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MOFFETT FIELD
SSIC NO. 5090.3

December 20, 1994

PRC

Mr. Stephen Chao/Mr. Hubert Chan
Department of the Navy
Engineering Field Activity West
Naval Facilities Engineering Command
900 Commodore Way, Building 101
San Bruno, California 94066-2402

CLEAN Contract N62474-88-D-5086
Contract Task Order 0236

Subject: Moffett Federal Airfield Operable Unit 1 (OU1) Feasibility Study (FS) Response to Comments

Dear Messrs. Chao and Chan:

Enclosed are PRC Environmental Management, Inc.'s (PRC's) responses to comments received on the OU1 Draft Final Feasibility Study (FS) Report and Proposed Plan, dated February 1, 1994. The comments have been incorporated into the OU1 Revised Draft Final FS Report and Proposed Plan submitted December 20, 1994.

If you have any questions, please call us at (303) 295-1101.

Sincerely,

Thomas J. Peters
Project Engineer

Michael N. Young
Project Manager

Enclosure

cc: Mr. Michael Gill, EPA (2 copies)
Mr. C. Joseph Chou, DTSC (2 copies)
Mr. Michael Bessette, RWQCB
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Ms. Sandy Olliges, NASA (2 copies)
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MOFFETT FEDERAL AIRFIELD OU1 FS

RESPONSE TO COMMENTS
FEASIBILITY STUDY REPORT

1.0 INTRODUCTION

This report provides PRC Environmental Management Inc.'s (PRC's) responses comments by the U.S. Environmental Protection Agency (EPA), California EPA Department of Toxic Substances Control (DTSC), California Regional Water Quality Control Board (RWQCB), and Silicon Valley Toxics Coalition (SVTC) on the Operable Unit 1 (OU1) Draft Final Feasibility Study (FS) Report dated February 1, 1994. The comments have been incorporated into the Revised Draft Final OU1 FS Report and Proposed Plan submitted December 20, 1994. The draft final FS report developed remedial alternatives to address landfill refuse, leachate, surrounding groundwater, surface water, and landfill gas for the two landfills at OU1.

2.0 RESPONSES TO EPA COMMENTS

GENERAL COMMENTS

Comment 1: The proximity and potential impact of the landfills' contamination to the ecological receptors, wetlands and other habitat in these adjacent ecological areas at Moffett Field has led EPA and others (the State, National Aeronautics and Space Administration [NASA] and some members of the Community) to conclude that additional data presently being gathered during the site wide ecological assessment should be incorporated before finalizing the feasibility study. The incorporation of groundwater into this operable unit was an important step into characterizing the potential impacts to human health, but this did not fully take effects on the surrounding ecological areas into consideration. In addition to allowing the regulators an opportunity to look at ecological assessment data, this approach will also allow us to analyze more rounds of groundwater sampling data in this area, where leaching could potentially occur.

Response: *The OU1 schedule was delayed to collect several more rounds of groundwater samples. Additional rounds of samples from December 1993, February 1994, and May 1994 have been incorporated into the FS. Preliminary (unvalidated) sampling data from August 1994 have also been reviewed and will be included in a separate attachment. The chemical data from these four rounds are similar to previous rounds; and therefore, groundwater results and recommendations remain unchanged*

in the revised draft final FS report.

The Navy has prepared an Ecological Assessment Technical Memorandum (EATM) to evaluate ecological impacts from proposed remedial alternatives at the landfills. The EATM concludes that temporary destruction of the habitat at OU1 is not expected to have any long-term effects on the environment. The revised draft final FS includes a discussion of ecological impacts from capping in the comparative analysis of alternatives.

Ecological impacts to adjacent surface waters and wetlands may occur through leachate migration into surface waters or through landfill surface soils migrating into the surface water through runoff or wind transport. Monitoring data show that adjacent surface water bodies have not been affected by leachate. Surface water quality measurements taken during the remedial investigation (RI) and the recent quarterly sampling events have not shown any impacts from the landfills. In addition, data from the groundwater monitoring wells located between the landfills and surface water bodies do not show that leachate is migrating from the landfills. Potential future impacts will be addressed by continued monitoring and corrective actions if waste discharge limits (ambient water quality criteria for aquatic life [marine waters]) are exceeded in groundwater. The revised draft final FS report presents a groundwater monitoring plan and a corrective action contingency plan. The revised draft final FS report also evaluates and compares the extent that each remedial alternative minimizes potential ecological impacts to adjacent surface water bodies and wetlands, including the potential for contaminant migration through runoff.

Comment 2: The basic premise substantiating the closure requirements of the OU1 landfills is that they were operated as municipal waste landfills and thus should be closed as such. The Navy needs to substantiate this assumption and reconcile the background information which indicates significant quantities of hazardous waste were deposited at the landfill sites. Based on the information in the FS report, the wastes disposed of at the two landfill areas at the site included transformer oil containing polychlorinated biphenyls (PCBs), various solvents and cleaners, including trichloroethene (TCE), 2-butanone (MEK), and toluene, asbestos, paints, pesticides, jet fuel, used lubricating oil, fuel filters (containing fuel sludge, lead compounds, and rust), and waste oil. It is doubtful, therefore, that Moffett Field would qualify as a municipal solid waste landfill, but rather is more like an industrial landfill. Why is there so much discrepancy in quantities? If the landfills are hazardous waste landfills versus municipal landfills, the closure requirements will be more rigorous than what is proposed.

Response: *The text has been revised to clarify the similarities between OU1 landfills and solid waste landfills. The text states that chemical concentrations in leachate are low and do not indicate that large amounts of hazardous waste exist in the landfill. Maximum detected leachate concentrations are below maximum concentrations given for the toxicity characteristic in 40 Code of Federal Regulations (CFR) 261.24. In other words, the leachate at OU1 does not exhibit the toxicity characteristic and*

would not be identified as a hazardous waste based on this criterion. Also, visible surface debris includes obvious construction and demolition debris, such as concrete rubble with reinforcing steel, asphalt chunks, wire, wood chips, glass, and mounds of dirt overgrown with weeds (possibly street sweepings), which are similar to municipal landfill waste. The amounts of PCBs, oils, and solvents disposed as described in the Initial Assessment Study (IAS) are rough estimates that appear to be over estimates. By complying with solid waste closure regulations, the intent of hazardous waste regulations will be met as they are very similar and not any more rigorous. The Navy has identified California State solid waste regulations (Title 14 California Code of Regulations [CCR]) as relevant and appropriate regulations to guide OU1 landfill remedial actions and believes these regulations will protect human health and the environment.

The inconsistent information between the Initial Assessment Study (IAS) report and collected data is due to the combination of the uncertainty with the landfill characterization data and the probable inaccuracy of the anecdotal reports. There is no question that the landfill content is not characterized and it is not known with certainty what was disposed in the landfills. Notably, this circumstance is not unique to Moffett Federal Airfield (MFA). Many Superfund landfills have the potential to contain a wide variety of wastes, including drums of waste. EPA guidance (EPA 1993, 1991) is very clear on how to address these sites. Containment is the best remedy unless (1) the location of the drums is known, (2) the location is easily accessible, and (3) removal will reduce the principal threat.

Reconciling anecdotal and current information is extremely difficult. No documentation or disposal records were kept for the landfills. Any information obtained from interviews cannot be verified without excavating the landfills. A fate and transport analysis would have little value since the waste could have been disposed in drums.

An additional strategy to protect against the possibility of buried, drummed waste mobilizing and migrating off-site has been added to the FS. This strategy includes enhancing natural containment with a subsurface interceptor trench along the northern boundary of Site 1. This trench has been added as a corrective action contingency measure and will be in place in the event leachate migrates (please see Section 4.2.3 of the revised draft final FS report). Only the northern boundary of Site 1 is selected for the possible additional containment because it is upgradient to the stormwater retention pond (SWRP) ecosystem. Releases along other borders are not likely and will not affect sensitive ecosystems. Any releases along these borders could be addressed solely by hydraulic control and additional containment is not warranted. Site 2 is not considered for the additional containment since hydraulic control is maintained near the site by the Building 191 lift station.

Comment 3: In general, the language of the FS report should be tightened. At every seemingly possible point, the Navy inserted "qualifying" words that either implied that the risks at the site are minimal, or that questioned the validity of the data collected during the RI. These characterizations need to be eliminated from the report as they undermine

the credibility of the same.

Response: *Unnecessary qualifying words were eliminated from the revised draft final FS report.*

Comment 4: Numerous comments in the FS are conclusive in nature and inappropriately "characterize" the site data. Estimates of the waste disposed of at the site are characterized as "crude" (page 12), detections of various hazardous substances were classified as potentially resulting from "laboratory contamination" (see, for example, pages 33, 57, 66, 68, 70), and certain health risks were described as "negligible" (for example, pages 76, 152, 154). Such characterizations undermine the impartial presentation of data that is essential to provide to the remedial action decision maker and should be deleted from the final FS. Further, the Navy is not consistent in its discussion of the various hazardous substances detected at Moffett Field. When discussing the detection of various volatile organic compounds (VOCs), the Navy sets forth the detected concentrations in the text of the report, in all likelihood because the concentrations are generally low. When discussing inorganic compounds (metals), the Navy fails to do so and the FS report does not consistently contain an appropriate cross-reference for a reader to readily locate this data. (see, for example, pages 28, 29, 30, 37, 55, 59-60, 63). The impact of the presence of metals at the site is not clear from a reading of the report, though an impression is clearly created that it should be minimal.

Response: *The text has been revised. Inappropriate characterizations have been deleted and data is presented consistently and without bias to the extent practicable. Best professional judgement and the Navy's familiarity of the sites has been used when scrutinizing data.*

The Navy believes that initial estimates of waste disposed at the landfills are rough. The IAS contains these initial estimates and the estimates are based on speculation. The estimates are not supported by any of the physical data collected.

The Navy believes that detections of several compounds during the RI are likely due to laboratory contamination. Bis(2-ethylhexyl)phthalate (BEHP) and acetone have not been consistently detected since the RI and the detections should not influence remediation strategies.

The Navy believes that noncarcinogenic health risks calculated in the baseline risk assessment (BRA) were accurately characterized in the FS as acceptable, or below a hazard index (HI) of one. This characterization was based on definitions given in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The Navy also believes that carcinogenic risks calculated in the BRA were also accurately characterized as being above 1E-06, or, within a NCP-defined risk range that may warrant remediation. Notably, these are characterizations of risks that are calculated from limited data.

The Navy presented VOC detections to illustrate that a release of VOCs has not occurred from the landfills. The Navy did not discuss all inorganic detections in the

text because they are numerous. The data were presented in the FS appendices and in the RI documents.

The Navy believes that inorganic detections are a result of naturally occurring levels and that the landfill's are not sources of inorganic contamination which requires cleanup. An expanded discussion of inorganic concentrations is included in the revised draft final FS report.

Comment 5: The issue of background levels of various contaminants in the north base area (NBA) is discussed in this document. The questions, in order, should be: 1) is there a risk to human health because of these contaminants and 2) is the contamination naturally occurring. Background in the NBA is mentioned as undetermined at various points in the document (pages 35, 59, 60). By following EPA's guidance sent to the Navy on March 4, 1994, the Navy will many times be able to determine if a risk is present from existing sampling data. Discussions of background do not belong in this document.

Response: *The Navy has evaluated naturally occurring and upgradient concentrations of compounds to assess if the landfill's are sources of groundwater contamination, not for risk assessment screening purposes. Appropriate upgradient and comparison concentrations will continue to be monitored for this purpose.*

Background metals concentrations presented in the OU RI reports were inadequate because of varying groundwater chemistry at MFA. Consequently, additional discussions of naturally occurring or upgradient concentrations are important and belong in this document.

SPECIFIC COMMENTS

Comment 6: Section 1.3. The document fails to present whether or not data quality was assessed or taken into consideration during the site characterization process. The only mention of possible data quality issues occurs during discussions of spurious data points caused by laboratory contamination. The data tables located in the appendices show many qualified analytical results. These are not discussed in the text of the report and need to be referenced if done in past reports.

Response: *Data quality is discussed in the quarterly sampling reports and the approved RI report. References have been added to the revised draft final FS report. The appendices now include a description of data qualifiers.*

Comment 7: Section 1.3.1, Page 13, First Full Paragraph. The last two sentences, beginning with "The heterogeneity of contaminant distribution . . . does not require such information (EPA 1991)" should be deleted. If such statements are necessary at all, they should be moved to a later section of the report, most likely during the discussion of potential remedial alternatives.

Response: *This statement is a primary feature of the EPA-advocated presumptive remedy approach for landfills. This statement should be included in the site characterization discussion because the reader should understand that characterizing landfill refuse is a formidable task and is generally not pursued. The refuse data collected to date are limited and not likely representative.*

Comment 8: Section 1.3.2, Page 17, Paragraph 1. The report indicates that the porosity for clays located below the landfill had permeability values of 10 to the minus 8 centimeters per second (cm/sec). Does this indicate low permeability?

Response: *The measured permeability of 1E-08 cm/sec is lower than the permeability requirement for landfill bottom liners.*

Comment 9: Section 1.3.2, Page 20, Paragraph 4. The concepts that perched water within Site 1 shows limited hydraulic connection with surrounding aquifers; that it does not exhibit outward gradients; and that it does not increase hydrostatic pressure at the landfill boundaries are fundamental to the plausibility of the recommended alternative for the site. Therefore, the support of these concepts should be expanded with gradient and pressure calculations and graphical depictions of groundwater/leachate analytical data comparisons.

Response: *The hydrogeology interpretation has been modified as discussed during the July 1994 meeting. Elevated water levels within Site 1 do indicate outward gradients; however, these outward gradients are accompanied by low flow. Please see the response to comment 13. Gradient and flow calculations are presented in the revised draft final FS report as well as graphical depictions of water level data. Graphical depictions of chemical data comparisons are not included because a release has not occurred from the landfills.*

Comment 10: Section 1.3.2, Page 21, Paragraph 2. Identify which wells within Site 1 were considered to be completed in perched groundwater and which represent regional, hydraulically connected groundwater completions.

Response: *Leachate wells W1-9, W1-10, W1-11, and W1-13 are completed in a elevated or "mounded" zone. All perimeter wells are screened in an aquifer except W1-16, GL1-1, and GL1-2, which are screened in overlying clay. This information has been added to the revised draft final FS report.*

Comment 11: Section 1.3.3.1, Page 24, Third Full Paragraph. Reference is made to a well that was destroyed, W1-4(A1). Please explain why it was destroyed.

Response: *The text has been revised to state that the well head was presumably destroyed by accident during dredging activities. The casing, however, may still be present and will be correctly abandoned during the RA.*

Comment 12: Section 1.3.3.2, Page 28, Paragraph 4. This paragraph does not reflect the detections of PCBs found at depths greater than 3 feet, yet they appear on Plate 1

(W1-9, W1-10). Please add these detections to the text.

Response: *PCB detections on Plate 1 have been referenced in the text of the revised draft final FS report.*

Comment 13: Section 1.3.3.5, Page 30. A detailed statement is needed in this section to address the surface water and groundwater hydraulic relationship, its effect on changing groundwater gradients, and any tidal fluctuations that may be present.

Response: *The section has been revised as suggested. The revision is summarized below. The hydraulic relationships between the leachate, the A1-aquifer zone, and the SWRP are discussed first. A discussion of the hydraulic relationship between the leachate and Jagel Slough follows.*

Gradients exist from the leachate to the A1-aquifer zone and from the leachate to the SWRP. However, the clay surrounding Site 1 is restricting flow from the leachate zone. Restricted flow is evident through consistently elevated water levels in the leachate zone as well as the lack of leachate migration detected in the A1-aquifer zone and SWRP. Contaminant migration through clay occurs very slowly due to low hydraulic conductivity and adsorption. Approximately 5 to 7 feet of clay exists vertically between the leachate zone and the aquifer and usually more than 20 feet of clay exists laterally between the leachate zone and the shoreline of the shallow SWRP. Because of these clay barriers and low leachate chemical concentrations, contamination is not migrating to the aquifer or the SWRP, as shown by the analytical data. During very wet periods, the shoreline of the SWRP has been observed directly adjacent to Site 1. To remedy this condition, the SWRP shoreline will be permanently moved away from the landfill boundary by constructing a perimeter road and shoulder.

As stated above, a gradient from the leachate to the A1-aquifer zone exists. There is also a gradient from Jagel Slough to the A1-aquifer zone. In addition, water levels also suggest that a gradient may exist from the leachate to the slough, as leachate elevations in well W1-10 are higher than in the slough. However, the potentiometric surface in the A1-aquifer zone is lower than both the slough and leachate. In addition, the water elevation in monitoring well W1-16, which is screened in clays from 3.5 to 13.5 feet below ground surface (bgs) between the slough and the landfill, is also lower. Consequently, there is a potentiometric low between the leachate and Jagel Slough. These data indicate that flow could occur from both the leachate and the slough to the aquifer or surrounding clays, but not from the leachate zone to the slough.

