DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE RD, SUITE 900
SAN DIEGO, CA 92108-4310

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Ser BPMOW.ELB\0589
May 30, 2007

Ms. Elizabeth Wells (2 copies)
San Francisco Bay Regional
Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Ms. Alana Lee (2 copies)
US EPA
Region 9
75 Hawthorne Street (SFD-73)
San Francisco, CA 94105

Dear Ms. Wells and Ms. Lee:

The Responses to Comments received on the Draft Building 88 Investigation Report of July 21, 2006 are enclosed for your review. Comments were received from Environmental Protection Agency (EPA) on March 20, 2007, the Regional Water Quality Control Board on September 29, 2006 and May 3, 2007, and National Aeronautical and Space Administration (NASA) on August 22, 2006. To facilitate the comment/response process, the Navy and agencies met on April 25, 2007. Upon concurrence with these responses, the Navy will finalize the report.

This document has been prepared for the Navy's environmental restoration at Moffett Field. If you have questions or need additional information, please contact Ms. Elizabeth Barr, Remedial Project Manager, at (619) 532-0903 or me at (619) 532-0963.

Sincerely,

DARREN NEWTON
BRAC Environmental Coordinator
By direction of the Director

Enclosure: (1) Responses to Comments Received on the Draft Building 88 Investigation Report of July 21, 2006

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Copy to:
Mr. Don Chuck (3 copies)
National Aeronautics and Space Administration
Ames Research Center MS 218-1
Moffett Field, CA 94035

Ms. Tania Fragomeno (w/o encl)
4250 Executive Square, Suite 670
La Jolla, CA 92037

EPA COMMENTS ON DRAFT
FORMER BUILDING 88 INVESTIGATION REPORT
DATED JULY 21, 2006
FORMER NAS MOFFETT FIELD
MOFFETT FIELD, CALIFORNA

Comments dated: March 20, 2007

Comments by: Ms. Alana Lee
U.S. Environmental Protection Agency (EPA) Project Manager

GENERAL COMMENTS

Comment 1: ***Remediation of Navy Sources within the MEW ROD Regional Study Area Needed.*** *In the 1993 Amendment to the 1990 Federal Facilities Agreement between the Navy, EPA and the State of California, the Navy is obligated to both control and remediate source control areas within the Middlefield-Ellis-Whisman (MEW) Regional Study Area in accordance with the MEW Record of Decision (ROD). This approach was adopted in order to eliminate any impediment to the effective implementation of the MEW Regional Groundwater Remediation Program (Regional Program) North of Highway 101 and to maintain a consistent and coordinated approach to remediation within the MEW ROD Regional Study Area. Source control and remediation are a central component to the groundwater remedy that the Navy has adopted.*

In the Draft Building 88 Report, the Navy indicates its intention to utilize the existing West-side Aquifers Treatment System (WATS) extraction wells to capture the volatile organic compound (VOC) contamination from the Former Building 88 area. However, the WATS extraction wells are designed as part of the regional remediation system, not as source control wells. It is neither efficient nor cost effective to allow VOC contamination to migrate over 1,000 feet before reaching the first downgradient extraction wells. Additionally, extraction well EA1-1, pumping intermittently at an average flow rate of 0.3 gallons per minute, is not adequate to control and remediate the former Building 88 source area. Additional source control measures must be implemented by the Navy to adequately contain and remediate the Building 88 source area.

Response 1: The purpose of the Building 88 Report is to determine whether tetrachloroethene (PCE) contamination is present in soil and groundwater. The sampling results detected PCE contamination in soil and groundwater at the former Building 88 site. The Navy is internally

discussing the next steps for source control at the site and will present the potential options to the BCT.

Comment 2: ***Recommendations for Further Action Missing.*** *The Draft Building 88 Report presented and evaluated several alternative technologies that could potentially be used to address the Building 88 source area. It is unclear why none of the technologies evaluated were recommended to address the Building 88 source area. The FFA requires that where Navy sources are identified on Moffett Field, the Navy will take action to remediate those source areas. Data provided in the Draft Building 88 Report shows an ongoing source of tetrachloroethene (PCE) and trichloroethene (TCE) from the Building 88 area. The Draft Report must be revised to include recommendations for further action to contain and remediate the Building 88 source area.*

Response 2: As discussed during the April 25, 2007, meeting, the intent of the former Building 88 Investigation Report was to evaluate whether there was an ongoing source of PCE at the site. The EPA, Water Board, NASA, and Navy agreed to move forward with resolving comments to finalize this investigation report. The Navy continues to explore potential source control options for Site 28, which includes Building 88.

Comment 3: ***Focused Feasibility Study to Evaluate Alternates for Building 88 Source Area.*** *The Draft Report provides only a brief analysis of potential source area cleanup alternatives. A Focused Feasibility Study should be prepared to fully evaluate the potential cleanup technologies and alternatives to address the Building 88 source area. EPA recognizes that the Navy is actively participating in workgroup meetings with the MEW Companies, NASA and regulatory agencies to evaluate alternate groundwater strategies for the regional groundwater VOC plume area. While the regional focused feasibility study effort is still in the work plan stage, rigorous source control and aggressive VOC mass removal will likely be considered as a component of these alternatives. EPA would expect the Navy's approach to address the Building 88 source area to be consistent with this overall site-wide regional groundwater strategy and remedy.*

Response 3: The Navy will continue to coordinate with the regulatory agencies and stakeholders throughout the environmental restoration process for the former Building 88. The Navy will continue to evaluate environmental restoration strategies for Building 88 that are protective of human health and the environment. The Navy is currently participating in the Groundwater Focused Feasibility Study working group meetings; however the extent of the Navy's participation in the Feasibility Study has not yet been decided.

Comment 4:

(a) ***Analysis of PCE, TCE and Degradation Products.*** *The Draft Report does not evaluate the full range of contamination from the Building 88 source area. Specifically, the Draft Report fails to assess TCE, cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride soil gas concentrations in its evaluation. The Draft Report explains that this was done because the Building 88 source area "overlies the regional TCE plume" (page 2-3). However, TCE, cis-1,2-DCE, and vinyl chloride are each degradation products of PCE . Due to the age of the Building 88 source area (decades), there has been sufficient time for PCE and TCE degradation to occur especially with the co-mingling of petroleum hydrocarbon contamination. Thus, it is likely that the PCE contamination from the Building 88 source area has partially degraded and co-mingled with the regional groundwater VOC contamination. In addition, based on the presence of elevated PCE and TCE concentrations in the Sump 66 area, the Building 88 area appears to be a source of PCE and TCE contamination.*

(b) Therefore, all soil, soil gas, and groundwater sample results (current and historical) in the area should be summarized and the Draft Report should include the technical evaluation of all the PCE, TCE, cis-1,2-DCE and vinyl chloride results in groundwater, soil, and soil gas, to fully evaluate potential source areas.

