UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IX

In the Matter of: **MEW Study Area** **Fairchild Semiconductor Corporation** **Schlumberger Technology Corporation** **National Semiconductor Corporation** **Renesas Electronics America Inc.** **SUMCO** **Sobrato Development Companies** **Vishay GSI, Inc.** **Baker Hughes Incorporated** **The Dow Chemical Company** **Respondents**	**U.S. EPA** **Administrative Order Docket Number 91-4A** **(Amendment to Administrative Order Docket Number 91-4)**

Amendment 91-4A to Administrative Order, Docket Number 91-4
Remedial Design and Remedial Action of the
MEW Site Vapor Intrusion Remedy

The U.S. Environmental Protection Agency (EPA) issued Administrative Order for Remedial Design and Remedial Action, Docket Number 91-4 (Order), on November 29, 1990, requiring Respondents to implement the remedy for the Middlefield-Ellis-Whisman (MEW) Superfund Study Area (Site) as selected in the 1989 Record of Decision (ROD). Since issuance of the Site ROD, EPA has determined that the remedy in the 1989 ROD did not adequately protect human health, because it did not address exposure to Site contaminants through the vapor intrusion pathway. On August 16, 2010, EPA amended the ROD (2010 ROD Amendment) to select a vapor intrusion remedy for the Site. In accordance with Section XII.A of the Order, EPA has determined that additional response activities are necessary to protect human health at the Site. Accordingly, EPA amends the Order as follows:

Page 3A of the Order is inserted to add the following subparagraph E to Section I (Introduction and Jurisdiction):

E. The Order was issued to 9 Respondents. This amendment to the Order names those Respondents or, where applicable, their successors in interest.

Page 17 of the Order is substituted and Page 17A is inserted to add the following subparagraphs 12, 13, and 14 to Section II.B. (Findings of Fact: Site Investigations and Enforcement History):

12. In 2002, EPA received information that indicated that the remedy set forth in the 1989 ROD may not be protective of human health and the environment because the remedy in the 1989 ROD did not address exposure to Site contaminants through the vapor intrusion pathway. Since 2003, Respondents have been conducting actions to support development of the vapor intrusion remedy and to address the vapor intrusion pathway. On August 16, 2010, EPA issued an Amendment to the 1989 ROD to address the vapor intrusion pathway.

13. Respondents to the Order participated with EPA in development of a Vapor Intrusion Remedial Design and Remedial Action Statement of Work (Attachment 4) which details the Vapor Intrusion Work to be conducted to implement the vapor intrusion remedy.

14. Two potentially responsible parties – Intel Corporation and Raytheon Company – have been implementing a portion of the soil and groundwater remedy selected in the 1989 ROD pursuant to a Consent Decree with the United States, Case No. 91-CV-20275 JW, entered on April 10, 1992 (Consent Decree 91-CV-20275 JW). These parties have agreed to implement the Vapor Intrusion Work under the terms of a proposed amendment to that Consent Decree.

Page 21 of the Order is substituted and Page 21A is inserted to add the following subparagraph 5 to Section II.C. (Findings of Fact: Endangerment to Human Health and the Environment):

5. Chemicals originating from each Respondent's facility and migrating from the subsurface into overlying buildings at the MEW Site pose a threat or a potential threat to human health of building occupants.

Page 23 of the Order is substituted and Page 23A is inserted to add the following language to Section IV (Notice to the State):

On September 12, 2011, EPA provided notice to the California Department of Toxic Substances Control and the California Regional Water Quality Control Board – San Francisco Bay Region of its intent to issue the amendment to the Order.

Page 28 of the Order is substituted and Page 28A is inserted to add the following definitions in subparagraphs 24-26 to Section VI (Definitions):

24. "2010 ROD Amendment" shall mean the document signed by the Assistant Director of the Superfund Division of Region IX on August 16, 2010, which describes the vapor intrusion remedy to be implemented at the Site.

25. "Vapor Intrusion Remedial Design and Remedial Action Statement of Work" shall mean the document setting forth the Work to be conducted to implement the vapor intrusion remedy, and which is attached hereto as Attachment 4.

26. "Vapor Intrusion Work" shall mean the Work required in the Vapor Intrusion Remedial Design and Remedial Action Statement of Work (Attachment 4).

Page 38 of the Order is substituted and Page 38A is inserted to add the following:

Subsection (e) is added to Section IX.B.3 (Work to be Performed: Work Requirements: Requirements of the Work and Cleanup Standards):

(e) **Vapor Intrusion Remedy** Where a vapor intrusion remedy is determined to be required at existing or future buildings according to the protocol, and in the geographic area, designated by Attachment 4, the selected remedy for the vapor intrusion pathway in the 2010 ROD Amendment is: (i) for existing buildings: installation, operation, maintenance, and monitoring of an appropriate active sub-slab/sub-membrane ventilation system, where determined necessary through indoor air sampling and other lines of evidence. Existing non-residential buildings may utilize the building's indoor air ventilation system as the remedy if the property/building owner agrees to use, operate, and allow for monitoring of the indoor air ventilation system; (ii) for future construction/buildings: the installation of a vapor barrier and passive sub-slab ventilation system with the ability to be made active except where multiple lines of evidence show that there is no potential for vapor intrusion into a particular building exceeding indoor air cleanup levels; and (iii) the implementation of institutional controls and monitoring to ensure the long-term effectiveness of the remedy. Requirements for implementation of the vapor intrusion remedy are set forth in the Vapor Intrusion Remedial Design and Remedial Action Statement of Work (Attachment 4). The MEW Site indoor air cleanup levels for long-term exposure for residential and non-residential buildings are as set forth in Table 1 of Attachment 4.

The following language is added to Section IX.C.1. (Work to be Performed: Work Requirements: Joint Work: General Description):

Joint Work shall also include the implementation of the vapor intrusion remedy as set forth in the Vapor Intrusion Remedial Design and Remedial Action Statement of Work (Attachment 4) in all areas of the Site except those properties designated as Facility-Specific in either this Order or the Consent Decree 91-CV-20275 JW.

Page 43 of the Order is substituted and Page 43A is inserted to add the following language to Section IX.D.1. (Work to be Performed: Work Requirements: Facility-Specific Work: General Description):

Facility Specific Work shall also include implementation of the vapor intrusion remedy as set forth in the Vapor Intrusion Remedial Design and Remedial Action

Statement of Work (Attachment 4) at all properties designated as Facility Specific in either this Order or the Consent Decree 91-CV-20275 JW.

In accordance with Section XII.B of the Order, Respondents shall notify EPA of their intent to perform the additional response activities within 7 days of receipt of this amendment to the Order.

IT IS SO ORDERED on this 16th day of September, 2011.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

BY: K Moore for KS

Kathleen Salyer
Assistant Director, Superfund Division, California Site Cleanup Branch
U.S. Environmental Protection Agency, Region 9

Attachment 4

Vapor Intrusion Remedial Design and Remedial Action Statement of Work

Statement of Work

Remedial Design and Remedial Action to Address the Vapor Intrusion Pathway

Middlefield-Ellis-Whisman (MEW) Superfund Study Area
Mountain View and Moffett Field, CA

September 2011

1 Introduction

This Statement of Work (SOW) is for the Remedial Design (RD) and Remedial Action (RA) activities for the vapor intrusion remedy at the Middlefield-Ellis-Whisman (MEW) Superfund Study Area in Mountain View and Moffett Field, California (MEW Site or Site). All work required pursuant to this SOW is referred to herein as Vapor Intrusion Work.

The parties conducting the Vapor Intrusion Work under this SOW are both the Defendants in the 1991 Consent Decree and the Respondents to the 1990 Unilateral Administrative Order (106 Order) (collectively referred to herein as "MEW Companies"). The MEW Companies are responsible for implementing the Vapor Intrusion Work in this SOW in all areas of the Vapor Intrusion Study Area except for the area within the former Naval Air Station (NAS) Moffett Field designated as the Navy Vapor Intrusion Area, as depicted on the map attached as Figure A1. Vapor Intrusion Work in certain other areas of the Vapor Intrusion Study Area at NAS Moffett Field will be conducted by the National Aeronautics Space Administration (NASA). All entities conducting the Vapor Intrusion Work pursuant to this SOW are referred to in this SOW as "Implementing Parties." The Implementing Parties shall conduct the Vapor Intrusion Work and submit deliverables to EPA for review and approval in accordance with the August 16, 2010 Record of Decision Amendment (2010 ROD Amendment), this SOW, and the enforcement document pursuant to which it is being implemented.

EPA selected the vapor intrusion remedy for the MEW Site in its 2010 ROD Amendment. (see Attachment A). The 2010 ROD Amendment addresses the potential long-term exposure risks from trichloroethene (TCE) and other Site chemicals of concern through the vapor intrusion pathway. Vapor intrusion is an exposure pathway from the shallow subsurface contamination that was not addressed in the 1989 ROD for the MEW Site. The 1989 ROD presented selected soil and groundwater remedial actions, and these remedial actions are being conducted pursuant to the enforcement agreements with the Implementing Parties.

The primary source of vapor intrusion into buildings at the MEW Site is TCE contamination in shallow groundwater; accordingly, the Vapor Intrusion Study Area is generally defined as the area where TCE concentrations in shallow groundwater are greater than 5 micrograms per liter (μg/L), or parts per billion (ppb) (See Figure 1, Vapor Intrusion Study Area – MEW Area and Moffett Field Area). The area south of U.S. Highway 101 (Bayshore Freeway) within the Vapor Intrusion Study Area (referred to herein as the "MEW Area") includes shallow groundwater contamination that migrates northward through the subsurface onto former NAS Moffett Field, where the contamination mixes with U.S. Navy and NASA contaminant sources. The combined area of contamination within the Vapor Intrusion Study Area on Moffett Field is referred to herein as the "Moffett Field Area."

The Remedial Action Objective (RAO) that will be addressed by the vapor intrusion remedy is "to ensure that building occupants (e.g., workers and residents) are protected from Site contamination by preventing subsurface Site contaminants from migrating into indoor air or accumulating in enclosed building spaces exceeding indoor air cleanup levels for long-term exposure." (See 2010 ROD Amendment).

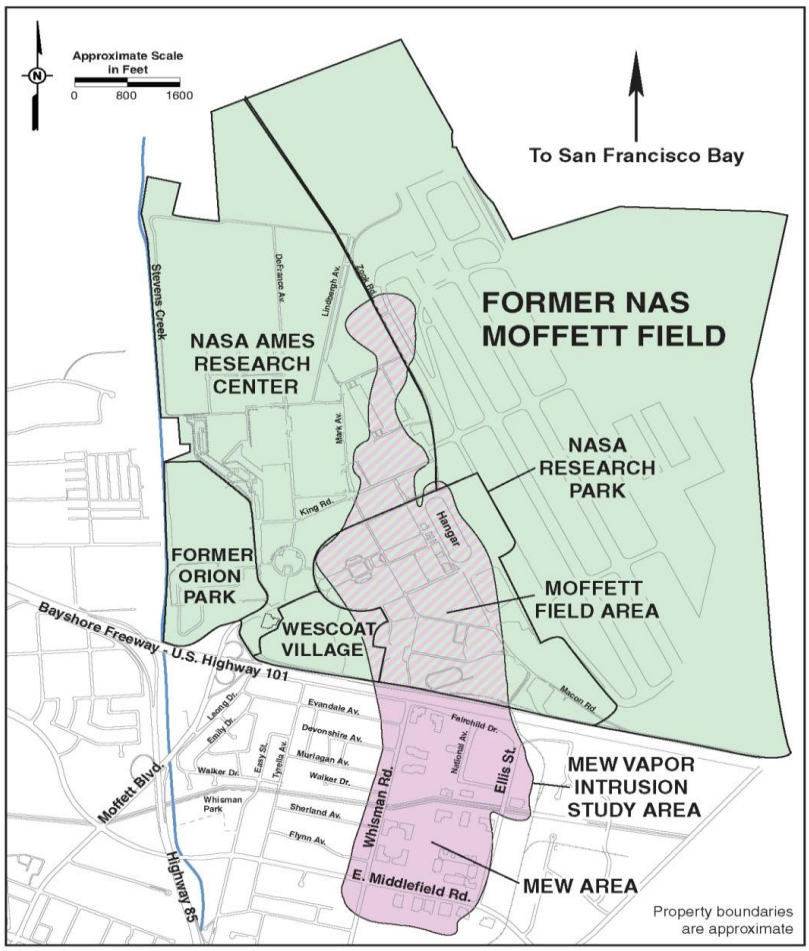


Figure 1: Vapor Intrusion Study Area – MEW Area and Moffett Field Area

In addition, the 2010 ROD Amendment set the Site indoor air cleanup levels for long-term exposure for TCE and other Site chemicals of concern for residential and non-residential buildings (Table 1).

EPA's Vapor Intrusion Remedy

The vapor intrusion remedy for the MEW Site consists of the following within the Vapor Intrusion Study Area:

- For Existing Buildings – Installation, operation, maintenance, and monitoring of an appropriate Sub-slab/Sub-membrane Ventilation System, where determined necessary through indoor air sampling and other lines of evidence. Existing non-residential buildings may utilize the building's indoor air mechanical ventilation system as the remedy if the property/building owner agrees to use, operate, and allow for monitoring of the system.

TABLE 1

Indoor Air Cleanup Levels for Long-term Exposure for the MEW Site - Residential and Non-Residential Buildings

MEW Site Chemical of Concern	Indoor Air Cleanup Level (microgram per cubic meter [µg/m^3])	
	Residential	Non-Residential
Trichloroethene (TCE)	1	5
Tetrachloroethene (PCE)	0.4	2
cis-1,2-dichloroethene (1,2-DCE)	60	210
trans-1,2-DCE	60	210
Vinyl Chloride	0.2	2
1,1-dichlorethane (1,1-DCA)	2	6
1,1-dichloroethene (1,1-DCE)	210	700

- For Future Buildings – Installation of a vapor barrier and passive sub-slab ventilation system with the ability to be made active, except where multiple lines of evidence show that there is no potential for vapor intrusion above Site indoor air cleanup levels into a particular building.
- Institutional controls (ICs) and monitoring to ensure the long-term effectiveness of the vapor intrusion remedy.

The vapor intrusion remedy will be implemented on a building-by-building basis, and in some instances property-by-property basis, where response actions are required in the MEW and Moffett Field Areas under Site-wide and Building-Specific or Property-Specific planning and reporting documents, as summarized below. See ROD Amendment, Section 12.1, for more details.

Tiering System to Determine Appropriate Vapor Intrusion Response Action

The 2010 ROD Amendment provides a tiering system to determine the appropriate response action for each building/property within the Vapor Intrusion Study Area. There are two tiering systems for existing buildings based on indoor air sampling with or without engineering controls in place, and another tiering system for future (new construction) buildings. After a building or property has been assigned a tier, the corresponding response action is implemented. Additional lines of evidence may be collected and evaluated at any time to determine whether a move between tiers is appropriate.

Existing Buildings

To determine the appropriate tier and corresponding response action for each existing building, the building must be evaluated using results from building surveys, walk-throughs, interviews, inspections, indoor air sampling, subsurface sampling, and other lines of evidence. For existing non-residential (e.g., commercial) and residential buildings, there are response action tiers for buildings sampled with an engineering control in place and operating and response action tiers for buildings sampled with no engineering control in place or operating. The tiers and corresponding response actions are shown in **Tables 2A** and **2B**.

For buildings sampled while an engineering control is in place or operating (e.g., active indoor air ventilation system or passive or active sub-slab ventilation system), it is assumed that the engineering control is acting to keep indoor air concentrations below the Site indoor air cleanup levels. In order to assess whether the operation or use of the engineering control is necessary to control vapor intrusion, the building must be sampled with the engineering control not operating.

For those buildings sampled while the engineering control is operating that fall into Tier 2, the vapor intrusion remedy requires continued operation, maintenance, and monitoring of that engineering control. For details, see **Table 2A**.

TABLE 2A
Response Action Tiering System for Existing Non-Residential and Residential Buildings in Vapor Intrusion Study Area Sampled with Passive Engineering Control in Place or Active Engineering Control Operating

Tier	Description	Response Action
Tier 1	Building with indoor air concentrations greater than outdoor (background)* air concentrations and indoor air cleanup level.	Implement remedy (appropriate engineering control) to meet indoor air cleanup levels. Once indoor air cleanup level achieved and confirmed, building re-categorized as Tier 2. Implement governmental, proprietary, and informational ICs.
Tier 2	Building with indoor air concentrations below the indoor air cleanup levels. Former Tier 1 existing building and Tier A future (new) building that confirmed indoor air concentrations are below the indoor air cleanup levels.	Ensure continued operation and maintenance of active ventilation system or other selected engineered remedy to meet RAOs. Develop and implement long-term monitoring and ICs implementation plan. Implement governmental, proprietary, and informational ICs. Where remedy is achieved through operation of an active ventilation system, agreement of property owner must be contained in a recorded agreement.

* Outdoor concentrations of TCE typically range from below laboratory analytical detection limits to 0.4 $\mu g/m^3$.

Reference: EPA 2010 ROD Amendment, Table 6A

For those buildings sampled without an operating engineering control and without an existing passive engineering control in place, and if indoor air results are below the Site indoor air cleanup levels, an engineered remedy is not required. For details, see **Table 2B**.

Where converging lines of evidence indicate that there is no potential for vapor intrusion above Site indoor air cleanup levels in a building at a property, the building and property will be categorized as Tier 4 with no response action required.

TABLE 2B
Response Action Tiering System for Existing Non-Residential and Residential Buildings in Vapor Intrusion Study Area Sampled with No Engineering Control in Place or Operating

Tier	Description	Response Action
Tier 1	Building with indoor air concentrations greater than outdoor (background)* air concentrations and indoor air cleanup level.	Implement remedy (appropriate engineering control) to meet indoor air cleanup levels. Once indoor air cleanup level achieved and confirmed, building re-categorized as Tier 2. Implement governmental, proprietary, and informational ICs.
Tier 3A	Building with indoor air concentrations below indoor air cleanup levels, but greater than outdoor (background) concentrations.	No engineered remedy required. Develop and implement long-term monitoring plan. Implement governmental ICs.
Tier 3B	Building with indoor air concentrations at or within outdoor air (background)* concentrations.	No engineered remedy and no long-term monitoring required. Implement governmental ICs.
Tier 4	Buildings where converging lines of evidence demonstrate that there is no longer the potential for vapor intrusion into the building exceeding indoor air cleanup levels.	No action required after performance of all necessary confirmation sampling and documentation approved by EPA that no action is necessary.

* Outdoor concentrations of TCE typically range from below laboratory analytical detection limits to 0.4 $\mu g/m^3$.

Reference: EPA 2010 ROD Amendment, Table 6B

Future Buildings

For future non-residential and residential buildings at properties within the Vapor Intrusion Study Area, there are two tiers: Tier A and Tier B. The description of Tiers A and B and their corresponding response actions are presented in **Table 3**.

Tier A applies to future buildings (new construction) on properties where engineering controls and ICs are necessary to meet the remedy requirements. Tier B is for those buildings on properties where multiple lines of evidence indicate that there is no potential for vapor intrusion exceeding Site indoor air cleanup levels in a building on the property. For both Tiers A and B, confirmation sampling must be performed after a building is constructed to confirm that indoor air cleanup levels are met.

TABLE 3
Response Action Tiering System for Future Non-Residential and Residential Buildings in Vapor Intrusion Study Area*

Tier	Description	Response Action
Tier A	Future (new) building on property where lines of evidence (soil gas, sub-slab soil gas, crawlspace) indicate that there is the potential for vapor intrusion into the new building above indoor air cleanup levels.	Implement remedy and perform indoor air sampling after construction to confirm remedial action is effective and meets Site indoor air cleanup levels. Implement governmental and proprietary ICs. Re-categorize as Tier 2 Existing Building.
Tier B	Future (new) building on property where lines of evidence indicate there is no potential for vapor intrusion into the building above EPA's indoor air cleanup levels.	Perform indoor air sampling after building is constructed to confirm that there is no potential vapor intrusion risk and indoor air cleanup levels are met. If confirmed with EPA approval, then re-categorize as a Tier 4 Existing Building and no action is required.

* Non-Residential or multi-family residential buildings constructed with aboveground raised foundations typically would be separated from the ground by a parking garage, which would allow adequate ventilation to prevent vapor intrusion into the occupied spaces. For this construction, perform targeted confirmation air sampling after building is constructed to verify absence of preferred pathways into building and to confirm indoor air cleanup levels are met.

Reference: EPA 2010 ROD Amendment, Table 7.

Summary of Vapor Intrusion Remedy

Table 4 summarizes the vapor intrusion remedy.

Existing Non-Residential Buildings

For Tier 1 and Tier 2 non-residential buildings, the vapor intrusion remedy is the sealing of all identified direct and leaking conduits that serve as pathways for subsurface vapors to migrate in the building, installation of an active sub-slab/sub-membrane ventilation system, ongoing operations, maintenance, and monitoring, and ICs. However, for an existing non-residential building with an operating indoor air ventilation system, such as a heating, ventilation and air conditioning (HVAC) system, use of that system may be utilized instead of an active sub-slab/sub-membrane ventilation system where the property/building owner agrees in a signed, recorded agreement to use, operate, and allow for monitoring of the building's ventilation system in a manner consistent with the operations, maintenance, and monitoring plan developed for that building. A sub-slab pressurization system with vapor barrier may be appropriate for an existing building where (1) such system has already been installed, and (2) if the system is operated in a manner consistent with the operations, maintenance, and monitoring plan developed for that building.

TABLE 4
EPA's Selected Vapor Intrusion Remedy for Existing and Future Buildings in Vapor Intrusion Study Area

Building Scenario	Vapor Intrusion Remedy
Existing Buildings (Non-Residential and Residential)	
Tier 1 and Tier 2 Buildings	Active Sub-slab/Sub-membrane Ventilation, Monitoring, and ICs (including conduit sealing) [1] ICs consist of: • Permitting and building requirements to install appropriate engineering controls in future construction. • Recorded Agreements for non-residential buildings in MEW Area to ensure installation and operation of engineering controls; require information be provided to future owners; require information of building changes be provided to EPA and the Implementing Parties. • Tracking service to provide information to EPA and the Implementing Parties of occupancy and building changes.
Tier 3A Building	No engineering control. Monitoring and ICs only. ICs consist of: permitting and building requirements to install appropriate engineering controls in future construction.
Tier 3B Building	No engineering control and no routine monitoring. ICs only. ICs consist of: permitting and building requirements to install appropriate engineering controls in future construction.
Tier 4 Building/Property	No vapor intrusion remedy required for building or future building on property.
Future Buildings (Non-Residential and Residential)	
Tier A Buildings	Passive Sub-slab/Sub-membrane Ventilation with Vapor Barrier (and the Ability to Be Made Active), Monitoring, and ICs[2] ICs consist of: • Permitting and building requirements to install appropriate engineering controls. Recorded Agreements remain in place for non-residential buildings.
Tier B Buildings	No vapor intrusion remedy required.

Notes:

[1] Alternatively, Active Indoor Air Ventilation System, Monitoring, and ICs (including conduit sealing) may be selected as the vapor intrusion remedy for Tier 1 and Tier 2 existing non-residential buildings, if the property/building owner agrees to use, operate, and monitor the indoor air ventilation system (e.g., HVAC), in a manner consistent with the operations, maintenance, and monitoring plan developed for that building, in a signed recorded agreement.

[2] Alternatively, Active Sub-slab/Sub-membrane Ventilation, Monitoring, and ICs (including conduit sealing) may be selected as the vapor intrusion remedy for Tier A future buildings.

Reference: EPA 2010 ROD Amendment, Table 8 (modified).

Existing Residential Buildings

For existing residential buildings where indoor air sampling indicates engineering controls are necessary to reduce chemicals of concern in indoor air to below the cleanup levels, the remedy is the sealing of all identified direct and leaking conduits that serve as pathways for subsurface vapors to migrate into the building, installation of an active sub-slab/sub-membrane ventilation system, monitoring, and ICs. For residential buildings with a slab-on-grade foundation or basement, the remedy requires depressurization. For residential buildings with a crawlspace, the remedy requires implementation of a sub-membrane depressurization system.

Future (New Construction) Buildings/Properties

The remedy for all future buildings is installation of a vapor barrier and passive sub-slab ventilation system with the ability to convert to active, monitoring, and ICs. Areas overlying higher TCE groundwater concentrations are considered to have a greater potential for vapor intrusion at levels exceeding indoor air cleanup levels; therefore initial installation of an active sub-slab ventilation system would meet the remedy requirements.

Institutional Controls

ICs for the vapor intrusion remedy are to: (1) ensure the operation and monitoring of engineering controls used to prevent levels of Site chemicals of concern associated with the vapor intrusion pathway from exceeding indoor air cleanup levels; (2) ensure that the appropriate engineering controls are incorporated, where necessary, into new building development at the Site; (3) provide information to building owners and tenants regarding the appropriate vapor intrusion remedy for each building; (4) provide information to EPA and the Implementing Parties regarding, among other things, new construction and changes of property ownership within the Vapor Intrusion Study Area.

As detailed below, the remedy requires utilization of three types of ICs: governmental controls, proprietary controls, and informational mechanisms. The remedy's governmental controls include the formalization of planning and permitting requirements at the City of Mountain View to require the appropriate vapor intrusion control measures in new building construction within the MEW Area of the Vapor Intrusion Study Area and to require that new construction plans obtain EPA approval to ensure that the appropriate vapor intrusion control system is part of building construction where necessary. In the Moffett Field Area, the remedy requires incorporation of remedy requirements into the applicable planning and permitting documents. For the NASA-owned portion of the Moffett Field Area, this means compliance with the Environmental Issues Management Plan (EIMP) and incorporation of remedy requirements into the NASA land use master plan, permitting, and other appropriate documents within the Moffett Field Area. For the U.S. Army-owned portion of the Moffett Field Area, the remedy requires that such requirements are incorporated into the appropriate planning, permitting, and other relevant documents for the Wescoat Housing Area. This IC must include a mechanism to ensure both that the appropriate requirements are in place and that they are implemented.

For proprietary controls, in the MEW Area the remedy requires the recording of agreements between the Implementing Parties and property owners at any property where an engineered vapor intrusion remedy is in place in buildings.

These recorded agreements must be enforceable and binding on successors. The recorded agreements must include: (1) notice to future building/property owners of the vapor

intrusion remedy and requirements; (2) access for sampling, remedy operation and maintenance, and monitoring; and (3) notice to EPA and the Implementing Parties when there are changes to the building ownership or operation that could impact the vapor intrusion remedy at that property. For future building construction in the MEW Area, the recorded agreements will remain in place and will be layered with the governmental ICs implemented through the City of Mountain View's planning and permitting procedures. Where agreements with property owners fail to be recorded, land use covenants with EPA as a third party beneficiary will be required to ensure that the remedy is appropriately implemented over time.

In the Moffett Field Area, ICs will be implemented through the federal land owners' planning documents. For most of the Vapor Intrusion Study Area on Moffett Field, the ICs will be implemented through NASA's land use planning documents, including the NASA land use master plan, permitting requirements, the 2005 EIMP and any subsequent EPA-approved revisions thereto. For the Wescoat Housing Area, owned by the U.S. Army, the ICs must be implemented through the applicable planning documents. The land use planning documents must require (1) implementation of the applicable remedy, (2) compliance with building-specific long-term operations, maintenance, and monitoring requirements for vapor intrusion control measures, (3) access for monitoring of a required remedy, and (4) incorporation of the applicable vapor intrusion remedy into new building construction.

For information mechanisms, the vapor intrusion remedy requires additional measures, including creation of a mapping database (e.g., Geographic Information System [GIS]), to ensure that parties interested in properties within the Vapor Intrusion Study Area are informed of the appropriate remedy requirements when making inquiries with the City of Mountain View, property owner, Moffett Field property owner, or EPA. The remedy also requires the use of an informational service to provide information to EPA and the Implementing Parties regarding activities in the Vapor Intrusion Study Area that could impact the vapor intrusion remedy, including changes to property ownership or occupancy and permitting applications for new construction, in order to ensure that owners and occupants can be informed regarding the remedy and its requirements in a timely manner.

2 Work To Be Performed

The MEW Site vapor intrusion remedy applies to buildings and properties within the Vapor Intrusion Study Area, and determination of the necessary response action is to be implemented on a building-by-building or property-by-property basis. This SOW applies to Site-wide vapor intrusion work, Building-specific work, and Property-specific work ("the Vapor Intrusion Work"). All provisions of the 1991 Consent Decree and 106 Order shall remain in effect for the purpose of implementing the Vapor Intrusion Work.

Unless otherwise directed by EPA, the Implementing Parties should not perform any Vapor Intrusion Work to fulfill requirements of the vapor intrusion remedy at the Site prior to EPA's authorization and approval to proceed.

The Implementing Parties shall cooperate and participate with each other to perform the Vapor Intrusion Work and shall coordinate their Facility-specific Vapor Intrusion Work activities with other Implementing Parties as appropriate.

As applicable to this SOW, the Implementing Parties shall integrate the results of any tasks or sampling performed by EPA and EPA's representatives, or as designated by EPA for inclusion into the Vapor Intrusion Work deliverables.

The Implementing Parties shall cooperate with EPA in providing information to the public regarding the Vapor Intrusion Work. As requested by EPA, the Implementing Parties shall participate in the preparation of information for distribution and presentation to the public. In addition, as requested by EPA, the Implementing Parties shall participate in public meetings which may be held or sponsored by EPA, or in which EPA is a participant, to explain activities relating to the Vapor Intrusion Work.

Access required for the Vapor Intrusion Work shall be obtained in the manner prescribed by the 1991 Consent Decree (Section XIV.A) and the 106 Order (Section XIX). All deliverables pertaining to Vapor Intrusion Work for actions requiring access shall include estimated expected timeframes to obtain access.

As provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and Section 300.400(e) of the NCP, no permit shall be required for any portion of the Vapor Intrusion Work conducted entirely on-site. However, certain of the Vapor Intrusion Work may require a state or local permit or approval, because the activities involved serve purposes other than solely for the vapor intrusion remedy. Where any portion of the Vapor Intrusion Work requires a state or local permit or approval, the Implementing Parties shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals. For any delay in the performance of the Vapor Intrusion Work resulting from a failure to obtain, or a delay in obtaining, any permit or approval, Settling Defendants may seek relief under the provisions of CD Section XVIII (Force Majeure) or 106 Order Section XXII (Delay In Performance), as applicable, provided that they have submitted timely and complete applications and taken all other actions necessary to obtain all such permits or approvals.

Unless another schedule is agreed to, final deliverables, including all plans and reports, required pursuant to this SOW are due within 30 days of receipt of EPA's comments on any draft deliverable.

All final deliverables shall be made available electronically for posting on a publicly available website within 14 days of EPA approval of the final deliverable. Any private residential or confidential business information shall be redacted prior to making information publicly available.

2.1 General Description of Work

The Implementing Parties shall submit the following deliverables for the Vapor Intrusion Work necessary for implementation of the vapor intrusion remedy.

A summary of deliverables and response action activities is provided in Section 3, Table 5, of this SOW.

Initial Site-Wide and Building/Property-Specific Plans for Sampling, Data Collection and Response Action Tiering

- Site-wide Indoor Air Sampling and Analysis Work Plan (*for Unsampled Buildings*)
- Building-Specific Indoor Air Sampling and Analysis Work Plans
- Building-Specific Indoor Air Sampling Reports
- Site-wide Vapor Intrusion Sampling and Analysis Work Plan (*for Response Action Tiering*)
- Supplemental Building/Property-Specific Vapor Intrusion Sampling and Analysis Work Plans
- Building/Property-Specific Vapor Intrusion Sampling and Evaluation Reports

Site-wide Long-term Vapor Intrusion Operatons, Maintenance, Monitoring, and Management

- Site-Wide Long-term Vapor Intrusion Operations, Maintenance, Monitoring, and Management Plan (includes Long-term Operations, Maintenance and Monitoring *for Tier 2 and Former Tier 1 and Tier A Buildings* and Long-term Monitoring and Management *for Tier 3A Buildings*)
- Site-wide Vapor Intrusion Institutional Controls Implementation, Management, and Monitoring Plan

Vapor Intrusion Remedial Design

- Building-Specific Vapor Intrusion Control System Remedial Design
- Building-Specific Long-term Operations, Maintenance and Monitoring Plan (*for Tier 2 and Former Tier 1 and Tier A Buildings*)
- Building-Specific Long-term Monitoring and Management Plan (*for Tier 3A Buildings)*

Vapor Intrusion Remedial Action

- Building-Specific Vapor Intrusion Response Action Implementation
- Building/Property-Specific Vapor Intrusion Response Action Implementation Report
- Site-wide Vapor Intrusion Remedial Action Completion Report

Vapor Intrusion Data Management and Progress Reporting

- Monthly Vapor Intrusion Field Activity and Progress Report
- Annual Vapor Intrusion Progress Report

2.2 Initial Site-wide and Building/Property-Specific Plans and Sampling, Data Collection and Response Action Tiering

2.2.1 Site-wide Indoor Air Sampling and Analysis Work Plan

The MEW Companies submitted a Draft Indoor Air Sampling and Analysis Work Plan on December 14, 2010, for the remaining unsampled buildings in the MEW Area as requested by EPA on October 8, 2010. The buildings in the Moffett Field Area that have not been sampled since 2003 must also be incorporated into this Work Plan.

The Site-wide Indoor Air Sampling and Analysis Work Plan shall include, but is not limited to, descriptions of the following:

(a) Project team organization and roles and responsibilities;

(b) Data quality objectives;

(c) Sampling design and strategies for sampling different types of buildings and conditions;

(d) Methods for evaluating current indoor air ventilation system (e.g., HVAC) operations, conducting building/property surveys, identifying potential pathways for vapor intrusion, and proposed sampling locations;

(e) Laboratory and field methodologies and analytical methods to be utilized;

(f) Updated list of buildings to be sampled in the MEW Area and Moffett Field Area (current use, occupancy, and operations); and

(g) Work schedule and task activities.

The MEW Companies submitted a Final Site-wide Indoor Air Sampling and Analysis Work Plan on June 7, 2011, and EPA approved the Work Plan on July 1, 2011.

Building Walk-throughs and Building-Specific Indoor Air Sampling and Analysis Work Plans

Within 30 days of EPA approval of the Final Site-wide Indoor Air Sampling and Analysis Work Plan (by July 31, 2011), the Implementing Parties shall conduct the building walk-throughs and submit Building-Specific Indoor Air Sampling and Analysis Work Plans to EPA.

The Building-Specific Work Plans shall include, but not be limited to, the following:

(a) Proposed sampling locations and rationale for each sampling location;

(b) Proposed field activity schedule;

(c) Sampling method, sampling duration, and operating status of indoor air or sub-slab ventilation system prior to and during sampling;

(d) Provisions for collecting additional information if needed;

(e) Completed building questionnaire/survey; and

(f) Submittal date of Building-Specific Indoor Air Sampling Report documenting the field activities, sampling results, and recommended actions.

Completion of initial sampling of each building must be completed within 60 days of EPA approval of the Building-Specific Indoor Air Sampling Work Plan.

The Implementing Parties must provide EPA with at least 10 days notice of scheduled building walk-throughs and scheduled sampling to allow EPA the opportunity to participate in the walk-throughs and oversee the sampling.

Building-Specific Indoor Air Sampling Report

Within 60 days of completion of sampling performed in accordance with the Building-Specific Indoor Air Sampling and Analysis Work Plan, the Implementing Parties shall submit a Building-Specific Indoor Air Sampling Report. The Report shall include, but not be limited to, the following:

(a) Building conditions, occupancy and use conditions, summary of all building/property-specific data, including identification of potential pathways for subsurface vapor intrusion;

(b) Evaluation of current indoor air ventilation system (e.g., HVAC) operations and completed building surveys;

(c) Map of building/property layout and actual sampling locations, including photographs, where permitted;

(d) Summary of all sampling and data collection results;

(e) Laboratory analytical data;

(f) Quality Assurance/Quality Control data and activities; and

(g) Schedule, recommendations, and follow-up actions, which shall include to the extent necessary, additional sampling to determine the source of vapor intrusion exceeding indoor air cleanup levels and vapor intrusion mitigation measures.

2.2.2 Site-wide Vapor Intrusion Sampling and Analysis Work Plan for Response Action Tiering

Within 90 days of EPA approval of the Final Site-wide Indoor Air Sampling and Analysis Work Plan, the Implementing Parties shall submit a Draft Site-wide Vapor Intrusion Sampling and Analysis Work Plan to determine the appropriate response action tier for all buildings and properties within the Vapor Intrusion Study Area.

The Site-wide Vapor Intrusion Sampling and Analysis Work Plan shall include, but is not limited to, the following:

(a) For all existing non-residential buildings, within both the MEW and Moffett Field Areas, indicate the sampling status, and current use and occupancy, where known;

(b) For all existing residential buildings within both the MEW and Moffett Field Areas, that have been sampled and/or have a vapor intrusion remedy in place, indicate the current Tier and whether any additional sampling is necessary to determine or change response action tier;

(c) For residential buildings and properties within the MEW and Moffett Field Areas where sampling has not been conducted or where the buildings/properties have not been tiered and where the property owner requests that the building/property be sampled, indicate the process for conducting the sampling, response action tiering, and data reporting for that building/property in the appropriate report(s);

(d) For each non-residential building that has been sampled, indicate the response action tier designation if determined;

(e) Project team organization, roles, responsibilities, and contact information;

(f) Data quality objectives;

(g) Sampling design and strategies for collecting and evaluating multiple lines of evidence to determine response action tier, and how additional data collection may result in change of tier designation;

(h) Methods for evaluating current indoor air ventilation system (e.g., HVAC) operations, conducting building and property surveys, identifying potential pathways for vapor intrusion and proposed sample locations;

(i) Laboratory and field methodologies and analytical methods to be utilized;

(j) Methodologies proposed to aid in determining whether the indoor air contaminant concentrations are attributable to subsurface Site contamination or other sources, such as consumer products or outdoor background air sources;

(k) Description of presumptive interim vapor intrusion mitigation measures that may be taken if sampling or other conditions indicate such measures are necessary and will be consistent with future response actions to be taken and reporting process after those measures have been taken;

(l) Description of process to obtain approval of interim vapor intrusion mitigation measures that have not been identified as presumptive interim vapor intrusion mitigation measures;

(m) Description of access requirements for the work to be performed, existing access conditions, and expected additional tasks necessary and scheduled to obtain access;

(n) Data Management and Reporting Plan including: (1) discussion of how historical data and future data will be organized, managed, and reported; (2) description of graphical presentation of relevant data by building and property, including

analytical sampling data, quality assurance/quality control data, and multiple lines of evidence information; (3) description of reporting format for reports and distribution list of electronic and hardcopy submittals to EPA, the property/building owners, and the public; and (4) description of types of information that will be posted and regularly updated on a publicly available website; and

(o) Work schedule, including a staggered schedule for walk-throughs, sampling activities, submittal of the Supplemental Building/Property-Specific Vapor Intrusion Sampling and Analysis Work Plans, and associated tasks.

2.2.3 Supplemental Building/Property-Specific Vapor Intrusion Sampling and Analysis Work Plan

A separate Supplemental Building/Property- Specific Vapor Intrusion Sampling and Analysis Work Plan or Addendum is required for additional data collection efforts to determine the response action tier for individual buildings and properties within the Vapor Intrusion Study Area.

Within 30 days, 60 days, and 90 days of EPA approval of the Site-wide Vapor Intrusion Sampling and Analysis Work Plan for Response Action Tiering (Section 2.2.2), the Implementing Parties shall conduct the building walk-throughs, as necessary, and submit Building/Property-Specific Vapor Intrusion Sampling and Analysis Work Plans in accordance with the specified staggered schedule approved by EPA in the Site-wide Vapor Intrusion Sampling and Analysis Work Plan for Response Action Tiering.

The Supplemental Building/Property- Specific Vapor Intrusion Sampling and Analysis Work Plan for each building and property to be sampled shall include, but is not limited to, the following:

(a) Building survey results on chemical use, operations, and current and historical facility and property information;

(b) Subsurface conditions and features, including potential pathways for subsurface vapor intrusion;

(c) Building conditions, occupancy and use conditions; summary of relevant previous data collected at and near the property (e.g., groundwater, soil gas, sub-slab soil gas, crawlspace, pathway samples);

(d) Lines of evidence and specific data to be collected to determine the response action tier or to move from one tier to another;

(e) Building/Property layout and proposed sampling locations;

(f) Sampling method(s) and sampling duration;

(g) Description of access requirements for the Vapor Intrusion Work to be performed, existing access conditions, and expected additional tasks necessary and scheduled to obtain access;

(h) Description of any interim vapor intrusion mitigation measures taken at the building to date, and a description of the tasks being performed to monitor the ongoing effectiveness of the measures; and

(i) Field activity work, sampling, and reporting schedule.

The Implementing Parties must provide EPA with at least 10 days notice of scheduled building walk-throughs and scheduled sampling to allow EPA to participate in the walk-throughs and oversee the sampling.

Additional Sampling and Data Collection

Completion of all sampling and data collection efforts of each building/property must be completed within 60 days of EPA approval of the individual Supplemental Building/Property-Specific Work Plan or Addendum.

2.2.4 Building-Specific or Property-Specific Vapor Intrusion Sampling and Evaluation Reports

Within 60 days of completion of sampling performed in accordance with the Supplemental Building/Property-Specific Vapor Intrusion Sampling and Analysis Work Plan, the Implementing Parties shall submit a Building/Property-Specific Vapor Intrusion Sampling and Evaluation Report to support EPA's determination of the appropriate response action tier for the specific building or property. The Report shall include, but not be limited to, the following:

(a) Building conditions, occupancy and use conditions, summary of all building/property-specific data, including identification of potential pathways for subsurface vapor intrusion;

(b) Evaluation of current indoor air ventilation system (e.g., HVAC) operations, building and property surveys;

(c) Description of any interim vapor intrusion mitigation measures taken at the building to date, and a description of the tasks being performed to monitor the ongoing effectiveness of the measures;

(d) Description and summary of all lines of evidence and specific data collected to determine response action tier;

(e) Map of building/Property layout and actual sampling locations;

(f) Sampling and data collection results and summary of data;

(g) Laboratory analytical data;

(h) Proposed response action tier designation and, where necessary, indicate what additional information is needed to determine response action tier;

(i) Quality Assurance/Quality Control data and activities;

(j) Description of access requirements for the work to be performed, existing access conditions, and expected additional tasks necessary and scheduled to obtain access;

(k) Description and schedule if an existing engineered vapor intrusion control system will be utilized that may not require a Building/Property-Specific Remedial Design under this SOW;

(l) Recommendations, and follow-up actions, including whether a pilot test for a specific Tier 1 or Tier 2 Building is needed; and

(m) Schedule.

2.3 Site-wide Long-term Vapor Intrusion Operations, Maintenance, Monitoring, and Management (OMMM)

Within 60 days after EPA approval of the Site-wide Vapor Intrusion Sampling and Analysis Work Plan for Response Action Tiering, the Implementing Parties shall submit a Draft Site-wide Long-term Vapor Intrusion Operations, Maintenance, Monitoring and Management (OMMM) Plan. The OMMM Plan shall include: (1) a Site-wide Long-term Vapor Intrusion Operations, Maintenance and Monitoring Program for Tier 2 Buildings and former Tier 1 and Tier A Buildings; and (2) a Site-wide Long-term Vapor Intrusion Monitoring and Management Program for Tier 3A Buildings.

2.3.1 Site-wide Long-term Vapor Intrusion Operations, Maintenance and Monitoring (OM&M) Program (for Tier 2 and Former Tier 1 and Tier A Buildings)

The Long-term OM&M Program shall address the long-term vapor intrusion operations, maintenance, and monitoring of all components of the engineered vapor intrusion remedy for **Tier 2 Buildings and former Tier 1 and Tier A Buildings**. The engineering controls include sub-slab/sub-membrane ventilation systems, mechanical indoor air ventilation systems, and interim vapor intrusion mitigation measures (e.g., air purifiers, sealing conduits, enhanced ventilation). The Long-term OM&M Program is intended to be a long-term ongoing program to which the plans, specifications, and design conditions of the building-specific plans and design documents shall conform. The Long-term OM&M Program shall include, but not be limited to, the following:

(a) General descriptions of the type of vapor intrusion control system used or anticipated to be used;

(b) For each type of vapor intrusion control system, a description and schedule of normal operation and maintenance tasks, including equipment and material requirements, anticipated equipment replacement for significant components, availability of spare parts, provisions for remote monitoring and control, operator training and certification requirements, staffing needs, and related requirements;

(c) Project organization, contact information, and responsibility of tasks;

(d) Description of record keeping and reporting requirements, including operating and inspection logs, maintenance record and checklists, and periodic reports;

(e) Description and analysis of potential operating problems and contingency plan (e.g., equipment failure, higher than expected contaminant concentrations), including

emergency operating and response activities and relevant health and safety information;

(f) Recommended frequency and methodologies of sampling, types of samples, and performance monitoring to evaluate the effectiveness of the vapor intrusion control system;

(g) Description of how the monitoring data will be analyzed, interpreted, and reported to EPA, property owner, and tenants;

(h) Description of air emission monitoring to verify that air emissions from treatment operations do not exceed requirements established by the Bay Area Air Quality Management District;

(i) Quality Assurance/Quality Control tasks;

(j) Operations, maintenance, and monitoring schedule;

(k) Description of the data management and reporting system for OM&M data and discussion of how the historical data and future data collection will be organized, managed, and reported to EPA, property owners, and the public;

(l) Description of data and reporting format and electronic presentation of all relevant data by building and property, including but not limited to building- and property-specific data, analytical sampling data, and quality assurance/quality control data.

(m) Description of reporting format for progress reports and distribution list of electronic and hardcopy submittals to EPA, the property and building owners, and the public;

(n) Types of information that will be posted and regularly updated on a publicly available website; and

(o) Proposed decision-making process and criteria for determining the engineering control is no longer necessary as a vapor intrusion remedy (i.e., shut-down criteria).

2.3.2 Site-wide Long-term Vapor Intrusion Monitoring and Management Program (for Tier 3A Buildings)

The Site-wide OMMM Plan shall also include a description of the Long-term Monitoring and Management Program to address **Tier 3A Buildings**. The elements of the Long-term Monitoring and Management Program shall include, but not be limited to, the following:

(a) Description of the types of monitoring data to be collected, including sampling and data gathering methods;

(b) Recommended frequency and methodologies of sampling, types of samples, and monitoring;

(c) Quality Assurance/Quality Control tasks;

(d) Project organization, contact information, and responsibility of tasks;

(e) Monitoring schedule;

(f) Description of notification and coordination with EPA, property owner, and building management and tenants, for collection of samples and monitoring data;

(g) Description of the data management and reporting system for long term monitoring data and discussion of how the historical data and future data collection will be organized, managed, and reported to EPA, property owners, and the public;

(h) Description of data and reporting format and electronic presentation of all relevant data by building and property, including but not limited to building- and property-specific data, analytical sampling data, and quality assurance/quality control data.

(i) Description of reporting format for progress reports and distribution list of electronic and hardcopy submittals to EPA, the property and building owners, and the public;

(j) Types of information that will be posted and regularly updated on a publicly available website; and

(k) Proposed decision-making process and criteria for determining that long-term monitoring is no longer necessary or no action is required.

2.3.3 Site-wide Institutional Controls Implementation, Management and Monitoring

Within 60 days after EPA approval of the Site-wide Vapor Intrusion Sampling and Analysis Work Plan for Response Action Tiering, the Implementing Parties shall submit to EPA a Site-wide Institutional Controls Implementation, Management and Monitoring Plan (ICIP) for the Vapor Intrusion Study Area.

Site-Wide ICs Implementation Plan

The Building-specific and Site-wide ICs in certain instances will be layered and overlap with each other.

ICs will be required to ensure that: (1) the required engineering controls are appropriately operated and are not interfered with; (2) appropriate vapor intrusion controls are installed in new building construction where required; (3) building owners and occupants are provided information regarding applicable operating remedy requirements; and (4) building owners and tenants provide information to EPA and the Implementing Parties regarding changes to the building occupancy or structure that may impact the remedy.

The Site-wide ICIP shall include, but not be limited to, the following:

(a) Description of how the ICs will meet the four requirements in the above paragraph;

(b) Detailed description of governmental controls (permitting and building requirements) requiring installation of the appropriate engineering controls on future construction;

1. For the MEW Area, describe what ICs will be addressed through the City of Mountain View's permitting and building requirements;

2. For the Moffett Field Area owned by NASA, describe what ICs will be in NASA's land use planning documents, including the EIMP, permitting and building requirements, and Land Use Master Plan;

3. For the Wescoat Housing Area of the Moffett Field Area owned by the U.S. Army, describe the land use planning documents that encompass the planning and permitting processes and building requirements, describe what ICs will be in those documents, and describe how those ICs will be incorporated; and

4. For both the MEW and Moffett Field Areas, describe how the Implementing Parties will ensure that these requirements will be implemented.

