

APPENDIX E

RESPONSES TO EPA COMMENTS ON SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT FOR VAPOR INTRUSION SUBMITTED ON 14 AUGUST 2006

APPENDIX E

Responses to EPA Comments on August 2006 Supplemental Remedial Investigation Report for Vapor Intrusion Middlefield-Ellis-Whisman (MEW) Area and Moffett Field, California

EPA General Comments

General Comment 1

Some of the technical conclusions and statements made as facts in the Draft Supplemental Remedial Investigation Report (Draft RI Report) are not sufficiently supported by the information presented. The Draft RI Report lacks comprehensive information about the ventilation criteria, its development, and how it is to be implemented. Additionally, several factual errors were noted. The following comments should be addressed in the Revised RI Report.

Response: See below for responses to individual comments.

General Comment 2

Based on all the data collected as part of the RI, the Draft RI Report is missing the fundamental basis for conducting the Feasibility Study (FS). EPA has determined there is the potential for vapor intrusion into buildings overlying the shallow subsurface contamination at the MEW Superfund Study Area (Site). Assessment is needed to determine what actions are necessary to prevent, cut off or minimize the potential vapor intrusion (VI) pathway at the Site and ensure building occupants are protected from Site contamination. The RI Report should be revised to better explain why the FS is necessary and that the FS process will evaluate alternatives to address the vapor intrusion pathway at the MEW Site.

Response: Per the request in the comment above, language from EPA's 8 March 2006 letter requesting a supplemental RI/FS for vapor intrusion will be included in Section 1.1.

General Comment 3

Navy's Lack of Participation in Supplemental RI/FS Process and Ability to Evaluate the Vapor Intrusion Pathway.

Throughout the Draft RI Report, the MEW Companies assert that the evaluation of the VI pathway is not possible in certain areas north of U.S. Highway 101 on Moffett Field because of alleged uncharacterized Navy source areas. EPA does not agree that assessment of the VI pathway is dependent upon the further characterization of potential Navy source areas. The subsurface to indoor air pathway for contaminants is an actual and potential exposure route threatening human health in areas overlying the regional groundwater contamination, which includes both source areas and the co-mingled MEW, Navy, and NASA groundwater contamination. Vapor intrusion is a potential problem where there is volatile organic compound (VOC) contamination in the subsurface, whether as part of a source area or a dissolved plume. Accordingly, the vapor intrusion remedy will apply to all current and future buildings overlying source areas and regional VOC contamination.

Although the Navy is responsible for addressing its sources, areas where there is not an identified source, remedial action to address the VOCs is the joint and several responsibility of the Navy, MEW Companies, and NASA. While EPA continues to encourage the Navy to participate in the Supplemental RI/FS process for the vapor intrusion remedy, EPA will expect all of the potentially responsible parties (PRPs) to implement the vapor intrusion remedy once the Record of Decision is finalized.

Response: As shown in the Supplemental RI report, The MEW Companies and NASA have conducted an extensive investigation and implemented, when necessary, interim remedial measures to address the vapor intrusion pathway. The Navy has participated in meetings and received draft and final versions of work product related to the supplemental vapor intrusion RI/FS, but the Navy has not yet accepted responsibility in its area of responsibility (e.g., WATS) to investigate and remediate, when necessary, the vapor intrusion pathway. As recognized by EPA, sufficient information has been collected by the MEW Companies and NASA in the RI phase to evaluate remedial alternatives for the vapor intrusion pathway. Accordingly, the draft supplemental FS develops a menu of alternatives to be used for existing and future residential and commercial properties at the Site. It is uncertain at this time how the Navy will use the findings of the FS to address the vapor intrusion pathway in its area of responsibility.

General Comment 4: Conceptual Site Model

A conceptual site model (CSM) identifies sources, potential exposure pathways and receptors. A site-wide CSM should be presented in the Draft RI Report that explains all sources and migration pathways for the entire MEW Site. Subsequent figures should then focus on the air exposure pathways (both indoor and outdoor). The Draft RI Report only partially discusses the subsurface to indoor air pathway and how contaminants of concern can enter into buildings.

In addition, the CSM needs to be improved to look at the bigger picture when considering the outdoor air pathway. It appears that a faulty interpretation of what constitutes "background" for an indoor air environment is presented in the Draft RI Report. For instance, the Draft RI Report refers to outdoor background as the background for indoor air; however, this is not accurate. Indoor air background can be influenced by indoor sources (consumer products) as well as contributions from outdoor ambient air that surrounds the building; whereas contaminants in outdoor air near buildings reflect the net contributions from sources such as local industry, off-gassing from subsurface contamination, and more distant sources (what the Draft RI Report refers to as "background"). Refining the CSM, specifically with regard to background air will improve the interpretation and analysis of the indoor air data.

Response: The subject of the supplemental RI/FS is the vapor intrusion pathway, so it is not clear why a site-wide CFM explaining all sources and migration pathways for the entire MEW site is necessary. This discussion will be provided in the Site-Wide groundwater FFS¹ that is being developed for the Site. Section 3.3 of the Supplemental RI included a short description of the other pathways evaluated in the Endangerment Assessment. A similar short description will be included in the introduction to Chapter 3 of the revised RI.

Regarding the second part of the comment above, the CSM is very clear in distinguishing between the different sources that contribute to indoor air. More specifically, it identifies indoor sources (e.g.,

¹ Northgate Environmental Management, Inc., 2007, "Site-Wide Focused Feasibility Study Work Plan, Middlefield-Ellis-Whisman Study Area, Regional Groundwater Remediation Program", 31 July.

consumer products) as a potential source of VOCs to indoor air (see Section 3.1 of the Supplemental RI). From the comment above, it seems EPA would rather change the definitions of background to differentiate between background due to indoor sources and background due to outdoor sources. These definitions will be included in the revised RI.

General Comment 5: Comparison of Indoor Air to Outdoor Air

The primary objective of the Supplemental RI is to evaluate the nature and extent of indoor air contamination due to vapor intrusion, thus it is important that outdoor air represent the net influence of both local and distant sources of trichloroethene (TCE), the primary chemical of concern at the Site and other VOCs. Nearby sampling points (not distant points) are most relevant to assessing the contribution of outdoor air infiltration into individual buildings. In addition, because of the temporal variability in outdoor TCE levels, outdoor air testing should coincide with indoor air testing. Therefore, as discussed at EPA/MEW/Navy/NASA All Parties meetings, for purposes of evaluating vapor intrusion, the indoor air results should be compared to nearby outdoor air samples collected concurrently with the indoor air samples. In addition, the RI Report's conclusions should state whether the indoor air results are consistent with outdoor ambient air data (see glossary of terms below), and remove the reference to "background."

Response: When collecting indoor air samples, outdoor samples were collected concurrently with the indoor air samples. Section 4.1.1 of the Supplemental RI defines outdoor samples to be collected "outside buildings (e.g., at HVAC unit inlets" and that the "results from these samples can be compared to those from indoor samples to evaluate the potential contribution of VOCs from outside air to indoor air". The Supplemental RI includes such a comparison for each sampled building in Chapter 4 and in Table 4-18.

It is also important to compare indoor air concentrations to background (outdoor air) – as defined in EPA's comments. Samples from some of these background locations (e.g., the Whisman Park Station) provide data on outdoor air concentrations on days other than the days when indoor air samples were collected. As a result, it provides additional data on outdoor air quality in the area. Future remedial decisions may depend not only on the outdoor air samples collected on the day of sampling, but also on the general background concentrations measured in the area.

General Comment 6: Impact of Subsurface Contamination on Outdoor Air

A secondary objective of the Supplemental RI is to evaluate the nature of subsurface contamination at the MEW Site and its impact on outdoor air (Subsurface to Outdoor Air Pathway). "Background" air in this case would refer to any outdoor air contamination that is not related to volatilization from contaminated soils and groundwater at the MEW Site. Statistical comparisons between local outdoor air quality and air quality further upwind could be helpful in evaluating the possible influences of soil gas and groundwater contamination on outdoor air. However, this type of analysis may not adequately distinguish between local industrial sources and volatilization of VOCs. Thus, additional lines of evidence (e.g., direct measurements of volatilization using flux chamber measurements) may be needed. An analysis of background concentrations that included a statistical evaluation and limited flux chamber measurements was performed previously by the MEW Companies. This evaluation should be summarized and referenced in the Draft RI Report.

Response: The focus of the RI/FS has been investigation of the vapor intrusion on indoor air quality. In its first request for information regarding the vapor intrusion pathway, EPA requested a work plan

for additional investigation to evaluate the "groundwater to indoor air exposure pathway"². Subsequently, in its request for a supplemental RI/FS work plan focused on vapor intrusion, EPA states that it "has determined that additional response activities are necessary to address the subsurface to indoor air (vapor intrusion) pathway from the commingled contaminated shallow groundwater" at the MEW Area and Moffett Field³.

In its First Five-Year Review Report for the Site⁴ (Five-Year Review), EPA concluded that based on the results of air samples collected at the Site, "there does not appear to be an unacceptable short-term or long-term health risk to outdoor air" from subsurface volatilization into the outdoor air. The EPA also found that outdoor air quality in the vicinity of the Site is generally similar to the outdoor air quality in other urban environments in the San Francisco Bay Area. Specifically, EPA stated that "[o]utdoor air quality in areas over the TCE groundwater plume area is generally consistent with outdoor air quality at reference locations outside the TCE groundwater plume area". EPA also noted, though, that existing data sets could be used to further evaluate the subsurface-to-outdoor air pathway and that EPA is considering further evaluation of this potential pathway.

Consequently, the MEW Companies prepared and presented first to EPA and then to the Northeast Mountain View Advisory Committee (on 20 April 2005) a multiple-line-of-evidence analysis converging on one conclusion that the groundwater plume and the soils at the MEW Site are not significant sources of TCE to outdoor air. The analysis confirmed the findings in EPA's five-year evaluation report.

An appendix will be added to the RI report to include the analysis previously presented to EPA regarding the subsurface to outdoor air pathway.

General Comment 7: Statistical Analysis

Statistical analysis throughout the Draft RI Report should include the rationale for performing the statistics and an explanation of what the results mean. This will provide greater transparency with respect to key decision points that were made by the statistician. This was particularly acute in the discussion of background air where there was an inadequately developed conceptual site model.

Response: The revised RI will include more explanations on rationale for performing the statistics and an explanation of what the results mean. Section 4.3 will be revised to explain the rationale for the Wilcoxon test performed to compare indoor to outdoor air concentrations. In addition, the description of the methodology used to estimate the background concentrations will include additional language explaining the statistical procedures.

