



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

August 31, 2023

Mr. Joshua Nandi  
Northrop Grumman Systems Corporation  
One Space Park Mail Stop: NGC CER-XE6D21  
Redondo Beach, CA 90278

SENT VIA EMAIL

**Re: Northrop Grumman Vapor Intrusion Evaluation Report. Former TRW Microwave Site, 825 Stewart Dr., Sunnyvale, California, TRW Microwave Superfund Site (CERCLIS ID# CAD009159088)**

Dear Mr. Nandi:

Thank you for submitting the Northrop Grumman Systems Corporation (NGSC) Vapor Intrusion Evaluation Report, dated of June 23, 2023; and prepared by AECOM on behalf of NGSC. The Report presents and evaluates the results of the field data collected during the investigation conducted at the Site between April 24, 2023, and May 5, 2023.

EPA agrees that, based on the results of the field data collected in this investigation, subsurface vapors of volatile organic compounds (VOCs) are not migrating into indoor air at levels above detection limits and there are no unacceptable human health risks for inhalation of indoor air from subsurface vapors at the Site under current building conditions.

Based on the data from this investigation, EPA further concludes that the building HVAC/ventilation system operations (resulting in positive building pressure) and the building slab are the major conditions preventing and mitigating vapor intrusion under the building's current conditions.

Although the field data results are usable and accepted by EPA, this Vapor Intrusion Evaluation Report (Report) is not acceptable as written and needs to be revised and resubmitted to EPA. The vapor intrusion evaluation in this report based on the Acetone concentration and calculated attenuation factor is fundamentally incorrect. Therefore, all the related discussion and evaluation should be deleted, and another evaluation presented that considers building pressure and slab condition.

EPA requests repeating this sampling event during the upcoming winter season to record the effects of the HVAC operating conditions and pressure cycling during a different season (targeting the late fall to early winter as the seasonal weather changes) to record information for a long-term stewardship planning. This additional data can assist in the planning of institutional controls (e.g., inspect building slab, building use changes, HVAC/ventilation modification (e.g., addition of HVAC units or exhaust, rebalancing of the HVAC)) in the long-term stewardship.

From the report it appears that port SS7 was not found and therefore was not decommissioned. For the long-term stewardship, this port shall be found and decommissioned.

#### A. General Comments

This Report neglected to discuss the pressure differential data in the context of the results, incorrectly indicated that the SVC system was effective in mitigating vapor intrusion, and erroneously presented a discussion on attenuation factor for Acetone, which is commonly found as background in indoor air of residences, industrial buildings, and laboratories. Each of these issues is discussed in more detail below.

##### 1. Pressure Differential Data

The Executive Summary and the report did not discuss the indoor air results in the context of the pressure differential data. In Section 2.4 the pressure differential is presented as average values. EPA recommends presenting the range of the diurnal variation of the actual readings of pressure differential, instead of average values. EPA checked the pressure differential data, and it shows the building indoor air is consistently under positive pressure in relation to the subslab soil gas, thereby inhibiting subsurface vapor migration into the building.

EPA concludes that the building HVAC/ventilation system operations (resulting in positive building pressure) and the building slab, are the major conditions preventing and mitigating vapor intrusion under the building current conditions.

##### 2. Effectiveness of Passive SVC System

The Report states that the passive SVC system installed in 2015 is effective in mitigating vapor intrusion. Nevertheless, there is no data to support that this passive SVC system, as built, can sustain any measurable depressurization under this building slab. The data collected in 2015 for the VI pathway, demonstrated that there was no unacceptable risk from vapor intrusion after tenant improvements were completed and all penetrations of the slab were re-sealed. Therefore, a reasonable conclusion is that the tenant improvements and sealing of penetrations were effective in mitigating vapor intrusion. Please remove all statements from this report about the effectiveness/protectiveness of the passive SVC system.

EPA considers the primary benefit of the installed SVC system as being that it can be made active if needed. The data also helps to provide evidence that exhaust from the SVC is not impacting the building's ventilation system / roof intakes. The current field data results indicated that activation of the SVC system into an active SSD (subslab depressurization) system is not required at this time, because the building slab and building HVAC/ventilation system are effectively preventing and mitigating vapor intrusion.

Accordingly, please delete from this report the following statement:

- “Note that the installation of the passive SVC system effectively increases the attenuation of sub-slab vapors between the building foundation and indoor air by perhaps one to two orders of magnitude”.

There is no data collected associated with this passive SVC system (e.g., capacity of promoting subslab depressurization, air velocity, air flow and air concentration through vent riser) to support this statement and, as stated above, there were other lines of evidence that prevented/mitigated the vapor intrusion into this building.

