N00296.002054
MOFFETT FIELD
SSIC NO. 5090.3

CLEAN

Contract Number N62474-88-D-5086

Contract Task Order 0236

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NAVAL AIR STATION
MOFFETT FIELD, CALIFORNIA

OPERABLE UNIT 6
RESPONSES TO COMMENTS ON
DRAFT REMEDIAL INVESTIGATION REPORT

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May 4, 1994

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ACRONYMS

atm	Atmospheres
BEHP	Bis(2-ethylhexyl)phthalate
bls	Below Land Surface
BRAC	Base Realignment and Closure
CalEPA	California Environmental Protection Agency
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
Cm^2	Square Centimeters
Cm^3/hr	Cubic Centimeters per Hour
COC	Chemical of Concern
CRQL	Contract Required Quantitation Limit
CSF	Carcinogenic Slope Factor
CWA	Clean Water Act
DDT	Dichlorodiphenyl trichloroethane
DTSC	California Environmental Protection Agency Department of Toxic Substances Control
EAG	Exposure Assessment Group
EPA	U.S. Environmental Protection Agency
GC/MS	Gas Chromatography/Mass Spectrometry
GI	Gastrointestinal
HHRA	Baseline Human Health Risk Assessment
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
m^3/hr	Cubic meter per hour
MEW	Middlefield-Ellis-Whisman
mg/day	Milligram per day
mg/kg	Milligrams per kilogram
mg/kg-day	Milligram per kilogram body weight - day
mg/L	Milligram per liter
mm Hg	Millimeters of mercury
mol/m^3	Moles per cubic meter
Montgomery	Montgomery Watson
msl	Mean Sea Level
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration

ACRONYMS, Continued

OSA	Office of Scientific Affairs
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PEA	Preliminary Endangerment Assessment
PEF	Particulate Emission Factor
PRG	Preliminary Remediation Goals
QA/QC	Quality Assurance and Quality Control
RAGS	Risk Assessment Guidance for Superfund
RfD	Reference Dose
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
RME	Reasonable Maximum Exposure
RPD	Relative Percent Difference
RWQCB	California Regional Water Quality Control Board, San Francisco Bay Region
SGRA	Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities
SQL	Sample Quantitation Limit
SVOC	Semivolatile Organic Compound
SWEA	Sitewide Ecological Assessment
TCE	Trichloroethene
TPH	Total Petroleum Hydrocarbons
UCL	Upper 95th Percent Confidence Limit
VOC	Volatile Organic Compound
WESCO	Western Ecological Services Company, Inc.
μg	Micrograms
μg/kg	Micrograms per kilogram
μg/day	Micrograms per day
$\mu g/m^3$	Micrograms per cubic meter
μg/L	Microliter

1.0 INTRODUCTION

This report presents point-by-point responses to comments received from regulatory agencies for the draft Naval Air Station (NAS) Moffett Field operable unit 6 (OU6) remedial investigation (RI) report dated January 20, 1994. The comments were received from Mr. Michael Gill of the U.S. Environmental Protection Agency (EPA) and from Mr. Joseph Chou of the California Environmental Protection Agency (Cal EPA) Department of Toxic Substances Control (DTSC) in letters dated March 4, 1994. Ms. Elizabeth Adams of the California Regional Water Quality Control Board (RWQCB) had no additional comments.

This response to comments report has been divided into four sections. Section 1.0 presents an introduction. Section 2.0 addresses general comments and Section 3.0 addresses specific comments. Section 4.0 presents additional changes made to the baseline human health risk assessment (HHRA) tables presented in Section 6.0 of the draft final OU6 RI report.

2.0 GENERAL COMMENTS

According to the Federal Facilities Agreement (U.S. EPA 1990) for NAS Moffett Field, "The RI/FS must be conducted in accordance with the National Contingency Plan and guidance issued by the U.S. EPA for the CERCLA program." For this reason, the Navy has closely followed the explicit and detailed guidance EPA has developed for conducting baseline human health risk assessments (HHRA) at CERCLA sites. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Volume 1, Part A (RAGS) (EPA 1989) outlines the overall experimental paradigm and details specific steps to be followed in estimating human health risks from site-related chemicals. Where applicable, the Navy also followed DTSC guidance presented in Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities (SGRA) (DTSC 1992).

There are fundamental differences between RAGS (EPA 1989) and SGRA (DTSC 1992). DTSC states that the SGRA is "designed to be consistent with the procedures of the U.S. Environmental Protection Agency as described in the "Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A, July 1989." Differences exist with regard to risk assessment methodology and exposure assumptions. In those instances where there were significant differences,

EPA guidelines were given preference. The principal reason for this decision was consistency. Numerous Navy installations are undergoing remedial investigations according to EPA guidelines, and other Navy installations in states other than California will soon be added to the list. It is in the Navy's best interest for all Navy sites included in the Navy's installation restoration program (IRP) to use a single risk assessment approach. This approach will promote consistency allowing the Navy to use comparative risk information to prioritize Navy bases and to fund cleanup in a cost-effective manner. Employing different risk assessment approaches according to the requirements of each state could result in inconsistent application of risk management criteria. Therefore, the Navy has followed the step-wise methodology suggested in RAGS (EPA 1989). DTSC's supplemental guidance however, was, used when appropriate and a separate analysis was employed to specifically estimate risks based on California toxicity values.

California DTSC Comments

Comment Number 1: We assume that sampling of environmental media, analytical chemistry data and quality assurance procedures described and summarized in the document reviewed by Office of Scientific Affairs of DTSC (OSA) were adequately reviewed by regional staff. If deficiencies or data gaps were encountered with respect to adequacy for risk assessment, these are noted in our comments.

Response: *The draft final OU6 RI work plan dated October 1, 1993 recommended sampling locations, depths, and chemical analyses, in addition to presenting the risk assessment approach to be conducted. This document was reviewed by EPA, DTSC, and RWQCB. The Navy submitted written responses to comments and the final OU6 RI work plan on November 18, 1993. In addition, this document referred to the field sampling plan (PRC and JMM 1992a) and quality assurance project plan (PRC and JMM 1992b) for NAS Moffett Field, both of which were reviewed and approved by EPA, DTSC, and RWQCB. Field sampling was conducted in accordance with these documents.*

Comment Number 2: The document was reviewed for scientific content. In general, minor grammatical or typographical errors that do not affect the interpretation have not been noted. However, these should be corrected in the final version of the document.

Response: *Grammatical and typographical errors were corrected in the draft final document.*

Comment Number 3: Future changes in the document should be clearly identified. This may be done in several ways: by submitting revised pages with the reason for the changes noted, by the use of strikeout and underline, by the use of shading and italics, or by cover letter stating how each of the comments here have been addressed.

Response: *Changes made to the document as a result of EPA and DTSC comments are identified in this response to comments report and have been highlighted in the text.*

Comment Number 4: In its present form, the Baseline Human Health Risk Assessment for OU6 does not meet our guidelines. Sampling data were inadequate for risk assessment; compounds of potential concern were improperly eliminated; toxicity values were incorrectly cited; and default exposure assumptions did not conform to U.S. EPA and Cal/EPA guidance.

Response: *As described in the response to DTSC general comment number 1, the Navy submitted an OU6 RI work plan for agency comment on October 1, 1993. Comments were addressed and the final OU6 RI work plan was submitted on November 18, 1993. The work plan proposed sampling locations and the approach to be followed in conducting the HHRA for OU6. Both field sampling and the HHRA were conducted in accordance with this work plan.*

In addition, there are no known sources of contamination in OU6, which is an officially designated wetland on which no known historical manufacturing, storing, or operational activities have taken place.

However, even if sources of contamination exist in OU6, EPA (EPA 1989) warns not to conduct sampling in a purposive manner.