Response 4:

(a) The Navy has shown that there is a continuing source of trichloroethene (TCE) and its daughter products (cis-1,2-dichloroethene [cis-1,2-DCE] and vinyl chloride [VC]) from upgradient Middlefield-Ellis-Whisman (MEW) sources impacting the groundwater underlying the former Moffett Field. The Navy has unsuccessfully attempted to distinguish upgradient MEW sources from on-site Navy sources using stable isotopes. As such, until upgradient sources of TCE, cis-1,2-DCE, and VC are eliminated and the groundwater contamination from those sources remediated, it is difficult to differentiate the impacts from Navy sources.

Based on the above response, no change in the text is warranted.

(b) The current and historical co-mingled groundwater results from MEW, National Aeronautics and Space Administration (NASA), and Navy sources at Moffett have been, and continue to be, summarized in each party's respective annual groundwater report.

Based on the above response, no change in the text is warranted.

Comment 5:

Evaluation of Subsurface Vapor Intrusion to Indoor Air Pathway. The Draft Building 88 Report does not evaluate the potential impact of VOCs in soil, soil gas and groundwater on indoor air quality in existing and future buildings overlying the source area and resulting plume. The Draft Building 88 Report should be revised to evaluate the

nature and extent of the shallow VOC groundwater, soil, and soil gas contamination and potential impact to current and future building occupants from the subsurface vapor intrusion pathway.

Response 5:

Evaluation of potential impacts of VOCs to indoor air was not part of the Building 88 investigation, because Building 88 has been demolished. The potential for vapor intrusion in future structures should be addressed by the site owner, and the appropriate mitigation measures implemented. The Navy will provide appropriate notice of the potential environmental impacts to human health and environment to the site owner.

The current Navy directive is not to evaluate subsurface vapor intrusion to indoor air.

Based on the above response, no change in the text is warranted.

Comment 6:

Nature and Extent of VOC Contamination. Additional sampling is necessary to define the extent of the VOC groundwater plume in the A1, A2, and B2 Aquifer zones. There has been insufficient sample data collected to date to determine the extent of the VOC groundwater plume to the east beneath Hangar 1 in the A1 and A2 Aquifer zones. In addition, two of the monitoring wells do not appear to have been installed at appropriate locations or sufficient depths to adequately assess the extent of contamination in the B2 aquifer zone. The extent of contamination must be adequately characterized in order to make any determination that a source area is controlled and "capture" is adequate.

(a) A1 Aquifer Zone: Because there are no sample points beneath Hangar 1, the eastern plume boundary in the A1 and A2 aquifer zones is not defined. This is made clear in the Draft Report, Figure 9-4, where the undefined plume boundary is represented by dashed lines rather than a solid contour line. In the text, however, the Draft Report indicates that it is unlikely that the groundwater contamination plume reaches under Hangar 1. This conclusion is unsupported, and, in fact, the data appears to suggest that it is likely that the plume would reach to at least beneath the Hangar.

(b) A2 Aquifer Zone: It is unclear why the A2 aquifer zone plume depicted on Figure 9-5 has a "lobe" around EA2-3. The rationale and data supporting the depiction of the PCE plume around EA2-3 should be explained.

(c) B2 Aquifer Zone: In addition, monitoring wells W88-2 and W88-3 do not appear to have been installed at appropriate locations or sufficient depths to adequately assess the extent of contamination in the B2 aquifer zone.

(d) CPT-88-12: It is unclear why the PCE concentrations detected at CPT-88-12 in the A1 and A2 aquifer zones are not connected to the main plume. Instead it is depicted as a separate plume downstream of the main plume.

Response 6:

(a) The extent of the PCE, TCE, and daughter product plumes at the Moffett are summarized annually in the groundwater report. The eastern edge of the PCE plume in the upper portion of the A aquifer (Figure 9-4) is limited by the lack of detections to the east of Hangar 1 (all values to the east of Hangar 1 are less than the laboratory reporting limit [less than 2 micrograms per liter (µg/L)]). For human health reasons, it is not advisable to drill within Hangar 1 to define the exact eastern edge of the PCE plume.

Based on the groundwater flow direction (locally impacted by WATS), apparent source area(s), and apparent preferred pathway (utility backfill along Cummins Avenue) within the upper portion of the A aquifer, the PCE plume in the upper portion of the A aquifer is mostly to the west of Hangar 1.

Based on the above response, no change in the text is warranted.

(b) For clarity, the following text will be added to Section 9.2.3, 4th paragraph to explain the impact of extraction well EA2-3 on the shape of the PCE plume.

> The PCE plume within the lower portion of the A aquifer is wider than depicted using solely groundwater data from monitoring wells. Dissolved PCE in the lower A aquifer along Cummins Avenue (downgradient of the traffic island) appears to be controlled by preferred flow paths (sand channels) and the groundwater flow direction. It is possible ~~that~~ there is some dispersion that would cause dissolved PCE to migrate beneath Hangar 1. However, since extraction well EA2-3 only contains low PCE concentrations, it is not likely that there is significant dispersion beneath Hangar 1. **Shortly after EA2-3 was installed in late 2004, the PCE concentration in a sample collected from the well was less than the laboratory reporting limit of 2 µg/L. After pumping for one year (late 2005), the PCE concentration in a sample from the well was 29 µg/L. Therefore, it is likely the operation of EA2-3 captured a portion of the PCE plume in the lower portion of the A aquifer, as depicted in Figure 9-5.**

(c) The following text will be added to Section 5.2, 2nd paragraph to better define the selected locations of the new B2 aquifer monitoring wells.

B2 aquifer zone monitoring well W88-1 was drilled and installed at location CPT-88-13 because of the detected PCE concentrations at 60 feet bgs (considered to be the bottom of the A aquifer), and the lack of a B2 aquifer zone monitoring wells located immediately downgradient of this location. Two additional B2 aquifer zone monitoring wells **(W88-2 and W88-3)** were installed **to fill potential gaps in the network of existing B2 aquifer zone monitoring wells (W9-11, W9-15, and W9-12) downgradient of the former Building 88 and Traffic Triangle areas.** ~~generally hydraulically downgradient of location CPT-88-13,~~ **Well W88-2 was** ~~one~~ located to the north of Hangar 1 ~~(W88-2)~~ and ~~the other~~ W88-3 ~~located~~ in a parking lot on the northwest corner of Severyns Avenue and North Akron Road ~~(W88-3)~~ (Figure 5-1). The new B2 aquifer zone groundwater monitoring wells were installed between July 26 and August 3, 2005.

The following text will be added to Section 5.3, 1st paragraph to better define the target completion depth of the new B2 aquifer zone monitoring wells.

It was intended to install monitoring wells W88-1, W88-2, and W88-3 into the top of the B2 aquifer zone. All three groundwater monitoring wells were completed in permeable materials below clay or clayey layers beneath the assumed base of the A aquifer. **The top of the B2 aquifer zone ranges from 60 to 80 feet bgs (TtEC, 2005).** However, a clear boundary between the A aquifer and the B2 aquifer zone has not been defined. Monitoring wells W88-1, W88-2, and W88-3 are screened in permeable soils approximately 10 feet higher in elevation than the other local B2 aquifer zone monitoring wells (51B2, W9-12, W9-15, 123B2, and W9-11). **However, the bottom 10 feet of each boring, which was drilled and backfilled before construction of each well, was fine-grained, low-permeability soils. Drilling and completing a monitoring well deeper than 97 feet bgs would have been deeper than the other B2 aquifer zone wells in the WATS area.** Based on a comparison of groundwater sample results (see Sections 4.0 and 6.0) and groundwater elevation data from the new monitoring wells and the 2005 annual sampling event (Tetra Tech FW, Inc., 2005b), it is possible to draw the following conclusions:

Tetra Tech EC, Inc. *2005. 2005 Annual Groundwater Report for WATS and EATS.* August.