(c) The Implementing Parties are responsible for implementation of the remedy in the MEW Area. However, where an engineered remedy is necessary in a building, the remedy requires proprietary controls to document access agreements, notice of non-interference with the controls, and any transfer of responsibility for construction or operation and maintenance of a system to a property owner. The ICIP shall include a detailed description of the proprietary controls for the MEW Area, including a description of recorded agreements with current property owners, a plan for acquiring the agreements, and a template to be used for the agreements including provisions for the following: (1) provision for operation of and non-interference with engineering controls; (2) incorporation of vapor intrusion controls in new construction; (3) provision of information to building owners and occupants of remedy requirements, and (4) requirements to inform EPA and the Implementing Parties regarding occupancy or structural changes that may impact the remedy;

(d) Detailed description of types of informational devices and how they will be used, including: notification and informational tracking systems that will be utilized to ensure proper notification to EPA and the Implementing Parties regarding changes to the building structure, foundation, or subsurface areas, creation of potential pathways from the subsurface into the building, changes in property ownership, and changes in building occupancy that may impact the vapor intrusion remedy and monitoring of the remedy;

(e) Detailed description of ICs for Tier 3B Buildings (buildings without a Building-Specific Long-term Monitoring and Management Plan);

(f) Detailed description of the tracking mechanism for ongoing ICs monitoring; and

(g) Schedule for ICs implementation.

2.4 Remedial Design of Vapor Intrusion Control System for Existing and Future Buildings

2.4.1 Building/Property-Specific Vapor Intrusion Control System Remedial Design

A Building/Property-Specific Remedial Design is required for each building or property requiring an engineered remedy (e.g., Tier 2 Building or Former Tier 1 or Tier A Buildings, sub-slab or sub-membrane ventilation system, indoor air ventilation systems). Following tiering of a building requiring implementation of an engineered remedy, the Implementing Parties must submit a Building/Property-Specific Vapor Intrusion Control System Remedial Design that includes, but is not limited to, the following components:

Pilot Test Work Plan Memorandum

Should a Remedial Design of an engineered vapor intrusion remedy require conducting a pilot test, within 45 days of EPA's written notification, the Implementing Parties must submit a Pilot Test Work Plan Memorandum that includes, but is not limited to, the following:

(a) Description of the proposed vapor intrusion remedy;

(b) Description of pilot test including purpose, protocol, features, and monitoring requirements;

(c) Description of access requirements for the pilot test work to be performed, existing access conditions, and expected additional tasks necessary and scheduled to obtain access; and

(d) Description of contents of Pilot Test Results Memorandum; and

(e) Schedule for implementation of the pilot test and submittal of Pilot Test Results Memorandum.

The Implementing Parties shall submit a Pilot Test Results Memorandum to EPA within 14 days of completion of the pilot test.

Building-Specific/Property-Specific Vapor Intrusion Control System Remedial Design

Within 60 days of either: (a) submittal of the Pilot Test Results Memorandum; or (b) EPA's written notification where a Pilot Test is not necessary for the Building-specific Remedial Design, the Implementing Parties must submit a Building/Property-Specific Vapor Intrusion Control System Remedial Design. The Building/Property-Specific Vapor Intrusion Control System Remedial Design must include, but is not limited to, the following:

(a) Description of the work to be performed;

(b) Description and documentation of any interim vapor intrusion mitigation measures performed or in-place;

(c) Description of access requirements for the work to be performed, existing access conditions, and expected additional tasks necessary and scheduled to obtain access;

(d) Design basis including results of the pilot test and other specific data relied upon for the design;

(e) Design analysis and permitting plan necessary to satisfy all permitting requirements;

(f) Building plan and detailed design plans, drawings, and specifications;

(g) Site preparation requirements;

(h) List of materials, equipment, and recommended vendors;

(i) Design criteria including detailed description of compliance with performance criteria and 2010 ROD Amendment;

(j) Design drawings including site and construction plans and drawings, utility lines, piping, and instrument drawings;

(k) Construction quality assurance/quality control plan;

(l) Contingency plan;

(m) Proposed Building-Specific OM&M Plan (see below, Section 2.4.2);

(n) Building-Specific or Property-specific ICs Implementation Plan; and

(o) Task list and schedule for implementation.

2.4.2 Building-Specific Long-term Vapor Intrusion Operations, Maintenance, and Monitoring (OM&M) Plan

All Tier 2 and Former Tier 1 and Tier A Buildings or Properties require a Building-Specific Long-term OM&M Plan for the engineered vapor intrusion control system remedy.

Within 60 days of EPA approval of the Building-Specific Vapor Intrusion Control System Remedial Design (pursuant to SOW Section 2.4.1), or within 60 days of EPA written notification if an existing building-specific engineered vapor intrusion control system is being utilized and a Remedial Design of that vapor intrusion control system is not required under this SOW, the Implementing Parties shall submit a Building-Specific Long-term OM&M Plan. The Building-Specific Long-term OM&M Plan shall conform to the plans, specifications, design conditions and be consistent with and may reference specific portions of the Site-wide Long-term OM&M Plan for general methodologies, as applicable. Each Building-Specific Long-term OM&M Plan shall set forth the ICs specific to that building or property and be consistent with the Site-wide ICIP.

The Building-Specific OM&M Plan shall also incorporate all the necessary elements of the Long-term Monitoring Program.

The Building-Specific OM&M Plan shall include, but not be limited to, the following:

(a) Description of vapor intrusion control system(s) used;

(b) Description and schedule of normal operation and maintenance tasks, including equipment and material requirements, anticipated equipment replacement for significant components, availability of spare parts, and, where appropriate, provisions for remote monitoring and control, operator training and certification requirements, staffing needs, and related requirements;

(c) Description of record keeping and reporting requirements, including operation and inspection logs, maintenance records and checklists;

(d) Description and analysis of potential operating problems and contingency plan (e.g., equipment failure, higher than expected contaminant concentrations), including emergency operating and response activities and relevant health and safety information;

(e) Description of the types of monitoring data to be collected, including sampling and data gathering methods;

(f) Recommended frequency and methodologies of sampling, types of samples, and performance monitoring;

(g) Description of how the performance data will be analyzed, interpreted, and reported to evaluate system performance;

(h) Description of air emission monitoring to verify that air emissions from treatment operations do not exceed requirements established by the Bay Area Air Quality Management District, if applicable;

(i) Quality Assurance/Quality Control activities;

(j) Project organization and responsibility;

(k) Overall operations, maintenance, and monitoring schedule;

(l) Description of notifications and coordination with EPA and property owner, building manager, or tenants for collection of monitoring data;

(m) Description of the building-specific ICs monitoring, management, and implementation plan;

(n) Proposed decision-making process and criteria for determining the vapor intrusion control system is no longer necessary as a vapor intrusion remedy (i.e., shut-down criteria); and

(o) Description of the contents, format, and frequency of progress reporting.

2.4.3 Building/Property-Specific Long-term Vapor Intrusion Monitoring and Management Plan (for Tier 3A Buildings)

All Tier 3A Buildings require a Long-term Vapor Intrusion Monitoring and Management Plan. For all Tier 3A Buildings, within 60 days of EPA written notification of Tier 3A designation and long-term monitoring and management, the Implementing Parties shall submit a Draft Building/Property-Specific Long-term Monitoring and Management Plan. The Plan shall reference and be consistent with the Site-wide Long-term Monitoring and Management Program and the Site-wide ICIP for general ICs. Where appropriate, the Building/Property-Specific Long-term Monitoring and Management Plan shall include, but not be limited to, the following:

(a) Recommended frequency and types of monitoring data to be collected, including sampling and data gathering methods and monitoring;

(b) Description of how data will be analyzed, interpreted, and reported;

(c) Quality Assurance/Quality Control activities;

(d) Project organization and responsibility;

(e) Description of notifications to and coordination with EPA and property owner, building manager, or tenants for collection of monitoring data;

(f) Record keeping and reporting requirements;

(g) Description of the building-specific ICs monitoring, management, and implementation plan;

(h) Proposed decision-making process and criteria for determining when long-term monitoring is no longer necessary or no action is required; and

(i) Contents, format, and frequency of progress reporting.

2.5 Vapor Intrusion Remedial Action for Existing and Future Buildings

2.5.1 Building/Property-Specific Vapor Intrusion Response Action Implementation Report

Within 90 days of EPA's approval of a Building/Property-Specific Vapor Intrusion Control System Remedial Design, the Implementing Parties shall begin the construction, installation, and implementation of the engineered vapor intrusion control system.

Within 60 days of implementation of the engineered vapor intrusion control system or within 60 days of EPA written notification if an existing building-specific engineered vapor intrusion control system is being utilized and a Remedial Design of that vapor intrusion control system is not required under this SOW, the Implementing Parties shall submit a Building/Property-Specific Vapor Intrusion Response Action Implementation Report documenting the completion of the response actions. The Building/Property-Specific Response Action Implementation Report shall include, but not be limited to, the following:

(a) Summary of construction activities and chronology of events;

(b) As-Built construction drawings and specifications of all components of the vapor intrusion remedy;

(c) Contract pre-final inspection and final inspection, if needed, and certification;

(d) Confirmation sampling and performance monitoring results;

(e) Summary of project costs;

(f) Discussion and reference to the draft Building-Specific Operations, Maintenance, and Monitoring Plan; and

(g) Discussion of and reference to the Building/Property-Specific Vapor Intrusion ICs Implementation Plan, documentation of ICs are in place, and a schedule for implementation of any ICs that are not in place.

2.5.2 Site-wide Vapor Intrusion Remedial Action Completion Report

Within 90 days after EPA written notification, the Implementing Parties shall submit to EPA a Draft Site-wide Vapor Intrusion Remedial Action Completion Report for the MEW and Moffett Field Areas. The Draft Report shall document the completion of the implementation of the Site-wide Vapor Intrusion Remedial Action Program, and the contents of the Report shall include the elements outlined in EPA's *Close Out Procedures for National Priorities List Sites*, OSWER Directive 9320.2-22, May 2011, including but not limited to, the following:

(a) Demonstrating that all response actions have been implemented at all existing buildings requiring a response action and that the necessary ICs are in place; and

(b) Construction activities, chronology of events, performance standards and construction quality control, final inspections and certifications, operations and maintenance activities, and summary of project costs.

2.6 Data Management and Progress Reporting

All communications, whether written or verbal, from any Party to EPA shall be directed to EPA's Remedial Project Manager (RPM). The Implementing Parties shall submit to EPA copies, in both hard copy and in electronic format, of all deliverables required in this SOW as requested by EPA.

EPA's RPM for the Vapor Intrusion Work is:

Alana Lee
U.S. Environmental Protection Agency Region 9
75 Hawthorne Street, SFD-7-3
San Francisco, California 94105
Telephone: 415.972.3141
E-mail: Lee.Alana@epa.gov

2.6.1 Data Management

The Implementing Parties shall maintain a database containing sampling data in an internally consistent format, compatible with EPA Region 9's computer systems. The Implementing Parties shall provide the electronic database and any updates to EPA on an annual basis, or upon request by EPA.

In addition, the Implementing Parties will maintain, and provide to EPA on a quarterly basis, a distribution list to whom draft and final documents will be provided.

2.6.2 Vapor Intrusion Progress Reports and Schedule

The Implementing Parties shall provide Monthly Field Activity Reports while any fieldwork or construction work is being conducted; Annual Vapor Intrusion Progress Reports; and support information for EPA's Five-year Review Reports as requested.

Monthly Vapor Intrusion Field Activity and Progress Report

The Implementing Parties shall provide Monthly Field Activity and Progress Reports during fieldwork, sampling, construction and response action implementation activities and include a progress update, and issues or problems encountered for the fieldwork and other Vapor Intrusion Work activities. In addition, Implementing Parties shall provide a table summarizing the progress status for each building/property in the Vapor Intrusion Study Area.

Schedule:

The first Monthly Field Activity Report is due on the second Tuesday of the month after fieldwork begins under the Site-wide Indoor Air Sampling and Analysis Work Plan and Supplemental Building-Specific Sampling work plans. Subsequent Monthly Field Activity Reports are due on the second Tuesday of each month immediately following the preceding month when any field activities are being conducted.

Annual Vapor Intrusion Progress Report

Annual Progress reports shall conform to the format specifications approved by EPA in relevant Site-wide Plans and any EPA-approved updates. All Progress Reports shall include, but are not limited to, the following:

(a) Description of the Vapor Intrusion Work and activities taken to comply with this SOW during the reporting period, including a general description of all activities conducted during the reporting period;

(b) Work activities include, but are not limited to: fieldwork, sampling, data collection, reporting, community involvement and meetings, laboratory results, interim vapor intrusion mitigation measures, and remedial design and remedial action activities;

(c) Summary of all results of sampling and monitoring data by building or property address, including sampling location maps and figures, and data summary tables;

(d) Annual re-assessment of the extent of the Vapor Intrusion Study Area using the most recent shallow A zone groundwater concentration data and other lines of evidence, as appropriate. Updated shallow A aquifer zone TCE isoconcentration maps should be provided in the Annual Progress Report.

(e) Interpretation or explanation of the data collected during that period, including summary table update of response action tiering status of all buildings/properties;

(f) Description of Vapor Intrusion Work planned for the next reporting period, with updated schedules that show overall Vapor Intrusion Work completed, Vapor Intrusion Work planned for the next reporting period, and the overall project schedule for Vapor Intrusion Work task completion;

(g) Description of all issues/problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated delays; and

(h) Recommendations, follow-up actions, and proposed schedules for work to address problems encountered.

Schedule:

Annual Reporting Period: January 1 – December 31. The Annual Vapor Intrusion Progress Report is due on April 15 of the following year.

Five-Year Review Report

Upon EPA's written request, the Implementing Parties shall provide support information as requested for EPA's Five-Year Review Reports.

3 Summary of Work Activities and Deliverables

TABLE 5
Summary of Vapor Intrusion Work Activities and Deliverables
For Remedial Design/Remedial Action for the Vapor Intrusion Pathway
MEW Superfund Study Area, Mountain View and Moffett Field, California

Type	DELIVERABLE/ACTIVITY	SCHEDULE/DUE DATE	SECTION
Site-wide	Site-wide Indoor Air Sampling and Analysis Work Plan for *Unsampled Buildings*	June 7, 2011	2.2.1
Building-Specific	Building-Specific Indoor Air Sampling Work Plan for *Unsampled Buildings*	July 31, 2011 (30 days after EPA approval of Final Site-Wide Indoor Air Sampling and Analysis Work Plan)	2.2.1
Building-Specific	Completion of initial indoor air sampling of each unsampled building	60 days after EPA approval of Building-Specific Indoor Air Sampling and Analysis Work Plan	2.2.1
Building-Specific	Building-Specific Indoor Air Sampling Report	60 days after completion of building-specific air sampling	2.2.1
Site-wide	Site-wide Vapor Intrusion Sampling and Analysis Work Plan for Response Action Tiering	September 29, 2011 (90 days after EPA approval of Final Site-wide Indoor Air Sampling and Analysis Plan *for Unsampled Buildings)*	2.2.2
Building/Property-Specific	Supplemental Building/Property-Specific Vapor Intrusion Sampling and Analysis Work Plan	Begin submitting 30 days after EPA approval of, and finish submitting 90 days after EPA approval of, Site-wide Vapor Intrusion Sampling and Analysis Work Plan	2.2.3
Building/Property-Specific	Completion of all sampling and data collection for building/property-specific work	60 days after EPA approval of Supplemental Building/Property-Specific Work Plan	2.2.3
Building/Property-Specific	Building/Property-Specific Vapor Intrusion Sampling and Evaluation Report	60 days after completion of building- or property-specific sampling	2.2.4
Site-wide	Site-wide Long-term Operations, Maintenance, and Monitoring (OMMM) Plan	60 days after EPA approval of Site-wide Vapor Intrusion Sampling and Analysis Work Plan for Response Action Tiering	2.3.1
Site-wide	Site-wide Vapor Intrusion Institutional Controls Implementation, Management, and Monitoring Plan (ICIP)	60 days after EPA approval of Site-wide Vapor Intrusion Sampling and Analysis Work Plan for Response Action Tiering	2.3.2
Building/Property-Specific	Building/Property-Specific Pilot Test Work Plan Memorandum	Following tiering of building and 45 days after EPA written notification	2.4.1
Building/Property-Specific	Building/Property-Specific Pilot Test Results Memorandum	14 days after completion of Pilot Test	2.4.1
Building/Property-Specific	Building/Property-Specific Vapor Intrusion Control System Remedial Design	Following tiering of building and 60 days after EPA written notification, or 60 days after submittal of Pilot Test Results	2.4.1

TABLE 5
Summary of Vapor Intrusion Work Activities and Deliverables
For Remedial Design/Remedial Action for the Vapor Intrusion Pathway
MEW Superfund Study Area, Mountain View and Moffett Field, California

Type	DELIVERABLE/ACTIVITY	SCHEDULE/DUE DATE	SECTION
		Memorandum.	
Building-Specific	Building-Specific Vapor Intrusion Operations, Maintenance and Monitoring (OM&M) Plan (*for Tier 2 and Former Tier 1 and Tier A Buildings*)	60 days after EPA approval of Building/Property-Specific Remedial Design, or 60 days after EPA written notification if Remedial Design not required	2.4.2
Building-Specific	Building-Specific Long-term Vapor Intrusion Monitoring and Management Plan (*for Tier 3A Buildings*)	60 days following EPA written notification of Tier 3A designation	2.4.3
Building/Property-Specific	Initiation of construction, installation, and implementation of engineered vapor intrusion control system or response action	90 days after EPA approval of Building/Property-Specific Remedial Design	2.5.1
Building/Property-Specific	Building/Property-Specific Vapor Intrusion Response Action Implementation Report	60 days after implementation of remedial action/response action, or 60 days after EPA written notification	2.5.1
Site-wide	Site-wide Vapor Intrusion Remedial Action Completion Report	90 days after EPA written request and after all response actions completed and ICs in place	2.5.2
Site-wide	Monthly Vapor Intrusion Field Activity and Progress Reports	Monthly while field work and implementation of vapor intrusion remedy is being conducted. Due second Tuesday of each month.	2.6.1 and 2.6.2
Site-wide	Annual Vapor Intrusion Progress Reports (January 1 – December 31)	Every year beginning with 2011 Annual Progress Report Due April 15 of following year.	2.6.1 and 2.6.2

Note: Final deliverables, including all plans and reports, required pursuant to this SOW are due within 30 days of receipt of EPA's comments on any draft deliverable.

Figure A1
Vapor Intrusion Areas of Responsibility
Moffett Field Area (North of U.S. Highway 101)

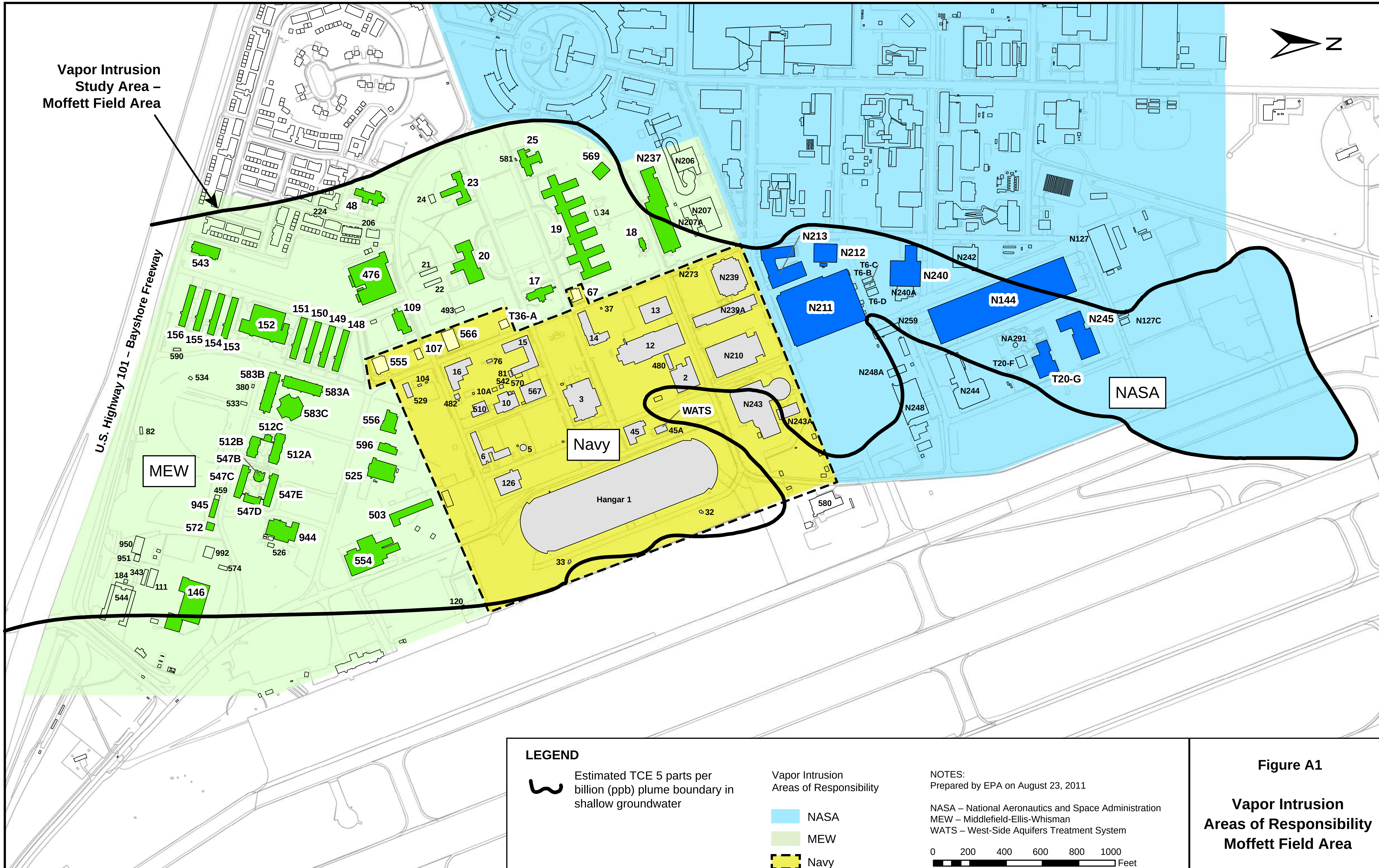
Attachment A

Record of Decision Amendment for the Vapor Intrusion Pathway

Middlefield-Ellis-Whisman (MEW) Superfund Study Area

Mountain View and Moffett Field, California

April 16, 2010



Vapor Intrusion Study Area – Moffett Field Area
U.S. Highway 101 – Bayshore Freeway
N
MEW
Navy
NASA
WATS
Hangar 1
25
581
569
N237
N206
23
24
48
224
206
34
19
18
N207
N207A
543
476
20
21
22
17
67
N273
N239
N213
N212
T6-C
T6-B
T6-D
N240
N240A
N242
N127
N144
N211
N239A
37
493
T36-A
13
109
151
150
149
148
152
156
155
154
153
590
566
107
555
15
14
12
N210
N259
N245
N127C
NA291
T20-F
T20-G
N248A
N244
N248
534
583B
380
583A
533
583C
104
76
81
542
570
16
480
2
529
482
10A
567
510
10
3
N243
N243A
82
512C
556
512B
512A
547B
596
45
45A
5
6
126
547C
525
459
547E
945
547D
503
572
32
580
944
950
526
992
554
951
574
184
343
111
146
544
33
120
LEGEND
Estimated TCE 5 parts per billion (ppb) plume boundary in shallow groundwater
Vapor Intrusion Areas of Responsibility
NASA
MEW
Navy
NOTES:
Prepared by EPA on August 23, 2011
NASA – National Aeronautics and Space Administration
MEW – Middlefield-Ellis-Whisman
WATS – West-Side Aquifers Treatment System
0 200 400 600 800 1000
Feet

Figure A1

Vapor Intrusion Areas of Responsibility Moffett Field Area

ES080811113812BAO_Fig_A1_VaporIntrusion.ai_082311_lho

RECORD OF DECISION AMENDMENT
for the Vapor Intrusion Pathway

MIDDLEFIELD-ELLIS-WHISMAN (MEW) SUPERFUND STUDY AREA
Mountain View and Moffett Field, California

- **Fairchild Semiconductor Corp. – Mountain View Superfund Site**
- **Raytheon Company Superfund Site**
- **Intel Corp. – Mountain View Superfund Site**
- **Portions of NAS Moffett Field Superfund Site**

U.S. Environmental Protection Agency Region 9
San Francisco, California

August 16, 2010

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5 Present Worth Costs of Alternatives for Existing and Future Residential Buildings
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PART 1
DECLARATION

Part 1 - Declaration

1 Site Name and Location

This amendment to the June 9, 1989 Record of Decision (1989 ROD) addresses the subsurface to indoor air pathway or vapor intrusion pathway at the Middlefield-Ellis-Whisman (MEW) Superfund Study Area in Mountain View and Moffett Field, California. The MEW Superfund Study Area ("MEW Site" or "Site") includes three separately listed National Priorities List (NPL) sites and portions of the Naval Air Station (NAS) Moffett Field NPL site:

Fairchild Semiconductor Corporation – Mountain View	EPA ID: CAD09598778
Raytheon Company	EPA ID: CAD009205097
Intel Corporation – Mountain View	EPA ID: CAD061620217
Naval Air Station Moffett Field	EPA ID: CA2170090078

2 Statement of Basis and Purpose

This amendment to the 1989 ROD (ROD Amendment) presents the selected remedy for the vapor intrusion pathway for the MEW Site in Mountain View and Moffett Field, California, in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (collectively referred to as CERCLA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record for the MEW Site.

The State of California, acting through the San Francisco Regional Water Quality Control Board (Water Board), concurs with the selected remedy.

3 Assessment of the Site

The U.S. Environmental Protection Agency (EPA) has determined that there are potential health risks associated with long-term exposure to trichloroethene (TCE) and other MEW Site chemicals of concern through the vapor intrusion pathway in existing and future buildings overlying the shallow groundwater contamination at the MEW Site.

The response actions selected in this ROD Amendment are necessary to protect public health from actual or threatened releases of hazardous substances into the environment.

4 Description of the Selected Remedy

The remedy selected in this ROD Amendment addresses the potential long-term exposure risks from TCE and other chemicals of concern through the vapor intrusion pathway at the MEW Site, which was not addressed in the 1989 ROD. The 1989 ROD presented the selected soil and groundwater remedial actions for the Site. At that time, less was understood about the vapor intrusion pathway, or the migration of volatile chemicals from the subsurface into overlying buildings. EPA's objective for the vapor intrusion remedy is to protect the health of current and future occupants, including workers and residents, of buildings overlying the Site's shallow subsurface TCE contamination.

EPA's selected remedy to address the vapor intrusion pathway and ensure protection of human health of building occupants in the Vapor Intrusion Study Area consists of the following:

- For Existing Buildings - The appropriate response action is determined by indoor air sampling and other lines of evidence for each building. If necessary, installation, operation, maintenance, and monitoring of an appropriate Sub-slab/Sub-membrane Ventilation System.
- Alternative for Existing Commercial Buildings - Use of building's Indoor Air Mechanical Ventilation System if the property/building owner agrees to use, operate, and monitor the system to meet remedy performance criteria and the remedial action objectives.
- For Future (New Construction) Buildings – Installation of a Vapor Barrier and Passive Sub-slab Ventilation System (With the Ability to be Made Active).
- Implementation of Institutional Controls (ICs) and Monitoring to Ensure the Long-term Effectiveness of the remedy.

The selected response action for the vapor intrusion pathway does not address source materials constituting principal threats at the Site, such as non-aqueous phase liquid (NAPL) in the subsurface. Containment and remediation of source materials and contaminated soils and groundwater are addressed in the original 1989 ROD for the MEW Site.

5 Statutory Determinations

The selected vapor intrusion remedy is protective of human health, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions to the maximum extent practicable.

The vapor intrusion remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. Unlike typical remedies to address contamination, remedies for vapor intrusion are not necessarily designed to reduce the toxicity, mobility, and volume through treatment of the site contaminants, but rather are designed to prevent exposure to these contaminants. Treatment of the contaminants causing vapor intrusion will continue to be accomplished by directly addressing the subsurface shallow soil and

groundwater contamination in accordance with the soil and groundwater remedy identified in the 1989 ROD.

After implementation of the vapor intrusion remedy, hazardous substances will remain onsite above levels that allow for unlimited use and unrestricted exposure, thus necessitating Five-Year Reviews. The first and second MEW Site Five-Year Reviews of the soil and groundwater remedy were completed in September 2004 and September 2009. A policy review will continue to be conducted a minimum of every five years to ensure that the Site soil, groundwater, and vapor intrusion remedy is, or will be, protective of human health and the environment.

6 ROD Data Certification Checklist

The following information is presented in Part 2- Decision Summary of this ROD Amendment. Additional information can be found in the Administrative Record file for the MEW Site.

- Chemicals of Potential Concern and their respective concentrations in shallow groundwater and indoor air (Sections 5.1 and 5.3).
- The risk represented by the Chemicals of Potential Concern (Section 7.1). An Endangerment Assessment conducted in 1988 as part of the original Remedial Investigation and Feasibility Study did not specifically address the subsurface vapor intrusion to indoor air pathway.
- Indoor air cleanup levels established for TCE and the other Chemicals of Potential Concern and the basis for these levels (Section 7.3).
- Source materials constituting principal threats are addressed in the 1989 Record of Decision and not in this ROD Amendment (Section 5.3).
- Current and future land use assumptions used in the 1988 Endangerment Assessment (baseline risk assessment) and this ROD Amendment (Section 6).
- Potential land uses at the Site as a result of the Selected Remedy (Section 12.4).
- Estimated capital, operations and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 12.3).
- Key factors that led to selecting the remedy (i.e., how the Selected Remedy provides the best balance of tradeoffs with respect to EPA's nine evaluation criteria listed in 40 CFR Section 300.430) (Section 12.2 and Section 14).

7 Authorizing Signature

This ROD Amendment documents the selected remedy for the vapor intrusion pathway at the MEW Site. EPA selected this remedy with the concurrence of the State of California, acting through the San Francisco Bay Regional Water Quality Control Board. The Director of the Superfund Division has delegated the undersigned the authority to approve and sign this ROD Amendment.

Kathleen Salyer

8/16/10

Kathleen Salyer
Assistant Director
California Site Cleanup Branch, Superfund Division
U.S. Environmental Protection Agency Region 9

Date

PART 2
DECISION SUMMARY

Part 2 - Decision Summary

This Decision Summary provides a description of the site-specific factors, supplemental investigations, remedial alternatives evaluated, and analysis of those options that led to the selection of the vapor intrusion remedy for the Middlefield-Ellis-Whisman (MEW) Superfund Study Area (referred to as the "MEW Site" or "Site"). It also summarizes the vapor intrusion remedy that EPA has selected and explains how the remedy fulfills the statutory and regulatory requirements.

1 Site Name, Location, and Brief Description

This document is an amendment to the June 9, 1989 Record of Decision (1989 ROD) for the MEW Superfund Study Area (**Figure 1**, MEW Site Location Map). The MEW Site is located in Mountain View and Moffett Field, California, and includes three National Priorities List (NPL) sites: Fairchild Semiconductor - Mountain View Site (EPA ID: CAD09598778); Intel Corporation - Mountain View Site (EPA ID: CAD061620217); Raytheon Company Site (EPA ID: CAD009205097), and portions of the NAS Moffett Field NPL Site (EPA ID: CA2170090078).

The groundwater contamination south of U.S. Highway 101 (Bayshore Freeway) (referred to herein as the "MEW Area") migrates northward through the subsurface onto former NAS Moffett Field (referred to herein as the "Moffett Field Area"), where the contamination mixes with U.S. Navy and National Aeronautics and Space Administration (NASA) contaminant sources. The combined area of contamination is referred to as the "regional groundwater contamination plume."

EPA is the lead regulatory agency responsible for directing the cleanup process under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for the MEW Site. The U.S. Navy is the lead agency for the cleanup at NAS Moffett Field. The San Francisco Bay Regional Water Quality Control Board (Water Board) is the support regulatory agency.

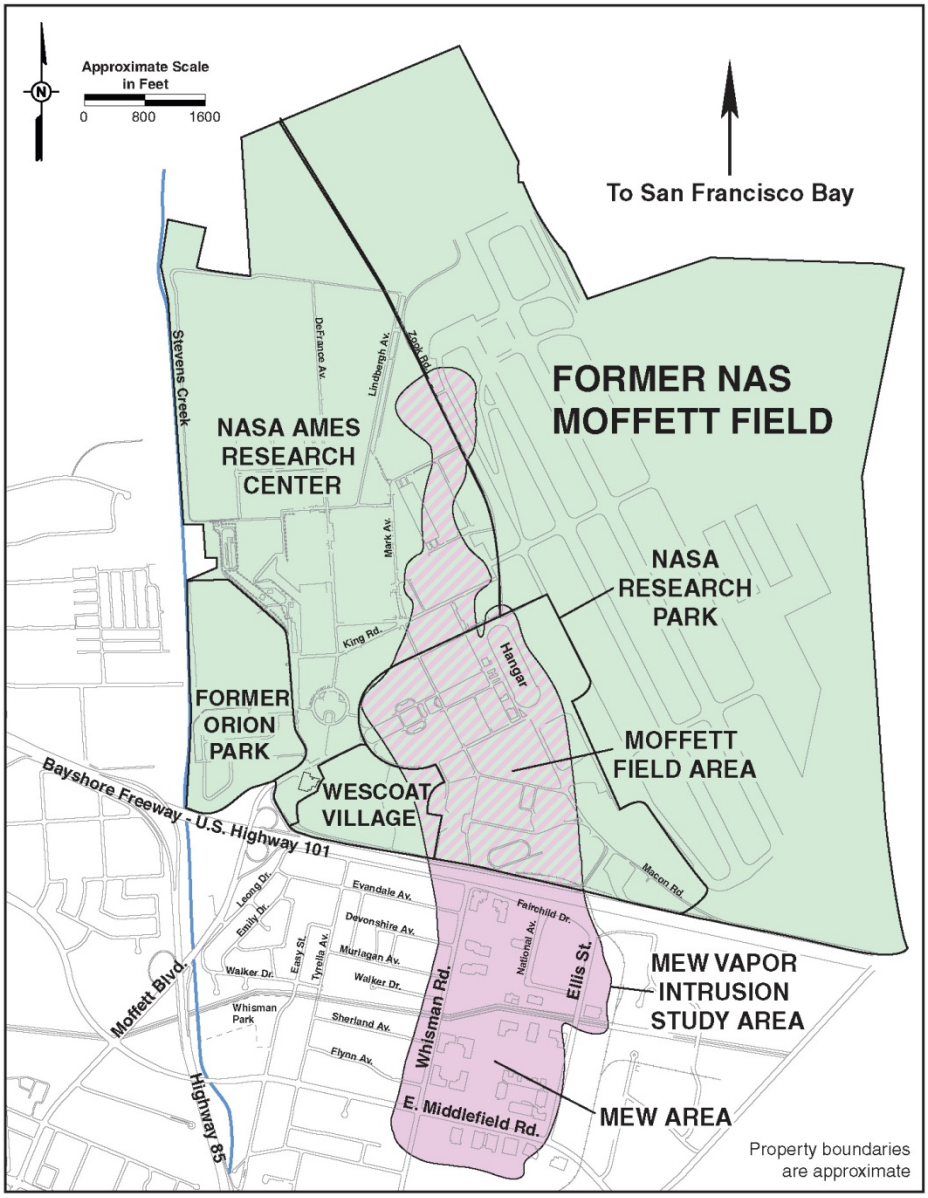


Figure 1. MEW Site Location and Vapor Intrusion Study Area

2 Site History and Enforcement Activities

During the 1960s and 1970s, several industrial companies conducted semiconductor, electronics, and other manufacturing and research activities at the MEW Area south of U.S. Highway 101. Chemicals used in these operations were released into the subsurface and subsequently contaminated the soil and groundwater with volatile organic compounds (VOCs), primarily the solvent trichloroethene (TCE).

The parties responsible for the contamination in the MEW Area (the Responsible Parties are also referred to as the "MEW Companies") no longer own or operate any facilities in the MEW Area. Historically, until the early 1960s, agricultural uses, including orchards, row crops, and greenhouse gardening, dominated the area. Commercial development began in the area with light-industrial facilities in the 1960s. Operations since the 1960s have included semiconductor and electronics manufacturing, metal finishing, and other operations that required the use of chemicals. Since the 1990s, major redevelopment and reuse has occurred in the MEW Area. The current property owners and tenants in the MEW Area were not operating at the time of the contaminant releases to the environment and are not directly involved with the investigation and cleanup activities at the MEW Site.

North of U.S. Highway 101, the former NAS Moffett Field was owned and operated by the U.S. Navy from the 1930s until July 1994 when most of the property was transferred to NASA. The Moffett Community Housing Areas, including the Wescoat Housing area, were transferred from the U.S. Navy to the U.S. Air Force in 1994 and then to the U.S. Army in 2001. Chemicals historically used at the former NAS Moffett Field during dry cleaning, maintenance, and fuel operation activities were released, contributing to the soil and groundwater contamination.

The MEW Companies are conducting investigation and cleanup activities required by the 1989 ROD under a 1990 Unilateral Administrative Order and a 1991 Consent Decree. The U.S. Navy is conducting cleanup activities pursuant to a 1990 Federal Facility Agreement (FFA) with EPA and the State of California for the NAS Moffett Field Site. A 1993 FFA Amendment requires the U.S. Navy to remediate its source areas of contamination within the MEW regional groundwater contamination plume in accordance with EPA's 1989 ROD for the MEW Site.

2.1 Soil and Groundwater Remedy

In June 1989, EPA issued a Record of Decision selecting the soil and groundwater cleanup remedy for the MEW Site. In 1990 and 1996, EPA issued Explanation of Significant Differences (ESDs) to the Record of Decision clarifying the soil and groundwater cleanup standards and the use of liquid-phase granular activated carbon for groundwater treatment. The soil cleanup remedy includes: (1) excavation, with treatment by aeration; and (2) soil vapor extraction, with treatment by vapor phase granular activated carbon. Soil cleanup has been completed at all of the former MEW facilities in the MEW Area.

The groundwater cleanup remedy includes: (1) slurry walls (barriers installed in the subsurface) to contain contaminant source areas; and (2) extraction and treatment systems to contain and clean up groundwater contamination using granular activated carbon and/or

air strippers. Groundwater extraction and treatment began at the MEW Site in the 1980s and is ongoing.

The groundwater cleanup is expected to continue for many decades until concentrations of TCE and the other MEW Site contaminants of concern meet cleanup standards. It is important to note that groundwater is not currently used for drinking water or other household uses. Optimization efforts for the groundwater remedy are underway and alternative groundwater cleanup technologies to expedite cleanup are currently being evaluated as part of a separate Supplemental Site-wide Groundwater Feasibility Study for the MEW Site.

2.2 Supplemental Remedial Investigation and Feasibility Study for the Vapor Intrusion Pathway

Scope of the Supplemental Remedial Investigation for the Vapor Intrusion Pathway

Based on EPA's updated understanding of the way chemicals can potentially migrate from the subsurface soil and groundwater to the indoor air, EPA requested the Potentially Responsible Parties (PRPs) for the MEW groundwater contamination – the MEW Companies, U.S. Navy, and NASA - to evaluate the potential vapor intrusion pathway into buildings overlying shallow TCE groundwater contamination at the MEW Site. During 2003 through 2008, the MEW Companies, NASA, U.S. Navy, and EPA collected over 3,000 air samples from 47 commercial buildings and 20 residences within the Vapor Intrusion Study Area.

The indoor air vapor intrusion investigation included the following types of samples: indoor air, outdoor ambient air, pathway air, crawlspace air, and sub-slab soil gas. Indoor air samples were collected in the breathing zone (approximately 3 to 5 feet above floor level) in occupied or potentially occupied areas. Pathway samples were collected in areas where potential conduits (such as penetrations through slab, drains, utility lines or vaults) into the building were observed that might provide a direct route for VOC vapor migration into the building. Outdoor ambient air samples were collected immediately outside the building, including near the air ventilation system air intake, for comparison to indoor air to evaluate the potential contribution of VOCs from outdoor air to indoor air. Additionally, EPA outdoor reference and MEW/NASA background outdoor air samples were collected at distances of 0.25 to 1.5 miles away from the MEW Site to assess background levels of VOCs in the general area.

The indoor air results were compared to (1) short-term health-based screening levels; (2) long-term health-based screening levels, and (3) outdoor ambient air. During the Supplemental Remedial Investigation, EPA used an interim long-term TCE indoor air screening level of 2.7 micrograms per cubic meter ($\mu g/m^3$) for commercial buildings and 1 $\mu g/m^3$ for residential buildings. Subsequent to the Supplemental Remedial Investigation, EPA established interim TCE indoor air action levels (now TCE indoor air cleanup levels) of 5 $\mu g/m^3$ for commercial buildings and 1 $\mu g/m^3$ for residential buildings. For more detailed information regarding the interim action levels, see the *Final Supplemental Feasibility Study for the Vapor Intrusion Pathway*, June 2009.

EPA also assessed the vapor intrusion pathway using multiple line of evidence. The types of information used include building surveys, chemical use, operations, historical facility

and property information, Site geology and hydrogeology, and subsurface and air sampling information and conditions (groundwater, soil gas, sub-slab soil gas, crawlspace, pathway samples), chemical ratios, and tracer compounds, to determine whether the indoor air concentrations were attributable to subsurface Site contamination and not other sources, such as consumer products or outdoor background air sources.

Findings of the Supplemental Remedial Investigation for the Vapor Intrusion Pathway

The indoor air concentrations detected during the Supplemental Remedial Investigation are summarized in Section 5.1. The Supplemental Remedial Investigation results also support the following conclusions:

Indoor air results indicate there are no immediate or short-term health concerns. All indoor air concentrations are below the screening criteria for acute and short-term health-based screening criteria (Agency for Toxic Substances Disease Registry [ATSDR] Minimal Risk Levels). Therefore, EPA's focus is whether TCE and other Site chemicals of potential concern in indoor air pose an unacceptable risk of chronic health effects from long-term exposure (30 years for residential exposure and 25 years for non-residential exposure).

TCE in indoor air was detected above EPA's interim long-term TCE indoor air screening level in 17 commercial buildings and three residences within the Vapor Intrusion Study Area. Where discrete mitigation measures (e.g., sealing conduits, enhanced mechanical ventilation, air purifiers, sub-slab vapor control systems) were implemented, indoor TCE concentrations were reduced to below the interim screening level.

Increasing air exchange rates generally resulted in decreasing indoor air TCE concentrations. Vapor intrusion resulting in concentrations above interim long-term indoor air screening levels appears more likely in commercial buildings when ventilation systems are not providing sufficient air exchanges with outside air in all or part of a building.

Buildings overlying elevated groundwater concentrations appear to have a greater likelihood of indoor air TCE concentrations exceeding the TCE screening level, but actual indoor air concentrations are also dependent on other building factors such as air ventilation system operations, building configuration, and preferential pathways into the building.

The highest TCE indoor air concentrations were found in a building with a basement, where there was direct contact with groundwater (644 National Avenue in the MEW Area). Elevated concentrations were also found in a NASA building, where the ventilation system introduced air from beneath the raised floor into the building (N210 in the Moffett Field Area).

Supplemental Feasibility Study for the Vapor Intrusion Pathway

Based on the findings of the Supplemental Remedial Investigation, the *Final Supplemental Feasibility Study for the Vapor Intrusion Pathway* evaluated a range of remedial alternatives that can be used to mitigate potential vapor intrusion into existing and future buildings in the Vapor Intrusion Study Area.

3 Community Participation

The Supplemental Remedial Investigation and Feasibility Study reports for the Vapor Intrusion Pathway were made available to the public on June 30, 2009. In July 2009, EPA issued a fact sheet announcing the availability of the Proposed Plan, Supplemental Remedial Investigation and Feasibility Study reports, and Administrative Record file for the Vapor Intrusion Pathway for review at the informational repositories at the Mountain View Public Library and the EPA Superfund Records Center in San Francisco. Electronic copies of the Proposed Plan and Supplemental Remedial Investigation and Feasibility Study documents were also made available on EPA Region 9's website: www.epa.gov/region9/MEW. Copies of the fact sheet were mailed to the EPA mailing list for the MEW Site, including approximately 2,800 members of the general public, elected officials, and nearby residents and homeowners. EPA also published notices in the *Mountain View Voice* and the *San Jose Mercury News* newspapers that summarized the Proposed Plan and announced the public meeting and public comment period.

A 30-day public comment period began on July 10, 2009. In response to requests for additional time, the public comment period was extended to November 7, 2009. A public meeting was held on July 23, 2009 at Mountain View City Hall and was attended by approximately 50 people. In addition, EPA met with City of Mountain View staff, commercial property owners, residential property owners and residents, and provided updates at the NAS Moffett Field Restoration Advisory Board meetings and DeAnza Foothill College District meeting.

Public comments received at the July 23, 2009 public meeting and written comments received during the 120-day public comment period (July 10, 2009 - November 7, 2009) are included in the Administrative Record file. EPA's summary of responses to comments received at the public meeting and written comments submitted during the public comment period are included in Part 3 - Responsiveness Summary of this ROD Amendment.

4 Scope and Role of Response Action

EPA selected the soil and groundwater remedy in the 1989 ROD and modified it in the September 1990 and April 1996 ESDs. The 1989 ROD, subsequent ESDs, and this ROD Amendment were developed in accordance with Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act, as amended by the Superfund Amendments and Reauthorization Act (SARA) (collectively referred to as CERCLA), 42 U.S.C. §117, and 40 C.F.R §300.435(c)(2)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The 1989 ROD presented the selected soil and groundwater remedy for the Site, but did not address potential long-term exposure risks from TCE and other Site chemicals of potential concern through the vapor intrusion pathway. Since 1989, EPA's understanding has evolved regarding the way chemicals can migrate from subsurface soil and groundwater to the indoor air. Based on this current understanding and the vapor intrusion investigations conducted at the MEW Site, EPA determined that a vapor intrusion remedy is necessary at the MEW Site to protect the health of current and future occupants, including workers and residents, in buildings overlying shallow subsurface contamination.

This ROD Amendment presents the selected remedy for the vapor intrusion pathway for the MEW Site in accordance with CERCLA and the NCP. The response actions will address the potential health risks associated with long-term exposure to TCE and other MEW Site chemicals of potential concern through the vapor intrusion pathway in current and future buildings overlying the shallow subsurface contamination at the MEW Site.

The vapor intrusion pathway may cause exposure to Site chemicals of concern for building occupants, including workers and residents, within the Vapor Intrusion Study Area. This response action will address the vapor intrusion pathway by preventing subsurface contaminants from migrating into indoor air or accumulating in enclosed building spaces at levels exceeding EPA's indoor air cleanup criteria for long-term exposure.

The primary source of vapor intrusion, contamination in shallow groundwater, will continue to be addressed by the groundwater remedy, which is being re-evaluated to determine whether groundwater cleanup can be expedited. The evaluation is being conducted in a separate Supplemental Site-wide Groundwater Feasibility Study. Any modifications to the current groundwater remedy will be addressed in a separate ROD Amendment or ESD, as appropriate.

5 Site Characteristics

This section presents an overview of shallow groundwater and indoor air concentrations, the Vapor Intrusion Study Area, and the Site Conceptual Model for vapor intrusion.

5.1 Shallow Groundwater and Indoor Air Concentrations

Indoor air data are available from 47 commercial buildings and 20 residences within the Vapor Intrusion Study Area that were sampled during the Supplemental Remedial Investigation. Since the Supplemental Remedial Investigation Report was finalized in June 2009, additional indoor air samples have been collected at 8 commercial and 16 residential buildings for a total number of 55 commercial and 36 residential buildings that have been sampled in the Vapor Intrusion Study Area.

Tables 1 and 2, on the next page, summarize the maximum shallow groundwater and indoor air concentrations detected since 2002 for the commercial and residential areas, respectively. The chemicals shown are the chemicals of concern specified in the 1989 ROD that are relevant to vapor intrusion.

TCE is the primary chemical of concern for the vapor intrusion pathway at the MEW Site, although the potential exists for other Site chemicals, such as tetrachloroethene (PCE), *cis*-1,2-dichloroethene (*cis*-1,2-DCE), and vinyl chloride, to enter indoor air at levels exceeding EPA's indoor air cleanup criteria for long-term exposure. The maximum TCE groundwater concentrations found in the shallow groundwater zone are: 40,000 micrograms per liter (µg/L) in the MEW Area and 3,600 µg/L in the Moffett Field Area. The maximum TCE indoor air concentrations found in existing residential and commercial buildings overlying the shallow groundwater contamination (within the Vapor Intrusion Study Area) are 490 micrograms per cubic meter (µg/m^3) in the MEW Area and 176 µg/m^3 in the Moffett Field Area.