Borehole logs and geotechnical data from the area between Jagel Slough and the landfill show that low conductivity material separates the two water bodies, which will restrict leachate flow from the landfill. Specifically, hydraulic conductivity was measured at 3E-08 centimeters per second in a sample from boring W1-5. Borehole logs in the area also show that clays exist between the slough and landfill.

Comment 14: Table 1, Page 31. Table 1 should identify the units of measurement, micrograms per liter (μg/L), for the reported compounds and whether the maximum contaminant level (MCL) is the state or federal MCL. Also, the current MCLs for BEHP (6 μg/L), pentachlorophenol (1 μg/L) and 1,1 dichloroethane (California state MCL, 5 μg/L) should be updated.

Response: *The table has been revised to incorporate units. MCLs have been removed from the table to avoid confusion.*

Comment 15: Section 1.3.3.5, Page 32, Second Full Paragraph, Second Sentence. Provide a brief description and application of the 5X/1OX rule for blank contamination applied when validating data.

Response: *This referenced discussion has been removed from the text.*

Comment 16: Section 1.3.3.5, Page 32, Third Full Paragraph. The presence of typical anaerobic degradation constituents may also be attributed to anoxic conditions within the landfill or aerobic contaminant degradation which is depleting available oxygen within the general vicinity of Site 1. This condition may warrant further evaluation. Water samples from within the landfill should be analyzed for carbon disulfide content to evaluate if concentrations reported in the perimeter wells are indicative of organic constituents in the native material or leachate.

Response: *Water samples from inside the landfill have been analyzed for carbon disulfide. Carbon disulfide has only been detected once in leachate and at a lower concentration than found in groundwater. Concentrations in surrounding groundwater are indicative of organic constituents in the native material rather than leachate. The text has been revised accordingly.*

Comment 17: Section 1.3.3.5, Page 33, First Full Paragraph, Second Sentence. Why are seasonal effects on surface water levels relative to groundwater not fully known at this time? What is known at this time? The evaluation of this relationship is significant to the proposed alternative for this site. This point validates the need for additional rounds of groundwater sampling in this area.

Response: *Evaluations of water level data from additional rounds of samples have been incorporated into the revised document and seasonal changes are discussed.*

Comment 18: Section 1.3.3.5, Page 33, Second Full Paragraph, Last Sentence. Can a partial evaluation of gradient changes within the vicinity of Site 1 be made? This sentence indicates a need for more groundwater level sampling.

Response: *More groundwater elevation measurements have been collected and added to the revised document and gradients are discussed.*

Comment 19: Section 1.3.3.5, Page 33, Last Full Paragraph. The reference to acetone being a lab contaminant should be deleted. Additionally, the paragraph implies that detection

limits are synonymous with waste discharge limits and that non-detects, therefore, indicate that no releases occurring from the landfill. This is somewhat inaccurate. Non-detects simply relate to the sensitivity range of the testing instruments. It does not correspond that no releases have occurred, simply that they are currently below detection limits. Should new equipment be developed with greater sensitivity ranges, current "non-detects" may be detected in the future. It would be better to state that no releases occurred above detection limits.

Response: *The document has been revised as suggested.*

Comment 20: Section 1.3.3.5, Page 33, Last Paragraph. Any statement regarding contaminant trends and plumes in groundwater must be qualified by the uncertainty of the nature of groundwater gradients in the Site 1 vicinity.

Response: *The document has been revised as suggested.*

Comment 21: Section 1.3.3.5, Page 34, First Full Paragraph. The statement in the first sentence indicating that contamination is not significantly migrating past landfill boundaries should be referenced with substantiating data. Also, reference should be made to data that support the assumption that perched water levels do not result in outward gradients which increase leachate migration. The additional data gathered in the coming months may help quantify this assumption.

Response: *Groundwater data described in Section 1.3.3.5 of the FS substantiates that leachate migration does not occur. Additional sampling data have also been incorporated into this discussion in the revised draft final FS report. Elevated water levels result in outward gradients; however, these gradients are not causing leachate to migrate since tight clays surround the landfill and leachate (source) concentrations are low. Also, please see the response to comments 9 and 13.*

Comment 22: Section 1.3.3.5, Page 34, Second Full Paragraph. The paragraph assumes that current conditions within the A2-aquifer will continue to result in an upward gradient from A2 to A1. Has there been an evaluation of the effects of vertical leachate migration from A1 to deeper aquifers if current conditions change (for example, increased pumping from lower water bearing units, fault movement?)

Response: *If an earthquake occurs or pumping strategies change, the gradients could potentially change in the area. It is difficult to predict these changes or if leachate migration will occur. Groundwater and surface water will continue to be monitored and if any releases are identified as problems, corrective action will follow. This strategy is common for regulated units since it is more cost-effective to allow monitoring systems to detect any changes in site conditions and address problems if they occur.*

Comment 23: Section 1.3.3.5, Page 34, Middle Paragraph. The first sentence indicates that the contamination has not migrated "significantly" past landfill boundaries. The term "significantly" is subject to much interpretation and should be deleted. If it is to be used, it should be "defined", for example, that contamination has only migrated a

few feet beyond the landfill boundaries, which is not significant. (See also, Page 109, first paragraph).

Response: *The document has been revised as suggested. The term "significantly" has been deleted when used in this context.*

Comment 24: Section 1.3.3.5, Page 35, Paragraph 1. On the discussion of heavy-metal concentrations at the site, it is noted that five are essential nutrients and will, therefore, not be studied. It is not set forth whether they are hazardous substances. This is the more relevant point. (This occurs again on page 59 during the discussion of Site 2). Near the end of the paragraph, it is noted that seasonal effects on the surface water-groundwater hydraulic relationship are not fully known. The Navy should develop this relationship with additional rounds of data gathered in the next 2 or 3 quarters.

Response: *The metals mentioned are not hazardous. Please see the response to comment 13.*

Comment 25: Pages 36, 61, and 62 (Tables 2, 5, and 6). The tables should footnote the definition of the NBA. Also, for consistency, the tables should include an upgradient/downgradient column similar to that in Table 1.

Response: *The text and tables have been revised to indicate upgradient and downgradient locations.*

Comment 26: Section 1.3.3.5, Page 37, "Conclusions for Inorganic Compounds:" Metals are stated as being within "normal" ranges for metals found in groundwater in the northern portion of the base. What does "normal" mean? Are the levels above safe standards? This should be explained.

Response: *The term "normal ranges" has been deleted from the document. It has been replaced with upgradient or comparison concentration ranges. An explanation of the levels used for comparison has been included.*

Comment 27: Section 1.3.3.7, Page 41, First Full Paragraph, Fifth sentence. Has an evaluation been completed of potential landfill gas migration if the surface water bodies are no longer present? What happens if the Cargill Salt Company ceases operation and the evaporation ponds are no longer functioning?

Response: *The text has been clarified to state that northward landfill gas migration is not likely to be a concern. Even if the Cargill Salt Company ceases operations, the depth to water will be very shallow and the area will likely remain a marsh. Migration cannot occur through saturated soils. If these bay muds ever desiccate, large cracks would form and provide a pathway for landfill gases to escape.*

Comment 28: Section 1.3.4, Page 44, Paragraph 1. The last two sentences indicate that full characterization of the landfill refuse for the Golf Course landfill (Site 2) is not required. This should be deleted. (See comment to page 13 above).

Response: *The Navy believes that this statement is necessary. In fact, this statement must be fully understood, as it is a primary feature of the EPA-advocated presumptive remedy approach for landfills. It is appropriate to include this statement in the site characterization discussion because it is important for the reader to understand that characterizing landfill refuse is a formidable task and is generally not pursued. The refuse data collected to date are limited and not likely representative.*

Comment 29: Section 1.3.5, Page 44, Paragraph 2, Fourth Sentence. Is the 1E-08 cm/sec permeability value attributed to all Site 2 soil or only soil underlying the landfill?

Response: *The paragraph has been clarified to state that this hydraulic conductivity value can be attributed to silty clays below Site 2. The location of these soils beneath Site 2 is shown in cross sections and borehole logs in the FS report.*

Comment 30: Section 1.3.6.5, Page 56, Third Full Paragraph. Text in this paragraph should include the chronologic period the groundwater data evaluation represents (number and dates of sampling quarters, sampling rounds, etc.).

Response: *The suggested information has been added to the revised draft final FS report.*

Comment 31: Section 1.3.6.5, Page 57, Paragraph 1. Since perched conditions do not exist within Site 2, why is this discussion limited to perimeter wells?

Response: *This section describes whether or not there has been a release from Site 2. The point of compliance for landfills is typically at the site boundary; and therefore, leachate wells are not discussed in this section.*

Comment 32: Section 1.3.6.5, Page 57, Paragraph 2. The text in this paragraph addresses groundwater contamination in both perimeter wells and landfill wells. A clear, concise statement should be included regarding the specific Site 2 area discussed in this section; the statement should indicate whether BEHP has been detected in groundwater samples within the landfill since 1989.

Response: *The text has been revised to show that BEHP was detected in wells W2-5, W2-6, W2-7, and W2-9. BEHP has been detected once since 1989 at Site 2 in well W2-6 at 12 μg/L. Seven sampling rounds have occurred since 1989.*

Comment 33: Table 4. The table fails to identify units of measurement (μg/L) for the reported compounds and does not define the MCL as state or federal. Also, the current MCLs for BEHP (6 μg/L), pentachlorophenol (1 μg/L) and 1,1 dichloroethane (California state MCL, 5 μg/L) should be updated.

Response: *The table has been revised to incorporate units. MCLs have been removed from the table to avoid confusion.*

Comment 34: Section 1.3.6.5, Page 59, Third Full Paragraph, Last Sentence. This sentence does not have any relevancy here.

Response: *The sentence has been deleted.*

Comment 35: Section 1.3.6.5, Page 60, Last Two Sentences On Page. These last two sentences make little sense. It is stated that the data does not necessarily indicate that a source of metal contamination exists upgradient of the landfill "as all concentrations could likely be within normal levels." What are "normal" levels? This should be explained. As it stands now, it appears contradictory.

Response: *The term "normal ranges" has been deleted from the document. It has been replaced with upgradient or comparison concentration ranges. The statement about upgradient sources has also been deleted to avoid confusion.*

Comment 36: Section 1.3.6.5, Page 63, "Conclusions for Inorganic Compounds." Metals are again listed as being within "normal" ranges without any definition of what "normal" is. This should be explained in better detail.

Response: *The document has been revised as suggested. Inorganic concentrations for Site 1 and Site 2 are presented in the revised draft final FS report and compared with upgradient concentrations and concentrations from other high total dissolved solids (TDS) areas at MFA.*

Comment 37: Section 1.3.7, Page 65, Paragraph 3. The final two sentences of this paragraph state that a number of substances were detected in surface soils, sediments, and groundwater. No citation is listed for the location of this data. This should be included.

Response: *The last two sentences were deleted from this paragraph to avoid confusion. This paragraph is an introductory paragraph for the fate and transport section stating the different types of sampling conducted for the landfills. These general statements are not relevant to the rest of the paragraph.*

Comment 38: Section 1.3.7.1, Page 66, Last Paragraph. In the sentence beginning, "At Site 2," a reference is made that "it has been concluded that acetone is not present at significant levels, and if ever present, has volatilized . . ." This sentence appears somewhat contradictory. Additionally, what is this conclusion based on? What are "significant" levels? Finally, what is the basis for the statement "if ever present?" These statements should be deleted unless they have data support.

Response: *The statements have been deleted to avoid confusion.*

Comment 39: Section 1.3.7.1, Page 68, Paragraph 3. The argument that the "reducing" environment tends to dissolve and mobilize some inorganic constituents should be accompanied by references and times associated with reduction.

Response: *The argument has been deleted from the document. The discussion presented in the paragraph is not relevant to the section, which discusses wind and water erosion of surface soils. The paragraph has been rewritten to discuss inorganic contamination*

transport via wind and water erosion of surface soils.

Comment 40: Section 1.3.7.2, Page 69, Paragraph 2. The report indicates that the stormwater retention pond, marsh area, and wetlands exist on the west and north of Site 1, restricting soil gas migration in that direction. This is qualified by the phrase, "When present . . ." Does soil gas migrate in that direction during the dry season, and is there a dry season that could be of concern?

Response: *The statement "if present" was deleted. Soil gas is not expected to migrate to the north, east, or west direction during the dry season. The salt evaporation pond north and east of the SWRP and the marsh area have not been observed as dry during the dry season. However, the Navy is proposing to install a passive vent during the remedial action (RA) to prevent westward migration. Please see the response to comment 27.*

Comment 41: Section 1.3.7.3, Page 70, First Full Paragraph. Please expand the discussion regarding the supposition that 2-butanone (MEK) and acetone are suspected laboratory contaminants. Please provide substantiation for the assumption that the leaching of organic compounds from Site 1 is/was a function of percolation rainfall. Also, PCBs can be mobilized in the presence of organic solvents (cosolvency) and through colloidal transport. Information presented on page 43 indicates that organic solvents (TCE, MEK, and Stoddard Solvent) were included in the "estimates of waste types disposed of at the landfill," therefore, the mechanism for cosolvency should also be evaluated for leachate migration.

Response: *The issue regarding acetone and MEK being laboratory contaminants is not relevant since they have not been consistently detected in perimeter wells since 1989.*

Additionally, the statement indicating that organic compound presence is a function of leaching through percolation has been deleted. Organic compounds in leachate could be the result of leaching from percolation, groundwater, or free liquids.

Furthermore, cosolvency is a potential mechanism for PCB migration, however, PCBs have not been detected in perimeter wells and were detected in only one sampling round and from only one leachate well. Consequently, PCBs are not a good indicator chemical for leachate migration. The text has been revised accordingly.

Comment 42: Section 1.3.7.3, Page 71, Paragraphs 2 and 3. It appears from these paragraphs that biodegradation would always be positive. But isn't it true that the resultant vinyl chloride from the reduction or degradation of tetrachloroethene (PCE) is actually more toxic than its original form? The argument that the active biodegradation of landfill contaminants in this case is positive needs to be validated.

Response: *Section 1.3.7.3 has been revised and and the discussion indicating that bioremediation is always a positive process has been removed.*

Comment 43: Section 1.4. As with the site characterization (Section 1.3), no references or documentation as to whether or not data quality was assessed or considered during the risk assessment process is presented in this FS report.

Response: *Data quality is discussed in the RI report and quarterly sampling reports. References have been added to the text.*

Comment 44: Section 1.4.1.3, Page 76, Paragraph 1. The final sentence, beginning with "under the very conservative assumption . . ." needs to be better explained. An explanation should be provided as to why the evaluation of the data found that exposures to the chemicals at the landfills will not result in noncancer health impacts. The final sentences in the final paragraph on this page also require further explanation. It is not clear whether remediation is required or not. The report states that some potential carcinogenic substances were detected above the 1E-06 range, EPA's point of departure. If no remediation is going to occur, this needs to be explained in detail.

Response: *The decision to remediate (cap) a landfill typically does not depend on risk assessment results. In fact, EPA does not advocate conducting quantitative risk assessments for landfill refuse. Quantifying risks from landfill refuse has little practical use because an underlying assumption has to be made that the landfill contents are well characterized, which is a questionable assumption at best. The heterogeneity of contaminant distribution and concentrations makes characterization of landfill contents an impractical task. Characterizing landfill contents is also a health and safety hazard for field crews. Because of these circumstances, EPA has developed a strategy to address landfills based on containment of contaminants. Containment is known as the presumptive remedy for landfills and does not require accurate characterization of landfill content or an assessment of associated risks. This concept has been clearly described in the revised draft final FS report and statements implying that the BRA results are conservative have been deleted.*

Comment 45: Section 1.4.2, Page 77, Last Paragraph. The third sentence reads, "Risks were not assessed for groundwater exposure pathways because pathways are assumed incomplete." Why are they assumed incomplete? This needs to be explained.

Response: *Groundwater exposure pathways are incomplete because TDS concentrations in the shallow aquifers preclude use as a drinking water source, as dictated by California Resolution 88-63. Land subsidence and salt water intrusion that resulted from pumping the shallow aquifers in the past will also likely preclude use in the future. Section 1.4.2.1 discusses these issues in detail.*

Comment 46: Section 1.4.2.1, Page 78, First Full Paragraph. The report states that the groundwater at the site is not a drinking water source due to high levels of TDS. Does a high TDS level automatically mean that groundwater cannot be treated to achieve safe drinking levels? Further, the citation to EPA's secondary drinking water standard, if it is to be provided, should be more specific, rather than 40 CFR 140-149. (The secondary drinking standard requirements are set forth at Part 143).

The citation to the proposed Resource Conservation and Recovery Act (RCRA) regulations concerning potable water should also be provided.

Response: *TDS levels can be reduced through treatment; however, groundwater with a TDS level greater that 3,000 milligrams per liter (mg/L) is not considered a potential source of drinking water under California State Water Resources Control Board Resolution 88-63. The discussion regarding EPA's secondary drinking water standards and proposed RCRA regulations have been deleted.*

Comment 47: Section 1.5, Page 80. To eliminate redundancy in identifying both the federal and state regulations, it is recommended that the California regulatory programs that have received federal authorization (that is, hazardous waste, solid waste, safe drinking water, air pollution) be used in lieu of the federal statutes.

