

**VAPOR INTRUSION EVALUATION REPORT  
FORMER 901/902 THOMPSON PLACE  
SUNNYVALE, CALIFORNIA**

**by**

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# VAPOR INTRUSION EVALUATION REPORT

Former 901/902 Thompson Place

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 facility located at 901/902 Thompson Place 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, 2014a). The Water Board letter requests AMD to submit a report comparing the methods used and conditions under which a vapor intrusion evaluation was completed in 2013 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additional information on the vapor intrusion work completed would be forthcoming to ensure consistency with USEPA’s draft guidance and guidelines.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<sup>1</sup>, 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.

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<sup>1</sup> *Site Cleanup Requirements Order Number 91-102* (the Order) was issued on June 19, 1991, by the Water Board. Although the Site is designated as a Superfund Site, USEPA delegated oversight authority to the Water Board on 22 October 1987 under the Multi-Site Cooperative Agreement.

## 2. SITE BACKGROUND

Two low-rise buildings, connected by a hallway, previously existed at the Site (the north building was 901 and the south building was 902 Thompson Place; Figure 2). AMD used the facility to design and fabricate semiconductor devices between 1969 and 1992 (Arcadis, 2001). Two below-ground acid neutralization system (ANS) tank vaults were located at the northern and southern ends of the 901 and 902 Thompson place buildings, respectively (Arcadis, 2001). The property was sold to Summit Commercial Properties (Summit) and redeveloped in 2007. The 901 and 902 buildings were razed and a large three-story building (875 East Arques Avenue; Figure 2) was constructed over the footprints of the previous buildings. The new building is currently operated as a self-storage facility (Super Space Self Storage; SSSS). A small office at the south end of the SSSS building is typically open from 9 a.m. to 6 p.m. Monday through Friday, 9 a.m. to 5 p.m. Saturday, and 9 a.m. to 4 p.m. Sunday. The SSSS building also contains 1,274 temperature controlled storage units for rent. The heating, ventilation, and air condition (HVAC) system at the SSSS building operates 24 hours per day to maintain a temperature between 65 and 75 degrees Fahrenheit. The SSSS building is a slab-on-grade building with a 15-inch concrete slab and cinderblock walls. The Site boundary as defined in the Record of Decision (USEPA, 1991) extends east to DeGuigne Drive (Figure 1) and includes seven other commercial buildings. These other seven buildings do not overly groundwater impacted by former AMD operations and no vapor intrusion evaluation has been required at these buildings.

The Site hydrostratigraphy is described by Engineering Science (1986) as a sequence of coarse-grained (sand and gravel) sediments separated primarily by silty clay. The primary water-bearing units are designated the A, B1, B2, and B3 Zones. The shallowest water bearing zone is identified as the A-zone. A-zone wells are generally screened from 10 to 25 feet bgs. The depth of the uppermost groundwater surface typically is encountered at approximately 10 feet bgs, and generally occurs under confined conditions. The horizontal hydraulic gradient is generally to the north – northeast, towards the Bay.

The major chemicals of concern (COCs) reported in groundwater samples above cleanup goals established in the Order are trichloroethene (TCE), cis-1,2-dichloroethene (cDCE) and vinyl chloride (VC). The distribution of COCs in A-zone groundwater is described in Section 3.1. The primary on-Site source of COCs appears to have been the ANS tanks at the 901 Building (Engineering Science, 1988; Geomatrix, 2006). An in situ bioremediation (ISB) system exists at the Site to treat COCs in groundwater in the vicinity of the 901-ANS using groundwater recirculation and amendment with organic substrate, and ex-situ treatment with granular activated carbon (GAC). A network of 21 wells are monitored for groundwater quality on an annual basis, and 13 wells located in the ISB area are monitored on a quarterly basis to evaluate the performance of the ISB system. Figure 2 presents the Site plan with the locations of shallow groundwater (A-zone) monitoring wells.

Three nearby sites where releases of TCE have impacted groundwater 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 915 DeGuigne Drive 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. Subsequent investigations performed in the 1990’s that improved the delineation of groundwater in this area indicate that the Site is not likely to be a source of the TCE OOU groundwater plume (EFW, 1997 and 1998).

Groundwater impacted by cDCE with lesser concentrations of TCE exists beneath the eastern portion of the Site in the vicinity of monitoring wells 14-S and 17-S; these impacts are attributed to the Mohawk

Laboratories Site (The Source Group, 2005). The most recent groundwater monitoring sample from well 17-S, located in the northeast corner of the Site, was collected in 2009 and was reported to contain TCE at a concentration of 28  $\mu\text{g/L}$ . TCE was not detected in the groundwater monitoring sample collected at well 14-S in 2009 (The Source Group, 2010). Groundwater beneath the eastern portion of the Site may in addition be impacted by releases associated with the Commercial Street Operating Unit.

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

In the following sub-sections, the results of shallow groundwater samples and an indoor air investigation completed at the SSSS building are summarized with respect to potential for vapor intrusion.

#### 3.1 Shallow (A-zone) Groundwater Monitoring

Concentrations of COCs and other volatile organic compounds (VOCs), chlorobenzene, chloroethane, 1,3-dichlorobenzene, and 1,4-dichlorobenzene (1,4-DCB), which have been detected in shallow groundwater samples collected in 2012 and 2013 as part of groundwater monitoring activities are presented in Table 1. Environmental Screening Levels (ESLs) for assessing the potential vapor intrusion from groundwater have been published by Water Board (2013b) and are also included in Table 1. Groundwater ESLs were developed by applying a chemical-specific attenuation factor<sup>2</sup> to target indoor air concentrations (i.e., indoor air ESLs). For this evaluation, the default groundwater ESLs for typical Bay Area sites (i.e., fine-coarse mix of soils) were selected since the lithology at the Site does not consist of sand, gravel, or fractured bedrock (Engineering Science, 1986) and significant preferential pathways are not present (Water Board, 2013b). In addition to ESLs, Vapor Intrusion Screening Levels (VISLs) published by the USEPA (2013d) are also included in Table 1. Similar to ESLs, VISLs are developed by applying a non-compound 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, 2013c).

ESLs and VISLs are conservative long-term screening levels that correspond to an acceptable risk level (i.e., cancer risk of one-in-one million or  $1 \times 10^{-6}$ ; non-cancer hazard quotient of 1); concentrations of the constituents below their respective ESLs or VISLs can be considered to pose no significant risk. Concentrations of constituents above their respective ESLs or VISLs do not necessarily indicate a risk is present, but rather suggest that further evaluation is warranted.

No VOCs were detected in groundwater samples collected in 2012 and 2013 at concentrations above their respective ESLs, with the exception of VC. VC was detected at concentrations greater than its ESL in samples collected from monitoring wells 16-S, 28-S, and X2A, which are located north (hydraulically downgradient) of the SSSS building in the area of active ISB remediation. Both VC and TCE were detected at concentrations above their respective VISLs. TCE was detected in groundwater samples at six monitoring wells (22-S, 23-S, 27-S, 29-S, 36-S, and 37-S) at concentrations greater than the VISL (7.4 micrograms per liter [ $\mu\text{g/L}$ ]), but below the ESL (640  $\mu\text{g/L}$ ). In addition, in the recently published Region 9 Guidelines, USEPA applied a 5  $\mu\text{g/L}$  TCE groundwater concentration to define the extent of vapor intrusion evaluation areas (USEPA, 2013e). Concentrations of TCE above 5  $\mu\text{g/L}$  were detected in 7 monitoring wells (15-S, 22-S, 23-S, 27-S, 28-S, 36-S, and 37-S), indicating the need for a vapor intrusion evaluation at the Site under the Region 9 Guidelines. Figure 3 presents the regional distribution of TCE in shallow (A-zone) monitoring wells located both on- and off-Site based on samples collected in October/November 2013. Concentrations of COCs in Site monitoring wells have shown a decreasing trend over time (Haley & Aldrich, 2014); as groundwater quality continues to improve, the potential for vapor intrusion to negatively impact indoor air quality is expected to decrease.

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<sup>2</sup> Chemical-specific attenuation factors were estimated by Water Board using the GW-ADV version of the USEPA Vapor Intrusion Model (U.S. EPA, 2004).

## 3.2 Indoor Air Sampling

At the request of the Water Board (2013a), a vapor intrusion evaluation was conducted by AMD at the SSSS building in March 2013 (AMEC, 2013b). Indoor air samples were collected inside the SSSS building with the HVAC system deactivated to evaluate potential “worse-case” conditions.

### 3.2.1 Indoor Air Sample Collection

Prior to collecting indoor air samples, a building survey was conducted, including a Site walk to identify appropriate indoor and ambient air sampling locations, on 20 February 2013 (AMEC, 2013a). During the building survey, 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 by volume as isobutylene. The building survey identified some storage of chemicals in the building for use by SSSS janitorial staff. Although the chemicals were not identified to contain target analytes for indoor air samples at the Site, SSSS staff were asked to remove these chemicals from the building prior to sampling. Staff at the facility were also asked to refrain from bringing dry-cleaned garments into the building, smoking, building maintenance, or cleaning inside the facility during the 48-hour period prior to and during implementation of the sampling program. However, it was not feasible to provide such recommendations to the storage facility’s tenants, nor to evaluate the contents of the rented storage units.

There are 15 HVAC units that service the SSSS building, with the air intakes on the roof and the air handling units within the building. SSSS turned off the HVAC approximately 36 hours prior to sampling, and it remained off until the sampling was complete. Indoor air samples were collected into 6-Liter Summa™ canisters at nine locations and analyzed for selected VOCs<sup>3</sup> using USEPA Method TO-15 in Selective Ion Monitoring (SIM) mode. All indoor and ambient air samples were collected for 8 hours overnight on the evening of 26 March through the morning of 27 March 2013. A figure from the Report of Results (AMEC, 2013b) showing sample locations is included as Appendix B.

Meteorological data summaries for measurements collected on 26 and 27 March 2013 at the nearby Moffett Field Meteorological Station<sup>4</sup>, located in Moffett Field, Mountain View, California are included as Appendix A. A summary of outside air temperatures during indoor air sampling is presented below:

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<sup>3</sup> Indoor air samples were analyzed for all COCs identified in the Order, as well as chemicals (chlorobenzene, chloroethane, 1,3-dichlorobenzene, and 1,4-DCB) detected in groundwater samples collected from the A and B1 zones during the two recent years of annual sampling.

<sup>4</sup> [http://www.wunderground.com/history/airport/KNUQ/2013/3/26/DailyHistory.html?req\\_city=NA&req\\_state=NA&req\\_statename=NA](http://www.wunderground.com/history/airport/KNUQ/2013/3/26/DailyHistory.html?req_city=NA&req_state=NA&req_statename=NA).