TABLE 1
Maximum Concentrations Detected in Shallow Groundwater and Indoor Air - Commercial Area

Chemical	MEW Area		Moffett Field Area		Indoor Air Screening Level ($\mu g/m^3$)
	Maximum Groundwater Concentration ($\mu g/L$)	Maximum Indoor Air Concentration ($\mu g/m^3$)	Maximum Groundwater Concentration ($\mu g/L$)	Maximum Indoor Air Concentration ($\mu g/m^3$)	
TCE	40,000	**490**	3,600	**176**	5
PCE	2,500	**8.9**	1,300	**35**	2
cis-1,2-DCE	120,000	190	160,000	17	210
trans-1,2-DCE	2,200	4.8	780	0.9	210
Vinyl Chloride	37,000	**14**	6,700	1.6	2
1,1-DCA	3,000	4.7	340	1.0	6
1,1-DCE	610	5.2	1,600	0.6	700
Chloroform	14	**9***	18	NT	0.4
1,2-DCB	11,000	2.9	12	1.8	700
1,1,1-TCA	2,700	33	10	5.6	18,000
Freon 113	1,900	64	81	NT	100,000

Notes:
* Result likely from indoor sources and not subsurface vapor intrusion
Bold indicates concentration exceeds indoor air screening level.
NT = Not tested
$\mu g/L$ = micrograms per liter
$\mu g/m^3$ = micrograms per cubic meter

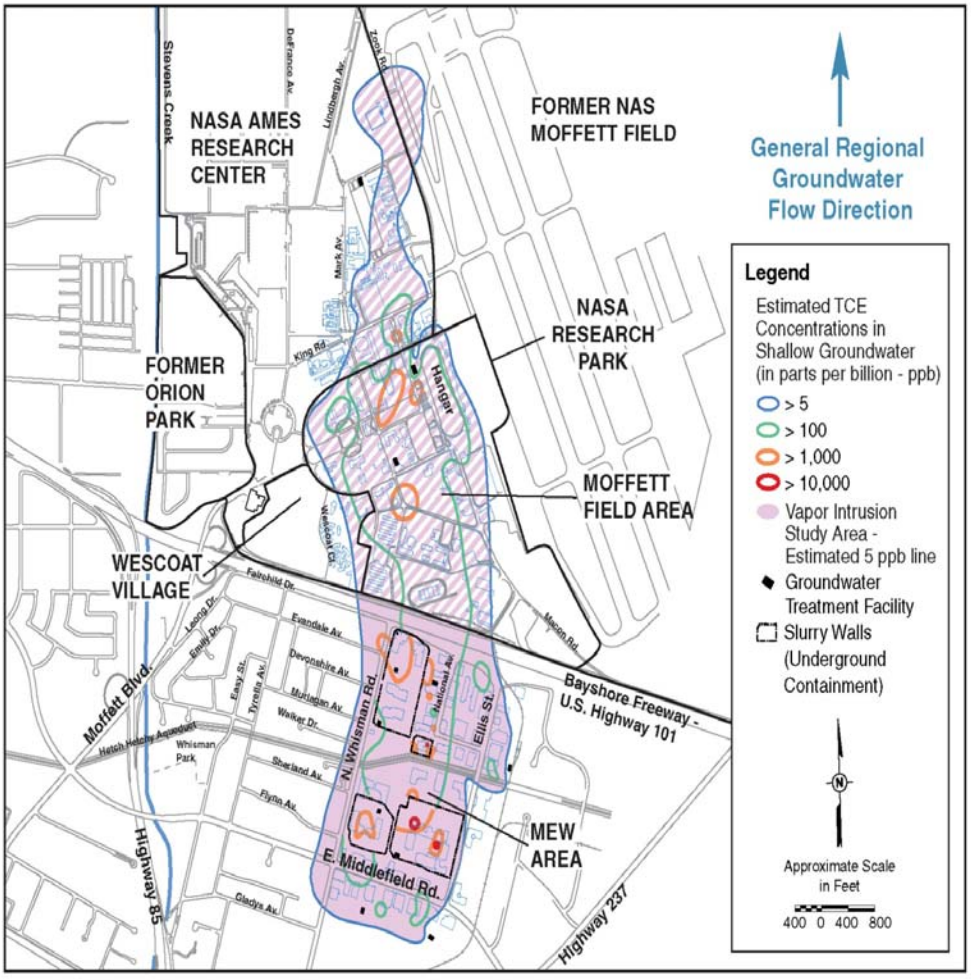
TABLE 2
Maximum Concentrations Detected in Shallow Groundwater and Indoor Air - Residential Area

Chemical	MEW Area		Moffett Field Area		Indoor Air Screening Level ($\mu g/m^3$)
	Maximum Groundwater Concentration ($\mu g/L$)	Maximum Indoor Air Concentration ($\mu g/m^3$)	Maximum Groundwater Concentration ($\mu g/L$)	Maximum Indoor Air Concentration ($\mu g/m^3$)	
TCE	180	**1.3**	110	**4.2**	1
PCE	18	**13***	ND < 3.1	NT	0.4
cis-1,2-DCE	48	0.3	350	0.03	60
trans-1,2-DCE	1.2	ND < 0.8	9.2	NT	60
Vinyl Chloride	5.6	0.13	ND < 3.1	0.03	0.2
1,1-DCA	4.5	0.1J	6.1	NT	2
1,1-DCE	5.3	0.15	8	NT	210
Chloroform	4.7	**33***	ND < 6.3	NT	0.1
1,2-DCB	6.9	1	ND < 3.1	NT	210
1,1,1-TCA	8.3	23J	ND < 3.1	NT	5,200
Freon 113	18	1.2	ND < 7.1	NT	31,000

Notes:
* Result likely from indoor sources and not subsurface vapor intrusion
Bold indicates concentrations exceed indoor air screening level.
NT = Not tested
ND = Not detected above indicated reporting limit
J = Estimated value
$\mu g/L$ = micrograms per liter
$\mu g/m^3$ = micrograms per cubic meter

5.2 Vapor Intrusion Study Area

Shallow groundwater beneath the Site is approximately 5 to 20 feet below the ground surface and generally flows in a northerly direction (i.e., from the MEW Area onto the Moffett Field Area). The TCE contamination in shallow groundwater is a primary source for vapor intrusion into buildings at the MEW Site; accordingly, the Vapor Intrusion Study Area is generally defined as the area where TCE concentrations in shallow groundwater are greater than 5 µg/L, or parts per billion (ppb). The estimated extent of TCE in shallow groundwater and the Vapor Intrusion Study Area are shown in **Figure 2** below.



[CORRECTED] Figure 2. Estimated Extent of TCE in Shallow Groundwater and Vapor Intrusion Study Area

Shallow groundwater is approximately 5 to 10 feet below the ground surface in the Moffett Field Area and approximately 10 to 20 feet below the ground surface in the MEW Area (the portion of the Vapor Intrusion Study Area south of U.S. Highway 101) (**Figure 2**).

5.3 Site Conceptual Model for Vapor Intrusion

The vapor intrusion pathway refers to the migration of volatile chemicals (i.e., chemicals that easily evaporate) from the subsurface soils and groundwater upwards as vapors, through conduits and preferential pathways, and into overlying buildings. These vapors can then collect inside the buildings and affect indoor air quality (**Figure 3** below). A conceptual model was developed to aid the evaluation of the vapor intrusion pathway at the MEW Site by identifying the potential sources of VOCs in indoor air, Site chemicals of potential concern, and potential pathways and receptors.

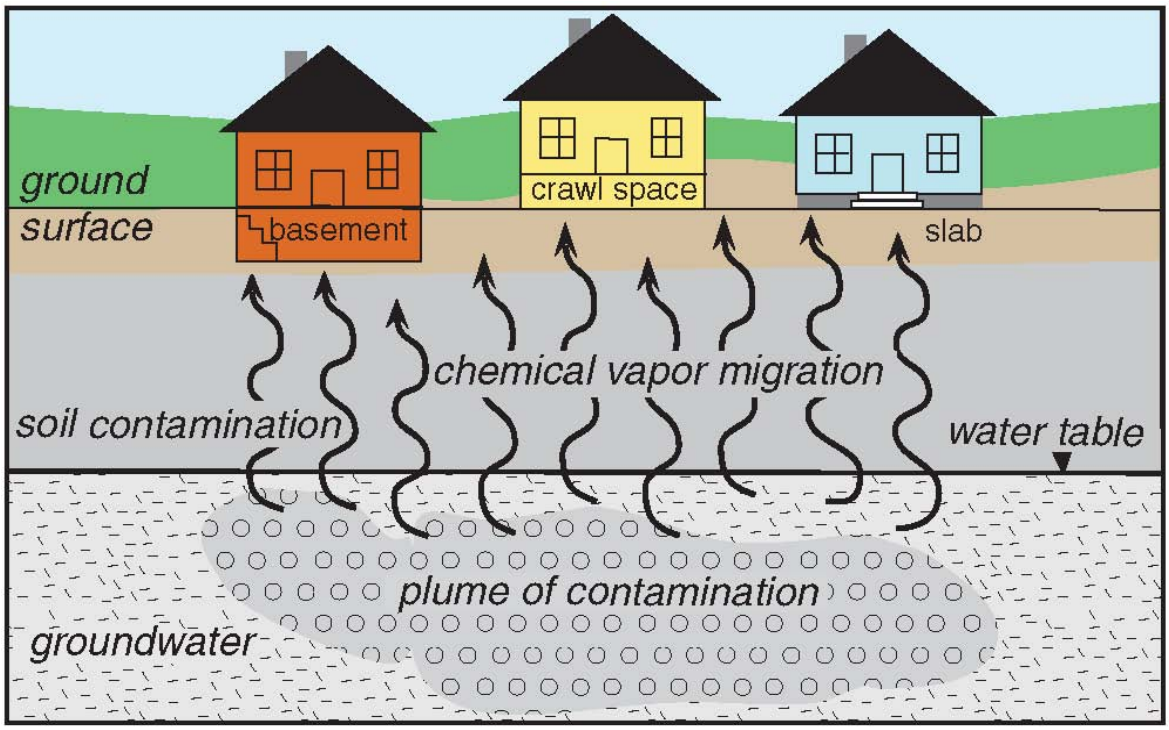


Figure 3. Schematic of Vapor Intrusion Pathway

Potential Sources of VOCs: Indoor exposure to VOCs can result from one or more of the following potential sources:

- Volatilization from subsurface shallow soil or groundwater contamination into a building structure (vapor intrusion);
- Occupational, household or consumer product use or storage inside the building (indoor source);
- Contribution of VOCs in outdoor air from outdoor sources, such as nearby industrial emissions (e.g., drycleaners, vehicle emissions), and volatilization from the subsurface to outdoor air near the building.

The potential sources of VOC contamination described above are not considered principal threat wastes. The source materials and source areas constituting principal threat wastes are addressed in the 1989 ROD, and therefore principal threat wastes are not addressed in this ROD Amendment.

Chemicals of Potential Concern: Air samples were analyzed for the MEW Site chemicals of concern defined in the 1989 ROD and detected in the groundwater. Based on the results of groundwater and air sampling results collected from 2002 -2010, the chemicals of potential concern for the vapor intrusion pathway at the MEW Site are: TCE; PCE; *cis*- and *trans*-1,2-DCE; vinyl chloride; 1,1-DCA; and 1,1-DCE.

Pathways: VOCs can evaporate from the groundwater or soils, migrate upward through building crawlspaces, cracks in the slab foundation, conduits, or subsurface structures, and enter into overlying buildings. For buildings with sumps, deep basements, or other subsurface structures (e.g., vaults, elevator shafts), VOCs can evaporate directly from the groundwater into the indoor air.

Potential Receptors: Potential receptors include persons occupying residential and commercial buildings overlying the Site's shallow groundwater contamination plume (see **Figure 2** Estimated Extent of TCE in Shallow Groundwater and Vapor Intrusion Study Area). In buildings where the vapor intrusion pathway is complete, receptors could potentially inhale the chemical vapors that accumulate in the breathing zone.

6 Current and Potential Future Site and Resource Uses

The MEW Area is a heavily populated, light-industrial, commercial, and residential area that currently hosts semiconductor, computer software, electronics businesses, and other commercial offices and light manufacturing facilities. The western boundary of the Vapor Intrusion Study Area is primarily residential.

The Moffett Field Area is primarily used for military housing, air operations, storage, educational facilities, research and development, office, and retail space. NASA's redevelopment plans in the Moffett Field Area include demolition of all non-historic structures. Plans are underway to redevelop unimproved land at Moffett Field into sustainable research facilities including office, educational, recreational, and residential uses.

Cleanup actions are being taken at the Site under the 1989 ROD to restore groundwater to its potential beneficial use, which is designated as drinking water. Note that the groundwater at the Site is not currently being used for drinking water or other domestic purposes. The MEW Site is not located in an environmentally sensitive area.

7 Summary of Site Vapor Intrusion Risks

This section presents a summary of Site vapor intrusion risks and the basis for taking the response actions to address the vapor intrusion pathway at the MEW Site.

7.1 Baseline Human Health Risk Assessment

A baseline human health risk assessment for the MEW Site is summarized in the 1988 *Endangerment Assessment for the Middlefield-Ellis-Whisman Site in Mountain View, California* (Endangerment Assessment). The exposure pathways that were evaluated in the Endangerment Assessment used exposure assumptions that were considered both conservative and reasonable in evaluating risk at that time. The Endangerment Assessment evaluated the potential for future exposure to contamination if the groundwater and its contaminant sources were left untreated and if that water was used for domestic purposes (e.g., drinking, showering, washing). Although groundwater at the MEW Site is not currently used for drinking water or other domestic purposes, cleanup actions are being taken at the Site to restore groundwater to its potential beneficial use as a potable drinking water source.

At the time, the Endangerment Assessment concluded that potential exposure to Site contaminants through the inhalation pathway presented negligible risks, and no Remedial Action Objectives for mitigating the subsurface vapor intrusion pathway were developed. Therefore, the 1989 ROD did not address potential long-term exposure risks from TCE and other chemicals of concern through the vapor intrusion pathway.

Since the issuance of the 1989 ROD, new information has been developed regarding the toxicity of TCE as well as the potential for vapor intrusion into buildings overlying shallow groundwater contamination. EPA has determined that the vapor intrusion response actions selected in this ROD Amendment are necessary to protect the public health of building occupants in the Vapor Intrusion Study Area from actual or threatened releases of hazardous substances into the environment via the subsurface vapor intrusion pathway.

7.2 TCE Toxicity Values

Status of the EPA Draft TCE Toxicity Values

There is currently no established toxicity value for TCE on EPA's Integrated Risk Information System (IRIS). The IRIS file for TCE currently states that "the carcinogen assessment summary for this substance has been withdrawn following further review." EPA's 2001 draft TCE health risk assessment underwent extensive review within EPA, including a peer review report by EPA's Science Advisory Board in December 2002. EPA developed and provided four issue papers to the National Academies' National Research Council (NRC) panel in February 2005 that highlight important scientific issues related to TCE. A report on the NRC panel's findings and recommendations entitled *Assessing the Human Health Risks of Trichloroethylene*[1]*, Key Scientific Issues* was released in July 2006 (National Academies Press, 2006). The report recommended that EPA finalize the TCE risk assessment with currently available data.

[1] Trichloroethylene is a synonym of trichloroethene (TCE).

On November 3, 2009, EPA released an updated health risk assessment for TCE titled "*Toxicological Review of Trichloroethylene: In Support of Summary Information on the Integrated Risk Information System* (IRIS)" (EPA/635/R-09/011A) (www.gpo.gov/fdsys/pkg/FR-2009-11-03/html/E9-26411.htm). The public comment period was open until February 1, 2010. EPA expects to finalize the TCE toxicity values on the IRIS database by 2011.

Tier 3 Provisional Toxicity Values Selected for TCE

In December 2003, EPA's Superfund program revised its hierarchy of human health toxicity values to be used in risk assessment (See OSWER Directive 9285.7-53 *Human Health Toxicity Values in Superfund Risk Assessments* www.epa.gov/oswer/riskassessment/pdf/hhmemo.pdf). This Directive also provides guidance for the sources of toxicity information that should generally be used in performing human health risk assessments when EPA has not established final toxicity values for a particular substance. This is relevant to MEW Site, because, as discussed above in Section 7.2, the primary MEW Site chemical of concern, TCE, currently has no EPA toxicity value.

According to EPA's guidance, toxicity sources other than EPA sources may be selected as Tier 3 toxicity values when they meet certain criteria. Preference is given to those sources that provide toxicity information based on similar methods and procedures as those used for Tier 1 and Tier 2, contain values which are peer reviewed, are available to the public, and are transparent about the methods and processes used to develop the values. In addition, priority is given to the most current sources of information.

Based on EPA's toxicity hierarchy guidance and consultation with EPA Headquarters, EPA Region 9 is using California Environmental Protection Agency (Cal/EPA) cancer toxicity values for TCE as a basis for setting indoor cleanup levels.

7.3 Indoor Air Cleanup Levels for MEW Chemicals of Potential Concern

In 2008, EPA Regions 3, 6, and 9 published a set of Regional Risk Screening Levels (RSLs). RSLs are not cleanup standards, but are risk-based concentrations used to assist risk assessors and others in initial screening-level evaluations of environmental measurements. The RSLs are general in that they are calculated without using site-specific information.

For the MEW Site, EPA used the RSLs and Site-specific information as a basis for setting MEW Site-specific action levels and cleanup standards where appropriate. EPA adopted the RSLs as the indoor air cleanup levels for residential exposures. Based on public comments, EPA adjusted the indoor worker exposure from an 8-hour work day to a 10-hour work day. This approach was also used to derive MEW Site-specific TCE indoor air cleanup level for commercial worker exposures (see Section 7.4 for equations).

The cleanup levels also consider whether the risk-based RSL is a practical number that can be achieved. For example, a cleanup level that is below ambient outdoor air levels of the same contaminant would not be appropriate as a cleanup level because indoor air cannot be cleaned up to levels below outdoor air that envelops a building. In addition, action is not required when the chemical concentrations are from other indoor sources and not from subsurface vapor intrusion or Site contamination. Indoor air cleanup levels for long-term exposure have been developed for TCE and the MEW chemicals of potential concern and are listed in **Table 3** on the next page.

TABLE 3
Indoor Air Cleanup Levels for Long-term Exposure for the MEW Site - Residential and Commercial Buildings

MEW Site Chemical of Potential Concern	Indoor Air Cleanup Level ($\mu g/m^3$)		Comments
	Residential	Commercial	
TCE	1	5	Representing 1 x 10^{-6} lifetime target cancer risk through application of the Cal/EPA toxicity factor and a 1 x 10^{-4} lifetime target cancer risk through application of draft 2001 EPA toxicity factor.
PCE	0.4	2	Representing 1x 10^{-6} lifetime target cancer risk.
cis-1,2-DCE	60	210	Not Available. Based on trans-1,2-DCE Non-cancer Hazard Index of 1.
trans-1,2-DCE	60	210	Representing Non-cancer Hazard Index of 1.
Vinyl Chloride	0.2	2	Representing 1x 10^{-6} lifetime target cancer risk. EPA uses a larger conversion factor from residential to commercial for vinyl chloride because the residential value takes into account child exposure and higher sensitivity earlier in life.
1,1-DCA	2	6	Representing 1x 10^{-6} lifetime target cancer risk.
1,1-DCE	210	700	Representing Non-cancer Hazard Index of 1.

Indoor Air Cleanup Levels for TCE

At the MEW Site, EPA is using TCE indoor air cleanup levels of 1 $\mu g/m^3$ of TCE in air for residential buildings and 5 $\mu g/m^3$ of TCE in air for commercial (non-residential) buildings. The cleanup levels for TCE in air are risk-based concentrations and were set to be protective against carcinogenic risks as well as other health effects associated with long-term exposure to TCE in residential and commercial/non-residential workplace settings respectively. The TCE indoor air cleanup level is set to correspond to a one-in-one million (1 x 10^{-6}) excess lifetime cancer risk level through application of the Cal/EPA cancer toxicity values.

Cleanup levels can be set at various risk levels within EPA's acceptable risk management range. At the MEW Site, EPA is setting the TCE indoor air cleanup level at the 1 x 10^{-6} point of departure risk level because emerging health science information (including both of EPA's 2001 and 2009 draft toxicity assessment updates) indicate more stringent TCE toxicity values in the future. Therefore, use of the 1 x 10^{-6} risk level for the TCE indoor air cleanup levels will better assure the remedy will remain protective once the toxicity values are finalized.

The equations used to derive the indoor air cleanup levels for TCE are presented on the next page and in the *Supplemental Feasibility Study for the Vapor Intrusion Pathway*. The equations for the other MEW chemicals of potential concern are the same.

For residential exposure, the TCE cleanup level is derived based on the following equation:

$$C = [TR \times AT] / [IUR \times ET_r \times EF_r \times ED_r]$$

Where:

C = Target TCE cleanup level concentration of 1 µg/m^3 derived by EPA for residential settings

TR = 1×10^{-6} through application of the Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA) inhalation unit risk (IUR) and upper end of risk range through application of draft 2001 EPA IUR.

AT = Cancer averaging time, 70 years expressed in days (25,550 days)

IUR = Inhalation unit risk, 0.000002 (per µg/m^3) from Cal/EPA and 0.00011 (per µg/m^3) from EPA, 2001

ETr = Exposure time (residential), 24 / 24 (total hours per 24 hr-day)

EFr = Exposure frequency (residential), 350 days per year

EDr = Exposure duration (residential), 30 years

The TCE indoor air cleanup level for commercial indoor workers (non-residential settings) is derived through the same equation as follows:

$$C = [TR \times AT] / [IUR \times ET_w \times EF_w \times ED_w]$$

Where:

C = target TCE concentration of 5 µg/m^3 derived by EPA for commercial settings

TR = 1×10^{-6} through application of the Cal/EPA IUR and upper end of risk range through application of draft 2001 EPA IUR

AT = Cancer averaging time, 70 years expressed in days (25,550 days)

IUR = Inhalation unit risk, 0.000002 (per µg/m^3) from Cal/EPA

ETw = Exposure time (indoor worker), 10 (hour workday)/ 24 (total hours per 24 hr-day)

EFw = Exposure frequency (indoor worker), 250 days per year

EDw = Exposure duration (indoor worker), 25 years

8 Remedial Action Objectives

The remedial action objectives (RAOs) for the Site established in the 1989 ROD are to reduce concentrations of chemicals in soil and groundwater (and chemical sources to groundwater) so that the groundwater could ultimately be used for domestic and drinking water purposes. At that time, no RAOs for the vapor intrusion pathway were identified.

This ROD Amendment adds two additional RAOs for the MEW Site. The first RAO will be addressed by the vapor intrusion remedy.

- To ensure that building occupants (e.g., workers and residents) are protected from Site contamination by preventing subsurface Site contaminants from migrating into indoor air or accumulating in enclosed building spaces exceed indoor air cleanup levels for long-term exposure.

The second RAO is not addressed by this vapor intrusion remedy; instead, it is being addressed by the soil and groundwater remedy being implemented under the 1989 ROD, and will be further evaluated in a separate Supplemental Site-wide Groundwater Feasibility Study. Any modifications to the current soil and groundwater remedy to address this RAO will be in a separate, future ROD Amendment.

- To accelerate the reduction of the source of vapor intrusion (i.e., Site contaminants in shallow groundwater and soil gas) to levels that are protective of current and future building occupants, such that the need for a vapor intrusion remedy would be minimized or no longer be necessary.

9 Documentation of Significant Changes from Preferred Alternative of Proposed Plan

The *Proposed Plan for the Vapor Intrusion Pathway* was published in July 2009, and identified EPA's preferred alternatives for the vapor intrusion remedy:

- For future buildings, EPA's preferred alternative was the installation of an appropriate Sub-slab/Sub-membrane Ventilation or Depressurization System.

- For existing buildings, EPA's preferred alternative was the use of the building's indoor air ventilation system unless the building does not have a mechanical ventilation system or if the ventilation system is unable to sufficiently reduce VOC concentrations below indoor air action levels; in these cases the preferred alternative was the installation of a Sub-slab/Sub-membrane Depressurization System.

- The preferred institutional control (IC) to support each of these remedial alternatives was a municipal ordinance in the MEW Area that requires implementation of the remedy.

During the public comment period, EPA received information that prompted consideration of allowing greater flexibility in the performance of the remedial alternative in meeting the first vapor intrusion RAO. Changes made to the July 2009 Proposed Plan are: (1) allowing for a broader selection of Sub-slab Ventilation System options for existing and future commercial buildings, (2) changing EPA's selected remedy for existing commercial buildings to installation of an appropriate Sub-slab/Sub-membrane Ventilation System unless use of the building's Indoor Air Mechanical Ventilation System meets the RAO and is implementable on a long-term, ongoing basis, and (3) using a combination of municipal permitting processes and recorded agreements as ICs.

Active Sub-slab Ventilation System Options: During the public comment period, EPA received new information about the implementability of different types of sub-slab vapor control systems that had not been assessed in the Proposed Plan. For existing buildings, EPA assessed the implementability of installing active sub-slab ventilation systems in existing buildings with a lower rating than that of the indoor air mechanical ventilation

system alternative because of the disruption associated with drilling through the floor and concrete slab foundation of an existing building. EPA now understands that installing sub-slab vapor control systems beneath existing buildings may be feasible in many circumstances, including installation of sub-slab vapor control systems from the perimeter of the building footprint. Therefore, the selected alternative is to select the sub-slab vapor control system most appropriate to the building that is capable of reducing VOC concentrations to below indoor air cleanup levels. The remedy would still allow for use of a building's indoor air mechanical ventilation system for existing buildings if the property/building owner agrees to use, operate, maintain, and monitor the ventilation system in a manner consistent with the operations, maintenance, and monitoring plan developed for that specific building.

For future commercial buildings, several comments on the Proposed Plan indicated a strong desire to allow for a range of sub-slab vapor control system options considering the needs of the individual property owner and building manager. Therefore, where EPA's preferred alternative for future commercial buildings in the Proposed Plan had been installation of a passive sub-slab ventilation system (with the ability to convert to an active system) and a vapor barrier on properties overlying low groundwater concentrations and installation of a Sub-slab/Sub-membrane Depressurization system on properties overlying higher groundwater concentrations, EPA is selecting a vapor intrusion remedy that provides an option of installing, operating, maintaining, and monitoring a Passive Sub-slab Ventilation System and Vapor Barrier (with the ability to be made active) or an Active Sub-slab Ventilation System that achieves RAOs and is capable of reducing VOC concentrations to below indoor air cleanup levels, rather than prescribing the particular type of sub-slab system.

Selected Remedy for Existing Commercial Buildings: Commercial property owners and building lessees expressed significant concerns regarding the logistics, cost, and uncertainty for the long-term operations, maintenance, and monitoring of the mechanical ventilation (e.g., heating, ventilation, and air conditioning [HVAC]) systems as the vapor intrusion control remedy and the requirements to ensure that the remedy is operating properly to meet the RAOs. Additionally, several buildings in the MEW Area have security and cleaning crews occupying the buildings after normal business hours for more than 8 hours a day. In some of these buildings, operation of the mechanical ventilation system for much longer periods of time than estimated in the June 2009 *Supplemental Feasibility Study for the Vapor Intrusion Pathway* would result in a significant increase in energy consumption costs, system maintenance, and ecological footprint. Therefore, EPA's selected vapor intrusion remedy for existing commercial buildings is the installation of an appropriate active sub-slab/sub-membrane ventilation system. However, in instances where the existing commercial building's indoor air mechanical ventilation system is reliable, cost effective, and capable of achieving the indoor air cleanup levels and RAOs, then the remedy allows the use of the mechanical ventilation system as the vapor intrusion control remedy if the property/building owner agrees to use, operate, and monitor the ventilation system in a manner consistent with the operations, maintenance, and monitoring plan developed for that specific building.

Selected Institutional Controls: The Proposed Plan identified the adoption of a municipal ordinance as EPA's preferred ICs for the vapor intrusion remedy in the MEW Area. Since

the issuance of the Proposed Plan, the City of Mountain View has formalized its permitting procedures that are necessary for ICs for future construction. With regard to existing commercial buildings, EPA has selected the use of recorded agreements that will provide notice to current and future owners and occupants, notice to EPA and the MEW Companies when there is a change in building ownership or configuration, as well as the necessary access to install, maintain, and operate the remedy. These agreements will also have to be binding on and enforceable against future property owners. Additionally, EPA has selected the use of a tracking service to provide notice when changes are made to properties within the Vapor Intrusion Study Area.

10 Description of Alternatives for Vapor Intrusion Pathway

The descriptions of the alternatives evaluated for the vapor intrusion pathway are presented below.

10.1 Common Elements

Each alternative, with the exception of the "No Action" Alternative, consists of an appropriate engineering control, ICs, and monitoring. The engineering control is the physical, operating portion of the remedy that, in this case, either prevents vapors from entering an overlying building or prevents vapors from accumulating indoors at concentrations exceeding indoor air cleanup levels for long-term exposure.

ICs are non-engineered remedy components that are part of each of the remedial alternatives. ICs are necessary for a variety of functions, including ensuring ongoing operation of the remedy itself in certain instances, requiring vapor intrusion control requirements for future building construction, and providing information about the Site and the vapor intrusion remedy to the public and prospective property owners and building tenants. None of the alternatives rely solely on ICs.

Monitoring to verify the effectiveness of the remedy is a component of each alternative. Additionally, ongoing monitoring of ICs will be necessary to ensure the remedy is effective over the long-term. Monitoring activities, schedules, and task responsibilities will need to be detailed in each building's operations, maintenance and monitoring plan, which will be incorporated into the Site's ICs Implementation Plan. For overall monitoring, there will need to be a system for tracking the remedy and its applicable ICs at each property.

The cost estimates presented below are for engineering controls and associated operations, maintenance, and monitoring, and are on a per-building basis. Cost estimates provided for each remedial alternative for the commercial building scenario are based on a one-story, 20,000 square-foot building. Cost estimates for the residential building scenario are based on a one-story, 2,000 square-foot building. The present worth costs are for 30 years of operations and maintenance for the remedy and are calculated using a real discount rate of 7 percent, in accordance with EPA's *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (2000) for non-federal facilities. The costs associated with ICs are included in the Site-wide cost estimate, but are not included under the alternatives below; the costs for some ICs apply to all alternatives and are not based on the number of buildings.

10.2 Description of Remedial Alternatives

The alternatives evaluated for the vapor intrusion pathway were:

- Alternative 1: No Action
- Alternative 2: Active Indoor Air Ventilation System, Monitoring, and ICs
- Alternative 3: Passive Sub-slab Ventilation with Vapor Barrier (and Ability to Convert to Active), Monitoring, and ICs
- Alternative 4: Active Sub-slab or Sub-membrane Ventilation, Monitoring, and ICs

Alternative 1: No Action

CERCLA requires that a "no action" alternative be evaluated. This establishes a baseline for comparison to other remedial alternatives. This alternative is applicable to existing and future commercial and residential buildings.

Under this alternative, EPA would not utilize any remedy at the Site to prevent exposure to Site contaminants in indoor air from the vapor intrusion pathway. Only monitoring would be performed to evaluate the potential for vapor intrusion, or to verify the presence or absence of the vapor intrusion pathway, into specific buildings. This monitoring may consist of one or a combination of the following:

- Groundwater monitoring: Trends in groundwater concentrations and water levels can be used to assess whether the potential for vapor intrusion is increasing or decreasing. Groundwater contamination plume boundaries would indicate whether the boundaries of the Vapor Intrusion Study Area should be modified.
- Air samples: Indoor, outdoor, and crawlspace air samples provide empirical information on the concentrations of Site VOCs in the enclosed space and potential impact on indoor air quality from the vapor intrusion pathway.
- Soil gas samples: Sub-slab soil gas and soil gas samples to assess the potential vapor intrusion pathway into a building.

<u>Estimated Costs for Alternative 1</u>

Commercial (for a 20,000 square foot building):

Capital:	$0
Annual O&M:	$2,400
Present Worth:	$30,000

Residential (for a 2,000 square foot building):

Capital:	$0
Annual O&M:	$900
Present Worth:	$11,500

Alternative 2: Active Indoor Air Ventilation System, Monitoring, and ICs

Mechanical indoor air ventilation systems (typically HVAC systems in commercial buildings) bring outdoor air into the building enclosure and vent indoor air to the outdoors.

The net effect of using a mechanical ventilation system for the remedy is the balanced exchange of indoor air with outdoor air allowing VOCs that enter the building to be removed. The exchange of outdoor air also dilutes the concentrations of VOCs inside the building prior to "venting" the indoor air to the outside air.

If the mechanical ventilation system is operated at a high enough level to cause the building to be under positive pressure, contaminants from the subsurface are prevented from entering the building. However, if there are areas of the building with negative pressure, then contaminants beneath the foundation or in the crawlspace may migrate into the building.

As part of this alternative, all identified direct and leaking conduits that serve as a pathway for subsurface vapors would be sealed. Air purifier units may be utilized as part of this alternative as an add-on technology to reduce VOC concentrations where there is inadequate outside make-up air. This alternative requires operation of the ventilation systems at levels sufficient to keep the concentrations of VOCs below indoor air cleanup levels.

This alternative can be implemented in existing and future commercial buildings and may be applicable to specific spaces in existing residential buildings (e.g., garage, basement, etc.).

Estimated Costs for Alternative 2

Commercial (for a 20,000-square-foot building):

Capital:	$4,500 to retrofit existing system; $140,000 for new system
Annual O&M:	$3,400
Present Worth:	$50,000 to retrofit in an existing building; $185,000 for installation of new system in future building

Residential (for a 2,000-square-foot building):

Capital:	$1,200 for installation of exhaust fan
Annual O&M:	$1,200
Present Worth:	$37,500

Alternative 3: Passive Sub-slab Ventilation with Vapor Barrier (and Ability to Convert to Active), Monitoring, and ICs

A passive sub-slab ventilation (SSV) system contains no active mechanical equipment; it uses slight pressure differences to force contaminant vapors to flow away from the building enclosure rather than allowing them to enter from beneath the building foundation. Construction of a passive SSV system involves installation of a venting layer below the floor slab that allows soil gas to move laterally beyond the building footprint also using natural diffusion or pressure gradients. This alternative requires installation of a vapor barrier to prevent soil vapors from entering through the building foundation.

A passive sub-slab ventilation system includes installation of perforated pipes within a gravel and/or sand layer manifolded to vent risers. At the end of the vent risers there is a wind-driven turbine that exerts a slight negative pressure in the subsurface and induces flow from the subsurface to the outside. Differential barometric pressures throughout the day can also generate a pressure differential and enhance the air flow. The passive SSV system would be designed and constructed so that it could be converted to an active

sub-slab ventilation system by adding a fan, if determined necessary to keep indoor air concentrations below the cleanup levels or increasing long-term effectiveness.

The passive sub-slab ventilation system is only feasible when constructing a new building, because of the infeasibility of installing a vapor barrier and the difficulty of placing a venting layer beneath slabs of existing buildings.

Estimated Costs for Alternative 3

Commercial (for a 20,000-square-foot building):

Capital:	$175,000 for future building
Annual O&M:	$2,400 for future building
Present Worth:	$207,500 for future building

Residential (for a 2,000-square-foot building):

Capital:	$25,000 for future building
Annual O&M:	$900 for future building
Present Worth:	$36,500 for future building

Alternative 4: Active Sub-slab/Sub-membrane Ventilation, Monitoring, and ICs

There are several Active Sub-slab/Sub-membrane vapor control ventilation technologies that may be used for this alternative. The technologies considered are 4A: Sub-slab Depressurization (SSD), 4B: Sub-membrane Depressurization (SMD), and 4C: Sub-slab Pressurization (SSP). Each of these alternatives would include monitoring and ICs.

Alternative 4A: Sub-slab Depressurization (SSD), Monitoring, and ICs

Alternative 4A is applicable to buildings with slab foundations. A SSD system actively pulls soil gas from beneath the slab and vents it to the outside, typically at a height above the roof and away from a building's windows and air supply intakes. The system functions by creating a pressure differential across the building slab that draws indoor air down into the subsurface and keeps subsurface air from moving upward into the building. When the system is operating, soil gas generally cannot flow from under the slab foundation into the building. SSD systems are typically considered the most reliable, cost effective, and efficient technique for controlling vapor intrusion into buildings.

SSD system components are similar to a passive venting system except that the sub-slab depressurization system is equipped with a fan or blower that draws soil gas through the sub-slab venting layer. To install SSD systems at existing buildings, one or more holes are cut into the existing slab, soil is removed from beneath the slab to create an open hole or "suction pit," and vertical suction pipes are placed into the holes. The pipes are then manifolded together and connected to a fan or blower that draws soil gas from beneath the slab through the piping and vents it outdoors.

All identified direct and leaking conduits that serve as a pathway for vapors from the subsurface to migrate into the building would be sealed prior to implementation of the system.

Alternative 4B: Sub-membrane Depressurization (SMD), Monitoring and ICs

Alternative 4B is applicable to buildings with crawlspaces or earthen basement.

A sub-membrane depressurization (SMD) system is similar to a SSD system except that a SMD system is typically used for a building with a crawlspace or where there is no slab foundation (e.g., building with dirt basement). A membrane is installed to help create the pressure differential in the subsurface. The system creates lower sub-membrane air pressure relative to the crawlspace air pressure by use of a fan-powered vent to draw air from soils under the membrane. The membrane could consist of polyethylene materials or plastic liner sheeting placed over the earthen or gravel area. The membrane must be sealed along the edges of the foundation wall or footings and at pipe penetrations through the membrane.

All identified direct and leaking conduits that serve as a pathway for vapors from the subsurface to migrate into the building enclosure would be sealed prior to implementation of the system.

Alternative 4C: Sub-slab Pressurization (SSP) with Vapor Barrier, Monitoring, and ICs

A sub-slab pressurization (SSP) system is similar to a sub-slab depressurization system except that fans push air from the building foundation footprint downward into the area below the slab and vent soil vapors around the building. A sub-slab pressurization system works by increasing sub-slab air pressure above ambient levels, thereby pushing subsurface soil vapors to the sides of the building where they vent through exhaust vents around the building. A SSP system also requires surface coatings or installation of a vapor barrier to prevent air that is forced into the system from entering the building through cracks and openings (referred to as short-circuiting). Types of surface coatings include epoxy paints, asphaltic coatings, and polyurethane caulk. Vapor barriers could be either synthetic liners or seamless, spray-applied membranes.

Alternative 4C is applicable to all future buildings. It is not practical for existing buildings because of the difficulty of placing a venting layer under existing slabs, and because the vapor barrier can only be installed properly beneath the foundation of new buildings.

<u>Estimated Costs for Alternatives 4A/4B/4C</u>

Commercial (for a 20,000-square-foot building):

Capital:	$177,000 to $183,000 for existing building; $76,000 to $192,000 for future building
Annual O&M:	$11,100 for existing building; $9,600 for future building
Present Worth:	$325,000 (Alternative 4A) to $331,000 (Alternative 4B) for existing building; $203,000 (Alternative 4B) to $318,500 (Alternative 4C) for future building

Residential (for a 2,000-square-foot building):

Capital:	$5,000 to $18,000 for existing building and $15,000 to $29,000 for future building
Annual O&M:	$1,400
Present Worth:	$24,000 (Alternative 4A) to $60,000 (Alternative 4B) for existing building and $38,000 (Alternative 4A) to $56,500 (Alternative 4B) for future building

10.3 Summary of Institutional Controls (ICs)

ICs are non-engineered legal and administrative instruments that help to minimize the potential for human exposure to contamination and protect the integrity of an engineered remedy. There are four categories of ICs: government controls; proprietary controls; enforcement tools with IC components; and informational devices. Each of these types of ICs can be used, alone or in combination, to ensure the protectiveness of an engineered remedy. Below is a summary of the selected ICs. See the *Final Supplemental Feasibility Study for the Vapor Intrusion Pathway* for more detailed information and an evaluation of each of the ICs considered.

The purposes of the ICs for the vapor intrusion remedy are to: (1) ensure the operation and monitoring of engineering controls used to prevent levels of Site chemicals of concern associated with the vapor intrusion pathway from exceeding EPA's indoor air cleanup levels as required by the remedy; (2) ensure that the appropriate engineering controls are installed into any new building development at the Site; (3) provide information to building owners and occupants regarding the appropriate vapor intrusion remedy for each building; (4) provide information to EPA and the Responsible Parties regarding, among other things, new construction and changes of property ownership within the Vapor Intrusion Study Area.

Government controls can include the use of local planning procedures to place requirements on properties that require special treatment in order to protect health and safety. The City of Mountain View is in the process of formalizing its planning and permitting procedures to require the appropriate vapor intrusion control measures are included in new building construction within the Vapor Intrusion Study Area. These procedures include requirements that those proposing new building construction within the Vapor Intrusion Study Area obtain EPA approval of plans to ensure that, where necessary, the appropriate vapor intrusion control system is part of the building construction. This may also be the case with current buildings undergoing significant new construction or entirely new construction. Additional controls that will be implemented by the City of Mountain View include creation of a mapping database (e.g., Geographic Information System [GIS]) to ensure that parties interested in properties within the Vapor Intrusion Study Area are informed of the appropriate construction requirements when making inquiries with the City of Mountain View.

For new development at NASA Research Park within the Moffett Field Area, this remedy will rely in part on management procedures already in place by NASA, the land owner. NASA uses its March 2005 *Environmental Issues Management Plan* (EIMP) as a decision framework for the management of residual chemicals in soil and groundwater. The EIMP already includes certain measures to be implemented in future development at NASA Research Park to address the vapor intrusion pathway. Specifically, the EIMP provides design requirements for new construction, risk management procedures for future subsurface activities, and procedures for long-term management of environmental conditions in the NASA Research Park area. Specifically with regard to vapor intrusion, the EIMP requires all future construction overlying 5 ppb of VOCs in the shallow groundwater to incorporate vapor intrusion mitigation either with a sub-slab ventilation system or an indoor air mechanical ventilation system that maintains positive pressure. Additionally, after mitigation measures are implemented, the EIMP requires ongoing monitoring of contaminants and remedial measures. A portion of the Moffett Field Area is not within the

NASA Research Park area, but is also owned by NASA. For those properties and all properties within the Moffett Field Area, sampling, operations, maintenance, and monitoring requirements should be incorporated into the appropriate Master Plan planning documents. Additionally, similar requirements to those in the EIMP should be adopted for new construction within the Moffett Field Area and for ongoing implementation and monitoring of the remedy.

In the MEW Area, because the vapor intrusion remedy will be implemented on a building-by-building basis, agreements between the MEW Responsible Parties and the property owners of existing buildings where a vapor intrusion remedy is required (see Section 12.1) will be necessary. The agreements are necessary to ensure that: (1) new and subsequent property owners are informed of the vapor intrusion remedy and its requirements; (2) there is appropriate access to conduct initial sampling, remedy implementation, and monitoring at each building; and (3) EPA and the MEW Responsible Parties are informed when there are changes in ownership or building configuration that could potentially impact the remedy. The agreements must include EPA as a third party beneficiary and be recorded with the Santa Clara County Recorder to ensure that these agreements (1) only need to be negotiated once for each property and will thereafter be permanent, and (2) are enforceable against current and future owners. As a third party beneficiary, EPA would be able to enforce the agreements directly where necessary. There are many buildings where agreements would be necessary; to avoid inconsistency among the agreements, the agreements should include similar or identical language to address the required elements described above. Where such agreements fail to be recorded, land use covenants with EPA as a third party beneficiary will be required with the above requirements to ensure that the remedy is appropriately implemented at each property over time.

Additionally, informational tracking services will be employed to provide information regarding activities at the MEW Site that could impact the vapor intrusion remedy. For example, such a service can be used to track property sales or to track permitting of new construction in the area. These services may be limited, however, to reporting activity that has already occurred (such as a sale that has already taken place), so it will remain necessary to layer the use of this service with the informational components of the governmental and proprietary ICs.

The ICs for the remedy will need to be monitored and managed closely, particularly due to the number of properties and buildings involved with the remedy. As part of Remedial Design, EPA will develop an Institutional Controls Implementation Plan ("ICIP") that will serve as the design document for implementation and ongoing ICs management.

11 Comparative Analysis of Alternatives for Vapor Intrusion Pathway

This section presents a comparative analysis of alternatives with respect to EPA's nine evaluation criteria listed in 40 CFR Section 300.430.

11.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and

describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

All of the alternatives, with the exception of the No Action Alternative (Alternative 1), would provide adequate protection of human health and the environment as long as they are implemented, operated, maintained, and monitored sufficiently. The No Action Alternative would not eliminate, reduce, or control risk through any engineering and management controls, and would not be protective of human health and the environment. ***Therefore, Alternative 1, the No Action Alternative is eliminated from discussion under the remaining eight criteria.***

11.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA and NCP, 40 C.F.R. §300.430(f)(1)(ii)(B), require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations, unless such ARARs are waived under CERCLA section 121(d)(4). Alternative 2 (Active Indoor Air Ventilation, Monitoring, and ICs), Alternative 3 (Sub-Slab Passive Ventilation with Vapor Barrier, Monitoring, and ICs), and Alternative 4 (Active Sub-slab/Sub-membrane Ventilation, Monitoring, and ICs) attain the ARARs identified for the vapor intrusion remedy.

11.3 Long-term Effectiveness and Permanence

The long-term effectiveness and permanence criterion assesses the expected residual risk, the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup levels have been met, and the adequacy and reliability of controls.

Alternatives 3 and 4 work to prevent the entry of VOCs into the building at levels exceeding indoor air cleanup levels for long-term exposure. With these alternatives in place, indoor air concentrations would be similar to outdoor air concentrations, and the risks would be similar to those found from breathing outdoor air. Alternative 4 has been demonstrated to be highly effective in controlling vapor intrusion in both existing and new buildings, and is therefore ranked the highest. However, the long-term effectiveness and permanence of any of these alternatives are dependent on proper operations, maintenance, and monitoring.

Alternative 2 can keep Site-related VOC concentrations in buildings below indoor air cleanup levels if the building's indoor air ventilation systems are operated and maintained in accordance with the remedy. However, because the building ventilation systems would be operated by building owners/occupants and not directly by the Responsible Parties, this remedy would rely heavily on ICs to ensure that the building ventilation systems are properly operated and maintained in accordance with the remedy and the long-term operation, maintenance, and monitoring plans for that specific building. The need for recorded agreements with building owners and operators to use, maintain, and monitor each building's ventilation system as a vapor intrusion control system to meet RAOs makes this alternative more complex and difficult to implement over the long-term than the other alternatives. Therefore, Alternatives 3 and 4 are more reliable and effective over the long-term than Alternative 2.

11.4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Reduction of toxicity, mobility, or volume through treatment analyzes the anticipated performance of the treatment technologies that may be included as part of a remedy. None of the vapor intrusion remedial alternatives meet this requirement.

Unlike typical remedies to address contamination, the vapor intrusion remedial alternatives are not designed to reduce the toxicity, mobility, and volume through treatment of contaminants. Instead the vapor intrusion control alternatives reduce risk by preventing exposure.

The soil and groundwater remedy selected in the 1989 ROD addresses the source of subsurface contamination and reduces the mobility and volume of contaminants through treatment. Treatment of the Site contaminants is accomplished by directly addressing the subsurface shallow groundwater and soil contamination. As discussed above, remediation of the shallow subsurface groundwater and soil contamination is being conducted in accordance with the 1989 ROD.

11.5 Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts on workers, the community, or the environment during construction and operation of the remedy until cleanup levels are achieved.

All of the alternatives are protective of worker's health during construction with standard construction procedures implemented. There are no additional risks to public health and the environment during the implementation of these alternatives. Alternatives 2, 3, and 4 could be implemented in a short-term time frame (less than one year) to effectively reduce VOC concentrations to below their respective indoor air cleanup levels for long-term exposure.

11.6 Implementability

Implementability addresses a remedy's technical and administrative feasibility from design through construction and operation. Factors considered include availability of services and materials, administrative feasibility, and coordination with other governmental entities.

For existing buildings, Active Indoor Ventilation, Monitoring, and ICs (Alternative 2) is generally implementable in commercial buildings where there is consent and cooperation of the property owner, though ongoing implementation in all commercial buildings requiring remedial action in the Vapor Intrusion Study Area could be very complex. Active Sub-slab/Sub-membrane Ventilation, Monitoring, and ICs (Alternative 4) is technically feasible in most buildings, but implementability in some large existing buildings may be moderately difficult because of the presence of complex subsurface utilities and fiber optics lines. In addition, buildings where slab foundations or subsurface structures encounter groundwater, Sub-slab Ventilation Systems may not be practical or feasible. Sub-Slab Passive Ventilation with Vapor Barrier, Monitoring, and ICs (Alternative 3) is very difficult to implement at existing buildings with basement and slab foundations because of the infeasibility of placing a vapor barrier beneath an existing slab foundation. With regard to ICs, for remedy implementation at existing commercial buildings within the MEW Area,

recording of agreements for each commercial building requiring remedial action within the Vapor Intrusion Study Area may be cumbersome but it is feasible. In order to be feasible, the agreements will have to be binding and enforceable on successor owners so that the agreements will only have to be negotiated one time for each property.

For new construction and future buildings, Alternatives 2, 3, and 4 are implementable and feasible. However, the administrative feasibility of the long-term operations, maintenance and monitoring is less complicated for Alternatives 3 and 4 than for Alternative 2. Formalization of City of Mountain View procedures to incorporate remedy requirements for new construction is feasible.

11.7 Cost

Capital and O&M costs vary with each alternative and its application. Active Indoor Air Ventilation System, Monitoring, and ICs (Alternative 2) has the lowest capital cost for commercial buildings. However, the long-term O&M and ICs costs can vary depending on the required use of the ventilation systems in each building to meet the RAOs and the cost of recorded agreements. Active Sub-slab/Sub-membrane Ventilation, Monitoring, and ICs (Alternative 4) has the lowest cost for existing residential buildings, and Passive SSV with Vapor Barrier (with the ability to convert to active), Monitoring, and ICs (Alternative 3) has the lowest cost for future residential buildings. The 30-year present worth costs of each applicable Alternative are estimated on a per building basis and are summarized in **Tables 4 and 5**, on this page and next page, for the commercial and residential scenarios.