In addition, the following text will be added to Section 5.2.2, 2nd paragraph to clarify the completion depth of the new B2 aquifer zone monitoring well W88-2. Section 5.3, Bullet No. 2 provides a detailed

discussion of the justification why well W88-2 is designated a B2 aquifer zone well.

> Monitoring well W88-2 was constructed inside the drill pipe. For monitoring well W88-2, the bottom of the borehole from 89 to 97 feet bgs was backfilled with bentonite chips as the nominal 8-inch diameter drill pipe was withdrawn. **The boring log for W88-2 shows that from 87 to 97 feet bgs the formation was silts and clays, which were considered to be low-permeability soils.** A 10-foot-long well screen, similar to the well screen set in monitoring well W88-1, was set between the depths of 77 and 87 feet bgs (the depth interval with the most permeable soils – see boring lithologic log in Appendix D). **Drilling and completing a monitoring well deeper than 97 feet bgs would have been deeper than the other B2 aquifer zone wells in the WATS area.** The remainder of the construction for monitoring well W88-2 was similar to the construction for monitoring well W88-1. A detailed monitoring well construction figure is provided on the well log in Appendix D.

In addition, the following text will be added to Section 5.2.2, 3rd paragraph to better define the completion depth of the new B2 aquifer zone monitoring well W88-3. Section 5.3, Bullet No. 3 provides a detailed discussion of the justification of why well W88-3 is considered to be a B2 aquifer zone well.

> Monitoring well W88-3 was constructed inside the drill pipe. For monitoring well W88-3, the bottom of the borehole from 89 to 97 feet bgs was backfilled with bentonite chips, as the nominal 8-inch diameter drill pipe was withdrawn. **The boring log for W88-2 shows that from 87 to 97 feet bgs, the formation was silts and clays, which were considered to be low-permeability soils.** A 10-foot-long well screen was set between the depths of 79 and 89 feet bgs (the depth interval with the most permeable soils – see boring lithologic log in Appendix D). **Drilling and completing a monitoring well deeper than 97 feet bgs would have been deeper than the other B2 aquifer zone wells in the WATS area.** The remainder of the construction for monitoring well W88-3 was similar to the construction for monitoring well W88-1. A detailed monitoring well construction figure is provided on the well log in Appendix D.

Per agreement between the EPA, Water Board, and the Navy in a meeting held on April 25, 2007, a new cross section has been included in the Report showing the aquitard between the A aquifer and the B2 aquifer zone. This cross section confirms that the new groundwater monitoring wells are completed in the B2 aquifer zone.

(d) The following text will be added to Section 9.2.3, as a new paragraph following the 2nd paragraph, to clarify why the PCE concentration at CPT-88-12 is not connected to the western PCE plume in the upper portion of the A aquifer.

The estimated concentration of PCE in the sample collected from CPT-88-12 of 180 µg/L is more than 25 times the maximum concentration detected within 600 feet of the western PCE lobe, shown on Figure 9-4. All groundwater monitoring well samples within a 600-foot distance from CPT-88-12 have concentrations that are low (less than 7.1 µg/L) or less than the laboratory reporting limit. This significant increase in concentration (greater than a factor of 25) suggests another source of PCE. Therefore, Figure 9-4 shows the PCE detection at CPT-88-12 as a separate plume.

SPECIFIC COMMENTS

Comment 1: ***Rationale for Sample and Monitoring Well Locations.*** *The Draft Building 88 Report does not sufficiently support the rationale behind the placement of several of the sample locations. For clarity, the Draft Report should be revised to include the rationale for the placement of sample and monitoring well locations.*

(a) Based on the Draft West-Side Aquifers Treatment System (WATS) Optimization Work Plan Addendum (Draft WATS Work Plan Addendum; Figure 2-1), two soil gas samples (SG-88-28 and SG-88-25) were collected from the area of two former (steam) pits. However, the Draft Report fails to show the location of the (steam) pits or discuss them in the analysis.

(b) The Draft Building 88 Report should indicate whether continuous core sample CC- 88-3 is located at post-excavation sample GS88-129 where 1,100 micrograms per kilogram (ug/kg) of PCE were left in place or at pre-excavation sample GN9 where 312,000 parts per billion by volume (ppbv) of PCE had been detected.

(c) One of the objectives of soil gas sampling was to identify areas where PCE is present in the vadose zone and indicative of a source area. Thus it is unclear why no soil gas samples were collected within the excavation areas and at sumps and a tank at former Building 88.

(d) Another objective of the soil gas sampling was to use the results to direct subsequent investigations (i.e., continuous soil coring). In light of that, the rationale behind placement of the continuous soil core samples is unclear. The five continuous soil cores were collected:

(1) within the excavations where no soil gas samples were collected;

(2) at SG-88-1 where PCE was not detected above 140 ppbv in soil gas;

(3) cross-gradient of the northern excavation and Tank 68 where PCE was detected in soil gas at 140 ppbv at SG-88-23; and

(4) 500 feet north of Building 88 outside potential source areas.

Selection of these locations in light of the soil gas results should be explained.

(e) The rationale for placement of monitoring well locations W88-2 and W88-3 is unclear. The Draft Report (page 5-1) states that these wells are generally located hydraulically downgradient of CPT-88-13. However, neither well is located along the utility corridor and well W88-2 is not located within the coarse-grained sediment shown in Figure 8-4. Analytical data show that PCE was not detected in these two new wells.

(f) As stated on pages 5-4 and 5-5 of the Draft Report, it is uncertain whether well W88-2 was installed in the B2 aquifer zone and there is some doubt that well W88- 3 was installed in the B2 aquifer zone.

Response 1:

(a) Figure 2-1 of the Draft Work Plan Addendum 1 (TtEC, 2005) does not show soil gas samples or former steam pits. Figure 2-2 of the Draft Work Plan Addendum 1 (TtEC, 2005) shows historical soil gas samples, but does not show SG-88-25, SG-88-28, or former steam pits.

Based on the above response, no change in the text is warranted.

(b) CC-88-3 was not located at the coordinates of either GS88-129 or GN9. Page 3-2, Section 3.2 of the Draft Report states CC-88-3 was located within the northern remedial excavation to identify potential sources (Page 3-2, Section 3.2 of the Draft Report).

Based on the above response, no change in the text is warranted.

(c) For clarity, the following text has been added as the 4th paragraph in Section 2.2.1.