Regarding the last sentence, please refer to the response to General Comment 4. That comment requested additional information regarding pathways other than the vapor intrusion pathway, which is

² EPA, 3 October 2002 letters to 106 Order and CD Companies requesting "Additional Response Activities" to investigate the vapor intrusion pathway.

³ EPA, 8 March 2006 letter, Request for Supplemental Remedial Investigation/Feasibility Study (RI/FS) and Supplemental RI/FS Report.

⁴ EPA, 2004, Final First Five-Year Review Report for Middlefield-Ellis-Whisman (MEW) Superfund Study Area, Mountain View, California, September.

the subject of the supplemental RI/FS, and a semantics definition of the term "background", neither of which results in the conceptual site model presented in the Supplemental RI as "inadequate".

General Comment 8: Statistical Analysis of Outdoor Data

A significant effort was undertaken in the Draft RI Report to perform a statistical analysis of the outdoor air data. The objectives of this statistical analysis are not readily apparent. Much of the effort appears to have focused on developing a background data set to which indoor air results could be compared. However, EPA disagrees that the air data set used is an appropriate background data set for evaluating indoor air.

Response: Section 4.2.1 will be revised to include a discussion of the purpose of evaluating a background concentration, and the rationale for the selection of the appropriate data population with which to calculate the representative value.

- **The statistical analysis provided in the Draft RI Report lacks transparency with respect to critical decisions that were made by the statistician. Consequently, it is difficult to evaluate whether the decisions were appropriate. For example, it is unclear why the data were pooled and averaged from spatially discrete locations. The rationale for combining reference and background locations (page 22) is not supported. The decision to present certain statistics (e.g., 95th confidence limit on the 95 percentile) and to ignore other statistics (e.g., quartiles) also cannot be evaluated. Also, the Draft RI Report should provide a sensitivity analysis that evaluates how the choice of statistical models influences the outcome, specifically whether choosing a different statistical model leads to the same conclusion.**

Response: Additional text describing the statistical analysis will be added to the RI Report. All of the analyses were performed using the ProUCL software provided by EPA. At the time of submittal of the Supplemental RI Report, the most recent version of ProUCL was version 3.0. Since the submittal of the Supplemental RI report, a new version of the ProUCL software (4.0) has been issued by EPA. Appendix C of the RI will be revised using the updated software.

Data from the background and reference locations were pooled to obtain a single representative outdoor concentration for the Site. The data were tested for adherence to one of three statistical models: normal, lognormal, and gamma. Since the data did not meet any of these distributions with 95% confidence, a non-parametric model was selected. The non-parametric model provides representative statistics that are not dependent on a specific data distribution. A sensitivity analysis of the model selection would not be valid, since the other models are not applicable. Using the new version of ProUCL, which handles nondetect values differently, the most appropriate statistical distribution changed for some of the chemicals.

The presented statistics for the background data are as recommended by the ProUCL software. The ProUCL documentation (EPA, 2007) specifically states that a 95% Upper Prediction Limit or Upper Tolerance Limit should be used when comparing individual site observations with a background level.

- **Different locations were apparently averaged together for each day prior to a statistical analysis. However, the data sets for different locations do not appear to have been evaluated to determine if they are in fact compatible and could be pooled together in this way. For example, the F ratio statistic (or similar test) should have been performed to determine whether the samples from different locations were drawn from the same population or not. Also, since some locations would have been sampled more frequently than other locations (e.g., NASA), certain locations are weighted more than other locations using this type of analysis.**

This is particularly problematic, given that the NASA data appears to have a localized source that likely skewed the "background" results higher.

Response: The locations were averaged together for each day to address the effect of temporal variability in the data set. By doing this, days on which multiple samples were collected are weighed equally with days on which fewer samples were collected. To evaluate whether the NASA sample location (B258) represents the same data population as the other background sample locations, an additional evaluation was performed.

Given the daily outdoor variability in concentrations, only days when the B258 and other locations were both measured can be used to evaluate how similar B258 is to other locations. The supporting materials with this memo include a table summarizing the dates on which multiple locations were sampled. There are only eight dates when B258 and another building were both sampled. Of these eight dates, only one other location was measured on four of them, two had two other locations measured, and two had eight other locations measured in addition to the B258 location. Chloroform and Freon 113 were never measured at B258. Given the inconsistency across dates and locations, and that most measured concentrations are nondetect, a rigorous statistical evaluation was not suitable.

Plots are included in the supporting materials showing the concentrations of the 10 chemicals measured at both B258 and other locations on the same date. These plots show that the B258 measurements are consistent with concentrations measured at other locations. Overall, the B258 concentrations are below those measured at other locations on the same date. Based on this review and comparison between locations where concentrations were measured, there is no justifiable reason to exclude the B258 location from the background dataset. Further, for several chemicals the only detected concentrations were measured at this location.

Specific review of the TCE concentrations measured at B258 identifies three days in the fall of 2003 when concentrations were higher than most other days. Review of TCE measured at other locations during this same time period shows that the B258 concentrations are not out of range, as a higher concentration was measured at the REFWESCOAT location.

Background calculations were performed using the new ProUCL software and for two scenarios:

1. Scenario 1 includes the entire dataset from B258
2. Scenario 2 excludes from B258 the date range in which TCE was elevated.

The RI will be revised to include the results of these two scenarios.

- **Distribution of hazardous air pollutants are often log-normally distributed (Limpert et al., *Log-normal Distributions across the Sciences: Keys and Clues*, May 2001 / Vol. 51 No. 5, BioScience pp 341-352). However, the Draft RI Report claims that this is not the case for the "background" contaminants in Mountain View. Referring to the population probability plots for TCE and PCE (Appendix C), the plot for PCE appears to follow a log-normal distribution with the exception of the lower left portion of the curve which deviates due to the handling of data at or near the limit of detection (i.e., the use of 1/2 the detection limit as a surrogate value below the limit of detection). Thus, the claim that the data do not follow log-normal distribution is questionable, since eliminating the non-detect data would likely lead to a reasonable**

fit of the data. With respect to the lognormal plot for TCE, deviation from the straight line is more prominent at the highest concentrations (upper right). This suggests that these points may represent an outlier. However, the analysis did not evaluate whether these data were an outlier.

Response: The referenced article suggests that air concentrations are often log-normally distributed, but also recommends testing the data for adherence to any distribution before applying a statistical model. Accordingly, the data were evaluated for adherence to the log-normal distribution and did not fall within 95% confidence of meeting that distribution. For that reason, the log-normal distribution was not used to derive summary statistics. This procedure is built into the EPA ProUCL software, version 3.0, which was used for the RI statistical calculations.

Since the submittal of the Supplemental RI Report, a new version of the EPA ProUCL software used to perform the statistical calculations has been released. The new version of ProUCL (4.0) includes a more statistically robust evaluation of nondetect data instead of using half detection limits. Appendix C of the RI will be updated using the ProUCL 4.0 software.

- **The probability plots that are presented should use individual data points, not averaged points.**

Response: The probability plots are used to qualitatively evaluate adherence of the data population to statistical distributions. Since the data population for this analysis consists of the date-averaged concentrations, it is more appropriate to display the date-averaged values on the plots. Using the new version of the ProUCL software, the probability plots have been removed from the RI Report.

- **The tables and figures should provide footnotes to explain the results and why some results are highlighted while others are not.**

Response: It is unclear which tables and figures are referenced by this comment. Tables in the Supplemental RI are annotated with comments.

General Comment 9: Air Exchange Rates

Insufficient information has been provided to correlate air exchange rates with the indoor air data collected. In most cases the actual air exchange rate during sampling conditions was not measured. Therefore, it is not known if data from buildings with variable exchange rates represent best or worst case “normal” operating conditions. Also, the effect of the number of hours ventilation systems are operated is not considered in the evaluation of data. The assumptions that are used to estimate air exchange rates may not represent actual conditions. The following building-specific information should be evaluated when estimating building air exchange rates.

- **Where buildings have different exchange rates in separate zones these zones should be identified and examined separately.**
- **Where buildings have higher ceilings than the assumed height, the impacts of a possible lower air exchange rate (due to a greater volume) and possibly inadequate mixing should be evaluated.**
- **Where buildings have multiple ventilation systems/units, individual units may not always be functioning either due to conservation measures or system breakdowns. These systems should be evaluated separately.**
- **Where part or all of a building uses natural ventilation, these areas should be evaluated separately.**

Response: Section 5.2.3 of the RI (Estimated Air Exchange Rates) states that the estimates assume "minimal economizer settings and estimated air flow rates in manual dampers". Table 4-9 includes in Note 6 a similar explanation. Since the submittal of the RI, however, additional information has been obtained on measured air exchange rates. The Supplemental FS report provided a correlation between air exchange rates and indoor air data (Figure 7-1 of the FS report). The information will also be included in Section 5.2.3 the revised RI report.

In accordance with the investigation work plan, and as approved by EPA, buildings were sampled in two seasons to evaluate seasonal changes in indoor air concentrations. These potential changes could be attributed not only to vapor intrusion mechanisms, but also to seasonal changes in operations of the ventilation system. The Supplemental RI shows that there were no significant seasonal changes in indoor concentrations (see Section 5.1).

With some exception, indoor air samples were collected during normal business hours to represent occupied conditions. In some cases, samples were collected on a weekend, or in unoccupied buildings. These conditions are clearly marked in the Supplemental RI report.

Regarding the bulleted items in the comment above, the following are responses to each bullet.

- Walkthroughs were conducted in buildings before sampling. Samples were collected in different areas of the buildings representing different use, but also different air exchange rates. For example, samples were collected in office areas, in utility rooms, in warehouses, in kitchens, in bathrooms, in conference rooms, and in computer labs. The results were documented in the Supplemental RI report (see Chapter 4 and the figures showing sample locations).
- The heights were assumed based on observations conducted during the walkthrough. It was not found, except in some minor cases such as warehouses or lobbies, that the ceiling was much different from the one used in estimating the air exchange rates. The RI addresses major changes in building configuration by collecting samples in each of these areas.
- Tables 4-9 lists whether or not an HVAC system was operating during sampling, or whether the unit is equipped with supplying outside makeup air. For example, at 670 National Avenue, one unit was not equipped to supply outside air, and one unit was not operating when samples were collected.
- The RI indicates buildings and portions of structures that rely on natural ventilation. For example, at 645 National Avenue (Table 4-9 of Supplemental RI), air exchange rates were estimated for the office area only because the warehouses in the back relied on natural ventilation.