Description	Temperature (degrees Fahrenheit)	Time
Start of Sampling	60.1	5:56 pm, 26 March 2013
End of Sampling	54.4	8:56 am, 27 March 2013
Minimum	51.1	11:56 pm, 26 March 2013; 1:56 am, 3:56 am, and 5:56 am, 27 March 2013
Maximum	60.1	5:56 pm, 26 March 2013

### 3.2.2 Results of Indoor Air Sampling

Analytical results for indoor air samples are presented in Table 2, and a Site plan with the analytical results of indoor air samples from the Report of Results—Vapor Intrusion Evaluation (AMEC, 2013b) is included as Appendix B. In addition, Figure 4 presents concentrations of VOCs detected in indoor air, presented graphically with concentrations of VOCs detected at nearby groundwater monitoring wells.

As shown in Table 2, analytical results of indoor air samples are evaluated by comparison to USEPA RSLs for indoor air in non-residential buildings (USEPA, 2013c). For VOCs 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; concentrations of VOCs below their respective RSLs or California-modified indoor air screening levels can be considered to pose no significant risk. Concentrations of VOCs 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.

Six VOCs (PCE, TCE, cDCE, 1,4-DCB, 1,1,1-trichloroethane [1,1,1-TCA], and Freon 113) were detected in at least one indoor air sample. All detections were at concentrations less than their respective RSLs, with the exception of the common household chemical 1,4-DCB, which was detected at concentrations greater than its RSL. The analytical results for each VOC detected in indoor air are discussed below:

- PCE was detected in indoor air samples collected at 8 of 9 primary sample locations with a maximum detected concentration of 1.8 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), which is less than the California-modified indoor air screening level ( $2.08 \mu\text{g}/\text{m}^3$ ).
- TCE was detected in every indoor air sample with a maximum detected concentration of  $1.5 \mu\text{g}/\text{m}^3$ , which is less than the RSL ( $3.0 \mu\text{g}/\text{m}^3$ ). TCE was detected in outside air sample OA1 at a concentration of  $0.16 \mu\text{g}/\text{m}^3$ .
- cDCE was detected in indoor air samples collected at 2 of 9 primary sample locations with a maximum detected concentration of  $0.14 \mu\text{g}/\text{m}^3$ , which is less than the California-modified indoor air screening level ( $31 \mu\text{g}/\text{m}^3$ ).
- 1,1,1-TCA was detected in indoor air samples collected at 8 of 9 primary sample locations with a maximum detected concentration of  $2.3 \mu\text{g}/\text{m}^3$ , which is less than the

California-modified indoor air screening level (4,400  $\mu\text{g}/\text{m}^3$ ). 1,1,1-TCA is generally absent from most shallow (A-zone) groundwater samples or detected at very low concentrations relative to PCE and/or TCE (Figure 4). Therefore, concentrations of 1,1,1-TCA measured in indoor air are likely due to an indoor air source, and are not likely related to vapor intrusion from groundwater.

- Freon 113 was detected in every indoor air sample with a maximum detected concentration of 0.82  $\mu\text{g}/\text{m}^3$ , which is less than the RSL (130,000  $\mu\text{g}/\text{m}^3$ ). Freon 113 also was detected in both outdoor air samples (OA1 and OA2) at concentrations of 0.66  $\mu\text{g}/\text{m}^3$ , which is comparable to the concentration of Freon 113 detected in indoor air samples. Therefore, concentrations of Freon 113 measured in indoor air are likely due to an ambient air source, and are not related to vapor intrusion from groundwater.
- 1,4-DCB was detected at concentrations above its RSL (1.1  $\mu\text{g}/\text{m}^3$ ) in every indoor air sample. The highest concentration of 1,4-DCB was detected in indoor air sample IA8 (at 62  $\mu\text{g}/\text{m}^3$ ), which was collected in the north hallway. The lowest concentration of 1,4-DCB among all of the indoor air samples was reported in the sample from the office (at 3.2 and 3.5  $\mu\text{g}/\text{m}^3$  in the duplicate and primary samples for IA2, respectively). Analytical results of 1,4-DCB are discussed further below.

Figure 4 presents a graphical comparison of VOC concentrations measured in indoor air samples with VOC concentrations in shallow groundwater samples<sup>5</sup>. If VOCs detected in indoor air were related to vapor intrusion from groundwater, the relative concentrations of VOCs would be similar in both indoor air and soil gas, and a similar pattern would be observed on both sides of the graphs presented in Figure 4. However, Figure 4 shows that 1,4-DCB was present in indoor air at substantially higher concentrations relative to the other VOCs measured in indoor air, as compared to the ratio of VOCs in groundwater samples. Similarly, PCE was measured in indoor air at concentrations similar to TCE concentrations, but PCE was measured at much lower concentrations than TCE in most groundwater samples collected in October 2013. The lack of correlation between the relative concentrations of VOCs in indoor air and groundwater samples indicates that the detected concentrations of 1,4-DCB and PCE are not related to vapor intrusion from groundwater. The VOCs detected in indoor air samples appear to be related to indoor sources (e.g., sources inside the storage units).

The only VOC that was detected at concentrations above its RSL was 1,4-DCB. It is unlikely that the presence of 1,4-DCB in indoor air is due to vapor intrusion, based on the following facts:

- *Comparison to Groundwater Concentrations*—In October 2013, 1,4-DCB was detected in groundwater samples from 5 of the 12 shallow (A-zone) monitoring wells sampled, at concentrations ranging from 0.6 to 2.4  $\mu\text{g}/\text{L}$ ; 1,4-DCB is not listed as a Site COC on the Order. As described above, 1,4-DCB was present in indoor air at significantly higher concentrations relative to the other VOCs measured in indoor air, as compared to the ratio of VOCs in groundwater samples (Figure 4). This comparison indicates that

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<sup>5</sup> In figure 4, equilibrium soil gas concentrations were calculated by applying Henry's Law Constant to measured aqueous VOC concentrations in groundwater samples (collected from monitoring wells in October 2013). With the exception of 1,3-dichlorobenzene, Henry's Law Constants were selected from the RSL chemical-specific parameters supporting table (USEPA, 2013c). For 1,3-dichlorobenzene, Henry's Law Constant was selected from the GW-ADV version of the USEPA Vapor Intrusion Model (U.S. EPA, 2004).

1,4-DCB concentrations in indoor air samples are not related to concentrations measured in groundwater, and are not related to vapor intrusion from a groundwater source.

- *No Source of 1,4-DCB in Soil*—TCE, not 1,4-DCB, which is not a COC, was the major COC detected in soil samples in the former source areas at 901 and 902 Thompson Place. This impacted soil was removed by excavation decades ago and no further remediation of vadose zone soil is required by the Water Board (Water Board, 2008). No source of 1,4-DCB in vadose zone soil has been found at the Site.
- *Potential Indoor Air Source*—According to USEPA’s Air Toxics Website, various household products contain 1,4-DCB, including some mothballs, toilet deodorizer blocks, mold/mildew prevention products, and disinfectants. These products are known to cause 1,4-DCB impacts to indoor air (USEPA, 2013b). Based on the current use of the SSSS building as a storage facility, the presence of mothballs, mildew prevention products, or other such products in storage units would be expected (as noted above, no rented storage units were inspected during the building survey).

The detections of 1,4-DCB above its RSL are not related to former AMD operations. Based on the evaluation presented above, COCs present in groundwater are not impacting indoor air quality.

### **3.3 Sub-slab Sampling**

Sub-slab sampling was not performed at the Site because the concrete slab of the building is a 15-inch thick tension slab. The installation of sub-slab soil vapor probes could cut the tension cables and disrupt the integrity of the slab. Groundwater is relatively shallow (approximately 10 feet below ground surface), and several monitoring wells are located in the vicinity of the building and monitored on a quarterly or annual basis. Groundwater monitoring data is sufficient to identify VOCs that are present in the subsurface as well as to estimate the relative concentrations (i.e., chemical-signature) that could potentially impact indoor air via the vapor intrusion pathway.

#### **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, 2014a). In this section, data collected as part of the vapor intrusion evaluation are compared to recommendations in the recently published Region 9 Guidelines (USEPA, 2013e).

##### **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 in indoor air is  $7 \mu\text{g}/\text{m}^3$ . The maximum detected concentration of TCE in indoor air samples collected at the SSSS was  $1.5 \mu\text{g}/\text{m}^3$ ; this sample (IA4) was collected in the west hallway of the SSSS building on 27 March 2013 (AMEC, 2013b). Thus, the maximum detected concentration of TCE is much lower than the short-term 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 ( $2.08 \mu\text{g}/\text{m}^3$ ). The maximum detected concentration of PCE in indoor air samples collected at the SSSS was  $1.8 \mu\text{g}/\text{m}^3$ ; this sample (IA4) was collected in the west hallway of the SSSS building on 27 March 2013 (AMEC, 2013b). Thus, the maximum detected concentration of PCE is below the PCE indoor air screening level.

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

No residential buildings are located on-property. Therefore, this guideline is not applicable to the vapor intrusion evaluation performed for the on-property area of the Site.

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

Indoor air samples were collected with the 15 HVAC units that service the SSSS building turned off for approximately 36 hours prior to sampling. The HVAC units remained off until the sampling effort was complete.

A total of 10 indoor air samples were collected at 9 locations within the SSSS building. Two of the indoor air samples were located at potential preferential pathways: IA1 was located in a mop closet with a floor drain and IA6 was located in a storage unit with a floor drain.

##### **Item #5 – On-Property Study Area Building Sampling**

Only one building, the SSSS building located at 875 East Arques Avenue, is located on-property in the vicinity of groundwater potentially impacted by historical on-Site COC sources. The vapor intrusion evaluation described above was completed at this building. Several other commercial buildings are located off-property, but within the Site boundary as defined in the ROD. These are a series of seven

low-rise buildings located on Thompson Place, the closest of which is approximately 100 feet east of the former 901/902 Thompson Place facility. These buildings are located hydraulically cross-gradient of all former Site source areas, and overlie groundwater impacted by off-Site, upgradient sources. Therefore, no sampling is needed for these buildings related to impacts at the former 901/902 Thompson Place Site.

**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**

Areas north (potentially downgradient) of the property that overlie groundwater with TCE concentrations above 5 µg/L include the former AMD 915 DeGuigne Drive Site, the former TRW Microwave Site (825 Stewart Drive), the former Philips Site at 811 East Arques Avenue, and the OOU (although this area does not appear to be downgradient of the former AMD 901/902 Thompson Place Site) (Figure 1). Vapor intrusion evaluations for these other Sites are being completed by AMD, Northrop Grumman Corporation, or Philips Electronics North America Corp., as directed by the Water Board.