As shown on Figure 2-5 of the Final Work Plan Addendum 1 (TtFW, 2005a), it was intended to place soil gas sample locations within sumps 66 and 91, and within the area of Tank 68. However, there were no historic as-builts for the former Building 88, and all structures had been removed. The locations of the former structures were estimated from previous drawings, historical air photos, previous reports, the locations of roads and sewers, and existing buildings in the

area. Historical Navy and NASA records were reviewed to find additional information on the building location. Finally, the footprint of the former building was surveyed using all of this information. However, previous drawings, descriptions of locations, and sizes/volumes of pits/tanks were inconsistent. Based on the subsequent core and CPT work, the soil gas sample locations were placed near to the intended sumps and tank, but due to the above uncertainties in the building location, not within the sumps and tank.

For clarity the following text has been added as the 2nd paragraph in Section 2.2.

> The soil gas survey was completed in accordance with the *Final West-Side Aquifers Treatment System Optimization Work Plan Addendum 1* (TtFW, 2005a). Initial soil gas survey locations were based on previous soil gas survey detections of PCE, reported residual PCE after Building 88 demolition and groundwater detections of PCE. **Because impacted soil to the depth of the water table had been removed in the former excavation areas, no soil gas samples were proposed in the Work Plan or completed in these areas. Soil gas samples targeted floor drains, the piping systems, the waste water collection trench system, and sumps of the former building.** Fifty soil gas probes were installed: 38 as originally proposed and 12 as step-outs at locations where PCE soil gas was detected at concentrations above 500 parts per billion by volume (ppbv). The value of 500 ppbv was chosen because it is half the average of the historical PCE soil gas concentrations. Soil gas probe locations and the survey results (described in Section 2.3) are shown on Figures 2-1 and 2-2. Soil gas probe installation and sampling activity photographs were provided in Appendix A.

(d_1) For clarity the following text will be added to the 2nd paragraph of Section 3.2.

> Five continuous core borings were completed in accordance with the *Final West-Side Aquifers Treatment System Optimization Work Plan Addendum 1* (TtFW, 2005a). Continuous core boring locations are shown on Figures 3-1 and 3-2. Continuous core boring CC-88-1 was located approximately 500 feet north (hydrologically downgradient) of the former Building 88 (see Figure 3-1). **CC-88-1 was randomly located to compare and calibrate the corehole lithology with a CPT log outside of a suspected source area.** Continuous core borings CC-88-2 through CC-88-5 were located near the Sump 66 excavation, the northern remedial excavation, the Tank 68 excavation, and the southern

remedial excavation, respectively (see Figure 3-2). **CC-88-2 was intended to be located within Sump 66. CC-88-2 was placed near the Sump 66, but due to uncertainties in the building location (see Section 2.2.1), not within the former sump footprint.**

CC-88-3 and CC-88-5 were placed in the former excavation areas based on historical soil sampling data showing that PCE contamination had been left in place below the water table. CC-88-4 was intended to be located within the Tank 68 footprint, as shown in the Final Work Plan Addendum 1 (TtFW, 2005a). CC-88-4 was placed near tank 68, but due to uncertainties in the building location (see Section 2.2.1), not within the intended tank footprint. Continuous core boring locations CC-88-2 through CC-88-5 were selected to investigate potential PCE source areas. A continuous core boring was not located at the Sump 91 excavation due to **the** lack of PCE detections in soil gas samples collected upgradient and downgradient of the sump site (see Section 2.3). Soil coring and sampling activity photographs ~~were~~ **are** included in Appendix A.

(d_2) For clarity, text has been added to the 2nd paragraph of Section 3.2, as shown in the Response to Specific Comment Number 1(d_1).

(d_3) For clarity, text has been added to the 2nd paragraph of Section 3.2, as shown in the Response to Specific Comment Number 1(d_1).

(d_4) For clarity, text has been added to the 2nd paragraph of Section 3.2, as shown in the Response to Specific Comment Number 1(d_1).

(e) Wells W88-1 through W88-3 were installed in the B2 aquifer zone. Well W88-1 was located within the Traffic Triangle source area. Wells W88-2 and W88-3 were located to fill potential gaps in a network of B2 aquifer zone monitoring wells (W88-2, W9-11, W88-3, W9-15, and W9-12) downgradient of the former Building 88 and Traffic Triangle areas. For clarity, the December 2005 groundwater potentiometric maps for the upper and lower portion of the A aquifer from the 2005 Annual Groundwater Report for WATS and EATS (TtEC, 2005) have been included in Section 8.0. Please see the Response to General Comment Number 6(c).

The top of the B2 aquifer zone ranges from 60 to 80 feet bgs (TtEC 2005 Annual Groundwater Report for WATS and EATS). The utility corridor along Cummins Avenue is located in the uppermost portion of the upper A aquifer (likely at a depth of less than 15 feet bgs). The utility corridor along Cummins Avenue is unrelated to the location and completion of wells W88-2 and W88-3.

The top of the B2 aquifer zone ranges from 60 to 80 feet bgs (TtEC 2005 Annual Groundwater Report for WATS and EATS). Figures 8-2 through 8-5 in the Building 88 Report show coarse-grained soils within the A aquifer at various depth intervals. Fine-grained soils were acting as an aquitard between the A aquifer and B2 aquifer zone. Therefore, these figures are unrelated to the location and completion of wells W88-2 and W88-3.

Wells W88-2 and W88-3 are completed within the B2 aquifer zone. PCE contamination has not been detected within the B2 aquifer zone, and thus would not be found in samples collected from wells W88-2 or W88-3.

Based on the above response, no other change in the text is warranted.

(f) The bullets in Section 5.3 of the Building 88 report summarize the available data for wells W88-1, W88-2, and W88-3. In each case, a conclusion is stated that the well is completed in the B2 aquifer zone. In addition, please see the Response to General Comment 6.

Based on the above response, no change in the text is warranted.

Comment 2:

Data Gaps and Further Investigation of Tank 68 Area Needed. *Further investigation of the Tank 68 area is necessary. In the Draft WATS Work Plan Addendum, one cone penetrometer test (CPT) sample was proposed within the Tank 68 excavation. Instead, the CPT and one continuous core sample locations were actually completed west (i.e., cross-gradient) of the Tank 68 excavation. Since post-excavation sampling indicated that soil and groundwater still contained PCE (i.e., up to 130 ug/kg in soil and 200 micrograms per liter [ug/L] in groundwater) indicating the possible presence of a continuing PCE source (see Section 1.2.3, Page 1-3), the Tank 68 excavation should have been further investigated.*

Soil gas samples were collected near Tank 68 at a depth of 4.5 to 5 feet; however, the Tank 68 excavation extended to a depth of 9 feet. In addition, Figure 1-5 shows that the highest PCE concentration detected in soil adjacent to the Tank 68 excavation was at a depth of 12.5 feet (i.e., 140 ug/kg at W68-1). Sample SG-88-29 located along the wastewater collection trenches that extended from Tank 68 contained PCE at 1,200 ppbv. This area represents a data gap and further investigation is warranted.

Response 2:

The purpose of the soil gas investigation was to determine if further investigation (e.g., Cone Penetrometer Testing [CPT] soil and groundwater sampling) within the area was required. The EPA-approved Final Work Plan specifies that soil gas concentrations of PCE above 500 parts per billion by volume (ppbv) would trigger

further investigation. All five soil gas samples within 20 feet of the apparent location of the former Tank 68 were less than or equal to 400 ppbv.