General Comment 10: Use of Consistent Terminology

Consistent terminology should be used throughout the Draft RI Report. Providing a glossary defining the terms used in the Draft RI Report would provide clarity. EPA proposes that the following definitions be included in the

glossary, and the terms be used wherever appropriate. Other terms used should also be defined and provided in a glossary of the Revised RI Report.

Glossary of Terms /Definitions

Air Exchange Rate: Air Exchange Rate is the rate at which outside air replaces indoor air in a space. Expressed in one of two ways: the number of changes of outside air per unit of time air changes per hour (ACH) or the rate at which a volume of outside air enters per unit of time - cubic feet per minute (cfm).

Ambient Air: Ambient air is the air surrounding a building.

Background (Outdoor Air): Background (Outdoor Air) in the context of indoor air/vapor intrusion refers to the presence of chemicals due to sources other than volatilization from the subsurface. Examples of background sources may include local industrial sources and more distant sources.

Background (Indoor Air): Background (Indoor Air) in the context of indoor air/vapor intrusion refers to the presence of a chemical in indoor air that is contributed by a source other than vapor intrusion. Background for indoor air could be the result of indoor sources (consumer products) and/or outdoor sources (local industry, volatilizations from the subsurface, and more distant sources).

Baseline Building: A Baseline Building is a building where no vapor intrusion mitigation activities (e.g., sealing conduits/ potential pathways, HVAC system improvements etc.) have been implemented prior to indoor air sampling.

Baseline Condition: Baseline Condition is the status of a building prior to implementation of any vapor intrusion mitigation activities (including sealing conduits/potential pathways and HVAC system improvements, etc.)

Exhaust Air: Exhaust air is air that is removed from a space that is discharged to the outside.

Interim Action Level: The Interim Action Level is the indoor air contaminant concentration whereby vapor intrusion mitigations measures are required to reduce the concentrations. The Interim Action Level for TCE in indoor air at the MEW Site is 1 $\mu\text{g}/\text{m}^3$ of TCE in air for residential buildings and 2.7 $\mu\text{g}/\text{m}^3$ of TCE in air for commercial/non-residential buildings.

Makeup Air: Makeup air can be a combination of outdoor and transfer air intended to replace exhaust air.

Outdoor (Ambient) Air: Outdoor (Ambient) Air is the air surrounding a building. It is the air that enters the building through a ventilation system or infiltration.

Preliminary Remediation Goals (PRGs): PRGs are cleanup goals for individual chemicals given a specific medium (soil, water, air) and land use (residential, commercial) at CERCLA sites.

Recirculated Air: Recirculated air is air that is removed from a space and reused as supply air.

Supply Air: Supply air is the air that is delivered to a space through mechanical or natural means.

Transfer Air: Transfer air is the air that is moved from one indoor space to another.

Response: Per EPA's comment above, a glossary has been added to the RI Report with definitions of the above terms. The following are changes to some of the definitions above:

Air Exchange Rate: Air Exchange (AE) Rate is the rate at which outside air replaces indoor air in a space. Expressed in one of two ways: the number of changes of outside air per unit of time air changes per hour (ACH) or the rate at which a volume of outside air enters per unit of time—cubic feet per minute (cfm). For example and AE rate of 1/hr means that outside air replaces the indoor in a space once each hour.

Ambient Air: Ambient air is the air surrounding a building. (Deleted because it is the same as Outdoor (Ambient) Air.

Outdoor mMakeup Air: Outdoor mMakeup air is the can be a combination of outdoor and transfer air supplied into the building intended to replace exhaust air.

Preliminary Remediation Goals (PRGs): PRGs are preliminary cleanup goals for individual chemicals given a specific medium (soil, water, air) and land use (residential, commercial) at CERCLA sites. PRG's are used for site "screening" to help identify areas, contaminants, and conditions that do not require further federal attention at a particular site. PRGs are not de facto cleanup standards and should not be applied as such.

Supply Air: Supply air is the air that is delivered to a space through mechanical or natural means.

Transfer Air: Transfer air is the air that is moved from one indoor space to another.

General Comment 11: Technical Edits

The Draft RI Report contains incorrect technical statements. The document should be reviewed and revised for technical accuracy. A few examples are:

- Use of the statement “concentrations below acceptable levels” is incorrect when the acceptance limit is a maximum acceptable concentration not a minimum acceptable concentration.
- Use of the statement “positive effect on VOC concentrations” is unclear when discussing an action that lowers concentrations, which indicates a negative correlation.
- Avoid using the term “recently” throughout the text.

Response: These phrases will be revised in the RI Report. For example, the RI will be revised to compare concentrations to long-term exposure goals and the TCE interim action level.

EPA Specific Comments

Specific Comment 1

Pages xiii-xv, List of Acronyms and Abbreviations

The List of Acronyms and Abbreviations should also include ASHRAE, micrograms per liter ($\mu\text{g/L}$), parts per billion (ppb), and sub-slab depressurization (SSD). The description for GAC and NRC should be corrected.

Response: The Supplemental RI will be revised per the comment above.

Specific Comment 2

Page xvii-xviii, Executive Summary, Remedial Investigations Related to Vapor Intrusion - Background Concentrations and page 23, Section 4.2.1 MEW and Moffett Field Background Concentrations in Air.

As stated in the General Comments, EPA does not agree that the Site TCE background value is appropriate or accurate. The text misrepresents how the outdoor air data is used. The last paragraph on page 23 should be deleted as EPA does not agree with the TCE background concentration estimates.

Response: Please refer to responses to General Comments. The first part of the last paragraph on page 23 is obtained from the Cal EPA website and provides information on potential risks to exposure to outdoor ambient air and background outdoor air. The last sentence in that paragraph is a direct calculation of risks from exposure to background TCE concentrations, but will be removed per the request above.

Specific Comment 3

Pages xvii and xviii, Executive Summary, Remedial Investigations Related to Vapor Intrusion.

Results: The statement in the Draft RI Report that 58 residences were sampled as part of this RI is misleading. Many of the residences sampled at Wescoat Housing do not overlie the shallow groundwater contamination. The text should be corrected to reflect the number of buildings sampled that overlie the shallow groundwater contamination with an appropriate buffer zone for consideration.

Response: Of the 58 residences referred to in the RI report, 27 are in Wescoat Housing redevelopment, but outside the Vapor Intrusion Study Area. Although sampled, and results were below EPA's long-term exposure goals, those residences will be removed from the count. A total of 31 residences were sampled in the Vapor Intrusion Study Area. The RI will be revised accordingly.

- **Page xviii, Fourth bullet, VI Occurs Under Limited Conditions.** The Draft RI Report erroneously suggests that vapor intrusion occurs only under specific limited circumstances: “Vapor intrusion appears to occur under limited conditions when: i) ventilation does not provide sufficient fresh air through an operating HVAC system, ii) the building has a basement or subsurface structure, iii) utilities are connected to outside deep vaults that intercept the groundwater.”

Response: The data collected during the RI phase demonstrated that vapor intrusion resulted in indoor air concentrations of VOCs higher than EPA's long-term exposure goals only under unique conditions. The Executive summary and similar section in the Supplemental RI report will be revised to i) include specificity regarding vapor intrusion resulting in indoor air concentrations of VOCs higher than EPA's long-term exposure goals under unique conditions, and ii) retain reference to deep vaults but remove the special condition of the vault intercepting the groundwater. Although no data were collected in such situations, the reference to vaults intercepting the groundwater will be removed for conservative reasons. The RI already refers to the special situation of NASA Building N210. The aforementioned sections will be revised to reference the unique HVAC setting of NASA Building N210.

The MEW Companies and NASA have and will continue to conduct walkthroughs in buildings to identify such unique situations. Interim remedies have been implemented when these situations have been encountered. Further, should such situations be encountered in the future, the Draft Supplemental FS provides the mechanism for implementation of an appropriate remedy.

First, the site conceptual model needs to be expanded to fully explain how vapor intrusion occurs into a building – source, pathway, exposure route. The conditions cited above do not explain how Site contaminant vapors can enter and accumulate into a building. Vapor intrusion may occur and has occurred in buildings with basements, concrete slab foundations, and crawlspaces with or without an operating HVAC system. Some buildings overlying the contaminated groundwater plume are designed to be ventilated by passive means or by use of intake or exhaust fans, and not by HVAC systems. This would include most residences and warehouses. The Draft RI Report must be revised to explain the mechanism and pathway for VOCs to enter into buildings. It should be clear that vapor intrusion can occur in different types of buildings through advection and diffusion and that there are certain conditions that may be more likely to cause subsurface vapor intrusion into a building.

Response: The Executive Summary provides a summary of the conceptual model, and the elements discussed above can be found in the Executive Summary, but also in the conceptual model presented in Section 3.1 of the RI – Sources of VOCs. Variations in building design and ventilation type are also discussed in the conceptual model.

Second, the Draft RI Report refers to deep vaults that intercept groundwater (i.e., 350-380 Ellis Street buildings, the former Raytheon property). No data have been provided that the water in these vaults is contaminated with VOCs, and that the presence of this water is required for vapor accumulation. The conditional phrase “that intercept groundwater” should be removed as a condition of vapor intrusion.

Response: The depth to water near the deep vaults ranged between 10 and 16 feet between April and October 2003, the time period in which indoor air samples were originally collected at 350-380 Ellis Street. The vaults are 10-14 feet deep. This indicates that water from the formation would infiltrate into the vaults. In addition, air samples collected in the vaults showed similar concentrations to those originally found in the utility rooms before remedial actions were implemented. Regardless, and as mentioned in the response to the first part of this specific comment, the reference to vaults intercepting the groundwater will be removed.

Third, the conditions for vapor intrusion discovered in some of NASA's buildings demonstrates that the conditions under which vapor intrusion occurs listed in the Draft RI Report may not be comprehensive enough to apply generally and to all remaining buildings that have not yet been sampled or evaluated. A significant example of conditions for vapor intrusion that was noted but not highlighted in the conclusions is NASA

Building N-210. The Draft RI Report indicates that vapor intrusion into NASA Building N-210 was potentially being increased by the ventilation system design. This unique condition should be included as a potential vapor intrusion condition in the Revised RI Report.

Response: The RI already refers to the special situation of NASA Building N210 (see Section 4.3.7.5). The aforementioned sections will be revised to reference the unique HVAC setting of NASA Building N210.