In summary, the vapor intrusion evaluation was completed at the on-property area of the Site in general accordance with USEPA Region 9 guidelines.

## 5. CONCLUSIONS

Based on the evaluation presented above, COCs present in groundwater are not impacting indoor air quality. The detections of 1,4-DCB above its RSL are not the result of vapor intrusion, nor are they related to former AMD operations. Therefore, no further indoor air monitoring related to vapor intrusion from groundwater is recommended at the on-property building.

Since vapor intrusion does not appear to be occurring based on the analysis presented herein, and since COC concentrations in groundwater have been following decreasing trends, future vapor intrusion risk to the on-property building is very low. However, if changes to the operation or construction of the building are made in the future, or groundwater COC concentrations increase substantially, AMD will re-evaluate the potential for vapor intrusion. Groundwater monitoring reports are currently submitted on an annual basis, per Order 91-102. Five-year Review Reports are also submitted which discuss the protectiveness of the remedy, including potential vapor intrusion. These periodic reviews are sufficient to monitor future vapor intrusion risk.

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## **TABLES**

**TABLE I**  
**SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW (A-ZONE) GROUNDWATER SAMPLES<sup>1,2</sup>**  
 FORMER 901/902 THOMPSON PLACE  
 SUNNYVALE, CALIFORNIA

Concentrations reported in micrograms per liter ( µg/L )

Well ID	Screen Interval (feet bgs)	Sampling Date	PCE	TCE	cDCE	tDCE	VC	1,1-DCE	1,1-DCA	1,1,1-TCA	1,2-DCB	1,3-DCB	1,4-DCB	Chloro-benzene	Chloro-ethane	Freon 113
15-S	8 - 16	10/11/2012	<0.5 <sup>3</sup>	<b>6.2</b> <sup>4</sup>	<b>5.0</b>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
		10/21/2013	<0.5	<b>7.0</b>	<b>6.1</b>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
16-S	9 - 16	10/10/2012	<0.5	<0.5	<b>3.2</b>	<b>0.9</b>	<b>20</b>	<0.5	<0.5	<0.5	<b>16</b>	<0.5	<b>2.4</b>	<b>10</b>	<1.0	<2.0
		10/17/2013	<0.5	<0.5	<b>2.0</b>	<b>0.6</b>	<b>7.0</b>	<0.5	<0.5	<0.5	<b>7.6</b>	<b>0.5</b>	<b>2.4</b>	<b>23</b>	<1.0	<2.0
22-S	11 - 16	10/12/2012	<b>0.6 J</b> <sup>5</sup>	<b>17</b>	<b>25</b>	<b>12</b>	<b>4.3</b>	<0.5	<0.5	<0.5	<b>27</b>	<0.5	<b>1.4</b>	<b>4.7</b>	<1.0	<2.0
		10/23/2013	<b>1.1</b>	<b>28</b>	<b>23</b>	<b>12</b>	<b>5.9</b>	<0.5	<0.5	<0.5	<b>28</b>	<0.5	<b>1.5</b>	<b>3.4</b>	<1.0	<2.0
23-S	9 - 16	10/10/2012	<b>0.9 J</b>	<b>30 J</b>	<b>120 J</b>	<b>7.6 J</b>	<b>15 J</b>	<1.0	<0.5	<0.5	<b>20 J</b>	<0.5	<b>0.8 J</b>	<b>0.5 J</b>	<1.0	<2.0
		10/17/2013	<b>1.0</b>	<b>37</b>	<b>130</b>	<b>13</b>	<b>12</b>	<b>1.5</b>	<0.5	<0.5	<0.5	<b>20</b>	<0.5	<b>0.8</b>	<0.5	<1.0
27-S	9 - 14	10/12/2012	<b>13</b> ( <b>14</b> ) <sup>6</sup>	<b>270</b> ( <b>280</b> )	<b>64</b> ( <b>65</b> )	<b>2.8</b> ( <b>2.6</b> )	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<5.0 (<5.0)	<10 (<10)
		10/23/2013	<b>14</b> ( <b>12</b> )	<b>230</b> ( <b>230</b> )	<b>110</b> ( <b>100</b> )	<b>4.5</b> ( <b>4.2</b> )	<b>2.7</b> ( <b>2.6</b> )	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<b>4.1</b> ( <b>3.8</b> )	<2.5 (<2.5)	<2.5 (<2.5)	<5.0 (<5.0)	<10 (<10)
28-S	10 - 16	10/12/2012	<0.5	<0.5	<b>3.5</b>	<b>1.0</b>	<b>43</b>	<0.5	<0.5	<0.5	<b>9.0</b>	<0.5	<b>0.7</b>	<b>4.8</b>	<b>1.3</b>	<2.0
		10/22/2013	<0.5	<0.5	<b>4.4</b>	<b>0.8</b>	<b>34</b>	<0.5	<0.5	<0.5	<b>9.5</b>	<0.5	<b>0.7</b>	<b>2.9</b>	<1.0	<2.0
29-S	11 - 16	10/10/2012	<b>0.6 J</b>	<b>29</b>	<b>2.2</b>	<0.5	<0.5	<b>0.5</b>	<0.5	<b>0.7</b>	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
		10/22/2013	<b>0.5</b>	<b>26</b>	<b>1.5</b>	<0.5	<0.5	<0.5	<0.5	<b>0.8</b>	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
36-S	10 - 16	10/11/2012	<b>2.0 J</b>	<b>80</b>	<b>10</b>	<0.5	<0.5	<0.5	<0.5	<b>0.6</b>	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
		10/23/2013	<b>2.3</b>	<b>74</b>	<b>8.1</b>	<0.5	<0.5	<0.5	<0.5	<b>0.5</b>	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
37-S	9 - 15	10/11/2012	<b>0.8 J</b>	<b>63</b>	<b>2.5</b>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
		10/22/2013	<b>1.0</b>	<b>95</b>	<b>1.6</b>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
28-MW	10.0 - 16.3	2/8/2012	<0.50	<0.50	<b>0.7</b>	<0.50	<b>4.8</b>	<0.50	<0.50	<0.50	<b>8.3</b>	<0.50	<b>0.70</b>	<b>9.4</b>	<1.0	<2.0
		4/20/2012	<0.50	<0.50	<b>1.0</b>	<b>0.70</b>	<b>6.6</b>	<0.50	<0.50	<0.50	<b>7.5</b>	<0.50	<b>0.70</b>	<b>7.8</b>	<1.0	<2.0
		7/24/2012	<0.50	<0.50	<b>0.9</b>	<0.50	<b>8.2</b>	<0.50	<0.50	<0.50	<b>7.0</b>	<0.50	<b>0.70</b>	<b>8.1</b>	<1.0	<2.0
		10/10/2012	<0.50	<0.50	<0.50	<0.50	<b>2.8 J</b>	<0.50	<0.50	<0.50	<b>7.5 J</b>	<0.50	<b>0.70 J</b>	<b>8.5 J</b>	<b>1.2 J</b>	<2.0
		3/12/2013	<0.5	<0.5	<b>0.5</b>	<0.5	<b>0.7</b>	<0.5	<0.5	<0.5	<b>7.5</b>	<0.5	<b>0.7</b>	<b>9.8</b>	<1.0	<1.0
		6/5/2013	<0.5	<0.5	<0.5	<0.5	<b>0.8</b>	<0.5	<0.5	<0.5	<b>7.0</b>	<0.5	<b>0.8</b>	<b>9.8</b>	<1.0	<2.0
		8/30/2013	<0.5	<0.5	<b>1.2</b>	<0.5	<b>4.5</b>	<0.5	<0.5	<0.5	<b>4.8</b>	<0.5	<b>0.6</b>	<b>6.8</b>	<1.0	<2.0
		10/17/2013	<0.5	<0.5	<b>1.7</b>	<0.5	<b>8.6</b>	<0.5	<0.5	<0.5	<b>5.2</b>	<0.5	<b>0.6</b>	<b>7.2</b>	<1.0	<2.0
X2A	10.0 - 19.9	2/9/2012	<2.5	<2.5	<b>43</b>	<b>3.9</b>	<b>380</b>	<2.5	<2.5	<2.5	<b>16</b>	<2.5	<2.5	<b>17</b>	<5.0	<10
		4/19/2012	<2.5	<2.5	<b>32</b>	<b>4</b>	<b>640</b>	<2.5	<2.5	<2.5	<b>17</b>	<2.5	<2.5	<b>15</b>	<5.0	<10
		7/23/2012	<5.0	<5.0	<b>27</b>	<5.0	<b>670</b>	<5.0	<5.0	<5.0	<b>15</b>	<5.0	<5.0	<b>17</b>	<10	<20
		10/11/2012	<5.0	<5.0	<b>54</b>	<5.0	<b>790</b>	<5.0	<5.0	<5.0	<b>23</b>	<5.0	<5.0	<b>21</b>	<10	<20
		12/12/2012	<1.0	<1.0	<b>120</b>	<b>6.2</b>	<b>140</b>	<1.0	<1.0	<1.0	<b>20</b>	<1.0	<1.0	<b>14</b>	<2.0	<1.0
		1/28/2013	<1.0	<1.0	<b>91</b>	<b>5.8</b>	<b>120</b>	<1.0	<1.0	<1.0	<b>18</b>	<1.0	<1.0	<b>13</b>	<2.0	<1.0
		2/20/2013	<1.0	<b>1.2</b>	<b>17</b>	<b>1.9</b>	<b>150</b>	<1.0	<1.0	<1.0	<b>12</b>	<1.0	<1.0	<b>10</b>	<2.0	<1.0
		3/12/2013	<0.5	<0.5	<b>2.9</b>	<b>0.9</b>	<b>34</b>	<0.5	<0.5	<0.5	<b>5.7</b>	<0.5	<b>0.7</b>	<b>16</b>	<1.0	<2.0
		6/4/2013	<0.5	<0.5	<b>0.7</b>	<0.5	<b>47</b>	<0.5	<0.5	<0.5	<b>6.0</b>	<0.5	<b>0.8</b>	<b>19</b>	<1.0	<2.0
		8/29/2013	<0.5	<0.5	<b>1.0</b>	<0.5	<b>96</b>	<0.5	<0.5	<0.5	<b>9.7</b>	<0.5	<b>0.6</b>	<b>18</b>	<1.0	<2.0
10/17/2013	<0.7	<0.7	<0.7	<0.7	<b>140</b>	<0.7	<0.7	<0.7	<b>14</b>	<0.7	<0.7	<b>17</b>	<1.4	<2.9		

**TABLE I**  
**SUMMARY OF ANALYTICAL RESULTS FOR SHALLOW (A-ZONE) GROUNDWATER SAMPLES <sup>1,2</sup>**  
 FORMER 901/902 THOMPSON PLACE  
 SUNNYVALE, CALIFORNIA