The former Tank 68 was located outside the southeast corner of the former Building 88. Sample SG-88-29 was collected closer to the northern (vs. the southern) portion of the former building. Figure 2-2 shows that soil gas samples SG-88-26 and SG-88-27 (also along the wastewater collection trenches that extended from former Tank 68, but considerably closer to the former location of former Tank 68 than SG-88-29) had considerably lower PCE vapor concentrations, at 400 and 300 ppbv, respectively. The closest soil gas sample, at a distance of about 5 feet from the apparent location of the former Tank 68, had a PCE vapor concentration of 330 ppbv.

Based on the above information, no further investigation in the area of Tank 68 is warranted. No change in the text is warranted.

For further clarification on Building 88 locations, please see the Response to Specific Comment 1(c).

Comment 3: ***Further Investigation of Sanitary Sewer Needed.*** *High soil concentrations of PCE were found in former monitoring well ERM-4 (up to 2,100 ug/kg) and at soil boring ERM-B13 (up to 6,900 ug/kg). Both of these locations are downgradient of Sump 66 (see Figure 1-5). However, no samples were collected from the sanitary sewer between Building 6 and Building 88 which is also located downgradient of Sump 66. This area represents a data gap and further investigation is warranted.*

Response 3: The following samples were collected between Building 6 and Building 88.

- Soil gas sample SG-88-1, with a PCE concentration less than the laboratory reporting limit, was located downgradient of former Sump 66, between Building 6 and former Building 88.
- Corehole CC-88-2, with soil samples collected at nine depths ranging from 12.5 to 54.5 feet bgs (see Table 3-2), was located downgradient of former Sump 66, between Building 6 and former Building 88.
- CPT-88-14, with soil and groundwater samples collected at six depths ranging from 10 to 47 feet bgs (see Tables 4-1 and 4-2), was located downgradient of former Sump 66, between Building 6 and former Building 88.

- CPT 88-15, with soil and groundwater samples collected at six depths ranging from 10 to 59 feet bgs (see Tables 4-1 and 4-2), was located downgradient of former Sump 66, between Building 6 and former Building 88 downstream along the sewer area.

- The soil and groundwater data from these locations has shown that PCE soil and groundwater contamination are present to the north of former Building 88.

Based on the above information, no further delineation of soil or groundwater is warranted. No change in text is warranted.

Comment 4: ***Deviations from the Work Plan.*** *The Draft Building 88 Report should include a section that identifies and discusses deviations from the Draft WATS Work Plan Addendum. For example, Figure 2-5 in the Draft Work Plan Addendum shows different soil gas sample locations within the Building 88 footprint than Figure 2-2 in the Draft Building 88 Report (e.g., no samples were collected from proposed locations within the Sump 91, Sump 66, and Tank 68 footprints) and no explanation is provided.*

Response 4: The following new section has been added to the report to the identify deviations from the *Final WATS Optimization Work Plan Addendum 1* (TtEC, 2005).

7.4 CHANGES TO WORK PLAN

There were five deviations from the Work Plan (TtFW, 2005): Field Change Request (FCR) -WATS-86-025, FCR-WATS-86-026, FCR-WATS-86-027, FCR-WATS-86-028, and FCR-WATS-86-031.

FCR #25, dated April 5, 2005, was a change in the sampling program. Monitoring well W29-6 could not be located and was replaced with monitoring well W29-4.

FCR #26, dated April 29, 2005, was a revision to the SAP (TtFW, 2005), which originally required field duplicates for soil samples. The purpose of duplicated samples was to evaluate the precision of the overall sample collection and analysis process. Field duplicates for soil samples could not be collected since the nature of boring sampling (split-spoon samples) prohibited the collection of a true field duplicate. Precision instead was measured through laboratory quality control samples, such as laboratory duplicates and matrix spike duplicates.

FCR #27, dated May 4, 2005, was a change in the sampling program, eliminating vadose zone soil sampling for VOCs, TOC, and leachability. The purpose of the vadose zone soil sample analysis was to evaluate potential contamination in the vadose zone considered to be causing detections of 10 to 20 µg/L of PCE in the shallow groundwater. However, relatively high soil concentrations (up to 7,000 µg/kg) were detected just below the water table. Based on the relatively high PCE concentration in soil just below the water table, the unsaturated zone concentrations and leachability information was considered to be of limited value.

FCR #28, dated May 4, 2005, was a change in the sampling program, adding B2 aquifer zone monitoring wells. PCE concentrations were detected up to 2,100 µg/L in permeable zones near the base of the lower A aquifer. Sampling of B2 aquifer zone wells was needed to evaluate the vertical extent of PCE contamination. B2 aquifer zone monitoring wells 51B2, W9-11, W9-12, and W9-15 were added to the sampling program.

FCR #31, dated September 11, 2005, was a change in the Work Plan (TtFW, 2005), installing up to 3 new B2 aquifer zone monitoring wells. These wells were installed to fill apparent gaps in the location of B2 aquifer monitoring wells downgradient of the Building 88 and Traffic Triangle source areas. Monitoring wells were installed using the sonic drilling method.

Comment 5:

(a) ***Depth to Groundwater.*** *In several areas, PCE was detected in soil at concentrations that indicate the presence of a dense non-aqueous phase liquid (DNAPL) (i.e., PCE soil concentrations greater than 1,500 ug/kg). Examples include: Continuous core sample location CC-88-3 at Building 88 between 10 and 19.5 feet below ground surface (bgs) and CPT-88-13 at the Traffic Island between 8 and 19 feet bgs. However, the fate and transport discussion in the Draft Building 88 Report does not include an assessment of the depth to groundwater at these locations.*

(b) For clarity, the Draft Report should be revised to indicate at what depth groundwater is encountered at the sample locations. In addition, the depth to the groundwater table should be shown in all cross-sections.

Response 5:

(a) EPA guidance states that soil-concentrations of dense non-aqueous phase liquid (DNAPL) related compounds exceeding 10,000 milligrams per liter (mg/kg) (one percent of the soil mass)

suggests the likelihood that DNAPL contamination is present (EPA, 2004). The maximum soil concentration detected during the former Building 88 investigation was in boring CPT-88-13 at a depth of 8 to 9 feet bgs at an estimated concentration of 7 mg/kg. Thus, in accordance with EPA guidance, DNAPL does not appear to be likely in soils in the former Building 88 area.

EPA. 2004. Site Characterization Technologies for DNAPL Investigations. EPA-524-R-04-017. September.

(b) Cone penetrometer testing (CPT) logging and the collection of direct push technology (DPT) soils and groundwater samples does not provide depth to groundwater data. However, these data are important in the assessment of contaminant fate and transport. The December 2005 groundwater potentiometric maps for the upper and lower portion of the A aquifer from the 2005 Annual Groundwater Report for WATS and EATS have been included in Section 8.0.

TtEC. *2005 Annual Groundwater Report for WATS and EATS.* August.