Response: *California regulatory programs are identified as potential applicable or relevant and appropriate requirements (ARARs) and associated rationale is provided.*

Comment 48: Section 1.5, Page 80. The definitions of "to-be-considered" (TBC) advisories, guidelines, other non-promulgated policies are presented in Section 1.5. TBCs also include local regulations including Santa Clara Valley Water District (SCVWD) well development and destruction requirements. However, TBCs are not identified in the text, tables, or ARARs documentation in Appendix J. It is recommended that the TBCs documents be identified or state that no TBCs were found that pertain to this site.

Response: *The document has been revised to include TBCs.*

Comment 49: Section 1.5, Page 80, Last Paragraph. The word "fully" should be deleted from the second sentence. An ARAR is applicable if it directly addresses or regulates a hazardous substance. The inclusion of the word "fully" adds a requirement to the ARARs analysis that is not required to be met.

Response: *The document has been revised as suggested.*

Comment 50: Section 1.5, Page 82, First Full Paragraph. It is recommended that this paragraph, beginning with, "Several of these waivers . . ." be deleted. This paragraph implies that ARARs waivers will be sought and that they are applicable. This may not be the case. If a particular ARAR is to be waived, this discussion should be had at that time, not in the FS.

Response: *The text did not intend to state or imply that waivers are being sought. It states that waivers may be relevant to OU1, which is valid. The discussion is presented for general information only.*

Comment 51: Table 7. The U.S. National Primary Drinking Water Regulations (NPDWRs) and California drinking water MCLs are relevant and appropriate regulations and should be included here in Table 7. While it can be argued that the TDS levels at Site 1

exceed 10,000 mg/L and may not necessarily be a source of drinking water, note that Site 2 TDS levels are below 10,000 mg/L and groundwater there could potentially serve as a drinking water source. Additionally, states have the option of classifying groundwater at any TDS levels as possible drinking water sources.

Response: *Drinking water standards are not relevant and appropriate. Site 1 and Site 2 groundwater TDS levels are above 3,000 mg/L and the aquifer is not a potential drinking water source. Please see response to comment 45.*

Comment 52: Table 7, Page 1 of 7. This table states that the RCRA Subtitle C regulations are not relevant or appropriate. This needs to be more fully addressed. Some of the wastes at the landfills are potentially hazardous wastes (for example, PCBs), making the regulations under Subtitle C relevant and appropriate.

Response: *Some of the wastes at the OU1 landfills are potentially hazardous waste, however, this circumstance is common to all solid waste and CERCLA landfills. Title 14 CCR regulations are more detailed and specific for landfills (specifically gas monitoring) than Title 22; and, by complying with solid waste monitoring and closure regulations, the intent of analogous hazardous waste regulations will be met as hazardous waste regulations are not any more rigorous. Further, low contaminant concentrations in leachate show that a minimal threat from hazardous substances exists at OU1. Maximum detected concentrations are below maximum concentrations given for the toxicity characteristic in 40 CFR 261.24. In other words, the leachate at OU1 does not exhibit the toxicity characteristic and would not be identified as a hazardous waste based on this criterion. This indicates that OU1 landfills were operated like solid waste landfills and received similar types of wastes (solid waste with small amounts of hazardous waste). Also, visible surface debris includes obvious construction and demolition debris, such as concrete rubble with reinforcing steel, asphalt chunks, wire, wood chips, glass, and mounds of dirt overgrown with weeds (possibly street sweepings), which are similar to solid waste landfill waste. For these reasons, the Navy identified Title 23 groundwater monitoring requirements and Title 14 closure regulations as most appropriate for OU1. The text has been revised accordingly.*

Comment 53: Table 7, Page 3 of 6. The discussion concerning the appropriateness of the Federal Water Quality Criteria appears to leave out any discussion of the potential effects to aquatic life due to the water quality at the site. This should be addressed as it is a consideration under 40 CFR 131.2. Discussion of effects on human health is insufficient.

Response: *The table has been revised as suggested and identifies these criteria as appropriate to protect aquatic life. The discussion about effects on human health has not been revised.*

Comment 54: Table 8, Page 1 of 3. A citation to 40 CFR 6.302 should be added to this table in the discussion of "flood plain." Additionally, this citation requires that all actions be evaluated to "avoid, to the extent possible, adverse effects associated with the

development of the flood plain. Further, this provision requires that a flood plain/wetlands assessment be done if it is determined that actions may be taken in a flood plain. The statement in this table indicates that such a situation may exist. Lastly, Executive Order 11990 and 40 CFR 6.302 require that the responsible official "either avoid adverse impacts or minimize them if no practicable alternative to the action exists." This requirement is not currently set forth in the table as a requirement to be met during the evaluation.

Response: *The citation to 40 CFR 6.302 has been added to the flood plain discussion in the table as requested. OU1 RA will occur in a flood plain as defined in Executive Order 11988. Section 5.2.4.2 discusses how the remedial alternatives will comply with these requirements.*

A citation for 40 CFR 6.302 has also been included with Executive Order 11990 in the wetlands portion of the table as requested. OU1 RA will occur adjacent to a wetland as defined in Executive Order 11990. Section 5.2.4.2 discusses the wetlands assessment and how the remedial alternatives will comply with these requirements.

Comment 55: Table 8, Page 2 of 3. A citation to 40 CFR 6.302(d) should be inserted into the applicability portion of the table concerning the coastal zone location. The requirements of this provision need to be complied with.

Response: *A citation for 40 CFR 6.302 has been included in the citation portion of the table concerning the coastal zone location as requested. Section 5.2.4.2 discusses how the alternatives comply with these requirements.*

Comment 56: Section 1.5.3, Page 96, Second Full Paragraph. The third sentence, beginning with "Available background . . ." is questionable. There has been no prior discussion in this report concerning what are "similar type of wastes" that would have been disposed of at a municipal landfill. To the contrary, it is more likely that the information known indicates that the landfills were operated in a manner more consistent with industrial landfills based on the disposal of PCBs, asbestos, used oils, jet fuel, and solvents. If the FS is to include such a statement, the phrase "similar types of waste" needs to be defined. It is most likely incorrect to analogize these landfills to municipal landfills.

Response: *The text has been revised to clarify the similarities between OU1 landfills and solid waste landfills. The text states that chemical concentrations in leachate are low and do not indicate that large amounts of hazardous waste exist in the landfill. Maximum detected leachate concentrations are below maximum concentrations given for the toxicity characteristic in 40 CFR 261.24. In other words, the leachate at OU1 does not exhibit the toxicity characteristic and would not be identified as a hazardous waste based on this criterion. Also, visible surface debris includes obvious construction and demolition debris, such as concrete rubble with reinforcing steel, asphalt chunks, wire, wood chips, glass, and mounds of dirt overgrown with weeds (possibly street sweepings), which are similar to municipal landfill waste. It appears that the amounts of PCBs, oils, and solvents described in the IAS are*

arbitrary and speculative. By complying with solid waste closure regulations, the intent of hazardous waste regulations will be met as they are very similar and not any more rigorous. The Navy has identified California State solid waste regulations (Title 14 CCR) as relevant and appropriate regulations to guide OU1 landfill remedial actions and believes these regulations will protect human health and the environment.

Comment 57: Section 1.5.3, Page 96, Third Full Paragraph. Since California RCRA Subtitle C and D have received federal authorization and are at least as stringent as federal regulations, citations to federally authorized California regulations should be used in place of federal requirements. To reduce confusion, it is recommended that this rationale be used to supersede federal requirements to replace the federal/state discussion presented in this paragraph.

Response: *The suggested additional rationale has been added to the document.*

Comment 58: Section 1.5.3, Page 96, Fourth Full Paragraph. This paragraph references activities (alternatives) that generate waste streams and presents specific ARARs for waste streams. Since waste streams generated by the alternatives are not presented or discussed elsewhere in the document, it is not clear why this paragraph is necessary.

Response: *This paragraph is only provided to show examples of action-specific ARARs.*

Comment 59: Table 9, Page 1 of 10. In comments to the Requirement Descriptions, #4, there is an incomplete citation to an EPA document. This should be filled in or deleted.

Response: *The reference has been completed as suggested.*

Comment 60: Table 9, Page 7 of 10, Second Row. Although federal air emission requirements are identified, local air pollution control rules and regulations are not presented. Since the local air pollution rules are presented in the State Implementation Plan (SIP) for EPA approval, they should be considered ARARs. It is recommended that the local air pollution regulations for OU1 be reviewed and addressed, and in particular, the Bay Area Air Quality Management District's Regulation 8, Rule 34.

Response: *Local air pollution regulations have been added to the table. California Air Resources Board (CARB) requirements for an Air SWAT have been met for OU1. Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 34 has been reviewed and it has been determined that OU1 landfills are exempt from these requirements based on Section 8-34-111. The Navy will submit a petition letter requesting exemption in accordance with 8-34-402.1.*

Comment 61: Table 9, Page 10 of 10, Fourth Row. Hazardous waste transportation is only applicable to off-site transport, and thus should not be defined as an ARAR. However, the Navy should identify in the text the specific alternative recommended for off-site transport and explain how off-site transport will be handled.

Response: *Hazardous waste transportation was deleted from the potential ARAR discussion.*

Comment 62: Table 9, Page 10 of 10, Fifth row. Worker health and safety requirements do not provide substantive requirements for cleanup and should not be defined as an ARAR. Additionally, the requirements are not environmental laws. However, compliance with worker health and safety requirements at CERCLA sites is required as addressed in the NCP.

Response: *The table has been revised as suggested.*

Comment 63: Section 2.1, Page 108, Fourth Full Paragraph, First line. The text concludes that risk levels identified above the "point of departure" are considered "the level below which risk is considered negligible." The acceptable risk range in the NCP is 1E-04 to 1E-06. The departure point is the initial risk level for risk management evaluation culminating in a site-specific risk level within a range acceptable to the NCP. This statement should be corrected after reviewing the Preamble to the Final NCP, 55 Fed. Reg. 8715 (March 8, 1990).

Response: *The text has been revised to state that the point of departure is considered as the level below which risk is less than 1E-06.*

Comment 64: Section 2.1, Page 109, Second Full Paragraph. Although there may not appear at this time to be leachate migrating beyond the landfill boundaries (see comment from page 34), consideration should given to future leachate migration when the site is surcharged with the cover material. Monitoring should be considered for a specified length of time after closure to fully understand the effect of closure on the sites.

Response: *Post-closure monitoring is planned for 30 years, with re-evaluation periods every 5 years.*

Comment 65: Section 2.1, Page 109, First Full Paragraph. Surrounding groundwater and leachate could migrate in the future, particularly if there is sufficient settlement to allow additional refuse and fill material to contact the leachate. Discussion should be provided pertaining to the potential for future migration of leachate, if none is found in the next few rounds of sampling.

Response: *No leachate migration has been identified through additional sample results. A modeling discussion concerning the potential for future leachate migration has been added to the fate and transport section. Post-closure monitoring is planned for 30 years, with re-evaluation periods every 5 years, to monitor settlement effects on leachate migration.*

Comment 66: Section 2.2, Pages 112-115. Throughout the entire section discussing remedial options, no treatment remedies are discussed at all (for example, collection of leachate, methane gas, etc.). There is no evidence that any treatment technologies of any kind were considered and then discarded (for example, excavation of hot spots).

This should be done. If no treatment is to be done at the site, then a rationale should be presented to illustrate that EPA considered it, and had a valid reason for rejecting it as a remedial option.

Response: *The text has been revised and presents rationale for not considering treatment options for leachate, methane gas, and landfill refuse. The following paragraphs summarize the rationale.*

The decision not to consider treatment for refuse was arrived at by following EPA guidance and considering expectations in the NCP. Treatment is fundamentally impractical for landfills. Consequently, the FS process for landfills can be streamlined accordingly (Please see pages 107 and 108 in the draft final FS report).

For landfill gases, calculations based on the proposed rule in Federal Register (FR) 24503 concerning non-methane organic compound (NMOC) emissions show that collection and treatment are not required (Please see page 111 in the draft final FS report).

For leachate, extraction and treatment were not considered for the following reasons (Please see pages 110 and 111 in the draft final FS report):

1) A release has not occurred.

2) Groundwater will not likely be extracted for use due to its poor quality.

3) Groundwater will not likely be extracted for use due to resultant salt water intrusion which may subsequently threaten deeper aquifers.

4) Groundwater will not likely be extracted for use due to adverse effects associated with land subsidence.

5) Base operations will not likely change significantly in the future and groundwater use will likely remain unchanged.

6) Conservatively calculated risks are below acceptable levels.

7) Groundwater monitoring and corrective action programs will protect beneficial uses, human health, and the environment.

Comment 67: Section 4.0, Page 129. Alternative capping designs should be considered which may be more effective and cost efficient. This would include the use of a Claymax or a high density polyethylene (HDPE) cover material.

Response: *The use of Claymax or HDPE cover material will lower the cost of a multilayer cap. However, the FS evaluates the need for impermeable caps, regardless of the layer type. Single layer caps were found to be more feasible than an impermeable cap in the FS report. Rationale for selecting a single layer cap is not affected by the use*

Claymax or equivalent, as:

1. *A native, single layer cap reduces infiltration to rates similar to rates achieved by a low hydraulic conductivity layer and lateral drain due to MFA's climate.*

2. *Leachate migration is not occurring and it is not expected to occur in the future. Therefore, minimizing infiltration is not a controlling factor.*

3. *Employing an impervious cap has the potential for increasing horizontal subsurface gas migration.*

4. *An multilayer cap would be more difficult to construct.*

5. *An impervious cap would be more costly.*

6. *Leachate will exist regardless of cap type because refuse is below the water table. In addition, since waste is saturated below the water table, other technologies will be required to mitigate leachate migration. Implementing a multilayer cap would not enhance the effectiveness of hydraulic control or significantly decrease the amount of water requiring extraction and treatment.*

7. *Any slight advantage gained through using a multilayer cap would be difficult to maintain. If hydraulic control is implemented, leachate extraction would increase refuse decomposition, gas generation, and settlement since waste is saturated. Settlement can result in barrier layer cracking.*

Comment 68: Section 4.2, Page 135, Second Full Paragraph. A single vent source for the passive gas collection system will concentrate the landfill gas emissions and create an exposure point source. This will be problematic should future land use provide for increased public access. It is recommended that this system be designed for future activation with the use of blowers and a treatment unit. The use of a strictly passive gas control system precludes potential future land use because of exposure to landfill gas contaminants. A better design would utilize a passive system that is designed for future activation with the addition of a blower and treatment system (typically granular activated carbon [GAC]) or at a minimum a vent stack which minimizes the exposure pathway (see preceding comment).

Response: *A passive vent should not concentrate landfill gas emissions. The majority of landfill gas is escaping vertically through the landfill. The gravel trench at the west end will simply allow gases at the western boundary to escape before they cross the site boundary. However, the Navy will design the vent to exhaust above the breathing zone (6 feet) to address this concern.*

Comment 69: Section 5.2, Page 145, Second Full Paragraph. The text in Section 5.2 - Compliance with ARARs - does not present details for how the ARARs are applied nor how they are met for Alternatives 2 and 3. For example, northern Moffett Field is identified as susceptible to tidal flooding and must be in compliance with the

Executive Order on Flood Plain Management (Table 8, second row), but Section 5.2 does not identify the requirements nor present the precautions needed to be taken to comply with this ARAR. This is of particular concern since a vegetative cover could suffer significant damage in a flood. It is suggested that more details be provided on how the ARARs are met for Alternatives 2 and 3.

Response: *Section 5.2 has been revised and presents more details about how Alternatives 2 and 3 will meet location-specific ARARs.*

Comment 70: Section 6.1, Page 152, Paragraph 1. The third sentence, beginning with "For landfill refuse, . . .", is confusing and should be deleted. The issue is whether the contaminants are present in concentrations above actions levels. It would seem they either are or they are not. This sentence should be modified accordingly.

Response: *The sentence has been deleted to avoid confusion. Action levels are not evaluated for refuse.*

Comment 71: Section 6.2. Many statements in this section may need to be modified when ecological data and additional rounds of sampling are analyzed in the coming months. Regarding risks to burrowing animals, the remedy should consider these risks at the FS and record of decision (ROD) stage. It would be a very difficult administrative change to modify the remedy in the remedial design phase. It might require an amendment to the ROD, not an easy task.

Response: *The statements have been revised based on additional rounds of sampling and the EATM, as appropriate. The EATM did not identify any burrowing animals that have burrow depths 3 feet bgs and exposure pathways are incomplete. In addition, the cap can be designed to eliminate exposure pathways for plant root uptake without modifying the ROD (please see Section 7.0 of the revised draft final FS report).*

Comment 72: Section 6.2, Page 152, Paragraph 3. The effect of potential settlement of the landfill due to the increase in surcharge should be estimated. In particular, the effect of allowing additional fill material to come into contact with leachate should be determined. This is of particular concern with Site 1 where on the eastern side of the landfill there is evidence of significant contamination present in perched leachate (see comment from page 20).