TABLE 4
Present Worth Costs of Alternatives for Existing and Future Commercial Buildings

Remedial Alternative	Existing Buildings			Future Buildings		
	Low	High	Average	Low	High	Average
1: No Action	$10,000	$50,000	$30,000	$10,000	$50,000	$30,000
2: Active Indoor Air Ventilation	$21,000	$79,000	$50,000	$157,000	$213,000	$185,000
3. Sub-Slab Passive Ventilation with Vapor Barrier (with Ability to Convert to Active)	NA	NA	NA	$173,000	$242,000	$207,500
4A: Sub-Slab Depressurization (SSD)	$253,000	$397,000	$325,000	$196,000	$286,000	$241,000
4B: Sub-Membrane Depressurization (SMD)	$259,000	$403,000	$331,000	$167,000	$239,000	$203,000
4C: Sub-Slab Pressurization (SSP) with Vapor Barrier	NA	NA	NA	$269,000	$368,000	$318,500

Notes:
1. Accuracy of estimates may be within -30 percent to +50 percent of the final project cost.
2. NA = not applicable
3. Alternative 1 includes monitoring.
4. Alternative 2 may include sealing leaking conduits and the use of air purification unit(s). Costs for these additional measures are not included in the estimate, as they may not be necessary. These costs are relatively small compared to the overall cost of the Alternative.
5. Alternatives 4A and 4B may include sealing leaking conduits. Costs for this additional measure is not included in the estimate, as it may not be necessary. These costs are relatively small compared to the overall cost of the Alternative.

TABLE 5
Present Worth Costs of Alternatives for Existing and Future Residential Buildings

Remedial Alternative	Existing Building			Future Building		
	Low	High	Average	Low	High	Average
1: No Action	$4,000	$19,000	$11,500	$4,000	$19,000	$11,500
2: Active Indoor Air Ventilation	$10,000	$11,000	$10,500	$10,000	$11,000	$10,500
3: Sub-Slab Passive Ventilation with Vapor Barrier (with Ability to Convert to Active)	NA	NA	NA	$27,000	$46,000	$36,500
4A: Sub-Slab Depressurization (SSD)	$14,000	$34,000	$24,000	$29,000	$47,000	$38,000
4B: Sub-Membrane Depressurization (SMD)	$40,000	$80,000	$60,000	$38,000	$75,000	$56,500
4C: Sub-Slab Pressurization (SSP) and Vapor Barrier	NA	NA	NA	$38,000	$58,000	$48,000

Notes:
1. Accuracy of estimates may be within -30 percent to +50 percent of the final project cost.
2. NA = not applicable
3. Alternative 1 includes monitoring.
4. Alternative 2 may include sealing leaking conduits and the use of air purification unit(s). Costs for these additional measures are not included in the estimate, as they may not be necessary. These costs are relatively small compared to the overall cost of the Alternative.
5. Alternatives 4A and 4B may include sealing leaking conduits. Costs for this additional measure are not included in the estimate, as it may not be necessary. These costs are relatively small compared to the overall cost of the Alternative.

11.8 State Acceptance

The State of California, acting through the San Francisco Bay Regional Water Quality Control Board (Water Board), concurred with EPA's selected remedy to address the vapor intrusion pathway for the MEW Site, in a letter dated August 6, 2010.

11.9 Community Acceptance

During the public comment period, the community expressed a wide range of opinions on the proposed alternatives. EPA received oral public comments at the July 2009 public meeting and the entire transcript of the public comments is included in the MEW Site Administrative Record file. EPA also received written comments from many members of the community, including residents, commercial property owners, the City of Mountain View, and the MEW Responsible Parties. All of the written comments, along with EPA's summary responses to them, are presented in Part 3 - Responsiveness Summary of this Responsiveness Summary.

While some community members expressed a preference for flexibility in selecting an appropriate vapor intrusion control remedy that is effective and easy to implement, many stakeholders, particularly the commercial property owners in the MEW Area, expressed strong support for Alternative4 (4A/4B/4C) over Alternative 2 for existing commercial buildings. In addition, many community members and stakeholders were opposed to a municipal ordinance as an institutional control. Based on public input, EPA reconsidered the preferred alternative described in the Proposed Plan and arrived at the selected remedy described in Section 12.

12 Selected Remedy

EPA's selected remedy will apply to buildings requiring response action, as described in Section 12.1. The selected engineered remedy for existing buildings is the installation of an appropriate Sub-slab/Sub-membrane ventilation system (Alternative 4). Where property owners of existing commercial buildings agree to the necessary use, operation, and monitoring of a building's indoor air ventilation system (Alternative 2) in a manner consistent with the operations, maintenance and monitoring plan developed for that building, the building's indoor air ventilation system may be utilized as an alternative remedy in existing buildings. Implementation of the remedy differs for existing versus future buildings. For all future buildings, EPA's selected engineered remedy is the installation of a vapor barrier and passive sub-slab ventilation system (with the ability to be made active) (Alternative 3).

12.1 Approach for Determination of Response Action Required

To evaluate and determine the appropriate response action that would be required at each building within the Vapor Intrusion Study Area at the MEW Site, EPA has developed a tiering system for existing commercial and residential buildings based on indoor air sampling and another tiering system for future buildings.

Existing Buildings

For existing commercial and residential buildings, the tiers and the required response actions are shown in **Tables 6A and 6B** on the next page. Table 6A applies to buildings sampled with an effective engineering control in place or operating (such as an active indoor air ventilation system, or passive or active sub-slab ventilation system). Table 6B applies to buildings sampled without an engineering control operating or in place (e.g., active ventilation systems are turned off during sampling) and there is no passive remedy in place. The assumption for an existing building that is sampled with an effective engineering control in place is that the engineering control is necessary to keep indoor air concentrations below the indoor air cleanup levels. In order to counter the assumption that operation of the active ventilation system is necessary to control vapor intrusion, the building must be sampled with the ventilation system turned off. For the Tier 2 building sampling scenario, the remedy requires continued operation, maintenance, and monitoring of the active ventilation system serving as the building's vapor intrusion control system.

To determine the appropriate response action and corresponding tier for each existing building, each building is evaluated using results from building surveys, walk-throughs, interviews, inspections, indoor air sampling, subsurface sampling, and other lines of evidence. Once a building has been assigned a tier, the selected response action for a building of that tier is implemented, including engineering controls and ICs. Additional lines of evidence may be collected and evaluated at any time to determine whether a move between tiers would be appropriate.

Where converging lines of evidence indicate that there is no potential for vapor intrusion above indoor air cleanup levels, and following confirmation and appropriate documentation, the building would be categorized as Tier 4, and no action would be required.

TABLE 6A
Response Action Tiering System for Existing Commercial and Residential Buildings in Vapor Intrusion Study Area (Sampled with Passive or Active Engineering Control in Place or Operating)

Tier	Description	Response Action
Tier 1	Building with indoor air concentrations greater than outdoor (background)* air concentrations and indoor air cleanup level.	Implement selected remedy (appropriate engineering control) to meet indoor air cleanup levels. Once indoor air cleanup level achieved and confirmed, building recategorized as Tier 2. Implement governmental, proprietary, and informational ICs (see Table 8).
Tier 2	Building with indoor air concentrations below the indoor air cleanup levels. Former Tier 1 existing building and Tier A future (new) building that confirmed indoor air concentrations are below the indoor air cleanup levels.	Ensure continued operation and maintenance of active ventilation system or other selected engineered remedy to meet RAOs. Develop and implement long-term monitoring and ICs implementation plan. Implement governmental, proprietary, and informational ICs (see Table 8). Where remedy is achieved through operation of an active ventilation system, agreement of property owner must be contained in a recorded agreement.

* Outdoor concentrations of TCE typically range from below laboratory analytical detection limits to 0.4 $\mu g/m^3$.

TABLE 6B
Response Action Tiering System for Existing Commercial and Residential Buildings in Vapor Intrusion Study Area (Sampled with No Engineering Control in Place or Operating)

Tier	Description	Response Action
Tier 1	Building with indoor air concentrations greater than outdoor (background)* air concentrations and indoor air cleanup level.	Implement selected remedy (appropriate engineering control) to meet indoor air cleanup levels. Once indoor air cleanup level achieved and confirmed, building recategorized as Tier 2. Implement governmental, proprietary, and informational ICs (see Table 8).
Tier 3A	Building with indoor air concentrations below indoor air cleanup levels, but greater than outdoor (background) concentrations.	No engineered remedy required. Develop and implement long-term monitoring plan. Implement governmental ICs (see Table 8).
Tier 3B	Building with indoor air concentrations at or within outdoor air (background)* concentrations.	No engineered remedy nor long-term monitoring required. Implement governmental ICs (see Table 8)
Tier 4	Buildings where converging lines of evidence demonstrate that there is no longer the potential for vapor intrusion into the building exceeding indoor air cleanup levels.	No action required after performance of all necessary confirmation sampling and documentation approved by EPA that no action is necessary.

* Outdoor concentrations of TCE typically range from below laboratory analytical detection limits to 0.4 $\mu g/m^3$.

Future Buildings

For future commercial and residential buildings and properties, the description of tiers and the corresponding response actions are shown in **Table 7** below.

TABLE 7
Response Action Tiering System for Future Commercial and Residential Buildings in Vapor Intrusion Study Area*

Tier	Description	Response Action
Tier A	Future (new) building on property where lines of evidence (soil gas, sub-slab soil gas, crawlspace) indicate that there is the potential for vapor intrusion into the new building above indoor air cleanup levels.	Implement selected remedy to meet RAOs. Perform indoor air sampling after construction to confirm remedial action is effective. Implement governmental and proprietary ICs (see Table 8). Re-categorize as Tier 2 Existing Building.
Tier B	Future (new) buildings on properties where lines of evidence indicate there is no potential for vapor intrusion into the building exceeding EPA's indoor air cleanup levels.	Perform indoor air sampling after building is constructed to confirm that there is no potential vapor intrusion risk and indoor air cleanup levels are met. If confirmed with EPA approval, then no action is required.

* Commercial or multi-family residential buildings constructed with aboveground raised foundations typically would be separated from the ground by a parking garage, which would allow adequate ventilation to prevent vapor intrusion into the occupied spaces. For this construction, perform targeted confirmation air sampling after building is constructed to verify absence of preferred pathways into building and to confirm indoor air cleanup levels are met.

Site-specific soil gas screening levels may also be developed.

Future buildings within the Vapor Intrusion Study Area are presumed to be in Tier A unless multiple lines of evidence sufficiently indicate that there is no potential for vapor intrusion above indoor air cleanup levels. For all Tier A buildings, the appropriate engineering controls and ICs would be implemented to meet the RAOs. If the building is proposed in an area where multiple lines of evidence indicate there is no longer the potential for vapor intrusion into the building exceeding indoor air cleanup levels, then the building/property is categorized in Tier B. For Tier B buildings, sampling is performed after the building is constructed to confirm there is no potential vapor intrusion risk and indoor air cleanup levels are met. If confirmed with EPA approval, then no action is required.

12.2 Description of and Rationale for the Selected Remedy

Existing Commercial Buildings

For existing commercial buildings, the selected remedy is Active Sub-slab/Sub-membrane Ventilation, Monitoring, and ICs (including sealing of all identified direct and leaking conduits that serve as a pathway for vapors from the subsurface to migrate into the building). Although this alternative has a higher initial cost than the Active Indoor Air Ventilation (e.g., HVAC) alternative, this alternative outperforms the Indoor Air Ventilation

alternative on long-term effectiveness and permanence, implementability, and community acceptance for existing commercial buildings.

The remedy for existing commercial buildings does allow for the use of the building's Indoor Air Ventilation system (e.g., HVAC) as an alternative remedy to operation of an active sub-slab/sub-membrane ventilation system, but only if the property/building owner agrees in a signed, recorded agreement to use, operate, and monitor the building ventilation system in a manner consistent with the operations, maintenance and monitoring plan developed for that building. Similar to use of an Active Sub-slab/sub-membrane Ventilation System, all identified direct and leaking conduits that serve as a pathway for vapors from the subsurface to migrate into the building will need to be sealed prior to implementation of the system.

For existing buildings utilizing a Sub-slab Ventilation System or mechanical Indoor air Ventilation System as the engineered remedy, ICs will be required to ensure that: (1) the engineering controls are appropriately operated and are not interfered with; (2) appropriate vapor intrusion controls are installed in any new building construction; (3) building owners and occupants are provided information regarding the operating remedy; and (4) building owners and occupants provide information to EPA and the MEW Responsible Parties regarding changes to the building occupancy or structure that may impact the remedy. To accomplish this, the remedy requires recording of agreements that are enforceable and binding on successors as well as the use of a notification service. Where agreements with property owners fail to be recorded, land use covenants with EPA as a third party beneficiary will be required to ensure that the remedy is appropriately implemented over time.

The recorded agreements must include: (1) notice to future property/building owners of the vapor intrusion remedy and requirements; (2) access for sampling, remedy operation and maintenance, and monitoring; and (3) notice to EPA and the MEW Responsible Parties when there are changes to the building ownership or operation that could impact the vapor intrusion remedy at that property. With regard to future building construction at these properties, the recorded agreements will remain in place and will be layered with governmental controls (i.e., City of Mountain View procedures and requirements for new building construction within the Vapor Intrusion Study Area). EPA is also selecting the use of a tracking service to ensure that proper notification of EPA and the MEW Responsible Parties of ownership and construction changes that could impact the remedy occur at the Site.

Existing Residential Buildings

For existing residential buildings where sampling indicates engineering controls are necessary to reduce TCE and the MEW Site chemicals of potential concern to below the indoor air cleanup levels, the selected remedy is Active Sub-slab/Sub-membrane Ventilation, Monitoring and ICs (including sealing of all identified direct and leaking conduits that serve as a pathway for vapors from the subsurface to migrate into the building). Sub-slab Depressurization would be utilized in a building with a slab-on-grade foundation or basement, and Sub-membrane Depressurization would be utilized in a building with a crawlspace. Sub-slab Pressurization with vapor barrier may be appropriate for buildings with such systems already installed, but could not be newly installed in other existing buildings.

EPA is selecting the use of a notification service to ensure that proper notification to EPA and the MEW Responsible Parties of ownership and construction changes that could impact the remedy occurs at the Site.

Future (New Construction) Buildings/Properties

The selected remedy for all future buildings is Passive Sub-slab Ventilation with Vapor Barrier (and Ability to Convert to Active), Monitoring, and ICs. Although Active Sub-slab/Sub-membrane Ventilation is considered to have a better long-term effectiveness than Passive Sub-slab Ventilation systems, areas with lower groundwater VOC concentrations are considered to have a lower potential for vapor intrusion at levels exceeding the Site indoor air cleanup levels, and therefore the passive option is more cost-effective in meeting the indoor air cleanup levels. Because areas overlying higher TCE groundwater concentrations are considered to have a greater potential for vapor intrusion at levels exceeding indoor air cleanup levels, implementing an active sub-slab/sub-membrane ventilation system is acceptable because of its high rating in long-term effectiveness.

For commercial buildings overlying low and high groundwater VOC concentrations, installation of a sub-slab/sub-membrane ventilation system is more reliable and administratively cost-effective than the long-term operation, maintenance and monitoring of an active indoor air ventilation system.

For future building construction in the MEW Area, ICs will be implemented through the City of Mountain View's planning and permitting procedures which will ensure that the appropriate remedy is applied to particular building construction. Where the property already has a recorded agreement in place with regard to future construction, these governmental controls will be layered with the proprietary controls. Similarly in the Moffett Field Area, ICs will be implemented through NASA's land use planning documents and its Environmental Issues Management Plan. Specifically, the land use planning documents should require the operation and maintenance of remedial measures and incorporation of the remedy into new construction.

Table 8, on the next page, summarizes EPA's Selected Vapor Intrusion Remedy for Existing and Future Buildings in the Vapor Intrusion Study Area.

TABLE 8
EPA's Selected Vapor Intrusion Remedy for Existing and Future Buildings in Vapor Intrusion Study Area

Building Scenario	Selected Remedy
Existing Buildings (Commercial and Residential)	
Tier 1 and Tier 2 Buildings	Active Sub-slab/Sub-membrane Ventilation, Monitoring, and ICs (including conduit sealing) [1] ICs consist of: • Permitting and building requirements to install appropriate engineering controls in future construction. • Recorded Agreements to ensure installation and operation of engineering controls; require information be provided to future owners; require information of building changes be provided to EPA and MEW Responsible Parties. Tracking service to provide information to EPA and MEW Responsible Parties of occupancy and building changes.
Tier 3A and 3B Buildings	No engineering control. ICs only. ICs consist of: • Permitting and building requirements to install appropriate engineering controls in future construction.
Tier 4 Building	No remedy required.
Future Buildings (Commercial and Residential)	
Tier A Buildings	Passive Sub-slab/sub-membrane Ventilation with Vapor Barrier (And the Ability to Be Made Active), Monitoring, and ICs [2] ICs consist of: • Permitting and building requirements to install appropriate engineering controls. Recorded Agreements remain in place.
Tier B Buildings	No remedy required

Notes:

[1] Alternatively, Active Indoor Air Ventilation System, Monitoring, and ICs (including conduit sealing) may be selected as the vapor intrusion remedy for Tier 1 and 2 existing commercial buildings if the property/building owner agrees to use, operate, and monitor the indoor air ventilation system (e.g., HVAC) in a manner consistent with the operations, maintenance, and monitoring plan developed for that building, in a signed recorded agreement.

[2] Alternatively, Active Sub-slab/sub-membrane Ventilation, Monitoring, and ICs (including conduit sealing) may be selected as the vapor intrusion remedy for Tier A future buildings.

* See Tables 6A, 6B, and 7 for Response Action Tiering System Determination for Existing and Future Buildings within the Vapor Intrusion Study Area Sampled With and Without Engineering Control In Place or Operating

12.3 Summary of the Estimated Vapor Intrusion Remedy Costs

EPA estimated the Site-wide cost of the vapor intrusion remedy based on the building tiering system and associated response actions. The existing buildings were classified into the tiers based on available indoor air sampling data, or, where indoor air sampling data was not yet available, on available building conditions and Site characterization data. The remedy appropriate to the building scenario was applied to each building. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design and implementation of the remedy.

The number of sampled and unsampled commercial buildings in the MEW Area and Moffett Field Area classified into each tier as of April 2010 are summarized below:

	Sampled Commercial Buildings				Unsampled Commercial Buildings*			
	Tier 1	**Tier 2**	**Tier 3A**	**Tier 3B**	**Tier 1**	**Tier 2**	**Tier 3A**	**Tier 3B**
MEW Area	13	23	0	4	5	11	12	8
Moffett Field Area	7	13	1	0	21	1	29	30
Total	20	36	1	4	26	12	41	38

Note:
Unsampled buildings are preliminarily classified based on available building conditions and Site characterization data; actual classifications will be based on indoor air sampling data.

The resulting 30-year present worth Site-wide cost of the vapor intrusion remedy, including capital costs, O&M costs, ICs, and actions conducted to date, is estimated to range from $14 million to $24 million, based on a 7% discount rate. A detailed breakdown of the estimated capital, operating and maintenance, and present worth costs associated with the selected remedy is included in **Table 9**, on the next page. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

TABLE 9
Site-wide Vapor Intrusion Remedy Cost Estimate

Category	Costs Incurred to Date ($)	Capital Costs ($)		Annual O&M Costs ($)		Total 30-year Present Worth Cost Including Costs Incurred to Date ($)	
		Low	High	Low	High	Low	High
Sampled Commercial Buildings	4,443,000	658,000	911,000	119,000	341,000	6,578,000	9,592,000
Unsampled Commercial Buildings	456,000	2,158,000	2,694,000	200,000	472,000	5,058,000	8,967,000
Residential Buildings	724,000	-	-	2,000	8,000	749,000	823,000
Institutional Controls	-	600,000	2,100,000	75,000	226,000	1,529,000	4,899,000
Total	**5,623,000**	**3,416,000**	**5,705,000**	**396,000**	**1,047,000**	**13,914,000**	**24,281,000**

GENERAL ASSUMPTIONS:

1. The total cost estimate for commercial and residential buildings includes costs incurred to date for sampling, reporting, and interim measures, as well as anticipated future capital and O&M costs of the remedy. Costs incurred to date are primarily based on information provided by the PRPs, and do not include EPA oversight costs, legal costs, and internal PRP costs.
2. Of the 61 sampled commercial buildings, 20 are in Tier 1, 36 are in Tier 2, 1 is in Tier 3A, and 4 are in Tier 3B.
3. For unsampled buildings, it is assumed that air samples will be collected in each building to classify it in a Tier. Of the 117 unsampled commercial buildings, 26 are assumed to be in Tier 1, 12 are assumed to be in Tier 2, 41 are assumed to be in Tier 3A, and 38 are assumed to be in Tier 3B.
4. For residential scenario, future costs of the remedy consist of sampling/reporting of an estimated 1 to 5 residences/year and O&M and monitoring of an existing vapor intrusion control system at one residence.
5. Site-wide institutional controls consist of municipal permitting procedures, recorded agreements, and informational devices.

12.4 Expected Outcomes of the Selected Remedy

Once implemented, the remedy will protect public health of building occupants in the Vapor Intrusion Study Area from actual or threatened releases of Site-related hazardous substances into the environment via the subsurface vapor intrusion pathway. Indoor air cleanup levels have been established that are protective of public health and that can be achieved upon implementation of the remedy.

Cleanup levels for Site soil and groundwater were addressed in the original 1989 ROD. Land use in the Vapor Intrusion Study Area is expected to remain as residential and commercial.

13 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA requires that remedial actions at Superfund sites achieve (or justify the waiver of) any state and federal environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate. This section selects the applicable or relevant and appropriate requirements (ARARs) with regard to the Site's vapor intrusion remedy.

ARARs are state or federal cleanup standards, controls, or provisions that specifically address the hazardous substances, remedial action being taken, location, or other site circumstance ("applicable" requirements) as well as those standards, controls or provisions that do not directly or fully address specific site activities but address similar situations or problems likely to be encountered as determined on a site-specific basis (i.e., "relevant and appropriate" requirements). Federal ARARs are those requirements under any federal environmental law. State ARARs are those requirements that are more stringent or broader in scope than federal requirements. In those cases where California state law delegates enforcement authority to local agencies that develop and implement state requirements, local regulations may also be ARARs. Requirements that are not federal or state requirements, are not environmental in nature, or are not substantive, are not ARARs. However, those requirements may be applied to activities at the MEW Site by the relevant regulating authority.

An ARAR may be either "applicable" or "relevant and appropriate," but not both. If there is not a specific federal or state ARAR for a particular remedial action, or if the existing ARARs are not considered sufficiently protective, then other criteria or guidelines may be identified for consideration and used to ensure the protection of public health and the environment.

ARARs fall into three categories: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs are health or risk-based restrictions on the mass or concentration of chemicals remaining in, or discharged to, a given medium. Location-specific ARARs set restrictions on certain types of activities based on characteristics of the site locale. Action-specific ARARs govern particular activities or technologies involved in a remedy and aim to control discrete actions.

13.1 Chemical-Specific ARARs

EPA sets site-specific cleanup levels in one of two ways. Where there is a regulatory standard for exposure to a chemical at a site, cleanup levels may be set at that standard. EPA may also set site-specific risk-based cleanup levels that apply specifically to the contaminants and exposures at the site. The site-specific risk analysis can be based on multiple considerations, including chemical-specific ARARs and To-Be-Considereds (TBCs).

Indoor Air Cleanup Levels

As explained in Section 7.4 of this ROD Amendment, for the MEW Site EPA is using the RSLs and Site-specific information to determine Site-specific risk-based indoor air cleanup levels. For example, for indoor air at the MEW Site, EPA is using indoor air cleanup levels for TCE of 1 $\mu g/m^3$ for residential occupancy and 5 $\mu g/m^3$ for commercial worker/non-residential occupancy. EPA derived the TCE indoor air cleanup levels using Cal/EPA's health-based screening level for long-term exposure to TCE, a TBC. All the MEW Site indoor air cleanup levels are listed on **Table 3**.

13.2 Location-Specific ARARs

There are no location-specific ARARs for the vapor intrusion remedy.

13.3 Action-Specific ARARs

Action-specific ARARs depend on the type of remedial alternative chosen. This section describes only the action-specific ARARs associated with remedial actions related to the vapor intrusion remedy.

13.3.1 Air Emissions

Bay Area Air Quality Management District Regulation 8, Rule 47

Bay Area Air Quality Management District (BAAQMD) regulations promulgated at Regulation 8, Rule 47 address emission control requirements for organic compound emissions from air stripping and soil vapor extraction systems. This Rule is potentially relevant and appropriate for emissions of VOCs from Active Sub-slab Depressurization systems or Sub-membrane Depressurization systems. Rule 47 requires a control device reducing emissions by at least 90 percent by weight for those operations that emit benzene, vinyl chloride, PCE, methylene chloride and/or TCE. BAAQMD Regulations § 8-47-301, Section 8-47-301 does not apply if the operation emits no more than one of the following compounds: benzene, vinyl chloride, TCE, PCE, or methylene chloride, and if benzene emissions do not exceed 0.05 pounds per day, vinyl chloride emissions do not exceed 0.2 pounds per day, or TCE, PCE, or methylene chloride emissions do not exceed 0.5 pounds per day. BAAQMD Regulations § 8-47-109, Rule 47 is therefore an ARAR for systems that emit more than the designated amount of benzene, vinyl chloride, TCE, PCE or methylene chloride.

Additionally, the provisions of Section 8-47-301 do not apply to operations with total emissions of less than 1 pound per day of benzene, vinyl chloride, PCE, methylene chloride, and/or TCE, unless those emissions subsequently rise to over 1 pound per day. BAAQMD Regulations § 8-47-113. Thus, these requirements are ARARs for systems emitting a total of 1 pound per day or more of benzene, vinyl chloride, PCE, methylene chloride, and/or TCE.

Based on the subsurface concentrations and anticipated flow rates of these systems, it is not anticipated that any of the emissions levels will be exceeded. This must be demonstrated during the design for each Active Sub-slab Depressurization and Sub-membrane Depressurization system.

Bay Area Air Quality Management District Regulation 8, Rule 40

BAAQMD Regulation 8, Rule 40 is potentially relevant and appropriate to activities during the construction phase of the chosen remedial actions. Where more than 8 cubic yards of contaminated soil are removed for construction of a remedial system beneath buildings at the Site, and where the soil has organic content above 50 parts per million weight (ppmw), Section 8-40-304 would require that inactive storage piles be appropriately covered. Thus, these requirements are ARARs where more than 8 cubic yards of contaminated soil are removed for remedy construction.

13.4 To Be Considereds (TBCs)

EPA Regional Screening Levels (RSLs)

As discussed in Section 7.4, the RSLs are risk-based screening concentrations that were used, in conjunction with Site-specific information, to formulate Site-specific risk-based cleanup levels for indoor air.

California Human Health Screening Levels (CHHSLs)

State of California Human Health Screening Levels, or "CHHSLs," developed by the Office of Environmental Health Hazard Assessment (OEHHA) on behalf of the California Environmental Protection Agency (Cal/EPA, 2005) were used as TBCs in future development of Site-specific risk-based soil gas screening level criteria for the vapor intrusion remedy.

14 Statutory Determinations

Under CERCLA Section 121, EPA must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ, as a principal element, treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes. The following sections discuss how the selected remedy meets these statutory requirements and preferences.

14.1 Protection of Human Health and the Environment

The selected vapor intrusion remedy will protect human health and the environment by using a combination of engineering controls and ICs. The appropriate Sub-slab/Sub-membrane Ventilation or Depressurization system will be used to prevent subsurface Site contaminants from migrating into indoor air or accumulating in enclosed building spaces at levels posing a long-term health risk. In specific circumstances in an existing building where use of the building's indoor air ventilation system meets the remedial action objective and is implementable on a long-term, ongoing basis, the remedy allows the use of the building's indoor air ventilation system to keep the indoor air concentrations below cleanup

levels. Through the use of these engineering controls, exposure levels will be reduced to indoor air cleanup levels set at $1x\ 10^{-6}$ for carcinogenic risk and below the hazard index of 1 for non-carcinogens.

ICs will be used for this remedy to protect human health by (1) ensuring the ongoing implementation of the remedy; (2) providing notice to owners and occupants of buildings overlying the shallow subsurface contamination about the remedy; and (3) providing notice to EPA and the MEW Responsible Parties of changes in occupancy or construction that could impact remedy implementation. Implementation of the vapor intrusion remedy will not pose any unacceptable short-term risks. No adverse cross-media impacts are expected.

14.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy will comply with all ARARs described in Section 13 of this ROD Amendment.

14.3 Cost-Effectiveness

40 C.F.R. Section 300.430(f)(ii)(D) requires EPA to determine the cost-effectiveness of the selected remedy by evaluating the cost of an alternative relative to its overall effectiveness. Effectiveness is defined by three of the criteria used in the detailed analysis of alternatives: long-term effectiveness, short-term effectiveness, and reduction of toxicity, mobility and volume through treatment. The overall effectiveness is then compared to cost to ensure that the selected remedy is cost-effective.

The estimated present worth Site-wide cost of the selected vapor intrusion remedy ranges from $14 million to $24 million. Because all the buildings have not yet been sampled, EPA estimated the projected Site-wide vapor intrusion remedy costs based on response actions taken on existing sampled buildings to date and any information known about unsampled buildings. The cost estimate assumed 94 buildings requiring an engineered remedy, monitoring, and ICs (Tiers 1 and 2) and 84 buildings requiring monitoring and ICs only (Tiers 3A and 3B). Note that reliance on the use of the active indoor air ventilation system alternative in most buildings rather than Sub-slab/Sub-membrane Ventilation could result in a lower overall Site-wide cost, but is dependent on the ability of the existing building ventilation system and agreement of the property/building owner to operate, maintain, and monitor the system in a manner to keep indoor air concentrations below the indoor air cleanup levels on an ongoing, long-term basis.

Because the sub-slab/sub-membrane ventilation system alternative has a higher ranking on long-term effectiveness than the active indoor air ventilation system alternative, EPA believes that the selected remedy achieves the greatest degree of overall effectiveness and health protectiveness relative to cost and is therefore the most cost effective remedy.

14.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected vapor intrusion remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the MEW Site. EPA has also determined that the selected remedy best meets the five balancing criteria (long-term effectiveness and permanence, reduction of

toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost), while also considering State and community acceptance.

The selected remedy satisfies the long-term effectiveness criterion by working to prevent the entry of Site chemicals of concern into the building at levels exceeding indoor air cleanup levels for long-term exposure. Indoor air concentrations would be similar to outdoor air concentrations. Active Sub-slab/Sub-membrane Ventilation has been demonstrated to be highly effective in controlling vapor intrusion in both new and existing buildings. The institutional controls selected will ensure that the remedy continues to be implemented appropriately at each building property in the Vapor Intrusion Study Area even when conditions change.

14.5 Preference for Treatment as a Principal Element

Treatment of the contaminants causing vapor intrusion is accomplished by directly addressing the subsurface shallow groundwater contamination, which is not specifically addressed by this vapor intrusion remedy. Instead, remediation of the subsurface shallow groundwater and soil contamination is being conducted in accordance with the remedy identified in the 1989 ROD.

The selected vapor intrusion remedy does not specifically satisfy the statutory preference for treatment as a principal element of the remedy. Unlike typical remedies to address contamination, remedies for vapor intrusion are not necessarily designed to reduce the toxicity, mobility, and volume through treatment of the Site contaminants, but rather to prevent exposure to these contaminants.

14.6 Five-Year Review Requirements

The vapor intrusion remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure. Therefore, EPA will conduct a review of the vapor intrusion remedy at least once every five years as part of the review of the overall Site-wide remedy. The review will assess whether the vapor intrusion remedy continues to provide adequate protection of human health and the environment. If it is determined that the vapor intrusion remedy is no longer protective of human health and the environment, then modifications to the remedy will be evaluated and implemented as necessary.

PART 3
RESPONSIVENESS SUMMARY

Responsiveness Summary:
EPA Responses to Public Comments on EPA's Proposed Plan for the Vapor Intrusion Pathway
Middlefield-Ellis-Whisman (MEW) Superfund Study Area
Mountain View and Moffett Field, CA

	PUBLIC COMMENT	EPA RESPONSE	(COMMENT BY)
Basis of Action, Groundwater Screening Levels, and Indoor Air Action Levels			
1	All of the buildings should at least have a walk-through. A total of 129 buildings, mostly north of 101, have not been sampled; and only 20 of them have had walk-throughs. By comparison, only 78 buildings have been sampled. And I think that with this proposed plan, that the walk-throughs and sampling should take place as soon as possible.	EPA has determined that all commercial buildings overlying shallow groundwater contamination need to be sampled. North of U.S. Highway 101 in the Moffett Field Area, EPA has been working with NASA to identify all the buildings that are currently occupied that have not yet been sampled. EPA will be working with the Responsible Parties and property owners in both the MEW Area and Moffett Field Area to conduct the necessary work. Prior to sampling, a building walk-through will be conducted.	Peter Strauss MEW and Moffett Field Technical Assistance Grant (TAG) Technical Advisor
2	Only a portion of the buildings was sampled, and the remedial design may not fit all buildings. We question how EPA is going to assure that all buildings in the study area are equipped with the appropriate mitigation systems, given that some buildings have not been tested at all.	See EPA response to Comment 1. After a building has been sampled, the appropriate follow-up action to be taken will be determined using EPA's response action tiering system in the ROD Amendment. If an engineered remedy is needed, an appropriate vapor intrusion control system will be operated, maintained and monitored.	Lenny Siegel Center for Public Environmental Oversight (CPEO)
3	There are screening levels for groundwater, and there's a demarcation of over a hundred parts per billion and less than a hundred parts per billion that require different kinds of mitigation strategies. That's just presented in the proposed plan, without explanation.	The Proposed Plan used 100 micrograms per liter (µg/L) or parts per billion (ppb) groundwater concentration screening levels based on the assumption that buildings overlying higher levels of groundwater contamination had a higher likelihood of vapor intrusion at significant levels than those overlying lower levels. This distinction is also generally consistent with estimated risk contours presented in NASA's 2003 Revised Human Health Risk Assessment for NASA Research Park. However, the ROD Amendment is not utilizing the 100 ppb TCE and PCE groundwater concentrations to distinguish between the appropriate remedial actions to be taken. Instead, the Vapor Intrusion Study Area is defined using the estimated extent of the 5 ppb TCE groundwater concentrations. Determination of the appropriate engineered remedy for existing buildings will be based on indoor and outdoor air sampling results and whether a building's indoor air ventilation system is operating to meet indoor air cleanup levels. For all new buildings in the Vapor Intrusion Study Area, regardless of the underlying concentration, the remedy requires a passive sub-slab ventilation system (with the ability to be made	Peter Strauss MEW and Moffett Field TAG Technical Advisor

	PUBLIC COMMENT	EPA RESPONSE	(COMMENT BY)
		active) and vapor barrier. Following the installation of the vapor barrier and passive sub-slab ventilation system, indoor air sampling will be conducted to determine whether the passive system is sufficient to meet indoor air cleanup levels. Property owners may elect to utilize an active sub-slab ventilation system instead of waiting to see whether the passive system is adequate. Soil gas data and other lines of evidence may be collected to develop other building-specific screening levels.	
4	**The Proposed Plan does Not Provide the Basis for the 100 Micrograms per Liter (ug/L) Concentration Trigger in Groundwater.** The Proposed Plan's tiering system distinguishes between buildings that overlie lower VOC concentrations in groundwater (less than 100 ug/L TCE or PCE in commercial areas) and higher VOC concentrations in groundwater (greater than 100 ug/L TCE or PCE in commercial areas). However, no technical basis is provided in the Proposed Plan or the FS to support the 100 ug/L concentration trigger.	See EPA response to Comment 3.	Mountain View Commercial Owners (MCO)
5	Provide the technical basis for EPA's selection of the concentrations used to establish the "lower" groundwater concentrations presented in Table 4. In addition, provide the technical basis for EPA's selection of 5 µg/L of TCE in groundwater as the boundary for the Vapor Intrusion Study Area. No references supporting use of these concentrations as defined are included in the Proposed Plan.	See EPA response to Comment 3. The selection of 5 µg/L or parts per billion (ppb) of TCE in groundwater as the boundary for the Vapor Intrusion Study Area is based on the generic groundwater screening levels in EPA's 2002 Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Draft Subsurface Vapor Intrusion Guidance) (Table 3c), Henry's Law constant (partitioning from groundwater to soil gas), and the shallow depth to groundwater contamination (5 to 20 feet below ground surface). In addition, actual indoor air data collected from buildings overlying low TCE concentrations (greater than 5 ppb and less than 100 ppb) in shallow groundwater confirm the potential for vapor intrusion at levels exceeding EPA's indoor air cleanup level of 1 microgram per cubic meter of TCE in air for residential buildings and 5 micrograms per cubic meter for commercial buildings.	Regional Water Quality Control Board (Water Board)
6	There is an assumption in the proposed plan that the groundwater contours are the best indicator of the potential for vapor intrusion. While in general buildings overlying the higher groundwater concentrations have a higher likelihood of indoor air samples exceeding the TCE action level, **we believe that soil gas data, if available, provides a better indication of vapor intrusion potential.** Where practical, the Responsible Parties should be encouraged to conduct more soil gas samples. The Proposed Plan should include known soil gas contours and determine the levels for each of the contaminants that would be necessary to	Soil gas data can provide an important line of evidence for vapor intrusion investigations, and soil gas and/or sub-slab soil gas data may be useful to help demonstrate the potential for vapor intrusion. For the area of the MEW Site not above source areas, where contamination is primarily in very shallow groundwater, the source for the vapor intrusion is the groundwater itself, not in the vadose zone. Therefore, soil gas data is not necessarily more informative about the potential for vapor intrusion than groundwater data. However, EPA supports the collection of soil gas data as a	Lenny Siegel CPEO

	PUBLIC COMMENT	EPA RESPONSE	(COMMENT BY)
	install active systems.	useful line of evidence in areas where groundwater is deeper than five feet. EPA also supports the development of Site-specific soil gas screening levels.	
7	The action levels now are based on the groundwater contamination, as I understand it; but soil gas is also frequently measured, sometimes more often than groundwater; and I can give an example of the site where the groundwater contamination is 50 ppb of TCE, but they found soil gas of 6,400, in almost the same location. We should have an action level for both the soil gas and the groundwater.	See EPA response to Comment 6. The action levels (now cleanup levels) for indoor air are based on health-protective risk levels for long-term exposure of indoor air concentrations. The 5 ppb groundwater concentration screening levels will only be used to determine which buildings are within the Vapor Intrusion Study Area.	Bob Moss NAS Moffett Field Restoration Advisory Board (RAB) member
8	EPA may be promulgating a new standard for TCE within the next few years, and there needs to be provision in this document for how that would be responded to, if indeed the level goes down lower.	The MEW Site-specific indoor air cleanup standards were selected taking into account that the TCE toxicity values are currently under review. Based on the proposed toxicity values contained in EPA's Toxicological Review of TCE (External Review Draft). EPA/635/R-09/011A, 2009, it is EPA's expectation that the current MEW Site-specific TCE indoor air cleanup standards of 1 microgram per cubic meter for residential occupancy and 5 micrograms per cubic meter for commercial occupancy will continue to be health protective. See: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=215006. However, once the Agency's TCE toxicity values are finalized, EPA will conduct an assessment of the MEW Site-specific TCE indoor air cleanup standards in light of the new values. In order for EPA to propose a change to the selected MEW Site-specific TCE indoor air standard, EPA would need to determine that the selected standard is no longer health-protective, taking into account both cancer and non-cancer health endpoints and short-term and long-term toxicity. Also, other factors such as outdoor "ambient" TCE levels would be considered to determine if a change to the TCE standard (indoor air cleanup level) could be implemented.	Peter Strauss MEW and Moffett Field TAG Technical Advisor
9	Achieving indoor air concentrations based upon the long-term health effects of exposure should be the primary Remedial Action Objective or Performance Goal for the vapor intrusion remedy. These, in turn, should comport with EPA's latest air action levels, which are the Regional Risk Screening Levels and the modified action level based on California's findings for TCE. Because industries in this area no longer use TCE, the much weaker occupational standards for the same chemicals are not applicable.	See EPA response to Comment 8. The Remedial Action Objective has been revised to specify that the objective is to "ensure that building occupants (workers and residents) are protected from Site contamination by preventing subsurface Site contaminants from migrating into indoor air or accumulating in enclosed building spaces above health-protective indoor air cleanup levels." The indoor air cleanup levels for commercial occupancy are based on modified Regional Screening Levels to take into account extended work hours for indoor workers at the MEW and Moffett Field Areas. EPA agrees that the indoor air cleanup levels are appropriate to protect the building occupants from long-term	Lenny Siegel CPEO

	PUBLIC COMMENT	EPA RESPONSE	(COMMENT BY)
		exposure from the subsurface vapor intrusion pathway.	
10	Performance goals for residential and commercial uses should be identified in the Proposed Plan. **For those buildings that serve as classrooms, house students, or have day-care centers, residential standards should be used.**	Generally EPA uses residential screening levels for schools, day care centers, and student housing. EPA will consider building use on an individual building-specific basis.	Lenny Siegel CPEO
11	It appears that background—the concentration of TCE in outdoor air—has been decreasing over time. **The proposed plan should discuss what happens to remediation goals when background goes down,** as EPA uses current background as a baseline. This discussion should be included in the SMP contingency plan.	EPA will continue to compare indoor air results to concurrent outdoor air results when sampling a building and take into account current outdoor (background) ambient air conditions. This sampling strategy, included as part of EPA's tiering system, is to help distinguish whether subsurface vapor intrusion is occurring into a building and not from outdoor sources. EPA is using the previous outdoor air concentrations as a guideline of outdoor air concentrations in the area. Once a remedial action is taken, EPA's goal is to minimize vapor intrusion into a building and reduce air concentrations to its health protective indoor air cleanup level.	Lenny Siegel CPEO
12	On November 3, 2009, U.S. EPA published a notice releasing the External Review Draft of its Toxicological Review of Trichloroethylene for public review and comment. The Review appears robust and exhaustive, and we believe it will lead to more protective standards governing exposure to TCE. If adopted, the indoor air action level, based upon the exposure associated with a one-in-a-million excess lifetime cancer risk in a residential scenario, would likely fall from 1.0 micrograms per cubic meter (ug/m^3) to .25 ug/m^3 or even lower. The occupational scenario indoor air action level would fall by the same percentage. Though it would take extra work to incorporate these proposed new numbers into the Vapor Intrusion Proposed Plan, it would take even more effort to incorporate them after the Plan's implementation. We therefore request that EPA begin immediately to study the implications of the proposed new exposure value for the MEW site. In particular, we believe it is important to determine, based upon indoor air or soil gas sampling already conducted, if the boundaries of the Study Area should be expanded. We also suggest that the efficacy of HVAC-based mitigation be re-evaluated based upon the likely new standard. Finally, we urge EPA to re-assess Table 5 as it pertains to passive systems (Alternative 3). As it is likely that the implied attenuation factors used to develop this Table will also have to be re-evaluated (i.e., developed from groundwater concentrations), given the new	See EPA responses to Comments 3 and 8. EPA will continue to confirm the effectiveness of vapor intrusion control systems and will develop long-term operations, maintenance and monitoring plans. Confirmation sampling will also be conducted to ensure that indoor air cleanup levels have been met. EPA has selected a remedy that is protective of human health based on current information. EPA will conduct five-year reviews to evaluate continued protectiveness of the remedy in the future. These reviews will consider the impact of any new information on the protectiveness of the remedy.	Lenny Siegel CPEO

	PUBLIC COMMENT	EPA RESPONSE	(COMMENT BY)
	information, it is important that EPA re -evaluate what it considers higher and lower concentrations. For those structures where it is already anticipated that sub-structure depressurization systems will be used as mitigation, we believe that those systems, if installed properly, will drive indoor air contamination levels down to background (ambient outdoor air levels). Nevertheless, it will remain imperative that any such mitigation success be confirmed by sampling capable [of] measuring concentrations at or below the new standard.		
13	It is our understanding from our review of the Proposed Plan - and based on our work on the Remedial Investigation (RI) and Feasibility Study (FS), as well as our many detailed conversations and meetings with EPA, that the ROD will only require an actual, engineered, remedial alternative for residences in a limited set of circumstances. In the Proposed Plan, for both existing and future residential buildings that overlie portions of the groundwater plume with less than 50 ppb TCE or PCE and less than 10 ppb vinyl chloride, there are two possible approaches: • First, for existing buildings where there are indoor air sampling results available, if those sampling results are above background contaminant levels, *but below action levels,* then future monitoring - only - will be appropriate. (This is also, at least theoretically, true for properties above higher concentrations of groundwater, but we are unaware of any such properties at this time.) • Second, for existing and/or future buildings, if there is sufficient evidence (using multiple lines of evidence) that there is no risk of potential vapor intrusion above action levels, even without indoor air sampling results, then no further action will be necessary (assuming such a conclusion is reached with EPA's concurrence.) It is our view that there is *already* sufficient evidence, set forth in detail in the RI Report, that there is no significant risk in the residences west of Whisman Road and that - whether for new or existing structures - no sub-slab remedy is necessary or appropriate. As set forth in the RI, after EPA finished conducting extensive sampling of residences in that area, the results demonstrated that there were no residences with TCE concentrations above action levels (after taking more than 200 samples in 17 residences), except for samples (i) in a residence with an earthen basement, (ii) in residences where there was an unrelated indoor source of TCE, or (iii) that were not confirmed in repeat, additional sampling. Consequently, we do not believe that future sampling of buildings in that part of the MEW Site is	For existing residential buildings *without current active vapor intrusion control measures* and where indoor air results are above background outdoor air levels but below indoor air cleanup levels, the remedy is monitoring and institutional controls only. Indoor air sampling results exceeded outdoor air levels and EPA's indoor air cleanup level of 1 microgram per cubic meter of TCE in air at two unoccupied residences near the estimated 5 ppb TCE groundwater plume boundary in the former Wescoat Housing area. These results prompted the requirement that a passive sub-slab system and vapor barrier be installed in the new Wescoat Village residential development. EPA also found TCE in indoor air of several residences above outdoor air levels along Whisman Road. Indoor air of one home in the MEW Area exceeded the indoor air cleanup level and required the installation and operation of a vapor intrusion control system. In October/November 2009 and February 2010, EPA collected indoor air samples from an additional 16 residences and did not find TCE concentrations above outdoor air concentrations. Based on all the residential data collected to date, it appears that residential buildings along the "100-foot" buffer zone of the Vapor Intrusion Study Area have a very low potential for vapor intrusion and no vapor intrusion into buildings exceeding background outdoor air concentrations were found. Therefore EPA has modified the Vapor Intrusion Study Area in the residential area to remove the 100-foot-buffer zone and include only those residences within the estimated 5 ppb TCE line (approximately one to - two homes along and to the west of Whisman Road and along Stewart Drive and Akron Street in the Wescoat Village area. EPA will continue to take the approach of sampling residences on a voluntary basis at the request of the homeowners themselves, and classifying buildings on a building-by-building basis based on actual indoor air	Raytheon and Schlumberger Technology Corp MEW Responsible Parties

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	necessary or appropriate, nor do we believe that future buildings should have any engineered remedy required. The data already demonstrate, after extensive sampling, that there is no significant risk, absent either (i) an earthen basement, or (ii) on-site sources of chlorinated solvents. We believe that those results provide sufficient evidence to demonstrate that the residences already built, or to be built, west of Whisman Road should fall under Tier 4 (existing residences) and Tier C (future residences), as those tiers are described in the FS and the Proposed Plan.	concentrations. EPA supports the collection of additional groundwater and/or soil gas sampling to further refine the Vapor Intrusion Study Area.	
14	Mitigation should be on a property-by-property/building-by-building basis, and the City believes that there is insufficient data about air quality conditions or vapor intrusion (not every building has been sampled adequately or at all). Moreover, the City is concerned that the cost of implementation and monitoring of each building-specific remedy has not been adequately or accurately estimated. Finally, the City questions whether certain air sampling data are so old (2003-2004) that this data are not accurate or reliable indicator of current interior vapor conditions.	The vapor intrusion remedy is being applied on a building by building basis. Each commercial building overlying shallow groundwater contamination will be sampled to determine whether remedial action is necessary. For those buildings that have not yet been sampled, EPA will be working with the Responsible Parties and property owners to conduct the necessary work. For those buildings that have been sampled and either have an engineered remedy or did not require one, EPA will determine whether further indoor air sampling is necessary to refine the application of the remedy to that building. The cost of implementing and monitoring the remedy was estimated based on generic assumptions to allow application to all Site buildings and will be refined on a building-specific basis during the Remedial Design phase.	City of Mountain View
15	On page 27 of the Proposed Plan, EPA states that the overall cost estimate for the preferred alternative was calculated based on its preliminary classification of existing buildings into various compliance tiers based on currently available indoor air sampling data. EPA should make these preliminary classifications available to property owners upon request.	This preliminary information used as part of the overall cost estimate is available and can be provided to the property owners upon request. The building owners should receive a copy of the indoor air sampling data for their respective building.	City of Mountain View
16	**The Proposed Plan is Based on Very Stringent Standards.** The indoor air Action Levels in the Proposed Plan and the supporting document, the *Final Supplemental Feasibility Study for the Vapor Intrusion Pathway,* prepared by Haley & Aldrich and dated June 2009 (FS), are based on layers of conservative assumptions. MCO supports the use of conservative standards to protect health. However, there are questions about whether these assumptions are being consistently applied by EPA and whether the MEW site is being treated evenhandedly. Specific conservative assumptions are as follows: • Under CERCLA, the EPA acceptable lifetime incremental cancer risk range is 10^{-4} to 10^{-6} or one-in-ten-thousand to one-in-a-million. The Action Levels in the Feasibility Study are based on 10^{-6} risk, which is at the uppermost conservative	In accordance with the National Contingency Plan (NCP), it is appropriate to set the indoor air preliminary remediation goal (PRG) initially at 1 x 10^{-6} (one-in–one million excess cancer risk) for both commercial and residential settings. A PRG could become a final cleanup level after considering the nine NCP cleanup criteria, also taking into account background outdoor and indoor sources. EPA can set its action or screening level for carcinogens within the risk management range of 1x10^{-6} to 1x10^{-4} based on the nine NCP criteria and Site-specific factors. [first and second bullets] With respect to the TCE cleanup levels selected in the ROD Amendment, the MEW indoor air cleanup level corresponds to a 1 x10^{-6} excess cancer risk level using California's TCE toxicity values and the upper	Mountain View Commercial Owners (MCO)

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end of the EPA risk range. *Is this typical for commercial properties?* • Recent EPA Region 5 guidance, entitled *Addendum #1 EPA Region 5 Recommendations on Vapor Intrusion Assessments at RCRA Corrective Action Sites* and dated July 2009, recommends that screening criteria be based on a target risk of 10^{-5}, which is ten times less stringent than the target risk for MEW Action Levels. *Why is a different standard being applied in EPA Region 5?*	end of the risk range ($1x10^{-4}$) using EPA's 2001 draft TCE toxicity values. EPA Region 9 set the indoor air cleanup level at the point of departure of 1 $x10^{-6}$ using the current California toxicity value to account for possible changes in the risk range once new toxicity values are formally adopted by EPA in its Integrated Risk Information System (IRIS). As a result of new TCE toxicity values, the associated risk management range may become more stringent as supported by multiple lines of evidence. For example, both EPA's 2001 and 2009 draft TCE toxicity assessments propose more stringent toxicity values than what California is currently using. [second bullet] EPA Region 9 set the TCE indoor air cleanup level at the MEW Site based on the nine NCP criteria, including public comments on the exposure assumptions for indoor workers. The TCE indoor air cleanup level selected is intended to be protective of both cancer and non-cancer health concerns using EPA's protectiveness criteria.	
• The Action Levels for commercial use assume people work at the site 10 hours per day for 25 years, whereas EPA's default commercial exposure assumption for a "reasonable maximum exposure" is 8 hours per day for 25 years. *Is this difference based on actual data or statistics?*	[third bullet] The 10 hours workday assumption was based on Site-specific input from community members who live and work in the MEW Area. Community members expressed that at least some of the workers in Silicon Valley (those representing a high end exposure) work more than the typical 8 hours per day.	
• For comparison purposes, EPA has stated that its vapor intrusion standard for workplace TCE exposure is approximately "10,000 or more" times stricter than the standard that OSHA, another federal agency, applies. That is inaccurate, by an order of magnitude. In fact, EPA is apparently *109,000 times stricter* than federal OSHA's standard, and is *27,000 times stricter* than the California Occupational Health and Safety Administration (Cal/OSHA) standard.[1(11)] *Since Cal/OSHA and federal OSHA are charged with protecting worker safety, why do those agencies permit employers to expose workers to 27,000 and 109,000 times the amount of the very same chemical that may migrate into a building from an underlying groundwater plume? Is there any logic to the discrepancy between these standards, all adopted by government agencies charged with protecting human health, and all applied to people in the workplace?*	[fourth bullet] EPA is charged with protection of human health and the environment, and, through the Superfund program, is charged with reducing human health risks at Superfund sites to levels within the risk management range of $1x10^{-6}$ to $1x10^{-4}$. This represents an additional lifetime cancer risk of between one in one million ($1x10^{-6}$) to one in ten thousand ($1x10^{-4}$)). Other Agencies may have overlapping jurisdictions and different obligations with regard to protection of human health.	