Comment 6: *It appears that all soil samples collected are saturated soil samples (page 9-5), the Draft Report states that groundwater was encountered at a depth of 5 feet bgs in the area of Building 88; on page 1-4, the Draft Report states that groundwater was encountered at 7 to 8 feet bgs at the Building 88 excavation). However, the percent moisture in most soil samples ranged between 18 and 25 percent (Table 4-2).*

Several things are unclear and should be explained:

(a) how were saturated soil samples distinguished from groundwater samples;

(b) how was contaminated pore water in the soil sample treated in the laboratory; and

(c) why the moisture content in the soil samples was so low.

Response 6: For clarity, Page 9-5, Section 9.2, the first two sentences have been modified as follows:

> Depth to groundwater in the area of the Building 88 is currently about ~~5~~ **7 to 8** feet. However, the depth to groundwater was likely ~~less~~ **greater** in **the** past ~~decades~~ **due to historic over-pumping.**

(a) Soil samples were collected by DPT methods using a split-spoon with core liners (see Section 4.2.3). Groundwater samples were collected by DPT methods using HydroPunch® equipment (see Section 4.2.2).

No change in text is proposed.

(b) Soil samples were collected using a 5-gram En Core® sampler. Three En Cores® were collected for each sample to ensure the laboratory had extra for potential reanalysis or dilutions. Upon receipt at the lab, each En Core® was extruded into a 40-ml VOA vial that had been pre-weighed. Once the soil was in the vial, the vial was weighed again to calculate the weight of the sample. Subsequently, the vials were prepared with a solvent and then one of the three vials for that sample was placed on the instrument's autosampler for analysis. The other two vials were used if reanalysis or dilutions were required.

No change in text is proposed.

(c) To calculate percent moisture, the sample sleeve or jar that was collected was used to weigh out an aliquot of the soil, dry it, weigh it again, and calculate percent moisture. All results are then reported based on a dry weight basis.

No change in text is proposed.

Comment 7:

PCE Mass Estimate. *The Draft Report (pages 9-3 and 9-4) quantifies the volumes of soil that are impacted by elevated PCE concentrations and the pounds of PCE that are contained in this soil, thereby implying that all contaminated areas have been delineated. However, there are not sufficient data points to delineate the areas with PCE concentrations in excess of the residential preliminary remediation goal (PRG) for PCE. The same applies to the estimation of pounds of PCE contained in groundwater (page 9-13). Soil and groundwater plume delineation must be conducted first in order to adequately estimate the volume of impacted soil and the pounds of PCE that have to be removed. Otherwise the mass estimate should be qualified or deleted from the Report.*

Response 7:

The calculated mass of soil and groundwater contamination is an estimate and may require refinement pending the methodology selected to remediate the source. The following locations and number of samples were used to estimate the mass of soil and groundwater contamination.

- There are ten CPT/DPT borings in the former Building 88 source area, with five to seven soil samples collected at various depths from each boring for a total of 56 soil samples. In addition, there are four coreholes in the former Building 88 source area, with six to eight soil samples collected at various depths from each corehole for a total of 29 soil samples. Thus, there are fourteen soil sample locations with 85 soil samples at depth defining the PCE soil contamination. Further delineation of soil contamination in the

former Building 88 area is not warranted for an estimate of the volume of impacted soils and mass of contamination.

- There are eight CPT/DPT borings in the Traffic Triangle source area, with five to seven soil samples collected at various depths from each boring for a total of 53 soil samples. Further delineation of soil contamination in the Traffic Triangle source area is not warranted for an estimate of the volume of impacted soils and mass of contamination.

- There are more than 78 groundwater samples (combination of HydroPunch® and monitoring well samples) defining the extent of the PCE groundwater contamination in the upper portion of the A aquifer (see Figure 9-4). Further delineation of PCE groundwater contamination in the upper portion of the A aquifer is not warranted for an estimate of the volume of impacted groundwater and mass of contamination.

- There are more than 51 groundwater samples (combination of HydroPunch® and monitoring well samples) defining the extent of the PCE groundwater contamination in the upper portion of the A aquifer (see Figure 9-5). Further delineation of PCE groundwater contamination in the upper portion of the A aquifer is not warranted for an estimate of the volume of impacted groundwater and mass of contamination.

No change in text is proposed.

Comment 8: ***Continuous Core Sampling.*** *The Draft Report does not provide a figure showing the results of the continuous core sampling effort. To better evaluate the results, a figure summarizing Table 3-2 should be added to the Report.*

Response 8: A new cross section figure with just the corehole data would not provide additional useful information. A cross section with only corehole data would be very large scale (cover a very small area).

The primary purposes of the coreholes, as defined in Section 3.0, were to correlate the CPT lithologic logs and to select sampling intervals for the DPT soil and groundwater samples. The continuous coreholes are generally co-located with CPT/DPT borings in the former Building 88 footprint. The CPT/DPT borings provide lithology and soils/groundwater chemistry in greater detail than the corehole data. The CPT/DPT soil and groundwater sample results are provided in cross section view on Plate 9-1.

No additional cross section is proposed.

WATER BOARD COMMENTS ON DRAFT FORMER BUILDING 88 INVESTIGATION REPORT DATED JULY 21, 2006 FORMER NAS MOFFETT FIELD MOFFETT FIELD, CALIFORNA

Comments dated: September 29, 2006

Comments by: Mr. Devender Narala, P.E., Regional Water Quality Control Board Project Manager

SPECIFIC COMMENTS

Comment 1: *We require a source removal plan for the solvent contamination at this site. The removal of the pollutant sources is mandatory by board Policy1[1]. According to the Draft Report's Sections 10 & 11, the treatability studies conducted at this site are a viable option for successful source removal and in-place treatment of soil and groundwater.*

Response 1: The purpose of the Building 88 Investigation was to determine whether PCE contamination is present in soil and groundwater. The sampling results detected soil and groundwater PCE contamination at the former Building 88 Site. The Navy is internally discussing the next steps for source control at the site, and will present the potential options to the BCT.

Comment 2: *The data in Draft Report (Tables 4-1 & 4-2) indicate that daughter products of Tetrachloroethene[2] (PCE) are prevalent at this site: however, the Draft Report does not address these daughter products. Remediation of these daughter products should be included in future treatability and feasibility studies.*

Response 2: The Navy has shown that there is a continuing source of TCE, cis-1,2-DCE, and VC from upgradient MEW sources impacting the groundwater underlying the former Moffett Field. The Navy has unsuccessfully attempted to distinguish upgradient MEW sources from on-site Navy sources using stable isotopes. As such, until upgradient

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[1] State Water Board Resolution No. 92-49. Policies and procedures for investigation and cleanup and abatement of discharges.

[2] Daughter products of PCE are TCE, DCE, DCA, and VC

sources of TCE, cis-1,2-DCE, and VC are eliminated and the groundwater contamination from those sources remediated, it is difficult to distinguish the impacts from former Building 88.

No change in the text is warranted.