Response: *An estimation of the amount of settlement could be calculated; however, the amount of settlement would not necessarily correspond to the amount of additional refuse that comes in contact with leachate. One foot of settlement does not signify that an additional foot of refuse will become saturated. Variable consolidation will occur throughout the landfill. In addition, the effect of allowing additional fill material to come in contact with leachate is difficult to estimate, as the nature of the additional fill is not known and neither is the degree of saturation. Post-closure monitoring is planned for 30 years, with re-evaluation periods every 5 years, to monitor settlement effects on leachate migration.*

Comment 73: Section 6.2, Page 153, First Full Paragraph. The Hydrologic Evaluation of Landfill Performance (HELP) model to estimate leachate generation should also be performed for Alternative 1 to provide a basis of comparison with Alternatives 2 and 3.

Response: *Infiltration for Alternative 1 has not been modeled since the properties of the current surfaces of the landfills are not known. The current surface is a mixture of asphalt, gravel, vegetated soil, and concrete of unknown depths. Consequently, the results of any attempted modeling would not be very useful. However, observations during site walks have revealed that there are probable macropores at the landfill which could cause significant infiltration into the current landfill.*

Comment 74: Section 6.2, Pages 153 and 154, Overlapping Sentence. The statement that EPA does not recommend multilayer caps for landfills that have minimal hazardous substances may be true. But the discrepancy that exists between the anecdotal evidence and the sampled data regarding the contents of these landfills needs to be resolved before the landfill can be properly classified as a municipal landfill.

Response: *Please see responses to comments 2, 4, and 56.*

Comment 75: Appendix G. The section on data evaluation (G.3.1) states that data quality objectives (DQOs) and quality assurance and quality control (QA/QC) measurements for the groundwater data "meet or exceed EPA Contract Laboratory Program (CLP) QA/QC criteria." CLP QA/QC criteria, as outlined in the CLP contract Statements of Work (SOW), are contractual laboratory performance criteria and are linked to laboratory payment, not to data usability. Data validation, performed using the National Functional Guidelines for Organic Data Review or Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis, can be used to assess data quality. The groundwater data tables presented in Appendix C of the report contain data qualifier flags, indicating that some form of data review/validation was performed. Many of the data points are flagged with the "J" (estimated) qualifier. While there are some cases where "J" flagged data are usable for risk assessment purposes, the report does not indicate whether or not steps were taken to determine whether or not qualified data points are usable.

Response: *The statement referencing CLP QA/QC has been deleted to avoid confusion. According to Risk Assessment Guidance for Superfund (RAGS) (EPA 1989), all "J" qualified data should be used in a human health risk assessment. Data qualified with a "J" indicates the reported values are estimated.*

Comment 76: Appendix J. This appendix presents a verbatim documentation of California landfill action-specific regulations and the relevance and appropriateness of each regulatory section. However, Appendix J does not present other location- or action-specific ARARs nor their relationship to the proposed alternatives. For example, Table 8 identifies the applicability of the California Coastal Act of 1976 (CCA), but Appendix J does not discuss compliance with the CCA or the need for a waiver. Appendix J should provide a comprehensive regulatory review, not only Title 14 and 23 of the CCR (landfill requirements). The reviewer should also be given sufficient

detailed information on the other regulatory requirements necessary in determining if the proposed alternatives will meet the ARARs or if a waiver is necessary. In its present form, Appendix J is too narrowly defined and limits the evaluation of the ARARs. It is recommended that the documentation of ARARs follow Section 1.5 of CERCLA Compliance with Other Laws Manual, Vol. I, OSWER Directive 9234.1-01 and Appendix E of Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01.1.

Response: *The Navy has followed CERCLA Compliance with Other Laws Manual, Vol. I (OSWER Directive 9234.1-01) and Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (OSWER Directive 9355.3-01.1) in preparing the OU1 FS. A comprehensive review of action-specific ARARs for OU1 remedial action has been provided as suggested. Section 5.2 discusses location-specific ARARs such as the CCA (please see response to comment 69).*

3.0 RESPONSES TO RWQCB COMMENTS

GENERAL COMMENTS

Comment 77: This FS evaluates the risk to human receptors, but does not address the ecological receptors which are present at Site 1 and Site 2 landfills. Since these landfills are viable habitats for a variety of burrowing animals and are adjacent to surface water bodies with aquatic life, the potential risks to the ecological receptors from soil and groundwater in both habitats needs to be evaluated before the final remedy can be determined.

Response: *Please see the response to comment 1.*

Comment 78a: The present groundwater gradients indicate that leachate/groundwater is flowing towards two surface water bodies, a portion of Site 1 to the SWRPs and Site 2 to the Northern Channel. There is also an indication that the groundwater flow may divide at Site 1 with a portion of the flow influenced by the pumping at Building 191. This groundwater flow data is new information and may change seasonally as the surface water level of Jagel Slough changes. A change in groundwater flow would alter the upgradient and downgradient wells at Site 1 and potentially move contaminants into the slough during summer months. Seasonal data needs to be collected to verify the groundwater flow patterns at Site 1. The text needs to clearly indicate the specific wells which are being evaluated as "upgradient and "downgradient" at Site 1 on all tables and the text.

Response: *The FS report has been revised to incorporate additional data collected and the hydrogeological interpretation has been modified. Elevated water levels within the leachate zone at Site 1 does indicate outward gradients; however, these outward gradients are accompanied by low flow rates. As a result, all perimeter wells are considered downgradient at Site 1.*

Comment 78b: The ecological and hydrologic impact of applying the remedial options needs to be included in Sections 5 and 6 of the text.

Response: *Please see the response to comment 1 regarding ecological impact. The hydrologic impact from applying remedial action is not expected to be significant. Infiltration will be reduced which may reduce the amount of leachate generated. Variable consolidation may occur throughout the landfill from capping. As a result, additional fill material may come into contact with leachate, but the volume is impossible to quantify, since the nature of the fill is not known and neither is the degree of saturation. Post-closure monitoring is planned for 30 years to monitor settlement effects on leachate migration.*

Comment 79: Burrowing animals, and potentially special status species, are presently inhabiting the landfills. The application of the remedial options needs to evaluate the destruction of the current habitat at the sites. The potential hydrologic impacts of the installation of a cap need to be evaluated. The potential of radial groundwater flow or an increase in communication between the groundwater and leachate may occur due to the weight of the cap and the shallow groundwater at the site.

Response: *The Navy has prepared an EATM to evaluate ecological impacts from the proposed remedial alternatives (please see the response to comment 1).*

The potential hydrologic impacts of from cap installation are discussed in the revised draft final FS report. The potential for radial groundwater flow or communication between the groundwater and leachate will be decreased by installing a cap and reducing infiltration. A 3-foot thick cap will surcharge the landfill approximately 300 pounds per square foot, which is approximately the same pressure applied by a 170-pound person standing on the landfill and should have little effect on any perched layers. The weight of the cap may consolidate wastes below; however, this consolidation will occur differentially and throughout the landfill. The decrease in pore-space volume will decrease the permeability of the refuse. The effects from any additional refuse that may saturate should not be significant and will be monitored.

Comment 80: The text needs to include the project's established background levels in evaluating the concentrations of inorganics in the soil and groundwater at the landfills. Good rationale is required if the Navy does not want to use the established background groundwater levels to evaluate inorganic concentrations at the landfills. The present discussion of upgradient, downgradient, and NBA groundwater concentrations must be supported with more detail and good rationale. The NBA, upgradient, and downgradient wells utilized for the comparison need to be listed in the text and tables in order to evaluate the Navy's assertion that inorganic groundwater concentrations at the landfills are not substantially elevated in comparison to "upgradient" and NBA concentrations.

Response: *The suggested detail and rationale have been added to the revised draft final FS report. The discussion of upgradient and downgradient wells have been revised as suggested.*

The Navy has evaluated naturally occurring and upgradient concentrations of compounds to assess if the landfill's are sources of groundwater contamination. Appropriate upgradient and comparison concentrations will continue to be monitored for this purpose. Established background metals concentrations presented in the OU RI reports were inadequate because of varying groundwater chemistry at MFA. Consequently, additional discussions of naturally occurring or upgradient are necessary.

Comment 81: The Navy should compare the leachate and groundwater concentrations to the water quality objectives in the San Francisco Bay Basin Water Quality Control Plan, 1991. Table III-2A and Table III-2B should be utilized for the groundwater/leachate movement into the wetlands, and Table IV-1A for groundwater leachate movement to the Northern Channel to evaluate potential aquatic impacts.

Response: *Water quality objectives for marine surface waters with salinities greater than 5 parts per thousand (Table III-2A) will be used to evaluate potential aquatic impacts and have been identified as waste discharge limits to protect beneficial uses at OU1.*

Comment 82: The use of deed restrictions at Site 1 is not encouraged by our agency. The potential for future recreational uses of that shoreline will be eliminated with deed restrictions. Future recreational use of the area should be evaluated in choosing the best remedial option.

Response: *Future recreational uses will not be eliminated with deed restrictions. Deed restrictions are needed to limit excavation activity on the landfill.*

SPECIFIC COMMENTS

Comment 83: Page 12, Paragraph 2. Please show the location of the ditch which collects surface water at Site 1 on a figure.

Response: *The ditch location is along the western boundary of the landfill on Figure 4.*

Comment 84: Page 17, Paragraph 3. In reviewing the historic water level data, it seems that monitoring well W1-10(F) does show anomalous patterns that do not match the trends of the other wells. However, W1-09(F), W1-11(F) and W1-13(F) do follow the pattern of the other surrounding wells with a slightly dampened response in some cases. These wells seem to be in hydraulic connection with the "groundwater" wells and follow the same trends as the others.

Response: *Wells W1-9, W1-11, W1-13 do show a similar response to precipitation; however, this does not indicate that they are in hydraulic communication with the aquifer. The consistently heightened water elevations in these wells above surrounding wells indicates that leachate flow is limited. This is also evident by the lack of leachate migration detected in aquifer wells.*

Comment 85: Page 21, Paragraph 2. The text needs to specify which wells were omitted from the development of the potentiometric surface map for Site 1. Well W1-10(F) seems to be a perched zone, but other wells seem to exhibit the same responses to precipitation as surrounding wells in the area.

Response: *Potentiometric maps have been revised for Site 1 based on the discussions in the response to comments 78a and 84.*

Comment 86: Page 23, Paragraph 1. The existence of a potential upward gradient between the A2 and A1 in the far west corner of the landfill does not mean that an upward groundwater gradient is present throughout the site. This point needs to be clarified throughout the text in the discussions of leachate and groundwater interaction. In addition, historic water level information should re-evaluated to determine whether the upward gradient is constant seasonally or is a new phenomenon.

Response: *The text has been clarified as suggested. Historic water elevations have been reviewed and the upward gradient is variable. The text has been revised to indicate that any upward gradients are seasonal and do not likely influence leachate movement. The uppermost, A1-aquifer zone will continue to be monitored for any leachate migration.*

Comment 87: Figure 11. Shouldn't this figure be titled sediment and <u>soil</u> sample locations?

Response: *The figure title has been revised as suggested.*

Comment 88: Page 31, Table 1 and Page 58, Table 4. The text indicates that three tables present groundwater concentrations from the perimeter wells and do not include the concentrations from the "fill" wells. If this is the case, the tables should be labeled to indicate that detections are from perimeter groundwater wells only.

Response: *The labels have been revised as suggested.*

Comment 89: Page 32, Section 1.3.3.5. The specific wells used in the discussion of upgradient and downgradient concentrations need to be clearly specified in the text.

Response: *The specific upgradient and downgradient wells have been specified as suggested.*

Comment 90: Page 33, Paragraph 3. The text should state that the perimeter wells W1-14 through W1-17 have only been sampled once.

Response: *Four rounds of sampling data from these wells are incorporated in the revised draft final FS report.*

Comment 91: Page 34, Paragraph 3. The upward gradient has only been observed in the far western portion of Site 1. It is misleading to use this information to imply that the upward gradient will affect the leachate movement at the entire site. The text should clarify the location and historic trends of the upward gradient.

Response: *The text has been revised to state that the upward gradient is seasonal, may not be sitewide, and that it does not likely influence leachate movement.*

Comment 92: Page 35, Inorganic Compounds and Table 2. This section should address the established background groundwater levels for inorganics and provide rationale for the use of downgradient, upgradient, and NBA well concentrations. The specific wells utilized for downgradient and upgradient at Site 1 should be listed since there is a question as to whether the groundwater flow changes seasonally. The specific wells from the NBA need to be listed to evaluate this comparison.

Response: *Please see the response to comment 80.*

Comment 93: Page 37, Paragraph 2. The conclusions regarding groundwater contamination seem to disregard leachate concentrations for arsenic, beryllium, barium and silver. Please clarify how these high levels in the leachate do not indicate a potential for groundwater contamination?

Response: *The leachate concentrations for several compounds including barium, arsenic, and iron are elevated and indicate a potential for groundwater contamination. However, except for barium, the concentrations are not elevated outside the landfill. The average barium concentration is statistically above the comparison data set in several perimeter wells at Site 1. However, these elevated levels are likely naturally occurring and the average barium concentration is two orders of magnitude below the waste discharge limit (WDL). Additional wells will be installed during the RA to further define inorganic concentrations in this area of the base.*

Comment 94: Page 39. Please address the potential for contaminants to migrate through the subsurface trench area that may be acting as a preferential pathway for leachate at Site 1. The locations of the perimeter wells will not be able to monitor this potential pathway for leachate or groundwater.

Response: *Perimeter monitoring points have been installed to monitor this area and results show that leachate is not migrating. In addition, field investigations have revealed that this area is not a preferential pathway because the subsurface "trench" is an old shallow stream meander and has not been backfilled with higher permeable material.*

Comment 95: Page 60. Please specify which wells are being utilized as NBA, downgradient and upgradient concentrations for this comparison of inorganic levels. Higher values of inorganics in downgradient wells may reflect the movement of leachate and groundwater from the landfill since 1964. The clarification of the wells used for this comparison will aid in the evaluation of the conclusions of this section.

Response: *The upgradient and downgradient wells have been clarified as suggested.*

Comment 96: Page 71, Paragraph 3. The conclusions regarding leachate movement seem relevant to the low levels of organics in the leachate at the sites, but the higher levels of inorganics

may still potentially move, or have moved in the past (Site 2), to downgradient locations.

Response: *The text has been revised to discuss that surrounding clays reduce flow and potential inorganic and organic contamination migration.*

Comment 97: Page 72, Section 1.4.1 etc. As discussed in the general comments, the characterization of pathways and receptors pertinent to the ecological habitats in the wetlands, surface water channels and uplands at the sites are necessary to evaluate the remedial options and finalize the appropriate remedy.

Response: *Please see response to comment 1.*

Comment 98: Page 84, Table 7. Resolution 68-16 should be included as a potential chemical specific ARAR. The resolution is promulgated to protect all beneficial uses, not just drinking water sources. If groundwater/leachate is impacting wetlands or surface water bodies then the Resolution would be applicable.

Response: *This resolution was established so that discharges to waters of the state do not degrade those waters. This resolution does not meet the definition of a chemical-specific ARAR. As requested by EPA and the state, the FS has identified federal and state ambient water quality criteria as chemical-specific ARARs for groundwater. Resolution 68-16 has been identified as a action-specific ARAR and will be evaluated in conjunction with any discharges that may occur as part of the RA.*

Comment 99: Table 8. Specific sections of the California Fish and Game Code may be applicable if the landfills are impacting aquatic or terrestrial wildlife.

Response: *It is not clear which sections of the Fish and Game Code would be applicable. The Fish and Game Code has been reviewed and it does not appear to be an ARAR for OU1.*

Comment 100: Page 138, Section 5.0 and Page 150, Section 6.0. These sections need to evaluate the impacts of applying the remedial alternatives to the existing habitat and the hydrologic concerns as outlined in general comment 79.

Response: *Please see the responses to comments 1, 78, and 79.*

4.0 RESPONSES TO DTSC COMMENTS

GENERAL COMMENTS

Comment 101: The feasibility study needs to address the potential risk to ecological receptors within the landfill boundaries and in adjacent aquatic environments which receive groundwater from the two landfills.

Response: *Please see the response to comment 1.*

Comment 102: Potential hydrologic and ecological impacts posed by implementing the three remedial alternatives must be evaluated in the screening of the remedial actions.

Response: *Please see the responses to comments 1, 78, and 79.*

Comment 103: The text should clearly define the monitoring wells which are included in the average concentrations of upgradient, downgradient, and NBA wells used to compare groundwater concentrations at the landfills.

Response: *Please see the response to comment 95.*

Comment 104: The historical and seasonal variations of groundwater flow directions in Site 1 and Site 2 area should be reflected in the text.

Response: *Please see the response to comment 78.*

Comment 105: The established background concentrations for soil and groundwater must be addressed in the text.