1 (11)Cal/OSHA's permissible exposure limit (PEL) for exposure to trichloroethylene (TCE) in the workplace is 25 ppm (or **135,000** ug/m3). Federal OSHA's PEL is 100 ppm (or **545,000** ug/m3). EPA's TCE Action Level for commercial buildings at the MEW site is **5** ug/m3. The PEL is the level below which no personal protective equipment is required.

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17	**Target Risk Level at Which Mitigation is Required is Not Clearly Defined.** The Proposed Plan indicates that a building is classified as Tier 1 if VOC concentrations in indoor air are greater than or equal to its respective Action Levels. The Proposed Plan and FS suggest that the TCE Action Level is based on the full EPA risk range of 10^{-4} to 10^{-6}, whereas the Action Levels for other VOCs are based on 10^{-6} risk. *Is mitigation required when a VOC other than TCE exceeds its Action Level at 10^{-6} risk?*	The MEW Site-specific indoor air cleanup levels are based on 1x 10^{-6} risk level for carcinogens and a Hazard Index of 1 for non-carcinogens and site-specific factors. A comparison of indoor air concentrations to outdoor air levels is also evaluated along with other lines of evidence (subsurface data, chemical ratios, building and chemical use survey) to ensure that indoor air concentrations are from vapor intrusion and not indoor or outdoor air sources. If it is confirmed that indoor air concentrations exceed the indoor air cleanup levels because of subsurface vapor intrusion and not indoor or outdoor sources, then a vapor intrusion control system is required to meet the cleanup level. See also EPA responses to Comments 16 and 18.	Mountain View Commercial Owners (MCO)
18	**Inadequate Criteria to Determine if Mitigation is Required Based on Indoor Air Sampling Results.**		Mountain View Commercial Owners (MCO)
	• **The Proposed Plan and FS Do Not Identify an Approach if Single Concentrations are Greater than the Action Level.** *If a single concentration is greater than an Action Level does this necessitate mitigation or will alternative data evaluations be used (e.g., statistical analyses at an individual location or throughout a building, data trends, etc.)?*	[first bullet] EPA does not rely on any individual data point, in the absence of confirmation, to require that vapor intrusion control measures be implemented. Typically, a minimum of four sample locations and multiple sampling events in each building were assessed. EPA compares all of the indoor air sampling data to outdoor air data, subsurface data, chemical ratios, and building and chemical use surveys. In addition, EPA evaluates whether the chemical may be from an indoor source (e.g., household or commercial cleaning products). EPA may also require the collection of additional samples at the same location and possibly other locations within the building to verify where vapor intrusion may be occurring.	
	• **The Proposed Plan and FS Do Not Discuss VOC Detections Other than TCE that are Above the Action Levels.** Currently, the FS does not provide discussion of other chemicals, such as tetrachloroethylene (a.k.a. perchloroethylene or PCE), that have been detected in indoor air at concentrations that exceed Action Levels. More specifically, PCE exceeded its commercial Action Level of 2 ug/m^3 in 14 buildings at the MEW Site south of Highway 101. The Proposed Plan and FS do none of the following: (a) discuss these incidents; (b) indicate if mitigation is required with respect to PCE; (c) indicate if the PCE hits are believed to be from other sources; or (d) provide some other rationale with regard to PCE. If the Proposed Plan is taken literally, mitigation should be implemented at these buildings.	[second bullet] The indoor air results for the other MEW chemicals of concern are evaluated in the same manner as TCE. Indoor air results are compared to outdoor air concentrations, chemical ratios, building and chemical use surveys, and sub-slab or subsurface concentrations where they are available. In addition, EPA evaluates whether the chemical may be from an indoor source (e.g., household or commercial cleaning products). Chloroform and PCE are chemicals that have been found indoors at levels exceeding the indoor air cleanup level, but in most of these instances other information indicated that the chemicals were from an indoor source and not from vapor intrusion. In a few buildings PCE was found indoors that is likely from vapor intrusion where TCE was also found. To date, response actions have been taken because of exceedances of the TCE indoor air cleanup levels from vapor intrusion and not	

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		indoor or outdoor sources. Where indoor air cleanup levels are exceeded for any of the MEW chemicals of concern that are confirmed to be from subsurface vapor intrusion and not other sources, a response action is required.	
19	It was not clear from the presentation what the levels of the TCE are in the open air. It would be good to see the entire range, from – to, and concentration areas.	The ranges of outdoor air concentrations are presented in Appendix C, Table C-1 of the June 2009 Supplemental Feasibility Study. TCE was not detected in most ambient outside air samples. However, there were periodic detections of low levels of TCE, which are consistent with what we have seen in other parts of the San Francisco Bay Area and are likely attributable to the urban air environment and not specific to sources of TCE at the MEW Site. Due to the high number of results where TCE was not detected, a spatial analysis would not be very helpful or reliable in this instance.	L.M. Community Member
Vapor Intrusion Remedy Selection/Criteria			
20	EPA needs to establish some operating standards for the HVAC system in the proposed plan. For instance, maintaining positive pressure and maintaining a certain air exchange rate.	EPA's selected remedy for existing Tier 1 and Tier 2 buildings is an appropriate active sub-slab/sub-membrane ventilation system. However, a building indoor air ventilation system (e.g., HVAC) may be selected as the vapor intrusion remedy if the property/building owner agrees to use, operate, and monitor the HVAC system in a manner consistent with the operations, maintenance, and monitoring plan developed for that specific building or system. Direct measurements of building pressure or air exchange rate may be appropriate on a building-specific basis, and will be included in the operations, maintenance, and monitoring plan, as appropriate.	Peter Strauss MEW and Moffett Field TAG Technical Advisor
21	For existing buildings, they should have the option of installing a sub-slab depressurization system; and that might be less expensive in the long run than monitoring for the HVAC system.	EPA modified the vapor intrusion remedy from the original 2009 Proposed Plan. For existing Tier 1 and Tier 2 buildings the selected vapor intrusion remedy is an appropriate active sub-slab/sub-membrane ventilation system. However, the option of a building ventilation system (e.g., HVAC) is acceptable as the vapor intrusion remedy if the property/building owner agrees to use, operate, and monitor the HVAC system in a manner consistent with the operations, maintenance, and monitoring plan developed for that specific building or system.	Peter Strauss MEW and Moffett Field TAG Technical Advisor
22	There need to be contingency plans. So if either the indoor air levels exceed the target thresholds, or if the systems are not depressurizing or HVAC-ing properly, or ventilating properly, then we would know what would be done, either optimization of those systems or the installation of new systems, such as if the heating, ventilation, air-conditioning systems are not bringing the levels low	Confirmation sampling and periodic monitoring will indicate whether the remedy in a particular building is successfully lowering indoor air contaminant levels. If the indoor air cleanup levels selected in the ROD Amendment are not being met by the remedy used in a particular building, then the application of that remedy will be examined as well as	Lenny Siegel CPEO

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	enough, then we would require sub-slab depressurization systems on those buildings.	looking at other factors that could cause remedy failure. For instance, where there is a conduit from the subsurface into the building that has not been addressed, the conduit must be addressed and alternative engineered remedies specified in the ROD Amendment will be considered.	
23	The Proposed Plan should define exactly what “multiple lines of evidence” means, and it should establish the burden of proof for existing buildings to opt out of the remedial requirements.	EPA is using the following lines of evidence to evaluate whether the lines converge on a conclusion that vapor intrusion is or is not a concern for a specific building at the MEW Site: (1) the location of the building relative to known source areas and depth and concentrations of underlying shallow groundwater, (2) sub-slab soil gas concentrations; (3) indoor air concentrations; (4) lateral and vertical distribution of soil gas concentrations and proximity to building; and (5) building survey, chemical use, ventilation system operations, chemical ratios, among others. Because each building is unique, and screening criteria may be adjusted as more site-specific data are collected, these lines of evidence will be evaluated on a building-specific basis.	Lenny Siegel CPEO
24	**No Criteria are Provided to Demonstrate “No Action Required.”** As discussed in Comment 16.4 [see Comment 48 of this Responsiveness Summary], the Proposed Plan does not provide guidance on the types of information that may be required under the “multiple lines of evidence” test to classify a site as “no action required.” In addition to the types of information, EPA should provide criteria that can be used to indicate that there is no longer the potential for vapor intrusion.	See EPA response to Comment 23 regarding multiple lines of evidence to classify a building/property as no action required.	Mountain View Commercial Owners (MCO)
25	In Figures 3 and 4 of the final Proposed Plan, EPA should define “confirmation sampling” (indoor air?) and “Level of concern.”	In Figures 3 and 4 of the Proposed Plan, confirmation sampling refers to indoor air and pathway sampling. These figures are not included in the ROD Amendment. "Level of concern" is the level above indoor air cleanup levels. The term “levels of concern” is not used in the ROD Amendment.	Lenny Siegel CPEO
26	Explain why a particular mitigation for a particular site was selected for an existing building or new building. For example, 4B is preferred when we have a new residential development, but we think 5 and 3 will also work; however, if you use those, you have to go through this verification. This way people have an option, and they understand the positive and negative of actually going with those options. I think if you only say, "This is the only thing that can be done for a particular environment," you're going to get resistance. But if you can give them the options and the reason why these options will or will not work, I think you'll get a much better reaction.	Based on public comments and further comparison of the implementability, cost, and long-term effectiveness of the proposed alternatives, EPA revised the remedy from the preferred alternative identified in the Proposed Plan and selected the installation of an appropriate sub-slab/membrane ventilation or depressurization system for existing and future buildings. Monitored operation of the building’s indoor air ventilation system (e.g., HVAC) is an available alternative for existing commercial buildings. The revised evaluation is summarized in the ROD Amendment. This revision should provide adequate flexibility to property	Bob Moss NAS Moffett Field RAB Member

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		owners in selecting which type of system will work in their individual buildings.	
27	I disagree with the suggestion that no particular type of sub-slab system be required, but just one that is capable of reducing VOC adequately. Being capable does not assure that the capability is obtained or enforced. If the added sub-slab system is active, not passive, the probability of reducing VOC below levels of concern is greatly increased. It seems reasonable to require commercial buildings that want to retrofit and add a sub-slab system to also be required to operate a HVAC system during working hours plus 1 hour before and after normal working hours. Both the sub-slab system and vapor barrier should be required for new construction, to provide significant redundancy.	Any sub-slab vapor intrusion control system that is selected for a building will be monitored under a building-specific operation, maintenance, and monitoring plan, which will include monitoring the system's ongoing effectiveness. The selected remedy for future buildings (new construction) is a passive sub-slab ventilation system and vapor barrier (with the ability to be made active). If indoor air monitoring results exceed the indoor air cleanup levels, then the remedy requires that the system be made active. For future buildings (new construction), EPA did not select a building's indoor air mechanical ventilation system (Alternative 2) as the remedy, nor retain it as a remedial option as was done for current buildings. For future buildings, installation of a sub-slab ventilation system in the building design process is easier to implement than installing a system in an existing building. Sub-slab ventilation systems are proven technologies to reduce indoor air contamination from the subsurface, and they are easier to monitor than an indoor air ventilation system that is being used for multiple purposes and is operated by another entity (i.e., the building owner or manager rather than the Responsible Parties). Additionally, use of a sub-slab system will not require the extensive institutional controls that would be required to ensure the operation of a ventilation system in accordance with the remedy. Because of the reasons stated above, the remedy does not require use of both a sub-slab ventilation system and the building indoor air ventilation system for redundancy.	Bob Moss NAS Moffett Field RAB Member
28	New residential buildings should be required to have both an active sub-slab system and a vapor barrier. The interior of every residential unit should be tested before occupancy to establish a baseline of existing indoor VOC levels, and then twice each year for at least 5 years, and annually after that if indoor VOC levels are acceptable.	The selected remedy for new residential buildings is a passive sub-slab ventilation system and vapor barrier (with the ability to be made active). If indoor air monitoring results exceed the indoor air cleanup levels, then the system will need to be made active. A long-term operations, maintenance, and monitoring plan will be developed and baseline sampling will be conducted at a representative number of units. The sampling frequency will be determined in the long-term monitoring plan.	Bob Moss NAS Moffett Field RAB Member
29	One open issue is how to require corrective actions for existing commercial buildings. Should they all be required to provide indoor air testing to verify VOC levels? If so should buildings that find excessive levels of VOC be required to take prompt corrective action? Would the corrective actions describe the potential	See EPA responses to Comments 1 and 2. EPA has determined that all commercial buildings overlying shallow groundwater contamination need to be sampled. After a building has been sampled, the appropriate follow-up action to be taken will be determined in accordance with the	Bob Moss NAS Moffett Field RAB Member

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	adequacy of HVAC systems, and also suggest retrofitting with sub-slab systems? Presumably the answer is yes, but it should be explicit, not deducted from past events and statements.	response action tiering system provided in the ROD Amendment. EPA will be working with the responsible parties and property owners to ensure the necessary work is conducted.	
30	CPEO agrees that active substructure—that is, sub-slab and sub-membrane— depressurization systems can provide effective, reliable mitigation for vapor intrusion, in both large and small structures. Nevertheless, **we do support a performance-based approach for non-residential buildings, in which the responsible parties and owners of each building have some flexibility in implementing mitigation as long as they can demonstrate, through periodic or continuing monitoring, that the subsurface is sufficiently depressurized and/or the air inside the building complies with EPA's action levels.** For example, though we have not been able to find any successful model where a sub-slab system has been drilled in from the perimeter of a building, we believe such an approach may be acceptable if it can be shown to create a suction field under the entire slab.	See EPA responses to Comments 20 and 21. Performance monitoring will be included in the long-term operations, monitoring, and maintenance plan.	Lenny Siegel CPEO
31	In general, we consider HVAC to be a supplement to sub-structure measures, not a stand-alone remedy, for many of the reasons that EPA stated in its August 20, 2009 "Potential Changes to Proposed Vapor Intrusion Remedy." But we are willing to accept HVAC systems as mitigation if they are operated and monitored to ensure protection—that is, achievement of EPA's performance goals—whenever the building is occupied.	See EPA responses to Comment 20, 21, and 27.	Lenny Siegel CPEO
32	We propose that *if* the HVAC system is used as the primary mitigation system, *then* it should be operated for one additional hour before and after the presence of any building occupants, including security or custodial personnel. While in modern buildings with building management systems such an approach is feasible, we believe that building owners should weigh the energy costs and greenhouse gas emissions associated with longer operation of HVAC systems before agreeing to rely on them as remedies. Still, we believe that there may be buildings that normally operate HVAC systems around the clock, for which there would be no additional run time.	The operations of the building indoor air ventilation system (e.g., HVAC) if used as the vapor intrusion control system, will be based on building use and occupancy and reflected in the building-specific operations, maintenance and monitoring plan. Based on public comments and other considerations, EPA has modified the remedy in the ROD Amendment so that the installation of an appropriate sub-slab/sub-membrane ventilation or depressurization system, rather than the building's ventilation system, is the selected remedy for both existing and future buildings. However, the use of the building's indoor air ventilation system would be allowed if it meets the remedial action objective and is implementable on a long-term, ongoing basis. For buildings with security and cleaning staff occupying the buildings after normal business hours, it may not be preferable to use the building ventilation system for the selected vapor intrusion remedy.	Lenny Siegel CPEO
33	The plan needs to clarify that HVAC system operation is only	EPA's selected remedy for existing Tier 1 and Tier 2	SMI Holding

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	required when the building is occupied for business (i.e. during normal working hours) and not during non-business hours (i.e., when janitorial and/or security staff may only periodically be present). The FS report states "Section 5142 of the OSHA regulations requires the HVAC system to be operated continuously during working hours". EPA's revisions to the proposed plan dated August 20, 2009 state that "...there may be several buildings with security and cleaning crews occupying the buildings after normal business hours but for at least 8 hours a day". For these buildings, EPA indicated that it may not be preferable to use the HVAC system for the selected remedy, and installation of a sub-slab depressurization system could be utilized. As an alternative, the ability to test the indoor air in areas occupied by the security and/or cleaning crews for at least 8 hours a day, without HVAC system operation should be allowed. If the indoor air test results indicate that the indoor air concentrations are below EPA's action level of 5 micrograms (ug/m3), then no additional remedy should be required.	buildings is an appropriate active sub-slab/sub-membrane ventilation system. However, a building indoor air ventilation system (e.g., HVAC) may be selected as the vapor intrusion remedy if the property/building owner agrees to use, operate, and monitor the HVAC system in a manner consistent with the operations, maintenance, and monitoring plan developed for that specific building. If a building is sampled only with the building ventilation system operating and the indoor air concentrations are less than the cleanup level, then the building is categorized as a “Tier 2” building and an engineered remedy, institutional controls, and monitoring are required. If indoor air testing is conducted with the building ventilation system off and the results are below the indoor air cleanup level, then the building is categorized as a Tier 3A or 3B and only institutional controls and monitoring are required. EPA’s remedy requirements apply to the building as a whole, and not just to areas occupied by cleaning or security crews. See Tables 6A and 6B of the ROD Amendment and see also EPA responses to Comments 20, 21, and 27.	MEW Responsible Party
34	While CPEO believes that engineering controls such as substructure depressurization are the most appropriate remedies for most of the buildings in the study area, we will support other types of remedies—including podium construction—as long as they achieve the performance goals. These goals, including actual or projected target indoor air concentrations for TCE, PCE, benzene, and vinyl chloride, should be documented in the Final Plan or Decision Document. The latter two compounds are mentioned because a study by NASA in March 2005 (“Preliminary Regulatory and Cost Evaluation of Alternative Approaches to Vapor Intrusion Mitigation,” EKI) identified these compounds as potentially exceeding the Bay Area Air Quality Management District’s trigger levels for requirements that a depressurization system needs to be equipped with an air emission control device, such as granular activated carbon.	Indoor air cleanup levels for TCE, PCE, and vinyl chloride are included in the ROD Amendment. After an engineering control is in place, the system will need to be monitored to ensure that the indoor air cleanup levels are being met. Benzene was not identified as a chemical of concern in groundwater in the 1989 MEW Record of Decision; however, NASA and EPA have included benzene on its target analyte list. Benzene has been found in both indoor and outdoor air exceeding EPA’s Regional Screening Levels; however, these levels have been attributable to other sources such as vehicle emissions (outdoor) and consumer products (indoor) rather than from shallow subsurface contamination in groundwater or soil gas. To date, Site-related benzene contamination has always been accompanied by an exceedance of TCE, PCE or vinyl chloride.	Lenny Siegel CPEO
35	**For new construction, we favor active sub-structure depressurization (with a vapor barrier) as the presumptive remedy**. Passive systems are unpredictable, as they rely on changing outdoor air pressure to provide a negative pressure. In warmer months and climates, ambient pressure at the roofline may be greater than the subsurface, and passive systems may provide little help. In most cases, they do not create the same pressure differential between the sub-surface and the indoor air as an active system; they may merely vent and dilute harmful	For future buildings (new construction), the selected remedy is a passive sub-slab ventilation system (with the ability to be made active) and a vapor barrier. It is anticipated that a passive sub-slab system will be sufficient in reducing vapor intrusion concentrations two-to-five-fold. If confirmation indoor air monitoring results indicate that the passive sub-slab system is not effective in meeting the indoor air cleanup levels, then the system will need to be	Lenny Siegel CPEO

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	vapors intermittingly. EPA reported in 1993 that passive sub-slab systems were 30 to 90 percent as efficient as active systems. Because cost estimates indicate that an active system has a very marginal operation and maintenance cost differential of $500 per year for a single unit, less than the cost of additional sampling, we favor the more protective active approach.	made active. The $500 differential between passive and active sub-slab depressurization systems is only for the residential building scenario; the differential for the commercial building scenario is much greater due to energy and maintenance costs associated with the active system.	
36	If a passive system is to be used, a greater burden of proof is needed to demonstrate that it will prevent vapor intrusion over the long-term, including more frequent indoor air testing and other activities that would be set forth in the aforementioned SMP. Testing should be conducted in the warmest months.	For future buildings (new construction), the selected remedy is a passive sub-slab ventilation (with the ability to be made active). A long-term monitoring plan will be developed and implemented. The number of samples, sampling locations, and sampling frequency will be determined on a case-by-case basis, including accounting for the individual building conditions as well as the remedy utilized in that building.	Lenny Siegel CPEO
37	Commercial property owners strongly endorse EPA's 20 August 2009 e-mail entitled "Potential Changes to Proposed Vapor Intrusion Remedy, Middlefield-Ellis-Whisman (MEW) Study Area, Mountain View, CA." This has a strong preference for engineered subslab remedies that responsible parties (RPs) can install and monitor.	Based on public comments, EPA has incorporated its August 2009 proposed change into the ROD Amendment.	Steve Gazzera Commercial Property Owner
38	The City believes that the operation of HVAC systems as a remedy-whether as the primary component of the remedy or as a back-up alternative-could serve as an option, but only as one of last resort and only if the property owner agrees. Operation of HVAC systems for extended periods will have adverse effects on the environment and will increase energy consumption and greenhouse gas emissions. The City recently adopted communitywide greenhouse gas reduction targets, and selection of HVAC operation as a remedy would work counter to these goals. The City cannot support any remedial alternative that uses or relies upon such a system, unless the immediate health and safety of its citizens require it and no other option is available.	Based on public comments, EPA's selected remedy for existing buildings is an appropriate active sub-slab/sub-membrane ventilation system. However, a building indoor air ventilation system (e.g., HVAC) may be selected as the vapor intrusion remedy if the property/building owner agrees to use, operate, and monitor the HVAC system in a manner consistent with the operations, maintenance, and monitoring plan developed for that specific building. It should be noted that in some instances where existing buildings have poorly engineered or operated ventilation (e.g., HVAC) systems, optimization and modification of the ventilation systems to provide optimal make-up during business hours may reduce energy consumption. Because the climate in the Bay Area is temperate for much of the year, introduction of increased outdoor air can serve to lower indoor temperatures without the use of air conditioning components.	City of Mountain View
39	In the event EPA retains HVAC as a potential remedial alternative, then the City believes EPA and the property owners should compile more information about current HVAC systems and operations. Neither the current Proposed Plan nor the Final Supplemental Remedial Investigation and Feasibility Study presents sufficient data to support extended HVAC operations as a feasible and viable alternative to vapor intrusion mitigation.	See EPA response to Comment 38. If a building owner seeks to use the building indoor air ventilation system as the vapor intrusion remedy, then operating parameters will be determined based on building-specific factors. The cost estimates in the ROD Amendment includes optimization or modifications to the building ventilation system. While the cost estimate for use of the building ventilation system as	City of Mountain View

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	There is insufficient information about conditions and operability of current HVAC systems on a building-by-building basis. Moreover, there is insufficient data about estimated costs needed to improve or replace HVAC systems on a building-by-building basis.	the vapor intrusion control system could be improved with actual operations and monitoring data, this information can be collected and used. For future construction, both recorded agreements as well as the City's planning and permitting procedures will inform developers of the requirements to ensure that the appropriate remedy is incorporated into any new construction.	
40	**Sub-slab Remedy for Existing Buildings.** On August 20, 2009, EPA published a proposed change to its Proposed Plan. It states that the preferred alternative for *both* existing and new buildings is a sub-slab system, an engineered remedy that can be installed and operated by the RPs. MCO strongly supports this change. As discussed below, engineered remedies are not only preferable because of their reliability, long-term effectiveness, implementability, protection of human health, and permanence, but they are technically feasible and within an acceptable cost range for existing buildings.	Based on public comments, EPA has incorporated its August 2009 proposed change into the ROD Amendment.	Mountain View Commercial Owners (MCO)
41	**HVAC Only if Owner Agrees.** MCO strongly supports EPA's acknowledgement that HVAC cannot be required as a remedy unless a building owner specifically agrees. Absent special arrangements with RPs, HVAC is not a permanent or reliable approach to mitigating vapors. Using HVAC as a CERCLA remedy presents problems in terms of logistics, cost, increased energy usage, and uncertainty regarding long-term operation and maintenance. For example, operating HVAC above normal operations will increase a building's carbon footprint and lower the building's EPA Energy Star score. Absent a written agreement between RPs and individual property owners concerning an HVAC remedy, EPA should require engineered sub-slab remedies (where they are needed) that can be installed, operated and maintained by the parties responsible for the contamination.	EPA has incorporated into the ROD Amendment use of the building's indoor air ventilation system only if the property/building owner agrees to operate the system in a manner that will meet the performance criteria and remedial action objectives.	Mountain View Commercial Owners (MCO)
42	**The Proposed Plan is Based on Inadequate Study of Conditions for After-Hours Workers.** The Proposed Plan appears not to have adequately considered that people are often in buildings after typical working hours when the HVAC system is usually turned off. Specific examples include security guards, janitorial staff, and daytime workers who work late or on weekends. • **More Testing Must Be Done to Ensure that After-Hours Workers are Protected.** Most of the available indoor air data was collected during normal business hours when the HVAC system was operational. This data may not be representative of after-hours conditions, especially at the end of a weekend.	The remedy utilized in each building will be required to meet protective indoor air levels whenever the building is occupied, whether it be during normal business hours or after-hours when workers such as security and janitorial staff typically occupy the building. This will be the case whether the remedy utilizes a sub-slab ventilation system or the building's indoor air ventilation system.	Mountain View Commercial Owners (MCO)

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After-hours indoor air sampling for VOCs should be performed at each building so that potential risks to after-hours workers can be fully evaluated. If EPA can confirm that running HVAC only during business hours is fully protective of all employees in all buildings, including after hours employees, it should provide that analysis and conclusion in the Proposed Plan. • **Engineered Sub-slab Remedies Can Be Continuously Operated and Monitored and Thus Are More Reliable than HVAC.** Once a sub-slab remedy, such as sub-slab depressurization (SSD), is installed and shown to be effective, concerns about potential exposure of after-hours workers to VOCs from vapor intrusion are eliminated.		
43 **EPA Is Treating MEW Differently.** EPA is breaking new ground at the MEW site compared with other sites in California and throughout the United States. • **No Other Federal Vapor Intrusion Sites Have Ordinances.** We are not aware of any other federal Superfund sites where an ordinance is used to require and enforce a vapor intrusion remedy. *Can EPA assure the City of Mountain View and commercial owners in Mountain View that the MEW site is being regulated by the same standards and using the same tools that apply to the thousands of other similar sites across the country?* This is very important because the perception of a difference can have a significant impact on the marketability of property, its value and the City's economy. • **EPA Treats the MEW Site Differently Than Other Silicon Valley Sites.** At other sites in Silicon Valley (some of which are also federal Superfund sites), California state agencies direct the cleanup, and they have not asked cities to adopt vapor mitigation ordinances. Some commercial tenants have already indicated an unwillingness to bring their business to Mountain View, and have gone elsewhere instead because of the way EPA has chosen to single out MEW. *What is the rationale for treating MEW differently from these other sites? Has EPA factored these significant costs into its fiscal analysis?* • **EPA Treats NASA and the Navy Differently.** NASA and Navy properties sit on top of the same MEW plume as the commercial and residential property owners in Mountain View. Yet NASA would not be subject to the ordinance EPA is recommending and is free to follow its own plan. We also understand that the Navy "does not believe in vapor intrusion"	All Superfund remedies are required to utilize institutional controls where necessary to minimize the potential for human exposure to contamination and to protect the integrity of engineered remedies. The most common institutional controls at Superfund remedies are land use covenants to prevent use of a property for uses that are incompatible with on-site contamination. Other institutional controls include governmental controls, such as zoning designations and ordinances, to prevent exposure to site contaminants. In the ROD Amendment, EPA selected institutional controls that combine proprietary controls (recorded agreements) with governmental controls (planning and permitting requirements) to ensure that the vapor intrusion remedy is implemented at properties in the Vapor Intrusion Study Area over time. On the NASA and Army property that is within the Vapor Intrusion Study Area, the remedy requires the inclusion of the same requirements within base planning documents. Because the Moffett Field property is owned by the federal government, agreements cannot be recorded. However, requirements within base planning documents will serve as the governmental controls for that portion of the Site. In buildings within the Vapor Intrusion Study Area where indoor air ventilation systems (such as HVAC) are operating, those systems can act to reduce levels of contamination indoors. For those buildings where the indoor air ventilation system is lowering indoor air contamination levels, when the ventilation system is not operating, indoor air contaminant levels could increase and exceed the indoor air cleanup levels. In those cases, the ventilation system itself is the vapor intrusion control system. As with any engineered	Mountain View Commercial Owners (MCO)

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and thus is not subject to the proposed ordinance or mandate for vapor mitigation measures. *Why is this so?* This is unfair, especially when NASA leases much of its property to commercial and residential tenants in direct competition with the other property owners in Mountain View. • **HVAC is Not Considered a "Remedy" if the Building Has Been Sampled Under Normal Operating Conditions.** In our experience, at other sites where indoor air has been sampled under normal operating conditions, no remedial action is required if the VOC concentrations are less than the site-specific action levels. Under the same circumstances at the MEW site, EPA is identifying HVAC as an "engineered remedy."	remedy, EPA must confirm not only that the system serving as the vapor intrusion control system is constructed and operational, but also that it continues to operate as needed. Therefore, where the ventilation system is used as the vapor intrusion remedy in an existing building, EPA ensures that its operation, maintenance, and monitoring requirements are met through institutional control instruments, in this case, recorded agreements. Where a building is sampled without the ventilation system operating, if indoor air levels are below the remedy's action levels, then it is assumed that no remedy is necessary in that building.	
44 **Commercial Property Owners and their Tenants Cannot Be Required to Operate HVAC as a CERCLA Remedy.** • There are several problems with EPA's initial suggestion that commercial property owners or their tenants should be obligated to operate HVAC in their buildings *for the purpose of remediating the vapor intrusion pathway.*[2][13] • First, the requirement to operate mechanical ventilation was never intended to be a CERCLA remedy for preventing vapors from groundwater contamination from entering buildings. Instead, regulations governing the operation of mechanical ventilation are based on considerations of "energy efficiency" and "occupant comfort."[3][14] • Second, the Energy Code and the Cal/OSHA regulations do not contemplate operating mechanical ventilation all day, every day, or when any single person is in a building for any given length of time. Rather, the Energy Code applies only	Based on these and other considerations, EPA has modified the remedy in the ROD Amendment so that the installation of an appropriate sub-slab/sub-membrane ventilation or depressurization system, rather than a building's indoor air ventilation system, will be utilized for both existing and future buildings. However, the use of an existing building's indoor air ventilation system would be allowed if it is demonstrated that the remedial action objectives can be met and the property/building owner agrees to operate the system on an ongoing, long-term basis.	Mountain View Commercial Owners (MCO)

2 (13) *See* EPA *Final Supplemental Feasibility Study for Vapor Intrusion Pathway: Middlefield-Ellis-Whisman Study Area: Mountain View and Moffett Field*, California (June 2009) (Feasibility Study) at p. 49 ("The California State Energy Code and OSHA regulations provide operating requirements for commercial building HVAC operation.") In particular, EPA points to Section 121 of the California Energy Code (CCR Title 24, Part 6, Subchapter 3, Section 121), and Section 5142 of California's OSHA regulations (8 CCR § 5142). Feasibility Study at 49. Title 8 CCR Section 5142 only requires HVAC to be operated "during working hours," and contemplates numerous exceptions when HVAC need not be operated. Section 5142 cross-references the State Building Standards Code, Title 24, Part 2 to determine the quantity of air that must be supplied. In 2001, the relevant portion of the Building Standards Code was located at Section 1202.2.1. Section 1202.2.1 required that enclosed portions of certain types of buildings that are "customarily occupied" by humans shall be either naturally or mechanically ventilated, and if mechanically ventilated, the ventilation system "shall be capable of supplying a minimum of 15 cubic feet per minute (7L/s) of outside air per occupant in all portions of the building during such time as the building is occupied." The Building Standards Code was revised in 2007, and Section 1202.2.1 was replaced with Section 1203.1, which provides for mechanical ventilation "in accordance with the *California Mechanical Code*." The Mechanical Code, found at CCR Title 24, Part 4, still requires that mechanical ventilation systems "shall operate so that all rooms and spaces are continuously provided with the required ventilation rate while occupied." Cal. Mech. Code § 402.3.

3 (14) *See* California Energy Commission, 2005 Building Energy Efficiency Standards: Nonresidential Compliance Manual (Nonresidential Compliance Manual) § 1.4 (Rev. 3 March 2005).

when buildings are *"normally* used by humans," or "when the space is *usually* occupied" or *"normally* occupied.[4]"[15] The California Energy Commission itself interprets these terms to refer "to spaces where people can be reasonably expected to remain for an extended period of time" rather than for "brief and intermittent" periods.[5][16] The Cal/OSHA regulations similarly apply only *"during working hours.[6]"*[17] And the Building Standards that Section 5142 cross-references similarly require mechanical ventilation only for spaces that are *"customarily* occupied by human beings.[7]"[18] In other words, the words *usually, normally, customarily,* and *during working hours* do not mean *always.*

- Third, the State of California, and its cities, do not enforce the Energy Code in the same manner they would enforce safety-driven regulations. As the City of Mountain View explained, "the City does not verify HVAC system functionality as part of the building inspection and permitting process. Furthermore, the City does not have the jurisdiction, resources, or staffing to implement this kind of ongoing monitoring and enforcement program; this would be an entirely new, unfunded program requiring legislative authority and enforcement power, resources, and fees.[8]"[19]
- Fourth, the Energy Code does not require the operation of *HVAC* per se; rather, it requires the operation of "mechanical ventilation" where there is inadequate natural ventilation.[9][20] Thus it is also inaccurate to suggest that the Energy Code requires commercial building owners to operate expensive *HVAC* systems when there may be other, less expensive *mechanical ventilation* systems available. Depending on how fan systems or HVAC systems are installed, they can be compliant with the Energy Code but can create a negative pressure, which would actually increase the potential for vapor intrusion rather than decrease it. Thus compliance with the Energy Code is no assurance that HVAC could be used as a CERCLA vapor intrusion remedy.
- Finally, operating HVAC for remedial purposes, if required for

4 (15) Energy Code §§ 121(a)(1), (c)(1), and (c)(2) (emphasis added).

5 (16) Nonresidential Compliance Manual § 4.3.

6 (17) 8 CCR § 5142(a)(2) (emphasis added).

7 (18) 24 CCR § 1202.2.1 (2001) (emphasis added).

8 (19) Letter from Kevin Woodhouse to Elie Haddad and Alana Lee (Nov. 22, 2006).

9 (20) Energy Code §121.

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	more than usual business hours, could be very costly for owners and tenants. It would also be highly energy intensive and, by using green house gases, have an adverse impact on global warming, surely an unintended (and ironic) result in a CERCLA remedy. Further, it would be impossible for owners to guarantee the remedy (short of running HVAC 24 hours a day *every* day), because employees are not always predictable about the times they will occupy a building, or reliable about ensuring HVAC is on at all. Absent special arrangements with RPs, HVAC is not permanent or reliable as formal "remedy" for mitigating vapors.		
45	**HVAC is Not an Implementable Alternative Because it Puts an Undue Burden and an Unachievable Remedy on Owners and Tenants.** The RPs caused the contamination at the MEW site, which is the source of vapor intrusion; the RPs should be implementing the remedy. Specific examples that highlight inadequacy of the evaluation of the HVAC alternative are as follows:	The building indoor air ventilation system (e.g., HVAC) would not be used as the vapor intrusion remedy without the full consent and cooperation of the property owner. See responses below.	Mountain View Commercial Owners (MCO)
	• At least one development with two buildings at the MEW Site contains 30 independent HVAC systems in the building that are the responsibility of 30 individual tenants. Under the Proposed Plan, the owner of a property with 30 independent HVAC systems, each operated by a separate tenant, would be responsible for verifying operation of these HVAC systems, which would be logistically impossible.	First bullet: See EPA response to Comment 44.	
	• The cost estimates for the HVAC alternatives do not consider the cost of running the HVAC; they only include capital costs for a one-time modification of the system. Nor do they include the costs for accelerated depreciation and early replacement if HVAC has to be run all the time. If HVAC is considered by EPA to be an "engineered remedy," then the cost to operate the HVAC should be part of the cost of the alternative.	Second bullet: The cost estimate for the building's indoor air ventilation system (e.g., HVAC) alternative is based on the generalized assumption in the Supplemental Vapor Intrusion Feasibility Study that the indoor air ventilation system would only be run during standard business hours, and that modification of the ventilation systems to provide optimal make-up air during standard business hours would have minimal energy cost impact because the introduction of outdoor air can serve to actually lower indoor temperatures without the use of air conditioning components in a temperate climate like the Bay Area. The actual impact on energy costs could vary widely depending on current ventilation system operating conditions for specific buildings. General assumptions such as these were made to simplify cost estimating for the entire Site.	
	• The cost estimates for the HVAC remedy do not include periodic maintenance costs such as sealing cracks and other conduits given that the efficiency of the HVAC remedy may change with time as a building ages or as new tenant	Third bullet: As indicated in Table 7-3 of the Final Supplemental Feasibility Study, the costs of sealing cracks would apply to not only the building ventilation system (e.g., HVAC) alternative, but also to sub-slab/sub-membrane	

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improvements are installed.	alternatives. These costs were considered, but were not included in the cost estimates because they may not apply to every building and these costs would be relatively small compared to the overall costs of the alternatives.	
• The HVAC remedy does not indicate the amount or type of verification that would be required to confirm that the system is operating effectively.	Fourth bullet: Verification monitoring is an important component of the remedy and will be part of each building's operations, maintenance and monitoring plan.	
• The HVAC remedy does not consider the effect of additional greenhouse gases released as a result of running systems beyond standard operating hours.	Last bullet: See EPA response to Comment 44.	
46 **Sub-slab and Sub-grade Remedies Can Be Installed at Existing Buildings.** The RPs have expressed concerns about the technical feasibility of installing sub-slab or sub-grade remedies at existing buildings, citing foundations and utilities as constraints. EKI reviewed the foundation plans and met with the general contractor who constructed nine of the buildings at the MEW site in the mid-to-late 1990s. For these buildings, it should be feasible to install an SSD system through the perimeter foundation. This approach is an option provided by EPA for radon mitigation.[10][22] EKI also spoke with a contractor who has installed sub-grade mitigation systems underneath building foundations using horizontal drilling techniques. Key technical considerations that demonstrate the feasibility of installing such systems under the existing buildings are as follows:	Based in part on the information provided by the commenters, EPA has selected as the vapor intrusion remedy for existing commercial buildings the installation of a sub-slab depressurization system. The specific installation methods, as well as confirmation sampling protocol to be used at each building will be determined during the Remedial Design phase.	Mountain View Commercial Owners (MCO)
• The newer buildings only have a single utility, the sanitary sewer, that runs under the building. The location of the sanitary sewer line can be readily located.		
• The newer buildings are underlain by a gravel layer installed as a water vapor break.		
• The newer buildings do not generally have an extensive grade beam network that would limit the effectiveness of SSD.		
• For older buildings that may not have a gravel layer or have an extensive grade beam network, a sub-grade system can be installed using horizontal drilling techniques. MCO is aware of such a system that was installed for vapor intrusion mitigation at a 40,000 square foot building in the Los Angeles area for a capital cost of approximately $300,000 and has		

10 (22) EPA, July 1991, *Sub-slab Depressurization for Low-Permeability Fill Material, Design and Installation of a Home Radon Reduction System*, EPA/625/6-91/029.