### 3. Acetone Analysis

The Pathway Analysis presented in Section 3.1 focused on Acetone, and it was fundamentally incorrect as described below.

Acetone is a common background chemical in indoor air, outdoor and lab environments. This Report focused on discussing Acetone when TCE/PCE already indicated no vapor intrusion is occurring. The Report focused on a compound (Acetone) that is not a chemical of concern, is commonly found as background, has no vapor intrusion screening levels nor a project action level, and was detected in very low concentration (25 ug/m<sup>3</sup>). As a reference, below are the available exposure limits for Acetone:

- OSHA: The legal airborne permissible exposure limit (PEL) is 2,400,000 ug/m<sup>3</sup> averaged over an 8-hour work shift.
- NIOSH: The recommended airborne exposure limit (REL) is 590,000 ug/m<sup>3</sup> averaged over a 10-hour work shift.

The vapor intrusion evaluation should be focused on the detected compounds in the subsurface with the highest concentrations and highest frequency of detection, and the COC for the site, particularly TCE, PCE. Once a determination is made if vapor intrusion (VI) is occurring or is not occurring, based on the detected compounds with highest concentrations in the subsurface, any of the other detected compounds may be evaluated accordingly.

The soil gas is a mixture of chemical compounds. If VI is not occurring for one compound with the highest concentration in the mixture (e.g., TCE), then VI is not occurring for any of the other compounds of the mixture. On the other hand, if VI is occurring, then the compound concentration ratios in the soil gas mixture should be similar to the concentration ratios of those compounds in the indoor air.

Please remove the following statement on page 10. It is fundamentally incorrect and is not how VI is evaluated:

- Acetone was the only chemical detected in all media. Acetone was not detected in sub-slab soil vapor at SS-7R indicating the concentration in indoor air at IA-2 was not likely due to VI. Co-located samples SS-10/IA-3 reported detections of acetone; thus, a location-specific attenuation factor was calculated (7.1 microgram per cubic meter [ $\mu\text{g}/\text{m}^3$ ] in indoor air / 25  $\mu\text{g}/\text{m}^3$  in sub-slab soil vapor = 0.28). This attenuation factor (0.28) is approximately nine times greater than the USEPA default value (0.03), indicating that the source of acetone in indoor air is unlikely the result of VI.

Acetone is a common indoor air contaminant, and this type of evaluation is misleading and unnecessary. If this was a site COC, that is not a common indoor air contaminant, it would be fundamentally incorrect to conclude that if the location specific attenuation factor is greater than the EPA default value this would be an indication of indoor air sources. If a site-specific (location specific) attenuation factor is greater than the EPA default value, all it indicates is that the EPA default value was not conservative enough to predict the site-specific attenuation.

An attenuation factor can be as high as 1, and the value of 1 indicates that there is no attenuation. If a location specific attenuation factor is greater than 1, that may indicate an indoor air source or the existence of another subsurface source or preferential pathway that were not identified.



## B. Specific Comments

Revise Executive summary to:

- Delete the sentence: “The passive Sub-Slab Vapor Collection (SVC) system below the existing site building is effectively mitigating the VI pathway.”
- Include “at this time” after “no further sampling is warranted.”
- Discuss the indoor air results under the context of the pressure differential data.
- Include discussion on long-term stewardship.
- Clarify what institutional controls are in place to assure that sampling is performed if changes in building conditions occurs in the future that could affect the vapor intrusion pathway.

Page 1, Delete the following sentences:

- As noted in Section 1.1, previous VI sampling events in May and December of 2015 have established that the passive Sub-Slab Vapor Collection (SVC) system is protective of human health.
- Evaluations have determined that the SVC system is effectively mitigating the VI pathway.

Page 3, Activity 3 is missing the following:

- deployed outdoor air sampling equipment (Radiello samplers) near the HVAC intake on the roof top for 7-day sampling duration.

Page 3, Activity 3 and 4, correct the subslab ID, replace SS-7 by SS-7R, in the following sentences:

- Deployed differential pressure recorders at SS-2, SS-7, and SS-10 for continuous monitoring...
- Stopped and removed differential pressure monitoring equipment from SS-2, SS-7, and SS-10.

Note that subslab ID SS-7 was not located and another port was installed with ID SS-7R.

Page 4, Port ID SS-7 was not located and therefore was not demolished. Please remove it from the list in following sentence:

- Demolished new and existing sub-slab sample probes (SS-2, SS-3, SS-4, SS-5, SS-7, SS-7R, SS-10, and SS-12).