- Page xviii, Fifth bullet, TCE as an indicator chemical for vapor intrusion. The Draft RI Report states, “TCE can be used as an indicator compound for vapor intrusion at the Site.” This statement should be clarified and revised because in certain instances TCE data alone cannot be used as an indicator chemical for vapor intrusion at the MEW Site. Instead, TCE should simply be considered a primary chemical of concern at the Site. During NASA’s vapor intrusion investigation, when elevated TCE concentrations were found in outdoor air, TCE could not be used as an indicator chemical for vapor intrusion. Instead, NASA used cis-1,2-dichloroethene (cis-1,2-DCE) as the indicator chemical for vapor intrusion. Additionally, EPA used chemical ratios to evaluate potential indoor air sources of TCE at several residences. To help differentiate between likely vapor intrusion, indoor sources, and outdoor air sources, EPA uses a multiple lines of evidence approach to assess the vapor intrusion pathway (e.g., chemical ratios, pathway sample results, sub-slab soil gas and soil gas data, groundwater data, building/household surveys, repeated sampling, etc). The Draft RI Report should be revised to reflect these points.

Response: Extensive sampling during the RI phase showed that remedial measures were warranted only when TCE exceeded the interim action level. Therefore, it is appropriate to use TCE as an indicator chemical for remedial actions. However, the RI will be revised to state that TCE is the primary chemical of concern at the Site. The data from the multiple lines of evidence were discussed in the Supplemental RI in Chapters 4 and 5, as appropriate.

- Page xviii, Sixth bullet, 644 National Avenue. EPA has been provided information indicating that the basement at 644 National Avenue has been routinely occupied. The text should be revised to remove the term “unoccupied” from the description and throughout the RI Report. It is EPA’s understanding that the property was recently transferred to a new owner and the occupants have vacated the building. The Draft RI Report should be revised to also include updated information of current and planned future use of the property.

Response: Several visits by MEW Contractors to the basement at 644 National Avenue to collect samples, to service the exhaust system, and to service the groundwater sump pump did not confirm that the basement has been "routinely occupied". Instead, the basement has been used for storage where it was accessed intermittently, most recently for temporary storage of Katrina relief efforts.

After the Supplemental RI was submitted to EPA in 2006, the building was sold and vacated in late 2007, and is scheduled to be demolished in 2008. The RI report will be revised to include this recent information on the property transaction.

Specific Comment 4. Section Page xix, Executive Summary, Data Analyses and Findings

- **First Bullet. Baseline Buildings.** The Draft RI Report states that, “TCE concentrations are not detected above the 2.7µg/m³ interim action level in any of the 28 baseline buildings with slab-on-grade construction when standard building occupancy ventilation is operating.” This statement is inaccurate and misleading. First, the definition of a baseline building must be clarified. EPA considers a baseline building as a building where no vapor intrusion mitigation activities (e.g., sealing conduits/potential pathways, HVAC system

improvements etc.) have been implemented prior to indoor air sampling. The Draft RI Report inappropriately disqualifies buildings from being identified as "baseline buildings" if an interim action was taken to mitigate elevated indoor air concentrations. The Draft RI Report should be revised to reflect EPA's definition of a baseline building and to include these baseline buildings in the analyses. In general, the use of baseline buildings should be useful in evaluation of pre- and post vapor intrusion Site conditions. EPA has determined that, based on indoor air sampling, those buildings with sample results exceeding the interim action level in indoor air indicate that the vapor intrusion pathway is complete and actions are necessary to reduce those levels. The Draft RI Report should be revised to correctly characterize the baseline buildings and appropriately describe and summarize the data.

Response: The executive summary, Data Analysis and Findings (first bullet) defines baseline buildings as those with "no remedial measures implemented" before sampling. Section 5.2 of the Supplemental RI provides a definition for baseline buildings as those "sampled prior to any voluntary remedial measures to address vapor intrusion". These definitions are consistent with the definition provided in the comment above.

EPA's comment above is contradictory. First, the comment states that "EPA considers a baseline building as a building where no vapor intrusion mitigation activities [...] have been implemented prior to indoor air sampling", which is consistent with the definition provided in the Supplemental RI. However, the comment then states that the "Draft RI Report inappropriately disqualifies buildings from being identified as "baseline buildings" if an interim action was taken to mitigate elevated indoor air concentrations". We believe that the first definition is correct, and it is the definition used in the RI.

The comment above also states that EPA has determined that, based on indoor air sampling, those buildings with sample results exceeding the interim action level in indoor air indicate that the vapor intrusion pathway is complete and actions are necessary to reduce those levels. The RI clearly discusses all voluntary remedial actions that were implemented to reduce indoor air concentrations below the long-term exposure goals. For example, refer to detailed building-by-building discussions in Chapter 4 and to the evaluation of the voluntary remedial measures in Section 5.5.

The last sentence asks for the Supplemental RI to be revised "to correctly characterize the baseline buildings and appropriately describe and summarize the data." According to the definition above, the Supplemental RI correctly characterized the baseline buildings, and a very detailed description of the data in each building is provided in Chapter 4.

The following buildings and results should be included in the Baseline Buildings analysis: 670 National Ave building and NASA Building 16. Baseline buildings are those buildings that were initially sampled prior to any modification to the operating conditions. Mitigation measures after the sampling may have been implemented to reduce TCE concentrations and other chemicals of concern.

Response: These two buildings were included as "baseline buildings". Please refer to Tables 4-14 and 5-1 of the Supplemental RI.

The 501 Ellis building, NASA Building 15, NASA Building N-210, and possibly others (e.g., 660 National) appeared to have had functional HVAC systems prior to remedial action. If the presence of a ventilation system is the criterion being evaluated, these buildings should not be excluded from the baseline building set.

Response: These buildings were included as "baseline buildings". Please refer to Tables 4-14 and 5-1 of the Supplemental RI.

- **First bullet, Inclusion of All Data.** In the Draft RI Report, some data were disregarded and labeled "anomalous" and two buildings, 415 E. Middlefield, and 545 N. Whisman Road, were inaccurately reported as having results always below the TCE interim action level. At the 415 E. Middlefield building on May 6, 2003, TCE was reported at a concentration of $4.8 \mu\text{g}/\text{m}^3$. This result was inconsistent with an EPA split sample, but the primary sample was above the TCE interim action level of $2.7 \mu\text{g}/\text{m}^3$. Also, an indoor air TCE concentration of $3.3 \mu\text{g}/\text{m}^3$ was reported for 545 N. Whisman on May 13, 2003. This concentration was confirmed by a duplicate sample ($3.4 \mu\text{g}/\text{m}^3$). The Draft RI Report identifies these values "anomalous." These data, particularly the TCE indoor air data collected at the 545 N. Whisman building, would not necessarily be anomalous. The term "anomalous" should be removed from the Draft RI Report, and this data should be used unless determined to be not valid.

Response: Chapter 4 of the Supplemental RI provides a detailed building-by-building discussion of the data. Section 4.3.1.12 – 545 N. Whisman Road – clearly discusses the TCE concentration referenced in the comment above and states the following:

TCE was detected in 2 indoor samples (a primary sample and its duplicate) at concentrations above the interim action level of $2.7 \mu\text{g}/\text{m}^3$. Although the detected concentration of $3.4 \mu\text{g}/\text{m}^3$ at one indoor location was confirmed by the duplicate sample collected on the same date, the results could not be reproduced in subsequent sampling events.

Section 4.3.4.2 – 415 E. Middlefield Road also discusses the TCE concentration reference in the comment above and states the following:

[...] TCE was detected in 13 of 17 indoor air samples with concentrations ranging from 0.19 to $0.49 \mu\text{g}/\text{m}^3$ (a sample collected on 6 May 2003 at location 415AMB3R showed anomalous results for several analytes; the duplicate sample collected at the same location and same time did not reproduce the results in the primary sample).

- **Third bullet, Ventilation On and Off.** The Draft RI Report states, "In those baseline buildings where samples were collected with ventilation on and off, there is at least a 10-fold reduction in TCE air concentrations when ventilation is on." This statement is not accurate and should be revised. While there is a general decrease in TCE concentrations and some results show greater than 10-fold reduction, other results do not. One sample, 380AMB3CW, highlighted in the Draft RI Report on page 53, had a concentration of $1.0 \mu\text{g}/\text{m}^3$ with the ventilation off and $0.44 \mu\text{g}/\text{m}^3$ with the ventilation on, which is less than a three-fold reduction. It is important for the RI Report to include information evaluating the expected reduction of contaminant levels after implementation of a remedial action. The Draft RI Report should be revised to more accurately reflect the data results.

Response: Section 5.4 will be revised to specify that the 10-fold reduction is observed in buildings where the ventilation system was off for an extended period of time (such as at 401 and 415 Middlefield Road), rather than when it was off for a short time such as during the weekend. This is consistent with the description in Table 5-1. A new table will be added to the RI report showing percentage reduction in TCE concentrations after a mitigation measure was implemented. Section 5.5 of the RI will be revised to reflect the percentage reductions when data are available to perform the calculations.

- **Sixth bullet, Unconfirmed Samples.** The text notes that some of the residential data “exceeding the interim action level could not be subsequently confirmed.” The use of confirmation by re-sampling is not appropriate for this type of air sampling. Unlike soil samples, air samples can show significant temporal variations. To truly confirm that a high concentration is not representative of indoor air conditions, a representative annual average concentration must be generated. Without an annual average concentration or data to suggest that the results are not valid, results should be considered to be real values. Also, specifically, the concentration detected above the interim action level in Residence 11 is consistent with the other data collected in that home. The text should be revised to reflect this point.

Response: The word "confirmed" will be revised in the executive summary and in the detailed discussion regarding Residence 11 presented in Section 4.4.3 of the RI.

Specific Comment 5. Page xix, Evaluation of Voluntary Mitigation Measures

Second bullet, Adequate Fresh Air. The Draft RI Report states, “All buildings where adequate fresh air is provided to the indoors showed TCE concentrations below the interim action levels.” This statement is not adequately supported by the conditions at the Site. It is uncertain whether adequate fresh air was being provided to occupied areas in the 501 Ellis Street building, NASA Building 15, and NASA Building N-210. Additionally, it is unclear why a residential building or other space (such as a warehouse), which is designed to be passively ventilated, would be defined as not having “adequate fresh air.” The Draft RI Report should be revised to reflect these points. In addition, to avoid confusion, the FS should provide clarification and divide the buildings into four main groups: Residential – existing buildings and future buildings and Non-residential or Commercial – existing buildings and future buildings.