The comment that the sampling data are inadequate for a risk assessment is vague and inappropriate for two reasons. First, the sampling plan, developed specifically for the risk assessment of the wetland area, was explicitly detailed in the OU6 Baseline Human Health Risk Assessment Work Plan (PRC 1993). There is an assumption of tacit approval of all aspects of the work plan once it is reviewed and approved by regulatory agencies. This is because developing a comprehensive site-specific work plan involves considerable time, effort, and cost. Following approval, PRC carried out sampling and analysis in strict accordance with the work plan.

Second, notwithstanding DTSC's approval of the work plan, the Navy believes that the OU6 data are scientifically tenable for conducting the OU6 HHRA since it parallels EPA guidance (EPA 1989). An additional 20 soil and sediment samples were specifically collected in various areas of OU6 to fill data gaps in order to estimate risk for potential receptors. Specifically, these samples were collected to better characterize the extent of PCB, inorganic and hexavalent chromium concentrations across OU6. These samples were combined with samples collected during the SWEA and resulted in a total of approximately 63 soil and sediment samples. Sixty-three samples is a sufficient number to calculate exposure point concentrations necessary to conduct an HHRA. This is particularly true for a wetland with no known sources of contamination.

As discussed in the work plan, the principal objective of additional sampling in OU6 was to collect sufficient data to derive exposure point concentrations within each exposure area in order to estimate chemical intake for potential receptors. Defining exposure areas was not done arbitrarily. Considerable thought was devoted to developing the overall site conceptual model and developing a data aggregation methodology for each potential receptor. Data aggregation is based on exposure areas and environmental conditions, according to RAGS (EPA 1989). In this

evaluation it was first necessary to define all potential current and future uses of the site, identify specific receptors, and determine where exposure could occur within OU6. This evaluation formed the basis for data aggregation that is representative of actual site conditions and exposures as suggested in the Supplemental Guidance to RAGS: Calculating the Concentration Term (EPA 1992). This guidance states:

> *"For example, if you assume that an exposed individual moves randomly across an exposure area, then the spatially averaged soil concentration can be used to estimate the true average concentration contacted over time. While an individual may not actually exhibit a truly random pattern of movement across an exposure area, the assumption of equal time spent in different parts of the area is a simple but reasonable approach."*

Thus, the sampling strategy developed for OU6 was based entirely on EPA guidance. The three typical sampling strategies for a CERCLA site as discussed in RAGS (EPA 1989) include purposive, random, and systematic sampling. According to EPA, only the last two are appropriate for a risk assessment. EPA strongly cautions against using purposive sampling as DTSC has recently suggested. According to EPA, source-driven sampling should be used only to characterize the site, for conducting a chemical inventory, or to evaluate visually obvious contamination. EPA further states that:

> *"Although areas of concern are established purposively (e.g., with the intention of identifying contamination), the sampling locations <u>within the areas of concern</u> generally should not be sampled purposively if the data are to be used to provide defensible information for a risk assessment. Due to the bias associated with the samples, data from purposively identified sampling locations generally should not be averaged, and distributions of these data generally should not be modeled and used to estimate other relevant statistics. After areas of concern*

have been established purposively, ground-water monitoring well locations, continuous air monitor locations, and soil sample locations should be determined randomly or systematically within the areas of concern." (Emphasis added)

For this reason, once exposure areas were defined in OU6 for specific receptors, the Navy collected samples in a systematic manner within the exposure area.

Similar to EPA guidance, DTSC guidance (DTSC 1992) also cautions against nonrandom (spatial or purposive) sampling, stating:

> *"Spatial (non-random) sampling characterizes the extent of contamination of soil and is typically used to characterize the spatial extent of the source or the spread of contamination from a source. Spatial sampling does not assume randomness of sampling, and does not characterize a larger unit of a medium. Descriptive statistics such as mean and standard deviation would have little or no meaning when applied to this type of data."*

The reason purposive sampling should not be used for a quantitative risk assessment is that the basic underlying assumption of the HHRA is random contact with all regions within the exposure area. By focusing only on areas of contamination, exposure point concentrations are biased and the basic tenant of a risk assessment, which is random contact with all areas, is violated. In using purposive sampling to characterize risk, it is assumed that the receptor spends the entire exposure duration going from one contaminated area to the next. This does not reflect actual or realistic exposure conditions.

The Navy also disagrees that chemicals of concern (COCs) were improperly eliminated. The Navy selected COCs in a manner consistent with EPA (EPA 1989) and DTSC (DTSC 1992) guidelines. As noted in SGRA, the selection of COCs is to proceed in consultation with DTSC. For this

reason, the Navy submitted a detailed work plan outlining the selection criteria and rationale that were used to select COCs. Details of the selection criteria were presented in the text and the sequence of applying these criteria was presented in a flow chart. The COC selection criteria were approved without comment, which the Navy interpreted as the required consultation and approval. The elimination criteria used for OU6 are those suggested in both EPA and DTSC guidance and include frequency of detection, evaluation of essential elements, and background information. As requested by EPA Region 9, an optional toxicity-concentration screen that EPA (EPA 1989) regards as appropriate was not used in the OU6 HHRA.

Lacking site-specific background data, inorganic compounds were not eliminated based on a background analysis. Thus, in the final analysis the selection of COCs should be considered conservative. That is, all inorganic contaminants that may be present at background levels were not eliminated but were retained in the HHRA.

EPA regards as important, the reduction in the number of contaminants taken through the quantitative risk assessment for reasons other than time and effort. Carrying a large number of chemicals through the quantitative risk assessment is time consuming, labor intensive, and costly. However, if all chemicals are taken through the quantitative risk assessment, the true site-related risks can be obscured by insignificant or non-site specific risks. EPA (EPA 1989) states that:

> *"Carrying a large number of chemicals through a quantitative risk assessment may be complex, and it may consume significant amounts of time and resources. The resulting risk assessment report, with its large, unwieldy tables and text, may be difficult to read and understand, and it may distract from the dominant risks presented by the site."*

All toxicity values and exposure assumptions used in the risk assessment have been derived by either EPA or DTSC.

Comment Number 5: Although in general we mandate that a residential exposure scenario be included in the risk assessment, we feel this is unnecessary in the case of OU6, since it appears that the base will continue to have the same land use as that at present for the foreseeable future. If at some future time, the land use pattern at the facility is to be altered, then the exposure assessment should be reconsidered to see if it is still appropriate for the proposed new use. Additionally if any construction is anticipated, a construction worker scenario should be evaluated using 480 milligrams per day (mg/day) soil ingestion and a dust level of 1000 micrograms per cubic meter ($\mu g/m^3$).

Response: *Because Moffett OU6 is a federally protected wetland, construction activities are precluded from the site. Consequently, construction workers will not be exposed.*

Additionally, DTSC (DTSC 1992) guidance recommends default ingestion rates of 50 milligrams per day (mg/day) for a commercial/industrial worker, 100 mg/day for an adult agricultural exposure and 100 mg/day for an adult in a residential scenario. SGRA (DTSC 1989) does not recommend an intake value of 480 mg/day.

Comment Number 6: This risk assessment does not sum risks from OU6 with risks from other OU's although chemicals from other OU's may present a risk to receptors on OU6 through such pathways as wind borne dust, vapor emission or by the receptor spending time in the other OU's. At some time a basewide risk assessment for the entire base needs to be performed where risk and hazard from all the OU's will be comprehensively addressed.

Response: *A comprehensive, station-wide RI for NAS Moffett Field is scheduled to be completed in 1995. Scoping for this RI is underway. The station-wide investigation will include a complete HHRA estimating risks associated with all of at NAS Moffett Field. The station-wide risk assessment will evaluate risks for receptors who may contact contaminants in all environmental media from all areas without regard to arbitrarily imposed boundaries.*

Comment Number 7: Why isn't the ground water pathway analyzed? We note that no soil gas monitoring data are presented in this document, although groundwater is contaminated with volatile organic chemicals (VOC's) on some areas of the base. It is our understanding that a groundwater solvent plume may extent to the vicinity of OU6.

