



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX  
75 Hawthorne Street  
San Francisco, CA 94105**

August 11, 2014

Certified Mail  
Return Receipt Requested

Advanced Micro Devices, Inc.  
Attn: Mr. Brett Stringer  
One AMD Place  
Sunnyvale, CA 94088-3453

[brett.stringer@amd.com](mailto:brett.stringer@amd.com)  
Certified Mail Label # 7010 2780 0000 2814 6765

Northrop Grumman Systems Corporation  
Attn: Ms. Linda Niemeyer  
3343 Fosca Street  
Carlsbad, CA 92009

[linda.niemeyer@ngc.com](mailto:linda.niemeyer@ngc.com)  
Certified Mail Label # 7010 2780 0000 2814 6772

Philips Semiconductors, Inc.  
c/o Project Realty LLC  
Attn: Ms. Shau-Luen K. Barker  
15313 West 95<sup>th</sup> Street  
Lenexa, Kansas 66219

[shauluen@aol.com](mailto:shauluen@aol.com)  
[shauluen.barker@philips.com](mailto:shauluen.barker@philips.com)  
Certified Mail Label # 7010 2780 0000 2814 6789

**SUBJECT:** Notice of Deficiency

Request to Prepare and Implement a Vapor Intrusion Work Plan for Philips Site  
Source Buildings and Offsite Operable Unit

Triple Site: AMD 901/902 Thompson Place Superfund Site, Philips (formerly  
Signetics) Site, and TRW Microwave Superfund Site and Offsite Operable Unit,  
Sunnyvale, California

Dear Mr. Stringer, Ms. Niemeyer, and Ms. Barker:

Please be advised that the United States Environmental Protection Agency (EPA) Region 9 and San Francisco Bay Regional Water Quality Control Board (Regional Board; collectively, the Agencies), have agreed to transfer lead agency oversight responsibilities for the Advanced Micro Devices 901/902 Thompson Place Superfund Site (AMD 901/902 Site), Philips (formerly Signetics) Site (Philips Site), and TRW Microwave Superfund Site (TRW Site) and associated Offsite Operable Unit (OOU; collectively, the Triple Site or Site) from the Regional Board to EPA.

## ***Background***

Four operable units (OUs) were covered by the 1991 Record of Decision (ROD) for the Triple Site, all located in Sunnyvale, California:

- (1) The AMD 901/902 Thompson Place Site;
- (2) The Philips Site, located at 811 East Arques Avenue, 440 North Wolfe Road, and facilities along Stewart Drive (formerly known as the Signetics Site);
- (3) The TRW Microwave Site; and
- (4) The Offsite Operable Unit (OOU), a commingled plume of contaminants which originated from the other three operable units.

At the time of adoption of the 1991 ROD, the OOU was defined as a 100-acre area, downgradient and north of the Triple Site in an area bounded by the Sunnyvale East Drainage Channel on the west and Santa Paula Avenue on the east, and as the area inside a 5 micrograms per liter ( $\mu\text{g/L}$ ) isopleth for trichloroethene (TCE) in groundwater. Over 100 residences and at least 4 schools are present within the OOU.

The AMD 901/902, TRW, and Philips Sites all contributed to the commingled TCE plume in the OOU. As regards the Philips Site, Philips (formerly Signetics), operated a semiconductor manufacturing facility at the 811 East Arques Avenue property beginning in 1964. The manufacturing processes employed utilized various organic solvents (including TCE), acids, corrosives, and metals.

Initial investigation at the Philips Site began in February 1982 with the detection of a leak in an underground waste solvent storage tank at the 811 East Arques Avenue property. The presence of contaminated soil was verified during the tank removal. Following additional investigation at this location and at the other Philips facilities (located at 440 North Wolfe Road, 815 and 830 East Arques Avenue and Stewart Drive) this waste solvent storage tank and a wastewater neutralization tank area (both at the 811 East Arques Avenue property) were identified as the principle source of contaminants from the Philips Site and impacting downgradient areas within the OOU.

## ***EPA Vapor Intrusion Guidelines***

On December 3, 2013 EPA Region 9 issued supplemental guidelines on vapor intrusion evaluations and indoor air TCE short-term inhalation exposures for the Triple Site and other National Priorities List (NPL) sites within the South San Francisco Bay area, recommending that vapor intrusion evaluations:

- follow the “multiple-lines-of-evidence” approach as outlined in EPA’s 2013 Office of Solid Waste and Emergency Response (OSWER) *External Review Draft – Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from the Subsurface*

*to Indoor Air;*

- include multiple rounds of sampling, including winter heating season sampling and crawlspace sampling for residential or otherwise passively ventilated buildings;
- include heating, ventilation, and air conditioning (HVAC) system “on” and “off” sampling at commercial buildings;
- include source (“on-property”) building sampling; and
- include all buildings overlying 5 µg/L TCE shallow-zone groundwater contamination.

