



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, CA 94105-3901**

**Addendum to
Third Five-Year Review Report
Advanced Micro Devices, Inc. (Building 915) Superfund Site
Sunnyvale, Santa Clara County, California**

The Third Five-Year Review Report (Report) for the Advanced Micro Devices, Inc. (Building 915) (AMD 915) Superfund site (the Site) at 915 DeGuigne Drive in Sunnyvale, California was approved by Stephen Hill, California Regional Quality Water Control Board, San Francisco Bay Region (RWQCB), and concurred by Kathleen Salyer, Assistant Director, Superfund Division, on September 30, 2009. The protectiveness determination was deferred because of the potential for vapor intrusion from the groundwater contamination of trichloroethylene (TCE) to an office and research building on the property. The statement in the Report regarding protectiveness was as follows:

“A protectiveness determination of the remedy at Advanced Micro Devices (AMD) Superfund site at 915 DeGuigne Drive cannot be made at this time until further information is obtained concerning the potential for vapor intrusion. Recent changes in the methodology to assess risk from VOCs due to vapor intrusion suggests further evaluation of the potential for vapor intrusion into buildings and exposure to VOC vapors in indoor air should be conducted on-site. It is anticipated that a protectiveness determination will be made in approximately 18 months, following the collection and chemical analysis of VOC soil gas and indoor air samples.

Although the groundwater plume has been reduced and contained, current information indicates that the groundwater extraction and treatment system may not be able to restore the groundwater to its beneficial use as a potential drinking water source. The AMD 915 Site is capturing upgradient, off-site contamination from ongoing in-situ cleanup efforts at the AMD 901/902 Thompson Place and TRW Microwave Superfund sites, and from the Philips Semiconductor site which is regulated under the Resource Conservation and Recovery Act (RCRA) program. This commingled VOC plume is referred to as "The Companies" Offsite Operable Unit is migrating northward to approximately 4,000 feet long and extends beyond Highway 101. Phillips is operating its own system on-site to contain the bulk of the plume. In the short-term, the institutional controls are preventing exposure to, and the ingestion of, contaminated groundwater. However, for the remedy to be protective in the long term, in particular for potential vapor intrusion concerns, the feasibility of alternative remedies or improvements to the existing system will need to be evaluated in order to insure that the long term remedial objectives are also achieved.

Also, a new environmental restriction covenant consistent with current California law should be recorded to ensure long-term protectiveness.”

Progress Since the Five-Year Review Completion Date

Background

The Site is a former semiconductor fabrication facility located at 915 DeGuigne Drive in Sunnyvale, California. The Site lies north of the TRW Microwave Superfund site and AMD 901/902 Thompson Place Superfund site, and the Philips Semiconductors site at 811 East Arques. The Philips site is regulated under the Resource Conservation and Recovery Act (RCRA) program. Historically, groundwater contamination at AMD 915 has commingled with groundwater contamination from Philips, AMD 901/902, and TRW into a commingled plume. There are four water-bearing units beneath the Site, with the shallowest water between 5 and 25 feet below ground surface. The primary chemicals currently associated with the Site are tetrachloroethylene (PCE), TCE, vinyl chloride and other volatile organic compounds (VOCs).

There are two large commercial buildings, connected by a hallway, located on the site: the former AMD 915 main building (the larger building with an east west orientation), and the former AMD Submicron Development Center (in the southwest portion of the site). The former AMD 915 main building was the focus of the indoor air testing, as the Submicron Development Center is no longer in use and the higher levels of the contaminated plume associated with AMD 915 lie below the main building.

The main building has a basement and two above-ground floors. The basement level is only present on the east and west sides of the building (see Figure 3), and the middle section of the building does not have a basement level. The basement is occupied full time with approximately 3-5 people working in offices. The first floor has offices, labs, and a cafeteria.

Figure 1 shows the Site Plan. Figure 2 shows the comingled plume at and near the Site. Figures 3 through 6 show the locations of the sampling.

Vapor Intrusion Data & Analysis – On-site Building at 915 DeGuigne Drive

On June 2, 2011, personnel from AMEC (AMD’s consultant), RWQCB and U.S. EPA conducted a building survey, including a site walk to identify appropriate indoor and ambient air sampling locations. Observations of building exteriors and interiors, including factors related to chemical storage, presence of floor drains, conditions of the concrete slab (e.g., utility conduits or cracks), and presence of heating, ventilation and air conditioning (HVAC) units were evaluated. As part of pre-field activity, 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. The site walk toured the basement areas of the 915 DeGuigne main building, but time did not permit viewing the first or second floors. Preferential pathway sample locations were chosen during this survey.

