

## MORASH, MELANIE

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**From:** MORASH, MELANIE  
**Sent:** Friday, January 29, 2016 11:45 AM  
**To:** Wes Hawthorne  
**Cc:** Cynthia Woo; Dana Koefoed; Lawrence McGuire; Leslie Lundgren; Rafael Rangell; Rose Condit; Wenqian Dou; DIAZ, ALEJANDRO; Estrada, Thelma; Harris-Bishop, Rusty; Lyons, John; Maldonado, Lewis; MORASH, MELANIE; Plate, Mathew; Shaffer, Caleb; Stralka, Daniel; Yogi, David; Elizabeth Brown; Heather O'Cleirigh; Joseph Innamorati; Linda Niemeyer; Michele Yuen; Morgan Gilhuly; Nancy-Jeanne LeFevre; Peter Bennett; Peter Scaramella; Rebecca Mora; Shau Luen Barker; Shaun Moore; Soetebier, Kristen; Todd Maiden; Wendy Feng  
**Subject:** EPA's Conditional Approval - Triple Site Mitigation Plans - Residences #92/93, #71/99, #100  
**Attachments:** Morash - Mitigation Response to Comments 2016-01-27.pdf

Good morning, Wes,

Thank you for submitting revised mitigation plans and the response-to-comments letter for the three residences referenced above.

This e-mail conveys EPA's conditional approval of these mitigation plans, to be revised based on your response-to-comments letter attached.

**As discussed in your response letter, please update the mitigation plans based on the response-to-comments letter and prepare Spanish translations of each plan. Please provide these updated English/Spanish versions to EPA by Tuesday, February 2<sup>nd</sup>. Please also send a copy of the Spanish versions to EPA's contractor, CB&I Federal Services, so that they can provide QC review of the Spanish.**

Please plan to provide your Health and Safety Plan (HASP) Addendum to EPA for review, and the Operations, Maintenance & Monitoring (OMM) Plans and Quality Assurance Project Plan (QAPP) Addendum to EPA for review and approval within ten (10) calendar days of the property owner's approval of the mitigation plans.

Once you update the mitigation plans and provide both the English and Spanish versions to EPA, we will send copies of these plans to the property owners, accompanied by the cover letter that you and the RP group recently reviewed. We will copy you when these plans are mailed out.

These mitigation plans should be finalized and submitted to EPA within ten (10) calendar days of discussions/meetings with property owners/occupants and receipt of property owners' approval to proceed.

Some additional comments, in response to your letter, are as follows:

- (1) The RES 78/79 data EPA referred to is as follows:

Sample Location	TCE Concentration July 2015	TCE Concentration October 2015	PCE Concentration October 2015
Indoor Air Sample (24-hr sample) Living Room (RES078)	1.1 µg/m <sup>3</sup>	0.4 µg/m <sup>3</sup>	Not detected

Indoor Air Sample (24-hr sample) Bedroom Closet (RES079)	--	0.11 µg/m <sup>3</sup>	0.056 µg/m <sup>3</sup>
Indoor Air Sample (24-hr sample) Living Room (RES079)	0.096 µg/m <sup>3</sup>	--	Not detected
Crawlspace Air Sample (24-hr sample) (RES078)	0.98 µg/m <sup>3</sup>	0.74 µg/m <sup>3</sup>	0.059 µg/m <sup>3</sup>
Crawlspace Air Sample (24-hr sample) (RES079)	Not detected	--	Not detected
Outdoor Air Sample (Highest Concentration Detected in Neighborhood)	0.31 µg/m <sup>3</sup>		0.19 µg/m <sup>3</sup>
<b>EPA Screening Levels</b>			
Short-term Screening Levels	2.0 µg/m <sup>3</sup>		36.5 µg/m <sup>3</sup>
Long-term Screening Levels	0.48 µg/m <sup>3</sup>		0.48 µg/m <sup>3</sup>

(2) The “recommended” path forward discussed in the Teledyne/Spectra-Physics planning table are recommendations put forward by the Responsible Parties (RPs). EPA is in the process of evaluating these recommendations and has not yet made final determinations.

Regards,

Melanie

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Melanie Morash, Project Manager  
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**From:** J. Wesley Hawthorne [<mailto:hawthornej@locustec.com>]  
**Sent:** Wednesday, January 27, 2016 9:12 PM  
**To:** MORASH, MELANIE <[morash.melanie@epa.gov](mailto:morash.melanie@epa.gov)>  
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**Subject:** RE: EPA Comments - Mitigation Plan for Residences #92/93, #71/99, #100

Melanie:

Attached is a letter responding to each of your comments.