We are not aware of the extent to which any of these areas underlie OU6. If they do underlie OU6, the potential for exposure to chemicals volatilizing through the soil and into air should be evaluated.

Response: *Exposure to groundwater is an incomplete exposure pathway. Moreover, it is implausible that it will be developed for future use. As an officially designated wetland, drilling a groundwater well into OU6 is effectively precluded by the Clean Water Act (CWA) Section 404.*

Additionally, although organic compounds have been detected in upgradient groundwater wells, OU6 groundwater is considered to be uncontaminated. With the exception of a few detections at very low concentrations at the periphery of OU6, there is no groundwater contamination in OU6. Therefore, exposure to volatile chemicals in OU6 via volatilization from OU6 groundwater is insignificant.

Groundwater contamination at NAS Moffett Field is not being ignored but is being addressed on the west side of NAS Moffett Field under the Middlefield-Ellis-Whisman record of decision. The remaining groundwater contamination has been investigated under OU5. The text has been modified to clearly indicate that groundwater is being addressed under other activities.

Comment Number 8: If further sampling is going to be done on OU6, the results should be incorporated into a revised risk assessment.

Response: *All OU6 sampling was completed prior to submitting the draft RI. Specific contaminant sources have not been identified in OU6 so additional sampling will not be necessary. Sampling in Patrol Road ditch is planned as part of the phase II additional sites investigation and data will be included in the station-wide HHRA and RI. Any additional data collected will be incorporated into the station-wide risk assessment.*

Comment Number 9: In general, detected chemicals should not be eliminated as chemicals of concern. The risk assessment process outlined in U.S. EPA and OSA guidance entails summing risks and hazards across all chemicals and exposure pathways. The advent of computerized spreadsheets does not make carrying a large number of chemicals in a risk assessment an onerous task.

Response: *The Navy agrees that the physical process of carrying a large number of chemicals through the risk assessment is not an onerous task. However, this approach would require the Navy to first calculate insignificant, non-site specific risks and then spend considerable time, effort, and cost communicating this information to the public. That is, risk from essential nutrients, infrequently detected chemicals, or background chemicals are, according to EPA (EPA 1989), either insignificant or irrelevant to site-related risks. In either case, it is more effective and expeditious to present COC selection criteria in the main body of the text, along with the necessary rationale for eliminating each chemical from further consideration than to carry all chemicals through the RI/FS process. This approach will add considerable clarity to the risk assessment and allow the HHRA to focus on those chemicals that may be health hazards and may be potential targets for remediation. To identify all chemicals detected in OU6 as COCs and carry them through the quantitative risk assessment will lead to excessive and unnecessary work for the Navy. Furthermore, as lead agency, it will be the Navy's responsibility to explain to the public why all COCs will not be remediated. According to EPA, listing the list of COCs is important not only in terms of cost, time, and effort, but to ensure that the non-site related risks do not "distract from the dominant risks presented*

by the site" (EPA 1989). It should also be noted that with few exceptions other EPA regions not only allow COCs to be selected as they have been in the OU6 HHRA, but most require it. EPA Regions 8 and 10 are two examples. Site-specific COC selection provides meaningful information to risk managers and the public.

EPA Comments

Comment Number 1: Throughout the document, the Navy provides comments concerning "overcautiousness" of the methods imposed by EPA regarding the calculation of risk (e.g. Sections 6.3.2.3, 6.2.4, 6.6.1, 6.6.4, 6.7, 7.3). The risk assessment methods in use by EPA are based on scientifically valid reasoning and are used throughout the country to estimate risk. It is important to be consistent in these methods and it is appreciated that the Navy follows these methods as well. Potentially responsible parties (PRPs) throughout the country use them and this allows EPA to apply consistent risk management decisions across the board, regardless of who the PRP may be, federal or private.

Response: *The Navy disagrees with EPA that the term "overcautiousness" was used in any of the referenced sections.*

The risk assessment methodology used in the HHRA was initially developed by the National Academy of Sciences and subsequently adopted and codified by EPA. For this reason, the Navy does not consider EPA's risk assessment methodology to be either "cautious" or "overcautious." EPA's methodology is simply the process used to estimate risks. The exposure scenario assumptions and input parameters defining exposures ultimately determine the level of conservatism of the HHRA. For example, if all information collected during the RI/FS process indicates that future site use will be limited to occupational exposures but residential risks are estimated and included in the HHRA based on a "what if" worst-case scenario, it is appropriate to put the risk into perspective and qualify the relative uncertainty underlying the risk estimate. Under this hypothetical scenario, it is important to communicate to the reader the information that residential risks may overestimate actual site risks in the HHRA.

In addition to exposure scenarios, input exposure parameters used to estimate risk also contribute to the level of conservatism in the risk estimate. Exposure parameters can be site-specific best estimates, or the result of upper-bound (or reasonable maximum exposures), EPA default parameters based on national statistics of the average, or worst-case.

It is incorrect to state that the risk assessment approach is consistent "throughout the country." Although the same EPA guidance is used, different regions have individual requirements for exposure parameters. For example, risk assessments in states with colder climates require exposure parameters such as time apportioned indoors and outdoors; they also require surface area for dermal exposures to be adjusted in the risk assessment to reflect actual site conditions. If the risk assessment was not adjusted for weather conditions, the estimated risk could exceed actual risks.

The best risk management decisions are based on all available information regarding actual or potential site-specific risks. For this reason, it is appropriate to qualify the risk as either best estimates, conservative upper-bound, or maximum estimates. It is also necessary to identify areas of conservatism at each step of the process.

Comment Number 2: The issue of background levels of various contaminants has been a subject of debate recently. Establishing background levels by sampling on-site at an industrial facility can produce suspect data, be extremely expensive and may be unnecessary. The questions, in order, should be: 1) is there a risk to human health and 2) is the contamination naturally occurring.

In brief, a facility may be able to reduce the chemicals of concern (COCs) by comparing sampled contaminants to the Preliminary Remediation Goals (PRG) tables. This can potentially reduce the number of COCs. The facility should then perform a spatial analysis of the COCs. This may provide a reality check of potential hot spots and help determine if any historical activities may have contributed to the elevated levels of

contamination. If these answers are ambiguous, then background sampling may be necessary. It is cheaper to start by looking at the existing sampled data, which exists at Moffett Field. The facility may actually find it cheaper to remediate the area in question than to determine background levels through additional on-site/off-site sampling. EPA will soon be sending a letter to the Navy with more detail on this issue of background.

Response: *The Navy believes that the time, effort, and costs associated with selecting and implementing remediation justify a comprehensive background analysis at a CERCLA site with the significance and size of NAS Moffett Field. The Navy agrees with EPA, however, that the background analysis should be cost effective. Based on the potential remediation that may be necessary for NAS Moffett Field, the Navy believes a more thorough site-specific background investigation is warranted. Otherwise, the Navy risks spending millions of dollars implementing unnecessary or inappropriate remedies for the base to clean up inorganic compounds present only at naturally occurring levels.*

Comment Number 3: Many constituents sampled are eliminated based on the three criteria which the Navy has outlined in Section 6.3.2. In general, this may be a legitimate screening process. But some highly toxic substances, such as benzo(a)pyrene, were detected at fairly high levels. Even though a chemical may be detected at only a few locations, these particular locations may present a problem to receptors. EPA considers it important that these toxic chemicals be carried through the risk assessment. If in fact the lack of exposure pathways or lower contamination levels are prevalent, then the risk assessment should bear this out. But it is important to carry these highly toxic substances through the calculations.