Concentrations reported in micrograms per liter ( µg/L )

Well ID	Screen Interval (feet bgs)	Sampling Date	PCE	TCE	cDCE	tDCE	VC	1,1-DCE	1,1-DCA	1,1,1-TCA	1,2-DCB	1,3-DCB	1,4-DCB	Chloro-benzene	Chloro-ethane	Freon 113
DW-2	10.0 - 14.0	2/9/2012	<0.50	<0.50	<b>0.90</b>	<0.50	<0.50	<0.50	<0.50	<0.50	<b>1.4</b>	<0.50	<0.50	<b>0.5</b>	<1.0	<2.0
		4/19/2012	<0.50	<b>0.80</b>	<b>0.80</b>	<b>0.70</b>	<0.50	<0.50	<0.50	<0.50	<b>1.3</b>	<0.50	<0.50	<0.50	<1.0	<2.0
		7/24/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0
		10/10/2012	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0
		3/12/2013	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<2.0
		6/4/2013	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<7.1	<14
		8/29/2013	<0.5	<0.5	<b>1.9</b>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<b>0.6</b>	<0.5	<0.5	<0.5	<1.0
10/17/2013	<0.5	<0.5	<b>2.0</b>	<0.5	<b>1.3</b>	<0.5	<0.5	<0.5	<0.5	<b>0.7</b>	<0.5	<0.5	<0.5	<1.0	<2.0	
<b>Maximum Detected Concentration</b>			<b>14</b>	<b>270</b>	<b>130</b>	<b>13</b>	<b>790</b>	<b>1.5</b>	<b>ND</b>	<b>0.8</b>	<b>28</b>	<b>4.1</b>	<b>2.4</b>	<b>23</b>	<b>1.3</b>	<b>ND</b>
<b>Water Board Commercial ESL <sup>7</sup></b>			<b>640</b>	<b>1,300</b>	<b>26,000</b>	<b>120,000</b>	<b>18</b>	<b>130,000</b>	<b>NA</b>	<b>NA</b>	<b>1,600</b>	<b>NA</b>	<b>1,800</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>
<b>U.S. EPA VISL <sup>8</sup></b>			<b>65</b>	<b>7.4</b>	<b>NA</b>	<b>1,600</b>	<b>2.5</b>	<b>820</b>	<b>33</b>	<b>31,000</b>	<b>11,000</b>	<b>NA</b>	<b>11</b>	<b>1,700</b>	<b>97,000</b>	<b>6,100</b>

#### Notes

- Groundwater samples were collected by Field Solutions, Inc., of San Jose, California, and analyzed by Curtis & Tompkins, Ltd., of Berkeley, California, for the USEPA Method 8010 list with Freon 113 in accordance with EPA Method 8260B.
- All compounds selected as target analytes for indoor air samples are presented; for a full list of analytes and detected compounds, see laboratory analytical reports. Only analytical results from groundwater samples collected in 2012 and 2013 are presented.
- "<" indicates constituent not detected above the laboratory reporting limit shown.
- Results in **bold** indicate the constituent was detected in the sample above the laboratory reporting limit.
- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- Duplicate sample results are presented in parenthesis.
- 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)
- Groundwater Vapor Intrusion Screening Levels (VISLs) for commercial scenario, (U.S. EPA, 2013c).

#### Abbreviations

1,1-DCA = 1,1-dichloroethane  
 1,2-DCB = 1,2-dichlorobenzene  
 1,3-DCB = 1,3-dichlorobenzene  
 1,4-DCB = 1,4-dichlorobenzene  
 1,1-DCE = 1,1-dichloroethene

cDCE = cis-1,2-dichloroethene  
 Freon 113 = 1,1,2-trichloro-1,2,2-trifluoroethane  
 PCE = tetrachloroethene  
 1,1,1-TCA = 1,1,1-trichloroethane  
 TCE = trichloroethene

tDCE = trans-1,2-dichloroethene  
 VC = vinyl chloride  
 bgs = below ground surface  
 ND = not detected  
 NA = not available

**TABLE II**  
**SUMMARY OF ANALYTICAL RESULTS FOR INDOOR AND OUTDOOR AIR SAMPLES**  
 FORMER 901/902 THOMPSON PLACE  
 SUNNYVALE, CALIFORNIA

Concentrations reported in micrograms per cubic meter (µg/m<sup>3</sup>)

Sample ID	Sample Type	Location	Date Collected	PCE	TCE	cDCE	tDCE	VC	1,1-DCE	1,1-DCA	1,1,1-TCA	1,2-DCB	1,3-DCB	1,4-DCB	Chloro-benzene	Chloro-ethane	Freon 113
<b>Outdoor Ambient Air Samples</b>																	
OA1	Ambient <sup>1</sup>	Parking lot	3/27/2013	<0.14	<b>0.16</b> <sup>3</sup>	<0.079	<0.079	<0.051	<0.079	<0.081	<0.11	<0.30	<0.60	<0.60	<0.092 <sup>2</sup>	<0.12	<b>0.66</b>
OA2	Ambient	Parking lot	3/27/2013	<0.14	<0.11	<0.079	<0.079	<0.051	<0.079	<0.081	<0.11	<0.30	<0.60	<0.60	<0.092	<0.12	<b>0.66</b>
<b>Indoor Air Samples</b>																	
IA1	Preferential Pathway <sup>4</sup>	Mop closet	3/27/2013	<0.14	<b>0.16</b>	<0.079	<0.079	<0.051	<0.079	<0.081	<0.11	<0.30	<0.60	<b>5.5</b> <sup>5</sup>	<0.092	<0.12	<b>0.69</b>
IA2	Breathing Zone <sup>6</sup>	Office area	3/27/2013	<b>0.14</b>	<b>0.17</b>	<0.079	<0.079	<0.051	<0.079	<0.081	<b>0.13</b>	<0.30	<0.60	<b>3.5</b>	<0.092	<0.12	<b>0.70</b>
IA10	Blind Field Duplicate <sup>7</sup>		3/27/2013	<0.14	<b>0.16</b>	<0.079	<0.079	<0.051	<0.079	<0.081	<b>0.12</b>	<0.30	<0.60	<b>3.2</b>	<0.092	<0.12	<b>0.74</b>
IA3	Breathing Zone	Adjacent to elevator shaft	3/27/2013	<b>1.2</b>	<b>0.87</b>	<0.079	<0.079	<0.051	<0.079	<0.081	<b>1.1</b>	<0.30	<0.60	<b>16</b>	<0.092	<0.12	<b>0.74</b>
IA4	Breathing Zone	West hallway	3/27/2013	<b>1.6</b>	<b>1.5</b>	<0.079	<0.079	<0.051	<0.079	<0.081	<b>2.3</b>	<0.30	<0.60	<b>17</b>	<0.092	<0.12	<b>0.82</b>
IA5	Breathing Zone	West hallway	3/27/2013	<b>1.8</b>	<b>1.1</b>	<0.079	<0.079	<0.010	<0.079	<0.081	<b>0.98</b>	<0.30	<0.60	<b>43</b>	<0.092	<0.12	<b>0.74</b>
IA6	Preferential Pathway	Storage unit with floor drain	3/27/2013	<b>1.1</b>	<b>0.89</b>	<b>0.086</b>	<0.079	<0.13	<0.079	<0.081	<b>0.65</b>	<0.30	<0.60	<b>59</b>	<0.092	<0.12	<b>0.73</b>
IA7	Breathing Zone	Adjacent to elevator shaft	3/27/2013	<b>0.16</b>	<b>0.50</b>	<0.079	<0.079	<0.051	<0.079	<0.081	<b>0.25</b>	<0.30	<0.60	<b>12</b>	<0.092	<0.12	<b>0.70</b>
IA8	Breathing Zone	North hallway	3/27/2013	<b>0.58</b>	<b>0.73</b>	<b>0.14</b>	<0.079	<0.20	<0.079	<0.081	<b>0.49</b>	<0.30	<0.60	<b>62</b>	<0.092	<0.12	<b>0.75</b>
IA9	Breathing Zone	East hallway	3/27/2013	<b>1.6</b>	<b>1.2</b>	<0.079	<0.079	<0.10	<0.079	<0.081	<b>0.86</b>	<0.30	<0.60	<b>45</b>	<0.092	<0.12	<b>0.76</b>
<b>Maximum Detected Indoor Air Concentration</b>				<b>1.8</b>	<b>1.5</b>	<b>0.14</b>	<b>ND</b>	<b>ND</b>	<b>ND</b>	<b>ND</b>	<b>2.3</b>	<b>ND</b>	<b>ND</b>	<b>62</b>	<b>ND</b>	<b>ND</b>	<b>0.82</b>
<b>U.S. EPA Region 9 Regional Screening Level (RSL) for Industrial Air<sup>8</sup></b>				<b>2.08</b> <sup>9</sup>	<b>3.0</b>	<b>31</b> <sup>9</sup>	<b>260</b>	<b>0.16</b> <sup>9</sup>	<b>310</b> <sup>9</sup>	<b>7.7</b>	<b>4,400</b> <sup>9</sup>	<b>880</b>	<b>NA</b>	<b>1.1</b>	<b>220</b>	<b>44,000</b>	<b>130,000</b>

**Notes**

1. Ambient samples were collected outdoors, at opposite ends of the building, at ground level.
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 necessarily representative of employee exposure.
5. Shaded cells indicate that the analyte was detected in the sample above the RSL.
6. Breathing zone samples were collected indoors from the approximate height of a seated worker.
7. Duplicate sample was collected simultaneously with the associated primary sample, using a T-splitter.
8. Regional Screening Level (RSL) for Industrial Air (U.S. EPA, 2013b).
9. California-modified indoor air screening level (DTSC, 2013).