*J. Wesley Hawthorne, PE, PG*

Senior Vice President

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27 January 2016

Melanie Morash  
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*RE: Revisions to Indoor Air Mitigation Plans: RES092/093, RES071/099, and RES100 Offsite Operable Unit, Sunnyvale, California*

Dear Ms. Morash:

This letter is submitted on behalf of Philips Semiconductors Inc (Philips) in response to the comments received on 22 January 2016 with regard to the indoor air mitigation plans submitted to EPA on 8 January 2016 for Residence #92/93, #71/99, and #100.

The mitigation plans submitted on 8 January 2016 were prepared in response to an email request from the EPA on 9 November 2015 (Residence #71/99 and #100) and 15 October 2015 (Residence #92/93). This letter contains written responses to EPA comments, which include intended revision(s) to the mitigation plans. Once the resolution to these comments is agreed upon, revised mitigation plans will be resubmitted for EPA review and approval.

EPA Comments

*Comment 1: Res 100-Specific Mitigation Plan Comment: The broken asphalt in the crawlspace for RES 100 should be excavated for trenching to install the 4" PVC soil gas extraction pipe. The pipe needs to be laid in a trench to make the extraction of soil gas more uniform over the crawlspace floor. A 4" pipe laying on the surface of the crawlspace will not be as effective in establishing a partial negative pressure under the membrane that is uniform over the crawlspace.*

Response: The previously-submitted mitigation plan reads as follows: "Given the broken asphalt noted to date, care will be needed to ensure that pipe is laid against the soil sufficient to create a vacuum in the underlying soil." The pipe will not be "laying on the surface of the crawlspace," as stated in the comment. The plan also accounts for post-installation confirmation of uniformity over the crawlspace: "A pressure test under the membrane will be conducted upon initial installation to ensure the SMDS is providing a negative pressure across the crawlspace." Additionally, if vapors are penetrating from the soil through the degraded asphalt, the asphalt does not provide

a sufficient barrier against vapor intrusion and will not, therefore, create a vapor barrier to an active vacuum. Similarly, the membrane that extends across the entire surface, above the broken asphalt, creates a suction at the exit point of the vapor. The plan will be revised to include the following statement, further ensuring EPA that the vacuum will be provided: "If good contact cannot be made between the horizontal perforated pipe and the sub-surface, the mitigation installer will drill through the asphalt to the sub-surface uniformly, insert vertical suction piping into each hole, and connect these points to the suction system with a 'T.'"

Because the only sizable access point to this crawlspace is through a bedroom in this residence, this approach will achieve the goals of the mitigation plan with far less impact to the owner/occupant during installation, compared to trenching and removing asphalt through the house.

*Comment 2: Design Decisions. Page 2, Description Section: The plan states that options will be discussed with owner or will accommodate owner requirements. However, design decisions should also be approved by EPA for sound technical basis as well.*

Response: In each mitigation plan, the following sentence will be revised as follows (new text in *italics*): "Locus will discuss these options with the owner and will accommodate owner requirements if feasible *and if approved by EPA.*"

*Comment 3: Vapor Barrier. Page 2, Description Section: EPA supports the proposal of a vapor barrier that is Class A, however, the 10 mil thickness proposed is insufficiently thick and inconsistent with EPA's guidance. A thicker barrier (20 or 30 mil) is less likely to be punctured or otherwise damaged. The specifications included for the proposed barrier also seem to indicate its usage for slab-on-grade buildings, as opposed to crawlspaces. Please revise to a 20 mil Vapor Block, Class A vapor barrier to address durability concerns.*

Response: A 10-mil barrier was specified in the previously submitted mitigation plans for Residences #21, #84/85, #105/124/125 which were "conditionally-approved" by EPA, and a change to the vapor barrier thickness was not among the conditions of approval. The subject mitigation plans entail the same Class A vapor barrier as included in the conditionally-approved plans. The explanation for the selected vapor barrier was provided in the response to comments letter dated 21 December 2015:

*The reference to "temporary applications" is mistaken in EPA's comment. Each reference to "temporary" applications in the specification sheet is with regard to outdoor usage, not indoor as will be the case for the crawlspace applications. In fact, the specification sheet for the Dura-Skrim 12 mil barrier (R12WB) includes "Remediation Covers or Liners" and "Underslab Vapor Retarders." Less aggressive barriers (the RUFECO 400, now out of production) were installed at the Hookston Station site as early as 2004.*