Response: *The detection limits for benzo(a)pyrene are explained in the response to DTSC comment number 5.*

With regard to potential areas of high levels of benzo(a)pyrene, the Navy evaluated the data and found no evidence of a hot spot. A similar evaluation was carried out for all chemicals detected at the site. No hot spots were identified. This was not surprising since no known contaminant sources exist in OU6.

Comment Number 4: Ground water is not included in this risk assessment as a potential pathway. Please provide more detail as to why it is not included.

Response: *Please refer to DTSC comment number 7 for the response.*

Comment Number 5: Marriage Road and Patrol Road ditches need to be considered as part of this operable unit. These areas are physically closer to humans than many other areas of OU6 (golf courses) and may provide the highest potential risk to recreational and occupational users of the land. In a majority of the high concentration samples, the locations are very close to one another. The Northern Channel and the eastern diked marsh are areas where the highest concentrations of chemicals are detected. The Northern Channel, in particular, is also fairly close to where consistent recreational exposures in the area occur, the golf course. This area, in combination with Marriage Rd. and Patrol Rd. ditches, could present an unacceptable cumulative health risk.

Response: *The Marriage Road ditch was included as part of OU2. Consequently, it has not been included as part of OU6. Validated data are not available for the Patrol Road ditch and samples were not collected during phase I of the sitewide ecological assessment or during OU6 sampling. Additional samples will be collected in the Patrol Road ditch and at the outfall into the Northern Channel during phase II of the additional sites investigation. The field work plan for the phase II additional sites investigation is being developed. Data from these samples will be incorporated into the sitewide RI. As the RI/FS process requires, the Navy has calculated and presented the average risks for OU6 in the draft final HHRA.*

Comment Number 6: Stevens Creek samples are included here and should be included in the Site-wide Ecological Assessment (SWEA).

Response: *The samples collected from Stevens Creek that are included in the OU6 RI also have been included in the SWEA.*

Comment Number 7: EPA agrees with the Navy that the two sets of data not included here, the average risk calculation data (only reasonable maximum exposure [RME] is included here) and the summary of California-based risk numbers, should be included in the draft final version of this document.

Response: *The average risk calculation data and a summary of California-based risk numbers have been included in the draft final OU6 RI.*

3.0 SPECIFIC COMMENTS

California EPA DTSC Comments

Comment Number 1: Executive Summary, Page ES-2: OSA views 10^{-6} as a point of departure for determining acceptable carcinogenic risk and we do not necessarily view risks within the 10^{-4} to 10^{-6} range as acceptable.

The document states that "Background levels have not been established for OU6, which is primarily composed of fill soils from an unknown source." Background should be determined for native soils in the immediate site vicinity. According to Section 3.0 (Physical Features page 3-1), "most of the OU6 area was constructed on fill over historic tidal wetland or tidal flats." It is not acceptable to use background levels determined from imported fill unless extensive samples are collected and contaminant chemicals are distinguished from background by a probability plot. Imported fill could have contained hazardous levels of contaminants when it was originally deposited on site.

Response: *The Navy agrees that DTSC does not have an acceptable a priori risk level. However, DTSC (1992) states:*

> *"For the purposes of this guidance document, an acceptable risk is defined to be a risk which is no greater than $1x10^{-6}$. However, given the numerous uncertainties and conservatism in the risk assessment process, risks which are "greater" than $1x10^{-6}$ can be justified on a site-specific, receptor-specific, or regulatory-specific basis. Note, however, that other California regulatory processes consider a risk level of $1x10^{-5}$ as being acceptable."*

The Navy agrees that a site-specific background analysis of the type mentioned is necessary for OU6.

Comment Number 2: OU6 Investigation, Section 2.0, Page 2-1: It appears that only shallow (0 to 0.5 feet) soil samples were reported for some sampling locations. Were deeper samples collected at those locations? If not, please explain the rationale. Deeper samples are required to assess the risk in the event of any future construction or housing and to determine if compounds present in subsurface soils are migrating into groundwater or volatilizing into the atmosphere.

Response: *Samples were not collected from depths below 0.5 feet below land surface (bls) at the locations described. From a risk assessment standpoint, there are three reasons why no subsurface sampling is necessary. First, previously discussed, no construction on OU6 will be possible due to its federal classification as a wetland. Second, the California Coastal Act also precludes the development of housing units within a coastal buffer zone extending to 1,000 yards from the mean high tide line. Finally, because there are no contaminant sources in OU6, it is unlikely that subsurface soils would be contaminated.*

Comment Number 3: Inorganic Constituents, Section 4.1.1, Page 4-1 and Table 4-1: It is not acceptable to eliminate a chemical from consideration as a chemical of concern (COC) based on detection in 10 percent or less of samples. U.S. EPA's guidance document, Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A, Interim Final 1989 (RAGS), suggests 5% as a criterion; however, this is only a suggestion and in some circumstances even more stringent conditions could be utilized. A chemical could only be detected in 10% of the samples, but could be present as a hot spot, presenting an important health risk to receptors at those locations.

Similarly, it is not generally permissible to eliminate chemicals from consideration because they are essential nutrients. Based on our review of Table 4-1 we disagree with the elimination of zinc and copper as compounds of concern. As compared to macronutrients such as calcium, these trace or micronutrients have appreciable toxicity and should be carried through the risk assessment and summed with other contaminants to derive an overall hazard index in conformity with EPA (RAGS) and OSA guidance. To our knowledge, aluminum is not an essential nutrient. Speciation data for hexavalent chromium should be provided in Table 4-1.

Response: *The statement that metals were eliminated from the HHRA based on detection in 10 percent of samples was an error. The criterion of 5 percent was used and the text has been corrected to consistently reflect this. In addition, a cursory evaluation of the data indicated that a more time-consuming hot spot analysis was not warranted.*

The Navy agrees that aluminum is not an essential nutrient. Copper and zinc, however, are essential nutrients. Neither zinc nor copper accumulates in the body to an appreciable degree. Chronic daily intakes (CDI) of from occupational exposures to OU6 soil and sediments are estimated to be 0.003 milligrams per day (mg/day) for copper and 0.014 mg/day for zinc. The safe and adequate dose for copper is 1.5 to 3.0 mg/day and the recommended daily allowance for zinc is 12 to 15 mg/day. By comparison, the maximum exposed individual would receive insignificant doses of either zinc or copper in OU6, even when compared to levels necessary to maintain normal human health.

Furthermore, the estimated CDI of either zinc or copper associated with OU6 is far below toxic levels. For example, EPA's reference dose is 3.7 milligram per kilogram per day (mg/kg/day) for copper and 0.3 mg/kg/day for zinc. By comparison, the estimated CDIs for the maximum exposed occupational receptor at OU6 are 0.00005 mg/kg/day for copper and 0.0002 mg/kg/day for zinc. A summary table presenting this information has been included in the HHRA.

Speciation data for hexavalent chromium were not included on table 4-1, because hexavalent chromium was not detected in any of the samples collected. The table footnotes have been corrected to state that neither thallium nor hexavalent chromium was detected.

Comment Number 4: Volatile Organic Compounds, Section 4.1.2, Page 4-3 and Table 4-2: The description of sampling results in this section and tabulation of the data in Table 4-2 are not clear. Many common volatile organic compounds (VOCs) such as trichloroethlene (TCE) and ethylbenzene are not listed in the table, although Volume II of the document (Appendices) indicates they were analyzed for. Evidently these compounds were analyzed for but not seen above the detection level. This should be noted in the text and footnoted in the table. In the text some discussion should be provided about the range of detection levels.