On December 19, 2013 EPA Region 9 issued additional technical comments specific to vapor intrusion evaluations at the Triple Site.

On July 9, 2014 EPA Region 9 issued an additional memorandum with attachments, containing recommended response action levels and recommendations to address near-term inhalation exposures to TCE in air from subsurface vapor intrusion.

On July 11, 2014 EPA Region 9 transmitted the July 9, 2014 memoranda to the Regional Board, clarifying that the memoranda supersede Item #1 (Interim TCE Indoor Air Short-Term Response Action Levels and Guidelines) of the December 3, 2013 EPA Region 9 guidelines letter.

### ***Vapor Intrusion Evaluations to Date***

EPA appreciates the efforts to date in conducting vapor intrusion evaluations at the on-property (source) buildings for the Triple Site TCE shallow groundwater plume located at the AMD 901/902 Site and TRW Site, as well as the indoor air monitoring conducted at certain school buildings within the OOU.

### ***How EPA Evaluates Indoor Air***

EPA evaluates indoor air quality by comparing the concentrations of chemicals detected to levels determined by EPA to be protective of human health for long-term and short-term exposure. Within this study, for cancer causing chemicals, EPA considers levels to be protective if they fall within the *range* of a 1 to 100 in a million increased lifetime cancer risk. The level that falls into the most protective end of the increased lifetime cancer risk range – 1 in a million increased lifetime risk – is what is used as the *screening level* for any particular chemical.

For example, EPA’s indoor air *long-term screening level* for TCE is currently 0.48 micrograms per cubic meter (µg/m<sup>3</sup>), corresponding to an increased lifetime cancer risk of 1 in one million. However, the health protective risk range is truncated (no longer 0.48 – 48 µg/m<sup>3</sup>) by EPA’s *short-term or non-cancer screening level* for TCE (2.0 µg/m<sup>3</sup>), which is the concentration corresponding to an increased risk of non-cancer health effects, such as liver and kidney effects or organ and immune system problems in babies whose mothers were exposed during pregnancy. Thus the health protective risk range for TCE now becomes 0.48 – 2 µg/m<sup>3</sup>.

### ***Health Protection Goals***

EPA’s goal for indoor air exposures to Superfund site-related chemicals is to keep exposures as low as reasonably possible within the protective risk range or below the protective risk values.

The most conservative risk values (screening levels) are then used to help determine whether further action such as additional sampling or remediation is necessary.

While most concentrations measured in previous sampling events at certain OOU school buildings fall within the risk range for TCE, some sampling events showed TCE concentrations exceeding the high end of the risk range. Ultimately, certain sampling results, including data from as recent as May 2014, exceed the current EPA residential Regional Screening Level (RSL) for TCE ( $0.48 \mu\text{g}/\text{m}^3$ ) and prompt additional investigation.

### *Notice of Deficiency*

The Additional Vapor Intrusion Evaluation Work Plan, dated May 1, 2014, submitted by Locus Technologies (Locus) on behalf of Philips Semiconductors, Inc. (Philips), for the OOU is deficient with respect to addressing potential subsurface-to-indoor air vapor intrusion associated with the Triple Site, including, but not limited to, the following:

#### Source Building Evaluations

- Source building evaluations at the Philips Site are not addressed, including, but not limited to:
  - o Lack of historical background section, including summary of vapor intrusion evaluation and mitigation work performed to date, and description of building use and occupancy;
  - o Lack of summary of relevant previous data collected at and near the buildings (e.g., groundwater, soil gas, sub-slab soil gas, crawlspace, pathway and outdoor air samples); and
  - o No vapor intrusion evaluation protocols specified to fill any identified data gaps

#### School Building Evaluations

##### *General Comments – School Sampling*

- No sampling is proposed for the school located on San Miguel Avenue. This omission should be addressed.
- For the three schools located at 790 East Duane Avenue, 562 North Britton Avenue, and 794 East Duane Avenue, the proposed building approach is inconsistent with EPA guidelines, including:
  - o Lack of Heating, Ventilation, and Air Conditioning (HVAC)-off testing to:
    - evaluate the potential for subsurface vapor intrusion into buildings without reliance on the indoor air ventilation system;