*Additionally, Raven Engineered Films, the manufacturer of the Dura-Skrim, RUFECO, and VaporBlock membranes, would not recommend the VaporBlock PLUS 20 in an application that includes an active depressurization system. However, the VaporBlock 10 (VB10) is an ASTM E1745 Class A membrane for permeance, tensile strength, and puncture resistance and is a better match for the planned implementation. It also does not increase the installation time, which would increase the inconvenience to the owner and occupant. The mitigation plans have been revised to specify the VB10 membrane, having a Class A rating as compared to the Class C R12WB. Home renovation or repair activities are*

*not anticipated to be "frequent," and operation and maintenance of the barrier will address any future damage. Philips acknowledges and accepts the associated maintenance responsibility. Ultimately, post-mitigation sampling will determine system effectiveness.*

Therefore, no change is proposed.

**Comment 4: ASTM Standard. Page 3, Paragraph 3: Instead of ASTM E2121-11, revise to ASTM E2121-13.**

Response: This change will be made as requested.

**Comment 5: Page 4, Implementation Schedule: It states that implementation of the plan will take 90 days, yet the installation will take no more than three days. Please reduce the estimated timeframe for required implementation (such as to 15-45 days, depending site-specific situations).**

Response: The subject mitigation plans entail the same implementation scheduled as included in the conditionally-approved mitigation plans for Residences #21, #84/85, #105/124/125. The explanation for the implementation schedule was provided in the response to comments letter dated 4 December 2015:

*The estimated time to install the mitigation system (1-3 days) is not the only factor to be considered for the period required between plan approval and the dates of the install. The installation date is dependent upon many factors including, but not limited to:*

- *Obtaining plan approval from the owner(s) and tenant(s) entailing a meeting onsite*
- *Providing a site visit for the mitigation installer (which may coincide with the owner/tenant meeting) for obtaining additional building-specific measurements and making final design decisions*
- *Gathering all site-specific installation materials*
- *Scheduling with the owner(s) and tenant(s) to minimize inconveniences associated with power interruption and any potential noise during installation*
- *Scheduling in accordance with all parties involved, including the mitigation installer, the owner(s), the tenant(s), Locus, EPA, and EPA's contractors*
- *Preparation of final O&M Plans for the property owner(s)*

*With the number of stakeholders involved in this project, it will not be feasible to complete the implementation within 14 days. However, in the interest of expediting the installation, Locus has revised the installation period in the mitigation plans from 120 to 90 days contingent on availability of system components, any permits required, and scheduling with the occupants and contractors. Locus will work as quickly as possible, but given the potential for delays, a 90 day period will allow the project to proceed on the predetermined schedule.*

In addition, since the conditional approval of the previous mitigation plans (with 90-day implementation schedule) for Residences #21, #84/85, #105/124/125, EPA has requested an additional "final" approval of the mitigation plan following the property owner's approval to proceed, and the timing for EPA's approval cannot be determined by the mitigation installation team. Therefore, no change to the schedule is proposed.

**Comment 6: Crawlspace Action Levels. Regarding the proposed crawlspace action levels (with footnote justification), the provided justification for the proposed crawlspace cleanup level**

is not defensible and is insufficiently protective. EPA's preferred action level for this early action associated with the ongoing VI evaluation is the long-term screening level (0.48 micrograms per cubic meter or ug/m3), which can be evaluated in light of the risk range and a robust statistical analysis of background outdoor air concentrations.

Regarding the outdoor air concentrations, while we have seen outdoor air TCE levels up to 0.62 ug/m<sup>3</sup> in the course of the investigation, these levels do not appear to be typical. Further sampling and analysis is appropriate regarding background for the site, and should include data sets from sampling investigations at nearby sites and historical outdoor air trends.

#### **Calculation of House-Specific Attenuation Factors Not Defensible**

The approach proposed in the mitigation plans is to set "house-specific" crawlspace cleanup levels, minimizing the attenuation factor (AF) ratio, defined as the crawlspace concentration divided by the indoor air concentration. However, with only two sets of data points in the dataset (for example, RES 92 and 93 data sets in the plan for RES 92/93), statistical calculations would not be meaningful, which EPA assumes is why the plan proceeds with a simple range comparison. However, the dataset is simply too small to yield a result of any confidence. EPA cannot support building-specific nor site-specific attenuations on such a basis.