Response: *Established soil background concentrations are not relevant for OU1 because soil treatment will not occur. Please see the responses to comments 80, 89, and 90 for discussion regarding groundwater inorganic concentrations at OU1.*

Comment 106: Water quality objectives from the San Francisco Bay Basin Water Quality Control Plan, 1991, should be utilized to evaluate potential aquatic impacts from the movement of landfill groundwater and leachate.

Response: *Please see the response to comment 81.*

Comment 107: The State requests that a revised draft final FS shall be submitted by the Navy. The data collected from ongoing monitoring program and from Phase II Site Wide Ecological Assessment activities should be included.

Response: *A revised draft final FS report has been prepared as suggested. To avoid delaying the OU1 ROD, OU1 has been removed from the SWEA process. This accelerates OU1 activities and allows the original schedule to be met. To facilitate this separation, the EATM was prepared for OU1 to assess OU1 ecological impacts. The EATM results have been incorporated into the OU1 FS.*

Comment 108: The California Department of Fish and Game, as a California's State Natural Resources Trustee, should be on the distribution list to provide comments or specific ARARs for wetland and other natural resources related documents.

Response: *The California Department of Fish and Game will be added to the distribution list.*

SPECIFIC COMMENTS

Comment 109: Page 1, 2nd Paragraph. The second sentence should read "This work coordinated through a Federal Facility Agreement (FFA) with the U.S. Environmental Protection Agency (EPA), the California EPA, which include the Department of Toxic Substances Control (DTSC) and the Regional Water Quality Control Board (RWQCB)".

Response: *The text has been revised as suggested.*

Comment 110: Page 20, 1st Paragraph. The consistently high water levels at well W1-9(F) may not be the result of perched groundwater. Please discuss other possible effects such as groundwater mounding or topographic variation.

Response: *The suggested discussion has been added to the text. Leachate levels are consistently higher in leachate wells W1-9, W1-10, W1-11, and W1-13, which indicate the leachate is within an upgradient "mounded" zone. The surrounding tight bay muds are restricting flow from the landfill and causing this "mound." However, there is not a continuous source of water that could sustain a groundwater mound. Topographic variation could possibly influence water levels. Well W1-10 is located in a low-lying area at the base of the pistol range where infiltration may be slightly higher. However, ponded water has not been observed in this location.*

Comment 111: Page 20, 1st and 2nd Paragraph In an unsaturated zone, it is not uncommon that perched water may show a higher "perched water table" than true water table. Further evaluation will be necessary to decide whether the higher water table from wells W1-9 and W1-13 were caused by perched layers or not.

Response: *Please see the responses to comments 9, 13, 78, 110, and 112.*

Comment 112: Page 20, 4th Paragraph. It is agreeable that perched water levels do not result in outward gradients. However, with the limited information, it is immature to eliminate the possibility of outward gradient flow at Site 1.

Response: *Water level data continue to show that consistently higher elevations are found in leachate wells. These data show that outward gradients may exist but flow is limited due to the surrounding low hydraulic conductivity clay. This is also shown by the absence of leachate migration detected in aquifer wells.*

Comment 113: Page 20, 5th Paragraph. It was stated that groundwater movement in the northern part of Moffett Field flows in the direction of the storm sewer lift station. However, in Figure 10, the groundwater flow directions vary from NW to SW, neither a significant groundwater divide nor southward groundwater flow toward Building 191 could be found from this figure.

Response: *The general groundwater movement at MFA is well documented and A1-aquifer groundwater in the northern part of MFA flows in the direction of the storm sewer lift station. Figure 10 has been revised based on discussions in the responses to comments*

9, 13, and 78. The groundwater in the A1-aquifer zone at Site 1 generally flows south. The leachate water level is elevated above the A1-aquifer zone level and is upgradient.

Comment 114: Page 21, 3rd Paragraph. The correct statement cited from the OU1 RI report (IT 1993) should be "The trench does not appear to greatly influence the movement of leachate at Site 1." It is too early to conclude that the trench does not affect groundwater/leachate movement. Historical and seasonal influences of groundwater levels and directions should be considered.

Response: *Additional data have been collected and reviewed and the conclusion remains unchanged.*

Comment 115: Page 22, Figure 10. Please compare the potentiometric surface map with previous data such as the quarterly report (September 1993) and explain the different patterns of equipotential lines.

Response: *Figure 10 has been revised. Please see the response to comment 113.*

Comment 116: Page 23, 1st Paragraph. According to OU1 Additional Field Investigation Technical Memorandum, only one measurement of A2 aquifer water level was taken from W1-7 in November 1993. The existence of upward gradient flow cannot be determined by such limited data. In addition, the upward flow cannot be determined by only comparing water levels from A1 and A2 aquifers, more detailed analysis will be necessary.

Response: *Historic data have been presented which show the upward vertical gradient is seasonal and appears to diminish during wet seasons. The text will be clarified to state that the water level comparison is based only on data from this well and that these data indicate a seasonal upward gradient exists. Please see the response to comment 86.*

Comment 117: Page 34, 2nd Paragraph. Please see comments 110 and 111.

Response: *Please see the responses to comments 110 and 111.*

Comment 118: Page 34, 3rd Paragraph. Please see comment 116.

Response: *Please see the response to comment 116.*

Comment 119: Page 35, 2nd Paragraph. Please explain how to define upgradient and downgradient wells at Site 1. A revisit of previous monitoring data might be necessary to confirm the local groundwater flow directions.

Response: *Upgradient and downgradient wells are based on the potentiometric surfaces in the area. At Site 1, all perimeter groundwater wells are downgradient from leachate. Please see the responses to comments 9, 13, 78, and 110.*

Comment 120: Page 37, 3rd Paragraph. Please explain why metals in sediments and surface water were not discussed? Please compare the results with Phase I Site Wide Ecological Assessment.

Response: *Inorganic concentrations are similar to other high TDS wells in the area, indicating the landfill is not a source of inorganic contamination. However, contamination in surface water and sediment could result from several other different sources, as the surface water receives runoff from other locations on the base. The remedial alternatives will mitigate OU1 as a potential source of contamination to these surface water bodies and associated sediments. The SWEA will evaluate the need to remediate any existing contamination in the sediment and surface waters and possibly address other potential sources. For these reasons, the revised draft final FS report does not include sediment data. However, surface water data are included for comparison purposes.*

Comment 121: Page 44, 3rd Paragraph. Please clarify if the past regional pumping activities had any contributions to the low water table (currently below mean sea level) at Site 2.

Response: *The text has been clarified and states that the pumping at Building 191 is the major contributor to below msl water table elevations at Site 2. The contributions from past regional pumping (for example, agricultural use) are not known but likely are minimal at this time.*

Comment 122: The water levels data taken on February 25 and August 26, 1993 should be compared with the current potentiometric surface map. Please explain the different patterns of equipotential lines in these documents.

Response: *Hydrographs have been presented to illustrate the fluctuations in relative water levels. The relative water level fluctuations in the hydrographs show that equipotential patterns do not change over time.*

Comment 123: Page 49, 3rd Paragraph. It is inappropriate to compare the estimated equipotential lines with the measured A2 aquifer water level from well W2-5. The upward groundwater flow could be detected by installing a nest piezometer.

Response: *The vertical gradient does not influence the remediation strategy recommended in the FS and nested piezometers are not necessary. Extrapolating equipotential lines to estimate the A1-aquifer zone water level near A2-aquifer well W2-7 is appropriate to indicate a general feature.*

Comment 124: Page 60, 2nd Paragraph. Please see comment 119.

Response: *Please see the response to comment 119.*

5.0 RESPONSES TO SILICON VALLEY TOXICS COALITION COMMENTS

SVTC reiterated several comments made on the draft FS report. In Section 5.1, the initial comments made on the draft report and the associated initial responses are provided and are followed by a SVTC reiteration and an additional response. In Section 5.2 comments generated on the draft final FS report are presented with associated responses. Comments in Sections 5.1 and 5.2 were discussed at a meeting held between SVTC, regulatory agencies, the Navy, and Navy consultants on July 25, 1994. Discussions from this meeting are incorporated in responses below.

5.1 RESPONSES TO COMMENTS ON THE DRAFT FS REPORT

Comment 125: [Initial Comment 55]. It is unclear of the radius or depth of groundwater that is going to be considered. Please provide this information as soon as it is available.

[Initial Response]. Leachate and any groundwater contamination outside the perimeter boundaries of the landfills is addressed in the draft final OU1 FS.

Provide a simple answer to Comment 55 (the radius and depth of groundwater that is considered).

Response: *Any groundwater outside the perimeter landfill boundary (point of compliance) that becomes contaminated by Site 1 or Site 2 landfill refuse will be addressed as part of OU1. Groundwater directly below the landfill is not outside the point of compliance.*

Comment 126: [Initial Comment 57]. Minimizing infiltration should be a remedial action objective (RAO). There is no reason to believe that leachate from the landfills will not eventually migrate. A strategy which minimizes infiltration slows down migration of leachate.

[Initial Response]. Minimizing infiltration and migration is included as an RAO in the draft final OU1 FS report].

With regard to Comment 57, how is the design different than the draft FS?

Response: *Infiltration will be minimized by capping the landfills. Regulations typically specify low-permeability, multilayer caps to minimize infiltration after landfill closure. The draft final FS proposes a 3-foot thick, single layer soil cap to minimize infiltration (a 2-foot thick cap was proposed in the draft FS). A computer analytical model was used to evaluate the relative performance between cap systems. Performance was measured by evaluating differences between the amount of infiltration that occurs with a multilayer cap and a single layer cap. The EPA's Hydrologic Evaluation of Landfill Performance (HELP) model was used to calculate the water balance for the different landfill cap*

systems. Site-specific precipitation, temperature, and solar radiation data are entered into the model and the model calculates the amount of water lost through runoff, evapotranspiration, and through drainage layers. The model also calculates the amount of water stored in each layer based on soil properties. After the amount of storage reaches steady state, the resultant infiltration through the cap can be determined and comparisons in cap performance relative to minimizing infiltration were made. Results showed that the multilayer cap will not reduce infiltration rates below those achieved by a native, single layer cap. For Sites 1 and 2, a 3-foot soil cap reduces infiltration into refuse to 1.13 inches per year, which is approximately 9 percent of annual precipitation. A multilayer cap reduces infiltration to 1.06 inches per year, which is about 8.5 percent of annual precipitation. No significant difference in the amount of infiltration occurs, as the multilayer cap reduces infiltration an additional 0.07 inches per year as compared to a soil cap. The 3-foot soil cap will function to minimize infiltration and meet the RAO. In addition, there are several advantages from using a 3-foot soil cap as compared to a low-permeability, multilayer cap. Section 6.0 of the draft final FS report provides additional rationale as well as the response to comment 67.

Cap performance was also modeled following a large precipitation event. Relative cap performance was compared assuming a 100-year, 24-hour storm occurs in January. In addition, performance was also compared assuming a 100-year, 24-hour storm occurs in July. During normal precipitation events, the lateral drainage layer and barrier layer do not function to remove any water from the cap system, as evapotranspiration dominates water removal. After a large storm event during the wet season, the drainage layer and barrier layer function to remove approximately 0.76 inches, which is approximately 4 percent of total annual precipitation. Evapotranspiration and runoff dominate by removing 13 inches (73 percent). After a large storm event in the dry season, the available storage capacity in the upper soil layer accommodates all the precipitation that does not run off. The stored water is subsequently lost through evapotranspiration. These results support the conclusion that a soil cap is more feasible than a multilayer cap. Detailed results of this modeling are included in the revised draft final FS report.

Comment 127: [Initial Comment 58]. At the very least, a remediation strategy must include: minimizing infiltration; collecting and treating leachate until it is shown that it does not impair water quality; dewatering the fill material: and placing an impervious cap on the fill. (I would add that identification and removal of hot spots within the fill material should be an objective).

[Initial Response]. Site-specific data do not justify the suggested remediation strategy. The Navy requests that more rationale be provided before considering such a strategy.

The burden is on the Navy to show why it does not need to undertake the strategy recommended in Comment 58. All anecdotal information indicated that the landfills were used as dumping grounds for significant quantities of hazardous materials. Again, while recognizing that this information may have exaggerated the quantity of hazardous materials entering the landfills, on the basis of soil borings and leachate wells, we know

that some hazardous waste was placed in the landfills.

Response: *The following discussion presents rationale for not considering the above-mentioned remediation strategy.*

1. Dewatering the refuse and collecting and treating leachate until water quality is no longer impaired is not necessary because current analytical data show no impairment of surrounding groundwater from the landfill leachate (see Section 1.3 of the draft final FS report).

2. Placing an impervious cap on the fill is not necessary based on discussions presented in Section 6.0 of the draft final FS report. In summary, an impervious cap is not proposed for the following reasons.

a. A native, single-layer cap reduces infiltration to rates similar to rates achieved by a clay layer and lateral drain due to MFA's climate.

b. Leachate migration is not currently occurring, it is not expected to occur in the future, and therefore, minimizing infiltration is not a controlling factor.

c. Employing an impervious cap has the potential for increasing horizontal, subsurface gas migration.

d. An multilayer cap would be more difficult to construct.

e. An impervious cap would be more costly.

f. Leachate will exist regardless of cap type because refuse is present below the water table. In addition, since waste is saturated below the water table, other technologies will be required to mitigate leachate migration. Implementing a multilayer cap would not enhance the effectiveness of hydraulic control or significantly decrease the amount of water requiring extraction and treatment.

g. Any slight advantage gained through using a multilayer cap would be difficult to maintain. If hydraulic control is implemented, leachate extraction would increase refuse decomposition, gas generation, and settlement since waste is saturated. Settlement can result in barrier layer cracking.

3. Regarding the identification and treatment of hot spots, no hot spots have been positively identified. Anecdotal information indicates drums of liquid waste exist at Site 1. However, conductivity surveys do not show areas of high conductivity indicative of buried drums. In addition, data from leachate and groundwater monitoring wells do not indicate that hot spots exist.

EPA guidance (EPA 1993) states that treating hot spots is not warranted unless four questions are all answered affirmatively. The questions and OU1-specific answers are presented below.

i. Does evidence exist to indicate the presence and approximate location of waste?

At Site 1, no reliable information exists to indicate the location of the waste. Conductivity surveys do not indicate any buried drum fields.

ii. Is the hot spot known to be a principal threat waste?

It is not known if potential hot spots are principal threats since no documentation exists, their existence is suspect, and characteristics are unknown.

iii. Is the waste in a discrete, accessible part of the landfill?

It is not known if hot spots are in a discrete, accessible location since the location is unknown.

iv. Is the hot spot known to be large enough that its remediation will reduce the threat posed by the overall site but small enough that it is reasonable to consider for removal (for example, less than 100,000 cubic yards)

The presence of hot spots is suspect. In addition, their size and characteristics are not known.

None of the four questions can be answered affirmatively. Therefore, attempts to search for hot spots are not warranted. The response to comment 129 (below) discusses this issue further.

Comment 128: [Initial Comment 59]. The Navy should delay choosing a remedy until the OU6 remedial investigation and feasibility study (RI/FS) and the ecological assessment are completed.

There is the potential for communication between the area considered in the OU1 FS (including the revised definition, as discussed above) and the wetland areas in OU6. The RI/FS for OU6 has not been completed, and important data regarding the effects of low levels of toxic materials on the wetland ecosystem is yet to be analyzed. Furthermore, the base-wide ecological assessment has not been completed. This report could also yield important data that would affect an environmental protection strategy. For example, these studies may conclude that stricter cleanup goals than those considered in the OU1 draft FS area are necessary to protect endangered species habitat.

Since data suggest that there is not an immediate threat to human health or the environment, I suggest that the Navy delay a permanent remedy until these aforementioned studies are completed. However, I do recommend that a temporary remedy should be designed which limits contact between the new OU1 area, and OU6 and people. This may take the form of temporary fencing with some hydraulic controls and groundwater\leachate treatment.

[Initial Response]. Delaying the OU1 schedule should be discussed as an alternative strategy; however, it is likely that ecological concerns could be incorporated at the remedial design phase. The draft final OU1 FS report should be thoroughly reviewed before discussing schedule changes.

Please explain why you think it is "likely that ecological concerns can be incorporated at the remedial design phase." Describe how this could be done.

Response: *Please see the response to comments 1 and 107. The cap can be designed to eliminate exposure pathways associated with burrowing animals and plant roots.*

Comment 129: [Initial Comment 60]. There is a disconnect between the amounts of hazardous materials detected in the OU1 RI/FS and the tons of liquid and solid hazardous materials that were reported in the IAS.

Although I recognize that the IAS was based on anecdotal information, I recommend that the Navy reconcile this disparate information in the FS report. In addition, I would not dismiss these anecdotal reports merely because a few borings and wells have not shown heavy contamination. Other explanations could exist, including that these contaminants are now in the Bay or groundwater, that they have degraded, that they weren't located by the borings, or that they were disposed of at another landfill on the base. In fact, there is a third landfill located within the golf course that was identified by IT in 1988.

[Initial Response]. The Navy does not agree that reconciliation of the past fate of landfill refuse is needed. These data are not needed for the FS report and would be based on speculation.