- understand the full range of possible exposure scenarios; and
- identify HVAC as a possible vapor intrusion remedy for certain buildings

and in particular be conducted at school buildings where Philips' own consultant has, as recently as May 2014 and dating back to at least June 2013, identified substantial deficiencies in ventilation systems, including the following:

- outdoor air screens needing replacement or cleaning;
- economizers and outdoor air dampers that do not open and close properly;
- checklists indicating HVAC unit clocks, timers and/or switches improperly set at certain times;
- lack of suction at certain intakes;
- filters in poor condition, improperly installed, or having major air leaks; and
- supply fans disconnected at certain units, with no corresponding air flow near indoor exhaust and no detectable suction at the indoor air intakes, concluding

***“...Cumulatively, these issues may affect indoor air quality by allowing chemicals to accumulate within the buildings over time...”***

- Lack of pathway sampling; and
- Lack of additional evaluation or otherwise proposal for implementation of appropriate near-term response activities, which may include for the 790 East Duane Avenue school buildings:
  - a preferential pathway investigation;
  - potential conduit sealing/ventilation; and
  - HVAC-system overhaul and submittal for EPA approval of an Operations, Maintenance & Monitoring (OM&M) plan

and in particular in light of the indoor air sampling results, including data from as recent as 2014, which exceed current EPA residential Regional Screening Levels (RSLs) for TCE, certain of which also exceed the EPA Region 9 TCE indoor air response action levels.

*Additional Comments – May 1, 2014 General School Work Plan*

Page 14, 28. Inspection frequency of ventilation systems should be increased beyond annual until indoor air concentrations have been lowered within or to below the risk protective range and observed HVAC-system deficiencies between inspection periods are substantially reduced or eliminated.

Page 17. “...similar construction...therefore, it is unnecessary to sample all the buildings...”

Building-specific evaluations should be conducted at every building overlying concentrations of concern in the TCE shallow-groundwater plume. Buildings with similar construction specifications can show markedly different vapor intrusion-related indoor air impacts due to, for example, building- or location-specific preferential pathways, differences in occupant usage which lead to varying building mixing/dilution rates, and changes in soil gas entry rates.

Page 18. "...results have been found to not cause concern for indoor air quality..."  
EPA does not agree with this statement. See above discussion.

Page 18. "...future indoor air sampling will be conducted in January..."  
While rounds of winter heating season sampling are appropriate to assess seasonal effects, future sampling should be conducted as soon as possible, including rounds of sampling during colder-weather periods, in particular in light of the screening level exceedances already measured which prompt additional mitigation (discussed above).

Page 18. "Although EPA has suggested collection of indoor samples with all HVAC systems shut down, this is not a reasonable exposure condition."  
HVAC-off sampling is important to fully assess the range of potential exposures scenarios within the typical commercial/office building. EPA's experience working with building owners and tenants in the South Bay has included findings of workers or other occupants present (for example, janitorial personnel working nights and weekends or law firm employees working overtime/after-hours to meet a filing deadline) when HVAC systems are not operating or operating at reduced settings, leading to actual or potential unacceptable exposures due to vapor intrusion. At the Triple Site, the HVAC-system deficiencies previously identified in certain buildings (see above discussion) further support the need to conduct rounds of indoor air sampling with HVAC systems shut down, and in particular given the sensitive population at risk in these buildings.

Page 18. "Further sampling efforts are directed towards locations that have not been sampled previously."  
This may be acceptable for "HVAC-on" sampling, but not for HVAC-off sampling because this type of sampling has not yet been conducted (see above). However, for sampling locations that will not be re-sampled and that exceed RSLs, additional mitigation activities (beyond already implemented HVAC system improvements) should be proposed and implemented, given the continued RSL exceedances measured despite HVAC system improvements.

Page 29. "Within 60 days after analytical results are received...provided to the RWQCB..."  
Sample results should be conveyed to the EPA within 48 hours of receipt from the laboratory, in particular any results that exceed screening levels.

Page 30. Schedule unacceptable and should be revised. A phased approach to the investigation may be acceptable, however, building survey and sampling activities should be timed appropriately (for example, school buildings fall 2014, outreach/sampling at residences over 50 µg/L TCE November-December 2014, step-out outreach/sampling at residences over 5 µg/L TCE January-February 2015) so that another winter heating season sampling opportunity for residential-type, passively ventilated buildings is not missed.