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	been effective at reducing VOC concentrations in indoor air below the site-specific action level. • The RPs have indicated that, in some circumstances, sub-slab remedies will not be effective because the primary pathway for vapor intrusion is through a conduit. This concern highlights the need for adequate and representative baseline testing to identify and address the source of conduit vapor, if it exists. Moreover, follow-up indoor air testing should be performed after installation of the sub-slab remedy or conduit mitigation to verify that the remedy is effective.		
47	**The Only Sub-slab Building Retrofit Included in the FS Cost Estimates Were Alternatives that Penetrated the Floor.** A building retrofit for SSD that penetrates the floor may be appropriate for some buildings, but not the newer buildings or occupied buildings. MCO's evaluation of potential costs to install SSD in an existing building shows that the cost to retrofit a building through the exterior perimeter foundation is similar to penetrating the slab. A summary of these cost estimates is provided below and provided in more detail at **Tab 5.** • The capital cost to install SSD through the perimeter foundation for a 35,000 square foot building footprint is estimated to be $120,000 without contingencies (Alternative 3 in **Tab 5).** The 30-year net present worth cost to install, operate, and monitor the system is estimated to be $280,000 (excluding contingencies and using a 7% discount rate to be consistent with the cost estimates in the Proposed Plan). The net present worth cost to install SSD in an existing building in the Proposed Plan is $325,000. • As indicated in the prior comment, a sub-grade system can be installed using horizontal drilling techniques if it is not feasible to install a system through the perimeter foundation (Alternative 4 in **Tab 5).** The capital cost and 30-year net present worth cost to install, operate, and monitor a sub-grade depressurization system are estimated to be $260,000 and $600,000, respectively (again, excluding contingencies and using a 7% discount rate). • These alternatives can be installed and monitored without disturbing the building interior.	EPA appreciates the information provided. See EPA response to Comment 46.	Mountain View Commercial Owners (MCO)
48	**The Application of the Tiering System and Remedy Selection Is Not Clear.** The core of EPA's July 2009 Proposed Plan is the remedy selection process for a given building, as presented in Table 4 (Tiering System) and Figure 3 (Decision Flowchart). However, the table and figure are inconsistent. Specific examples	For clarification, the tables have been revised in the ROD Amendment.	Mountain View Commercial Owners (MCO)

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	are provided below:		
	• For Tier 2, Table 4 indicates that (a) in place engineered remedies should continue to be operated, (b) monitoring should be performed, and (c) institutional controls should be implemented. However, Figure 3 only calls for monitoring and institutional controls.	First bullet: The continued operation of in-place engineered remedies, although not specified, is implied in Figure 3. The long-term verification program specified in Figure 3 refers to verification of the operation of the engineered remedies. The tables have been revised to include a description of the institutional controls for each tier, The flowchart is not included in the ROD Amendment.	
	• If an existing building overlies "high" volatile organic compound (VOC) concentrations in groundwater and VOC concentrations in indoor air are at or less than background, the proposed remedy is not clearly identified in Table 4.	Second and third bullets: The use of "High" and "Low" groundwater concentrations has been removed from the tiering system. The table has been revised to provide clarification of the response action required.	
	• Tier 3 represents a low-risk scenario: a building that overlies "low" VOC concentrations in groundwater and VOC concentrations in indoor air that are at or less than background. In this scenario, the Proposed Plan calls for an Institutional Control (IC) to notify future owners. The nature of the IC and the purpose of the notice are not discussed. Is it unclear whether ICs are needed only to make sure that the preferred remedy is implemented for future buildings.	Third bullet: Tables 6A, 6B, and 7 present the response action tiering system, which has been revised in the ROD Amendment.	
	• For Tier 4, the Proposed Plan indicates that multiple lines of evidence can be used to show there is no potential for vapor intrusion above levels of concern. However, the Proposed Plan provides no guidance as to the types of evidence that may be acceptable. RPs, owners and tenants would like a clear understanding of when buildings do not require add-on vapor control measures.	Fourth bullet: See EPA response to Comment 23.	
49	**Some Buildings May Operate Under Negative Pressure.** The preferred alternative of HVAC in the Proposed Plan does not consider that some buildings or portions of buildings may operate under negative pressure. Typically, facilities that include laboratory spaces, kitchens, and even bathrooms operate under negative pressure. Vapor intrusion may be significantly higher in areas with negative pressure compared to areas operating under typical HVAC conditions.	The presence of spaces that are typically under negative pressure is evaluated during the building walkthroughs/inspections prior to indoor air sampling, and this information is incorporated into the indoor air sampling design. The suitability of the use of the ventilation system as the remedy is based, in part, on this evaluation, the air sampling results, and other information gathered about ventilation system operations during the inspection.	Mountain View Commercial Owners (MCO)
50	**The FS Did Not Include Adequate Costs for Sampling.** Whether the remedy is an HVAC remedy or a sub-slab remedy, the monitoring cost estimates included in the Proposed Plan and the FS are insufficient to adequately verify that the remedy is effective. More specifically, the cost estimates in the FS assume $400 per sampling event per building. The analytical cost for a single indoor air sample using EPA Method TO-15 SIM (to get adequate reporting limits) is approximately $350 per sample, not including the cost to perform the sampling. One sample per event	The operations and maintenance (O&M) cost estimates presented in the Supplemental Feasibility Study are annual costs, and the $400 corresponds to the low-range annual cost of sampling. The assumption for the low-range estimate was that sampling would be conducted every five years, not annually. Each five-year sampling event was estimated at $2,000. The actual sampling frequency for each building will be included in the building's long-term operations,	Mountain View Commercial Owners (MCO)

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	per building cannot be considered adequate to verify that a remedy is operating effectively, especially if HVAC is the remedy.	maintenance and monitoring plan.	
51	The Companies continue to express their strong disagreement with EPA's selection of sub-slab passive ventilation and/or depressurization systems (i.e., Alternatives 3 and 4AIB) as the preferred remedial alternatives for many existing and all future commercial buildings at the MEW Site. Instead, the use of heating, ventilation, and air conditioning (HVAC) systems (i.e., Alternative 2) should be chosen as the preferred alternative for most commercial buildings. As demonstrated by the data collected during the RI process, the proper installation and use of HVAC systems will effectively keep MEW Site-related VOC concentrations in buildings under action levels. Because such use already is required for most buildings by existing state regulations, the use of HVAC systems should be chosen as the preferred alternative over other alternatives, where appropriate. Consequently, this remedy will not only be capable of ready enforcement, but also will be more implementable, and significantly less costly than the other proposed alternatives for many existing and all future commercial buildings.	The remedy selected in the ROD Amendment allows for the use of a ventilation system in commercial buildings to serve as the vapor intrusion remedy where it is shown that the system adequately meets remedy requirements and that ongoing operation of the remedy is assured. This remedial option is more complex to implement and will require more monitoring than with the use of a sub-slab ventilation system. Therefore, for future commercial buildings, the remedy requires the inclusion of a sub-slab ventilation system in the Vapor Intrusion Study Area. The vapor intrusion remedy cannot rely on the California ventilation regulations (found in Title 24 of the California Code of Regulations) to ensure that indoor air contaminant levels do not exceed the remedy's cleanup levels for several reasons. First, the ventilation regulations do not in all instances meet the requirements of the remedy. Second, the ventilation regulations do not provide an adequate enforcement mechanism to ensure ongoing ventilation operation as required by the remedy. Third, in instances where the system would need to be operated for significant time beyond that required by the ventilation regulations, use of the ventilation systems is not more cost-effective. Fourth, ongoing monitoring of the use of ventilation systems for the remedy is much more resource intensive than monitoring of a sub-slab ventilation system. Fifth, in response to the Proposed Plan, many commercial property owners in the MEW Area indicated that they would not necessarily be willing to operate their indoor air ventilation systems in accordance with the remedy.	Raytheon and Schlumberger Technology Corp MEW Responsible Parties
	A. The Proposed Plan Fails to Acknowledge That California Ventilation Regulations Require the Use of HVAC Systems in Commercial Buildings and Apply to Many Existing and All Future Commercial Buildings at the MEW Site. Many existing and all new commercial buildings at the MEW Site must have HVAC systems, and as shown in the RI, these HVAC systems operated by default in a manner that actually achieve indoor air concentrations less than the proposed action levels. Since the mid-1950s, California regulations have provided ventilation requirements for commercial buildings. 1955 Unif. Bldg. Code § 605. These regulations continue in force today, and are found in three separate parts of the California Building Standards Code: (1) the Building Code, Title 24, Part 2; (2) the Mechanical Code, Title 24, Part 4; and (3) the Energy Code,	A. The California ventilation regulations (as identified in the comment) will work in tandem with the vapor intrusion remedy in some instances. However, the ventilation regulations do not in all instances meet the requirements of the remedy, thus these requirements cannot take the place of the vapor intrusion remedy. The California ventilation regulations do apply to some buildings in the MEW Area, but they do not apply to all. The regulations that apply to each building are those that were in place when that building's construction permit was submitted. Thus, for instance, the 2008 Energy Code regulations will apply only to those buildings that submit a construction permit after January 2010. Buildings with	

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Title 24, Part 6 (collectively, the "California ventilation regulations"). The Energy Code, which has the most stringent ventilation rate requirements of the three ventilation schemes, applies to many existing and all new commercial buildings for which an application for a building permit or renewal of a building permit is filed as of the effective date of the Code's ventilation provisions.[112] 24 CCR Part 6, § 100. The Energy Code requires that all enclosed spaces in such buildings that are normally used by humans must be ventilated. 24 CCR Part 6, § 121(a). Each space in such a building that is not naturally ventilated must be ventilated with a mechanical system capable of providing an outdoor air rate no less than the larger of 0.15 cubic feet per minute (cfm) per square foot of commercial building space or 15 cfm per person times the expected number of occupants. *Id.,* § 121(b). The Code further provides that the minimum rate of outdoor air required by this section "shall be supplied to each space at all times when the space is usually occupied." *Id., §* 121(c). **B. Because State Law Already Requires the Proper Use of HVAC Systems, Alternative 2 Should Be Selected as the Preferred Alternative for Many Existing and Future Commercial Buildings at the MEW Site.** **1. California ventilation regulations require safe air exchange rates.** The Proposed Plan acknowledges that HVAC systems will keep Site-related VOC concentrations under action levels where those systems are operated properly. (Proposed Plan at p. 17). When operated at high enough levels, HVAC systems cause a building to be under positive pressure, preventing contaminants from the subsurface from entering a building. *(Id.* at 11). When operated at lower levels, HVAC systems act to dilute the concentration of VOCs that have already entered a building with outdoor air. (id.). Indeed, data collected at the MEW Site indicate that a rate of 1 air exchange per hour is effective in reducing concentrations of VOCs to below long-term exposure goals. For a single story commercial building, Cal/EPA states that 0.15 cfm per square foot equates to approximately 1 air exchange per hour. (Cal/EPA 2005). As noted, 0.15 cfm per square foot is the minimum air ventilation rate for HVAC systems operating in accordance with the Energy Code. See 24 CCR Part 6, § 121(a). Accordingly, many existing and all future commercial buildings at the MEW Site are already required to	construction permits submitted before 1978 would be entirely exempt from Section 6 (Building Energy Efficiency Standards). Each building will have its own set of codes that will apply to its ventilation use and energy consumption, not all of which will require the same ventilation and air exchange rates. Additionally, the purpose of the California ventilation regulations is to provide for adequate indoor ventilation, but another primary goal of the regulations is to integrate energy efficiency. Energy efficiency goals require that the building not use more energy than is required to meet a building's ventilation needs. Title 24, Subpart 5. These goals are not always in synch with the requirements of the vapor intrusion remedy. B1. The specific requirements of the ventilation regulations do not in all instances meet the needs of the vapor intrusion remedy. The requirements in Title 24, Part 6, Section 121(b)(2) provide for ventilation calculated based on floor size or at a rate of 0.15 cfm per person times the number of occupants (which is calculated based on fixed seating or one-half of maximum occupancy). This calculation may generically meet the requirements of the vapor intrusion remedy, but may not in certain instances as applied to particular buildings. For instance, in a sparsely inhabited building, the ventilation rate required by this regulation might not meet EPA's requirements. Also, the regulations require that the minimum rate of outdoor air be utilized when the space "is usually occupied." 121(c)(1). This does not necessarily require ventilation adequate for the remedy when after hours workers (such as janitorial staff and security) continue to work in the building. Buildings may be operating in compliance with state ventilation codes but this does not necessarily mean indoor air cleanup levels are being met. Finally, Title 24, Part 6 does not apply to all parts of a building. For example, in a space where the remedy is clearly necessary – basements - the ventilation requirements do not apply where 50% of the space is below	

11 (2) Specifically, the Energy Code applies to buildings classified in Occupancy Groups A, B, E, F, H, M, R, S or U. 24 CCR Part 6, § 100. These Occupancy Groups represent the following categories: assembly (A); business (B); educational (E); factory (F); hazardous (H); mercantile (M); residential (R); storage (S); and utility (U). See 24 CCR Part 2, 2007 CBC §§ 303-12 (defining occupancy groups).

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operate their HVAC systems to provide at least 1 air exchange rate per hour, thereby ensuring that indoor air concentrations will be reduced to, and remain below, levels of concern.[12][3]	grade (e.g., basement). Title 24, Part 6, Section 100.	
2. Enforceability concerns about Alternative 2 are mitigated because the use of HVAC systems is required by existing law.	B2. Enforcement: Even if the California ventilation regulations were consistently able to meet the needs of the vapor intrusion remedy, they are not enforceable in a manner necessary for the vapor intrusion remedy operation. The California ventilation regulations require that the building's ventilation system be designed in a manner capable of meeting Title 24 requirements, but do not necessarily require the ongoing operation of the system at these levels. (Subsection 10-103). The regulations provide that local authorities may provide ongoing enforcement, but here the City of Mountain View has indicated that it does not have the resources, either monetary or staff, to conduct enforcement of ongoing ventilation operations.	
Because HVAC systems would be operated by building owners/operators and not directly by the PRPs, the Proposed Plan expresses uncertainty about the enforceability of Alternative 2 as a remedy at the MEW Site. (Proposed Plan at p. 17).		
The Proposed Plan, however, fails to account for the fact that for many existing and all future commercial buildings, the proper use of HVAC systems will not only be mandated as an EPA remedy, but it is also mandated by state law. Building owners and operators undertaking to construct new commercial buildings at the MEW Site are required by the California ventilation regulations both to install HVAC systems and to use them in a manner that will effectively provide proper air exchanges. The same is true for many existing buildings. To further ensure this, the Proposed Plan states that EPA will rely heavily on institutional controls (ICs) - namely a municipal ordinance - to ensure that HVAC systems are operated and maintained in accordance with the remedy. Further, the Companies believe that this would be true with or without an ordinance, as the Companies have committed to work with the City to provide the resources necessary to enforce either an ordinance (if passed) or the existing provisions of the Code that are set forth above. See Cal. Health & Safety Code § 17960; 24 CCR Part 2, 2007 CBC § 108.3.1 (requiring the building department of every city and county to enforce all the provisions of the building code). Thus, ventilation requirements will be enforced one way or another (with or without an ordinance), and any uncertainty about the enforceability of the remedy will be mitigated.		
Furthermore, even without involving the City of Mountain View at all, the Companies have committed to EPA, and hereby repeat their commitment, to obtain private party agreements (and to record either notices of those agreements or access agreements to put future property owners on notice) to ensure that property owners continue to operate their HVAC systems in a manner that would meet the indoor air standards set for breathing zone work spaces. In the event that the Companies, for any reason, are unable to obtain such agreements for one or more properties, the Companies would seek EPA's assistance with respect to such	B2. Implementability: Many of the commercial property owners in the MEW Area have indicated that they would not agree to operation of their building indoor air ventilation systems for the remedy. Although there are requirements for operating commercial ventilation systems, those requirements are not in all instances aligned with the requirements for the vapor intrusion remedy. Without the ongoing cooperation of property owners and building operators, the use of a building's ventilation system for the	

[12] [(3)] The only commercial Occupancy Group to which the Energy Code does not apply is Institutional (I), which consists of nurseries for full-time care of children, hospitals and nursing homes with nonambulatory patients, health care centers and nursing homes for ambulatory patients, and mental hospitals, jails, and prisons. 24 CCR Part 2, 2007 CBC § 308.1. Such institutional buildings are regulated by the Mechanical Code, which requires minimum ventilation rates of 0.12 cubic feet per minute (cfm) per square foot for cells and 0.06 cfm for day rooms, guard stations, and booking areas. 24 CCR Part 4, § 402.1, Table 4-1. It is extremely unlikely that any institutional occupancy building would ever be built within the MEW Site and, if it were, the City of Mountain View would certainly require adequate ventilation as part of the building permit and CEQA processes.

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properties. **3. Cost burdens associated with Alternative 2 are significantly lower than the Proposed Plan's preferred alternative remedies for existing and future commercial buildings.** Of the various remedial alternatives being considered for existing and future commercial buildings at the MEW Site, Alternative 2 is by far the least costly remedy, both in terms of capital costs and annual operation and maintenance costs. (Proposed Plan at pp. 12-14). Importantly, because most building owners/operators must install and operate HVAC systems in order to comply with state regulations (regardless of EPA's selected remedy), Alternative 2 will impose no additional capital or operational costs on buildings at the MEW Site. Given that the proper use of HVAC systems is effective to ensure safe air quality levels and is required by existing law, a remedy requiring construction of sub-slab ventilation systems (i.e., Alternatives 3 and 4A/B) at most commercial buildings at the MEW Site is unwarranted - both in terms of cost and of efficacy, let alone conserving resources and reducing the carbon footprint. Alternative 2, by contrast, will achieve the same results at a **substantially** reduced cost.	remedy is not implementable. B3. Cost effectiveness: In some instances, use of a commercial building's indoor air ventilation system may not be the most cost-effective remedial alternative. Where a building is occupied all day, and the ventilation system is not already operated through those hours, additional operation of the system to comply with the remedy, along with additional wear-and-tear on the system from increased operation could result in significant additional operational costs. Also, the monitoring to ensure that a ventilation system is operating on an ongoing basis at a level required for the vapor intrusion remedy will be far more intensive than the monitoring necessary for a sub-slab system that has as its sole purpose preventing subsurface contamination from reaching the indoors. Building management will have to be carefully trained to understand how the ventilation system plays a role in the remedy, and anyone with the ability to adjust the system will have to be part of the operation process. Thus, the increased training and monitoring of this remedial option may increase its implementation cost.	
Institutional Controls and Long-Term Monitoring		
52 On the HVAC system, you have to have a way of identifying when there are both people in the building and when the system is working; and you have to be able to ensure that the system continues to work as long as the building is occupied. In your institutional controls, you talked about tracking changes of ownership of the building, but that's not sufficient. You could have changes of occupancy; and for example, you might have somebody who's occupying a building who's an ordinary office, 9:00 to 5:00, five days a week, and they leave, and some other company comes in, that works, say, in the internet, and they're 24 hours a day, seven days a week. So if the HVAC system originally only worked during normal working hours, and that's still what it does when the occupant changes, that doesn't work. So we have to have somebody tracking it.	Where the engineered remedy for vapor intrusion is use of the building's indoor air ventilation system, the operation of the system would be linked to the building's actual occupancy. Thus, tracking of occupancy patterns is an important component of the remedy and will be part of each building's operations, maintenance and monitoring plan. Institutional controls for the buildings using the ventilation system as the engineered remedy will need to include notice provisions, both for change of ownership and of occupancy. Notice of change in ownership will allow the remedy requirements to be conveyed to all occupants. That notice will need to require notification to the MEW Responsible Parties and EPA if there is a change in occupancy as well as any change in building or ventilation system configuration that may impact the remedy.	Bob Moss NAS Moffett Field RAB Member
53 One unresolved issue is active vs. passive sub-slab systems. Typically developers request the cheaper passive systems that can be upgraded to active. This presents several problems. First there must be regular indoor air testing at least twice each year for at least 5 years, reducing to annually if VOC levels are acceptable over time. Who is responsible for testing and who reports the results must be established. If the developer is required to obtain	For all new building construction, EPA has selected installation of a passive sub-slab ventilation system and vapor barrier (with the ability to be made active) as the engineered vapor intrusion remedy. Following construction, confirmation sampling will be required to ensure that the passive system is sufficient to keep the indoor air concentrations below the indoor air cleanup levels. If indoor	Bob Moss NAS Moffett Field RAB Member

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	the test data, there should be some oversight to assure that the sampling was done properly and the results are valid. It may be a problem getting accurate tests run with the required frequency. Assuring that the local government (almost always the city) has adequate oversight of the testing and evaluation is necessary. If the passive system or passive system plus HVAC does not reduce VOC below allowable levels, will the city have the ability to require the passive sub-slab system be converted to an active system? For these reasons it is best to require an active sub-slab system.	air concentrations exceed the indoor air cleanup levels, then the system would need to be made active and operate continuously as an active system. In situations where it is expected that an active system will be necessary (for instance, where the subsurface contaminant levels are higher), developers may choose to install an active system in the first instance instead of a passive system with the ability to be made active. Where the subsurface levels of contamination are lower and there are not other preferential pathways for contamination to enter the building from the subsurface, EPA has found the passive systems can be very effective in keeping contamination from entering the overlying buildings. For instance, passive sub-slab ventilation systems were installed in the Wescoat Housing development when it was constructed in 2006 and confirmation indoor air sampling results have indicated that the indoor air concentrations are below cleanup levels. The frequency of the monitoring for each building will be determined during the Remedial Design phase, based upon the vapor intrusion control system installed in that particular building. The monitoring frequency for any building could change based on changes in occupancy patterns or of conditions in the building or the subsurface. As with the installation of the remedy and development of operations, maintenance and monitoring plans, EPA expects that the monitoring will be conducted by the Responsible Parties with EPA oversight.	
54	You have to talk about how long you're going to monitor, how you're going to monitor differently between different types of buildings; that is, retrofit of the existing building, or a new building which is started from scratch, which has, let's say, mitigation 3 versus mitigation 4A versus mitigation 4B. How long is the monitoring going to go on? Annually, every five years, for five years, for ten years?	The ROD Amendment specifies the remedy for existing residential and commercial buildings based on a response action tiering system and indoor air sampling results. For buildings that require monitoring, monitoring will continue until EPA determines that no further action is required (i.e., there is no longer the potential for vapor intrusion into the building). The monitoring frequency for each building will depend on the remedy utilized as well as the conditions in both the building and in the subsurface. The long-term monitoring plan will be incorporated in the building's operations, maintenance and monitoring plan and will be finalized in the Remedial Design phase. When conditions in a building change or the subsurface	Bob Moss, NAS Moffett Field RAB Member

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		conditions change such that the remedy may not be able to keep the subsurface contamination from entering the building at levels exceeding indoor air cleanup levels, samples will be required to confirm the adequacy of the remedy. This sampling will not occur on a scheduled basis but will be required when certain changes occur.	
55	A number of buildings are being built, particularly in Palo Alto, which are multi-use; they have commercial on the ground floor and residential above. So the monitoring should be identified for the worst case. And also instances where the owner only wants to monitor in the commercial space and ignore the residential space; that should be disallowed. It should be very clear to the developer, the building inspector, the City Council, whoever's involved in establishing and maintaining controls.	The vapor intrusion remedy for future multi-use buildings will have to meet the requirements for all of the building's uses. Thus, where a multi-use building includes residences, the indoor air concentrations must meet the residential indoor air cleanup levels. Building-specific operations, maintenance, and monitoring plans will be developed that will address monitoring requirements and the respective indoor air cleanup levels for both commercial and residential uses of a building.	Bob Moss NAS Moffett Field RAB Member
56	It should be unambiguous to anybody, both the occupants, the owner of the building, and the community, including the City government, who's supposed to be enforcing it, what has to be done, and how to know it has been done correctly.	Institutional controls are part of the vapor intrusion remedy in the MEW Area and Moffett Field Area. The details of the institutional controls will be set forth in the Institutional Controls Implementation Plan, or ICIP, developed as part of the Remedial Design phase. The ICIP will clearly identify the entity responsible for enforcement, and those parties who will have the ability to enforce the remedy will have sufficient understanding of the remedy requirements to adequately enforce the remedy requirements.	Bob Moss NAS Moffett Field RAB Member
57	A strong, long-term management plan has to be developed now, along with the proposed plan, because these mitigation strategies will only work, or we can only count on them, with that kind of support. And the two questionable provisions of this are first, the allowance of the construction of residential properties directly above concentrations of the plume; one expects this to happen particularly on NASA property, as part of the University Research Consortium; we support that development, but it's particularly important to have long-term management support of that. And also the use of heating, ventilation and air-conditioning systems as a mitigation, I think there's good evidence in the remedial investigation that that strategy can work, but it's going to take insurance in terms of long-term management.	EPA recognizes the importance of a long-term management plan to ensure that the vapor intrusion remedy is effective and health protective. Long-term management will be included in the building-specific operations, maintenance, and monitoring plan and in the Institutional Controls Implementation Plan, or ICIP. Because of the building-by-building nature of the remedy, the ICIP will likely be extensive, and it will also have to be robust. The ICIP must include several components: (1) notice provisions to new owners and occupants regarding the remedy; (2) notice requirements to EPA and the MEW Responsible Parties for changes in building configuration, ownership, or occupancy; (3) access for monitoring in accordance with each building's operations, maintenance, and monitoring Plan; (4) requirements for remedy changes where necessary in each building; and (5) enforcement of these requirements. Each of these elements will be incorporated into Site institutional controls. There may be one or more institutional control that incorporates each element.	Lenny Siegel CPEO

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		There may be areas within the Site that are currently zoned for commercial use, but may be rezoned for residential use in the future. The remedial measures selected in the ROD Amendment have been found to be effective in both commercial and residential contexts; thus, the remedy does not require that land use within the Site be limited to only commercial use. Where residential housing is constructed within the Vapor Intrusion Study Area, as is expected as part of the University Research Consortium, construction will have to include remedial components and the ongoing operation and monitoring of the remedy will meet the requirements of the remedy for residential use Use of a building's indoor air ventilation system as the remedy will require more extensive management than use of a sub-slab system both in the short-term for establishing the remedial requirements and in the long-term for ensuring remedial operation and maintenance by future occupants and owners. The building's operations, maintenance, and monitoring plan for buildings using its ventilation system as the engineered remedy will be robust, and the institutional controls will have to be more extensive.	
58	A major open issue is oversight and enforcement of any rules or monitoring. Some controls are relatively straight-forward and should be easy to enforce. Installation of vapor barriers and sub-slab systems can be controlled by making that a requirement for issuing building permits in designated areas such as MEW. Vapor barrier installation should be added to the building inspector checklist so that proper installation can be verified and checked off. This requires cooperation of the cities within which the toxic soil and groundwater contamination exists. They should be formally asked to modify building permit applications and approvals to include vapor barrier requirements, inspections needed, and final approval and check off.	The City of Mountain View already requires developers within the Vapor Intrusion Study Area to consult with EPA regarding appropriate mitigation measures, and EPA's recommendations to date have been required as a condition of development. Where the building permit undergoes formal CEQA review, EPA is provided with a formal opportunity to comment on the permit as well. With the ROD Amendment, EPA's recommendations are remedy requirements. The City has agreed to formalize its requirement that the mitigation measures be part of the building inspector checklist and a condition of development. [See Section 10.3 of the ROD Amendment regarding the City's development requirements as Institutional Controls.]	Bob Moss NAS Moffett Field RAB Member

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59	There is mention that EPA is going to work with NASA with the Environmental Issues Management Plan, but we've been informed that this is being rewritten. We have no idea what the rewrite is going to be.	NASA's 2005 Environmental Issues Management Plan ("EIMP") includes remedial measures to be incorporated into construction in the NASA Research Park area within the Moffett Field Area. The EIMP is a decision framework for management of residual contamination at the Site, and it includes measures to be implemented in future development to address the vapor intrusion pathway. Should the 2005 EIMP be rewritten, the remedy will require NASA to incorporate the same vapor intrusion control measures in any alternative planning document. As with NASA's property that does not fall under the EIMP, the remedy anticipates that the relevant planning documents include design requirements for new construction that require either a sub-slab ventilation system or an internal indoor air ventilation system that maintains positive pressure, risk management procedures for future subsurface activities, and procedures for long-term management of environmental conditions for all future construction overlying concentrations greater than 5 ppb of TCE in the shallow groundwater as well as ongoing monitoring of contaminants and the remedial measures.	Peter Strauss MEW and Moffett Field TAG Technical Advisor
60	EPA is allowing installation of sub-slab systems under existing buildings rather than rely mainly on HVAC systems. I agree that this is acceptable providing that after the sub-slab system is installed there must be testing and verification over time to demonstrate that the retrofitting adequately reduced indoor VOC. I suggest that any commercial building with an added sub-slab system have the indoor air tested at least bi-annually for at least 5 years to verify that the system reduces VOC to acceptable levels.	A long-term operations, maintenance monitoring plan will be developed for the engineered remedy during the Remedial Design phase. See EPA responses to Comments 53 and 54.	Bob Moss NAS Moffett Field RAB Member
61	The owner or occupant of the residence must give testing permission. The city must have a system in place to encourage homeowners to agree to VOC testing of the indoor air or too many homeowners will just opt out of testing for fear it will hurt their property values, and contamination may go undetected.	Indoor air testing is required in all commercial buildings in the Vapor Intrusion Study Area. Testing of indoor air is encouraged and continues to be offered for owners of residential properties. In order to access a property to conduct sampling, EPA initially seeks voluntary consent from both the property owner and the occupant. As a matter of policy, EPA will not require access into personal residences without consent of both the owner and the occupant. To date, EPA has conducted outreach to inform residential owners and occupants of the availability of testing. Continued public outreach will be a component of the Institutional Controls Implementation Plan (ICIP). Where renters desire to have their residences sampled, EPA will contact the property owner to facilitate agreement for access into the residence.	Bob Moss NAS Moffett Field RAB Member

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62	If automated testing and reporting of indoor VOC concentrations becomes available it should be required in commercial buildings and suggested in residential buildings.	Currently there is no available automated testing for low-level indoor air concentrations for volatile organic compounds (VOCs). The advantage of such testing would be ongoing assurance that vapor intrusion control systems are adequately lowering indoor air VOC levels. Should automated testing become available, EPA may consider its use for buildings where appropriate in the Vapor Intrusion Study Area.	Bob Moss NAS Moffett Field RAB Member
63	Any development that has both commercial and residential occupancy should be governed by residential VOC levels, testing frequency and number of samples. Testing and verification of indoor air quality should be based on residential occupancy for any mixed-use property.	The vapor intrusion remedy for future multi-use buildings will have to meet the requirements for all of the building's uses. Thus, where a multi-use building includes residences, the indoor air concentrations must meet the residential indoor air cleanup levels. Building-specific operations, maintenance, and monitoring plans will be developed that will address monitoring requirements and the respective indoor air cleanup levels for both commercial and residential uses of a building..	Bob Moss NAS Moffett Field RAB Member
64	It would help if EPA can prepare a model ordinance that describes required mitigations such as active sub-slab barriers plus vapor barriers, and on-going testing and monitoring required for existing commercial and residential buildings, mixed commercial and residential buildings, and new commercial, residential and mixed use construction. Cities such as Mountain View then would have a template that could be adopted as is or modified to address issue-specific situations.	The City has adopted policies for permitting and planning that will require the vapor intrusion remedy be implemented in new construction in the MEW Area. EPA did not select the use of a health and safety ordinance as an institutional control for the vapor intrusion remedy. See Section 10.3 of the ROD Amendment for a discussion of the City's involvement with Institutional Controls.	Bob Moss NAS Moffett Field RAB Member
65	**Wherever mitigation is required, it should be supported by a long-term management plan, or what New York State calls a Site Management Plan (SMP).** This SMP should be developed along with the remediation plan and then updated as information becomes available. The plan should designate how future inspections are to be carried out, with what frequency and with what tools, and it should lay out what training is necessary for the inspectors. The draft SMP should be made available for public comment. Some of the major components are outlined below. a. Notice. The SMP, including a summary for lay readers, and reports (sampling, inspection, contingency activities, etc.) generated under its requirements should be available to the public, **and each entrance to a non-residential building should contain a sign or plaque reporting that the property is subject to an environmental SMP, with instructions for accessing it.** Such signs should inform current and future occupants without unnecessarily frightening them. b. Monitoring of Physical Parameters. **Immediately after installation, the functionality of mitigation systems should be**	A Site-wide operations, monitoring, and maintenance plan will be developed, and each building with a vapor intrusion remedy in place will have its own building-specific operations, monitoring and maintenance plan. In addition, the vapor intrusion remedy will require an institutional controls implementation plan, or ICIP, which will provide for the long-term management of the remedy. The ICIP will be developed as a part of remedial design for the remedy and will include many of the elements outlined in the comment. Although the ICIP will be finalized as part of remedial design, certain elements of it have been developed as part of this ROD Amendment. (a) Notice will be required to inform building owners and occupants within the Vapor Intrusion Study Area about the remedy, remedial requirements, and where to obtain more information about the remedy. Although this notice may not require posting signs, similar methods that are effective at providing information to building occupants will be considered. It is important that information be informative	Lenny Siegel CPEO

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confirmed. Vapor barriers should be smoke tested for leaks and sealed wherever a penetration is found. Depressurization systems should be pressure-tested at distal locations and modified if the pressure differential does not meet design objectives. **Pressure testing should continue periodically for as long as there is contamination on site and the building is occupied.** Depending upon site conditions, that could be quarterly or annually. c. Indoor air sampling. **Indoor air sampling should be conducted immediately after installation.** Occupants of buildings also need direct confirmation that the air is safe. Although this practice may be considered to be redundant with pressure testing (assuming that sub-structure depressurization is the remedy), it is useful to conduct indoor air sampling annually. This is particularly true for buildings that are going to be used as classrooms, residential housing and dormitories, and childcare facilities, and for building that are going to rely on other remedies. **Indoor air monitoring is essential in buildings where the selected remedy is an HVAC system or passive sub-slab ventilation**. Ideally, if there is no centralized HVAC system, each distinct airspace should be sampled. Vapors under an entire slab can become concentrated inside one room if there is a preferential pathway into that room, and that will not be detected if testing is done in another room with no air connection to the first. d. Operations and Maintenance. **There should be an operation and maintenance plan that assigns responsibility for keeping operating equipment, such as fans, in working order.** This may include automatic alarms for reporting system failure. If HVAC systems are considered part of the mitigation system, there should be an enforceable schedule to ensure that ventilation is effective whenever the building is in use. e. Inspections. **There should be a tiered, regular approach to inspecting engineering controls**, including passive components of the mitigation system, such as the visible elements of vapor barriers and the integrity of institutional controls (below). Inspections should follow a checklist, and be performed on at least a quarterly basis. The frequency of inspections and monitoring may be adjusted to account for site-specific information. f. Institutional Controls. **There should be clear, enforceable prohibitions on activities that would undermine remediation and mitigation systems** (such as drilling holes in the slab), as well as changes in use of the property that might increase the likelihood or severity of exposures.	about both the remedy and its protectiveness. (b) Following installation, mechanical performance of the systems will also be verified using appropriate measures such as pressure differential testing. Smoke testing, or more quantitative methods such as tracer testing, may also be utilized to test for leaks, Pressure differential testing will be performed along with routine inspections and periodic indoor air sampling to monitor the performance of the system. The frequency of these activities will be determined on a building-specific basis. (c) Indoor air confirmation sampling will be required following installation of new remedial equipment or adaptation of already existing equipment. Indoor air sampling will be based on previous sampling and walkthroughs/inspections of the building spaces. Indoor air sampling is the preferred form of initial and confirmation sampling regardless of whether the remedy is use of the building's indoor air ventilation system or installation of a sub-slab ventilation system. Indoor air monitoring frequency will be determined based upon the system in place and the building conditions, including whether the users of the building are sensitive populations. Additionally, the type of sampling will be impacted by the type of system being used for the remedy. (d) Each building will have an operations, maintenance, and monitoring plan that will address the operation and maintenance of the remedial system in place, the schedule for work on the system, and the entity responsible for the work. As has been the case with the groundwater remedy and the vapor intrusion remedy to date, EPA expects that the Responsible Parties will be responsible for ensuring that the vapor intrusion remedy is operating as required. (e) All parts of the remedy will be inspected on a regular basis. The frequency of inspections will depend on various factors, including the type of system being used. The frequency of inspections will be identified in the operations, maintenance, and monitoring plan. (f) The institutional controls will include notification provisions to inform building owners and operators both about what information needs to be provided to EPA and the MEW Responsible Parties, including changes in building configuration, and about what activities would interfere with the remedy.	

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	g. Training. **All personnel charged with inspection and operation and maintenance, as well as those charged with reviewing their reports, should be trained in their tasks so they may properly determine when and to whom to report problems.** Training should explain the purpose of each activity, as well as how to conduct it. h. Contingency Planning. **Each SMP should outline actions to be taken if mitigation systems or other engineering controls fail, if indoor air concentrations exceed standards, or if groundwater contamination increases, rather than decreases.** Other contingencies include fires, floods, earthquakes and other natural disasters. A contingency plan should address the most probable events that would trigger a change of approach, and it should be developed and updated by a group of interdisciplinary experts in the fields of toxicology, geology, hydrology, chemistry and the social sciences. i. Continuous management. **SMPs, should, to the extent possible, use continuous monitoring tools**. Continuous management tools are emerging, based upon the widespread and inexpensive availability of Internet connections. Continuous management systems can not only be designed to demonstrate that active systems are operating, but they can report pressure data and even vapor concentration results—if the proper sensors are available. Provision should be made to incorporate new sampling technologies as they emerge. j. Annual Reports. **Annual reports should be prepared for each building or groups of buildings**. Each report should summarize findings from the monitoring and inspection reports, confirm the continuing effectiveness of engineering and institutional controls, and determine whether remedial objectives or performance standards are being met. If not, it should lay out a plan for achieving those standards and for confirming that achievement. k. Certification. An environmental professional or licensed engineer should be responsible for preparing the annual report, and **he or she should certify not only the annual report but also the monitoring and inspection reports for the year covered by the report.**	(g) All persons involved with inspections, operations, maintenance, and monitoring of the remedy will be expected to be trained in the activities they perform with regard to the remedy. (h) The building-specific operations, maintenance, and monitoring plans will be required to include contingency plans. (i) See EPA response to Comment 62. (j) The frequency of reporting will be determined on a building-specific basis and will be identified in the Site-wide operations, maintenance, and monitoring plan. (k) Agreed.	
66	**CPEO supports the suggestion that the City of Mountain View promulgate a City Health and Safety Ordinance** (HSO). We believe such an ordinance should do the following: 1) regulate the operation and maintenance of the HVAC systems and other remediation methods in commercial buildings that fall within the Vapor Intrusion Study Area; 2) provide buyers or tenants of residences within the Vapor Intrusion Study Area within the city	As described in the ROD Amendment, the institutional controls (ICs) for the vapor intrusion remedy do not currently include a municipal ordinance or deed restrictions. However, the ICs do require formalizing City procedures to address new construction as well as recorded agreements to ensure notice and access for sampling, remedy implementation,	Lenny Siegel CPEO

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	with an opportunity to have the indoor air tested and mitigated, if necessary, at the expense of the Responsible Parties, and; 3) obligate sellers or lessors of residential property to inform potential purchasers and tenants of the opportunity to have their residence tested, if it has not been tested within the last 24 months.	and monitoring. With regard to notification of residents, EPA has been and will continue to offer sampling of indoor air and provide information to residents regarding sampling results. As discussed in EPA's response to Comment 61, to date EPA has conducted outreach to inform residential owners and occupants of the availability of air testing and 34 residences have been tested. Continued public outreach will be a component of the Institutional Controls Implementation Plan (ICIP). Where renters desire to have their residences sampled, EPA will contact the property owner to facilitate agreement for access into the residence.	
67	The responsible parties should bear all the costs of implementing the ordinance, and we suggest that the City enter into an agreement with one or more qualified third parties to implement the ordinance as well as monitor any associated institutional controls	As has been the case with this Site to date, EPA has looked to the PRPs to pay for the remedial actions taken at the Site. The PRPs have paid for the soil remedy and are currently paying for the groundwater remedy. The PRPs have also paid for some of the vapor intrusion interim response actions, such as upgrading and replacing HVACs so that they would be able to achieve the air exchange rate necessary to keep concentrations of TCE in indoor air below the action level. EPA expects to continue to look to the PRPs to pay for the remedial actions associated with the vapor intrusion remedy, including the cost for the institutional controls elements of the remedy. A municipal ordinance is no longer the selected IC.	Lenny Siegel CPEO
68	To address the contingency that Mountain View does not agree to adopt a Health and Safety Ordinance, EPA should articulate in its Proposed Plan an alternative approach to ensuring that performance goals are being met. It should consider proprietary controls with third party management as well as oversight by state agencies—at the expense of the Responsible Parties.	As discussed in the Institutional Controls section of the ROD Amendment (Section 10.3), the City of Mountain View has formalized/will be formalizing its planning and permitting procedures to ensure that remedy requirements are incorporated into development permits within the Vapor Intrusion Study Area. For ongoing assurances providing notice of the remedy; access to sample, operate and maintain remedial equipment, and monitoring; and notice of changes in property ownership or building configuration that would impact the remedy, EPA is relying on enforceable agreements that run with the land to ensure access and, where relevant, appropriate operation of the remedy by the property owner.	Lenny Siegel CPEO
69	As recommended above, owners of residential structures falling within the bright line of the Vapor Intrusion Study Area should have an opportunity to have their homes tested for vapor intrusion and an obligation when selling or leasing the residence to disclose either the results of the test, or the opportunity to have the home tested. Because California requires disclosure of proximity to	Indoor air testing of existing residential buildings within the Vapor Intrusion Study Area is encouraged and continues to be offered to all residents. To be able to access a property to conduct air sampling, EPA initially seeks voluntary consent from both the property owner and the occupant. To date, EPA has conducted outreach to inform residential	Lenny Siegel CPEO

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	Superfund Sites, this should be no extra burden on the homeowner, and it will provide them with the opportunity to have their homes tested. If a residence does not have a vapor intrusion problem (through indoor air tests within the past 24 months, and that groundwater remediation is continuing to capture the western plume), property owners should be able to state, "To the best of our knowledge, we do not have a vapor intrusion concern." If a mitigation system is in place, then the owner must disclose this.	owners and occupants of the availability of testing. Continued public outreach will be a component of the Institutional Controls Implementation Plan (ICIP). Where renters desire to have their residences sampled, EPA will contact the property owner to facilitate agreement for access into the residence. EPA is working with the City of Mountain View to develop requirements when residential housing is developed, rebuilt, or significant additions are planned. EPA is not anticipating linking compulsory testing to property sales.	
70	**There should be an enforceable mechanism for regulating mitigation systems on federal property, similar to the local ordinance**. In particular, occupants of residential units on federal property should have the same opportunity to request testing and additional mitigation as residents in Mountain View.	The current residential units within the Vapor Intrusion Study Area in the Moffett Field Area were constructed with a passive sub-slab ventilation system and vapor barrier. Confirmation indoor air sampling was conducted in a representative unit of each building and the results were below the indoor air cleanup levels. Any future residential buildings within the Vapor Intrusion Study Area will be required to implement the same type of sub-slab ventilation system.	Lenny Siegel CPEO
71	Clarify how institutional controls will be monitored and maintained within the Vapor Intrusion Study Area. I understand EPA, in response to community comments, has elected to use recorded agreements rather than a municipal ordinance as the institutional control mechanism. No information explaining how recorded agreements are prepared or implemented has been provided.	See EPA response to Comment 68. These institutional controls will also be layered with other mechanisms, such as informational mechanisms. The various institutional controls used will be identified and monitored through the institutional controls implementation plan (ICIP).	Water Board
72	Clarify how EPA will insure that the HVAC systems and other active engineered remedies will be operated, maintained, and monitored once implemented. The remedial action is being completed by the MEW Companies, none of which own or occupy the buildings within the Vapor Intrusion Study Area. It is not clear in the Proposed Plan how EPA intends to monitor and document that these remedies are operating as intended, either by the MEW Companies or the building owners/occupants.	The vapor intrusion remedy will require an institutional controls implementation plan, or an ICIP, which will provide for the long-term management of the remedy. The ICIP will be developed as a part of the Remedial Design for the remedy. Although the ICIP will be finalized as part of the Remedial Design, certain elements of it have been developed as part of the ROD Amendment. The ICIP will identify not only what the remedy is for each building, but also how it is monitored and the reporting requirements. Because the MEW Companies do not own any of the buildings, the remedy requirements will need to be established in other enforceable forms. Requirements for future construction will be formally incorporated into the City's planning and permitting processes. Requirements for current buildings will be enforced through agreements that are binding on future owners and recorded to ensure notice and enforceability. These institutional controls will also be layered with other mechanisms, such as informational mechanisms. The various institutional controls used will be	Water Board

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		identified and monitored through the institutional controls implementation plan (ICIP).	
73	The City believes that there are viable and effective non-legislative alternatives for a municipal component of the vapor intrusion remedy's Institutional Control. These include the City's permit application and approval process, development/use conditions of approval, property databases, and California Environmental Quality Act review of projects and refinements to the City's CEQA Guidelines. The City recommends that the City's administrative process for development and building permits serve as the municipal component of the vapor intrusion remedy's Institutional Control. These administrative procedures, described in draft form in Attachment 3, have been adhered to in practice by the City for many years, effectively addressing environmental conditions related to new and re-development in the MEW Study Area. The City has the authority, under its police power, to require property owners and tenants to comply with these procedures. These administrative procedures, which the City's Community Development Director formally will issue, capture building construction or improvement that involve or implicate elements of vapor pathway mitigation (e.g., installation of sub-slab systems and correction of slab incursions or defects).These administrative procedures also describe "future improvements", which the City believes could enhance and improve the development and building permit process as it applies to the MEW Study Area. An "Integrated Permit System" could integrate and coordinate the City's three database systems (planning, building and code enforcement) to ensure that all properties and parcels within the MEW Study Area are captured by this Institutional Control. Although the City does not have the resources to purchase and implement this type of integrated system, if the EPA determines such a system is critical to the MEW Study Area vapor intrusion remedy, then the City would request that EPA and/or the Responsible Parties reimburse it for the costs of updating and improving the software necessary to integrate these database systems	EPA appreciates the work the City has done to date to implement vapor intrusion mitigation and efforts made during the remedy development process to formalize that involvement. The process used to date to require appropriate vapor intrusion mitigation measures, though informal, has worked effectively. Specifically, prior to approval of permits for new development within the Vapor Intrusion Study Area, vapor intrusion mitigation has been required in the development plans. In order to serve as an institutional control, these procedures will be formalized by the Cit through the issuance of an administrative order by the Community Development Director. The City has confirmed that the issuance of the policy administratively to formalize inclusion of remedy requirements in the permitting process and into development and use conditions of approval will not require passage of a separate ordinance as originally envisioned by EPA These procedures will be layered with others to serve as the remedy's institutional controls (ICs). EPA is interested in mechanisms that will better ensure the implementation of ICs. The Integrated Permit System could be one of the tools utilized to ensure that all departments in the City are coordinated with regard to implementation of the vapor intrusion remedy. Systems such as these will be part of the discussion of layered institutional controls in development of the ICIP.	City of Mountain View
74	The Proposed Plan currently identifies a "municipal ordinance" as EPA's preferred Institutional Control for all remedial alternatives (except for the "No Action" alternative). In light of the above recommendation about the most effective and practical Institutional Control, the City questions whether an ordinance would be a viable part of any long-term remedy. An ordinance as a mechanism to enforce remedial alternatives is not feasible or	The City has raised these concerns through the remedy development process, and EPA has considered them when selecting the ICs for the vapor intrusion remedy. Because these issues were addressed through the changes to the remedy's ICs, this response will not necessarily address each of the City's concerns raised in this comment. With regard to the costs of an ordinance, EPA has asked the	City of Mountain View

effective for several reasons, including the following:

a. Due to equal protections constraints, any ordinance would need to apply to areas and properties in addition to MEW Study Area buildings and residences; thus, an ordinance would have an overly and disproportionately broad sweep to address a small number of properties;

b. The City does not have funds, personnel, resources or expertise to enforce and implement on-going sampling, monitoring and correction. Furthermore, even if it was intended that such on-going City involvement would be fully cost-recovered through payment from the MEW Site Responsible Parties, it would represent a new type of regulatory activity for the City with indirect resource impacts and administrative complexities. Thus, the City questions whether such a program would be in the best operational and financial interests of all parties involved, especially when contamination site monitoring has occurred for decades directly between RPs, private environmental contractors, and lead regulatory agencies without local agency involvement.

c. An ordinance is the result of political action and, by definition, could be temporary and subject to change; legislated solutions are less durable and effective (due to the "political" quality of council decisions). The Plan's statement on page 15 - that "[o]nce adopted ... use of a municipal ordinance can be an effective long-term method to ensure remedy implementation" -- is not necessarily true.

Other potential downsides to an ordinance for which here has been little to no consideration or analysis in the Proposed Plan include the following:

a. The process by which an ordinance must be prepared, vetted and enacted is long, unwieldy and uncertain. Extensive public input is required, and study sessions and public hearings are time-consuming but necessary. The outcome of this process is not predictable.

b. Costs of preparation, public participation and hearing, and adoption and implementation of an ordinance are uncertain. On page 10, the Plan states that "the estimated cost to prepare and adopt an ordinance is approximately $25,000, and the annual cost to monitor and enforce the performance of the ordinance is $23,000, resulting in a 30-year present worth cost of $310,000." Although only preliminarily reviewed by the City, these estimates were made before more fully reviewing the concept of an ordinance with the EPA, the Responsible Parties, and commercial and residential property owners, and are likely to be significant

City to provide estimates of expected costs should the remedy include implementation and enforcement by the City; EPA will still need that information if it becomes necessary. As with the operation of the engineered remedy, EPA will look to the Responsible Parties to fund the development, implementation, and enforcement of institutional controls.