Response: *Table 4-2 reports the only sampling locations at which VOCs were detected and only the compounds detected. Appendix A presents the complete soil and sediment analytical results. The text has been modified to clarify that VOCs were not detected in the remaining 15 sediment samples. In addition, a paragraph explaining the range of detection limits has been added to the document.*

Comment Number 5: Semivolatile Organic Compounds, Section 4.1.3, Page 4-4 and Tables 4-3 and A-3A.1: Based on our brief review of the appendices, detection levels for semivolatile organic compounds (SVOCs) are often unacceptably higher than levels for which we would have health based concerns. For example,

detection limits for soil samples SB001-001 through SB001-003 presented on pages 1 and 2 of Table A-3A.1 range up to 9400 μg/kg. This is far too high for SVOCs compounds, many of which are potent carcinogens. For example, the detection limit for benzo(a)pyrene, a very potent carcinogen, was listed as 3500 to 3900 μg/kg for those borings. We inquired of the consultant's project manager about this in the week of February 14. He said he would talk to the chemistry laboratory about this and call back; however, to this point he has not. Given these high detection levels, we strongly disagree with limiting SVOC chemicals of concern to fluoranthene and pyrene. We recommend SVOC samples be reanalyzed using appropriate analytical or cleanup procedures to increase the sensitivity to levels meaningful for risk assessment purposes.

We especially object to dropping some of the highly toxic compounds such as benzo(a)pyrene, as a COC when it was detected at a high level in one sample; and in other samples it was listed as not detected at the detection level, but the detection level was in the thousands of μg's/kg. In addition, the issue of hot spots needs to be considered. A chemical may be present in only a few locations at high concentrations; but those locations might be contacted by a receptor. We have serious concerns over many compounds dropped as COC's. Inadequate detection levels can by themselves constitute grounds for rejection of a risk assessment.

Equally of concern, incomplete sampling data are presented. No SVOC data are presented for locations SSLA-001 through SSLA-006 along Lindbergh Avenue in Table A-3A.1, even though these locations are presented as having been sampled in Figure 2-1. These are important sampling locations and should not have been skipped for SVOCs. Also the locations do not appear to have been sampled for VOCs as well (Table A-2A.1). All instances where a particular sampling location was skipped with regard to a chemical or class of chemicals, should be identified in the risk assessment and the omission explained or justified.

Regarding Table 4-3, is the chemical dibenzofuran the unsubstituted chemical or is it one or more of the congeners of the chlorinated dibenzofuran group?

Additionally in Table A-3.1, values for some samples are given as 0 - 2 feet. Please give an explanation as to what this means. We interpret this to mean a composite was taken from depths of 0 to 2 feet. If our interpretation is correct, this is too great a depth over which to composite a surface sample and could tend to "dilute out" near surface contamination.

Response: *The Navy agrees that two samples contained unacceptably high quantitation limits for benzo(a)pyrene. However, high detection limits in 2 of 47 samples do not invalidate the entire data set. The Navy believes that only the two samples with high detection limits for benzo(a)pyrene are unacceptable for a risk assessment. The remaining sample results are useable in the HHRA.*

Several factors contribute to high detection limits. These include high moisture content in sediment samples and matrix interferences that may require dilution of the sample. A review of all laboratory data and supporting QA/QC analyses indicated that a high level of matrix interference affected the results for the two samples with high detection limits. As noted in the laboratory case narrative, matrix spike (MS) and matrix spike duplicate (MSD) analyses showed effects of matrix interferences with high relative percent differences (RPDs). The laboratory carried out all proper method analyses and cleanup procedures as required under EPA's contract laboratory program (CLP). For example, sample volumes varied slightly although most sample analyses started with a 30 gram extraction volume; samples were concentrated to 500 microliters (µL), followed by a 2 µL injection. Dilution factors ranged from 1 to 20 with a mean dilution factor of 5.

First, matrix interferences were limited to only two samples. Detection limits for benzo(a)pyrene in the remaining 45 samples were all within typical detection limits. The contract required quantitation limit (CRQL) is the detection limit EPA has established as appropriate for each chemical. The CRQL for benzo(a)pyrene is 330 micrograms per kilogram (µg/kg). Some detection limits are elevated because of the level of analysis performed (medium- or low-level). The level is determined by screening the sample; matrix interferences could cause an analyst to choose a medium-level analysis instead of a low level analysis. Medium level CRQL for benzo(a)pyrene is 1,200 µg/kg.

Second, many of the sediment samples collected during the SWEA were saturated. The moisture content in soil or sediment samples will also affect detection limits. Although the Navy agrees that detection limits were sufficiently elevated in two samples to render them unusable for the risk assessment, it does not invalidate the remaining samples which have detection limits within the range of default risk-based concentrations.

Third, when both moisture content and matrix interferences are considered, this detection limit can be increased substantially. The reported sample quantitation limit (SQL) represents the individual detection limit for each sample. When a chemical is undetected in a sample, the laboratory reports an SQL that is typically above the actual concentration that could have been detected if the chemical were present in the sample. For example, the estimated benzo(a)pyrene value for sample SSRP-023 was 0.14 mg/kg, which is one order of magnitude below the SQL of 1.4 mg/kg for benzo(a)pyrene in that sample. This result of 0.14 was flagged with a "J" qualifier. The "J" flag indicates an estimated value. This flag is used when the mass spectral data indicates the presence of a compound that meets the semivolatile GC/MS identification criteria, and the result is less than the SQL but greater than zero. Hence, for sample SSRP-023, the SQL was an order of magnitude above the estimated concentration of benzo(a)pyrene. The detection limits of the 45 remaining samples ranged from 0.006 to 14 mg/kg. When factoring the order of magnitude estimate, it is possible

that the actual concentrations may range between 0.0006 to 1.4 mg/kg. The risk-based concentration for an occupational receptor corresponding to a risk level of 1E-06 is 0.38 mg/kg (EPA 1994). The detection limits for all but two samples are, therefore, sufficient for an HHRA.

Fourth, although benzo(a)pyrene is a Class B2 or probable carcinogen it was not detected at a high level in one sample, as suggested by DTSC. Instead, the concentration was estimated (qualified with a "J") to be 0.14 mg/kg. This concentration of benzo(a)pyrene is below the risk-based concentration of 0.38 mg/kg.

Consequently, Navy believes it is appropriate to eliminate benzo(a)pyrene as a COC because all EPA COC selection criteria have been satisfied. According to EPA (1989):

> *"Consider the chemical as a candidate for elimination from the quantitative risk assessment if: (1) it is detected infrequently in one or perhaps two environmental media, (2) it is not detected in any other sampled media or at high concentrations, and (3) there is no reason to believe that the chemical may be present."*

These criteria have been met or exceeded at OU6. The actual detection limits for benzo(a)pyrene were sufficiently low for the HHRA. Benzo(a)pyrene was infrequently detected in only 2 percent of the samples (excluding the two samples with high detection limits), which is below the benchmark of 5 percent typically used by EPA. The toxicity of benzo(a)pyrene was also taken into account according to EPA guidance. Regarding the elimination criteria, EPA (1989) states:

> *"It may be practical and conservative to retain a chemical that was detected at low concentrations if that chemical is a Group A carcinogen."*

As noted, benzo(a)pyrene is not a Class A carcinogen, but a Class B2 carcinogen. Finally, there is no reason to believe benzo(a)pyrene is present in OU6.

With respect to inadequate SVOC sampling, there is no known source of SVOCs at OU6. Consequently, the samples collected along the Lindbergh Avenue storm drain channel were not analyzed for VOCs and SVOCs because there is no source for these compounds in this area. The Navy submitted a draft final OU6 RI work plan for agency comment on October 1, 1993. After receiving comments, the Navy submitted a final OU6 RI work plan on November 18, 1993. Proposed sampling locations and analyses were described in this plan. Section 2.1 and 2.2 describe the analyses conducted on SWEA and OU6 samples.

In reference to Table 4-3, the chemical dibenzofuran is an unsubstituted chemical, not a congener of the chlorinated dibenzofuran group.