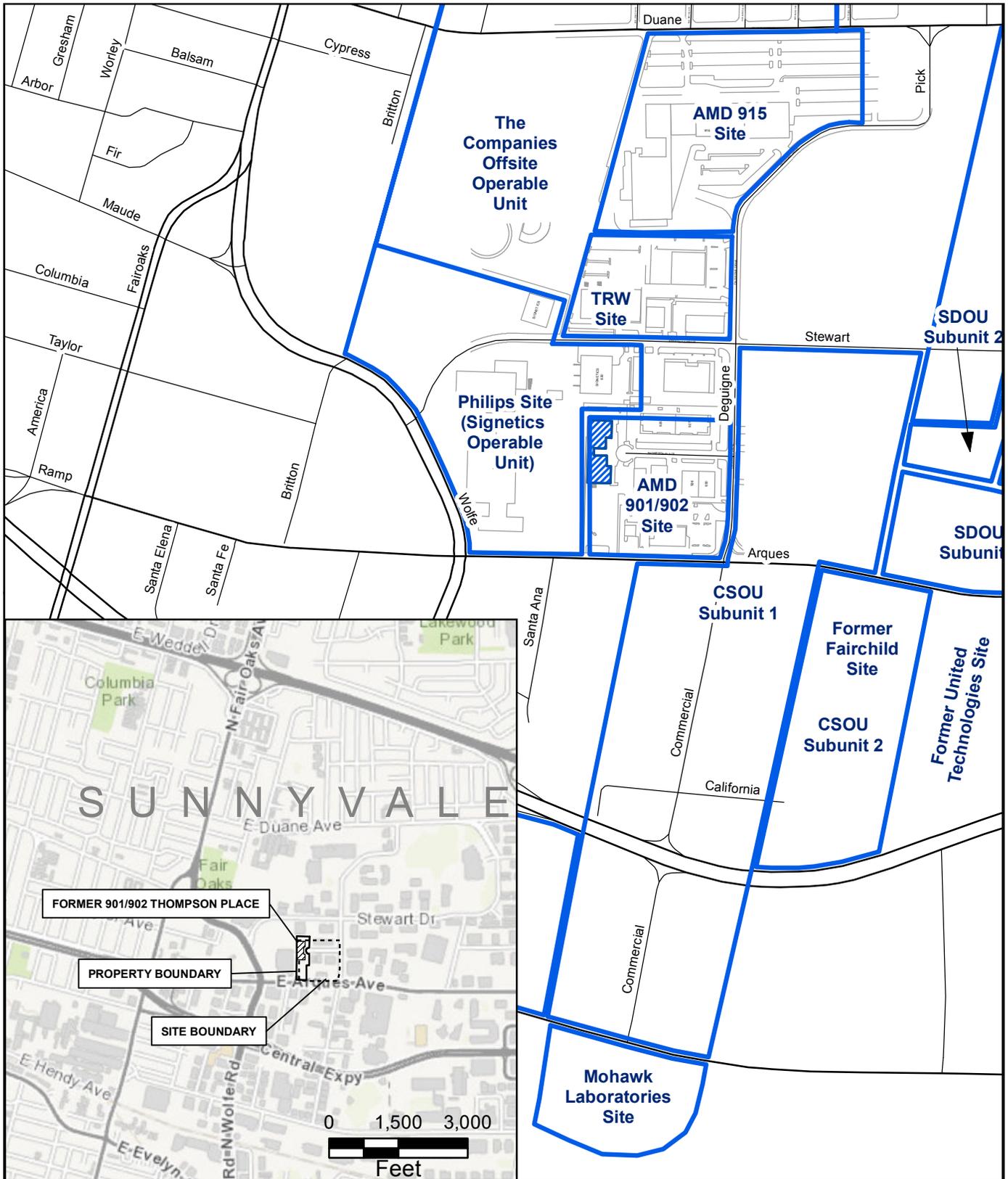
**Abbreviations**

1,1-DCA = 1,1-dichloroethane  
 1,2-DCB = 1,2-dichlorobenzene  
 1,3-DCB = 1,3-dichlorobenzene  
 1,4-DCB = 1,4-dichlorobenzene  
 1,1-DCE = 1,1-dichloroethene  
 trans-1,2-DCE = trans-1,2-dichloroethene

Freon 113 = 1,1,2-trichloro-1,2,2-trifluoroethane  
 PCE = tetrachloroethene  
 1,1,1-TCA = 1,1,1-trichloroethane  
 TCE = trichloroethene  
 VC = vinyl chloride

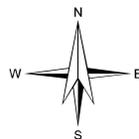
RSL = U.S. EPA Region 9 Regional Screening Level  
 NA = not available

## **FIGURES**



 Former 901/902 Thompson Place

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



0 350 700  
Feet

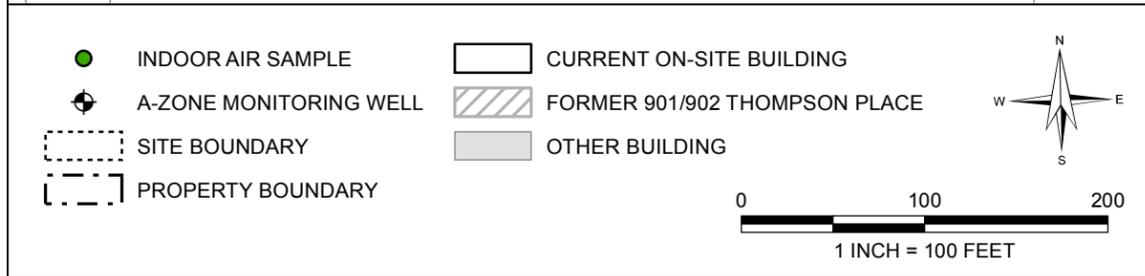
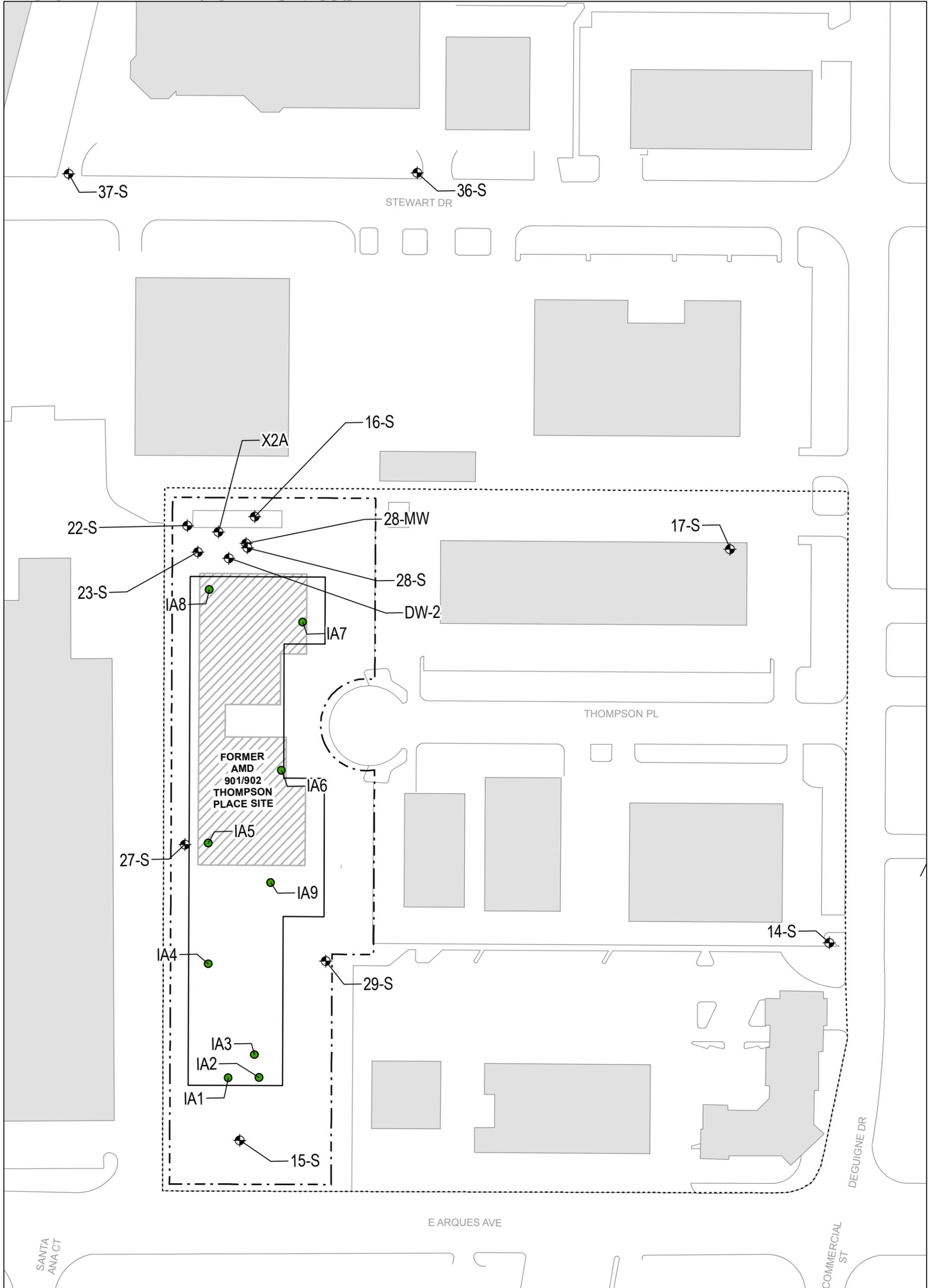
**HALEY & ALDRICH**