If port ID SS-7 was later located and demolished, further discussion of SS-7 should be added to the report, including photo.

Revise Figure 4 to indicate SS-7 was not located therefore it was not demolished.

Page 4, Delete or edit the following sentence:

- Temperature readings were not used for any type of evaluation or data interpretation.

As noted above, temperature was used by the laboratory for the Radiello sampling results.

Page 4. Indicate in section 2.1 and Figure 4, that location IA-7 was moved closer to the SS-2 location.

Pg. 4. This report stated that:

- “temperature readings were not collected” and “Temperature readings were not used for any type of evaluation or data interpretation.”

This statement shall be deleted or edited to discuss the missing temperature readings, or the temperature information can still be gathered from the building HVAC set point for indoor air temperature.

Temperature is used by the laboratory to quantify sample results from Radiello samplers. The laboratory report and chain of custody (COCs) for the Radiello samples were missing from this report. It was provided later upon EPA request. The laboratory assumed a standard temperature (25 degrees Celsius, 77 degrees Fahrenheit) to determine the Radiello sample results. As building temperatures are normally set in the range of 68 – 78 degrees Fahrenheit, and the conditions of the building during sampling were consistent with this temperature range, EPA accepted the data results from the Radiello samples as usable but recommends that the HVAC temperature set for the indoor air be recorded in any future sampling.

Page 6, Section 2.4.2.1, the text is confusing and not accurate and needs editorial revision. Shut-in test is performed first, then a leak test is performed during purging and during sampling. For the leak test during purging a purged volume of 300 ml was adopted to have enough air (soil gas) for a helium detector reading.

Page 7. Section 2.4.2.2, text is not accurate, needs editorial revision. A fixed volume of 300 ml was adopted for purging to get enough volume for the helium detector reading.

Page 8. Section 5. Following sentence shall state Modified Method TO-17

- samples collected via Radiello® sampler were analyzed for VOCs using USEPA Method TO-17.

Page 9. Section 3.1 It is stated:

- Co-located sub-slab soil vapor and indoor air samples were collected at locations SS-7R/IA-2 and SS-10/IA-3.

There are other collocated sample locations not referenced: SS-2/IA-7 and SS-5/IA-6

Page 9. Section 3.1. The following sentence is fundamentally incorrect and should be deleted:

- An attenuation factor greater than the default is indicative of an indoor source of chemicals.

If a site-specific (location specific) attenuation factor is greater than the EPA default value, all it indicates is that the EPA default value was not conservative enough to predict the site-specific attenuation.

Page 10. There is no fundamental basis for the following statement, which should be deleted:

- Note that the installation of the passive SVC system effectively increases the attenuation of sub-slab vapors between the building foundation and indoor air by perhaps one to two orders of magnitude,

Page 11. Section 3.2.5. There is no evidence to fundamentally support the following statement:

- The passive SVC system is designed to collect vapors below the building slab and vent to the atmosphere as a protective measure against any current or future vapor intrusion...health risk should the SVC system be removed from service.

As stated above, there is no evidence that support the passive SVC as the major factor mitigating VI. The slab condition and the building positive pressure are the major mitigation factors.

Page 12, second paragraph, replace “should the SVC system be non-operational” by “should building be underpressurized relative to soil gas”.

Page 12. Section 4.1. Replace the text “presence of the passive SVC system” by “building pressurization and slab condition”.

Page 12 Section 4.2.1 edit the following sentence to indicate “represents a different operating condition scenario”:

- The HVAC system was running throughout sample collection. Previous sampling events were conducted with the HVAC system off which represents a worst-case scenario for VI.

There is no evidence that HVAC system off is always the worst-case scenario for VI. HVAC system off represent just a different operating condition. If a building occupancy under normal operating conditions is with HVAC system on, that is the condition representing the exposure scenario. Revise the above statement accordingly.

Page 13 section 4.3, Include “at this time” after “no further sampling is warranted”.

Table 2. Define what negative pressure means.

Table 3. Include the historical TCE/PCE results for comparison.

Based on the comments above, please revise and resubmit the Report within 30 days from the date of this letter. While this Report is being revised, please proceed with scheduling the requested second sampling event to capture seasonal changes and coordinate with EPA for oversight.

Please feel free to contact me anytime at [abreu.lilian@epa.gov](mailto:abreu.lilian@epa.gov) or 415-972-3010 if you have any questions or comments.

Sincerely,

**LILIAN ABREU**  
Digitally signed by LILIAN  
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Lilian Abreu, PhD  
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cc: Holly Holbrook, AECOM