In August 2011, AMD conducted indoor air sampling in the former AMD 915 main building in order to evaluate the potential for subsurface vapor intrusion. Samples were collected from

sixteen locations within the building, as well as from five outdoor locations, and analyzed for VOCs that have been reported in groundwater in the vicinity of the Site. The samples were collected with only one of the building's 20 to 25 HVAC systems turned off, because EPA determined it would not be necessary to turn HVAC units off that serviced temperature sensitive laboratory equipment and experiments. The results, summarized in Table 1, were presented in the *Report of Results—Indoor Air Sampling* (AMEC, 2011a).

Indoor air results are compared to U.S. EPA Regional Screening Levels (RSLs) for indoor air as a first step in determining whether response actions may be needed to address potential human health risks. The RSLs are chemical-specific concentrations for individual contaminants that correspond to an excess cancer risk level of 1×10^{-6} (or a Hazard Quotient (HQ) of 1 for noncarcinogens), and they have been developed for a variety of exposure scenarios (e.g., residential, commercial/industrial and recreational) and exposure pathways (e.g., inhalation, ingestion and dermal contact). RSLs are not de facto cleanup standards for a Superfund site, but they do provide a good indication of whether cleanup actions may be needed. For the industrial (i.e., worker) exposure scenario for indoor air, the current RSL for vinyl chloride is 2.8 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and for Freon-113 is 13,000 $\mu\text{g}/\text{m}^3$.

In November 2011, EPA completed a review of the TCE toxicity literature on IRIS for both cancer and non-cancer toxicity values which resulted in a lower value for RSLs for TCE. For industrial exposures, assuming an 8-hour work day, the screening level for chronic exposure for an excess cancer risk level of 1×10^{-6} is now 3.0 $\mu\text{g}/\text{m}^3$. Also, as a result of the November 2011 TCE reassessment, a subchronic, non-cancer screening level for TCE was developed to account for the effect of short-term exposure on neonatal development. Exceedances of the non-cancer RSL would potentially trigger the need for remedial measures to reduce exposures to below RSL concentrations. The non-cancer RSL for TCE is 8 $\mu\text{g}/\text{m}^3$.

EPA also reassessed PCE toxicity literature on IRIS for both cancer and non-cancer toxicity values and released the review in February 2012. The reassessment determined that the risk of cancer under industrial exposures was less likely than originally assumed, and EPA has raised the industrial exposure cancer RSL for PCE to 47 $\mu\text{g}/\text{m}^3$. The non-cancer RSL was also revised based on adverse neurological effects and resulted in a lowering of the non-cancer RSL.

The RSLs for contaminants of concern at the AMD 915 site are summarized in Table 2.

Table 1. Indoor Air Sampling Results at 915 DeGuigne Drive

Sample ID	Sample Type	Location	Date Collected	PCE ($\mu\text{g}/\text{m}^3$)	TCE ($\mu\text{g}/\text{m}^3$)	Freon 113 ($\mu\text{g}/\text{m}^3$)	Vinyl Chloride ($\mu\text{g}/\text{m}^3$)
U.S EPA Regional Screening Levels (industrial)				47.2	3.0	13,000	2.8
August 2011 Sampling							
AMB-1	Ambient	Parking lot	8/21/2011	<0.14	<0.027	0.67	<0.013
AMB-2	Ambient	Roof	8/21/2011	<0.14	0.37	0.69	<0.013
AMB-3	Ambient	Equipment Pad	8/21/2011	<0.14	0.11	0.71	<0.013
AMB-4	Ambient	Equipment Pad	8/21/2011	<0.14	0.55	0.76	<0.013
AMB-5	Ambient	Equipment Pad	8/21/2011	<0.14	0.043	0.74	0.017
IA-1	Preferential Pathway	Mechanical Room with AH-1	8/21/2011	<0.14	1.6	1.2	<0.013
IA-2	Breathing Zone	Office Area (supplied by AH-1)	8/21/2011	<0.14	1.4	1.3	<0.013
IA-3	Preferential Pathway	Storage room	8/21/2011	<0.14	0.94	0.98	<0.013
IA-4	Preferential Pathway	Mechanical room with air handlers	8/21/2011	<0.14	0.56	0.73	<0.013
IA-5	Preferential Pathway	Adjacent to elevator shaft	8/21/2011	<0.14	2.0	0.72	<0.013
IA-6	Breathing Zone	Electrical test area (supplied by AH-6)	8/21/2011	<0.14	1.9	0.77	<0.013
IA-7	Preferential Pathway	Mechanical room with air handlers	8/21/2011	<0.14	0.2	0.71	<0.013
IA-7R	Blind Field Duplicate	Mechanical room with air handlers	8/21/2011	<0.14	0.19	0.77	0.017
IA-8	Breathing Zone	Office Area (supplied by AH-2)	8/21/2011	<0.14	0.96	1.0	<0.013
IA-8R	Blind Field Duplicate	Office Area (supplied by AH-2)	8/21/2011	<0.14	0.99	1.0	<0.013
IA-9	Breathing Zone	Office Area (supplied by AH-39)	8/21/2011	<0.14	0.65	0.8	<0.013
IA-10	Breathing Zone	Office Area (supplied by AH-10)	8/21/2011	<0.14	0.58	0.69	<0.013
IA-11	Breathing Zone	Office Area (supplied by AH-3)	8/21/2011	<0.14	0.52	0.68	<0.013
IA-12	Breathing Zone	Office Area (supplied by AH-4)	8/21/2011	<0.14	0.57	0.72	0.017
IA-13	Breathing Zone	Office Area (supplied by AH-43)	8/21/2011	<0.14	1.1	0.74	<0.013
IA-14	Breathing Zone	Office Area (supplied by AH-9)	8/21/2011	<0.14	1.0	0.91	<0.013
IA-15	Breathing Zone	Conference room (supplied by AH-6)	8/21/2011	<0.14	2.8	0.89	0.018
IA-16	Preferential Pathway	Adjacent to elevator shaft	8/21/2011	<0.14	1.1	0.83	<0.013