Response: Chapter 4.0 of the Supplemental RI includes a building by building discussion, and includes the three buildings above. The RI does not specify that residential buildings or warehouses do not have adequate fresh air. The supplemental FS does provide remedies for the four groups listed in the comment above.

Specific Comment 6. Page 3, Section 1.1 Reasons and Purpose of Supplemental RI, first sentence

The text should be revised to clarify that “the FS will evaluate alternatives to address the long-term management and mitigation of potential vapor intrusion to current and future buildings at the Site.”

Response: Section 1.1 of the Supplemental RI states: The FS will address the long-term management and mitigation of potential vapor intrusion to current and future buildings at the Site." It will be revised in accordance with the suggestion above.

Specific Comment 7. Page 5, Section 2.1 Site History, last paragraph

The Draft RI Report states, “Residential development is not planned over areas of the regional plume.” The text should be revised and updated to indicate that residential development may be planned over areas of the shallow groundwater plume. Analysis and FS alternatives should include the potential for future residential development over areas of the regional groundwater plume.

Response: Since the submittal of the Supplemental RI, new information became available regarding residential development. It is now known that an area south of Middlefield Road may be rezoned for residential development, and that residential developments may occur on Moffett Field. Therefore, the

statement "Residential development is not planned over areas of the regional plume" will be changed to "residential development may be planned over areas of the regional plume".

Specific Comment 8. Page 7, Section 2.3 Subsurface Remedial Investigations

The following was not identified in MEW ROD as a chemical of concern in groundwater at the Site: 1,2-dichloroethane (1,2-DCA).

Response: References to 1,2-dichloroethane (1,2-DCA) as a chemical of concern will be removed.

Specific Comment 9. Page 14, Section 2.9 Site Redevelopment

The Draft RI Report should be updated to include the Vineyards development, Classic Communities development, the Wescoat Village development and any other new development. The text should be revised to also include what vapor intrusion mitigation measures were implemented as part of the redevelopment.

Response: Section 2.9 will be revised to list the Vineyards, Classic Communities, and Wescoat Village developments. Please refer to Section 4.3.9 of the Supplemental RI that includes a discussion of the mitigation measures at the Vineyards development, and to Section 4.5 that includes a discussion of Wescoat Housing.

Specific Comment 10. Page 17, Section 3.1. Sources of VOCs – Background Sources

The Bay Area Air Quality Management District (BAAQMD) monitoring station in Mountain View was not abandoned in 2000. The temporary monitoring station at Whisman Park operated between April 2004 and December 2005. Samples were collected periodically – every 12 days. The text should be revised to address these points.

Response: Please note that this section refers to the BAAQMD station on Questa Drive, where the last air sample was collected in 2000. The same section also refers to the temporary monitoring station at Whisman Park, and the Supplemental RI uses the information from that station in the evaluations. The section will be revised to add that samples from the temporary station were collected every 12 days.

Specific Comment 11. Page 18. Section 3.2, Chemicals of Concern

The Draft RI Report should be revised to note that NASA analyzed for a different set of VOCs, and did not analyze for all the MEW Site chemicals of concern.

Response: The section will be revised accordingly. NASA did not analyze for chloroform and Freon 113, and that exception will be added to Section 3.2.

Specific Comment 12. Page 21 Section 4.1.2 Sampling Procedures

The text should be revised to state that the Navy and EPA sampled four residences in the Wescoat Housing Area in 2003 and 2004. Not all of the residences sampled in the Wescoat Housing Area overlie the shallow regional groundwater contamination. The text should be revised to clarify the number of residences sampled that overlie the shallow regional groundwater contamination both before and after the Wescoat Housing Area was redeveloped.

Response: A discussion of the Wescoat Housing development (including the four units mentioned in the comment above) is included in Section 4.5 of the Supplemental RI. Section 4.1.2 will be revised to state that samples were collected from 31 residences in the Vapor Intrusion Study Area. This number includes 3 former residences sampled by the Navy and EPA in 2003 and 2004 prior to redevelopment of Wescoat Housing.

Specific Comment 13. Pages 24 and 25, Section 4.2.3 Long-term Exposure Goals

The Draft RI Report states that long-term goals may not be appropriate for comparison to air sampling results collected from unoccupied areas such as utility rooms or infrequently used areas. Although this statement is appropriate for the current use of these rooms/areas, future use of the rooms or areas may be converted to spaces that are used on a regular basis, so long-term goals may be useful comparison criteria for future conditions in these rooms/areas.

In addition, sampling in these areas and at potential pathways may demonstrate where vapor intrusion into a building may be occurring. Interim mitigation measures have been taken to reduce these levels where the VI pathway is complete and where there is the potential for indoor air quality impacts at levels of concern for long-term exposure.

Response: In the unlikely event that the utility rooms or infrequently used areas be occupied, long-term exposure goals would be applicable.

Specific Comment 14. Page 27, Section 4.2.3.2 Current Status of the EPA Draft TCE CSFs (Cancer Slope Factors)

The Draft RI Report states that "These CSFs are based predominantly on studies where the route of exposure was oral. The upper-end value of the draft TCE CSFs is based on an epidemiological investigation of a population with oral exposure to TCE and other chemicals in drinking water." This statement is incorrect. Most of the human epidemiological studies used to develop the CSFs were based on worker studies where exposure to TCE occurred primarily via the inhalation route. And, the highest estimated CSF (see Figure 4-3, page 4-43 of EPA's draft TCE Health Risk Assessment) was based on inhalation exposures in the Finnish workers study. The text should be revised and corrected.

Response: It is agreed that EPA Figure 4-3 provides a number of additional data for point of departure and risk-specific doses and that these data were considered by EPA in the weight of evidence. However, Table 4-9, which is a compilation of cancer risk estimates, shows which of those data were used to derive slope factors for TCE. Of those derived, the upper end value of $0.4 \text{ mg/kg-day}^{-1}$, which forms the basis for the EPA risk-based concentration for TCE is based on a drinking water study of ecological design. Thus this study was an oral study. While it is the case that EPA derived additional estimates higher than the $0.4 \text{ mg/kg-day}^{-1}$ estimate, in discussing these EPA stated:

Two sets of estimates appear to lie apart from all others. On the low end, rats appear to be less sensitive than mice or humans. On the high end, estimates from the Anttila study are rather uncertain, based on a small number of cancer cases and an assumed uniform exposure duration of 15 years. Setting aside these lowest and highest estimates, there appears to be convergence of the other estimates, even though they are derived from different sources. The remaining slope factors, per mg/kg-d, are 2×10^{-2} (derived from occupational inhalation exposure), 3×10^{-2} to 2×10^{-1} (derived from mice), and 4×10^{-1} (derived from residential drinking water exposure).

Because they are supported by diverse studies and do not reflect the highest estimates (from the Anttila study) or the lowest estimates (from the rat studies), these remaining estimates constitute a middle range of risk estimates where confidence is greatest. This middle range is robust in the sense that it is not likely to be dramatically altered by a new study or by minor changes in the analysis of existing studies.

This new slope factor range, 2×10^{-2} to 4×10^{-1} per mg/kg-d, lies just above EPA's previous slope factor for TCE, 1.1×10^{-2} per mg/kg-d. (EPA 2001 page 4-27).

Thus EPA 2001 placed primary reliance on CSF values between, 2×10^{-2} to 4×10^{-1} mg/kg-day⁻¹, with the CSFs derived based on inhalation data from the Finnish studies (Anttila et al. 1995) set aside. Remaining studies are the derivation of a CSF of 0.02 mg/kg-day⁻¹ (EPA 2001 Table 4-9) based on an assumed air concentration equivalent to the TWA in the Henchler et al. (1995) study and the Bois (2000a,b) calibration of data from two gavage studies in mice (NTP 1990 and NCI 1976, [see EPA 2001 Tables 3.1, 4.4, and 4-9, and page 4-19]). Although there is one study in the range based on inhalation exposure (Henchler et al. 1995), this study did not have exposure information and exposure was instead inferred to be the TWA. Remaining studies in the range identified by EPA as the range of primary reliance were all oral studies and, most relevant for this discussion, the upper-end of that range was based on an oral exposure setting.

Regardless, the statement will be removed from the RI report.

References:

Anttila, A; Pukkala, E; Sallmen, M; et al. (1995) Cancer incidence among Finnish workers exposed to halogenated hydrocarbons. *J Environ Occup Med* 37:797–806.

Bois, FY. (2000a) Statistical analysis of Fisher et al. PBPK model of trichloroethylene kinetics. *Environ Health Perspect* 108(suppl 2)275–282.

Bois FY. (2000b) Statistical analysis of Clewell et al. PBPK model of trichloroethylene kinetics. *Environ Health Perspect* 108(suppl 2)307–316.

U.S. EPA. 2001. Trichloroethylene health risk assessment: Synthesis and characterization. EPA/600/P-01/002A. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC.

NTP. (1990) Carcinogenesis Studies of Trichloroethylene (Without Epichlorohydrin) (CAS No. 79-01-6) in F344/N Rats and B6C3F1 Mice (Gavage Study). NTP TR 243. Research Triangle Park, NC: U.S. Department of Health and Human Services.

NCI (National Cancer Institute). (1976) Carcinogenesis Bioassay of Trichloroethylene. National Cancer Institute Carcinogenesis Technical Report Series No. 2. HEW Publication No. (NIH) 76–802.

Specific Comment 15. Page 31, Section 4.3.1.1, 313 Fairchild Drive - Evaluation of Sampling Results

The text states that "Detected indoor air concentrations were within or below EPA's long-term goals. TCE was consistent with outdoor and below background concentrations." The terms "within" and "below background concentrations" should be removed. The term "within" implies a range, which is not appropriate given that sampling results are compared to a single value (i.e., 1 or 2.7 µg/m³ of TCE). Also, indoor air results should be compared with outdoor ambient air samples that were collected concurrently with indoor samples and in close proximity to the building being evaluated. The term "background concentration" is incorrectly applied to indoor air (see previous comment on background air. Also, see terms.) and the text should be revised. These changes to the text should be made in this section and throughout the Draft RI Report, where similar text is presented.

Response: Table 4-3 of the RI shows the long-term exposure goals for VOCs. Whereas TCE is the primary chemical of concern for vapor intrusion at the Site, the RI includes long-term exposure goals for other MEW COCs. The RI will be revised to refer to long-term exposure goals. When referring specifically to TCE, the RI will state the interim action level (1 and 2.7 µg/m³ for residential and commercial occupancy, respectively).