Comment 60 stands, and is reiterated. Since the IAS for Moffett in 1986, almost every study concerning Sites 1 and 2 has listed the large amounts of hazardous waste being disposed of at these Sites. While I acknowledge that the IAS may have been incorrect, I think it is incumbent upon the Navy to prove that it was incorrect. In my opinion, the Navy has not met its burden of proof and is showing a disregard to the community by not agreeing to reconcile early reports (that is, the IAS) and findings to date.

Response: *Reconciling anecdotal and current information is extremely difficult. No documentation or disposal records were kept for the landfills and it is impossible to verify any information obtained from interviews without actively excavating the landfills. A fate and transport analysis would have little value since the waste could have been disposed in drums.*

To address this concern, the Navy has (1) reviewed the IAS (NEESA 1984) and examined the basis for assumptions regarding disposal in the IAS, (2) identified approaches in EPA guidance (EPA 1993, 1991) regarding similar circumstances since these circumstances are common to many landfills, and (3) considered additional remediation strategies that regard anecdotal information as potentially accurate.

One explanation for the differing information in the IAS and collected data is that the IAS is not accurate. To evaluate this further, the following paragraphs contain a summary of the IAS and places emphasis on the basis for assumptions made.

The IAS contains an extensive survey of waste generation rates and disposal practices at Moffett Field from the 1930s to the early 1980s. The information is based on record searches, on-site surveys, and civilian and military personnel interviews. The IAS presents waste generation rates from different groups that have resided at Moffett Field, most notably public works, P-3 Orion patrol squadrons and jet squadrons, aircraft intermediate maintenance departments, and general operations (such as the fire department, photography lab, and naval exchange gas station). Of these groups, public works and the squadrons reportedly used the landfills for waste disposal. Waste disposal at the landfills from public works and the squadrons are summarized below from the IAS.

Public works operated, maintained, and repaired buildings, structures, and other facilities at Moffett Field. Public works is comprised of metal and welding shops, paint shops, utilities shops, electrical shops, pipe shops, the steam plant, the building trades shop, the transportation division, and the pesticide shop. Of these shops and divisions, the paint shop, the electrical shop, the pipe shop, and utilities shop disposed of waste at the landfills.

According to the IAS, the paint shop had an area of Site 2 reserved for paint shop waste. Paints and thinners were disposed in cans, as it was easier to dispose of wastes in barrels at the shop rather than on the ground. The paint shop staff never observed pools of liquid or chemical smells at the landfills.

The electrical shop reportedly used paper elements to filter oil from transformers. The crews used about seven to eight filters in a filter press and filtered about two to three 20- to 30-gallon capacity transformers per month in the summer. The shop generated a few dozen filters per year, as well as small amounts of sawdust used to soak up spilled transformer oil. The filtering was done on site and the filters were dried in an oven. The electrical shop reportedly used the landfills only for disposal of paper transformer oil filters.

Jet squadrons operated at Moffett Field from 1950 until 1962. According to personnel interviewed, most oily and solvent wastes were collected in 55-gallon barrels and stored beside hangars. The outside corners of the hangars reportedly were used to store barrels of waste materials. According to the IAS, the barrels were either hauled to the runway landfill (Site 1) by station personnel or disposed of down storm sewers around the hangars, or off the edge of the aprons. The amount of liquid wastes taken to Site 1 is not known; however, the IAS estimates 1.5 million gallons were generated and assumes 5 to 10 percent of the 1.5 million gallons generated were disposed at the landfills. The basis for this assumption is unknown.

Seven P-3 Orion squadrons have been stationed at Moffett Field since 1962, which was near the time that Site 1 began operations and Site 2 ceased operations. Disposal methods reportedly varied. In the early 1960s, much of the solvents were poured down deck drains, around the hangars, and around the aprons, or placed in barrels and stored around the hangars. Personnel interviews indicated that some of the waste containerized in 55-gallon drums was hauled to Site 1 in the early 1960s. The amounts are not known.

The IAS reports of disposal practices contain several inconsistencies. The IAS indicates that barrels were disposed of at Site 1 from 1950 to 1962, however, the Site 1 landfill did not exist before 1962. In addition, the IAS states that 1.5 million gallons of liquid waste were generated by the Orion squadrons from 1962 to 1978 (that is, during the operating period of Site 1). However, the report tables indicate that 687,000 gallons of liquid waste were generated. The IAS then assumes that 5 to 10 percent of the 1.5 million gallons was disposed at Site 1. Both the 5 to 10 percent estimate and the 1.5 million gallon estimate are arbitrary. The IAS also states that 1.5 million gallons of liquid waste were generated during the jet era at Moffett Field, however, report tables indicate that 528,000 gallons were generated. The report again arbitrarily assumes that 5 to 10 percent of the 1.5 million gallons (1,363 to 2,727 55-gallon drums) were disposed at Site 2. The estimates appear to be arbitrary and speculative, and are inconsistent with other estimates in the IAS report.

Another explanation for the differing information in the IAS and collected data is that the collected data do not adequately depict landfill content. There is no question that the landfill content is not characterized and it is not known what was disposed in the landfills. Notably, this circumstance is not a unique to MFA. Many Superfund landfills have the potential to contain a wide variety of wastes, including drums of waste. EPA guidance (EPA 1993, 1991) is very clear on how to address these sites. Landfill characterization is not recommended and containment is the best remedy unless (1) the location of the drums is known, (2) the location is easily accessible, and (3) removal will reduce the principal threat. At MFA, geophysical surveys do not show any drum disposal areas within Site 1. Leachate and groundwater data show low concentrations. Lastly, information presented in the IAS regarding waste disposal is questionable. The stated assumptions appear to have no basis and are difficult to verify.

Containment is the presumptive remedy due to multiple problems associated with hot spot (drum) excavation and removal and treatment. First, landfill excavation is extremely dangerous to the work crews and the environment. High methane levels are present within Site 1. During leachate well installation for the RI, combustible gas indicator (CGI) alarms were triggered by high methane levels and two borings had to be abandoned to avoid serious health and safety hazards. Landfill gases will pose an explosion hazard during excavation. Sparks generated from excavator shovels could ignite a pocket of methane and air.

Other hazards also exist. Not only is chemical exposure possible, but asbestos was reportedly disposed of in the landfill and can pose an inhalation hazard. Significant personal protection, as well as many other safety precautions, would be required for the

excavation crew. Ground stability would be a concern during excavation, as slopes could become unstable during equipment operations.

Furthermore, there are no guarantees that excavation would be effective. Drums could be easily damaged during excavation, which could worsen hazards. If drums exist at OU1, the likelihood of drum damage is even greater since drum locations are unknown.

In addition, the cost of excavation, hauling, and waste redisposal would be enormous (approximately $200 million for Site 1). The extensive sampling and laboratory analysis that would be required to determine limits of excavation and characterize and sort the heterogeneous wastes for redisposal would also be costly. Also, land disposal restrictions would apply and the waste may require treatment prior to disposal, which would further increase costs. Excavation and redisposal is a hazardous and costly strategy that does not appear to be warranted.

The Navy has proved that landfill contamination is not currently migrating past landfill boundaries by sampling perimeter groundwater monitoring wells for the last 9 years. Up to 11 perimeter groundwater monitoring wells at Site 1 and six at Site 2 have been sampled for 12 rounds, spanning from 1985 to 1994. The Navy's strategy has been to evaluate containing the refuse through capping and, most importantly, to recognize that if any previously drummed waste begins to migrate from the landfill, the monitoring program will detect the release and corrective action will be implemented.

An additional strategy to protect against the possibility of buried, drummed waste mobilizing and migrating off-site will be evaluated. This strategy includes enhancing containment with a subsurface interceptor trench with a vertical barrier along the northern boundary of Site 1. This trench has been added as a corrective action contingency measure and will be in place in the event leachate migrates. The interceptor trench, in conjunction with capping and monitoring, will protect aquatic life in adjacent surface water. Only the northern boundary of Site 1 is selected for the possible additional containment because this area is upgradient to the SWRP ecosystem. Releases along other borders will not affect sensitive ecosystems and additional containment is not warranted. Any releases along these borders could be addressed solely by hydraulic control if needed. Site 2 is not considered for the additional containment since hydraulic control is easily maintained near the site by the Building 191 lift station.

Comment 130: [Initial Comment 61]. The additional golf course landfill identified by IT in 1988 should be integrated with the new OU1 draft final FS report.

[Initial Response]. The additional landfill is undergoing characterization under station-wide RI/FS activities.

With regard to Comment 61, it would seem cost effective to treat all landfills at the same time. Please explain why the characterization for the additional landfill(s) cannot be accelerated. Also, please indicate if a second landfill not covered by OU1 or the second golf course landfill has been discovered.

Response: *The Navy agrees that it would be efficient to address all landfills at the same time. However, Golf Course Landfill (GCL) 2 and GCL 3 field work is not completed and RI reports are not approved. The schedule for these activities has been developed in an efficient manner that considers other field activities that are needed at MFA.*

Comment 131: [Comment 62]. The Navy should investigate and consider other remedies for old landfills that abut the San Francisco Bay. Several landfills abutting the bay have been closed or are in the closure process. These include: remediation of an old landfill at Oyster Creek in South San Francisco (remedy was capping with a slurry wall to prevent migration of leachate); remediation and bay restoration of the West Winton landfill in Hayward (clay cap, vegetative cover, groundwater monitoring, and leachate collection and treatment system); and the remediation of the Third Avenue Landfill in San Mateo (clay cap and shoreline reconstruction). Additionally, CalTrans is currently remediating and restoring the old Stinson Beach Landfill (excavation, dewatering, segregation of hazardous and nonhazardous wastes, disposal, and restoration), as a mitigation project for restoring intertidal mudflat habitat destroyed during reconstruction of Route 1; and, the KOFY landfill in Hayward is being closed. I understand that a landfill remedy is also being considered for Fort Hamilton in Novato.

[Initial Response]. Remedy selection should be based on site-specific data. However, several of the alternatives mentioned above are part of the selected remedy for OU1.

With regards to Comment 62, merely stating that remedy selection is based on site-specific data is insufficient, and is insensitive to the community. After all, landfill remedies abutting the Bay, or are in close proximity to the Bay, have undergone regulatory scrutiny, and to a degree, reflect the concerns of the region. While I expect that site-specific data will be a critical factor in determining a remedy, information regarding the surrounding area must also be factored into a decision. Additionally, has the Navy investigated or made inquiries concerning the listed sites, and if so, what was revealed?

Response: *PRC has requested information on the above-mentioned projects and received information about Oyster Point, Third Avenue Landfill, and the old Stinson Beach landfill. The following three paragraphs summarize information obtained and discuss any applicable information to OU1.*

The California Integrated Waste Management Board (CIWMB) was contacted for information regarding Oyster Point. The remedy was single layer capping with a slurry wall to prevent migration of leachate. The landfill was closed in the early 1970s by placement of low permeability cap. The cap was constructed solely with bay muds. The area is currently a marina. It is not known whether leachate migration was occurring, however, a slurry wall was constructed. Since it is not known whether leachate migration was occurring, it is difficult to compare these circumstances and associated remedy to OU1.

CIWMB was also contacted for information regarding the Third Avenue Landfill. The remedy was a multilayer clay cap and shoreline reconstruction. Waste is located below

the water table, however, leachate migration was not occurring. No remedy was implemented to restrict potential leachate migration. This circumstance is similar to Site 1; however, at Site 1 a groundwater interceptor trench is proposed to protect surface water from potential future leachate migration.

Caltrans was contacted for information regarding the Stinson Beach Landfill. The remedy was excavation, dewatering, segregation of hazardous and nonhazardous wastes, disposal, and restoration. Leachate migration was a concern at the Stinson site, but not occurring. This remedy was done as a mitigation project for restoring intertidal mudflat habitat destroyed during reconstruction of Route 1. The remedy was apparently not pursued because of leachate migration problems. Since this landfill does not abut the bay, it is difficult to compare this remediation strategy to OU1.

CIWMB stated that apparently several old landfills around the bay have resulted in waste below the water table. However, leachate migration is generally not a problem. OU1 landfills are similar and it would be atypical if leachate migration was a problem.

Comment 132: [Initial Comment 64]. The design of the old landfills needs to be better understood before a remedy is proposed.

Based on the data presented, it appears that the Navy does not know much about the initial design of these landfills. There is not an adequate description of the base material or the sides of the landfill to make a reasonable judgement pertaining to how these may contain the fill materials for long durations. In order to contain the landfill contents, as apparently expected by the minimal proposed remedial plan, it is essential that design characteristics of the existing landfill be well understood.

[Initial Response]. No operating or disposal records were kept for either landfill. Therefore, it is impossible to understand the "design" of the OU1 landfills. However, hydraulic conductivity of surrounding soils has been tested and evaluated.

With regard to Comment 64, please identify the number of borings that were taken of the base of the landfills in order to evaluate hydraulic conductivity. Please indicate where this data is evaluated. As I read your response to this comment, it indicates that the conductivity of "surrounding" soils has been tested and evaluated. Please indicate how this evaluation would lead you to a better understanding of the base materials under the landfill, and also indicate critical assumptions one would have to make in order to extrapolate the results to the base material. The draft final FS report (Page 34), states that "It is not known if the layer is continuous" (referring to the clay layer beneath the landfill). I propose that more testing be done before the Navy assumes that the base of the landfill it is not a pathway, or a potential pathway, for leachate migration.

Response: *The conductivity of soils underneath and surrounding the landfill was evaluated through geotechnical testing and soil classification during borehole drilling in the Confirmation Study (CS), RI, and subsequent investigations. Geologists classified soils using the Unified Soil Classification System (USCS) during borehole drilling. This information is summarized in cross sections and borehole logs which are located in RI and FS*

reports. These evaluations lead to a better understanding of the base materials under and surrounding the landfills because certain classes of soils exhibit particular soil properties. For example, soils classified as clay exhibit relatively lower hydraulic conductivities. The Navy has collected soil samples from 23 locations surrounding the landfill and believes that the surrounding soils have been adequately characterized.

Twelve soil samples were collected for geotechnical testing from 12 different locations around Site 1. These data are presented in the OU1 RI report (IT 1993). Seven locations exhibited conductivities in the 1E-08 centimeters/second (cm/sec) range. Three locations measured 1E-06 cm/sec, one location exhibited 1E-09 cm/sec at 21 feet bgs and another taken at 50 feet bgs was measured at 1E-05 cm/sec.

The soil and groundwater data show that a significant clay layer exists. However, the Navy assumes that the base of the landfill is a potential pathway and will monitor groundwater as a result. The statement: "is not known if the clay layer is continuous" will always be true and identifies the uncertainty associated with all subsurface investigations.

Comment 133: [Initial Comment 65]. The FS report should contain milestones by which the success of the subsequent remediation can be evaluated. The remedy and the accompanying plan should contain firm commitments.

It is important for the community that the OU1 Draft FS report and subsequent plans contain a measurable schedule and performance standards which can be verified. Broad commitments as to the timing of cleanup activities can and should be spelled out.

[Initial Response]. Scheduled commitments are identified in the FFA.

With regard to Comment 65, specifically identify scheduling commitments in the FFA. Are there substantive commitments and milestones that indicate the timing of cleanup?

Response: *Substantive commitments and milestones are developed and presented in the documents cited in the FFA. For example, the remedial design and remedial action (RD/RA) work plan will contain dates for RA construction. The RD/RA work plan will be submitted with the record of decision (ROD). The Navy is developing a schedule for deliverables beyond the current FFA schedule. This information will be distributed when it becomes available.*

Comment 134: [Initial Comment 66]. The OU1 Draft FS report does not address questions that were raised or left unanswered in other reports, and is therefore inadequate.

[Initial Response]. The scope of the draft OU1 FS report did not include groundwater. The draft final OU1 FS report includes characterization and a comprehensive evaluation of all media potentially affected by the landfills at OU1.

With regard to Comment 66 MHB General Comment 10, the response does not address the question.

Response: *The following discussion provides a response for each of the questions from other reports referenced above.*

Question 1: The OU1 Technology Screening Report states that "Based on the preliminary risk assessment", potential chemicals of concern (COCs) for the soil and water within the fill cannot be estimated. Please explain how this uncertainty stated in October 1992 was addressed and resolved by April 1993 (that is, publication of the OU1 Draft FS report).

The uncertainty stated in October 1992 still exists. The uncertainty is addressed and resolved by employing a strategy based on containment rather than treatment. Variable composition and heterogeneity are common characteristics of landfills and to address this circumstance, containment is the most frequent remedy and is being recommended for Sites 1 and 2. Containment addresses all chemicals in the landfill; therefore, identifying COCs is not necessary. Other strategies would require accurate characterization of the refuse so that COCs may be selected. EPA guidance generally advocates the strategy that the Navy is employing.

Question 2: The Solid Waste Assessment Test (SWAT) concluded that leachate contained elevated levels of organic compounds and metals, and that seepage could enter surface waters. Does a soil cap remedy this condition? If so, please explain in detail.