Table 2. Summary of Industrial Air RSLs for Containments of Concern at 915 DeGuigne

Contaminant of Concern	RSL for cancer excess risk level of 1×10^{-6} ($\mu\text{g}/\text{m}^3$)	RSL for non-cancer effects risk ($\mu\text{g}/\text{m}^3$)
TCE	3.0	8 (subchronic)
PCE	47.2	175
Vinyl Chloride	2.8	N/A
Freon-113	13,000	N/A

Sampling results at the 915 DeGuigne building suggest that a complete vapor intrusion pathway exists; however, all results were below their respective RSLs. Remedial action is not triggered at this time, although the TCE result of $2.8 \mu\text{g}/\text{m}^3$ for sample IA-15 is close to the cancer RSL. It is EPA's understanding that Spansion, the owner and tenant of the building, is planning to discontinue use of the building. If the building continues to be occupied, to verify the protectiveness conclusion, we recommend an additional sampling event in 2014 to ensure that the TCE indoor air concentrations remain within the protective range. If the building is demolished, any commercial or residential project built on the property would need to have adequate institutional controls and may potentially require engineering controls to prevent vapor intrusion and indoor air testing prior to occupancy to ensure protectiveness from vapor intrusion.

Issues and Recommendations

The following issues and recommendations have been developed since the Third Five-Year Review report for the Site was issued in September 2009.

Issues	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
There is just one sampling event at the main building at 915 DeGuigne which is the basis for the protectiveness determination.	Collect another round of indoor air samples prior to the next FYR, if the building is occupied.	AMD	EPA	2014	N	N

Protectiveness Statements

Based on new information and additional sampling data gathered since the 2009 Five-Year Review, the protectiveness statement is being revised as follows:

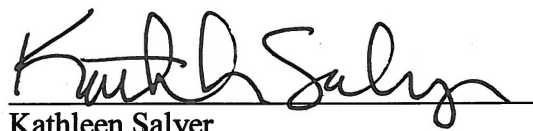
The remedy at Advanced Micro Devices, Inc. (Building 915) Superfund site at 915 DeGuigne Drive is currently protective. To verify the protectiveness, another round of indoor air samples should be collected before the next Five-Year Review. If building use changes, the remedy needs to be re-evaluated to address indoor air levels.

Although the groundwater plume has been reduced and contained, current information indicates that the groundwater extraction and treatment system may not be able to restore the groundwater to its beneficial use as a potential drinking water source. The AMD 915 Site is capturing upgradient, off-site contamination from ongoing in-situ cleanup efforts at the AMD 901/902 Thompson Place and TRW Microwave Superfund sites, and from the Philips Semiconductor site, which is regulated under the RCRA program. This commingled VOC plume, referred to as "The Companies" Offsite Operable Unit, is migrating northward and is currently approximately 4,000 feet long and extends beyond Highway 101. Phillips is operating its own system on-site to contain the bulk of the plume. In the short-term, the institutional controls are preventing exposure to, and the ingestion of, contaminated groundwater. However, for the AMD 915 remedy to be protective in the long term, in particular for potential vapor intrusion concerns, the feasibility of alternative remedies or improvements to the existing system will need to be evaluated in order to insure that the long-term remedial objectives are also achieved. Also, a new environmental restriction and covenant consistent with current California law should be recorded for the AMD 915 site to ensure long-term protectiveness.

The RWQCB has reviewed this addendum and concurs with the protectiveness statement.

Next Five-Year Review

The next five-year review will be completed by September 2014, five years after the signature of the last five-year review report.



Kathleen Salyer
Assistant Director, Superfund Division
California Site Cleanup Branch
US EPA Region 9

Date 9/27/12

References:

AMEC 2011a. *Report of Results—Indoor Air Sampling, 915 DeGuigne Drive, Sunnyvale, California*. Prepared for Advanced Micro Devices by AMEC. October 2011.