Table 2. This table should be updated to reflect current RSLs (most recently updated May 2014), as well as the more stringent California-modified screening levels for certain chemicals, including perchloroethene (PCE). The table should also include the EPA Region 9 TCE indoor air response action levels.

Plan should be revised to reflect submittal of data and reports to EPA.

*Additional Comments – May 1, 2014 Site-Specific Work Plan – 790 E Duane Ave*

Page 3. “Additional sampling...indicated that the janitor’s closets and restrooms at the south end of the building were not acting as preferential pathways for vapor intrusion.”

This statement may no longer be accurate, given the ten years that have elapsed since this sampling was conducted.

Page 4. “Results from all sampling activities over the past nine years have consistently indicated that there are no short-term or immediate health risks.”

EPA believes that additional sampling is necessary before a statement like this can be made, in particular given the noncarcinogenic screening levels developed and certain sampling results which exceed these levels. See above discussion.

Page 6. Sampling Locations.

See above discussion of sampling efforts.

Table 2.

EPA notes that no recent data has been obtained from Building G, despite TCE concentrations measured in indoor air up to  $4.6 \mu\text{g}/\text{m}^3$  in 2004, exceeding both the long-term and short-term screening levels.

EPA notes that indoor air samples from Building H vary within the risk range, with the majority of samples exceeding the long-term screening level for TCE, two of which (one breathing zone height and one pathway) exceed the short-term screening level for TCE.

Regarding Building L, EPA notes a pathway sample collected in 2005 that exceeds the short-term screening level for TCE and other breathing zone detections above the long-term screening level for TCE.

Regarding Building S, EPA notes a number of breathing zone samples exceeding the long-term screening level for TCE, one of which also exceeds the short-term screening level for TCE.

EPA notes that historic TCE concentrations measured in Building V are generally lower than those measured in other buildings, however, certain measurements exceed the long-term screening level for TCE.

*Additional Comments – May 1, 2014 Site-Specific Work Plan – 562 N Britton Ave*

Page 3. “Results from all sampling activities in August 2004 and April 2005 indicate that there were no short-term or immediate health risks...”

See above discussions of sampling data.

Page 3. “Additionally, groundwater-related concentrations observed in all buildings at the property were below all applicable long-term risk-based criteria.”

EPA does not agree with this statement. See December 3, 2013 EPA Region 9 Supplemental Vapor Intrusion Guidelines letter.

Page 4. Sampling locations should be revised, per discussions above.

Residential Evaluations

- No other buildings (for example, single-family residences), are proposed for testing within the 5 µg/L TCE shallow-zone groundwater contour line (which includes over 100 residences and at least one additional school), including:
  - o Lack of multiple rounds of sampling beginning as soon as is practicable, including winter heating season testing (November 2014-February 2015) in residential, passively ventilated structures to assess the potential variability of indoor air contaminant concentrations during conditions when the potential for vapor intrusion may be higher; and
  - o Lack of crawlspace or basement sampling, where such are present in buildings; and in particular in light of indoor air TCE screening level exceedances at school buildings and concurrent indoor air investigations at other South Bay Superfund sites with similar depth to groundwater and TCE shallow-zone concentrations, including nearby sites in Sunnyvale, which continue to show TCE screening level exceedances at both residential and commercial buildings overlying concentrations ranging from 5 µg/L to over 100 µg/L TCE in shallow-zone groundwater which are requiring mitigation.<sup>a</sup>

***Authority to Require Action***

Pursuant to Section 106 (a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and 40 CFR Section 300.415(b) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA is authorized to require responsible parties to take any response actions necessary to protect public health, welfare or the environment. These response actions include the preparation and implementation of a Vapor Intrusion Work Plan to investigate and mitigate vapor intrusion at or from the Site.

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<sup>a</sup> For the most recent, publicly available vapor intrusion-related reports, indoor air data and TCE shallow-zone groundwater plume maps for the South Bay sites, please visit [www.epa.gov/region9/cleanup/california.html](http://www.epa.gov/region9/cleanup/california.html)

### ***Preparation and Implementation of a Vapor Intrusion Work Plan***

EPA requests the submittal within twenty-one (21) calendar days of your receipt of this letter a comprehensive Vapor Intrusion Work Plan and implementation schedule for the former Philips Site source buildings and Offsite Operable Unit, including, but not limited to, properties located at or within:

- 811 East Arques Avenue
- 440 North Wolfe Road
- Facilities along Stewart Drive, including, but not limited to:
  - o 813 Stewart Drive
  - o 815 Stewart Drive
  - o 830 Stewart Drive
  - o 848 Stewart Drive
- The Offsite Operable Unit, inclusive of any buildings overlying the 5 µg/L isoconcentration contour for TCE in shallow-zone groundwater.