In response to the comment regarding soil sampling depths, soil boring samples collected in the vicinity of the Site 1 landfill were collected for the SWEA (SB001-001, SB001-002, SB001-003, and SB001-004). These samples were collected using a hand auger, boring from the ground surface to a depth of 2 feet below land surface (bls). Soil from the boring was placed in a clean stainless steel bowl, and VOC and purgeable total petroleum hydrocarbon (TPH) fractions were immediately placed in the appropriate containers. The remaining soil was homogenized and the remaining fractions (pesticides/PCBs, organophosphorus-pesticides, extractable TPH, SVOCs, and total metals) were sampled.

No subsurface (2 feet to the water table) samples were collected because there are no complete pathways at this depth. Consequently, it was prudent to obtain an indication of any contaminants on or near the surface. This is a common approach used and a typical depth interval for estimating risks.

Comment Number 6: Total Petroleum Hydrocarbons, Section 4.1.6, Page 4-7. It is our understanding that the petroleum hydrocarbons found at Moffett Field are not excludable for consideration under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The samples detected at Moffett Field are not crude petroleum products but refined products: diesel fuel, gasoline and motor oil. According to a memo (attached) from Toxics Legal Office, by Joan A. Markoff dated September 8, 1992, only petroleum or crude oil are exempted.

Response: *Petroleum constituents have not been addressed in the OU6 HHRA because they are subject to the petroleum exclusion under CERCLA. According to a memorandum dated August 12, 1983 from A. James Barnes, Acting General Council of EPA, to Sheldon M. Novick, Regional Council, EPA Region 3, refined petroleum products such as those detected at NAS Moffett Field are included in the petroleum exclusion under CERCLA. Although they are not being addressed by the remedial investigation/feasibility study (RI/FS) process, sources of petroleum-related contamination are being investigated as part of the petroleum sites investigation in accordance with applicable state regulations.*

Comment Number 7: Soil Samples, Section 4.2, Pages 4-7 to 4-12: Please see our specific comments 3 through 6 above regarding elimination of chemicals of concern, detection limits, compositing of samples and petroleum exclusion since they apply equally as well to soil sampling results as to sediments.

According to this section, only 9 soil samples were analyzed for VOCs, SVOCs and organophosphorate pesticides. This appears to be inadequate sampling to us since OU6 is so large.

Response: *Please refer to the responses to DTSC specific comments 3 through 6 regarding elimination of chemicals of concern, detection limits, compositing of samples, and the petroleum exclusion.*

Comment Number 8: Contaminant Fate and Transport, Section 5.0, Pages 5-1 to 5-32: We only reviewed this section briefly since it is outside our area of concentration. We note that on page 5-2 the section on sorption is incomplete, only ionic processes of adsorption are described. Hydrophobic interactions (non-polar) are not described or mentioned. Why was information on the bioaccumulation of the chlorinated pesticides and PCB's not presented.

Response: *Hydrophobicity and specific bioaccumulation values have been addressed the text.*

Comment Number 9: Essential Nutrients, Section 6.3.2.1, Page 6-7: There are several inaccuracies in this section. To our knowledge, aluminum is not an essential nutrient for humans. It is not true that copper and zinc only induce toxicological effects at "exceedingly high levels." The reference dose (RfDs) for these compounds are in the range of their Acceptable Daily Intakes from a nutritional standpoint and are not exceedingly high. Also copper and zinc are exceedingly toxic to aquatic organisms.

Response: *Please refer to DTSC Specific Comment 9 for response to the first part of this comment.*

In the context of the HHRA for OU6, we are not addressing the effects of inorganic elements on aquatic organisms. The SWEA addresses these environmental effects.

Comment Number 10: Quantify Chemical Intake, Section 6.4, Pages 6-18 and 19: On page 6-18, we reject the assumption that occupational and recreational receptors are in direct contact with soil and sediments only from May through September. Our site visit took place in mid February (mid-winter). There were numerous people out and about (many wearing shorts), engaged in biking, walking, jogging, roller blading and playing golf. Clearly, people are outdoors and in potential contact with contaminated soils and sediments year around in this area. The default value of 350 days per year as specified in our supplemental guidance (DTSC 1992) should be used.

On page 6-19 we do not agree with a absorption value of 6% for dermal absorption of PCB's, the value of 20%, cited in Table 3 of OSA's Preliminary Endangerment Assessment (PEA) guidance (DTSC 1994) should be used. This value is based on in vivo studies performed in primates and published in a well established toxicology journal (Wester et. al. 1990).

The document states on page 6-21 that dermal absorption of inorganic chemicals is considered negligible. This statement is erroneous. For example, arsenic in a recent paper was found to have a dermal absorption of 3% in vivo (Wester 1993). For dermal absorption of inorganics, our PEA guidance as cited above should be followed.

Response:

Estimates of exposures for all receptors have been based on year-round exposure to soils and sediments. However, because much of the site is alternately saturated and unsaturated during the wet and dry season, exposures to different areas are limited by saturated conditions.

For example, it has been documented that on average, much of OU6 is saturated during the winter months (October through April). During this period, the retention ponds as well as other low-lying areas are covered by standing water. Therefore, it is not reasonable to assume that either the occupational or recreational receptor will come into direct contact with soil and sediments covered with water in these areas. During the wet season, receptors come into contact only with those areas that are dry. However, during the wet season they can may also contact standing surface water. This scenario was evaluated, together with soil and sediment exposures during the wet season. In the dry season, all areas are considered accessible.

Contrary to DTSC's interpretation, the Navy did not assume receptors would only be exposed 6 months of the year. By taking into account all changing environmental conditions in the OU6 site conceptual model, the Navy was able to develop an exposure model based on site characteristics resulting in the best estimate of site-specific risk, which was ultimately the goal of the OU6 HHRA.

The Navy disagrees with the dermal absorption value of 20 percent that DTSC has proposed for PCBs. The source of this value is the Preliminary Endangerment Assessment Guidance Manual (Cal/EPA 1993), which simply presents screening levels to provide an upper-bound conservative estimate and is not directly applicable for a site-specific HHRA.

As noted in the HHRA, the dermal absorption factor for PCBs has been verified by EPA's Exposure Assessment Group (EAG) of the Office of Health and Environmental Assessment. The Dermal Exposure Assessment: Principles and Applications *(EPA 1992) EAG, summarizes:*

> *"Therefore, it is appropriate to apply the recommendations for TCE in Table 6-3 to all PCBs and Arochlors. The upper bound of 6% should be used."*

It should be emphasized that EPA not only considers 6 percent an appropriate dermal absorbance value for PCBs, but believes this value is the upper bound estimate. It should also be noted that even though EPA and Cal/EPA use the same source of peer-reviewed toxicological publications to independently derive PCB absorbance factors, the respective values are widely divergent.

DTSC has requested that more recent toxicological information be considered and the dermal absorption value of PCBs used in the HHRA reevaluated. The Navy has reviewed the recent study by Wester and Wade (1993) and concurs with DTSC that a dermal absorbance factor of 14 percent is more appropriate to conservatively estimate dermal absorbance. The necessary corrections have been made in the draft final document.

Although the dermal absorption factor for PCBs has been adjusted to account for recent toxicological information, the Navy believes a 3 percent dermal absorbance value for arsenic is not applicable for OU6 exposure conditions. There is a fundamental difference between the experimental paradigm used by Wester et al. (1993) and actual exposure conditions at

OU6 that make the results of the study nonapplicable. In estimating dermal absorbance of arsenic, Wester et al. prepared contaminated soil by adding H_3AsO_4 in water to coarse-grained soil with low retention capacity. This contaminated soil preparation does not represent naturally occurring exposure conditions because important bioavailability factors associated with the mineralogic form and grain size of arsenic have been ignored.

Data suggest arsenic concentrations in OU6 occur naturally in the mineralogic form. The Navy will continue to use 0.1 percent for dermal absorption of arsenic from soil, as recommended by EPA.