AMEC 2011b. *Final Work Plan for Indoor Air Investigation, 915 DeGuigne Drive, Sunnyvale, California*. Prepared for Advanced Micro Devices by AMEC. July 2011.

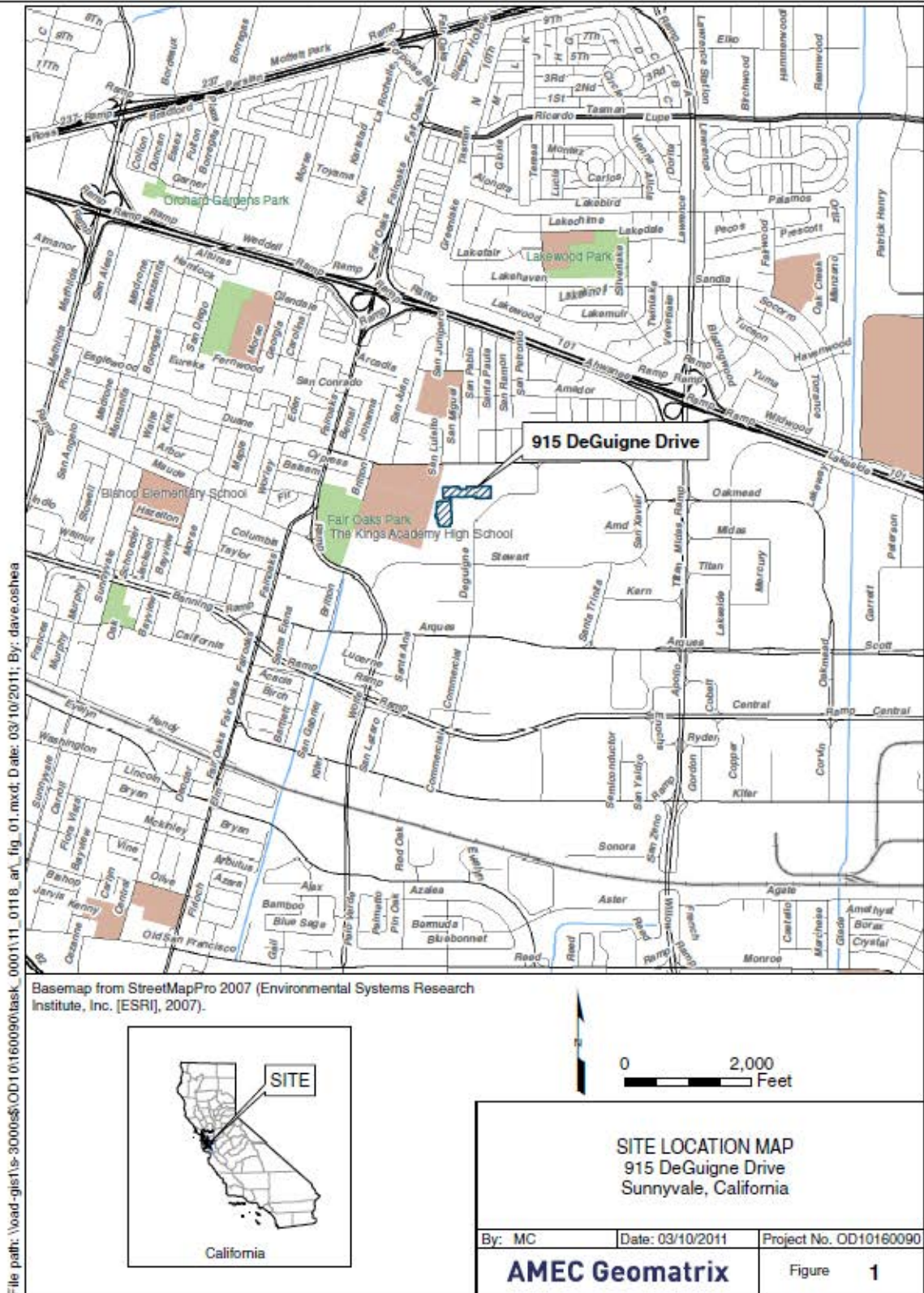


Figure 1 – Site Location Map

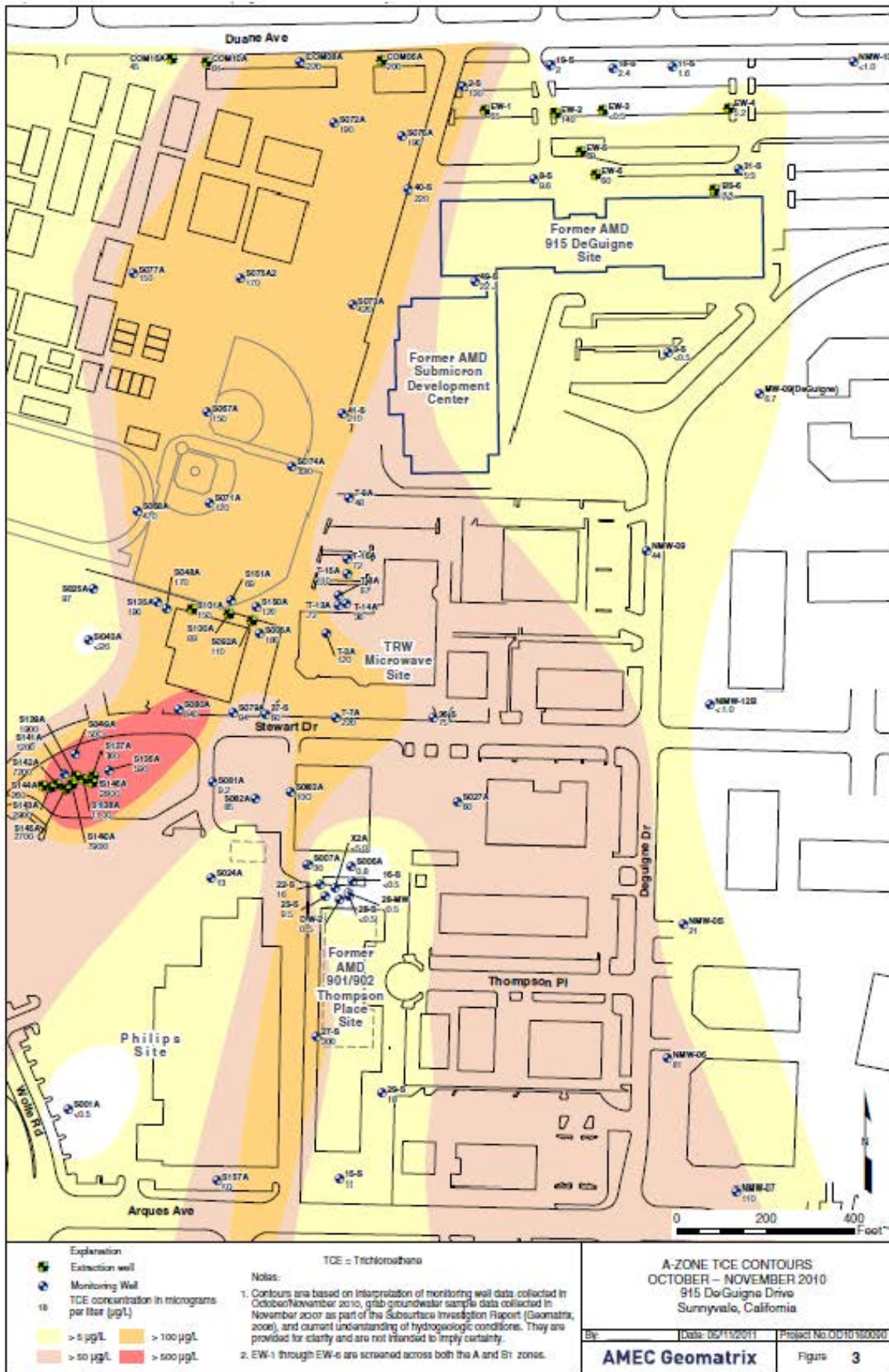


Figure 2 – A Zone TCE Contours