The small number of data points for this house do not make for a robust evaluation of a building-specific or site-specific crawlspace attenuation factor. Consider for instance, EPA, 2012<sup>1</sup>, in which EPA concluded that data from 45 residential buildings nationwide were not a statistically significant data set to modify an attenuation factor for crawlspace-to-indoor-air to a value different than 1. Therefore, the default attenuation factor should be 1 (no attenuation) per EPA's OSWER guidance, and the long-term target crawlspace air concentration for TCE remains the long-term screening level (0.48 µg/m<sup>3</sup>) for justification of mitigation termination procedures.

Using the larger data set from EPA's vapor intrusion guidance, the 90<sup>th</sup> percentile shows no attenuation between crawlspace and indoor air. Therefore, we must assume no attenuation and use an appropriate action level for these early mitigation efforts. (See below for discussion of data from this and other VI investigations that illustrate lack of attenuation.) While we can set a higher level (though still within the risk range, see below) at which to evaluate the effectiveness of the mitigation work, EPA's long-term goal for Superfund Sites is to lower exposures as much as possible within the protective risk range to the low end of the risk range (for TCE, the long-term screening level).

<sup>1</sup>EPA, 2012, **EPA's Vapor Intrusion Database: Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings**, EPA 530-R-10-002, Office of Solid Waste and Emergency Response, Washington, DC 20460, March 16.

#### **Concerns Regarding Make-Up Air**

As discussed above, EPA's guidance includes a general attenuation factor of 1 for crawlspaces and does not support the methodology used in the footnote of the mitigation plans of a building-by-building basis using a very limited data set.

Without evidence to the contrary, we must assume that there are potentially certain rooms in each building (such as interior rooms, or other rooms with certain occupancy features) that are poorly ventilated, or without windows or other venting entirely, for which all of the

replacement (“make-up”) air may be coming from the crawlspace. In these rooms we will likely see much higher levels of contaminants (for example, under increased stack effect during the heating season), given higher frequency monitoring that is capable of detecting these variations.

Given the presence of such indoor spaces, it would not be acceptable to leave crawlspace TCE levels at a concentration that is three times higher than the long-term screening level, in light of the narrowness of the risk range and the stringency of the short-term screening level.

An alternate scenario is a future modification to the building (such as a renovation or repair that creates new pathways to the crawlspace) that we have no control over, which may create future unacceptable exposures.

### **Sampling Results at Nearby Sites**

EPA is conducting VI investigations at similar South Bay sites in similar residential settings (similar housing stock – mix of older and newer single- and multi-family buildings, raised over crawlspace) where no attenuation is observed via the crawlspace. (We have already discussed the sampling results of RES 79 of this investigation, which was completely sealed during the sampling event (in-between tenancies) and showed identical TCE levels indoors and in the crawlspace.)

In fact, indoor air levels higher than crawlspace levels are being observed across multiple sampling events without apparent indoor air sources of TCE. See, for example the attached data table for the residential VI evaluation associated with the Teledyne/Spectra-Physics site in Mountain View, CA.

For example, the occupant of RB-6 is elderly and does not generally leave his home. This pattern of occupancy results in all windows & doors shut for extended periods of time, which allows indoor air levels of TCE rising from the crawlspace to accumulate.

Another example – the levels measured in RB-8 result from a winter sampling event, during which the occupants heat their home and minimize opening & closing of doors. We can see levels in the indoor air during this sampling event that are six times higher indoors than in the crawlspace.

The proposed crawlspace action level of 1.6 ug/m<sup>3</sup>, for example, for Residence #92/93, would not have been sufficiently protective in either of these cases. Action levels must ensure protectiveness across all reasonable occupancy (exposure, ventilation, etc.) scenarios.

Excerpt from Teledyne/Spectra-Physics Data Table:

RB-2 (0.23 ug/m<sup>3</sup> TCE in indoor air / 0.22 ug/m<sup>3</sup> TCE crawlspace)  
RB-6 (1.8 ug/m<sup>3</sup> TCE in indoor air / 0.75 ug/m<sup>3</sup> TCE crawlspace)  
RB-8 (2.9 ug/m<sup>3</sup> TCE in indoor air / 0.48 ug/m<sup>3</sup> TCE crawlspace)  
RB-21 (0.63 ug/m<sup>3</sup> TCE in indoor air / 0.39 ug/m<sup>3</sup> TCE crawlspace)  
RB-24 (0.64 ug/m<sup>3</sup> TCE in indoor air / 0.38 ug/m<sup>3</sup> TCE crawlspace)

### **Need for a Mitigation Effort Consistent with Final VI Remedy**

EPA needs to ensure that the ultimate remedy for vapor intrusion, memorialized in the future Record of Decision Amendment (RODA) for the Triple Site, is consistent with the current mitigation effort. For example, we would not want to implement mitigation systems for