FORMER 901/902 THOMPSON PLACE  
SUNNYVALE, CALIFORNIA

**SITE LOCATION MAP & VICINITY**

SCALE: AS SHOWN  
FEBRUARY 2014

**FIGURE 1**



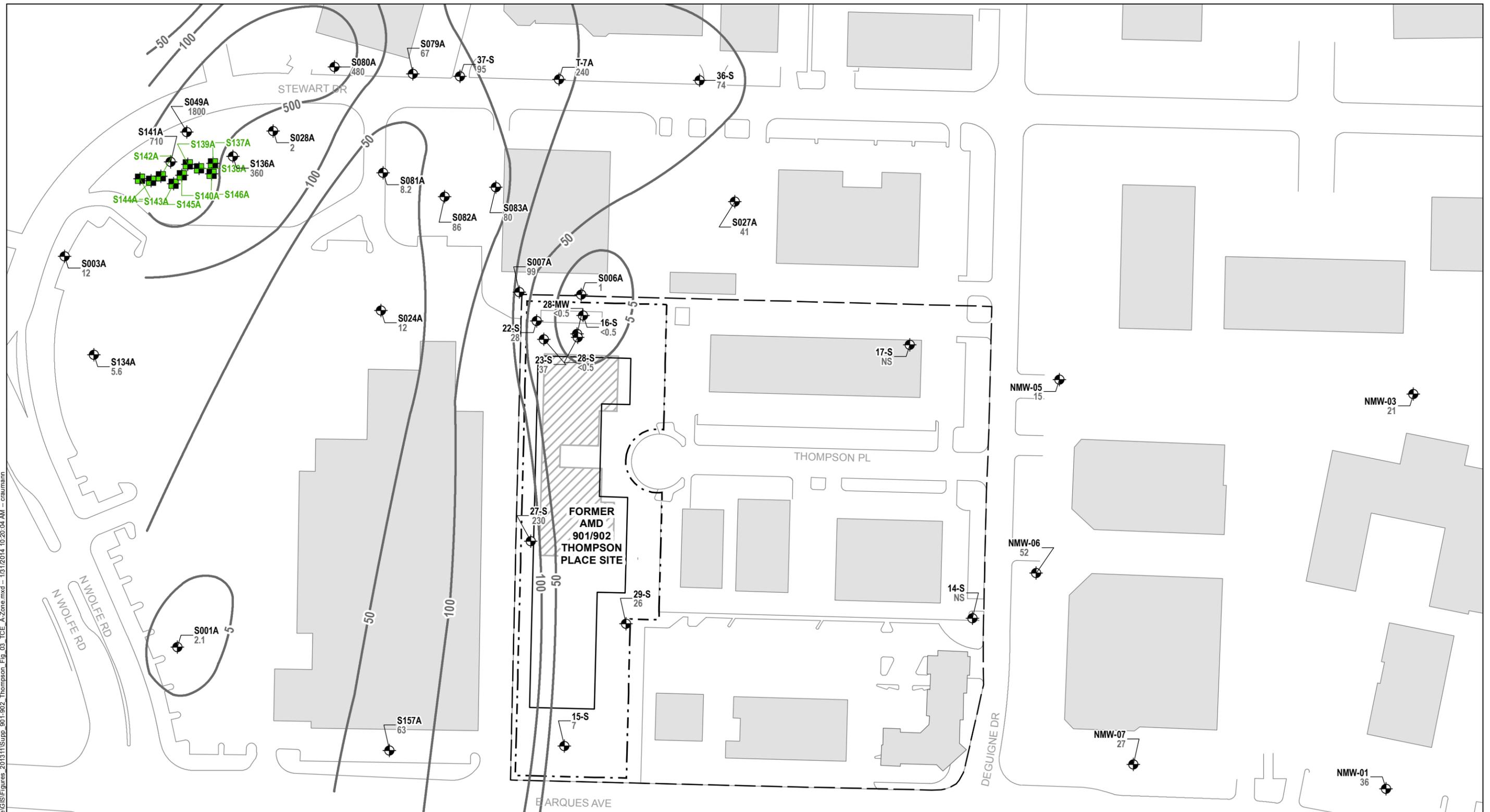
**HALEY & ALDRICH** FORMER 901/902 THOMPSON PLACE  
SUNNYVALE, CALIFORNIA

**SITE PLAN WITH SHALLOW (A-ZONE) MONITORING WELLS**

SCALE: AS SHOWN  
FEBRUARY 2014

**FIGURE 2**

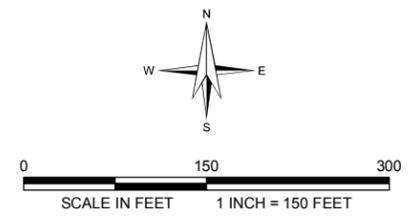
G:\39751\_AMD\_Former 901-902 Thompson Place\GIS\Figures\_201311\Supp\_901-902\_Thompson\_Fig\_03\_TCE\_A-Zone.mxd - 1/31/2014 10:20:04 AM - craumann



- A-ZONE MONITORING WELL WITH TCE CONCENTRATION (µg/L)
- EXTRACTION WELL
- 5 TCE CONCENTRATION CONTOUR
- SITE BOUNDARY
- PROPERTY BOUNDARY
- CURRENT ON-SITE BUILDING
- FORMER 901/902 THOMPSON PLACE
- OTHER BUILDING

**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.

TCE = TRICHLOROETHENE  
 µg/L = MICROGRAMS PER LITER  
 J = ESTIMATED CONCENTRATION  
 NS = NOT SAMPLED



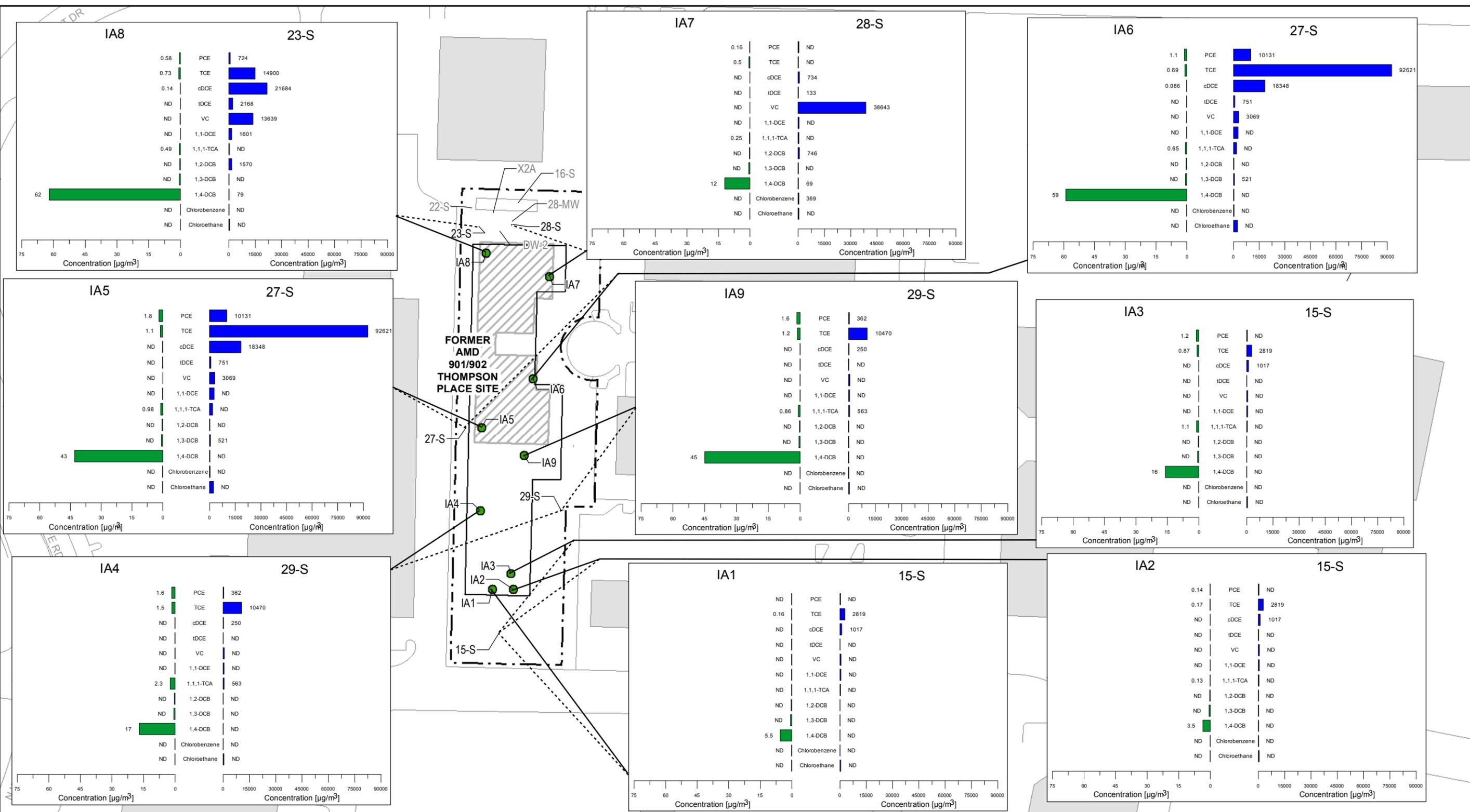
**HALEY & ALDRICH** FORMER 901/902 THOMPSON PLACE  
 SUNNYVALE, CALIFORNIA

**A-ZONE TCE CONTOURS  
 OCTOBER 2013**

SCALE: AS SHOWN  
 FEBRUARY 2014

**FIGURE 3**

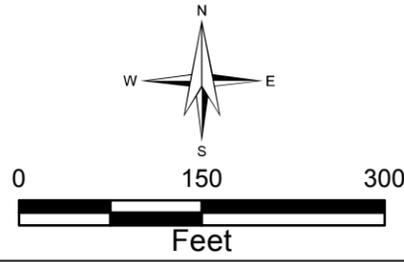
G:\39751\_AMD\_Former 901-902\_Thompson Place\GIS\Figures\_201401\901-902\_Thompson\_VI\_Fig\_04.mxd -- 1/17/2014 12:16:27 PM -- kketron



Note: Analytical results of indoor air samples collected in March 2013 are compared to concentrations of COCs predicted in soil gas based on analytical results of groundwater samples collected in October 2013 from shallow (A-zone) monitoring wells. Soil gas concentrations are estimated from groundwater concentrations by applying Henry's Law Constant at 25 degrees Celcius (USEPA, 2013c; USEPA, 2004 for 1,3-DCB) Only COCs detected in groundwater in October 2013 are presented.

PCE = tetrachloroethene  
TCE = trichloroethene  
cDCE = cis-1,2-dichloroethene  
tDCE = trans-1,2-dichloroethene  
VC = vinyl chloride  
1,1-DCE = 1,1-dichloroethene  
1,1,1-TCA = 1,1,1-trichloroethane  
1,2-DCB = 1,2-dichlorobenzene  
1,3-DCB = 1,3-dichlorobenzene  
1,4-DCB = 1,4-dichlorobenzene

- LEGEND**
- INDOOR AIR SAMPLE
  - ⊕ A-ZONE MONITORING WELL
  - - - PROPERTY BOUNDARY
  - ▭ CURRENT ON-SITE BUILDING
  - ▨ FORMER 901/902 THOMPSON PLACE
  - ▭ OTHER BUILDING