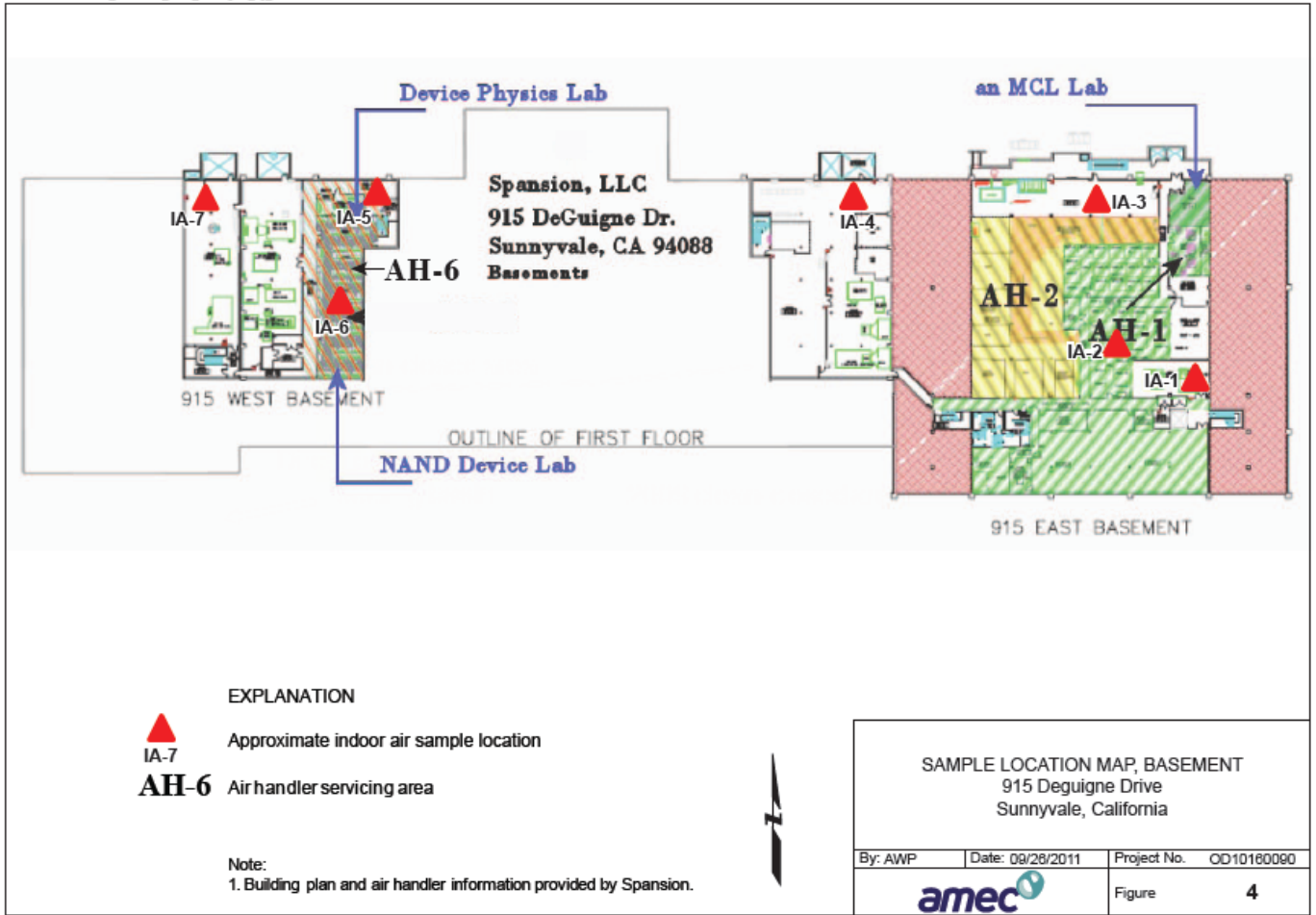


Figure 3 – 915 DeGuigne building basement indoor air testing locations

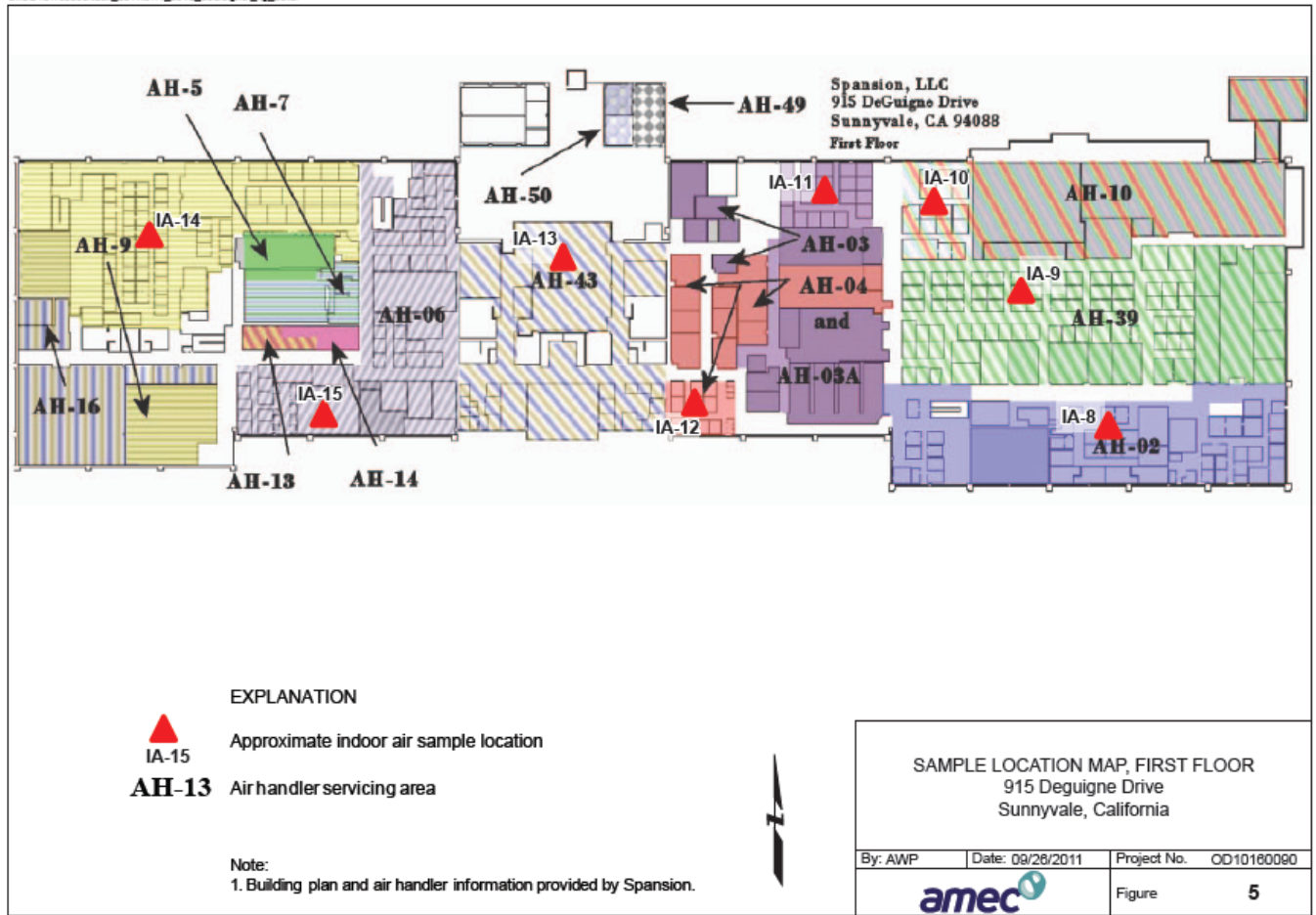