Comment 3: *Figure 1-5, the lines from the box information are not pointing to the correct location and some of box information is missing due to printing errors. Printing errors are wide spread through out the Draft report (mostly in Figures). Modify the Draft Report accordingly.*

Response 3: The tag lines on Figure 1-5 have been corrected, and now point to the proper sample location. All the remaining figures in the Draft Report were checked and no other errors were detected.

Comment 4: *The soil gas investigation is along the sanitary sewer only; however, Figures 1-6 and 1-7, indicate that PCE is present down gradient of former Building 88 in the Upper A aquifer and lower a aquifer above the remediation goal. In these figures, the PCE concentration contours are not well defined. Additional investigation is required to determine the lateral and vertical extent of PCE contamination downgradient of former Building 88.*

Response 4: Figure 1-6 and 1-7 show the PCE configuration in the upper and lower portion of the A aquifer in December 2004 (prior to the Building 88 investigation). These data triggered the Building 88 investigation. The interpretation of the PCE plume in the upper and lower portion of the A aquifer was updated with the data from the Building investigation and are presented in Figures 9-4 and 9-5.

WATER BOARD COMMENTS ON DRAFT
FORMER BUILDING 88 INVESTIGATION REPORT
DATED JULY 21, 2006
FORMER NAS MOFFETT FIELD
MOFFETT FIELD, CALIFORNA

Comments dated: May 3, 2007

Comments by: Ms. Elizabeth Wells, P.E., Regional Water Quality Control Board Project Manager

Addendum to September 29, 2006 Comments

SPECIFIC COMMENTS

Comment 4: *We do not concur with the lateral extent of the PCE[3] plume presented by the Navy on Figures 9-4 and 9-5. The lateral extents of the plumes in the upper and lower A aquifers are depicted with dashed contour lines: however, there is insufficient data to support the location of these contour lines. Unless additional groundwater sampling is performed, the lateral extent of the plumes should be assessed using existing data to the east (such as wells WU4-8 through WU4-11 and WU4-24 beyond Hangar 1) and to the west (such as wells W9-8, W9-19, W9-33, and W9-44 beyond Dugan Avenue). In addition, the presence of and extent of degradation products of PCE in this area should be assessed and presented in the Investigation Report.*

Response 4: The PCE concentration data requested are already incorporated into the figures. Figures 9-4 and 9-5 use all of the monitoring wells sampled for the annual groundwater sampling event (wells agreed upon through coordination with the EPA and Water Board) supplemented with CPT/DPT data collected for the Building 88 investigation. The PCE plumes in the upper and lower portion of the A aquifer are well defined and shown in Figures 9-4 and 9-5.

The Navy has shown that there is a continuing source of TCE and its daughter products (cis-1,2-DCE and VC) from upgradient MEW sources impacting the groundwater underlying the former Moffett Field. The Navy has unsuccessfully attempted to distinguish upgradient MEW sources from on-site Navy sources using stable isotopes. As such, until upgradient sources of TCE, cis-1,2-DCE, and

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[3] PCE = tetrachloroethene

VC are eliminated and the groundwater contamination from those sources remediated, it is difficult to distinguish the impacts from former Building 88.

Based on the above response, no change in the text is warranted.

ADDITIONAL COMMENTS

Comment 5: *The extent of impact in the B2 aquifer and below must be defined in the vicinity of B2 aquifer well W88-1 and Building 88. PCE was detected at elevated concentrations in soil and groundwater samples from this well. No other sampling from within or below the B2 aquifer was performed near this well.*

Response 5: The last paragraph of Section 9.2.3 states that the only detection of PCE in the B2 aquifer zone greater than an estimated concentration of 0.31 µg/L was in well W88-1. Shortly after well completion in August 2005, a sample from well W88-1 had an estimated concentration of 69 µg/L and a field duplicate sample with an estimated concentration of 47 µg/L. The December 2005 sample collected from well W88-1 had a PCE concentration of 6 µg/L. The detections of PCE in samples from well W88-1 appear to have been caused by drag-down during well drilling and construction. Drag-down is a typical condition when trying to complete a monitoring well below a source area. There appears to be de minimus PCE impacting the B2 aquifer zone.

All B2 aquifer zone wells in the WATS area were sampled during the December 2005, and August 2006 events.

Based on the above response, no change in the text is warranted.

Comment 6: *Section 5.2.1: Clarify the procedure used to collect the En Core® soil samples from the rotosonic drill core. Based on the sampling method described in the text, the En Core® samples were collected from disturbed soil core. U.S. EPA[4] guidelines state that samples analyzed for volatile organic compounds should be handled as intact soil cores until transferred into the appropriate preservative or analysis container. Mr. Dennis Goldman of Tetra Tech stated at the April meeting that samples were collected from the state-of-the practice procedures. Modify the text to correctly reflect sampling procedures. Additionally, correct the grammatical errors present in this section.*

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[4] United States Environmental Protection Agency (U.S. EPA), 2005, USEPA region 9 Technical Guidelines for Accurately Determining Volatile Organic Compound (VOC) Concentrations in Soil and Solid Matrices, R9QA.05.2, Final, December.

Response 6: The text at the end of the 1st paragraph in Section 5.2.1 has been modified as follows:

> Soil samples for the lower portion of the borings for the new B2 aquifer zone monitoring wells were collected from the rotosonic continuous core. **The rotosonic continuous core was extruded from the core barrel into a semi-clear polyvinyl liner.** ~~Intervals of potential interest were collected into plastic bag and placed on ice. The material collected ranged in intervals of core from 0.5 foot to 2.5 feet. Latter, after~~ **The liner was sliced open and the lithology logged.** ~~s~~Sample intervals **of the core from 0.5 foot to 2.5 feet** were selected for **possible** analysis. **The entire interval of the polyvinyl liner was sliced with minimal disturbance. A small portion of each core interval was placed in a plastic bag for field screening. The remainder of the selected interval was carefully placed in a large plastic bag, minimizing any disturbance, and temporarily placed in an iced cooler. After selecting the interval to be sampled (based on the highest field screening detection using a photoionization detector),** an En Core® sampler was ~~then~~ pushed into the soils ~~within the bag~~ to collect the sample **for** analysis. **The En Core® sample was placed in its bag, sealed, and placed in an iced cooler.** Soil samples were collected from the soil core at depths of 70 to 70.5 feet bgs and ~~at~~ 73 to 73.5 feet bgs. Drilling was terminated at a total depth of 97 feet bgs. The boring log ~~was~~ **is** provided in Appendix D. Soil sample analytical results are included in Table 5-1.

Any grammatical errors detected will be corrected.

Comment 7: *The Navy must investigate and identify the source of the PCE detected in groundwater samples from CPT-88-12 if it is not associated with the Building 88 plume. PCE concentrations detected in the CPT-88-12 samples are greater than concentrations detected in samples collected upgradient. The Navy has depicted the CPT-88-12 data as a separate plume on Figures 9-4 and 9-5.*

Response 7: The estimated concentration of PCE in the sample collected from CPT-88-12 of 180 µg/L is more than 25 times the maximum concentration detected within 600 feet of the western PCE lobe shown on Figure 9-4. All groundwater monitoring well samples within a 600-foot distance from CPT-88-12 have concentrations that are low (less than 7.1 µg/L) or less than the laboratory reporting limit. This significant increase in concentration (greater than a factor of 25) suggests another source of PCE. Therefore, Figure 9-4 shows the PCE detection at CPT-88-12 as a separate plume.

