		
Since 1 June cooling degree days	175		
Grow ing Degree Days	15 (Base 50)		
Moisture			
Dew Point	55 °F		
Average Humidity	72		
Maximum Humidity	84		
Minimum Humidity	59		
Precipitation			
Precipitation	0.00 in	0.01 in	0.01 in (1968)
Month to date precipitation	0.00	0.01	
Year to date precipitation	9.50	9.66	
Since 1 July precipitation	0.00	0.03	
Sea Level Pressure			
Sea Level Pressure	29.99 in		
Wind			
Wind Speed	8 mph (NNE)		
Max Wind Speed	20 mph		
Max Gust Speed	24 mph		
Visibility	10 miles		
Events			

T = Trace of Precipitation, MM = Missing Value

Source: NWS Daily Summary



Certify This Report

Hourly Weather History & Observations

Time (PDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:56 AM	64.0 °F	55.0 °F	73%	29.96 in	10.0 mi	ESE	6.9 mph	-	N/A		Overcast
1:56 AM	63.0 °F	54.0 °F	72%	29.97 in	10.0 mi	ESE	5.8 mph	-	N/A		Overcast
2:56 AM	62.1 °F	54.0 °F	75%	29.96 in	10.0 mi	SE	4.6 mph	-	N/A		Overcast
3:56 AM	62.1 °F	54.0 °F	75%	29.96 in	10.0 mi	SSE	3.5 mph	-	N/A		Overcast
4:56 AM	62.1 °F	54.0 °F	75%	29.96 in	10.0 mi	ESE	5.8 mph	-	N/A		Overcast
5:56 AM	61.0 °F	54.0 °F	78%	29.97 in	10.0 mi	SE	3.5 mph	-	N/A		Overcast
6:43 AM	60.8 °F	53.6 °F	77%	29.97 in	10.0 mi	East	5.8 mph	-	N/A		Overcast
6:56 AM	60.1 °F	54.0 °F	80%	29.98 in	10.0 mi	Variable	3.5 mph	-	N/A		Overcast
7:56 AM	60.1 °F	53.1 °F	78%	29.99 in	10.0 mi	SE	4.6 mph	-	N/A		Overcast
8:56 AM	61.0 °F	53.1 °F	75%	30.00 in	10.0 mi	Variable	3.5 mph	-	N/A		Overcast
9:23 AM	60.8 °F	53.6 °F	77%	29.99 in	10.0 mi	Calm	Calm	-	N/A		Overcast
9:56 AM	62.1 °F	54.0 °F	75%	30.01 in	10.0 mi	Calm	Calm	-	N/A		Overcast
10:56 AM	66.0 °F	54.0 °F	65%	30.01 in	10.0 mi	North	6.9 mph	-	N/A		Mostly Cloudy

11:11 AM	66.2 °F	53.6 °F	64%	30.00 in	10.0 mi	Variable	4.6 mph	-	N/A		Partly Cloudy
11:42 AM	68.0 °F	53.6 °F	60%	29.99 in	10.0 mi	North	6.9 mph	-	N/A		Mostly Cloudy
11:56 AM	68.0 °F	54.0 °F	61%	30.00 in	10.0 mi	Variable	6.9 mph	-	N/A		Scattered Clouds
12:56 PM	69.1 °F	55.9 °F	63%	29.99 in	10.0 mi	NNW	9.2 mph	-	N/A		Clear
1:56 PM	70.0 °F	55.9 °F	61%	29.98 in	10.0 mi	NNW	10.4 mph	-	N/A		Clear
2:56 PM	68.0 °F	55.9 °F	65%	29.98 in	10.0 mi	NNW	15.0 mph	-	N/A		Clear
3:56 PM	69.1 °F	55.9 °F	63%	29.96 in	10.0 mi	North	19.6 mph	-	N/A		Clear
4:56 PM	69.1 °F	55.9 °F	63%	29.96 in	10.0 mi	North	17.3 mph	21.9 mph	N/A		Clear
5:56 PM	68.0 °F	57.0 °F	68%	29.96 in	10.0 mi	NNW	16.1 mph	-	N/A		Clear
6:56 PM	66.0 °F	57.0 °F	73%	29.97 in	10.0 mi	North	15.0 mph	-	N/A		Clear
7:56 PM	63.0 °F	55.9 °F	78%	29.99 in	10.0 mi	North	12.7 mph	-	N/A		Clear
8:51 PM	62.6 °F	55.4 °F	77%	29.99 in	10.0 mi	NNW	8.1 mph	-	N/A		Mostly Cloudy
8:56 PM	62.1 °F	55.9 °F	80%	30.01 in	10.0 mi	NNW	8.1 mph	-	N/A		Mostly Cloudy
9:56 PM	62.1 °F	55.9 °F	80%	30.03 in	10.0 mi	NW	4.6 mph	-	N/A		Overcast
10:56 PM	61.0 °F	55.0 °F	81%	30.03 in	10.0 mi	NNW	4.6 mph	-	N/A		Overcast
11:56 PM	62.1 °F	55.0 °F	78%	30.04 in	10.0 mi	Calm	Calm	-	N/A		Overcast

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