Regarding comparison of indoor concentrations to outdoor ambient air samples collected concurrently with indoor air samples, this comparison was performed in the Supplemental RI, is included in the building-by-building narrative in Chapter 4, and is summarized in Table 4-18. Also, please refer to the response to General Comment 5.

In reference to comparison to background, the terminology "background" will be changed per the response to General Comment 10. Also, please refer to General Comment 5 regarding appropriateness of comparing indoor air concentrations to background outdoor air, in addition to outdoor ambient air in the vicinity of the building.

Specific Comment 16. Page 42, Section 4.3.1.13, 644 National Avenue – Evaluation of Sampling Results

The Draft RI Report incorrectly states that the basement in the building has not been occupied for several years and remains unoccupied." The text should be revised to more accurately reflect previous and anticipated future conditions.

Response: Please see response to Specific Comment 3.

Specific Comment 17. Pages 45 and 46, Section 4.3.3.1, 501 Ellis Street – Sample Locations and Evaluation of Sampling Results and Figures 4-18 and 4-61

The text incorrectly states that "four additional samples were collected inside a drain" and that "EPA collected a pathway sample from below floor level, within the fire sprinkler test system drain located in the server room." EPA's pathway sample was collected at the opening of the drain, not inside the drain nor below floor level. The room may have formerly been a server room, but it was vacant at the time of sampling. The text and figures should be revised and corrected in the Revised RI Report.

Response: Section 4.3.3.1 will be revised accordingly.

Specific Comment 18. Pages 50-55, Section 4.3.4. 370 Ellis Street, Buildings A, B, D – Evaluation of Sampling Results

The text should include the depth of the groundwater compared to the utility vaults. In the last paragraphs of each subsection, clarify what the TCE concentrations were reduced to in Room A112.

Response: The depth to water near the deep vaults ranged between 10 and 16 feet between April and October 2003, the time period in which indoor air samples were originally collected at 350-380 Ellis Street. The vaults are 10-14 feet deep. This indicates that water from the formation would infiltrate into the vaults. In addition, air samples collected in the vaults showed similar concentrations to those originally found in the utility rooms before remedial actions were implemented.

Additional information will be added to the text to indicate to what level were TCE concentrations reduced. This information can also be found in the tables the Supplemental RI.

Specific Comment 19. Page 63, Section 4.3.7.2, Building 16 - Evaluation of Sampling Results

The Draft RI Report indicates that a HAPSITE investigation of NASA Building 16 did not identify any preferential pathways. However, the HAPSITE did identify significant potential pathways and conduits inside and outside of Building 16. The text should be corrected. In addition, EPA indoor air and sub-slab soil gas sampling conducted in May 2005 indicates elevated levels of TCE indoors and beneath the slab of Building 16. These results should be included in the Revised RI Report.

Response: The 10 July 2005 NASA Report entitled "Final Report on Long-Term Indoor Air Quality Monitoring; Buildings 15, 16, 17, 20, N-210, and N-243, NASA Ames Research Center, Moffett Field, California" includes a Section 6.9.2 discussing the results of the HAPSITE samples. This report determined that the HAPSITE samples did not identify any preferential vapor intrusion pathways for Building 16 (and Building 20). Reference to this report will be included in Section 4.3.7.2 of the Supplemental RI.

Specific Comment 20. Pages 80-83, Section 4.6 QA/QC Analyses

The Draft RI Report includes a quality assurance/quality control (QA/QC) evaluation that appears to be limited to the MEW Companies data set. The extent of the QA/QC data evaluated should be clarified, and where possible, evaluation of data sets from the Navy, NASA, EPA, and others should be included in the Revised RI Report.

Response: Section 4.6 is not limited to only the MEW Companies dataset. There are several references to Navy, NASA, and EPA QA/QC procedures. For example, the first paragraph in Section 4.6 states that the MEW Companies, NASA, EPA, and Navy reviewed the data for analysis within holding time, sample contamination, and detection limits. The reader is referred to summaries of QA/QC findings in several MEW Companies, Navy, and NASA reports. In the correlation between primary and duplicate dataset (Section 4.6.4), the full dataset was analyzed. For example, R-squared values were obtained for primary vs. duplicate samples, for primary and EPA duplicate samples, and for primary and split samples. The analyses using the entire dataset concluded that the results of the duplicate and split samples are acceptable.

Specific Comment 21. Page 92, Section 5.4, Findings

- **Finding #6.** The suggestion is made in Finding #6 that the 85 percent upper confidence limit (95UCL) concentration in a building is a more representative exposure concentration than individual sample results or the maximum detected concentration. For most buildings, there is insufficient data to calculate an appropriate 95 UCL. Although there may be enough data within a building to calculate a 95UCL using ProUCL, those samples may not all be from one "exposure area." If sampling results are similar throughout the building on a given day, it may be appropriate to aggregate data over time to calculate a 95UCL. However, if concentrations within the building are not similar, calculating a 95UCL may not be an appropriate methodology for evaluating the data for a building. Exposure areas may be small (e.g., people may spend a majority of their time in individual offices) so the 95UCL for the entire building would not be representative of an exposure area. In addition, it is important to note that baseline samples (collected prior to building mitigation) cannot be pooled together with air samples obtained after building mitigation to estimate a 95UCL.

Response: During meetings with EPA before the submittal of the Supplemental RI report, the companies discussed with EPA the 95% upper confidence level concept referenced in the comment above. While the companies disagree with statements expressed by EPA in the meetings, and summarized in the comment above, the Supplemental RI did not use the 95% confidence level for comparison.

- **Finding #7.** The Draft RI Report must be revised to include the residences at Wescoat Housing where TCE concentrations exceeded the interim action level in two units – 620E and 620F (unoccupied at the time of sampling).

Response:

Finding 7 will be supplemented to say that two unoccupied and now demolished residences in Wescoat Housing sampled in 2003 and 2004 showed TCE above the interim action level.

Specific Comment 22. Pages 92-93, Section 5.5 Evaluation of Implemented Voluntary Remedial Measures

The sections should be revised to assess the interim remedial measures conducted at the Site. For each of the measures taken, the RI Report should be revised to assess the percent reduction in TCE and other VOCs. This information is needed in the FS Report to assess the effectiveness and expected reduction in TCE and other VOCs and aid in the selection of the appropriate remedial action measure.

Response: Section 5.5 will be revised accordingly, based on the availability of data before and after mitigation measures. A Table 5-10 summarizing the percentage reduction in TCE concentrations will be added to the RI.

Specific Comment 23. Page 95, Section 5.5.6 Vapor Barriers and Passive Ventilation in Residences

This section concludes that samples from the residences with vapor barriers and passive sub-slab ventilation systems demonstrate the effectiveness of the barriers and passive sub-slab ventilation systems. However, as stated in the text, many of the homes in the Wescoat Housing Area do not overlie the shallow TCE groundwater plume. The Draft RI Report should provide additional details indicating which homes sampled are located over the shallow TCE groundwater contamination plume and which ones are not. The developer installed vapor mitigation measures

beneath the slab of all the Wescoat Village residential buildings as a precaution and to ensure that the residents would be protected from the potential vapor intrusion pathway.

In addition, the Revised RI Report should also indicate that the Classic Communities development, a portion which may overlie the western edge of the regional groundwater plume, installed vapor barriers and a passive venting system as a precautionary measure to prevent the potential vapor intrusion pathway.

Response: Information provided to Locus includes sampling of several residences in the Wescoat Housing area, 10 of which are in the Vapor Intrusion Study Area. Unfortunately, the data provided to us cannot be used to determine which data corresponds with what building. For example, tabulated data were referred to as "Building 18" or "Building 35" (e.g., Table 5-8), but the figure provided to us uses different building names. Regardless, all residences, whether inside or outside the Vapor Intrusion Study Area, showed concentrations below the TCE interim action level of $1 \mu\text{g}/\text{m}^3$.

The information on Classic Communities will be included in the RI, although it is not certain whether or not it overlies the western edge of the Vapor Intrusion Study Area.

Specific Comment 24. Page 98, Section 6.1 Summary of Findings

Finding #9 states that the potential effect of groundwater depth and groundwater concentrations on indoor air quality is not evident. However, the statement is also made in the conclusions that there are not sufficient data to assess a correlation between subsurface conditions (e.g., groundwater concentrations) and the potential for vapor intrusion. The underlying groundwater concentrations and water levels may be an important factor in predicting the potential for vapor intrusion, so this appears to be a potential data gap that needs addressing.

Response: Data findings at the Site indicate that an air exchange rate of 1/hr is sufficient to result in concentrations below long-term exposure goals regardless of the groundwater concentrations or the groundwater depth. If additional commercial buildings are sampled in the future, it may be possible to develop a relationship between groundwater concentrations and the potential for vapor intrusion.

Specific Comment 25. Pages 98-99, Section 6.2 Evaluation of Implemented Remedial Technologies

Effectiveness of the mitigation measures should include the amount of reduction resulting from the mitigation measure. This comparison is often missing in the analysis of the results.

In addition, increase in ventilation air may be effective in reducing the TCE and other VOC concentrations to meet the interim action levels. However, because of the challenging logistics, including both a consistent, reliable "ventilation criteria" implementation and the expenses associated with its implementation, other mitigation measures should first be employed prior to implementing mechanical ventilation.

Response: Regarding the first part of this comment, please refer to response to Specific Comment 22. Section 6.2 will be revised accordingly.

The second part of the comment is subject to the analyses provided in the supplemental FS report. A revised FS was submitted to EPA on 24 January 2008.

Specific Comment 26. Page 99, Section 6.3 Recommendations for Additional Data

The Draft RI Report recommends collection of “additional information operation of the HVAC systems would be helpful in evaluating proper operation parameters for these HVAC systems (e.g., economizer settings, time of operations).”

EPA agrees that additional data collection is needed for the buildings previously sampled to support any proposed ventilation criteria. Ventilation criteria are not considered valid until the data gaps have been addressed. EPA agrees with the Draft RI Report recommendation that knowing the “time of operation”, which appears to refer to the time of sampling, should enable the MEW Companies to find the respective historic weather data, including the ambient temperature and humidity. Knowing the ambient conditions would allow the MEW Companies to determine the “economizer settings” (at the time of sampling), assuming that the economizer mode was operating as intended. It should be known whether sampling occurred when the HVAC “economizer mode” was on or not.