Arsenic is a naturally occurring element which is typically bound in a mineralogic form that renders it relatively inert. Typically, arsenic and other heavy metals which are naturally occurring in soils are bound in the crystalline structures of iron minerals (such as magnetite or hematite), iron and manganese hydroxides, or clay minerals. Davis et al. (1993) have shown that this soil mineralogy is a critical factor in bioavailability by controlling dissolution of arsenic from soil. In contrast to the naturally occurring form of arsenic, Wester et al. prepared a solubilized arsenic solution that coated the outer surface of coarsed-grained soil particles. Under these conditions arsenic is not incorporated into the mineralogical complex. In this artificial form, arsenic is much more bioavailable and would be expected to be absorbed more readily.

Comment Number 11a: Section 6.5.1, Page 6-38: In general this section was not well done, few references are cited and a number of errors were found. Due to constraints on time and resources we have not provided a detailed review of this section, we only point out the more fundamental errors. We suggest this section be rewritten. Both inhalation and oral cancer slopes should be provided when available. Many Cal/EPA cancer slopes are available for both exposure routes.

Response: *The Navy disagrees that the toxicity section was poorly written. It was based on peer reviewed toxicological publications and verified EPA databases. With reference to toxicity profiles, EPA (1989) states:*

"A short description of the toxic effects of each chemical carried through the assessment in non-technical language should be prepared for inclusion in the main body of the risk assessment. Included in this description should be information on the effects associated with exposure to the chemical and the concentration at which the adverse effects are expected to occur in humans."

Specifically, inhalation and oral cancer slopes have been provided in the draft final document.

Comment Number 11b: Page 6-24: The U.S. EPA oral cancer slope factor for arsenic is presented and compared to the Cal/EPA inhalation slope factor. Since values for both routes by both agencies are available all four values should be presented and the exposure routes identified.

Response: *In addition to toxicological profiles, a summary table was included in the HHRA to present both EPA and DTSC toxicity values. A check on the recent database revealed that the oral slope factor for arsenic is pending. The California inhalation slope factor is 12 mg/kg-day.*

Comment Number 11c: Page 6-25: Barium is identified as an essential element, please provide a reference to this. The sources we consulted, including Recommended Daily Allowances by the National Research Council (1989), failed to designate barium as an essential nutrient.

Response: *The Navy agrees that a typographical error was made in the toxicity profile for barium. The Navy selected barium as a COC rather than eliminating it as an essential nutrient.*

Comment Number 11d: Page 6-27: Please provide both Cal/EPA and U.S. EPA cancer slope factors for cadmium (inhalation). Note that recent studies by Waalkes and Rehm (1992) indicate that cadmium may be carcinogenic by the oral route. However, neither agency has established an oral potency slope at this time.

Response: *The carcinogenic slope factors for cadmium are presented in Table 6-62. Additionally, we have added this information to the cadmium toxicity profile.*

Comment Number 11e: Page 6-28: The statement about the relative non-toxicity of Dichloro-Diphsdyl-Trichloromethane (DDT) and congeners to humans is out of place. DDT is a probable human carcinogen (class B2).

Response: *The Navy does not agree that the statement regarding DDT is out of place, but the statement does need clarification. From a toxicologic standpoint, chemicals are classified on the basis of producing either systemic or carcinogenic effects (although carcinogens can also induce systemic effects).*

Although classified by EPA as a probable carcinogen (Class B2), the systemic manifestation of pathological effects indicates that DDT is relatively nontoxic as indicated by the dose-response relationship. That is, systemic effects are observed only at relatively high doses (Casarett and Doull 1992). As an example, DDT was commonly used as a fumigant in which humans were directly sprayed with DDT to control lice. Even after such direct application, DDT produced no obvious acute systemic effects in humans. The dose necessary for DDT to produce pathological effects such as peripheral neuropathy or central nervous system disorders is considerable and much higher than that expected to be associated with OU6 exposures.

The Navy did, however, clearly state the tumorigenic potential of DDT and its congeners in the toxicity profile. Not only was EPA's B2 carcinogen classification stated but the target organs in which tumors are induced were identified.

The Navy believes it is necessary to distinguish between systemic and carcinogenic effects so that public concerns about direct contact with low levels of DDT and its congeners are in perspective. For example, at the

low concentrations of DDT detected in OU6, potential receptors should be concerned about carcinogenesis, not systemic effects. A sentence further clarifying this distinction has been added to the toxicity profile.

Comment Number 11f: Page 6-31: We are not aware of a U.S. EPA cancer slope of 0.05 for hexavalent chromium. It is our understanding the U.S. EPA only has an inhalation slope factor for this compound- the value is 41 $(mg/kg\text{-}day)^{-1}$. This value should be cited along with Cal EPA inhalation value of 510 $(mg/kg\text{-}day)^{-1}$. The Cal/EPA value of 0.42 cited should be identified as the oral value.

Response: *The Navy agrees and the text has been revised.*

Comment Number 11g: Page 6-33: The value of 300 milligrams/day (mg/day), cited as the normal daily adult intake of lead is off by a factor of about 10,000. Our understanding is that the normal daily dietary intake of lead is about 10 micrograms (μg). For people not living on a contaminated site, this would be one of the major, if not the major, source of lead exposure. Refer to DTSC guidance (DTSC, 1992).

Response: *The Navy agrees that a typographical error was made. The value of 300 mg/day should have read 300 μg/day, which is the intake value cited by Casarett and Doull (1975). More recent data indicate that the levels of lead intake may be dropping due the use of unleaded fuels and the ban on other lead-containing products. The Agency for Toxic Substances and Disease Registry (ATSDR 1990) has estimated that the average may now be as low as between 37 and 50 μg/day for different groups based on age and sex. This information will be incorporated into the discussion.*

Comment Number 11h: Page 6-35: Inhalation and oral cancer slope factors are available for methylene chloride from both U.S. EPA and Cal/EPA. All these values should be cited and identified.

Response: *The Navy agrees and the toxicity values for methylene chloride will be incorporated into the text and table.*

Comment Number 11i: Page 6-37: It is incorrectly stated that only nickel refinery dust is considered carcinogenic by the inhalation route. All forms of nickel are considered carcinogenic by Cal/EPA via inhalation.

Response: *The toxicity values for nickel were presented in table 6-62. For completeness, however, they have also been added to the toxicity profiles.*

Comment Number 11j: Page 6-38: It is incorrectly stated that there is no direct evidence of carcinogenicity of polycyclic aromatic hydrocarbons (PAH's) in humans. PAH's were the first known human carcinogens, identified by Sir Percival Pott in the 18th century. In addition, benzo(a)pyrene is thought to be the principal carcinogen in cigarette smoke.

Response: *The Navy disagrees that the statement regarding PAH carcinogenicity is incorrect. The Navy relied directly on EPA's Integrated Risk Information System (IRIS 1994), which is the source of EPA's verified toxicity values and information, and defines the carcinogenic potential of PAHs. EPA (1994) states:*

> *"Human data specifically linking benzo[a]pyrene to a carcinogenic effect are lacking. There are, however, multiple animal studies in many species demonstrating benzo(a)pyrene to be carcinogenic following administration by numerous routes."*

If there were direct evidence of carcinogenicity of PAHs in humans, EPA would categorize PAHs as class A carcinogens. Although Sir Percival Pott's historical findings are recognized as important, his case studies were anecdotal. According to EPA (1994), human or epidemiological studies are still lacking.

The Navy believes it is both correct and prudent to use EPA-verified toxicity information. It should also be noted that PAHs are not pancarcinogens, but must be metabolically activated to an epoxide intermediate before they effectively become carcinogens. In many studies, an initiator must be

coadministered. Many toxicologists believe that antioxidants and normal repair mechanisms effectively prevent the widespread induction of cancer by ubiquitously distributed PAHs (ATSDR 1990).