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	underestimates. Recorded covenants and access/mitigation agreements between Responsible Parties and property owners serve the same purpose and accomplish the same objectives as an ordinance or zoning. Such recorded instruments provide notice and information to current and prospective property owners and users. And the City's permit process, as explained above, combined with mitigation agreements tied to building-specific Operations and Maintenance Plans, will help ensure that new buildings, or buildings that undergo substantial modification, are designed, constructed, and/or improved to mitigate potential vapor intrusion. Recorded agreements have been negotiated and implemented successfully at the MEW site, as the Final Feasibility Study reports on page 74. In the event EPA and other parties nonetheless pursue an ordinance as part of the remedy's Institutional Control, there are many details to be developed and discussed regarding the feasibility of a municipal ordinance as an IC. EPA and the MEW parties must acknowledge and account for the costs of development, implementation, and on-going monitoring and enforcement of any such ordinance, as the City should be and is entitled to recover fully such costs. The City is not a responsible party (or liable person under CERCLA), and public monies in this case should not be expended for environmental clean-up tasks that are the responsibility of private parties who caused or contributed to the contamination at issue. Although the component of the remedy that suggests a municipal ordinance as an Institutional Control has been the subject of on-going discussion between City staff and EPA, this would require future study sessions and public meetings with the City Council. Therefore, EPA should anticipate extensive future public input during consideration of a municipal ordinance in its remedy selection decision, which EPA should respond to in the Responsiveness Summary and document in the Record of Decision Amendment.		
75	**Residential Areas.** For reasons discussed above, an ordinance would not be the most effective and efficient method to ensure implementation and management of a vapor intrusion remedy of existing or new residences in the Vapor Intrusion Study Area. The Responsible Parties should be required to install vapor intrusion control systems in existing residences that have been tested and warrant a system or in new residences as warranted. The City's permit process for Residential development is described in Attachment 3.	As recommended in the comment, the remedy does require the installation of a vapor intrusion control system in any residence where it is found that a system is warranted; this component of the remedy will not necessarily require the involvement of the City. However, with regard to new residences where the remedy requires inclusion of sub-slab systems in the building plans, as with commercial buildings, prior to approval of permits for the new development within the Vapor Intrusion Study Area, vapor intrusion mitigation should be required by the City in its permit process. In order	City of Mountain View

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		to serve as an institutional control, these procedures should be formalized by the City through the issuance of an administrative order by the Community Development Director. The City has confirmed that the issuance of the policy administratively to formalize inclusion of remedy requirements in the permitting process and into development and use conditions of approval will not require passage of a separate ordinance as originally envisioned by EPA. These procedures will be layered with others to serve as the remedy's institutional controls.	
76	The Record of Decision Amendment should recognize that any solution -- including the Institutional Control component of the remedy -- must be designed and implemented on a property-by-property/building-by-building basis. There are too many variations in building types and conditions (as the Proposed Plan acknowledges on page 9), as well as varying chemical concentrations in groundwater under different properties, for a standard or homogeneous solution. This in and of itself undermines the effectiveness of a general, overarching mechanism such as an ordinance or overlay zone in commercial and/or residential areas.	The vapor intrusion remedy has the same remedial action objectives throughout the Vapor Intrusion Study Area, although the remedy will be applied on a building-by-building basis based on the physical and environmental conditions specific to that that building or property. Each building will be individually evaluated and will have a specifically tailored operation and maintenance plan. Although these different plans could be enforced through a single municipal ordinance, EPA has selected institutional controls that do not require a single ordinance to address the entire remedy. Instead, City procedures would provide the institutional controls for future construction in the Vapor Intrusion Study Area and individual recorded agreements would provide the controls for current buildings.	City of Mountain View
77	The City agrees that sub-slab and sub membrane depressurization systems would be the most effective and reliable vapor mitigation alternatives. The City believes that Commercial Property Owners' ("MCO") proposed alternative for vapor intrusion plan has merit and could be effective, both in the immediate future and over the long term. Voluntary, negotiated, recorded agreements between Responsible Parties and property owners are viable, permanent and protective. In cases where a property owner refuses to grant access, the City is willing to assist the RPs and EPA however feasible on an informal basis to encourage owners to cooperate.	The institutional controls (ICs) for the vapor intrusion remedy do not currently contemplate a municipal ordinance or deed restrictions. However, the ICs do require formalizing City procedures to address new construction as well as recorded agreements to ensure notice and access for sampling, remedy implementation, and monitoring. EPA may require deed restrictions if the recorded agreements are not implemented as required.	City of Mountain View
78	Enacting a city ordinance specifically for the MEW area, we object to an ordinance for the following reasons: a) Property dimunition. b) There are at least 5 other areas in Mountain View that have various contaminations that have equivalent impacts as the MEW area but are under no requirements. c) There are at least 10 other areas in Silicon Valley that have various contaminations that have equivalent impacts as the MEW area but are under no requirements. d) Extra time and cost burdens. e) If the EPA has a concern of not being notified of construction on any particular	As explained in the ROD Amendment, Section 9, EPA will not be relying on a municipal ordinance for enforcement of the remedial requirements. Instead, through an administrative order issued by the City's Community Development Director, those procedures informally followed by the City with regard to the vapor intrusion remedy will be formally incorporated into the City's planning and permitting processes. The process used to date to require appropriate mitigation installation, though informal, has worked	Mission West Properties LP Commercial Property Owner

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	building, the cities all have the existing capability of flagging properties for notifications. They do this all the time in the instances of Flood Zones and Geohazard zones.	effectively. Specifically, prior to approval of permits for new development within the Vapor Intrusion Study Area, vapor intrusion mitigation has been required in the development plans. The City has confirmed that including remedy requirements in the permitting process and into development and use conditions of approval will not require passage of a separate ordinance as was originally envisioned by EPA in its Proposed Plan. These procedures will be layered with others to serve as the remedy's ICs. EPA is interested in other mechanisms that will better ensure the implementation of ICs as well. The Integrated Permit System could be one of the tools utilized to ensure that all departments in the City are coordinated with regard to implementation of the vapor intrusion remedy. Additionally, flagging of properties for notice purposes to ensure that EPA is notified when certain construction is occurring in the Vapor Intrusion Study Area is being explored. Systems such as these will be part of the discussion of layered institutional controls in development of the ICIP.	
79	Deed restrictions: a) Deed restrictions should only be applied if the Responsible Parties are held liable for all property dimunition. b) Mission West's property in this area has gone vacant for a number of years due to the stigma of the MEW area.	As described in the ROD Amendment, the ICs for the vapor intrusion remedy generally do not currently contemplate deed restrictions. Instead, the ICs require recorded agreements, which EPA has been informed by property owners in the area will not have the same barriers to implementation as deed restrictions. However, EPA may require deed restrictions if the recorded agreements are not implemented as required. As the comment highlights, there is concern regarding impacts of stigma from the MEW Superfund Site. The market is affected by a wide range of factors in addition to contamination, and we cannot predict the market. Full implementation of the vapor intrusion remedy should be able provide assurance that the contamination has been characterized and that exposure pathways are being addressed. Importantly, CERCLA is a statute that provides for cleanup of contaminated sites.	Mission West Properties LP Commercial Property Owner
80	Owners will provide reasonable access to the RPs provided that the RPs work does not interfere with normal commercial occupancy and use of the building.	Access for sampling, building evaluation, remedy installation, confirmation sampling, and ongoing monitoring has been done, and will continue to be done, in a manner which minimizes y interference with occupants and business operations.	Steve Gazzera Commercial Property Owner
81	Owners do not want an ordinance or deed restriction on their properties as it will cause unnecessary stigma that can have a	As described in the ROD Amendment, the institutional controls (ICs) for the vapor intrusion remedy do not currently	Steve Gazzera

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	significant impact on the property value and the ability to lease the property.	contemplate a municipal ordinance or deed restrictions. However, the ICs do require formalizing City procedures to address new construction as well as recorded agreements to ensure notice and access for sampling, remedy implementation, and monitoring; and EPA may require deed restrictions if the recorded agreements are not implemented as required. Although there is concern regarding impacts of stigma from the MEW Superfund Site, many factors influence property values in addition to contamination. EPA is responsible for addressing contamination and removing potential threats to human health and the environment. Full implementation of the vapor intrusion remedy should be able provide assurance that the contamination has been characterized and that exposure pathways are being addressed. EPA can provide property owners with information explaining what was found during sampling and what is being done to address the contamination.	Commercial Property Owner
82	The city's permit process works well and an ordinance is not needed.	To date, the City's permit process has been very helpful in communicating the appropriate mitigation measures necessary to prevent vapor intrusion in future construction in the Vapor Intrusion Study Area. The City's permit process, though informal, has worked effectively. In order to serve as the institutional controls for the vapor intrusion remedy, this process must be formalized by the City. EPA has requested that the City confirm that the formal issuance of the procedures by the City's Community Development Officer requiring that they be put in place. The City has confirmed that the issuance of the policy administratively to formalize inclusion of remedy requirements in the permitting process and into development and use conditions of approval will not require passage of a separate ordinance as originally envisioned by EPA. These procedures will be layered with others to serve as the remedy's institutional controls.	Steve Gazzera Commercial Property Owner
83	**MCO Proposes a More Workable, Effective Plan.** • EPA's Proposed Plan depends on the City of Mountain View adopting a health and safety municipal ordinance or restrictive covenants that require implementation of vapor intrusion mitigation measures by unspecified parties (possibly owners or tenants who did not cause the contamination). Such a regimen is impractical and problematic for the reasons described in these comments. • MCO's alternative, in contrast, relies on: o **Enforceability.** An amendment to the ROD, a CERCLA consent decree, and administrative orders issued to	The ROD Amendment is the decision document that sets forth what actions are necessary to ensure protectiveness at the Site. Consent decrees and unilateral administrative orders are two of the enforcement instruments that can be used to ensure implementation of the remedy. There are currently a consent decree and a unilateral administrative order in place that require the MEW Responsible Parties implement the soil and groundwater remedy. EPA expects that, once selected, similar enforcement instruments will be a part of the vapor intrusion remedy, and if necessary EPA may require deed restrictions if the recorded agreements	Mountain View Commercial Owners (MCO)

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RPs, to assure enforceability and permanence of vapor remedies; o **Access.** Voluntary agreements between the Responsible Parties and commercial property owners that provide needed access for vapor remedies and that are legally binding on successors and assigns, to assure permanence of protective measures; o **Baseline Testing.** A baseline survey, including after-hours testing, in each building to identify specific vapor mitigation measures needed to protect the health of occupants in that building; o **Engineered Controls.** Selection and implementation of EPA-approved vapor remedies for each building, with a strong preference for engineered sub-slab solutions in new and existing buildings (where they are needed); o **Written O&M Plan.** Preparation of an operation & management (O&M) plan that documents conditions in the building and building-specific vapor mitigation measures. Such a plan can be used by EPA and RPs to understand how vapors will be prevented from entering buildings and to make needed adjustments over time; o **Annual Inspection.** An annual inspection of each building based on a detailed checklist, together with air quality testing, to verify that vapor remedies remain effective; o **Annual Certification.** An annual certification that buildings remain suitable for long-term occupancy by regular workers and after-hours workers;[13][2] o **City Permit System.** Documentation of the City's existing municipal building permit procedures that require EPA approval when construction permits are issued in the MEW Study Area; o **Monitoring of Change.** Regular monitoring of changes in land use and ownership. • MCO's alternative is practical and fair. It provides specific tools to identify environmental conditions and to address the potential for vapor intrusion where necessary and appropriate. It also better addresses real world management of changing conditions in buildings. It does so without unnecessarily	are not implemented as required. EPA plans to use recorded agreements, binding on successors and assigns, as part of the institutional controls for the vapor intrusion remedy. Initial indoor air sampling either has been or will be conducted in each commercial building and in all residences where requested within the Vapor Intrusion Study Area. This initial sampling will guide determination of the appropriate remedy for each building. As part of the design of the remedy for each building, an operations, maintenance, and monitoring plan will be developed explaining the remedy and the operation, maintenance, and monitoring necessary for it. The frequency of inspections, sampling and reporting has not been established yet. The frequencies for these activities will be provided in a Site-wide operations, maintenance, and monitoring plan. The vapor intrusion remedy selected in the ROD Amendment requires the installation of sub-slab systems in new construction as well as in existing buildings except where the building owner and the MEW Companies can show that the building's ventilation system both can and will be operated at appropriate levels and at the times that the building is occupied. In order to serve as the institutional controls for the vapor intrusion remedy, the City's permit process requiring vapor intrusion mitigation measures to be incorporated into building design must be formalized into planning and permitting processes by the City. The various changes in building occupancy and configuration that could potentially impact the vapor intrusion remedy must be monitored. The remedy will rely on a layered approach including notice provisions that will require informing of EPA and the Responsible Parties when these changes occur as well as the use of a tracking service that will provide such information to EPA and the MEW Companies when such changes are registered in a public repository.	

[13] [(2)] EPA has already found that there are no short-term or acute health risks associated with vapor intrusion at the MEW site. Thus the annual certification of suitability for occupancy should be with respect to *long-term* occupancy.

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	stigmatizing MEW properties or devaluing them, and without placing undue liability on innocent landowners, tenants, and the City of Mountain View.		
84	**The Plan Does Not Call for Written O&M Plans.** Many state agencies that have studied vapor intrusion issues require the companies responsible for contamination to prepare written, building-specific O&M plans.[144] It is important to document for all stakeholders -- EPA, the City, owners, tenants and occupants -- what the building conditions are and how vapors will be controlled. This documentation is critical for managing ongoing implementation of vapor mitigation measures. The requirement for an O&M Plan is an important element of the remedy that should not be "left to the design phase."	Operations, maintenance, and monitoring of a cleanup remedy are usually determined in the design phase of a remedy. This vapor intrusion remedy requires building-specific operations, maintenance, and monitoring plans For buildings within the Vapor Intrusion Study Area requiring remedial action. Although it is helpful to have the plans for each building developed as early in the process as possible, it is important to keep in mind that the vapor intrusion remedy must also include a plan to incorporate operational changes to the engineered remedy based on building occupancy or configuration.	Mountain View Commercial Owners (MCO)
85	**The Plan Does Not Call for Annual Inspections.** One of the most important practical measures that can be taken to assure that vapors continue to be properly managed is to have each building inspected annually. **Tab 2** has examples of detailed inspection checklists that can be used by RPs to physically inspect buildings so that any exposure pathways can be sealed or repaired, and so that any changes to the structure can be evaluated to make sure that vapor mitigation measure remain protective, or that new controls are installed, as needed. For the remedy to be effective over time, permanent, and implementable, annual inspections are a critical element that should be identified in the ROD, not "left to the design phase."	As part of building sampling, EPA uses checklists with questions developed to help characterize building use and to identify potential pathways for subsurface vapors to enter the building. EPA appreciates the checklist provided by the MCO and will incorporate the relevant survey questions that are not already part of the checklist. The vapor intrusion remedy is, by its nature, building-specific. Following initial sampling and selection and implementation of the appropriate engineered remedy, a building-specific long-term operations, maintenance and monitoring plan will be developed. EPA will require confirmation sampling and monitoring on a periodic basis to ensure that the remedy is functioning effectively. The monitoring frequency will depend in part on the building conditions and engineered remedy.	Mountain View Commercial Owners (MCO)
86	**The Plan Does Not Call for Annual Certification of Suitability for Long-Term Occupancy.** A number of commercial owners have stated that it would be useful if the RPs would inspect and test their buildings once a year and make a simple certification that the building remains suitable for long-term occupancy in terms of vapor intrusion. Requiring this certification provides a real-world check that the companies responsible for controlling vapors have taken the needed steps to ensure ongoing compliance. It also provides important reassurance to building occupants. It addresses EPA's core concern, which is to have procedures that will verify that vapor mitigation measures remain	See EPA response to Comment 85. As part of the remedy, EPA will require that the Responsible Parties report on how the vapor intrusion remedy is functioning throughout the Site on a regular basis. The frequency of monitoring and reporting will be identified in each building's operations, maintenance, and monitoring plan, and the overall operations and effectiveness of the Site remedy will be evaluated in the Five-Year Review.	Mountain View Commercial Owners (MCO)

14 (4) See, e.g., California Department of Toxic Substances Control, Vapor Intrusion Mitigation Advisory (April 2009).

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	effective over time as environmental conditions and building uses change.		
87	**Type and Frequency of Monitoring Are Vague.** The Proposed Plan does not adequately address how RPs will verify that vapor mitigation measures remain effective over time. Actual monitoring of indoor air is preferred on a periodic basis to verify conditions.	See EPA response to Comment 85.	Mountain View Commercial Owners (MCO)
88	**Institutional Controls Are Not Spelled Out.** EPA's Proposed Plan states: *"The Preferred IC to support each of these remedial alternatives is a municipal ordinance that requires implementation of the remedy within the Vapor Intrusion Study area.*[15]*"*[5] It is unclear what would be in such a local ordinance. The public cannot meaningfully comment on such a vague plan. Nor has EPA explained what kind of ordinance it has in mind when questioned in workshops and meetings. A written O&M plan, annual inspections, legally enforceable access agreements, and annual certification of conditions are far more effective than an ordinance or land use covenant to assure that vapor mitigation continues to be managed practically on an ongoing basis.	As explained in the ROD Amendment, the institutional controls selected do not require the adoption of a municipal ordinance as part of the remedy. Institutional controls for the remedy are intended to ensure the operation of the remedy and ensure that notice is provided both to the property owners and occupants regarding the remedy requirements as well as to EPA and the MEW Companies to provide alerts when there are changes in building configuration, operator, or owner. These tasks can be accomplished through a variety of vehicles, including a municipal ordinance. Instead of a single ordinance to address vapor intrusion concerns within the MEW Area, EPA continues to work with the City to formalize planning and permitting procedures to require vapor intrusion mitigation measures be included in building design. To date, the City's permit process has been very helpful in communicating the appropriate mitigation measures necessary to prevent vapor intrusion in future construction in the Vapor Intrusion Study Area. The City's permit process, though informal, has worked effectively. In order to serve as the institutional controls for the vapor intrusion remedy, this process must be formalized by the City. The City has confirmed that the issuance of the policy administratively to formalize inclusion of remedy requirements in the permitting process and into development and use conditions of approval will not require passage of a separate ordinance. These procedures will be layered with others to serve as the remedy's institutional controls. The vapor intrusion remedy includes written operation, maintenance, and monitoring plans, regular inspections, and access agreements. However, these are not institutional controls and may not be part of the role played by the City. As with the groundwater remedy, EPA will be looking to the MEW Companies to develop the operation, maintenance, and monitoring plans, conduct inspections, and obtain	Mountain View Commercial Owners (MCO)

15 (5) July 2009 Proposed Plan at p. 25.

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	access to buildings at the Site as necessary.	
89 **A City Ordinance Is Not Needed: Voluntary Cooperation Between the Responsible Parties and Commercial Owners Can Achieve EPA's Goals More Effectively.** • EPA should use the same approach taken with respect to groundwater cleanups: RPs should negotiate terms of access and manage installation and maintenance of vapor remedies, just as they do for groundwater. A special ordinance is not needed.[16][6] • These conventional measures have worked well for groundwater cleanups and are well understood by owners, tenants, occupants and lenders. There is no need for a special ordinance. Further, an ordinance is not permanent; it can be rescinded by the next elected City Council. • EPA grossly underestimates the cost of adopting an ordinance at $25,000.[17][7] In August 2009 the City authorized a short-term $50,000 legal contract just to comment on EPA's Proposed Plan. The costs of evaluating and adopting an ordinance could easily cost several hundred-thousand dollars, *excluding* implementation. • EPA has ample legal authority in the ROD and CERCLA consent decrees and administrative orders to make remedies permanent and enforceable.	In the Proposed Plan, EPA's preferred alternative for institutional controls for the vapor intrusion remedy was a single municipal ordinance that could encompass all of the components of institutional controls necessary for the remedy. When considering utilizing an ordinance for the vapor intrusion institutional controls, EPA acknowledged that ordinances are not only permanent, but they can be changed without notice to EPA. However, EPA balanced the impermanent nature of ordinances with the efficiency of having one vehicle that provides an enforcement tool for the remedy through the Vapor Intrusion Study Area. During the public comment period, EPA received significant opposition to the use of an ordinance as part of the institutional controls for the remedy. Therefore, in the ROD Amendment, EPA selected institutional controls that include a combination of several types of controls. Although voluntary unrecorded agreements have been sufficient for the access necessary for the groundwater remedy at the Site, the vapor intrusion remedy, by necessity, will involve more significant access requirements for sampling, remedy implementation, and monitoring. Voluntary agreements may work for the remedy in certain instances, but those agreements must include provisions to bind future building owners as well as provide the notice necessary to the property operators and to the EPA and the MEW Companies should changes be made in ownership, operation, or building configuration in order to allow adjustments to the remedy where necessary. Therefore, EPA requires more robust institutional controls to ensure that the remedy is implemented and that proper notice is provided to property owners and operators of remedial requirements. Recorded agreements can provide the notice that EPA requires of the remedy and its requirements for access and otherwise. As another component of the institutional controls, EPA can rely on the City's formalization of its permitting procedures which to date have more informally required EPA review to ensure installation of	Mountain View Commercial Owners (MCO)

16 (6) In meetings with MCO, EPA asked whether EPA would be a third party beneficiary to the access agreements between the RPs and the commercial property owners. The answer is no. Although the RPs would be entitled to enforce the access agreements, EPA's enforcement mechanism is against the RPs via the ROD, consent decree, and administrative orders.

17 (7) See Feasibility Study (Section 8.3.3. Local Government Controls: Public Health and Safety Ordinances) at p. 70 ("The MEW Companies estimate that the cost to prepare and adopt an ordinance is approximately $25K, and the annual cost to monitor and enforce the performance of the ordinance is approximately $23K similar to that of monitoring a covenant.").

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	appropriate mitigation measures in new construction within the Vapor Intrusion Study Area. The cost of the ordinance as provided in the Proposed Plan was based on an estimate provided to EPA by the City. Without more information from the City at that time, EPA was not able to make an independent estimate of the cost to develop and enact an ordinance. During the public comment period, the City provided more information to EPA regarding the potential cost of an ordinance. A Record of Decision documents selection of a remedial action, but it is not in and of itself an enforceable document. EPA utilizes consent decrees and unilateral administrative orders to enforce remedy implementation. However, where, as here, the responsible parties do not own the properties at the Site, other mechanisms are necessary to ensure that the remedy is fully implemented. For instance, a consent decree or order that requires the responsible parties to implement the remedy does not of itself provide necessary notice and access that will be necessary to implement that remedy. EPA would expect to use that authority only where necessary with building owners that are not PRPs at the Site.	
90 **An Ordinance and Land Use Covenants Are Not Needed to Obtain Site Access: Voluntary Agreements are Legally Effective to Give RPs Access to Perform Necessary Work and to Provide Disclosure to Future Owners.** • More than 60% of existing commercial buildings by square footage already have written agreements with RPs that provide access, are binding on successors, and disclose conditions to future owners. **Tab 3** has an example of an existing access agreement that is binding on successors and assigns and has been recorded so that it appears on a title report. This is a legally effective way of assuring permanence of a required remedy. • EPA's Proposed Plan grossly overstates the need for special measures like an ordinance or land use covenant. With modest education -- and assurances that RPs will perform and pay for necessary work -- all or nearly all commercial owners will provide the necessary access. • EPA stated in public workshops that an ordinance is needed to secure access. This is factually inaccurate. Some 80% or more of commercial building owners by square footage have *already* agreed to have their properties tested. The balance of	EPA has appreciated the cooperation of the property owners that have provided access for implementation of the vapor intrusion remedy to date. Looking forward, voluntary agreements may be sufficiently effective to serve as institutional controls for the vapor intrusion remedy, depending upon the scope of the agreements, whether they are binding on future owners, and whether they provide sufficient notice. Agreements such as that provided as Tab 3 to the MCO comments could potentially be sufficient as a part of the institutional controls for the vapor intrusion remedy. Importantly, owners of the existing commercial buildings with written agreements with the MEW Companies are the owners of property that was formally owned or occupied by those companies. EPA is not aware of agreements with the other property owners overlying non-source areas. For those buildings that already have recorded agreements, such as that provided in Tab 3 of the MCO's comments, EPA can rely on agreements such as these as institutional controls in place of an ordinance. The key components necessary for such agreements to be used as institutional controls would be 1) provision of access for sampling,	Mountain View Commercial Owners (MCO)

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owners will likely do so with modest outreach and education.	operations, maintenance, and monitoring; 2) notice to EPA and the MEW Responsible Parties of changes in ownership, occupancy, or building configuration that would impact the remedy; 3) notice to owners and occupants of the remedy and requirements related thereto. Although existing agreements involve more than 60% of the commercial square footage in the MEW Vapor Intrusion Study Area, the remaining square footage is distributed among a larger number of smaller buildings. Due to the number of properties within the MEW Vapor Intrusion Study Area, it will be important to ensure that information to and about those buildings is provided in an effective and efficient manner. EPA has conducted outreach through mailings, internet communication, and in-person visits; such outreach is by its nature is resource intensive and time consuming. Therefore, EPA is looking to streamline the outreach component of the remedy as much as possible. A single notice mechanism for the area (such as through an ordinance) or a single notice mechanism for each property (such as recorded, binding agreements) will help to provide a more efficient informational process. This process will be detailed in the Institutional Controls Implementation Plan (ICIP) that will be developed during remedial design.	
91 **An Ordinance and Land Use Covenants Are Not Needed to Require Disclosure of Environmental Conditions at a Site.** EPA has stated a Mountain View ordinance is needed to ensure that buyers of property in the MEW area know it is a Superfund site and has the potential for vapor intrusion. MCO disagrees. A number of laws already compel such disclosure. • California's Civil Code[18][8] requires residential sellers and their real estate brokers/agents in connection with a sale to provide buyers with a Real Estate Transfer Disclosure Statement. The Disclosure Statement "must specify environmental hazards of which the seller is aware (e.g., asbestos, radon gas. . ., contaminated soil or water, etc.)."[19][9] In addition, any material fact that is known or should be discovered and may affect a buyer's decision must be reported. • Further, case law provides that both sellers and listing brokers have an affirmative duty to conduct a diligent investigation and report their findings to a buyer.	As discussed in the ROD Amendment, the remedy no longer anticipates the enactment of an ordinance by the City for implementation of the vapor intrusion remedy. Nonetheless, EPA continues to require notice to property owners and occupants as part of the institutional controls (ICs) for the remedy outside of the real estate disclosure process. Although California law does have requirements with regard to disclosure of adverse environmental conditions, the notice required as part of the vapor intrusion remedy is more specific than what may be provided as part of real estate transactions. The notice envisioned would include information about the existence of the Site, any remedial requirements, and the requirement to provide notice when alterations are made to the property that could create a new vapor intrusion pathway.	Mountain View Commercial Owners (MCO)

18 (8) Cal. Code Civ. Proc. §§ 1102 *et seq.*

19 (9) California Department of Real Estate, *Disclosures in Real Property Transaction,* p. 20 (6th ed. 2005), available at http://www.dre.ca.gov/pdf_docs/re6.pdf.

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	• Finally, the California Health and Safety Code obligates a seller to notify a buyer if the seller knows or reasonably believes that any release of a hazardous substances has come to be located on or beneath the real property.[20][10] • Thus, there are already well established laws that require sellers of property (and their agents) to disclose environmental conditions; failure to do so would expose the seller to lawsuits for damages, and the broker could also face liability for damages and potentially lose his or her license. A Mountain View ordinance would add nothing to these existing obligations of full disclosure.		
92	**An Ordinance or Land Use Covenants Are Not Needed to Assure Notification of Change of Ownership.** EPA has also suggested an ordinance is needed to alert RPs when land is sold and when owners may make changes to buildings. As EPA is aware, there are now commercial services that can be used to track changes in land use, changes in ownership and applications for construction permits. The RPs can utilize these commercial services (such as Terradex) to track changes in ownership or use that might require adjustment of vapor remedies.	As part of the institutional controls for this remedy, EPA expects that there will be a role for commercial notification services. In particular, these services can provide notice of changes in ownership of buildings within the Vapor Intrusion Study Area. However, these services do not provide notice to purchasers of the remedy and its requirements. Additionally, it is not clear whether such services can provide notification of changes in occupancy or changes in building configuration that would impact the vapor intrusion remedy. Where these services can provide notification assistance, they may be employed as part of the Institutional Controls Implementation Plan (ICIP).	Mountain View Commercial Owners (MCO)
93	**EPA Cannot Compel Mountain View To Adopt an Ordinance.** EPA itself acknowledges that it cannot compel Mountain View to adopt an ordinance.[21][12]	It is correct that EPA cannot compel the City to adopt an ordinance, which is why EPA identified a backup of recorded covenants as the preferred alternative for the institutional controls for the remedy. However, as explained in the ROD Amendment, the remedy no longer requires adoption of a municipal ordinance as part of the institutional controls for the vapor intrusion remedy.	Mountain View Commercial Owners (MCO)
94	**Cost Estimates in the Draft Proposed Plan for an Ordinance are Unrealistic.** The cost of adopting and implementing an ordinance would likely vary significantly based on the details contained in the ordinance and the degree of acceptance by interested stakeholders. Moreover, the cost estimate for the ordinance does not include an estimate of the diminution of property values and other foreseeable economic consequences of such a measure.	The cost of the ordinance as provided in the Proposed Plan was based on an estimate provided to EPA by the City. Without more information from the City at that time, EPA was not able to make an independent estimate of the cost to develop and enact an ordinance. Additionally, the cost estimate for the purpose of remedy selection is for the cost of remedy implementation. The value of any economic impacts from the remedy is not factored into that estimate, because it is not a cost of remedial implementation. Also, property values are affected	Mountain View Commercial Owners (MCO)

20 (10) Cal. Health & Safety Code § 25359.7.

21 (12) *See* EPA July 2009 Proposed Plan at p. 18.

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		by a wide range of factors in addition to contamination, and we cannot predict the market.	
95	In the section of the Proposed Plan entitled "Summary of Institutional Controls (ICs)," there is a brief discussion of recorded covenants. The section entitled "EPA's Preferred Institutional Control" states EPA's position that "if a municipal ordinance is not adopted, EPA's Preferred IC is recorded covenants." We do not agree with the conclusions that underlie EPA's stated preferences. Our position regarding recorded covenants has been stated multiple times previously, and it was explained in three separate face-to-face meetings with EPA in the three month period prior to publication of the Proposed Plan (April 6, June 11, and June 23, 2009). It has been explained on several occasions since the Proposed Plan has been published. Our arguments are again summarized below. **A. Recorded Covenants Are Not Required by California Law; 22 California Code of Regulations Section 67391.1 Is Not an ARAR** In section 8.2, EPA's Proposed Plan discusses Section 67391.1 of Volume 22 of the California Code of Regulations ("CCR") and says that it "may be an [ARAR.]" While we are pleased that this statement was less definitive than prior EPA statements on this subject, we write nonetheless to confirm that we do not believe that Section 67391.1 is or should be considered an ARAR. The Companies do not agree that this section is either applicable or relevant and appropriate for the MEW Site - and certainly not at this time. Section 67391.1(a)(2) specifies that the requirements of the regulation are only applicable if "hazardous materials, hazardous wastes or constituents, or hazardous substances ***will remain*** at the property at levels which are not suitable for unrestricted use of the land." Because of the scope of the ongoing remedy, the regulation is facially inapplicable to the MEW Site. It is unknown at present the extent to which hazardous substances will remain at various properties within the MEW Site and, if they do remain, at what concentrations and in which locations. **B. Section 673911 Requires EPA to Make a Feasibility Determination** Even if EPA were correct that Section 67391.1 is an ARAR, EPA must apply it in a manner consistent with the State's implementation of the regulation and cannot disregard key terms. Section 67391.1(f) provides that mechanisms other than restrictive covenants are appropriate where "it is not feasible to establish a land use covenant as a component of a remedy for a	EPA disagrees with the commenter's analysis of the timing and applicability of Title 22 CCR Section 67391.1 as an ARAR. That said, for this vapor intrusion remedy, EPA is not selecting Section 67391.1 as an ARAR. Specifically, it was determined that, should the City's planning and permitting requirements coupled with the recorded agreements prove sufficient to impart the appropriate information and place the necessary requirements on current and future property owners, then application of Section 67391.1 is not appropriate in this instance. If in the future it is found that the recorded agreements, in combination with formalized City procedures and use of a notification service, will not attain the necessary protectiveness, EPA will reassess the protectiveness of the remedy and Section 67391.1 may be reconsidered as an ARAR. In light of this, the remainder of this comment is not addressed here.	Raytheon and Schlumberger Technology Corp. MEW Responsible Parties

site."

We are pleased that the Proposed Plan recognizes that feasibility is a requirement before deed restrictions can be required and that "there may be circumstances where it is determined that placement of a land use covenant is not feasible, and, in those instances, other [IC] mechanisms may be used...." We believe that EPA's determination here that recorded covenants may not be feasible is consistent with outcomes at other sites, where EPA has recognized that feasibility is an integral component of the regulation. For example, in the September 2007 Final Record of Decision for the Brown & Bryant Site, EPA Region IX states that Section 67391.1:

> [r]equires that *whenever it is not feasible to record [sic[22][4]] a land use covenant* for a site, other mechanisms will be used to ensure that future land use will be compatible with the levels of hazards, which remain on the property.

Table 13-1 (ARARs for Selected Remedy) (emphasis added). The Brown & Bryant ROD continues, stating that a selected remedy can comply with Section 67391.1:

> by using other available mechanisms to ensure that future land use will be compatible with the levels of hazards which remain on the property *if it is not feasible to record a land use covenant. (Emphasis added.)*

Id. EPA, therefore, if it intends at any point in time to turn to recorded covenants as a part of the layering of ICs for the MEW Site, must perform the feasibility analysis required by Section 67391.1.

We believe that this interpretation is also consistent with the State of California's analysis of these issues. When promulgating Section 67391.1, DTSC recognized the inherent difficulties and complexities in seeking to record covenants on property owned by third parties. In response to comment that the proposed regulation did not adequately address situations where contamination was located "outside the property boundaries" of a responsible party, DTSC pointed to the feasibility analysis required by Section 67391.1 as providing flexibility. *See* DTSC Final Statement of Reasons Including Summary of Comments and Agency Responses, Land Use Covenants Regulations (R-99-17) at 12 (Comment #17). DTSC explicitly noted that in situations with third-party ownership of property, such as those that would arise due to

22 (4) This is an erroneous quotation of § 67391.1. As discussed elsewhere, in response to concerns about recording covenants on properties owned by third-parties and/or off-site, DTSC amended the final adopted regulation to require consideration of the feasibility of 'establishing" (as opposed to "recording") land use covenants.

the "complexities of groundwater plumes," DTSC *"must* determine if it is feasible to establish [land use covenants]." *Id.* (emphasis added). In fact, in response to this particular comment, DTSC amended the final regulation to require analysis of whether it is "feasible to *establish"* land use covenants, as opposed to the original, and more limited proposed language requiring an analysis of only whether it was "feasible to *record'* such covenants. *Id.*

It is our understanding that DTSC and other state agencies, including the Regional Water Quality Control Boards, have not applied Section 67391.1 to require recordation of restrictive covenants on third-party properties over groundwater plumes or in response to vapor intrusion. Similarly, state agencies have not, as a matter of course, required responsible parties to record restrictive covenants on property they no longer own. As such, EPA's interpretation of Section 67391.1 to require recordation of restrictive covenants at sites where property is owned by third parties, including innocent land-owners, is in conflict with implementation of the regulation by DTSC and other state agencies. As recognized by DTSC during promulgation of the regulation, such an interpretation could have far reaching consequences for sites with large groundwater plumes. It would also signal a significant change in policy for how these sites are addressed by EPA. These (and other) reasons all support the argument that implementing recorded covenants at the MEW Site would not be feasible.

C. Timing With Respect to Application of Section 67391.1

It appears from the Proposed Plan that EPA agrees with the Companies that a decision on the question of feasibility should at least be postponed until more information is available. We believe that such information will include not only the potential success of obtaining a municipal ordinance in Mountain View, but will also include important data about the implementation of private agreements during operation and maintenance of the remedy. This is consistent with Section 63791.1(a), which provides flexibility to EPA on the timing for the recordation of land use covenants. The regulation specifies that land use covenants be recorded at *"Nacility closure,* corrective action, remedial or removal action, or when other response actions are undertaken ..." (emphasis added). Even if EPA is correct that Section 67391.1 is an ARAR, EPA has the authority to delay any requirement to record land use covenants until closure of the MEW Site.

If EPA were to agree to such a delay, then EPA could rely upon non-recorded agreements prior to closure and, at closure,

evaluate whether Section 67391.1 remains applicable and, if so, whether it is feasible. This approach would be consistent with the NCP, which anticipates that institutional controls may be used, "where necessary, as a component of the completed remedy." 40 CFR § 300.430(a)(1)(iii)(D). It would also be consistent with the language of Section 67391.1 itself that, when recorded covenants are not feasible, "other acceptable alternatives may include `physical monuments, or a memorandum of agreement or consent agreement' in order to accomplish the same goals as a recorded covenant."

D. Recorded Covenants Would Be Expensive, Cause Delays, And Create Other Problems at the MEW Site

To summarize (but not belabor) the points that we have made previously, we believe that there will be significant impacts to the use (or attempted use) of recorded covenants at the MEW Site, where most of the properties in question were not previously owned by active PRPS, are currently owned by unrelated third parties, and are not themselves "source" properties. Those concerns include:

- o Significant delays, based on the Companies' experiences at other sites;
- o Complexity of agreements, as the parties argue over issues of the necessity of recorded covenants, indemnification, cost-sharing, etc.;
- o Unjustified demands for compensation;
- o Potential litigation;
- o Difficulties with lenders for both existing and future building owners (including the potential triggering of loan covenants); and
- o Tax abatement demands and the potential for reduced revenues for the City of Mountain View and the County of Santa Clara.

In short, we believe that recorded covenants should not be selected as a preferred IC for the MEW Site, even if only as a fallback to the first preferred IC, a municipal ordinance.

E. Use of Other Potential Institutional Controls

The Proposed Plan refers, generally, to "other institutional control mechanisms [that] may be used to require that future land use will be compatible with the level of hazardous substances left on the property," but it does not specify what those other controls may be. While we appreciated EPA's decision to put unrecorded agreements (along with recorded access agreements) into the

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	final Supplemental Feasibility Study, we believe that EPA should have included specific references to unrecorded agreements, recorded notices of agreements, and recorded access agreements in the Proposed Plan, and we request that the ROD recognize that such agreements would, themselves, be viable institutional controls for the MEW Site. In fact, the Companies believe that these three alternatives should be the preferred alternative, even ahead of a municipal ordinance, as the first preferred alternative institutional control. At a minimum, however, the three should be recognized as viable institutional controls.		
	<u>Vapor Intrusion Study Area</u>		
96	Revise EPA map to only show area that is definitely in the MEW, as to not alarm people living up to 100 feet outside who might not be affected (aka be less conservative and more certain in your map since this is going to affect property value). Maybe move to 50ft outside the boundary or 25 feet. It seems very un-reasonable to conservatively mark houses that "might" be contaminated causing unnecessary alarm and hurdles for houses that "might" have a problem. The map implies a black and white distinction which is not what the reality is. Change your map to clearly mark the MEW area with the boundary line and **separately delineate** areas beyond the 5ppb boundary (maybe using an asterick/note at the bottom of the map, noting that the EPA wants people living within 100 feet to be aware that there could be some contamination in their area even though they aren't in the actual MEW boundary). Marking the actual MEW area plus the conservative "estimated" 100 feet as one area is **unfair** to home-owners beyond the boundary. **CLEARLY delineate houses in the 5ppb area different than those in the 100 foot boundary.** Don't just include them all in one bucket to be conservative -- the cost is too high. **Remove houses from map/ordinance in the buffer zone (currently 100 feet) that are tested and are shown as clean.** Why alarm people when they are safe and/or proper steps have already been taken to protect them? At this point, being conservative and including them seems misleading. What is the goal?	In October/November 2009 and February 2010, EPA collected indoor air samples from an additional 14 residences and did not find TCE concentrations above levels found in background outdoor air concentrations. However, in previous sampling, EPA has found indoor air concentrations due to vapor intrusion in residences above outdoor air levels along Whisman Road and in two residences at the former Wescoat Housing area in the Moffett Field Area. Based on all the residential data collected to date, it appears that residential buildings along the “100-foot” buffer zone of the Vapor Intrusion Study Area have a very low potential for vapor intrusion. Therefore, EPA has modified the Vapor Intrusion Study Area map in the residential area by removing the 100-foot-buffer zone and including only those residences within the estimated 5 ppb TCE line (e.g., approximately one-two homes along Whisman Road and in the Wescoat Village area). EPA will continue the approach of sampling residences on a voluntary basis at the request of the homeowners themselves, and classifying buildings on a building-by-building basis based on actual indoor air concentrations. EPA supports the collection of additional groundwater and/or soil gas sampling to further refine the Vapor Intrusion Study Area as the remedy proceeds.	E.D. Resident
97	If you are in buffer zone, you should be called something different than those that overlay the plume.	See EPA response to Comment 96.	Wagon Wheel Neighborhood Association

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98	Add some number (1,000?) for the feet from the (drawn) boundary of the plume line that indoor air testing can happen or be requested.	All residential buildings within the Vapor Intrusion Study Area can be tested at the homeowner's request. The Vapor Intrusion Study Area has been revised to include the estimated 5 ppb TCE shallow groundwater plume boundary.	Jane Horton Resident
99	We believe that the boundaries of the residential portion of the Vapor Intrusion Study Area lines on the map are not well enough delineated because relatively few monitoring wells are used to extrapolate the precise location of the 5-part-perbillion TCE-concentration contour line. **We suggest that EPA and the PRPs at least double the number of boundary monitoring wells and update this map annually.** Indoor air testing results, indicative of the extent of the groundwater plume, should be incorporated in updated maps.	The estimated 5 ppb TCE groundwater line used to estimate the Vapor Intrusion Study Area boundary is sufficient to include any of the residential buildings that may need to be sampled. Additional subsurface data on the western portion of the Vapor Intrusion Study Area may be collected to further refine the boundary. The groundwater plume map (and associated Vapor Intrusion Study Area map) will be reviewed annually and updated as necessary. Indoor air testing results will be made available to property owners/tenants in a separate format.	Lenny Siegel CPEO
100	The Plan states: "The Vapor Intrusion Study Area includes a 100 foot buffer zone beyond the estimated 5 ppb TCE plume boundary to account for the uncertainty of the depicted plume boundary." While we agree that there may be uncertainty in the depicted plume boundary in some areas (i.e., the western edge of the plume), we know the plume boundaries with certainty on the southeast side of the plume, just east of SMI's site. An existing well (SO-PZ3) has been monitored since 1993, and has never had detectable concentrations of TCE (or other volatile organic compounds). Additionally, several prior investigations have been completed to assess potential groundwater impacts east of 485/487 East Middlefield Road (see Attachment A). The 100 foot buffer zone will result in unnecessary and unjustified additional costs associated with the construction of new buildings within the buffer zone. Therefore, for areas near the 5 ppm TCE plume boundary, where there is existing data to show that there is no shallow plume (or where additional data would demonstrate there is no shallow plume), a buffer zone is not needed.	The 100 foot buffer zone has been removed from both commercial and residential areas.	SMI MEW Responsible Party
101	Properties located in the buffer zone should be exempt from testing/monitoring.	The buffer zone has been removed from both commercial and residential areas. Only commercial buildings within the Vapor Intrusion Study Area will require indoor air testing.	Steve Gazzera Commercial Property owner
102	Buffer zone properties should not have the same mitigation requirements imposed on them.	The buffer zone has been removed from both commercial and residential areas. New buildings constructed within the Vapor Intrusion Study Area will require installation of a vapor barrier and passive sub-slab ventilation system (with the ability to be made active. For existing residential buildings within the Vapor Intrusion Study Area, only after a building is sampled can there be a determination of the appropriate vapor intrusion remedy requirement, if any.	Wagon Wheel Neighborhood Association

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103	CONSTRUCTIVE CRITIQUE OF 2009 MAP DIAGRAM: Currently, the 2009 map is one solid lavender colored area with Xs marking well spots. My initial impression was that the rectangular-shaped blue MEW study area of 2007 had now expanded in 2009 to a larger lavender blob. In comparing the 2009 MEW study map to the 2007 MEW study map, a layperson would logically infer that the EPA thinks that the vapors have gotten worse from 2007 to 2009 by expanding the study zone. I understand that the EPA wants to expand due to their conservative approach, but I think the 2009 map may mislead any new home-buyer who is thinking of moving to Mountain View MEW area with an erroneous and negative impression that the vapor area has expanded in 2009 from 2007. Furthermore, a layperson without any vested interest would not take the time to learn what the Xs labeled numbers on the map. Most people are not knowledgeable about the wells or what ppb mean. I think the EPA should reconsider how they present the MEW Study Zone 2009 map by current and future Mountain View residents, as it can be misinterpreted that things have gotten worse. This perception of expanding MEW area is contrary to what the EPA has actually done, which is "to reduce" the vapor intrusion.	The Vapor Intrusion Study Area map is intended to show a general area of potential concern for site-related vapor intrusion. It is not intended to be used to specify which buildings (residential or commercial) actually have vapor intrusion problems or not. EPA acknowledges that the different maps show a lot of information that may prompt questions. EPA staff is available to answer questions and will continue to try to update the community and stakeholders with information about the Vapor Intrusion Study Area and implementation of the vapor intrusion remedy. Separate maps, data summaries, and/or reports are used to show actual groundwater data or indoor air sampling data results.	Wagon Wheel Neighborhood Association
104	RECALCULATING INTRUSION AREA: Expanding 100 feet from wells measuring over 5 ppb (albeit creative) does not seem to be a very scientific method for formally laying out a study zone when vapors and waters are moving targets. The EPA has the legitimacy and technical resources to test. I as a public citizen, would like to see our Superfund dollars be spent towards a more scientific approach of assessment. We think that the current 2009 MEW Study Map drawing seems somewhat arbitrary. EPA could have stronger support of the Mountain View community if the diagram was based on more calculated research with better data points and mathematical functions. My understanding is that EPA consists of a talented group of expert hydrologists, toxicologists, chemists, and geologists with PhDs. If this sub-team was formed to weigh-in on how to reasonably calculate the potential risk of vapor intrusion through some set of equations, I think the public citizens would believe the map to be fair and backed by a scientific approach. I would prefer that the map was determined based on mathematical equations derived from 1. porosity of the ground/clay in Mt View MEW area 2. the groundwater resting areas and other aqua flow areas 3. the actual wells positioned at present. I think that 3-dimensional diagram showing current vapor with	The 100-foot buffer zone of the Vapor Intrusion Study Area has been removed. Vapor intrusion is still an evolving science with ongoing research and findings. Recent evidence suggests that modeling vapor intrusion based on groundwater concentrations, as suggested by this comment, may not be an effective way to determine the actual area of potential impact, as the migration of vapors from the subsurface to indoor air depends on several, highly variable factors, including subsurface lithology, the presence or absence or preferential pathways from the subsurface into the building, and pressure differences between the subsurface and indoor air. In light of these uncertainties, and in order to protect the health of building occupants, EPA is utilizing a conservative approach by assuming that any building overlying 5 ppb TCE in shallow groundwater may be impacted by potential vapor intrusion from contamination in groundwater. The Vapor Intrusion Study Area map is intended to show a general area of potential concern for Site-related vapor intrusion, and is not intended to be used to specify which buildings (residential or commercial) actually have vapor intrusion problems or not. The application of the vapor intrusion remedy at specific buildings within the Vapor Intrusion Study Area will depend	Wagon Wheel Neighborhood Association

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	overlaying potential areas of risk (extrapolated from differential equations / vectors through the lens of EPA experts in ground, water, and toxic materials) would be a better foundation for proposing a potential Vapor Intrusion Study Area.	on actual indoor air results.	
105	REFINING 2009 MAP DIAGRAM: A more topological diagram showing the progression of vapor mitigation from 2007 to 2009 would probably be more helpful for public understanding. Show "what's been done, what's been happening here in Mountain View" so as to validate EPA's approach to mitigation. Furthermore, using hatch-marks, spotted-dots, or diagonal-lines to delineate areas of interest vs. exploration would be better than a blanket solid lavender coloration. This would clearly mark areas that are definitely being tracked by EPA and areas unknown to the EPA that need more exploration. Additionally, using the well data points to create a gradient/shade of color would be more educational to the public regarding their health safety in being near the vapor intrusion vicinity. Example: Areas near wells @ 75ppb should be darker shade of purple; Meanwhile, areas near wells @ 5ppb should a lighter shade of purple. Gradient coloring would help immensely in the public's understanding of harms & risks especially for Mountain View residents living near the MEW vapor intrusion. I think a purple shading would help with the citizen's perception of what vapor might be where.	See response to Comment 104.	Wagon Wheel Neighborhood Association
106	The Proposed Plan and the Final Supplemental Remedial Investigation and Feasibility Study do not map clearly enough the specific boundaries of the Vapor Intrusion Study Area, although a subsequent map and lists identify properties by address. EPA should provide documentation that clearly shows which individual properties by parcel number fall within the study area and describes the process for estimating the plume boundaries and how frequently the plume is mapped. These details are critical to a property owner's understanding about the status of their property.	On an annual basis, EPA will consider new information on the extent of the TCE shallow groundwater contamination and other lines of evidence collected at individual properties. As such, EPA anticipates that the extent of the Vapor Intrusion Study Area may change over time and this information will be made available to the public.	City of Mountain View
107	The Vapor Intrusion Study Area should be clearly defined and precisely drawn, and the boundary between the Study Area "Buffer Zone" and the line of the plume estimated at TCE 5 ppb in shallow groundwater should be clearly delineated, particularly in residential areas. The distinction between being in the buffer zone versus actually above groundwater contamination could be an important distinction from a property owner's perspective.	See EPA Response to Comment 96.	City of Mountain View
108	**It is Unclear Which Properties Are Within the Vapor Intrusion**		Mountain View

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	Study Area. • On September 21, 2009, EPA issued a notice that included an updated map showing the residential and commercial properties within the Vapor Intrusion Study Area for the MEW Site south of U.S. Highway 101, as well as lists of those properties identified by address. For a property that straddles the MEW plume boundary, it remains unclear, however, whether the portion of such a property as shown on the map is all that is encumbered by EPA's Plan, or whether it is the whole legal parcel. *For example, what would happen if the plume is under a parcel's parking lot but not under its building?* • EPA should also develop and describe a procedure for monitoring changes to the plume boundary and changes of address, and for notifying property owners when those changes affect the status of their buildings. The RPs should ultimately be responsible for such monitoring and notification.		Commercial Owners (MCO)
<u>Community Concerns - Property Values and Cost of Remediation</u>			
109	We would hope that any measures in the plan will only benefit the Mountain View Triangle community more, and enhance the attractiveness of the area as an engine of commerce and a residential neighborhood and a safe place to work. We will be evaluating, with your help, the incremental benefits to health and safety, as well as the plan's cost, the logistics of its implementation and maintenance, and its potential effect on property values. We must all be careful that any new measures do not create an impression of the Mountain View Triangle which is not warranted by its actual conditions. This would be unfortunate for everyone.	EPA acknowledges your comment.	John Lovewell Commercial Property Owner
110	Who's going to pay for monitoring? Should a property owner be required to put money into an escrow account to receive payment for it indefinitely, or is the City going to have to pay for it, or the occupants?	The purpose of the ROD Amendment is to describe EPA's selected remedy, not how it will be implemented. However, as is the case with implementation of the soil and groundwater remedy at the MEW Site, EPA expects the Responsible Parties to implement the vapor intrusion remedy or to ensure that it is implemented at all affected buildings/properties.	Bob Moss NAS Moffett Field Restoration Advisory Board member
111	Add that homeowners/renters/occupants will bear NO cost of remediation, including utilities.	See response to Comment 110. EPA expects the Responsible Parties to cover the costs of implementing the vapor intrusion remedy, and not the residential property owners.	Jane Horton Resident
112	Add or emphasize that testing results are confidential.	Individual residential property addresses and owner/tenant contact information will not be released by EPA to maintain privacy. However, the owner or tenant can release the	Jane Horton Resident

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		information at their own discretion. Homeowners should consult with a real estate professional for transfer disclosure requirements.	
113	Add or emphasize that if TCE is detected in the amount that qualifies for remediation than the homeowner/renter/occupant is not required to disclose it nor is there a requirement for remediation. However, it will be disclosed if the residence is sold.	EPA is providing home sampling and remediation within the Vapor Intrusion Study Area with the voluntary cooperation of the homeowner or occupant. Sellers may have additional disclosure requirements pursuant to state or local laws. Both buyers and sellers need to be careful to conduct research and to make appropriate disclosures on properties that may be contaminated. .	Jane Horton Resident
114	If there is required messaging for future home-owners: (1) make sure it is not alarming and outlines the actual risk, (2) do not require messaging (or drastically adjust messaging) for cases where house has been tested in last X years and was fine or remediated. Additionally, create a different message for properties like Classics At Evandale where proper remediation has already taken place (if all properties had vapor management systems, then there wouldn't be an ordinance, so take this into consideration). You are already using this property as an example in your materials. Give prospective homebuyers for Classics at Evandale the same sort of assurance.	EPA will continue to provide information to those living and working within the Vapor Intrusion Study Area regarding the potential health risks from the vapor intrusion pathway as well as the efforts to mitigate that risk. EPA will endeavor to do so without creating undue alarm. EPA will continue to work with the individual homeowners and homeowner groups to develop appropriate messages for each property.	E.D. Resident
115	Get actual homeowner input on any messaging that they may be required to give prospective home buyers before it is finalized.	EPA is not always provided the information that developers or sellers provide or disclose to potential homebuyers.EPA will continue to work to ensure that the information being provided is accurate and aids in the accurate understanding of vapor intrusion and what is being done to mitigate the risks.	E.D. Resident
116	… is it possible to get the general locations of the 17 residences or structures that have been tested so far? My feeling is that, based on the 16 tested being below the 5 ppm, other units at the border of the study area would likely be negative also, and that is good info to have. It is the absence of data that causes concern on the part of potential buyers, and some current residents.	The 17 previously sampled residences are located west of Whisman Road within the Vapor Intrusion Study Area. In October/November 2009 and February 2010, EPA collected indoor air samples from an additional 14 residences and did not find TCE concentrations above background outdoor air concentrations.	Wagon Wheel Neighborhood Association
117	If the EPA is offering monitoring & remediation to anybody within the designated intrusion area then we should seize upon it; it appears that any sort of actual ordinance is up to the city (?) and regardless, if I were purchasing a home (ie, there is a house in escrow at the corner of Flynn & Whisman), I would certainly want	EPA acknowledges your comment.	Wagon Wheel Neighborhood Association