**HALEY & ALDRICH** FORMER 901/902 THOMPSON PLACE  
SUNNYVALE, CALIFORNIA

**DETECTED VOC CONCENTRATIONS IN INDOOR AIR SAMPLES AND CALCULATED VOC CONCENTRATIONS IN SOIL GAS**

FEBRUARY 2014 FIGURE 4

**APPENDIX A**

**Weather Report for March 2013 Sampling Event**

## Weather History for Moffett NAS, CA

Tuesday, March 26, 2013

Tuesday, March 26, 2013

« Previous Day

March ▾ 26 ▾ 2013 ▾ View

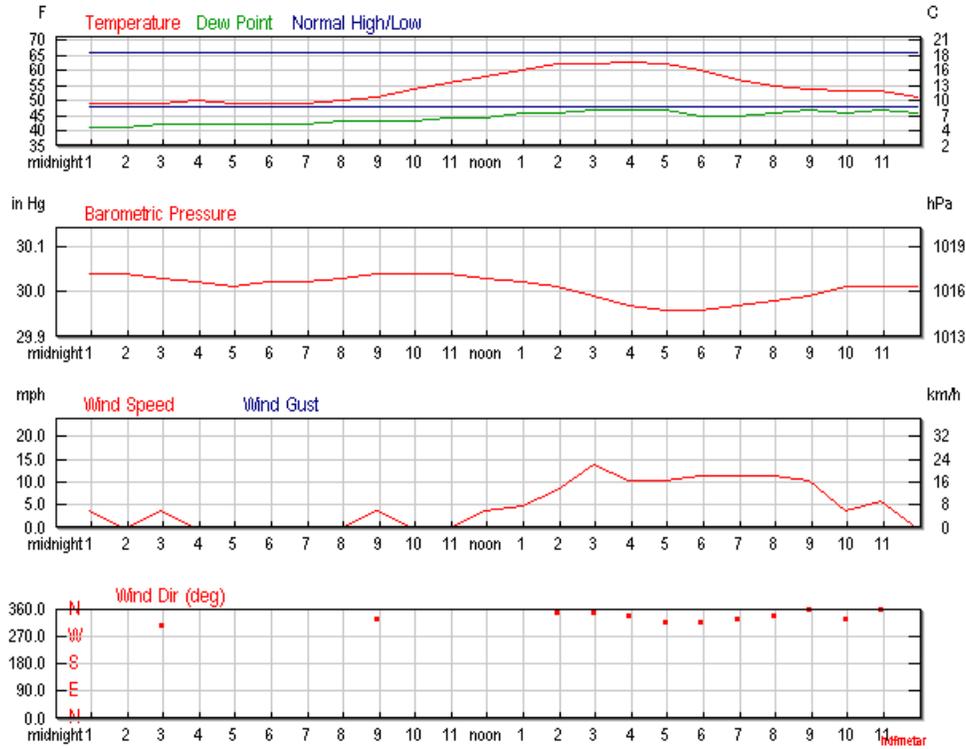
Next Day »

Daily Weekly Monthly Custom

	Actual	Average	Record
Temperature			
Mean Temperature	56 °F	57 °F	
Max Temperature	64 °F	66 °F	83 °F (1988)
Min Temperature	47 °F	48 °F	35 °F (1948)
Degree Days			
Heating Degree Days	9		
Month to date heating degree days	222		
Since 1 July heating degree days	1899		
Cooling Degree Days	0		
Month to date cooling degree days	0		
Year to date cooling degree days	0		
Growing Degree Days	6 (Base 50)		
Moisture			
Dew Point	44 °F		
Average Humidity	69		
Maximum Humidity	83		
Minimum Humidity	55		
Precipitation			
Precipitation	0.00 in	0.06 in	0.62 in (1991)
Month to date precipitation	0.70	1.98	
Year to date precipitation	1.42	7.80	
Since 1 July precipitation	9.19	12.85	
Sea Level Pressure			
Sea Level Pressure	30.01 in		
Wind			
Wind Speed	5 mph (NNW)		
Max Wind Speed	17 mph		
Max Gust Speed	22 mph		
Visibility	10 miles		
Events			

T = Trace of Precipitation, MM = Missing Value

Source: NWS Daily Summary



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Vdwhowh#X lhz #R i#P | #K rxvh

z z z 1P dsvJ dda { | lfrp

J hw#P dsv/#G lhfwrqv##) #Wudiilf#F rgg lwrvq#Z lw #Luhh#Dss:

### Hourly Weather History & Observations

Time (PDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:56 AM	48.9 °F	41.0 °F	74%	30.04 in	10.0 mi	West	3.5 mph	-	N/A		Partly Cloudy
1:56 AM	48.9 °F	41.0 °F	74%	30.04 in	10.0 mi	Calm	Calm	-	N/A		Scattered Clouds
2:56 AM	48.9 °F	42.1 °F	77%	30.03 in	10.0 mi	NW	3.5 mph	-	N/A		Partly Cloudy
3:56 AM	50.0 °F	42.1 °F	74%	30.02 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
4:56 AM	48.9 °F	42.1 °F	77%	30.01 in	10.0 mi	Calm	Calm	-	N/A		Overcast
5:56 AM	48.9 °F	42.1 °F	77%	30.02 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
6:56 AM	48.9 °F	42.1 °F	77%	30.02 in	10.0 mi	Calm	Calm	-	N/A		Overcast
7:56 AM	50.0 °F	43.0 °F	77%	30.03 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
8:56 AM	51.1 °F	43.0 °F	74%	30.04 in	10.0 mi	NNW	3.5 mph	-	N/A		Overcast
9:56 AM	54.0 °F	43.0 °F	66%	30.04 in	10.0 mi	Calm	Calm	-	N/A		Partly Cloudy
10:56 AM	55.9 °F	44.1 °F	64%	30.04 in	10.0 mi	Calm	Calm	-	N/A		Clear
11:56 AM	57.9 °F	44.1 °F	60%	30.03 in	10.0 mi	Variable	3.5 mph	-	N/A		Clear

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Time (PDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:56 PM	60.1 °F	46.0 °F	60%	30.02 in	10.0 mi	Variable	4.6 mph	-	N/A		Clear
1:56 PM	62.1 °F	46.0 °F	56%	30.01 in	10.0 mi	North	8.1 mph	-	N/A		Clear
2:56 PM	62.1 °F	46.9 °F	58%	29.99 in	10.0 mi	North	13.8 mph	-	N/A		Clear
3:56 PM	63.0 °F	46.9 °F	56%	29.97 in	10.0 mi	NNW	10.4 mph	-	N/A		Clear
4:56 PM	62.1 °F	46.9 °F	58%	29.96 in	10.0 mi	NW	10.4 mph	-	N/A		Clear
5:56 PM	60.1 °F	45.0 °F	57%	29.96 in	10.0 mi	NW	11.5 mph	-	N/A		Clear
6:56 PM	57.0 °F	45.0 °F	64%	29.97 in	10.0 mi	NNW	11.5 mph	-	N/A		Clear
7:56 PM	55.0 °F	46.0 °F	72%	29.98 in	10.0 mi	NNW	11.5 mph	-	N/A		Mostly Cloudy
8:56 PM	54.0 °F	46.9 °F	77%	29.99 in	10.0 mi	North	10.4 mph	-	N/A		Clear
9:56 PM	53.1 °F	46.0 °F	77%	30.01 in	10.0 mi	NNW	3.5 mph	-	N/A		Clear
10:56 PM	53.1 °F	46.9 °F	80%	30.01 in	10.0 mi	North	5.8 mph	-	N/A		Clear
11:56 PM	51.1 °F	46.0 °F	83%	30.01 in	10.0 mi	Calm	Calm	-	N/A		Clear

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## Weather History for Moffett NAS, CA

Wednesday, March 27, 2013

Wednesday, March 27, 2013

« Previous Day

March ▾ 27 ▾ 2013 ▾ View

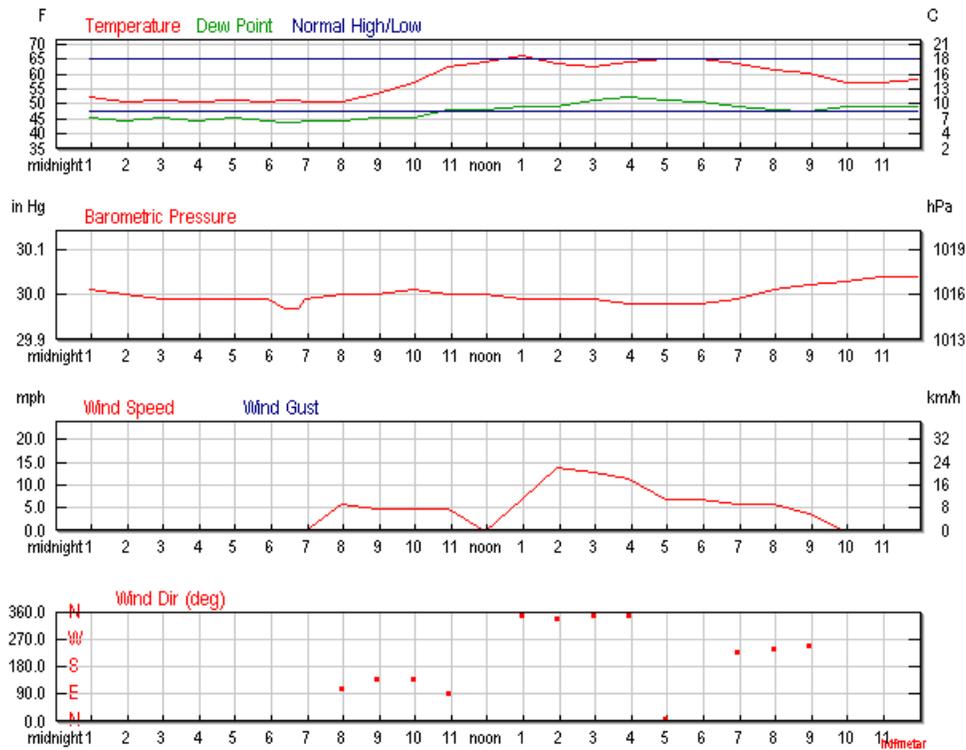
Next Day »

Daily Weekly Monthly Custom

	Actual	Average	Record
<b>Temperature</b>			
Mean Temperature	59 °F	57 °F	
Max Temperature	67 °F	66 °F	82 °F (1969)
Min Temperature	50 °F	48 °F	38 °F (1972)
<b>Degree Days</b>			
Heating Degree Days	6		
Month to date heating degree days	228		
Since 1 July heating degree days	1905		
Cooling Degree Days	0		
Month to date cooling degree days	0		
Year to date cooling degree days	0		
Growing Degree Days	8 (Base 50)		
<b>Moisture</b>			
Dew Point	48 °F		
Average Humidity	70		
Maximum Humidity	83		
Minimum Humidity	56		
<b>Precipitation</b>			
Precipitation	0.00 in	0.06 in	0.94 in (1979)
Month to date precipitation	0.70	2.04	
Year to date precipitation	1.42	7.86	
Since 1 July precipitation	9.19	12.91	
<b>Sea Level Pressure</b>			
Sea Level Pressure	30.00 in		
<b>Wind</b>			
Wind Speed	4 mph (North)		
Max Wind Speed	14 mph		
Max Gust Speed	30 mph		
Visibility	10 miles		
Events			

T = Trace of Precipitation, MM = Missing Value

Source: NWS Daily Summary



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### Hourly Weather History & Observations