Figure 4 – 915 DeGuigne building first floor indoor air testing locations

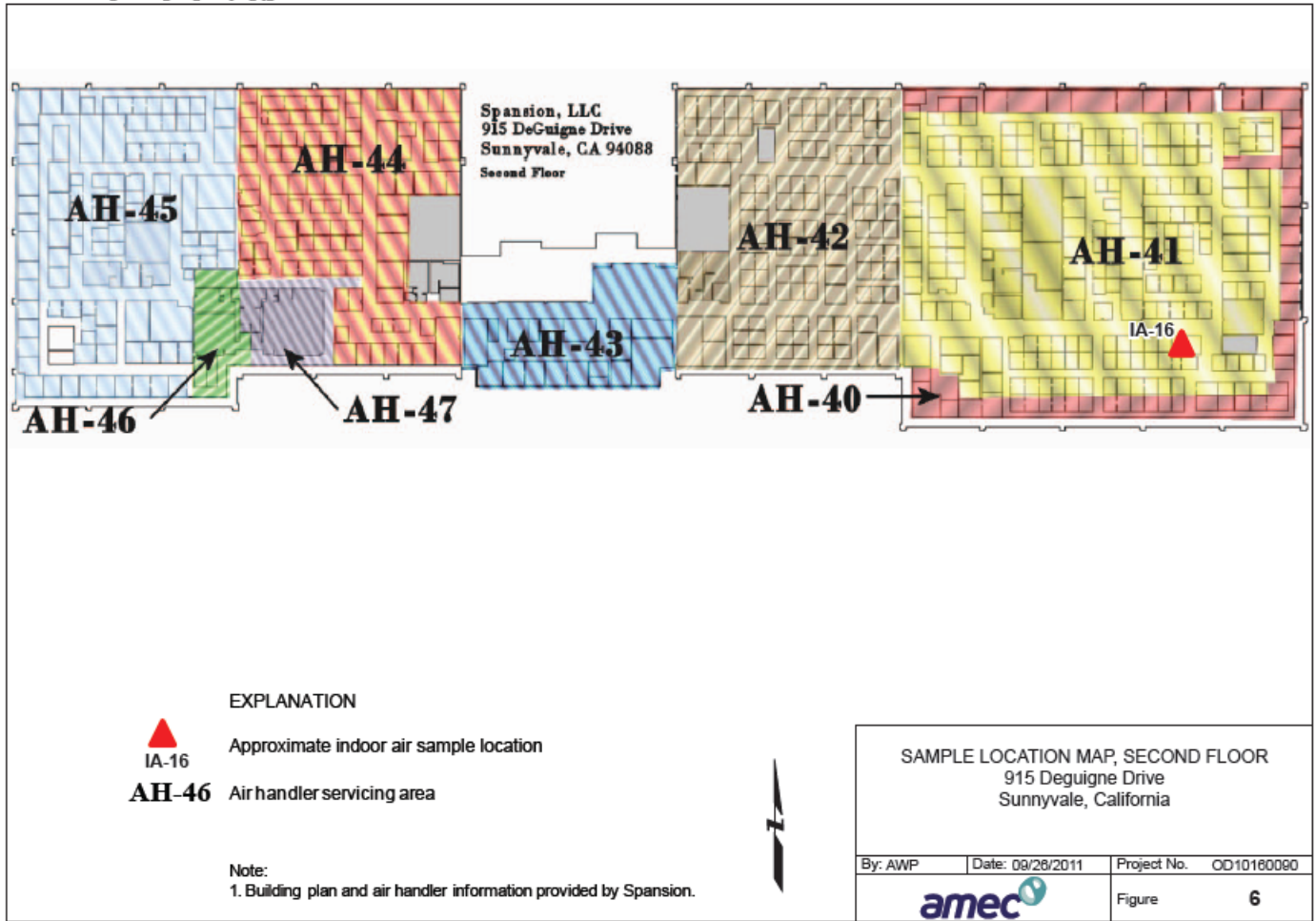