The proposed soil cap alone will not remedy this condition. In fact, no type of cap will remedy this condition because the water table has risen into the refuse, saturated portions of the waste, and consequently generated leachate. The cap has been proposed to remedy potential exposures associated with pathways above ground surface.

Groundwater and surface water monitoring and a subsurface interceptor trench are proposed to remedy this situation. If, through groundwater or surface water monitoring, the Navy finds that waste discharge limits have been exceeded, corrective action will be implemented. Corrective action will include hydraulically controlling gradients through groundwater extraction followed by treatment.

Question 3: Additionally, the SWAT stated that although the A-aquifer was contaminated at this location, it was not contaminated by the same compounds found in the leachate, thereby suggesting that the A-aquifer at this location was contaminated by another source. It does not appear that the OU1 Draft FS report addresses data which led to this conclusion. Please explain this oversight, and describe how this is to be reconciled in the OU1 draft final FS report.

The data interpretation in the SWAT (IT 1989) states: "Numerous metals are present in significant concentrations in the leachate of the Site 1 and 2 landfills. However, only a few metals are present in significant concentrations in the A-aquifer wells. Similarly, many organic compounds are present in significant quantities in leachate, but are absent in the A-aquifer wells. The disparities between the leachate contaminants and the A-aquifer contaminants suggest a source other than the landfills for the surrounding A-aquifer contamination. Because upgradient sources have not been fully evaluated, the

concentrations of metals found in the A-aquifer are not considered definitive of landfill leakage."

The Navy's current evaluation of OU1 data is similar and shows that the A1-aquifer zone near the landfill is not contaminated. As in the SWAT, the Navy has concluded that organic contaminants do not exist in perimeter wells. The main difference is that in the draft final FS report, the inorganic concentrations in surrounding wells are attributed to naturally occurring conditions.

Comment 135: Please respond to MHB General Comment 1.E.

It is inappropriate to use an industrial-recreational exposure scenario. Although the OU1 RI considered a residential exposure scenario, the OU1 Draft FS report bases its remedy on future land-use scenario of industrial/recreational use (see page 38). Not only should the remedy consider the potential effects on wildlife, but I question the wisdom of excluding a residential exposure scenario.

My position is supported by EPA OSWER Directive 9355.0-30 Role of the Baseline Risk Assessment in Superfund Remedy Selection Decision. April 1991. On page 5 of this document, EPA states that "both current and reasonably likely future risks need to be considered..." based on an assumption of future land use different from that which currently exists. The potential land use "associated with the highest level of exposure and risk..." should be used in developing remediation objectives. Furthermore, the directive points out that the NCP states that EPA will consider future land use as residential in many cases, "and undeveloped areas can be assumed to be residential in the future unless sites are in areas where residential land use is unreasonable." I do not believe that the Navy has made any showing that future residential land use either upon or abutting the landfills are unreasonable scenarios. Residential development along the bay front could be a possibility in the future.

Response: *Using a residential exposure scenario for landfill refuse instead of an occupational exposure scenario would have no impact on the remedial alternative selected for landfill refuse (that is, capping and deed restrictions). The landfill caps combined with deed restrictions would effectively reduce risks in either scenario. In addition, EPA guidance on presumptive remedies (EPA 1993) states that it is inappropriate and unnecessary to estimate risk associated with future residential use of the landfill refuse. Such use would be incompatible with the need to maintain the containment system.*

For surrounding groundwater, TDS levels preclude residential use. The risk assessment included in the draft final FS report assumes the groundwater could be used for irrigation, even though aquifer characteristics, probable land use, and past problems with shallow aquifer pumping dictate otherwise.

5.2 RESPONSES TO COMMENTS ON THE DRAFT FINAL FS REPORT

GENERAL COMMENTS

Comment 136: I support the decision by the Navy to postpone remedial action at OU1 until more data from Phase 2 of the Ecological Assessment (EA) is evaluated. However, it is not clear from evaluating the EA how the results of this study would be integrated into the FS report. Please describe your understanding of how this would be done.

Response: *An EATM is being prepared that evaluates ecological impacts from implementing the remedial alternatives. These results can be integrated directly in the FS report in the comparative analysis section.*

Comment 137: I recommend that the ARAR relating to the Endangered Species Act (protecting endangered or threatened species and their habitat) be given the broadest interpretation. For example, I view the SWRP adjacent to Site 1 as having high potential value as habitat to several protected species. I am aware that the habitat is presently degraded so that it does not support some plant and animal communities that would normally be found (for example, pickleweed). In the long term, I am hopeful that this habitat be enhanced. Therefore, it is important that we do not eliminate this area from protection.

Response: *The analytical data show that the SWRP habitat has not been degraded by the Site 1 landfill; however, the Endangered Species Act is identified as an ARAR. Actions will be taken to conserve T&E species that use the SWRP as a habitat. The cap will protect the SWRP habitat by reducing erosion and wash out that could accelerate contaminant migration into the pond. The draft EATM has not identified the landfill surface as a critical habitat upon which T&E species depend. Therefore, capping should not adversely impact any T&E species. Furthermore, design steps, such as targeted vegetation, may be able to enhance the site as a habitat for T&E species.*

Comment 138: The FS report is incomplete in that the RAs evaluated assume that the facility will continue to be used at levels similar to current use. Some community members are opposed to having Moffett Field continue long-term operations under NASA, almost as if there had not been a change in stewardship. While the draft comprehensive use plan (CUP) assumes continued operations at the air field at near existing levels, the CUP is a draft, and the community has not had an opportunity to respond. Even if the preferred option in the CUP is approved, the RA should not foreclose future options, such as reducing or eliminating flights, and significantly scaling back industrial activity. The RA should account for, wherever possible, a reduced use scenario where pumping from Building 191 no longer occurs. Elimination of pumping would create a stronger horizontal force on landfill contents and may affect groundwater levels, and will likely change groundwater flow patterns and direction in some areas. Consequently, migration of constituents via groundwater\leachate transport is more likely to occur.

Response: *If Building 191 pumping ceases, gradients could potentially lessen near Site 2 and most groundwater will flow north at Site 1. It is possible that more refuse may saturate; however, it is difficult to predict if leachate migration will increase. Groundwater and*

surface water will continue to be monitored and if any releases are detected, corrective action will follow. This strategy is common for all solid waste management units (SWMUs). It is most cost-effective to allow monitoring systems to detect any changes in site conditions and address problems if they occur.

Comment 139: Related to comment 137 above, I believe that efforts should be made to protect, and wherever possible, enhance existing wetlands, including the storm water retention pond to the north of Site 1. In the context of the Ecological Assessment, I think it is important to recognize that this is a somewhat degraded wetland that is potentially habitat for endangered species (salt harvest mouse). By enhancing the wetland, possibly by removing or creasing the levees to allow for more tidal flushing, pickleweed communities which are essential for the salt harvest mouse may become established. I believe that the FS report should assume that this an already enhanced and protected habitat. In the context of the FS report, it is important to understand how the remedy may affect this habitat, such as what would be the sediment loading from a soil cap?

Response: *Capping impacts on the habitat at the stormwater retention pond will be minimized. Side slopes will be vegetated to minimize sediment loading in the pond. The design of the cap will also include a perimeter road and shoulder with associated drainage to minimize sediment loading generated from hillside runoff. Capping the landfill will eliminate exposure pathways resulting from erosion of the landfill surface.*

Restoring tidal action would require breaching levees adjacent to the bay. This would pose a significant operational problem for the salt evaporation ponds.

Comment 140: Related to General Comment 1.E. of MHB Comments on the Draft FS report, (inappropriate to use an industrial-recreational exposure scenario), and General Comment 6 of MHB Comments on the Draft FS report (The Navy should investigate and consider other remedies for old landfills that abut the San Francisco Bay), it is important to look at the situation at Hamilton Air Force Base. At Hamilton, there has been a great deal of controversy surrounding the landfill. The presence of the landfill may have limited the use of the site (that is, the option to purchase acreage adjacent to the landfill by a private developer has not been exercised because of toxics found in the landfill).

While an industrial-occupational scenario for the Moffett OU1 may be appropriate for the landfill, it is important that the remedy not foreclose other long-term use of adjacent areas, such as residential development and or more child-intense uses. I believe that the soil cap is perceived as offering the least amount of long-term protection, and thereby may limit the desirability of adjacent uses.

Response: *The proposed strategy does not prevent other long-term uses of adjacent areas. If the landfill is capped, it will provide long-term protection regardless of adjacent land uses and will not reduce recreational uses. Furthermore, institutional controls will be placed on the landfill in case unrestricted land use is adopted for adjacent areas. Unrestricted land use is unacceptable for the landfill itself.*

Comment 141: The remedial proposal is based on the assumption that should leachate migrate from the landfills, it will be detected and appropriate remedies can be installed, as required. This concept is insufficient unless the FS report contains a contingency plan that establishes action levels that will require action, and what those actions are likely to be. I propose that action levels be set at a fairly low percentage of the MCL in combination with an increase in the level detected at existing wells. For example, if the TCE MCL is 5 ug/L, I would propose that remedial action (in this instance, likely to be leachate collection and treatment) be triggered when TCE is detected at 25 percent of the MCL and concentrations have increased over two quarters. (The above is an example of how a triggering mechanism could work, not a proposed standard.)

Response: *Waste discharge limits are proposed as the ambient water quality criteria for the protection of aquatic life (marine waters) in the revised draft final FS report. The WDLs are a combination of objectives in the Water Quality Control Plan for the San Francisco Bay Region and national ambient water quality criteria. Section 4.2.3 of the revised draft final FS report discusses groundwater monitoring, including detection monitoring and verification monitoring.*

Comment 142: There is a disconnect between the amounts of hazardous materials detected in the OU1 RI and draft FS report and the tons of liquid and solid hazardous materials that were reported in the IAS (same as former comment).

Although I recognize that the IAS was based on anecdotal information, I recommend that the Navy reconcile this disparate information in the FS report. In addition, I would not dismiss these anecdotal reports merely because a few borings and wells have not shown heavy contamination. Other explanations could exist, including that these contaminants are now in the Bay or groundwater, that they have degraded, that they weren't located by the borings, or that they were disposed of at another landfill on the base. In fact, there is a third landfill located within the golf course that was identified by IT in 1988.

Response: *Please see response to comment 129.*

Comment 143: The FS report should contain milestones of Superfund document production so remediation can be evaluated. The remedy and the accompanying plan should contain firm commitments. (Comment on Draft FS report)

I am not speaking of milestones for Superfund document production, which is what is found in the FFA. Rather, I am looking to the Navy for substantive milestones: for example, when will the remedy be installed, when will monitoring wells be installed? It is important for the community that the <u>OU1 Draft FS</u> and subsequent plans contain a measurable schedule and performance standards which can be verified. Broad commitments as to the timing of cleanup activities can and should be spelled out.

Response: *The types of milestones mentioned are developed and presented in the Superfund documents cited in the FFA. For example, the RD/RA work plan will contain dates for RA construction and will be submitted with the ROD. The Navy is developing a*

schedule for deliverables beyond the current FFA schedule. This information will be distributed when it becomes available.

Comment 144: Better information on groundwater levels is needed. Overall, our hydrologist (Dr. June Oberdorfer) was struck by the poor quality of water level monitoring. Because of compaction of fill materials, it is common practice for well heads to resurveyed annually. The rapid change in water levels may have been due to someone cutting off a protruding well head, and conclusions about water levels may be incorrect. I recommend that an annual survey of well heads be implemented.

Response: *A field investigation was conducted in September 1993 for OU1, and all Site 1 and Site 2 monitoring well elevations were resurveyed for the reasons mentioned. The new survey elevations were not different from the elevations measured in 1988. The purpose for the survey and the results are described in greater detail in the OU1 Additional Field Investigation Technical Memorandum (PRC 1993). Resurveying will be continued as part of the RA. Resurveying may occur on a biannual schedule or if water level data indicate changing conditions.*

Comment 145: I recommend that you include an analysis of partial excavation of landfill materials as a remedial alternative, particularly at Site 1. In addition, when analyzing its cost, please include difficult to quantify benefits such as restoration of habitat, wetland improvement, and increased recreational opportunities.

Response: *As stated in previous comments (comment 129), partial excavation is inappropriate for OU1. This conclusion is based on health and safety concerns because landfill excavation is an extremely hazardous activity. In addition, it is not considered cost-effective and EPA does not advocate partial excavation unless the locations of hot spots are known and known to be accessible. At OU1, there is no evidence of hot spots. Furthermore, even the potential benefits mentioned above are difficult to justify because (1) restoring one habitat will destroy another, (2) the current wetland is not degraded by the landfill, and (3) recreational opportunities are similarly plentiful after capping.*

SPECIFIC COMMENTS

Comment 146: The old trenches (see page 21) within Site 1, which I assume to be filled with waste materials, are a likely conduit for leachate into Jagel Slough or the SWRP. Although one well [W1-11(F)] has been situated in the major trench, I suggest that this is inadequate to prove or disprove whether there has been or will be migration from this source. I recommend that monitoring wells be placed in the SWRP and near Jagel Slough where this trench would intersect these bodies. I also suggest that embankment borings be installed at the intersection of the trench line, in order to better understand the potential for migration from this location.

I want to note that on a recent site walk in conjunction with our review of the Ecological Assessment, our group witnessed a small oil slick emanating from the approximate location where the trench would intersect the SWRP. Although I could not

be absolutely sure that it was man made, or that it was not emanating from a surface related phenomenon (for example, surface water spill, sediments in the SWRP) it certainly appeared as if it were coming from the landfill.

Response: *An investigation that addresses the trench as a preferential pathway leachate migration pathway has been completed. During the April 1994 field work, a portion of the former trench was identified west of the landfill, adjacent to the runway extension. This portion of the former trench was partially filled with a several inches of water and appears to be an old stream meander less than 1 foot deep.*

Two groundwater samples were collected in the old channel area at the landfill perimeter where the channel intersected the landfill boundary. Prior to sampling, a hand auger was used to collect soil to 6 feet bgs. Augered soils were examined to identify any non-native trench backfill that could act as a preferential path. Four locations were augured to search for backfill material. Two auger locations were chosen within the old channel area. These locations are known to be in the channel based on aerial photographs and visual identification of a portion of the channel while at the site. The other two locations were chosen along the landfill perimeter to evaluate whether a different sediment type exists within the channel area relative to surrounding soil. All four locations contained saturated clays, with varying stiffness and color. Soil from the two channel area locations was saturated beginning at 3 inches bgs and appeared to be a black, moderately plastic, organic clay with a consistency similar to soft modeling clay, much like the soils encountered while installing well W1-14. Saturated soil from the two nonchannel locations was stiff, highly plastic clay with an olive gray color. Non-native backfill was not encountered. Based on the morphology indicated in the aerial photographs and observed in the field, the former "trench" is an old shallow stream channel.

Two monitoring points were installed using a hand auger and sampled at the channel location. Three rounds of analytical results show no contaminant migration. These monitoring points will be left in place and sampled for two more quarters.

Comment 147: Contrary to PRC's conclusion on page 20 that the groundwater and the leachate are not hydraulically connected, Dr. Oberdorfer maintains that data suggest that there is a connection between the leachate and the groundwater. Dr. Oberdorfer believes that the similar response after rainfall between the peripheral leachate wells at Site 1 and surrounding groundwater wells suggest a connection. Dr. Oberdorfer argues that the differential response between the interior leachate wells and groundwater wells is due to the dampening effect of the refuse.

Dr. Oberdorfer also argues that the data do not indicate "perched layers and isolated pockets of leachate" (page 20). She bases this comment on the fact that the wells from which this data is derived are completed to the bottom of the landfills. Therefore, these wells could not detect a perched layer. Instead, Dr. Oberdorfer's interpretation of the data suggests that mounding is present at the site, which would lead to radial flow of the leachate. While the Navy believes groundwater direction at the landfill splits in the direction of the SWRP (north) and Building 191 (south) (page 21), mounding is a

logical explanation of this phenomenon.

Response: *Please see the responses to comments 9, 13, and 110.*

Comment 148: Minimizing infiltration should be a RAO.

Contrary to the Navy's response to comment 57 that "minimizing infiltration and migration is included as an RAO in the draft final OU1 FS report," the draft final OU1 FS report does not appear to include this. In fact, one of the reasons given for not installing a multilayer cap states "Not required if controlling infiltration is not a main consideration" (Table 10). I ask that you reconcile these two statements. I also believe that there is no reason to believe that leachate will not eventually migrate from the landfills. A strategy which controls infiltration slows down migration of leachate.

Response: *Table 10 was revised to eliminate the contradiction, as the proposed cap will reduce infiltration. Please see response to comment 126.*

Comment 149: The RAOs should be restated to include providing the term "long-term," adequate protection.

Response: *The RAOs were revised as suggested.*

Comment 150: In reference to Appendix I, please explain why only a 12" layer of refuse is assumed in the HELP model evaluation. Also, please explain the summary of results (page 3 of 24). Please explain what inches/year, % of precipitation, and GPM represent. Also, please indicate whether this model was used in any way to predict leachate generation and migration. (See page 153 which indicates that the model is used for this purpose). If the answer is yes, please explain how the results were used, and what conclusions were drawn.