Time (PDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:56 AM	53.1 °F	46.0 °F	77%	30.01 in	10.0 mi	Calm	Calm	-	N/A		Scattered Clouds
1:56 AM	51.1 °F	45.0 °F	80%	30.00 in	10.0 mi	Calm	Calm	-	N/A		Clear
2:56 AM	52.0 °F	46.0 °F	80%	29.99 in	10.0 mi	Calm	Calm	-	N/A		Overcast
3:56 AM	51.1 °F	45.0 °F	80%	29.99 in	10.0 mi	Calm	Calm	-	N/A		Partly Cloudy
4:56 AM	52.0 °F	46.0 °F	80%	29.99 in	10.0 mi	Calm	Calm	-	N/A		Overcast
5:56 AM	51.1 °F	45.0 °F	80%	29.99 in	10.0 mi	Calm	Calm	-	N/A		Overcast
6:22 AM	51.8 °F	44.6 °F	76%	29.97 in	10.0 mi	Calm	Calm	-	N/A		Overcast
6:46 AM	51.8 °F	44.6 °F	76%	29.97 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
6:56 AM	51.1 °F	45.0 °F	80%	29.99 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
7:56 AM	51.1 °F	45.0 °F	80%	30.00 in	10.0 mi	ESE	5.8 mph	-	N/A		Clear
8:56 AM	54.0 °F	46.0 °F	75%	30.00 in	10.0 mi	SE	4.6 mph	-	N/A		Mostly Cloudy
9:56 AM	57.9 °F	46.0 °F	65%	30.01 in	10.0 mi	SE	4.6 mph	-	N/A		Mostly Cloudy

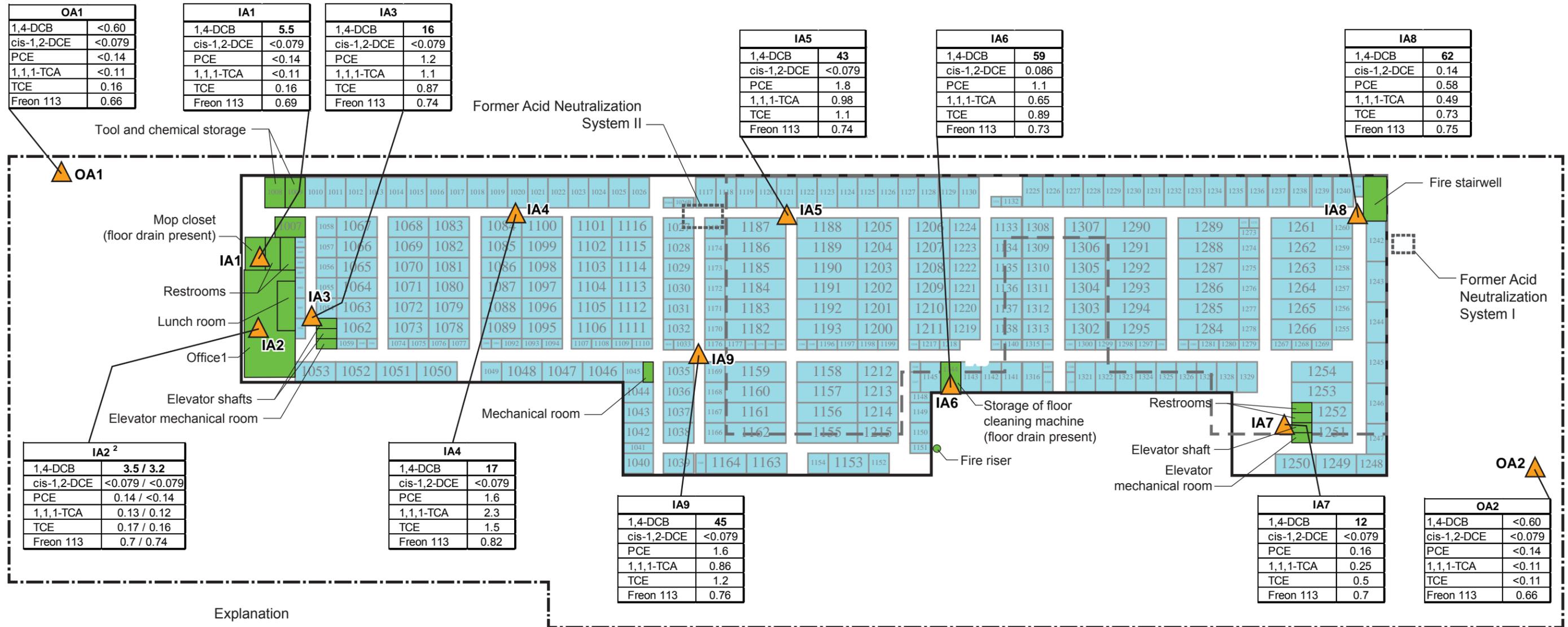
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Time (PDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
10:56 AM	63.0 °F	48.9 °F	60%	30.00 in	10.0 mi	East	4.6 mph	-	N/A		Mostly Cloudy
11:56 AM	64.9 °F	48.9 °F	56%	30.00 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
12:56 PM	66.9 °F	50.0 °F	54%	29.99 in	10.0 mi	North	6.9 mph	-	N/A		Overcast
1:56 PM	64.0 °F	50.0 °F	60%	29.99 in	10.0 mi	NNW	13.8 mph	-	N/A		Overcast
2:56 PM	63.0 °F	52.0 °F	67%	29.99 in	10.0 mi	North	12.7 mph	-	N/A		Overcast
3:56 PM	64.9 °F	53.1 °F	65%	29.98 in	10.0 mi	North	11.5 mph	-	N/A		Overcast
4:56 PM	66.0 °F	52.0 °F	60%	29.98 in	10.0 mi	North	6.9 mph	-	N/A		Overcast
5:56 PM	66.0 °F	51.1 °F	59%	29.98 in	10.0 mi	Variable	6.9 mph	-	N/A		Overcast
6:56 PM	64.0 °F	50.0 °F	60%	29.99 in	10.0 mi	SW	5.8 mph	-	N/A		Mostly Cloudy
7:56 PM	62.1 °F	48.9 °F	62%	30.01 in	10.0 mi	WSW	5.8 mph	-	N/A		Partly Cloudy
8:56 PM	61.0 °F	48.0 °F	62%	30.02 in	10.0 mi	WSW	3.5 mph	-	N/A		Overcast
9:56 PM	57.9 °F	50.0 °F	75%	30.03 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:56 PM	57.9 °F	50.0 °F	75%	30.04 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
11:56 PM	59.0 °F	50.0 °F	72%	30.04 in	10.0 mi	Calm	Calm	-	N/A		Overcast

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**APPENDIX B**

**Figure from *Report of Results – Vapor Intrusion Evaluation* (AMEC, 2013)**



OA1	
1,4-DCB	<0.60
cis-1,2-DCE	<0.079
PCE	<0.14
1,1,1-TCA	<0.11
TCE	0.16
Freon 113	0.66

IA1	
1,4-DCB	<b>5.5</b>
cis-1,2-DCE	<0.079
PCE	<0.14
1,1,1-TCA	<0.11
TCE	0.16
Freon 113	0.69

IA3	
1,4-DCB	<b>16</b>
cis-1,2-DCE	<0.079
PCE	1.2
1,1,1-TCA	1.1
TCE	0.87
Freon 113	0.74

IA5	
1,4-DCB	<b>43</b>
cis-1,2-DCE	<0.079
PCE	1.8
1,1,1-TCA	0.98
TCE	1.1
Freon 113	0.74

IA6	
1,4-DCB	<b>59</b>
cis-1,2-DCE	0.086
PCE	1.1
1,1,1-TCA	0.65
TCE	0.89
Freon 113	0.73

IA8	
1,4-DCB	<b>62</b>
cis-1,2-DCE	0.14
PCE	0.58
1,1,1-TCA	0.49
TCE	0.73
Freon 113	0.75

IA2 <sup>2</sup>	
1,4-DCB	<b>3.5 / 3.2</b>
cis-1,2-DCE	<0.079 / <0.079
PCE	0.14 / <0.14
1,1,1-TCA	0.13 / 0.12
TCE	0.17 / 0.16
Freon 113	0.7 / 0.74

IA4	
1,4-DCB	<b>17</b>
cis-1,2-DCE	<0.079
PCE	1.6
1,1,1-TCA	2.3
TCE	1.5
Freon 113	0.82

IA9	
1,4-DCB	<b>45</b>
cis-1,2-DCE	<0.079
PCE	1.6
1,1,1-TCA	0.86
TCE	1.2
Freon 113	0.76

IA7	
1,4-DCB	<b>12</b>
cis-1,2-DCE	<0.079
PCE	0.16
1,1,1-TCA	0.25
TCE	0.5
Freon 113	0.7

OA2	
1,4-DCB	<0.60
cis-1,2-DCE	<0.079
PCE	<0.14
1,1,1-TCA	<0.11
TCE	<0.11
Freon 113	0.66

- Explanation
- IA9 ▲ Sample location
  - Room or other feature inspected
  - Private storage unit (not inspected)
  - Existing building
  - - - Property boundary
  - - - Former 901/902 Thompson Place buildings

IA5 ←	
1,4-DCB	<b>43</b>
cis-1,2-DCE	<0.079
PCE	1.8
1,1,1-TCA	0.98
TCE	1.1
Freon 113	0.74

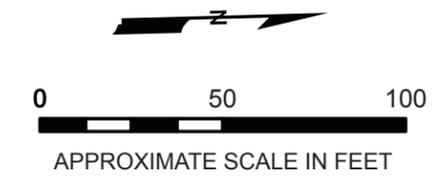
Concentration (µg/m<sup>3</sup>)

Constituent

Abbreviations:  
 1,4-DCB = 1,4-dichlorobenzene  
 cis-1,2-DCE = cis-1,2-dichloroethene  
 PCE = tetrachloroethene  
 1,1,1-TCA = 1,1,1-trichloroethane  
 TCE = trichloroethene  
 Freon 113 = 1,1,2-trichloro-1,2,2-trifluoroethane  
 µg/m<sup>3</sup> = micrograms per cubic meter  
 U.S. EPA = U.S. Environmental Protection Agency  
 < = Analyte was not detected at or above the laboratory reporting limit shown

- Notes:
- As recommended by DTSC (2013), the U.S. EPA Regional Screening Levels (RSLs) for commercial/industrial air (U.S. EPA, 2013) are presented to evaluate indoor air data, unless a DTSC-recommended alternative air screening level (DTSC, 2013) is available.
  - A blind field duplicate sample was collected at location IA2; primary and duplicate sample results are presented.
  - Bolded** results indicate the concentration is greater than the screening level.

Screening Levels <sup>1</sup>	
1,4-DCB	1.1
cis-1,2-DCE	31
PCE	2.08
1,1,1-TCA	4,400
TCE	3.0
Freon 113	130,000



SITE PLAN AND SAMPLE LOCATIONS  
 Former 901/902 Thompson Place  
 Sunnyvale, California

By: BW	Date: 11/07/2013	Project No. OD13164440
		Figure <b>5</b>

S:\OD13164440\Task\_h113\_0422\_iasr\_fig\_05.ai