Further, if it is found that the TCE concentrations were measured during the minimum ventilation mode, and the levels are below the interim action level, it would be appropriate to indicate that minimum ventilation is required in keeping TCE concentrations below the levels of concern. Thus, the ventilation criteria for this given building would be validated. If TCE concentrations were measured during the economizer mode, no meaningful conclusion about the proper ventilation requirement could be made, because the TCE concentrations were measured at a time when there was 100% outside air. As a result, the ventilation criteria cannot be properly applied in such building.

This is one example of how additional data collection can help to properly apply the ventilation criteria. The following is a general list of ventilation data that should be collected for all buildings evaluated. This information should be included in the Revised RI Report.

- **Ventilation Status**
- **Ventilation Mode – minimum ventilation or economizer mode**
- **Ventilation CFM (cubic feet per minute)**
- **Supply Air CFM – Sufficient supply air or air exchange rate is just as important as the ventilation air, as the former causes necessary air exchange (circulation) to move TCE and VOCs, and the latter introduces new fresh air pushing the room air, including TCE vapors to be exhausted from the room.**
- **Positive Pressure – Positive building pressure is critical in preventing vapor intrusion into a building. Although ventilation is a component adding supply air that helps create a positive building pressure, increase in ventilation air alone may not reliably keep TCE concentrations low (due to possible leaks, building cracks, unaccounted building exhaust, etc.), whereas the positive building pressure maintained throughout a building can minimize TCE concentrations and prevent VOCs from entering the building.**
- **TCE concentrations before and after mitigation measures. The Draft RI Report shows the TCE concentrations before and after measures for some buildings. Knowing the TCE concentrations before mitigation measures, which is sometimes omitted in the Draft RI Report, would contribute to further enhancing the ventilation criteria while better estimating what reduction in TCE concentrations should be expected from a typical mitigation measure.**

Once the ventilation and related TCE and VOC data above are collected, it is possible to evaluate ventilation impact on TCE concentrations, and apply the ventilation criteria for a given building. Regarding collecting the above data that would also match the time of previous sampling by the MEW Companies, the following strategies are recommended for each building and ventilation type:

- **Buildings with Minimum Outside Air Intake Systems.** These buildings will likely have the same ventilation CFM, air exchange rate, and building pressure as at the time of the previous air sampling events.
- **Buildings with Economizer Equipped Systems and Modern Energy Management Systems (EMS).** Check the historic data logs which should identify the economizer mode at the time. Modern EMS systems generally have such information available.
- **Buildings with Economizer Equipped Systems and Limited HVAC Controls.** Determine the ventilation mode at the time of sampling by checking both (1) historic weather data and (2) economizer cut-off temperature and humidity settings, if applicable. For example, if the ambient temperature at the time of sampling was 80 degrees F, it is likely that the economizer mode was disabled, and the system was likely operating in the minimum ventilation mode.

Once implementation of all other mitigation measures have been considered and applied, mechanical ventilation could be applied as described below for the buildings with existing mechanical ventilation systems and buildings with natural ventilation, respectively.

Response: Please refer to the response to General Comment 9.

Since the submittal of the RI, additional information has been obtained on measured air exchange rates. The Supplemental FS report provided a correlation between air exchange rates and indoor air data (Figure 7-1 of the FS report). The information will also be included in Section 5.2.3 the revised RI report.

In accordance with the investigation work plan, and as approved by EPA, buildings were sampled in two seasons to evaluate seasonal changes in indoor air concentrations. These potential changes could be attributed not only to vapor intrusion mechanisms, but also to seasonal changes in operations of the ventilation system. The Supplemental RI shows that there were no significant seasonal changes in indoor concentrations (see Section 5.1).

In addition, samples were collected for buildings with different configurations. Within buildings, samples were collected in office areas, conference rooms, kitchens, warehouses, restrooms, etc., all with different occupancy and ventilation configurations. The data again provides the same conclusion reached in the FS report.

It is not clear why such an extensive dataset on the ventilation system is necessary, and we are not aware of a similar request for any other sites. Further, it is not possible to collect this information and provide it in the revised RI. Also, please note the following:

- Information on temperature at the time of sampling was collected and provided in the RI in Appendix B. These data were used to analyze seasonal changes to indoor air concentrations.
- It was not possible to obtain historical records from 2003 on the ventilation system to assess the economizer setting when samples were collected. Records were not kept, or ownerships had been changed.

- The ventilation mode was provided in the tables in RI report (manual with dampers, economizers).
- It is not clear what is the importance of "supply air", unless the comment means that to be "outside makeup air".
- The FS includes provisions on collecting positive pressure measurements as one way of measuring ventilation. However, positive pressure measurements have limitations, as stated in the FS.
- The RI presents all available data before and after a voluntary remedial action was implemented. In most buildings, voluntary remedial actions were not necessary, so a "before and after" scenario is not applicable.

Specific Comment 27. Tables

Tables need to define acronyms used and the “J” qualifier in the Notes section. To help assess the potential vapor intrusion pathway, the data should also be compared to outdoor air samples.

Response: The notes section following each table defines acronyms, and in particular the "J" qualifier. We will revisit the notes and revise if necessary.

Specific Comment 28. Table 4-5, Summary of TCE Concentrations in Indoor and Outdoor Air Samples – Commercial Buildings

Table 4-5 should be revised to address the following comments.

TCE Concentrations Before and After Mitigation Measures.

With the exception of several buildings (i.e., 415 E. Middlefield, 644 N. Whisman, 401 National Ave., NASA Building 15, etc.), where the TCE concentrations are shown before and after a mitigation measure, most other buildings show only the TCE concentrations after the mitigation measures were taken. Knowing TCE concentrations before the conduits were sealed or before the ventilation system was restarted, etc. will allow a better understanding of how much the TCE concentrations could potentially be reduced or need to be reduced.

Also, in the case of 415 E. Middlefield, knowing the TCE concentrations before the ventilation was turned back on, helps better understand what TCE concentrations may be experienced at nights and on weekends, when ventilation is generally off. For example, if TCE concentrations are known to only slightly exceed the TCE interim action levels at nights and on weekends, the building ventilation may only need to be operated in a lower mode to meet the interim action level while the building is occupied.

Response: There seems to be a misunderstanding regarding the comment above. The RI includes detailed discussion of all voluntary remedial actions implemented for the vapor intrusion pathway. Mitigation measures were not implemented in ALL buildings. In fact, the opposite is true. Only unique building situations (e.g., presence of basements, low ventilation rates) warranted voluntary remedial actions. When those actions were implemented, Table 4-5 (and the RI document) compared

the results of samples before and after the remedy was implemented. If the RI did not include data before a conduit is sealed, then to our knowledge, these data do not exist.

There also seems to be a misunderstanding regarding the second paragraph of the comment above. TCE concentrations were measured in the building when the system was on and when it was off. The RI document is clear regarding these distinctions.

Note: New Information Since the Submittal of Draft RI Report.

It is EPA's understanding that the properties at 644 National Avenue, 660/670 National Avenue and 331/333 Fairchild Drive have been purchased by a new property owner. The buildings on these properties are currently vacant (November 2007). The following comments on 644 National Ave and 670 National Ave should be addressed as appropriate.

644 National Avenue.

Tables 4-5 and 4-9 incorrectly describes 644. N. Whisman Road when presenting the results of the 644 National Ave building. Further, throughout the Draft RI Report and in the comments section of Table 4-5 and Table 4-9, the text states that the basement is not occupied, apparently trying to justify that the TCE concentrations in the basement can remain above $2.7 \mu\text{g}/\text{m}^3$. EPA disagrees with the assessment that the basement has not been occupied during the RI. Because the basement is an occupiable space and has been used numerous times, appropriate action to protect the occupants in the basement from elevated TCE and other VOC concentrations in the basement must be taken. The text must be revised and corrected to address the following points:

The basement has been occupied for extended periods of time (e.g., with people sorting and preparing donation items to the victims of Hurricane Katrina in 2006), and could be occupied again.

Although the TCE and other VOC concentrations in the basement have been reduced substantially, TCE concentrations exceed the interim action level. The MEW Companies installed two exhaust fans, which, according to the tenant, only operated at night. When the exhaust fans are not operating, the TCE concentrations may increase considerably. The basement could reasonably be occupied periodically or permanently in the future, the TCE concentrations in the basement must be controlled and protective of occupants whenever in use.

In addition, several observations indicate that the operator of the building continues to penetrate the basement slab floor exacerbating the groundwater to indoor air pathway into the basement. This also demonstrates an example where more frequent and appropriate monitoring of the activities in the basement is needed.

Response: Please refer to response to Specific Comment 3. It is correct that the exhaust fans were operated during the night hours, per request from the property owner. However, the confirmation samples were collected during the day. Since the submittal of the Supplemental RI, the ownership of the building has changed. It is now not occupied, and is scheduled to be demolished in the first quarter of 2008. The Supplemental RI will be revised to include this new information.

670 National Avenue.

Table 4-5 shows that TCE indoor air concentrations consistently exceed the interim action level. It is unclear why no mitigation measures were implemented in this building and confirmation samples taken to ensure that the occupants were protected from Site contamination. The Revised RI Report should address this point.

Response: Subsequent to collection of the samples, the results were provided to the building owner, and the MEW Companies attempted to contact the owner to discuss the results and appropriate interim remedial measures. Soon afterwards, it was observed that the building was unoccupied, and we later

learned that it has been sold. Our understanding is that it is now scheduled for demolition in the first quarter of 2008. The Supplemental RI will be revised to include this new information.

NASA Building 16.

Table 4-5 shows that TCE indoor air concentrations consistently exceed the interim action level. EPA understands that NASA had plans to install a ventilation system and collected confirmation samples. The table should be updated to include the mitigation measures taken at Building 16.

Response: NASA plans to implement remedial measures at Building 16. A description and an evaluation of these measures will be reported to EPA by NASA after the remedy is implemented.

Remove comparison to short-term levels from table. Because the samples did not exceed the short-term levels, it is not necessary to include this information in the table and should be removed.

Response: The RI compares TCE concentrations to short-term and long-term exposure goals. Table 4-5 provides details to show that short-term exposure goals have not been exceeded in indoor samples.

Specific Comment 29. Table 4-6 355/365 E. Middlefield Road

Cracks were not sealed as part of the mitigation measure in this building.

Response: Correct. Table 4-6 will be revised accordingly.

Specific Comment 30. Tables 4-7, 4-8, 4-12 and 4-13 Results of Indoor, Outdoor Air and Pathway Samples – Commercial Buildings and Residences and EPA Reporting Limits

EPA reports “Not Detected” or “ND” data at concentrations less than ½ the quantitation limit. The tables with EPA data should be revised and corrected. Also, EPA analyzed for 1,2-DCA; however, 1,2-DCA is not a chemical of concern at the MEW Site. Therefore, 1,2-DCA should be removed from the data summary tables.