Response: *The refuse layer is modeled as a vertical percolation layer as defined by the HELP model. This layer was included so the model could calculate infiltration rates. Infiltration rates calculated by the HELP model do not depend on the thickness of subsurface vertical percolation layers.*

Inches per year, percent of annual precipitation, and gallons per minute (gpm) are three different ways to represent the amount of infiltration and were used to portray the differences between the performance of the two cap systems. Inches per year is a unit typically used to measure rainfall. Percent of precipitation is a relative comparison of the amount for infiltration through the cap relative to the maximum amount possible. GPM is a volumetric flow rate and was calculated by multiplying inches of rainfall per year by the surface area of the landfills.

The HELP model was not designed or used to predict the amount of leachate generated. It was only used to compare the performance between two cap systems.

Comment 151: It appears that the selected remedy does not meet the minimal requirements of the California Integrated Waste Management Board. California's Title 14. Chapter 3. Article 7.8 which requires, among other things: a two foot soil foundation and a one foot clay cap (1E-06 permeability); a leachate monitoring and control system (unless demonstrated that leachate does not have a deleterious effect on water quality); a 30-year post-closure groundwater monitoring plan; and, a proposed post-closure land-use design (see Section 17796). Please explain the basis for the Navy's belief that it is exempt from this requirement, specifically with regard to a multilayer cap.

Response: *The Navy does not believe that it is exempt from these requirements. Title 14 CCR, Chapter 3, Article 7.8 regulations are identified in the FS report as action-specific, relevant and appropriate requirements for OU1. Appendix J of the draft final FS report evaluates each requirement and assesses whether it is relevant and appropriate for OU1 and gives rationale for when the requirement is not relevant and appropriate.*

Landfill closure regulations (see 14 CCR 17773(c) and 14 CCR 17773(d)) allow for engineered alternatives to the standard multilayer cap described in the comment. For example, the CIWMB stated in the final Statement of Reasons that, because of diverse climate, topography, soil, and vegetation in California, alternatives to the prescriptive design should be considered. Because of the general flexibility in the regulations for cap design, EPA developed the HELP model to assist permit reviewers in evaluating the relative performance of proposed cap designs. The model measures relative performance by calculating the amount of infiltration through a cap, given the environmental conditions at the site. The Navy used the model as it was intended to analyze why a multilayer cap is, while relevant, not appropriate for OU1. A multilayer cap is not recommended for several other reasons in addition to conclusions from the HELP model. These reasons are described in Section 6.0 of the draft final FS report and the response to comment 127.

Flexibility in requirements is not only inherent in the regulations, but the CERCLA process also offers flexibility in determining appropriate cap designs through the concept of relevant and appropriate requirements. According to EPA guidance (1988), the basic considerations when evaluating whether a requirement is relevant and appropriate include assessing whether the requirement (1) regulates or addresses problems sufficiently similar to those encountered at the CERCLA site (that is, relevance) and (2) is appropriate to the circumstances of the release, such that its use is well suited to the particular site. Evaluating whether a requirement is relevant and appropriate is a site-specific assessment and must be based on best professional judgement. A requirement may be relevant but not appropriate for the specific site. Only those requirements determined to be both relevant and appropriate must be complied with. Portions of a requirement may be relevant and appropriate even if a requirement in its entirety is not. This evaluation is included in Appendix J of the draft final FS report.

Comment 152: With regard to the erosion potential of the soil cap (page 134), please explain how surface controls would control erosion on the north and west site of Site 1, where the landfill abuts the SWRP and Jagel Slough, respectively. As noted previously, I am concerned that additional sediment loading will further degrade the SWRP ecosystem.

Additionally, please indicate where any proposed diversion ditches will be directed.

Response: *Side slopes will be vegetated to minimize sediment loading. The root systems of the vegetation will bind soil together, stabilize soils, and resist erosional forces. Erosion netting will also be used at the Site 1 northern embankments to enhance erosion control. The design of the cap will also include a perimeter road and shoulder with associated drainage to minimize any sediment loading generated from hillside runoff. A perimeter road already exists between the landfill and Jagel Slough, although repairs are needed. Diversion ditches will likely be directed to the western end of the SWRP, where much base runoff collects.*

Comment 153: Please explain the statement on page 122 that "impermeable multilayer caps are not considered advantageous when significant amounts of refuse are below the water table."

Response: *Leachate will exist regardless of cap type because refuse is below the water table. Therefore, if leachate migration is to occur, it will likely occur regardless of the type of cap employed. In addition, since waste is saturated below the water table, other technologies will be required to mitigate leachate migration. Implementing a multilayer cap would not enhance the effectiveness of hydraulic control or significantly decrease the amount of water requiring extraction and treatment.*

Any slight advantage gained through using a multilayer cap would be difficult to maintain. If hydraulic control is implemented, leachate extraction would increase refuse decomposition, gas generation, and settlement since waste is saturated. Settlement can result in barrier layer cracking.

In addition to the above reasons, the results from the HELP model indicate that a multilayer cap will not reduce infiltration below rates achieved by a soil cap. Furthermore, leachate is not migrating at current infiltration rates. If significant migration occurs and waste discharge limits are exceeded, the monitoring program in place will detect it and appropriate corrective action can be implemented.

Comment 154: Please define recreational user (page 72). Please define assumptions regarding the exposure of children recreational users.

Response: *Recreational users are defined as bikers, hikers, bird watchers, and other individuals who may use the area for recreational purposes. Based on observations made at the site, a recreational user is estimated to visit the site approximately once a week for 2 hours per visit. The exposure duration for a recreational user is estimated to be 15 years.*

Children are defined in the OU1 RI (IT 1993) as being between the ages of birth and 15 years, in accordance with DTSC guidance.

Comment 155: Please explain and describe assumptions regarding the average and reasonable maximum exposures (page 74-75).

Response: *Reasonable maximum exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site. An average exposure is defined as the exposure that is most likely to occur.*

In the OU1 RI (IT 1993), the RME exposure was based on the 95 percent upper confidence limit of the mean concentration of the contaminant. The average exposure was based on the mean value of the contaminant concentration.

Comment 156: In reference to the row on State and Community Acceptance on Table 13 and discussions which precede it, the community has expressed concern about the three alternatives, and expressed greater concern about using a native soil cap than a multilayer cap. This should be properly characterized. In addition, I suggest that the State Acceptance and Community Acceptance be treated separately.

Response: *The text will be revised to evaluate state and community concerns separately. The community evaluation will reflect SVTC concerns.*

Comment 157: With reference to Table 14, I believe that an 8 percent interest rate (I assume you mean discount rate) is too high. Please explain how this rate was derived. I believe that 4 percent is more realistic.

Response: *The cost analysis is used to compare relative costs for alternatives. The same discount rate and maintenance period are used for calculating present worth for each alternative. Therefore, changing the interest rate will have little impact on the results of the comparative cost analysis.*

Comment 158: Please describe the proposed monitoring plan. Please try to be as specific as possible, such the number, location and depth of sampling points and frequency of sampling.

Response: *The detailed monitoring plan will be developed during the remedial design. However, the revised draft final FS report includes a discussion of the groundwater monitoring well network, monitoring frequency, and analyses to be conducted so that community concerns can be addressed.*

Comment 159: Hydraulic Gradient: The data available in the report contradict the stated conclusions (page 20) that perched zones exist within the landfill and that, therefore, outward gradients have not been created. Leachate wells W1-9, W1-10, and W1-13 are cited as monitoring isolated perched zones. However, upon inspection of the cross sections (Figures 5-7), it becomes apparent that well W1-9 and W1-10 are screened through the refuse to the bottom of the landfill. In order for these wells to monitor a presumed perched zone, they would have to be discretely completed in that perched zone. These wells are not. Even if a perched zone were to exist within the screened interval for one of the wells, water in the perched zone would drain downward through the casing or filterpack into the underlying, basal leachate zone. These wells, then, indicate the presence of higher water levels in the interior of the landfill, when compared to the peripheral leachate wells or the surrounding groundwater wells. This mounding would create a radially outward hydraulic gradient which could produce flow to the adjacent

wetlands.

Because of compaction and subsidence in the soft bay mud materials from the loading caused by the landfill waste, as well as compaction of the waste itself, it is common practice to resurvey the wellhead elevations at the landfill periodically. The 3-foot, stepwise increase in water levels in well W1-13 looks suspiciously like a change in measuring point elevation (for example, casing that's sticking out of the ground being broken off) rather than creation of a new perched zone. When was the last time the wellhead elevations were surveyed? Did the resurveying explain any anomalous water level data? Once resurveying has been performed (if it hasn't been done recently) and wells W1-9, W1-10, and W1-13 are included in the contouring, it should be possible to determine more accurately the hydraulic gradient in the vicinity of Site 1. Until that time, it is not possible to speak with confidence of "upgradient wells" (page 30), particularly when those wells may lie downgradient from the water table mound within the landfill.

Response: *The use of perched layer terminology is incorrect in the draft final FS report and the resulting confusion is understood. The Navy agrees that the wells cannot monitor perched layers isolated within the landfill. The Navy also agrees that these wells indicate the presence of higher water levels in the landfill when compared to the peripheral leachate wells or the surrounding groundwater wells. Elevated levels clearly exist; the remaining issue is to evaluate what impacts exist.*

SVTC believes that mounding is occurring and an associated radial gradient exists. The Navy agrees that mounding is occurring and believes that water levels show that a elevated water table exists throughout Site 1 and a potential for flow exists. The Navy's previous investigations are summarized below as well as a discussion of the Navy's understanding of what causes mounding and radial flow.

The possibility of groundwater mounding inside the Site 1 landfill was investigated in September 1993 to address RWQCB concerns about mounding and possible associated outward gradients. Previous groundwater elevations measured from wells at Site 1 indicated that groundwater may be mounding inside the landfill, causing a potential outward gradient from the landfill. It was believed that the majority of mounding was occurring near leachate well W1-10 because elevated water levels were consistently measured in well W1-10. There was uncertainty whether mounding was causing the apparent, elevated water level in leachate well W1-10. The uncertainty was due to other potential explanations, such as possible surveying errors or altered well casing elevations caused by landfill settlement. Therefore, well elevations were resurveyed and water levels were remeasured.

The new casing elevations did not show significant changes from the initial casing elevations. The water level measurements were also similar to previous water level measurements and suggested that groundwater was mounding in the landfill.

Sharp hydraulic head differences, including mounding, may be caused by several factors. These factors include differences in infiltration, recharge, and permeability of

hydrogeologic materials. The most significant factor influencing hydraulic heads in wells at Site 1 and in surface water bodies is the existence of lateral and vertical permeability barriers. Low-permeability barriers exist between the four major water bodies (landfill leachate, the shallow A1-aquifer zone, the SWRP, and Jagel Slough) in the area, causing movement of water to be limited or restricted between each body. It is for this reason that significant head differences are maintained between each water body. Without these barriers, or alternatively if high permeability zones existed between the water bodies, water levels would equilibrate over relatively short periods of time. With each wet season, water levels in each of these water bodies rise at different rates due to different contributions from recharge sources.

For example, the water level in Jagel Slough rises only slightly since recharge is largely limited to direct input from rainfall. However, the water level in the SWRP increases from rainfall, surface runoff, and increased discharge of groundwater. In dry periods the pond is dry even though potential for groundwater recharge exists. This indicates that groundwater recharge to the pond is not significant. Water levels in the A1-aquifer zone, which is confined at Site 1 (as indicated by higher water levels in wells W1-12 and W-17 than in the SWRP), are subject to small amounts of infiltration from rainfall, but primarily controlled by increased recharge from upgradient portions of the aquifer zone.

In contrast, water levels in the landfill leachate are significantly greater than any of the surrounding water bodies (though differences are less pronounced in landfill wells W1-11 and W1-3). Leachate levels after a high-rainfall period would be expected to increase due to that input and this is observed. Elevated water levels are maintained since the landfill is relatively isolated from the other water bodies by impermeable barriers. Potential for flow from the landfill to the other bodies exists, but actual flow is limited or constrained by these barriers. If the landfill material was homogenous and relatively permeable, a uniform water elevation could be expected under static conditions. If slight leakage or flow out of the landfill occurred, such as toward the SWRP where hydraulic heads are the lowest, a uniform gradient might be expected to be established in the landfill leachate. This appears to be the case to some extent at Site 1. The persistent gradient within the landfill (mounding) is indicated by consistently higher water levels at well W1-10 versus wells W1-11 and W1-13. The persistence of this gradient over the small lateral dimensions of the landfill area indicates that equilibrium hydraulic conditions are not established in the landfill. This pattern within the landfill is likely due to increased recharge in topographically low collection areas after rainy periods and low permeability zones in landfill materials.

Based on the data available, the potential exists for leachate to migrate from high-head areas of the landfill to low-head areas within the landfill. The fact that large head differences persist within the landfill even after long periods of insignificant infiltration indicates that flow within the landfill is limited. Leachate levels are significantly and persistently different (higher) than levels in the shallow aquifer zone stratigraphically below the landfill and in the surface water bodies adjacent to the landfill. This indicates that a potential for flow from the landfill to these bodies exists. However, the persistence of this head difference over short distances indicates that the landfill is isolated from these water bodies and flow between them is restricted and probably

variable (depending on head differences and permeability differences of the barriers). Water balance calculations and permeability measurements of materials isolating the landfill also show limited potential for significant flow from the landfill to these water bodies. Chemical analyses of surface water samples and groundwater samples from perimeter wells surrounding the landfill do not indicate significant or consistent chemical release from the landfill. This also supports the conclusion that leachate migration from the landfill is minimal.

Comment 160: Hydraulic Connection. As stated in the text (page 20), the landfill appears to be hydraulically connected to the surrounding aquifer. The similarity of water level response to rainfall between the groundwater monitoring wells and the leachate monitoring wells located along the periphery of the landfill indicates quite good connection. The lesser response in the leachate wells in the interior of the landfill most likely reflects attenuation, particularly as the water level rise would be traveling upgradient to the interior of the mound.

The groundwater monitoring wells surrounding the landfill are all completed in an underlying sand lens; a few are also partially screened in the overlying clay. In terms of chemical quality, the sand lens are going to dominate as the source of ground water sampled and analyzed. Even those wells partially completed in the clay will receive most of their inflowing water during purging from the sand horizon. The question arises about the chemical quality of the groundwater in the much more stagnant clay horizon, which is hydraulically connected with the surrounding wetlands. As far as can be determined from this report, there are no groundwater samples uniquely from that horizon which is in direct contact with the landfill. It is quite possible that contaminant concentrations in the first clay horizon are much more similar to leachate concentrations. Are any data available (Hydropunch?) from the clay horizon or would it be possible to acquire such data?

Response: *During the trench investigation, groundwater data were obtained from the clay horizon mentioned above. Two monitoring points were installed with 5 feet of screen at an interval from 1 foot bgs to 6 feet bgs. The preliminary analytical results are similar to data from the perimeter groundwater monitoring wells and show no detections. In addition, a review of the borehole logs from W1-14 and W1-16 (PRC 1993) show that they are screened in clayey silt, sandy silt, and silty clays. No leachate migration has been detected by samples from these wells.*

Significant groundwater flow though the clay is not occurring due to the low hydraulic conductivity of the clays surrounding the landfill. Water level data support this postulate. The majority of groundwater flow will occur through the sand lenses as it seeks the path of least resistance. If contamination is not migrating through the higher conductivity areas, it is even less likely to be migrating through the lower conductivity areas. A subsurface interceptor trench is proposed to remedy any leachate migration that may occur through any potential permeable stringers in the bay muds.

Comment 161: Trenches. It was very good to see the Navy's rapid response to concerns raised by regulators and the community at the March technical review committee (TRC) meeting

about the trenches beneath the landfill. It is unclear why, however, on the map attached to the April 27 PRC memo both sampling locations (GL1-1 and GL1-2) are shown at the intersection of the trench with the SWRP. That is certainly one logical place. The second and third logical places would be at the intersection of the trenches with Jagel Slough (approximately 60 feet and 160 feet SSE of abandoned well W1-4). This is particularly so since the currently proposed sites lie at the western end of the trench which is described as having been dry (that is, above groundwater) in the historic aerial photos. The eastern end of the trenches is most likely to contain saturated refuse. It is likely that subsidence has also caused the western end of the trench to become saturated. Two sampling locations should be added on the Jagel Slough side of the landfill.

Response: *As described in the response to comment 146, sample results show that a significant migration pathway does not exist. Two samples were collected at the intersection of the channel and SWRP at the landfill boundary downgradient of the landfill and leachate migration was not detected. Furthermore, the physical characteristics of the channel support these results because the feature is an old shallow stream meander, not an excavated trench.*

Water levels from Jagel Slough and nearby wells show that Jagel Slough is upgradient from surrounding groundwater and likely recharges groundwater slowly. Therefore, landfill contaminants cannot migrate into the slough. Also, please see the response to comment 13.

6.0 REFERENCES

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