Prior to this submittal you may also request a meeting with EPA representatives to discuss the technical approach for the investigation or any enforcement-related items.

The Vapor Intrusion Work Plan should address the items outlined in this letter and fully comply with the following:

- the “multiple-lines-of-evidence” approach as outlined in EPA’s 2013 Office of Solid Waste and Emergency Response (OSWER) *External Review Draft – Final Guidance for Assessing and Mitigating the Vapor Intrusion Pathway from the Subsurface to Indoor Air*;
- EPA Region 9’s December 3, 2013 *Guidelines and Supplemental Information Needed for Vapor Intrusion Evaluations at South Bay National Priority List Sites*;
- EPA Region 9’s December 19, 2013 Memorandum to the Regional Board, *Vapor Intrusion Comments, AMD 901/902, Philips, and TRW Microwave Offsite Operable Unit, Sunnyvale, California*;
- EPA Region 9’s July 9, 2014 Memorandum, *EPA Region 9 Response Action Levels and Recommendations to Address Near-Term Inhalation Exposures to TCE in Air from Subsurface Vapor Intrusion*; and
- EPA Region 9’s July 11, 2014 Letter to the Regional Board.

The Vapor Intrusion Work Plan should be revised and resubmitted to EPA within ten (10) calendar days following receipt of any additional EPA comments, and implemented beginning ten (10) calendar days following receipt of EPA approval of its contents.

### ***Community Outreach***

EPA will take the lead in developing and implementing an appropriate community outreach strategy for the vapor intrusion investigation, however, your full participation in developing outreach tools (such as press releases, fact sheets, etc.) and conducting outreach (door-to-door efforts, individual meetings with property owners and occupants, public meetings, etc.) is encouraged.

### ***Remedy Selection and ROD Amendment***

Information resulting from a robustly designed and implemented Vapor Intrusion Work Plan that evaluates all buildings, including source buildings, and all other schools, single-family residences, multi-unit apartment buildings, and any other commercial or industrial properties in the Offsite Operable Unit will help EPA to evaluate if TCE or other volatile organic compound (VOC) vapor intrusion associated with the groundwater contamination at the Triple Site is occurring into overlying buildings.

This evaluation will become part of a Remedial Investigation/Feasibility Study (RI/FS) which addresses the subsurface-to-indoor air vapor intrusion pathway at the Site, in support of a ROD Amendment (RODA).

### ***Work Completion Report***

This letter also requests you to submit to EPA for approval, within thirty (30) calendar days of completion of the sampling tasks described in the Vapor Intrusion Work Plan, a Work Completion Report, that documents the results of the vapor intrusion sampling and analysis tasks described in the Vapor Intrusion Work Plan and includes proposed response actions and, where necessary, a proposal for any additional work necessary to obtain necessary information to determine appropriate response actions.

The Vapor Intrusion Work Plan, Work Completion Report, and ultimately the RI/FS will inform the selection of the appropriate remedies to mitigate vapor intrusion, as appropriate, and will be incorporated into the RODA for the Triple Site. This process may also include the listing of the Philips Site on the NPL, consistent with EPA's approach for the AMD 901/902 Thompson Place Site and TRW Microwave Site.

The above information should be sent to:

Melanie Morash, Remedial Project Manager  
U.S. Environmental Protection Agency  
Region 9  
75 Hawthorne Street (SFD-7-1)  
San Francisco, CA 94105

You may, if you desire, assert a business confidentiality claim covering part or all of the information requested in the manner described by 40 C.F.R. Section 2.203(b).

You should read the above-cited regulations carefully before asserting a business confidentiality claim, since certain categories of information are not properly the subject of such a claim. If no such claim accompanies the information when it is received by EPA, the information may be made available to the public by EPA without further notice to you.

If you have any technical questions, please contact me directly at (415) 972-3050 or by e-mail to [morash.melanie@epa.gov](mailto:morash.melanie@epa.gov). You may also have your attorney contact Thelma Estrada, US EPA's attorney in this matter, at (415) 972-3866 or by e-mail to [estrada.thelma@epa.gov](mailto:estrada.thelma@epa.gov).

Sincerely,

A handwritten signature in cursive script that reads "Melanie Morash".

Melanie Morash, Remedial Project Manager  
Superfund Division

Attachments:

Triple Site Mailing List