Figure 5 – 915 DeGuigne second floor indoor air testing locations

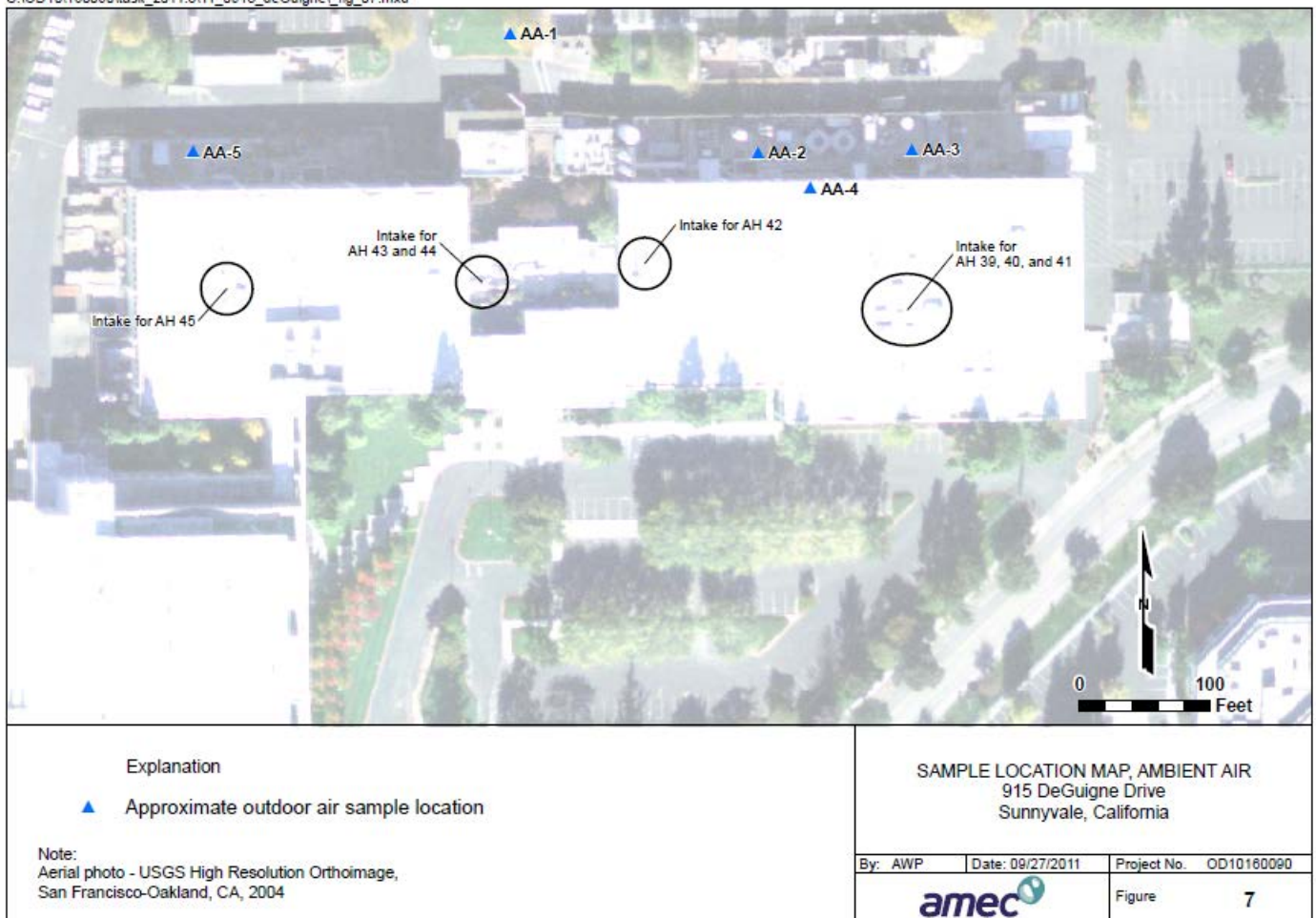


Figure 6 – 915 DeGuigne building outdoor air testing locations