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	to know about not only the potential for vapor intrusion from prior contamination but that there are also provisions in place to remedy it, and not even at any expense to the homeowner.		
118	I believe it is understood that the responsible parties (RPs) are to absorb the cost of installation and monitoring of vapor intrusion barrier systems. This all assumes that the responsible parties are financially viable. Perhaps the EPA should require that the RPs post a bond, at some point to be determined, to insure that the funds are available to perform their responsibilities in the event the RP faces a bankruptcy or liquidation for some reason. This is unlikely, but who knows.	EPA is also concerned that Responsible Parties have sufficient resources to implement and complete any Superfund cleanup action. Accordingly, agreements with responsible parties to conduct the cleanup work include financial assurance requirements language. These requirements have been developed to ensure that either the responsible parties have sufficient funds to conduct the work or, where they may not have sufficient funds, that they have acquired a financial instrument, such as a bond or a letter of credit, for the estimated cost of the cleanup.	Wagon Wheel Neighborhood Association
119	I think a zoning ordinance requiring the mitigation work hurts property values. It stigmatizes the area. A deed restriction or covenant hurts the same. It's a value killer. A deed restriction for this issue may make a property unsaleable. I believe a lender would likely not approve of it.	The vapor intrusion remedy includes the use of institutional controls to ensure the appropriate operation of the remedy in current buildings and installation of the remedy in future construction. The institutional controls adopted in the ROD Amendment include use of City planning and permitting procedures along with recorded agreements at the commercial buildings where there is an ongoing remedy. The remedy is not utilizing zoning ordinances or deed restrictions in the residential area. However, the comment highlights the concern regarding impacts of stigma. The market is affected by a wide range of factors in addition to contamination. Full implementation of the vapor intrusion remedy should be able provide assurance that the contamination has been characterized and that exposure pathways are being addressed.	Wagon Wheel Neighborhood Association
120	I appreciate the EPA addressing potential vapor intrusion into residential buildings. It seems to me that the EPA is in a much better position than I am to determine the level of TCE vapor that is harmful to people. The EPA is also in a better position than I am to recommend proposed actions to remediate potential vapor intrusion into new and existing residential buildings. However, one of my concerns is that the EPA has been very slow to provide information to the neighborhood. Property owners within the Vapor Intrusion Study Area may not know that their home is within the study area. It took the EPA far too long to compile the list of addresses within the study area. And, now that there is finally a list, what assurances do we have that the EPA has contacted every property owner?	Since 2004, EPA has made efforts to go door-to door, mail out information updates to the residents living within the Vapor Intrusion Study Area, and hold community meetings regarding the vapor intrusion indoor air investigations. The neighborhood has a diverse interest level. EPA staff is available to answer any public questions. EPA will continue its community outreach and education efforts.	Wagon Wheel Neighborhood Association

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121	The top concern I have is the EPA's proposed institutional control for enforcing proposed actions to remediate potential vapor intrusion. An institutional control that could result in a very negative perception of the area, and also result in lower property values is one that I vehemently oppose. A City Ordinance and/or Registered Covenants would be detrimental to the reputation of the area and result in property value declines. In addition, enacting an institutional control on something that cannot be accurately defined is a mismatch between the issue and the solution. • It is impossible to accurately define the boundaries of where TCE vapor intrusion is currently an issue or where it might be an issue. And, the area where it is an issue or might be an issue can change over time. How can the EPA consider using boundaries for anything when those boundaries can't accurately be defined? • The EPA admits that it is impossible to accurately define a boundary and so defined a 100' buffer zone. • Including homes in the buffer zone in the same institutional control as homes in the 'defined' zone unfairly penalizes these homes. Other institutional controls should be explored. For example, installing vapor intrusion barriers could be part of the building code so that all new residential construction would be required to have a vapor intrusion remediation system.	The vapor intrusion remedy includes the use of institutional controls to ensure the appropriate operation of the vapor intrusion remedy in current buildings and installation of the appropriate vapor intrusion control system in future buildings. The institutional controls adopted in the ROD Amendment include use of City planning and permitting procedures and not a City Ordinance along with recorded agreements for existing commercial buildings to inform current and future property/building owners of the required vapor intrusion remedy. The institutional controls are necessary to ensure that the remedy is operational in all buildings on an ongoing long-term basis where there is a threat of vapor intrusion from subsurface contamination. Deed restrictions are not included as an institutional control for the residential area. The comment also raises the concern regarding stigma from the MEW Superfund Site. The market is affected by a wide range of factors in addition to contamination, and EPA cannot predict the market impacts. Full implementation of the vapor intrusion remedy, including the institutional controls, should be able provide assurance that the contamination has been characterized and that the indoor air exposure pathway is being addressed to protect building occupants. See EPA responses to Comments 96, 99, 102, and 104. The Vapor Intrusion Study Area is based on the estimated extent of 5 parts per billion TCE in shallow groundwater. EPA originally included a 100 foot buffer zone because of the uncertainty and to allow additional homes to be sampled. During 2009-2010. ,EPA sampled an additional 14 homes, many within the buffer zone, and all indoor air results indicated no vapor intrusion into the homes. As a result, EPA has removed the 100 foot buffer zone and retains the estimated 5 ppb TCE line as the Vapor Intrusion Study Area. EPA supports the collection of additional groundwater and/or soil gas sampling to further refine the Vapor Intrusion Study Area as the remedy proceeds. EPA will assess whether the Vapor Intrusion Study Area needs to be updated based on changing conditions or new subsurface data.	Wagon Wheel Neighborhood Association
122	The EPA should also put in place assurances that any cost to remediate potential or actual vapor intrusion will be paid for by the	The purpose of the ROD Amendment is to describe EPA's selected remedy, not how it will be implemented nor who	Wagon Wheel Neighborhood

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	responsible parties. It does not make sense for property owners to have to pay for any remediation since once again it is a mismatch between the issue and the solution. And, there should not be a distinction in terms new or existing buildings. The responsible parties should pay to address remediation in all cases.	will pay for it. However, as is the case with implementation of the soil and groundwater remedy at the MEW Site, EPA expects the Responsible Parties to implement the vapor intrusion remedy, or to ensure that it is implemented, at all affected buildings and properties.	Association
123	Responsible Parties should pay for all costs and provide necessary labor: a) Tenants are in buildings to produce a product or service and in smaller buildings are either struggling or taxed to the limit and should not be burdened with monitoring or reporting on mitigating systems. Additionally a tenant will automatically factor any requirements into the rent that they are willing to pay. b) The Responsible Parties should be required to do all system maintenance, monitoring, and maintenance on new or existing buildings. c) Any additional requirements for new and existing buildings should be fully cost reimbursable for vapor barriers, passive systems, and again provide for all system maintenance and monitoring on new or existing buildings at their expense. d) Under slab passive systems for new and existing buildings can create additional construction costs when under slab utilities are need to facilitate new tenant requirements. Either the under slab passive system or the new utilities will have to be modified where they intersect. 3) Responsible Parties should pay for all excess cost due to mandated programs requiring passive systems or running HVAC systems longer than normal including replacement, maintenance, and energy costs.	The purpose of the ROD Amendment is to describe EPA's selected remedy, not how it will be implemented nor who will pay for it. However, as is the case with implementation of the soil and groundwater remedy at the MEW Site, EPA expects the Responsible Parties to implement the vapor intrusion remedy, or to ensure that it is implemented, at all affected buildings and properties.	Mission West Properties LP Commercial Property Owner
124	EPA Responsibility to mitigate administrative impacts: a) The EPA has an obligation and must consider the administrative burden caused by their actions. b) Federal, State, and local government constitutes 17 to 20 percent if not more of the total US work force, that represents a tax burden on individuals, companies and corporations. c) Federal, State and local administrations daily conjure up new regulations that burden USA industry making our products and businesses non-competitive in the world market costing citizens jobs and increasing our tax burden at the same time. Think very very carefully before you proceed with any plan.	Comment acknowledged. EPA has thoughtfully considered all comments received on the Proposed Plan and EPA's decision is reflected in this ROD Amendment.	Mission West Properties LP Commercial Property Owner
125	RPs should be responsible protecting public health and for assessing, installing, paying for, operating, maintaining, and verifying the vapor intrusion remedy in buildings at the MEW vapor study area. It is unfair to ask property owners and tenants to be responsible for implementing a remedy for contamination they did not cause. The liability for implementing or verifying the vapor intrusion remedy should not be shifted to the owners or their tenants.	See EPA response to Comment 110.	Steve Gazzera Commercial Property Owner

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126	The Proposed Plan discusses the requirement and/or option for property owners to conduct additional confirmation sampling to confirm their tier of compliance, also stating that "additional lines of evidence may be collected and evaluated at any time to determine whether a move between tiers would be appropriate" (p. 23). Property owners of "victim sites" to the groundwater contamination should not have to cover the costs of this "burden of proof' sampling. Additionally, EPA should specify with further guidance what constitutes "additional lines of evidence."	As has been the case with the vapor intrusion remedy to date, EPA expects the Responsible Parties to implement the sampling, installation, and monitoring of vapor intrusion remedy, or to ensure that it is implemented, at all affected buildings and properties. Initial air sampling will be used to determine whether a remedy is necessary at a particular building, and, if so, what remedy will be adequate. For future construction, both recorded agreements as well as the City's planning and permitting procedures and recorded agreements will inform developers of the requirements to ensure that the appropriate remedy is incorporated into any new construction. The developer can work with the Responsible Parties to determine whether additional sampling could be conducted to potentially change the tier in which the new building is currently categorized. EPA will use the following lines of evidence to evaluate whether a move to a different tier may be justified: (1) the location of the building relative to known source areas and depth and concentrations of underlying shallow groundwater, (2) sub-slab soil gas concentrations; (3) indoor air concentrations; (4) lateral and vertical distribution of soil gas concentrations and proximity to building; and (5) building survey, chemical use, ventilation system operations, chemical ratios, among others. Because each building is unique, and screening criteria may be adjusted as more site-specific data are collected, these lines of evidence will be evaluated on a building-specific basis.	City of Mountain View
127	As discussed on previous occasions with EPA, City staff reiterates and emphasizes that due to the complexities of this Proposed Plan, extra outreach to both residential and commercial property owners, tenants, and employees in the Vapor Intrusion Study Area is warranted. In addition, and related to outreach efforts, the City would like to recommend that the EPA consider the development of a clear and concise webpage that addresses the frequently asked questions and concerns regarding the MEW Study Area from the residential property owner, commercial property owner, and tenant's perspectives.	EPA will continue to involve and provide information and outreach to community members and stakeholders about the MEW Study Area and implementation of the vapor intrusion remedy. EPA will continue to provide updates on EPA's webpage for the MEW Site (http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dec8ba3252368428825742600743733/e4b75798264cff7988257007005e946e!OpenDocument) and add "Frequently Asked Questions."	City of Mountain View
128	**Clear Statement that RPs are Responsible for Vapor Remedies.** In meetings and workshops, EPA staff have repeatedly stated that RPs, not property owners, are legally responsible for remediating contamination under CERCLA. Staff have also stated that they will "look to the RPs" to implement, manage, pay for, and verify vapor mitigation measures. MCO asks that EPA state this explicitly in writing, by amending the	The purpose of the ROD Amendment is to describe EPA's selected remedy and not how it will be implemented or who will pay for it. However, as is the case with implementation of the soil and groundwater remedy at the MEW Site, EPA expects the Responsible Parties to implement the vapor intrusion remedy, or to ensure that it is implemented, at all affected buildings and properties	Mountain View Commercial Owners (MCO)

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	August 20, 2009 proposed change as follows (new text underlined): ***Sub-Slab System Options for Commercial Buildings:*** *EPA has received information about the implementability of types of sub-slab systems that had not been identified in the Proposed Plan as the preferred alternative for existing or future commercial buildings. For existing buildings, while EPA assessed the implementability of installing sub-slab systems in existing buildings as lower than that of the HVAC system alternative due to the disruption associated with drilling through an existing building's floor and slab, we understand that installing sub-slab systems in existing buildings may in fact be feasible in many circumstances, including installing sub-slab systems by drilling in from the perimeter of the building footprint. Therefore, the preferred alternative will be to look at a range of sub-slab options for that building, not just those that are installed through the building floor and slab, and then select the sub-slab system best suited to the building that is capable of reducing volatile organic compound (VOC) concentrations to below indoor air action levels. CERCLA remedies are implemented and paid for by the parties who have been identified by US EPA as responsible and who have been ordered to perform the work identified in a Record of Decision, typically via a consent decree and/or administrative order. In this case, the RPs, not building owners or tenants, will be responsible for implementing and verifying vapor mitigation remedies in commercial buildings at the MEW site. As discussed below, the remedy would still allow for use of a building's HVAC system for existing buildings if the property/building owner agrees to use, operate, and monitor the HVAC systems in a manner consistent with the operations and maintenance plan developed for that specific building.*		
129	**EPA's Proposed Plan Improperly Places Commercial Owners and Tenants In the Chain of Liability and Imposes Costs for the CERCLA Remedy on Them.** The risks of increased cancer incidence due to vapor intrusion at MEW are admittedly extremely low. Nevertheless, any harmful vapor intrusion is the legal responsibility of the companies that caused the contamination. EPA's Proposed Plan would unfairly place commercial property owners and their tenants in the liability chain by making them responsible for selection, implementation, and ongoing verification of a CERCLA remedy (e.g. HVAC).	As has been the case with the groundwater remedy and the vapor intrusion remedy to date, EPA expects that the MEW Responsible Parties will be responsible for ensuring that the remedy is operating as required. EPA will continue to work with the Responsible Parties to determine the remedial requirements and to implement that remedy in each building; however, because of the nature of vapor intrusion, individual property owners and operators have a role to play in ensuring the implementation of the remedy in a manner different from their roles with regard to subsurface groundwater. The owners and operators of property in the Vapor Intrusion Study Area will have certain involvement with remedy selection and implementation. For instance, the remedy selected does allow for property owners to work with	Mountain View Commercial Owners (MCO)

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	the Responsible Parties to utilize the building indoor air ventilation system as the engineered part of the remedy with the property owner's agreement. Where the property owner will not permit the air ventilation system to be utilized as the engineered remedy, then, where necessary, a sub-slab system must be installed. Regardless of the remedy utilized at any particular property, EPA will require assurances for: access for sampling and implementation of the remedy; notification of changes in ownership, building configuration, or actual building structure; and notification to future owners and operators of the ongoing vapor intrusion remedy. If the necessary assurances are not provided, EPA may require deed restrictions. These elements of the remedy of necessity involve property owners within the Vapor Intrusion Study Area.	
130 **The Proposed Plan Improperly Obliges the City of Mountain View to Pass and Enforce an Ordinance That Is Beyond Its Scope of Responsibility.** • The City of Mountain View has repeatedly emphasized to EPA that Mountain View "does not have the jurisdiction, resources, or staffing to implement [the] kind of ongoing monitoring and enforcement program" contemplated by EPA's Proposed Plan.[23][3] • Landowners do not have the resources or expertise to install or manage remedies to control vapors from groundwater contamination. • In contrast, the Responsible Parties and EPA have spent years studying the technical and scientific details of the vapor intrusion pathway at MEW. EPA should compel the RPs to assess each building and deploy an EPA-approved remedy (where a remedy is needed), with the RPs accountable to EPA (not the City of Mountain View) under consent decrees or administrative enforcement orders. • An ordinance is not needed for access. The majority of owners have already cooperated with RPs to provide enforceable access and most will do so if they are assured that the RPs will perform the necessary mitigation work, at no cost to the owner and without interference to ongoing commercial uses of buildings.	EPA did explore the process that would be required should the City be willing to consider passage of an ordinance, including the jurisdictional requirements and the resources that would be necessary to both develop and pass an ordinance as well as implement a monitoring and oversight program should such an ordinance have been undertaken. That said, the remedy selected in the ROD Amendment utilizes City planning and permitting procedures that do not require adoption of an ordinance as part of the institutional controls for the remedy. Importantly, EPA does not expect property owners at the Site to conduct any portion of the vapor intrusion remedy without expert assistance. The remedy will be determined for each building, and then an operation, maintenance and monitoring plan will be developed to govern implementation. Because the remedy must be implemented building-by-building, the landowners will necessarily be involved in the remedy's implementation; however, the extent of a property owners' involvement will depend upon the remedy selected for a particular building. For instance, where a property owner agrees to utilize the existing ventilation system as part of the remedy, the remedial requirements would be spelled out in the building's operations, maintenance, and monitoring plan, but the building owner and operator would be expected to conduct the actual operation of the ventilation system. Where mitigation in a building consists of installation of a sub-slab system, the property owner and	Mountain View Commercial Owners (MCO)

23 [(3)] Letter from Kevin Woodhouse to Elie Haddad and Alana Lee (Nov. 22, 2006); *see also* Letter from Kevin Woodhouse to Elie Haddad and Alana Lee (March 5, 2008) ("[T]he City does not have staff, resources or technical expertise to develop and implement such an ordinance and enforcement program.").

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		operator would be expected to provide access to install and operate the system and conduct the necessary monitoring. EPA appreciates the access that has been provided by the property owners to date. Access will be necessary going forward for sampling, building evaluation, remedy installation, confirmation sampling, and ongoing monitoring. Access for these activities has been and will continue to be undertaken accounting for use of the buildings and with an attempt to minimize any interference with operations. The remedy requires that agreements between the MEW Responsible Parties and the property owners ensure that notice is provided to future owners and operators of the remedy, access is assured, and that changes to building occupancy and use are conveyed to the Responsible Parties and to EPA. Regardless of the remedy utilized in any particular building, EPA anticipates that it will have an enforcement instrument in place (i.e., a consent decree or a unilateral order) with the MEW Responsible Parties to ensure implementation of the appropriate remedy in each building.	
131	**A Plan That Says *What* is Required, But Not *Who* is Liable, Is Unacceptable.** In numerous places, EPA's Proposed Plan sets forth requirements without specifying who is responsible for implementing (or paying for) the requirement. A ROD amendment, or any EPA supplemental remedial document, that states *what* is required to be implemented for vapor intrusion mitigation, but that does not specify *who* is to do it, may wrongfully impose responsibility on commercial owners, tenants, or city officials. It is also simply confusing, and may therefore lead to disputes or even litigation. Moreover, without clarity, prospective purchasers, lenders, and tenants have to assume they will be liable for these costs. These parties will steer clear of transactions that involve this type of exposure. This could have a very significant adverse impact on the economy of the City of Mountain View and its commercial properties.	A Record of Decision (ROD) or ROD Amendment documents the selection of a remedial action to be performed at a Site. The ROD is not a document used to assign liability. EPA's remedy selection decision sets forth the actions required to ensure protectiveness, regardless of how it is implemented. As has been the case with the groundwater remedy and the vapor intrusion remedy to date, following the issuance of the ROD Amendment, EPA expects that the Responsible Parties will be responsible for ensuring that the remedy is operating as required by the remedy.	Mountain View Commercial Owners (MCO)
132	**RPs Must Be Responsible for Sub-slab Systems in New and Existing Buildings.** • EPA has suggested it may be appropriate to require developers, not RPs, to pay the cost of vapor mitigation measures in new buildings. If vapor remedies are required as a CERCLA remedy, we see no valid reason why a private landowner should pay these costs. There is no supportable public policy rationale for discriminating between new and	The ROD Amendment documents the selection of the vapor intrusion remedy, both for current buildings overlying the shallow groundwater contamination, and future construction in this area. Although property owners and the City will have a role, as they have with the groundwater remedy and the vapor intrusion remedy to date, following the issuance of the ROD Amendment, EPA expects that the MEW Companies will be responsible for ensuring that the remedy is	Mountain View Commercial Owners (MCO)

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existing buildings. If EPA were building a new headquarters, would it want to pay to put in special controls for contamination that a known, solvent industrial tenant left behind because EPA is the "developer"? We think this is unlikely. Further, the RPs are responsible for ensuring their contaminants do not migrate horizontally or vertically. The RPs have installed and paid for slurry walls and a series of sophisticated extraction wells to contain contaminants horizontally; they should also contain their contaminants vertically. • EPA staff have explained that "in the past some developers have paid for vapor mitigation when new buildings are built." This is true. But it occurred when there was no specific agency mandate to install a vapor remedy and developers were simply trying to provide extra safeguards and added protection for their buildings. But if recent tests show evidence that vapor measures must be a formal CERCLA remedy in some buildings, RPs should pay for them --just as they pay for the costs to clean up soil and groundwater. • EPA staff have also noted that at some military sites, developers have paid for some elements of cleanup. That is an entirely different situation from what has occurred at MEW. Certain California bases were auctioned off with deeds that contained very explicit limitations on the cleanup measures the military would (and would not) undertake. All bidders were aware that they needed to factor some remedial costs into their bids. The situation at MEW is entirely different. All the MCO members bought their properties with the understanding that large, financially capable corporations were taking full responsibility for all necessary Superfund cleanup costs. That should continue to be the case for new and existing buildings.	implemented as required by the remedy.	
133 **Uncertainty Has an Impact on Property Values, Financing and Leasability.** • Prospective tenants, lenders or purchasers expect certainty in their financial transactions. They will not provide a defined amount of funding in the case of a loan or purchase, or "bet the company" in the case of a lease, where the timing is uncertain or conditions vague. These prospects will go elsewhere or, at a minimum, withdraw. This would leave an existing building unoccupied and unfinanced. Since the value of real estate is based on cash flow, a building with no cash flow will suffer a great decrease in value. Additionally, existing loans with approaching maturity dates cannot be replaced	Implementation of the vapor intrusion remedy is intended to provide certainty that the contamination will be addressed in buildings overlying the shallow groundwater contamination. The real estate and rental markets are affected by a wide range of factors in addition to contamination, and we cannot predict these markets. Full implementation of the vapor intrusion remedy should be able to provide assurance that the contamination has been characterized and that all exposure pathways are being addressed. EPA can provide property owners with sampling results and what, if anything, will need to be done to address the contamination.	Mountain View Commercial Owners (MCO)

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	because no new replacement lender will provide funding due to this uncertainty. This will result in the lender filing a Notice of Default and possible foreclosure. • Although leases are commercial transactions, they have many similarities to a consumer product. Tenants want simplicity, a predictable environment, traditional operating practices and to feel good emotionally about their decision. In using an automobile analogy for the HVAC remedy, tenants are not interested in being educated about whether the catalytic converter is operational while they are in the car, monitoring the catalytic system to ensure it stays operational, or reporting their results to a third party; they just want to drive the car and know that engineers have made it safe. Again, the longer there is uncertainty about whether a tenant may be operationally or financially responsible for these activities, the more it provides further negative impact on value and leasability.		
134	**Land Use Covenants May Trigger Foreclosure on Existing Loans or Make Properties Difficult to Finance.** Recorded Land Use/Restrictive Covenants are encumbrances against title. Security Instruments (Deeds of Trust) for traditional real estate loans contain a covenant that "Borrower shall keep the Property free from liens and encumbrances other than the lien of this Deed of Trust. If there is a default in the performance of this covenant, it is an "Event of Default," allowing the Lender to, "without notice, declare all Debt immediately due and payable." Thus, the imposition of land use covenants could force properties into foreclosure. This significant economic consequence is nowhere discussed in EPA's evaluation of institutional controls.	As described in the ROD Amendment, the institutional controls (ICs) for the vapor intrusion remedy do not currently include deed restrictions. Instead the ICs require recorded agreements, which will still be effective, but, according to property owners in the area, will be much less difficult to implement than deed restrictions. However, EPA may require deed restrictions if the recorded agreements are not implemented as required.	Mountain View Commercial Owners (MCO)
135	**An Ordinance Could Impact Value and Leasability.** An MEW ordinance would be unique to the area. It would stand out to real estate brokers, lenders, tenants, and purchasers as a warning they need to be especially careful in consummating a transaction in this area. Most professionals are familiar with the MEW site's history and the fact vapor intrusion was a discussion topic a number of years ago. Many will assume that, for there to be a sudden push to cause the City to enact an ordinance that points to properties in this area and no other, the conditions must have become significantly worse. Word spreads quickly and the public's perception becomes what they hear rather than what they might learn by reading 1,200 pages of technical information.	As indicated in the ROD Amendment, ICs for the vapor intrusion remedy no longer include a municipal ordinance. There will be informational components of the ICs to ensure that owners and occupants understand the remedy and its requirements, but they will not be within an ordinance. The City has committed to formalizing planning and building procedures that have been in place informally since EPA began investigation of the vapor intrusion remedy at the Site several years ago.	Mountain View Commercial Owners (MCO)
136	**The Proposed Plan Is Unnecessarily Stigmatizing.** The Proposed Plan seems to have its origins in elevated detections	Sampling results have confirmed the potential for vapor intrusion at levels above EPA's indoor air cleanup levels in	Mountain View Commercial Owners

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	of VOCs in a handful of the commercial buildings south of the 101 Freeway. These buildings have all been identified. Some of them are slated for demolition and vapor conditions in the others have been remediated. Currently all tested occupied buildings are at acceptable levels. The RPs are in compliance with their CERCLA orders. It seems EPA's and the City of Mountain View's policies and procedures are working satisfactorily. By publishing a plan that is vague as to specifics and timing, but that appears to flag a unique problem, the business community is left only to speculate. Seasoned business professionals do not want to make decisions based on speculation or uncertainty.	buildings overlying the shallow subsurface contamination at the MEW Site. Many, but not all, of the buildings in the Vapor Intrusion Study Area have been sampled and not all of the sampled buildings with elevated indoor air levels have been remediated. The ROD Amendment specifies the required remedial action: after samples are collected from each building and analyzed, the appropriate remedy is applied based on the sampling analytical results and the respective response action tiering system. With the remedy in place, speculation regarding the remedy with regard to that building should no longer be an issue. Changes to the building configuration or redevelopment of the property may also trigger requirements for remedial action. To date, EPA and the City have been working to ensure that protective measures are incorporated into planning and permitting requirements for new construction; however, to date, these efforts have been informal. The ROD Amendment requires the formalization of these requirements to ensure protectiveness in all buildings overlying the shallow groundwater contamination at the Site.	(MCO)
<u>Health Concerns</u>			
137	What is the effect, if any, of TCE on plants grown for food, and further on health of people consuming such food. This would include vegetables, specifically tubers such as carrots and potatoes, as well as fruit trees. Please include reference studies on this topic in your response.	Most groundwater within the MEW Area would not come into contact with vegetable roots because the water table is typically 10 to 20 feet below ground surface and most vegetable roots do not reach down this far. Groundwater contamination at Moffett Field is 5 to 10 feet below ground surface; however, at contaminated sites where the water table is less than 10 feet, eating vegetables watered with local groundwater has not been identified to pose a significant health risk. TCE found in groundwater is not known to bioconcentrate (build up) in plants to any significant degree (see references below). Laboratory studies have been conducted to see if vegetables store TCE and have determined that minimal (if any) accumulation of TCE occurs in vegetables, likely due to TCE's tendency to evaporate. See references below. *Trichloroethylene Uptake into Fruits and Vegetables: Three-Year Field Monitoring Study* http://pubs.acs.org/doi/pdf/10.1021/es0621804?cookieSet=1 Agency for Toxic Substances and Disease Registry: http://www.atsdr.cdc.gov/toxprofiles/tp19.html National Library of Medicine databases on toxicology,	L.M. Community Member

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		hazardous chemicals, environmental health, and toxic releases: http://toxnet.nlm.nih.gov/cgi-bin/sis/search With respect to plant toxicity, there is some evidence that TCE is toxic to plants at about 1 part per million in soils. This may be due to conversion of some of the TCE to trichloroacetic acid which is known to be phytotoxic. See references below. *Phytotoxicity and Fate of 1,1,2-Trichloroethylene: A Laboratory Study:* http://www.springerlink.com/content/q8797547mu3gkru1/ *Input of trichloroacetic acid into the vegetation of various climate zones—measurements on several continents:* http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V74-48FSTYD-1&_user=14684&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=976621142&_rerunOrigin=google&_acct=C000001678&_version=1&_urlVersion=0&_userid=14684&md5=cd1fe1e661039fd810ad3d7ff07a9a3a	
Expedite Groundwater Cleanup So Vapor Intrusion Remedy No Longer Necessary and New Remedial Action Objective ("RAO")			
138	I would like to see incorporated in this proposal more addressing of, other than pump and treat, what can be done to actually clean up the sites so that all of these remediations are no longer necessary.	The ROD Amendment for the Vapor Intrusion Pathway addresses the potential health risks associated with long-term exposure to TCE and other MEW Site chemicals of concern through the vapor intrusion pathway in current and future buildings. The ROD Amendment includes the remedial action objective of accelerating the reduction of the source of vapor intrusion (i.e., Site contaminants in shallow groundwater and soil gas) to levels that are protective of current and future building occupants, such that the need for a vapor intrusion remedy would be minimized or no longer be necessary. Groundwater cleanup optimization efforts and alternative groundwater cleanup technologies to expedite cleanup are currently being evaluated and tested as part of a separate Site-wide Groundwater Feasibility Study.	Jane Horton Resident
139	Make it clear that the Vapor Intrusion document does not take the place of clean-up. Spell it out so clearly that there is no way to misunderstand.	This has been clarified in the ROD Amendment.	Jane Horton Resident
140	Have biofilters been used, and/or could they be used in the future, for either air or water contamination at MEW site? Please see the following for reference: "Microbial Transformation and Degradation of Toxic Organic Chemicals" by Lily Y. Young and	Biofilters are typically used to treat pollutants in wastewaters and off-gas from manufacturing or remediation processes. Biofilters are not typically used to improve general indoor air quality, although particular indoor houseplants have been	L.M. Community Member

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	Carl E. Cerniglia, 1995 (Pp 408, 461 and Table 12.5).	shown to have some positive effect. Biofilters may be considered in the future Supplemental Site-wide Groundwater Feasibility Study as a treatment component for groundwater.	
141	Have birch and other trees been considered as a form of bio remediation?	The use of trees and plants for remediating soil and groundwater (otherwise known as phytoremediation) has been used successfully at certain sites, and will be evaluated for remediating Site groundwater under a future Supplemental Site-wide Groundwater Feasibility Study. This ROD Amendment addresses the vapor intrusion pathway only, for which phytoremediation is not considered applicable.	L.M. Community Member
142	Change the remedial-action objective about "reducing the source" to "accelerating the reduction in the source."	The remedial action objective has been changed to ”To accelerate the reduction of the source of vapor intrusion (i.e., Site contaminants in shallow groundwater and soil gas) to levels that are protective of current and future building occupants, such that the need for a vapor intrusion remedy would be minimized or no longer be necessary” in the ROD Amendment.	Peter Strauss MEW and NAS Moffett Field TAG Technical Advisor
143	**CPEO wants to reiterate the necessity of speeding up the groundwater remedy so that eventually vapor intrusion remedies are no longer necessary.** We expect such innovative strategies to be discussed in the “Supplemental Site-wide Groundwater Feasibility Study” for the site. It is imperative—to promote the cooperation of residents, other property owners, commercial and education tenants, and local officials in the complex web of necessary site management discussed above—that EPA affirm its commitment to this principle now.	EPA is committed to evaluating alternative groundwater cleanup technologies to expedite the cleanup so that the vapor intrusion remedy will no longer be necessary. EPA will continue to work closely with and seek the cooperation of and input from the community stakeholders in managing our Site cleanup efforts.	Lenny Siegel CPEO
144	If none of the indoor breathing zone samples pose short or intermediate term health risk, then we should work to clean up the source of the vapor before people are exposed to the vapor long term. The EPA should speed up the process to rid the area of the source of the TCE vapor using emerging methods to clean up the ground water, and therefore, the source of the vapor that is potentially intruding into homes.	See EPA responses to Comments 138, 142, and 143.	Wagon Wheel Neighborhood Association
145	Eliminate the source of the problem - The EPA should work to eliminate the source of the vapor problem by more aggressive pumping and clean up of the underground source of the vapor.	See EPA responses to Comments 138, 142, and 143.	Mission West Properties LP Commercial Property Owner
146	The City supports the Responsible Parties, the property owners and their tenants (both commercial and residential), and EPA in their efforts to do what is reasonably necessary to resolve all conditions that pose any threat to the health, safety and well-being	See EPA responses to Comments 138, 142, and 143.	City of Mountain View

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of the citizens of Mountain View and the community in general. Of paramount concern to the City is protection of the health, safety and well-being of its citizens. Toward this end, the City believes it is imperative that the RPs, property owners and EPA reach consensus on the best and most effective vapor intrusion remedy as quickly and as efficaciously as possible. The City agrees that it is necessary to accelerate remediation of the solvent plume in the groundwater to mitigate and eventually eliminate risk from vapor intrusion. This is the best and most effective way in *which* to mitigate *risk from* vapor intrusion into structures within the MEW Study Area. As such, alternative remedial technologies, such as bio-remediation or others, should be tested and, if successful under site conditions, implemented expeditiously to clean up the groundwater as soon as possible.		
147 **EPA should Expedite Cleanup of the Groundwater.** • **The Vapor "Remedies" Do Not Address the Underlying Problem.** In CERCLA terminology, the vapor intrusion "remedy" in the Proposed Plan does nothing to reduce toxicity, volume and mobility of contaminants. Active remediation of soil and groundwater is needed for that. Vapor intrusion is best controlled by completing cleanup of the site and eliminating the underlying source of VOCs in soil and groundwater. • **EPA should Respond to the RPs' Proposals.** We understand the RPs have submitted pilot study work plans to assess innovative groundwater cleanup options to EPA that have not received a response or comments for nearly a year. MCO encourages EPA to review and approve expeditiously all efforts by the RPs to accelerate the cleanup.	See EPA responses to Comments 138, 142, and 143.	Mountain View Commercial Owners (MCO)
148 The Proposed Plan specifies a Remedial Action Objective ("RAO") of protecting building occupants at the Site from vapor intrusion. But the plan also includes a "contingent" RAO related to groundwater cleanup standards, stating that EPA also intends to reduce or minimize the source of vapor intrusion (i.e., site contaminants in shallow groundwater) to levels that would be protective of the current and future building occupants, such that the need for a vapor intrusion remedy would be minimized or no longer be necessary. ***This Remedial Action Objective will not be addressed by the proposed vapor intrusion remedy; instead, it will be addressed by the current groundwater remedy,*** *which* ***is now being re-evaluated in a separate Supplemental Site-wide Groundwater Feasibility Study for the Site.***	The 1989 ROD established Remedial Action Objectives ("RAOs") to remediate contaminated groundwater to drinking water standards. However, the 1988 Endangerment Assessment, used to develop the groundwater RAOs, did not evaluate the subsurface vapor intrusion pathway. EPA's current understanding of the vapor intrusion pathway is that there is the potential for vapor intrusion into overlying buildings from the contaminated shallow groundwater at the MEW Site. Therefore, EPA is amending the 1989 ROD to address the vapor intrusion pathway. The RAOs in this ROD Amendment supplement those already selected in the 1989 ROD. Because TCE and other contaminant of concern in the shallow groundwater are the source of the indoor air contamination, it is appropriate to amend the RAOs to add that the groundwater must be remediated not only for the	Raytheon and Schlumberger Technology Corp. MEW Responsible Parties

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(emphasis in original). This statement is not an appropriate RAO, and should not be included in the ROD in this document because it is not an actual objective of the proposed vapor intrusion remedy evaluated by EPA. Rather than guiding the remedy selection process in the ROD, the statement only characterizes EPA's future intent, in a future document. Inclusion of such a statement as an RAO in the ROD is inconsistent with the NCP and EPA guidance, and would be unnecessarily premature given the circumstances at the Site. The NCP requires that EPA address a host of statutory requirements "as they relate to the scope and objectives of the action," including how the selected remedy, guided by the RAOs, is protective of human health and is consistent with ARARs, and whether it is cost-effective. 40 C.F.R. § 300.430(f)(5) (emphasis added). There is no administrative record or EPA evaluation at this time of how these required factors support this "contingent, anticipated" groundwater RAO for vapor intrusion. It is not possible for EPA to evaluate a selected remedy in the ROD, as required by the NCP, against an amorphous statement of possible future EPA action. EPA guidance further specifies that the discussion of RAOs should be directed to the "specific response action described in the ROD." See A Guide to Preparing Superfund Proposed Records of Decision, And Other Remedy Selection Documents (U.S. EPA July 1999) (OSWER 9200.1-23P) at § 6.3.8. The guidance also requires that RAOs "provide a general description of what the cleanup will accomplish," and "serve as the design basis for many of the remedial alternatives" discussed in the ROD. Id. Discussion of the RAOs in the ROD should include, at a minimum: (1) clear statement of applicable objectives; (2) basis and rationale for the objectives; and (3) how the objectives address risks identified in the risk assessment. Id. A "contingent" or "anticipated" action by EPA at some indeterminate time in the future, if ever, is not a "clear statement" providing a description of what the remedy "will accomplish." There is no way for EPA to address or analyze this contingent statement as required by the guidance. It is not, for instance, possible to use contingent future EPA action as a "design basis" for the analysis of remedial alternatives. Similarly, EPA cannot reasonably discuss how possible future EPA action, not yet developed or analyzed, addresses risk at the Site. Plainly put, attempting to characterize a possible or contingent future action by EPA as an RAO is trying to fit a square peg in a round whole. Neither the NCP, nor EPA guidance, anticipate or	purpose of restoring the drinking water resource, but also to prevent vapor intrusion into overlying buildings. Selection of this RAO is not premature, nor is it directed at a future anticipated action, as the MEW groundwater remedy has been underway for many years. This RAO simply clarifies one of the purposes of the groundwater cleanup. Concurrent with the selection of this vapor intrusion remedy, EPA is planning to conduct a Supplemental Feasibility Study for the existing groundwater remedy to determine whether there are other or additional remedial alternatives that could be implemented to expedite cleanup. Speeding up the process of groundwater cleanup is important, in part, because of the ongoing threat of human exposure through the vapor intrusion pathway. The Supplemental Groundwater Feasibility Study being conducted may result in a second ROD Amendment. For that process, it is important that the groundwater cleanup goals are for both drinking water restoration and for protection of indoor air in overlying buildings.	

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	allow for this type of RAO. Finally, for the reasons discussed elsewhere in this letter, it is also premature to conclude that a change to the groundwater remedy at the Site is necessary to address vapor intrusion. To the contrary, there is substantial evidence that the measures proposed by EPA in the plan have fully addressed, or will fully address, past, present and future vapor intrusion. For this reason, EPA should refrain from committing itself to a course of action on how future groundwater remedies may relate to vapor intrusion until the issue has been adequately evaluated. Such an evaluation, at a minimum, would require development of an administrative record and satisfaction of the relevant NCP requirements.		
<u>Miscellaneous</u>			
149	Will the Navy follow this plan?	EPA will work with the Navy, NASA, Army, and MEW Companies to ensure that the vapor intrusion remedy is implemented within the Vapor Intrusion Study Area on Moffett Field.	Peter Strauss MEW and NAS Moffett Field TAG Technical Advisor
150	Make this "irrevocable" so that this plan cannot be changed without public review and input. Make it clear that this document is valid no matter who is in charge of Region 9 and that there is no end date except for when the groundwater is clean.	This ROD Amendment sets forth the vapor intrusion remedy to be implemented to ensure protectiveness of human health. The remedy decision remains in place until it is no longer needed to ensure protectiveness. Sometimes, after a ROD is signed, new information is received or generated that prompts reassessment of a selected remedy. When this occurs, EPA evaluates the information relative to the applicable criteria used to select the remedy and determines whether a change in the remedy is warranted or necessary to ensure continued protectiveness. Where any change to the remedy is considered, EPA must document that change appropriately and follow the appropriate public process. As set out in the National Contingency Plan [NCP §300.435(c)(2)], where the change is significant, EPA would be required to issue an explanation of significant differences (“ESD”) and EPA would publish a notice in the newspaper. Where the proposed change to the remedy is fundamental, a ROD Amendment, that would undergo the same public process as this ROD Amendment (EPA Proposed Plan, public meeting and comment period), would be required.	Jane Horton Resident
151	1. I believe that openness and availability of information is important to us as individual residents and to all of us as a neighborhood and in the City of Mountain View. 2. Given the unchangeable mistakes of the past, I believe the scientific methods and approach researched and proposed by the	Comments acknowledged. See EPA response to Comment 76 regarding the City ordinance. The selected vapor intrusion remedy does not include adoption of an ordinance by the City of Mountain View.	E.S. Resident

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	EPA at taxpayer expense **is a sound and responsible approach** to short and near term mitigation and long term remediation. 3. While current property owners might see detrimental effects on their property values as a result of proposed tests, mitigation procedures, and published information**, I strongly believe it is better to KNOW and ACT** then to willfully resist knowing and taking action. 4. **I support and agree with the proposals** and participation in EPA remediation program and believe that acceptance of EPA plan will in the long term benefit our neighborhood as eventually this problem will be fixed and resolved, even if it takes years. Finally, this is an important health issue to the residents at the periphery of the main underground plume, and to all of us outside the affected area, but in the vicinity and breathing the same air. And an age-old adage tells us that "we cannot control what we don't measure" and so **we should support and adopt the EPA proposals, support our neighbors, by measuring and taking action as prescribed by the EPA.** In summary, I therefore support the government's EPA proposals. And would also consider supporting City of MV ordinances once they are drafted and reviewed.		
152	**The Proposed Plan Does Not Address Timing.** EPA's Proposed Plan lacks timetables and deadlines for RPs to implement vapor measures at either existing or new buildings. In the case of new buildings, timing is paramount. At a minimum, transactions can become much more costly when there is uncertainty in timing. If a project is delayed and a tenant or financing market is missed, the project can become a financial disaster. It is very important that EPA and the RPs act promptly -- especially where properties are being redeveloped, reconstructed, re-leased, or re-financed -- in order to avoid economic losses to owners, tenants, lenders, and the City of Mountain View.	The implementation schedule for the vapor intrusion remedy for existing and new (future) buildings in this ROD Amendment will be addressed as part of the remedial design and remedial action phase. The scope of work and, milestones for the remedial design and remedial action will be developed by EPA and the responsible parties. EPA intends to work closely with property/building owners on addressing access and schedule constraints and concerns.	Mountain View Commercial Owners (MCO)
153	**EPA Should Have Included Property Owners in Discussions About Vapor Intrusion Remedies Years Ago When It Undertook These Studies.** EPA and RPs have spent years studying vapor issues but did not include property owners, even though they are clearly key stakeholders. Even with extensions, owners have had very limited time to try to understand complex data and to retain the experts necessary to make comments. EPA should take the time necessary to work out a solution that is workable and agreeable to all affected parties.	EPA appreciates the time, effort, and cooperation of the property owners and values all the input provided to EPA. EPA will continue to work with the property/building owners, stakeholders, and responsible parties to ensure that the vapor intrusion remedy is implemented and protective of public health.	Mountain View Commercial Owners (MCO)
154	**EPA's Proposed Plan Has Not Received Community Acceptance.** CERCLA requires EPA to formally consider whether	EPA has carefully considered all of the public comments received on the Proposed Plan and provided a	Mountain View Commercial Owners

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	a proposed remedy is acceptable to the community. For all the reasons noted, the July 2009 Proposed Plan is not acceptable to MCO, key stakeholders comprising eighty percent (80%) of the commercial owners by square footage at the MEW site.	Responsiveness Summary as Part 3 of the ROD Amendment. EPA has revised the remedy based on public comments. Some key changes include: (1) changing EPA's selected remedy for existing commercial buildings to installation of an appropriate sub-slab/membrane system unless use of the building's indoor air ventilation system (e.g., HVAC) meets the remedial action objective and is implementable on a long-term, ongoing basis, and (2) changing the selected ICs to (a) reliance on the City's permitting and planning procedures to ensure future construction incorporates remedial components, and (b) recorded agreements with the property owners to ensure non-interference with the remedy, access for sampling, operation and maintenance of the remedy, that future owners and operators are informed of the remedial requirements, and that EPA and the responsible parties are informed of any physical changes to the building that may impact the remedy as well as any changes to property, ownership, or occupancy.	(MCO)
155	**Comments Submitted by the Center for Public Environmental Oversight.** MCO was provided with an October 23, 2009 memorandum to Alana Lee from Lenny Siegel of the Center for Public Environmental Oversight (CPEO), containing CPEO's comments on EPA's Proposed Plan. MCO agrees with many of CPEO's comments, as discussed below. **Areas of General Agreement.** MCO generally agrees with the following CPEO comments, identified by paragraph number: **No. 3** (goals based on long-term health effects); **No. 4** (performance goals); **No. 5** (long-term monitoring); **5(b)** (monitoring of physical parameters); **5(c)** (indoor air sampling); **5(e)** (inspections); **5(g)** (training); **5(h)** (contingency planning); **5(j)** (annual reports); **5(k)** (certification); **No. 7** (poorly delineated plume boundaries); **No. 11** (plan should address changes in background TCE concentrations); **Nos. 12 and 13** (plan should define vague terms); **No. 14** (each building should be tested); and **No. 15** (groundwater remedy should be accelerated and prioritized). **Areas of Disagreement or Comment.** • **No. 1.** MCO disagrees with CPEO comment No. 1 to the extent it is vague and can be interpreted to obligate innocent commercial owners to implement mitigation and demonstrate its effectiveness. The responsibility must clearly lie with the RPs.	Comments acknowledged. EPA appreciates both CPEO's and MCO's comments. See EPA responses to CPEO's comments (2, 6, 9, 10, 11, 23, 25, 30, 31, 32, 34, 35, 65, 66, 67, 68, 69, 70, 99, and 143).	Mountain View Commercial Owners (MCO)

- In addition, installation of a sub-slab remedy through the building's perimeter foundation system is an approach recommended by EPA for radon mitigation (EPA, July 1991, EPA/625/6-91/029). MCO agrees that the effectiveness of such a system should be verified through pressure measurements and sampling data.
- **No. 2 (HVAC).** MCO disagrees with CPEO comment No. 2 to the extent it calls for HVAC as a mitigation measure that is not predicated on owner consent, and to the extent it does not clearly place responsibility on the RPs for implementation and operation costs
- **No. 5(a) (Notice).** MCO disagrees with CPEO comment No. 5(a). There is no need to alarm the general public by placing placards at the entrance to non-residential buildings warning them of extremely remote vapor intrusion risks. It will be damaging to Mountain View's economy if its commercial properties are negatively branded with placards not required elsewhere.
- **No. 5(d) (Operations and Maintenance).** MCO agrees with CPEO that an operations and maintenance (O&M) plan is needed. However, it should be clear that the RPs are responsible for implementing the O&M Plan.
- **No. 5(f) (Institutional Controls).** MCO disagrees with CPEO comment No. 5(f). MCO does not support institutional controls that would contain "enforceability prohibitions" on the use of private property. Instead, MCO, in its Proposed Alternative, recommends a mechanism whereby the RPs would be notified of any owner planned construction activity that would breach a slab or otherwise require adjustment to a vapor mitigation measure; this will allow the RPs to respond in a timely manner to ensure the appropriate repairs are made, where needed. Instead of prohibiting land uses, RPs should be required to install vapor remedies and adapt them to changing conditions.
- **No. 5(i) (Continuous Management).** MCO agrees that continuous monitoring tools are appropriate for systems that have regular human interaction relating to the building operation, such as an HVAC system (e.g., people adjusting the HVAC for comfort reasons). However, for sub-slab systems, continuous monitoring is not necessary because the blowers are highly reliable and only people who are knowledgeable of the system would have access to it.

- **No. 6 (Ordinance).** MCO disagrees with CPEO comment No. 6. As explained throughout MCO's comments, a health and safety municipal ordinance is not acceptable.
- **No. 9 (Active Sub-structure Depressurization).** MCO also generally favors sub-structure systems. However, we understand that vapor barriers are not necessary for active sub-slab systems.[24][21] MCO agrees that active systems are more effective than passive systems, but passive systems can be appropriate, so long as adequate monitoring is performed to demonstrate the system's effectiveness. Such monitoring could be sub-slab to show that concentrations do not exceed the indoor air Action Level adjusted with an appropriate sub-slab-to-indoor-air attenuation factor. Although the FS cost estimates only show a $500 per year differential for an active system compared with a passive system at a residential building the Bay Area Air Quality Management District (BAAQMD) typically requires active systems to be permitted and the discharge to be monitored. The FS cost estimates do not account for these BAAQMD compliance costs.
- **No. 10 (Preference for Reliance on Soil Gas Data).** MCO agrees that soil gas data are a useful indicator for vapor intrusion potential. However, sub-slab data are also useful indicators. Therefore, MCO does not support any single type of sampling as a "better" indicator for vapor intrusion.

24 (21) DTSC, *Vapor Intrusion Mitigation Advisory* (April 2009).