*buildings that result in levels that are less protective than the cleanup levels for indoor air that are ultimately established in the RODA. This would necessitate us returning to these buildings in the future to re-do the mitigation systems. Rather, we should aim for a system that is more protective, to ensure that the systems we install can be the final, permanent VI remedy for each of the affected buildings.*

*For example, a number of Region 9 sites have used a goal of 1 ug/m<sup>3</sup> as an evaluation benchmark with a margin of safety to be protective of short-term exposures. Note that these benchmarks were set prior to EPA's 2011 re-assessment of the toxicological properties of TCE when the previous long-term screening level for TCE in residential settings was 1.2 ug/m<sup>3</sup> and the risk range extended to approximately 100 ug/m<sup>3</sup> (vs 2 ug/m<sup>3</sup>, as is now the case).*

*See, for example, the RODA for the MEW Superfund Site in Mountain View, which established a residential cleanup level of 1 ug/m<sup>3</sup> TCE for indoor air. Or the interim residential indoor air cleanup level of 1 ug/m<sup>3</sup> for the Motorola 52<sup>nd</sup> Street Superfund Site established in the Amended Consent Decree. At the Moffett Field and CTS Printex Superfund Sites, a TCE residential indoor air cleanup standard of 1 ug/m<sup>3</sup> has also been established. For the MEW and Moffett Field Sites, crawlspace levels exceeding this standard of 1 ug/m<sup>3</sup> prompt additional actions, such as increased sampling frequency and system optimization. While a few residences have required optimization of the mitigation system, these standards have generally been achievable.*

Response: The referenced 2012 EPA guidance for attenuation factors acknowledges that crawlspace attenuation factors are expected to be influenced by building characteristics. Where site-specific data are available, regional data may be reasonably determined to be unrepresentative of site-specific conditions. EPA has referenced RES079 results as an indication of concentrations being identical in the crawlspace and indoor air at this site. However, the crawlspace concentration was below detection in this residence, and the indoor concentration close to the reporting limit (0.096 µg/m<sup>3</sup>). These data do not appear to support this statement.

The proposed mitigation plan entails post-mitigation sampling, which will grow the dataset, and the proposed approach entails re-evaluation of the attenuation factor with these new data. The approach also evaluates all ambient data, using the worst-case applicable data for determination of the attenuation factor. Therefore, the recommended approach allows for an attenuation factor of 1.0 if supported by the data. Further, the ambient sampling locations (rooms) selected for sampling are those showing highest risk for vapor intrusion. Over time, an increasingly robust data set will be established to evaluate the actual building-specific attenuation factors, rather than relying on regional data which may not be relevant to this site.

Based on the proposed design, it is likely that the proposed mitigation system will effectively reduce concentrations below the 0.48 µg/m<sup>3</sup> screening level. However, since ambient background concentrations have been observed at this site above this screening level, it may not be effective or appropriate to take additional actions whenever crawlspace concentrations exceed this level. In the interest of addressing EPA's concerns about potential for crawlspace concentrations to directly impact occupants, Locus will proceed with additional evaluation to determine if further actions are warranted if concentrations are consistently observed above 0.48 µg/m<sup>3</sup> in the crawlspace, and there is a statistically significant difference between the indoor concentrations and the ambient background concentrations.

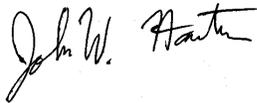
Finally, it is noted that in the dataset EPA provided from the Teledyne/Spectra-Physics site, there are crawlspace concentrations above  $0.48 \mu\text{g}/\text{m}^3$  where no action is recommended because indoor concentrations remain below the screening level (SSRB-28). This recommendation is contradictory with EPA's proposed approach for this site. Please clarify if EPA intends to approve that recommendation, or will be requiring action contrary to recommendations.

*Comment 7: The Operations, Maintenance & Monitoring (OMM) Plan. A reminder that OMM plans for these residential mitigation efforts must be provided to EPA for review before EPA can issue final approval of these mitigation plans.*

Response: Reminder noted. However, please note that draft mitigation plans are being provided to property owners and residents prior to this final approval, and consent from those property owners is being based on the provided draft copies of the plan. Therefore, there is limited opportunity for further revision to the plans once the owner has signed the access agreement.

If you have any questions regarding this correspondence, please call me at (415) 799-9937.

Sincerely,

A handwritten signature in black ink that reads "John W. Hawthorne".

J. Wesley Hawthorne, PE, PG  
Senior Vice President

JWH/njl

cc: (electronic copies)  
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