CPT-88-12 is located adjacent to NASA Building N243, and has historically been NASA property. A request to investigate and identify this PCE source should be directed to NASA.

Comment 8: *As stated in Comment No. 1 of our September 29, 2006, letter and discussed at the meeting, the source(s) of volatile organic chemicals in the Building 88 area must be removed. The Navy agreed at the meeting to present the results of the Building 88 work in the Investigation Report and to assess and select source removal and remediation options in a subsequent report.*

Response 8: The Navy has agreed to address source control options at the former Building 88 Site. The next steps will be presented to the BCT in either a letter, meeting, or subsequent report depending upon which method seems the most appropriate at the time.

Comment 9: *An assessment of the potential impact of volatile organic compounds in soil, groundwater, and soil vapor on indoor air quality for existing and future buildings overlying the contamination should be included as part of the remediation evaluation.*

Response 9: Evaluation of potential impacts of VOCs to indoor air was never an intent of the Building 88 investigation. The scope of work in the Final Former Building 88 Work Plan was approved by the EPA and the Water Board (TtFW, 2005).

Tetra Tech FW, Inc (TtFW). 2005. *Final West-Side Aquifers Treatment System Optimization Work Plan Addendum 1.* March.

The current Navy directive is not to evaluate subsurface vapor intrusion to indoor air.

No change in the text is proposed.

NASA COMMENTS ON DRAFT
FORMER BUILDING 88 INVESTIGATION REPORT
DATED JULY 21, 2006
FORMER NAS MOFFETT FIELD
MOFFETT FIELD, CALIFORNA

Comments dated: August 22, 2006

Comments by: Mr. Don Chuck, National Aeronautical and Space Administration (NASA) Manager Restoration and Subsurface

GENERAL COMMENTS

Comment 1: *NASA does have the following concerns. The investigation appears to be biased toward the sanitary sewer line and disregards possible contamination downgradient of Bldg. 88 itself. Soil gas locations, which were to help guide the investigation, were only installed the path of the sanitary sewer and not downgradient of the Dry Cleaners.*

Response 1: The former Building 88 Work Plan (Tetra Tech FW, Inc. [TtFW], 2005) specified 38 initial soil gas sample locations based on previous sampling (soil gas and soil) and suspected source areas (based on historical activities and groundwater samples). The Final Work Plan specified that soil gas concentrations of PCE above 500 parts per billion by volume (ppbv) would trigger step-out soil gas sample locations to define the extent of the PCE soil gas for further subsurface investigation. Twelve step-out sample locations were sampled, defining the PCE soil gas concentration boundary ≥500 ppbv.

[Tetra Tech FW, Inc. 2005. *Final West-Side Aquifers Treatment System Optimization Work Plan Addendum 1*. March.]

No change in the text is warranted.

Comment 2: *NASA does not agree that all TCE seen during the investigation is from the regional plume. It should be expected that TCE is also the result of degradation of PCE to TCE in the presence of petroleum. Gasoline from the NEX gas station is still present and commingled with the VOCs. The high concentrations of vinyl chloride seen in W9-18, downgradient of NEX and B.88 is an indication that degradation in the area is occurring.*

Response 2: It is likely that some of the TCE in the Regional Plume downgradient of the former Building 88 area is a result of degradation of PCE to TCE, and subsequent degradation of TCE to daughter products. However, the Navy has shown that there is a continuing upgradient MEW source of TCE and its daughter products (cis-1,2-DCE and VC)

impacting the groundwater underlying the former Moffett Field. The Navy has unsuccessfully attempted to distinguish upgradient MEW sources from on-site Navy sources using stable isotopes of TCE. As such, until upgradient sources of TCE, cis-1,2-DCE, and VC are eliminated and the groundwater contamination from those sources remediated, it is difficult to distinguish the impacts from Navy sources.

No change in the text is warranted.

Comment 3: *The depiction of the PCE plumes do not seem to follow the sand "channels" present in the report. There are several areas where the plume jumps from one channel to the next across areas where channels are not mapped. The presence of these channels is speculative, especially since they are based on very few data points. For example, on Figure 8-3, a "channel" is mapped starting around CPT-88-2. The next point appears to be W29-4, about 1150 ft away. Based on the highly heterogeneous nature of the hydrogeology at Moffett Field, it is highly unlikely that this is a continuous channel.*

Response 3: The PCE plume in the upper portion of the A aquifer (Figure 9-4) is consistent with the sand channel maps shown on Figures 8-2 and 8-3 for the following reasons:

- The PCE plume shown on Figure 9-4 (upper portion of the A aquifer) is a composite of the PCE in groundwater from the potentiometric surface (about 7 to 8 feet below ground surface [bgs]) to a depth of about 30 feet bgs. However, Figures 8-2 (showing the interpreted sand channels from the approximate depths of 20 to 25 feet bgs) and Figure 8-3 (showing the interpreted sand channels from the approximate depths of 29 to 32 feet bgs) are only a portion of the upper portion of the A aquifer.
- The sand channels shown on Figures 8-2 and 8-3 have dashed edges with question marks, showing that the exact extent (edges) of any one sand channel is not well defined.
- There is likely increased permeability of the utility backfill along Cummings Avenue.
- There are hydraulic impacts from the extraction wells within the upper portion of the A aquifer.

A similar argument can be made for the PCE plume shown on Figure 9-5 (lower portion of the A aquifer). The PCE plume and the sand channel figures are consistent when considering the following:

- The 3-dimensional aspect of the lower A aquifer (lower A aquifer is considered to range from 30 to 60 feet bgs while the sand channels shown are from 40 to 46 feet bgs [Figure 8-4] and from 45 to 52 feet bgs [Figure 8-5]).

- The impacts from the extraction wells pumping in the lower A aquifer. Please see the Response to EPA General Comment 6b.

No change in the text is warranted.

Comment 4: *Finally, NASA is concerned that the Navy has no plans to further address the PCE contamination, especially the high concentrations at the traffic triangle. If a DNAPL is present at this location, it would seem to be in the Navy's interest to try and reduce the high concentrations. Allowing these concentrations and possible DNAPL to remain will only increase the time the Navy will have to operate WATS to collect the PCE.*

Response 4: As discussed during the April 25, 2007 meeting, the intent of this report was to determine whether contamination related to past activities at former Building 88 (dry cleaning facility) has resulted in a residual source of PCE contamination. Based on the soil and groundwater results, the investigation report concludes that there is residual contamination at the site. The Navy recognizes that a source control action is necessary at this site and will continue to discuss options internally.

TETRA TECH EC, INC.

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Ms. Beatrice Appling, AQE.BA
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1220 Pacific Highway
San Diego, CA 92132-5190

DATE: 06/04/07
CTO: 0017
LOCATION: Moffett Field, CA

FROM: A. N. Bolt

A. N. Bolt, Program Manager

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