Response: It is not clear why EPA reports ND data at concentrations less than ½ the quantitation limit. It is also not clear why EPA analyzed for 1,2-DCA when it is not a chemical of concern for the MEW Site. For completeness, the 1,2-DCA data were included in the RI, and in previous submittals to EPA on the air samples. Per EPA's request, however, the tables will be revised to remove 1,2-DCA. The tables will also be revised to "double" the detection limit of the EPA samples.

Specific Comment 31. Table 4-9 Information on Ventilation Systems in Sampled Commercial Buildings

Table 4-9 shows many TCE concentrations as “less than 2.7 µg/m³” or “greater than 2.7 µg/m³”. Throughout the text, TCE and other VOC concentrations are shown as precise values or ranges. The text should specify the actual TCE values throughout the Revised RI Report, and in the related tables.

Response: Table 4-9 has been revised to specify the range of indoor TCE concentrations at each building. The reader is referred to the tables for additional information on individual sampling results. The last sentence in the comment is not clear, as it is not possible to include result of 2,800 air samples with multiple analytes in the text.

Specific Comment 32. Table 4-10 Information Collected on Un-Sampled Commercial Buildings South of U.S. Highway 101

Table 4-10 shows the proposed ventilation criteria based on the design ventilation rate of 20 cubic feet per minute (CFM) per person and maximum occupancy of the building. EPA understands that the ventilation criteria described in the Draft RI Report have since changed. The problem with using this method is that a building only needs to provide sufficient ventilation air for an actual physical count of people, and not for a maximum occupancy, unless both the building is designed for it and operates at design occupancy on a given day. Also, the ASHRAE recommended ventilation rates are less than the 20 CFM per person, and are as follows:

- Office space – 17 CFM/person based on 5 people per 1,000 square feet (sf).
- Reception area – 7 CFM/person based on 30 people per 1,000 sf.
- Telephone Data/Entry – 17 CFM/person based on 60 people per 1,000 sf.
- Main Entry lobbies – 11 CFM/person based on 10 people per 1,000 sf

Compliance with the ASHRAE standard is not required because it is not a code. Further, compliance with the current building codes is not required if the building had been built before such code was instituted, unless the building has been recently upgraded or retrofitted.

The ventilation criteria should be revised accordingly to be based on specific TCE removal or reduction requirements for each building, rather than on ASHRAE or other standards or codes.

Response: The ventilation criteria is discussed in the FS report. Table 4-9 estimates the air exchange rate in un-sampled buildings, and does not necessarily refer to ASHRAE standards. Table 4-10 will be revised to remove reference to the "Max. Projected Occupancy", "Ventilation Rate Application", and "Minimum Outside Air Ven. Rate" as they are not included in the estimate of the air exchange rate.

Specific Comment 33. Tables 4-17 Comparison of Maximum Concentrations in Residences to Background Levels and Table 4-19

As stated in previous comments, EPA does not agree with use of the 95th percentile of background concentrations as presented in the Draft RI Report. The comparison is misleading and should be removed from the RI Report, including Tables 4-17 and 4-19. Specifically, EPA does not agree with the statement that the 95th percentile of TCE background level is 1.5 µg/m³. Also, Residence C1 is occupied, has not been demolished, and does not overlie the regional groundwater contamination plume. The tables and text should be revised accordingly.

Response: Please refer to response to General Comments 5 and 8. Tables will be revised to exclude reference to Residence C1.

Specific Comment 34. Table 5-3 Comparison of Construction Type and Year of Construction of Baseline Buildings to Indoor TCE Air Concentrations

Table 5-3 shows all the slab-on-grade buildings with their respective ventilation status being "On" and all having the TCE concentrations below 2.7 µg/m³. It is unclear, though, what ventilation mode each building was operating in at the time of TCE sampling. As a result, it is difficult to estimate the precise ventilation impact on TCE

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Appendix E: Responses to EPA Comments on Supplemental RI Report

Final Supplemental Remedial Investigation Report for Vapor Intrusion Pathway

MEW Study Area, Mountain View and Moffett Field, California

concentrations unless a building is equipped with the “minimum (constant) ventilation air intake ” Otherwise, in the case of “economizer-run” HVAC systems, it is not known whether the HVAC system was in “economizer mode” at the time of sampling. Therefore, because of fluctuating economizer mode, the ventilation criteria cannot be properly applied. Additional ventilation data is needed to substantiate the comparison that the Draft RI Report makes in Table 5-3.

While Table 5-3 emphasizes that all the buildings with ventilation “On” have low TCE concentrations, the table shows only 34 buildings (with two data entries for the 645 and 670 National Ave buildings), out of the 47 buildings sampled. Data for all 47 buildings with the comprehensive ventilation data, if available, should be provided in the Revised RI Report.

Response: The Supplemental RI will be revised to include a description of the ventilation criteria provided in the draft FS. Since the submittal of the Supplemental RI, additional weekday were collected in 350 Ellis Street Building E, 370 Ellis Street Buildings A and B, and 380 Ellis Street Buildings C & D.

Also, please note that Table 5-3 includes "baseline" buildings only.

Specific Comment 35. Table 5-4 Comparison of HVAC System Mode of Baseline Buildings to Indoor Air TCE Concentrations and Appendix B – Sampled Building Information and Results of Air Samples

- The HVAC system modes for the first 9 buildings on Table 5-4 are identified as “Manual” and “Economizer/Manual”. Appendix B has similar terms. Please clarify what this means.
- Similar to Table 5-3, Table 5-4 shows only 25 buildings out of the 47 buildings sampled. Information for all buildings sampled should be included on the Tables 5-3 and 5-4.

Response: Per the request in the comment above, the definition "economizer" and "manual" will be added to Table 5-4 and Appendix B. Table 5-4 includes only baseline buildings for which we have information regarding the HVAC system.

Specific Comment 36. Figure 4-92

The figure is barely legible and should be revised and updated to clearly identify the status of each building.

Response: Figure 4-92 will be replaced with a new figure that specifies the status of each building that lies within the shallow groundwater plume. The status was updated based on new information gained since the Supplemental RI was submitted.

Specific Comment 37. Figure 4-93

Figure 4-93 should be revised to include the extent of the shallow TCE groundwater plume. The sampling results for Wescoat Housing extend beyond the area highlighted and the regional TCE groundwater contamination plume.

Response: Figure 4-93 will be revised per the comment above.

Specific Comment 38. Figures 4-94 through 4-110 Plots of TCE Concentrations for Residences

- For clarity and ease of comparison, the outdoor, pathway and indoor sample results should be shown on separate lines and should not overlap with each other.

Response: If all three sampling types were to be shown on separate vertical lines, the time scale would no longer be valid.

- Also, the residential TCE interim action level and the typical detection limit should be added to the figures.

Response: The residential TCE interim action level has already been included on Figures 4-94 to 4-111. It will be labeled as such for clarification. A typical detection limit will be added to the figures.

- The plot of TCE concentrations for Residence 17 and Wescoat Housing Area Residences – 619B, 620E, and 620F – should be included in the Revised RI Report.

Response: The Supplemental RI did not include Residence 17 because it was sampled after the submittal of the report. The Supplemental RI also did not include figures (but included data) from the three residences mentioned in the comment above because they have been demolished. Figures will be added to Supplemental RI showing the concentrations of TCE at Residence 17 and the three residences in the Wescoat Housing Area.

Specific Comment 39. Appendix B: Sampled Building Information and Results of Air Samples

The tables as presented are confusing and it is difficult to easily find specific information for a particular building or sample type. It would be helpful and easier to review and use the tabulated if they were separated and sorted by outdoor air locations and outdoor air samples and indoor air samples by MEW residences and Wescoat Housing residences, Buildings south of U.S. Highway 101 and Buildings north of U.S. Highway 101 with the appropriate type of information collected.

Because TCE is the primary chemical of concern at the Site, TCE sample results should be the first chemical listed on the data tables and a simplified summary table of all the TCE results by Building/Residence, sample location, type, and date should be included in the Revised RI Report.

Response: We found that sorting Appendix B according to responsible party then building address to be useful, as that segregates building-by-building information. However, we do understand that EPA may have different options for sorting the data. Accordingly, we will provide EPA with Appendix B electronically so that users at EPA can sort the data per their preference.

We believe that there are sufficient information in the tables section that concentration on TCE concentrations and evaluations. Regardless, a summary table that lists only TCE results with Building/Residence, sample Location, Type and Date will be added to Appendix B.

Specific Comment 40. Appendix C: Calculation of Background Concentrations in Air

- The purpose, methodology, and results tables presented in this appendix lack transparency. Appendix C should be revised to explain its objective and methodology in sufficient detail and describe what the tables represent. EPA is unable to comment on the merits of the approach without understanding all of these

components. The text should explain the purpose of collecting three types of “background” samples and how the information should be used. The analysis as presented provides no justification for combining the three types of background data (e.g., no statistical comparison of the data sets or outlier tests have been performed). Table C-2 indicates that the highest TCE concentrations were from the NASA area, where there have been impacts from a localized source. Consequently, it may not be appropriate to combine the NASA data set with the other background data if the objective is to calculate a single “background level” that is representative for the Site.

Response: The text has been revised to include additional discussion of the statistical analysis.

- **Table C-2. The probability plots appear to be constructed incorrectly. According to Table C-2, the Z-scores are derived as if each data set is as large as the largest data set (i.e., TCE with 161 average values). This causes the other probability plots to be compressed toward the center.**

Response: Since the probability plots are used only for a visual qualitative review of the data's statistical distribution, the actual Z-score values are not relevant for the evaluation. As long as the relative values of the Z-scores are correct, the distribution will appear the same. Appendix C will be revised using the newer version of EPA's ProUCL software, and the probability plots are no longer included in Appendix C.

- **The 95UCLs listed at the end of Appendix C on the chemical-specific tables do not match the 95UCLs on Table C-3. It is not apparent why these are different and how the 95UCLs on the chemical-specific tables were calculated.**

Response: The 95UCLs on the chemical-specific tables are based on a normal distribution. This 95UCL is calculated differently than the other UCLs presented on Table C-3. These UCLs are most similar to the Student's-t UCLs, but the Student's-t distribution differs slightly from the normal distribution. To simplify the statistical evaluation, the chemical-specific tables will be removed from Appendix C.