The Navy does not understand that relevance of PAHs in cigarette smoke to PAHs that have been detected in OU6. Cigarette smoke contains myriad chemicals in addition to PAHs. However, if PAHs are to be put into perspective, it should be noted that charcoal-broiled or smoked meats, leafy vegetables, grains, and fats and oils should also be added to the list of sources of PAHs (ES&T 1992). For example, the Total Human Environmental Exposure Study found that the average concentrations of PAHs in charcoal broiled beef is 26 μg/kg. Although the Navy could have presented information on the daily exposure levels of the average person to PAHs, we decided instead to present a balance of information that was germane to OU6 exposures. Otherwise, the toxicity profiles can be misleading and confusing to the general public. The Navy presented a toxicity profile that relied heavily on ATSDR and EPA sources for toxicity information.

It should be noted that the greatest environmental sources of PAHs are forest and prairie fires and volcanic eruptions (ATSDR 1990). So ubiquitous are PAHs in the environment that EPA specifically identifies PAHs as anthropogenic background constituents that should be evaluated at CERCLA sites (EPA 1989). However, due to the low frequency of detection and low concentrations of PAHs at OU6, the Navy did not feel a background evaluation was warranted for PAHs.

Comment Number 12: Section 6.6.1, Page 6-45: Cal/EPA does not consider nickel to be carcinogenic by the oral route. Also please note that 1E-6 is the point of departure for carcinogenic risk management decisions by Cal EPA.

Response: *The text of the draft final document has been changed to indicate that nickel is not considered carcinogenic by the oral route of exposure. See the response to DTSC specific comment number 1 with reference to risk levels.*

Comment Number 13: Section 6.6.3, Quantitation of Lead Exposure, Page 6-48: OSA has its own spreadsheet model for lead exposure (DTSC 1992), which should be used (in this case in addition to the U.S. EPA model). However, in this case for the level of 126 milligrams per kilogram (mg/kg) in soil, the Cal/EPA model will not show a hazard.

Response: *The Navy agrees with DTSC and does not believe any additional risk information will be gained by repeating the calculations with the Cal/EPA model. The results from EPA's Lead Uptake/Biokinetic Model indicate low risk and blood lead levels from lead exposure. Consequently, further analysis is not necessary.*

Comment Number 14: Table 6-1: The maximum and minimum concentrations for benzo(a)pyrene are listed as 0.140 mg/kg, yet the average concentration is listed as 18.01. This may be a result of using detection limits in estimating the mean and upper 95% concentrations, but this should be explained by a footnote.

Response: *The average concentration was misrepresented. The average concentration is 0.14 mg/kg. This correction has been in table 6-1.*

Comment Number 15: Tables 6-6, 6-8 and 6-9: For current occupational exposures, an exposure time of 1 hour per day is given in the document. An exposure time of 8 hours should be employed as listed for the future use scenario. Given the extensive facilities requiring maintenance personnel, such as golf course, roads, ditches, pumping stations etc, the value of 8 hours is appropriate.

Response: *An exposure time of 1 hour was used for the current occupational workers at the site, as presented in Table 6-6. The current employee at the site is responsible for checking three pumps at the site. The pumps are located at Building 191, and in the Marriage Road and Patrol Road ditches.*

According to NAS Moffett Field public works personnel, the total time required to maintain and check all three pumps is approximately 1 hour per day. This task is expected to remain the same after National Aeronautics and Space Administrative (NASA) takes control of NAS Moffett Field. An 8 hour per day exposure would overestimate risks, particularly since the maintenance personnel use a motorized vehicle to travel between pump stations and are in minimal direct contact with OU6 environmental media during the exposure duration.

The Navy agrees that future exposure conditions cannot be predicted. Therefore, an 8-hour exposure duration has been used to estimate future occupational exposures.

Comment Number 16: Table 6-7: As specified in our Preliminary Endangerment Assessment guidance, a surface area of 5800 square centimeters (cm^2) should be used for exposed skin surface area for adults.

Response: *Although both weather conditions and standard operating procedures used by the Navy dictate the type of clothing the occupational receptor can be expected to wear, the value of 5,800 cm^2 has been used for the future occupational receptor to be conservative. However, it is unlikely that short trousers will be used year-round. It should be noted that the OU6 HHRA work plan, approved by DTSC, stated that a value of 2,910 cm^2 skin surface area would be assumed for the occupational worker.*

A surface area of 5,800 cm^2 has been used for the RME recreational scenario as well.

Comment Number 17: Table 6-8: Please provide the equation for converting concentration in soil into airborne particulate level utilizing the Particulate Emission Factor (PEF). We believe the reference for the use of this factor is RAGS Part B, not RAGS Part A.

Response: *Tables 6-8 and 6-13 have been modified in the draft final document to include both the appropriate reference and the equation for converting concentrations in soil into airborne particulate levels using the PEF.*

Comment Number 18: Table 6-13: The inhalation rate of 1.25 cubic meters per hour (m^3/hr) for a recreational receptor is too low. On our site visit, we saw people jogging, bicycling and roller blading on OU6. A value of 2.5 m^3/hour is more appropriate. This is the value used for a construction worker scenario and would be appropriate for moderate exercise as well.

Response: *The draft final OU6 HHRA work plan stated that the inhalation rate value of 1.25 m^3/hour for a recreational receptor would be used in the HHRA. This value has been derived by EPA. There will be no construction in OU6. However, the value of 2.5 cm^3/hour will be used to conservatively estimate intake for the recreational receptor.*

Comment Number 19: Tables 6-18, 6-23 and 6-28: The table is titled "...ABSORBED DOSE OF CHEMICALS FROM INGESTION OF SURFACE WATER...". In Table 6-16, which gives the algorithm for ingestion of surface water, there is no indication of an absorption factor (nor should one be used). The table should be titled "... INTAKE OF CHEMICALS FROM INGESTION OF SURFACE WATER..." if no absorption factors were used. If absorption factors were utilized, they should be eliminated.

Response: *No absorption factors were used to calculate ingestion of surface water. Therefore, the titles of Tables 6-18, 6-23, and 6-28 have been corrected in the draft final HHRA.*

Comment Number 20: Table 6-25, 6-26 and 6-27: These tables should contain a value for the "fraction absorbed" or "% absorbed" for each chemical.

Response: *The values for percent absorbed via dermal absorption are presented in Tables 6-7 and 6-14.*

Comment Number 21: Tables 6-34 and 6-49: The U.S. and Cal/EPA potency factor for arsenic is incorrectly listed as 0.18. The correct value is 1.8. The Cal/EPA oral slope factor of 1.4 E-02 for methylene chloride should be listed.

Response: *The toxicity value for arsenic is a typographical error. The value of 0.18 has been changed to 1.8. It should be noted, however, that the correct value was used in the calculation of risk. The toxicity value of methylene chloride was inadvertently omitted. This oversight has been corrected.*

EPA Comments

Comment Number 1: Section 3.4, Page 3-3, Paragraph 2. How often is the emergency lift station near Stevens Creek used? It seems that this may be the source of any Moffett "type" contamination in Stevens Creek because of the nature of its use.

Response: *The emergency lift station at the northwestern corner of the NASA/Navy stormwater retention pond is used only during years of high precipitation, when the volume of water in the retention ponds is high. On the occasions when water is pumped from the retention pond into Stevens Creek, a portable pump is brought to the edge of the retention pond for this purpose and water is pumped over the high levees into Steven's Creek, which flows north into San Francisco Bay.*

In the past, flap gates were used to release water into Steven's Creek. Silt has accumulated around these flap gates, rendering them unusable. Water is estimated to have been pumped from the NASA/Navy stormwater retention pond only once every 7 or 8 years.

Considering that water is released from the NASA/Navy stormwater retention pond into Steven's Creek, any contamination present in the water would be released into the northern end of Steven's Creek, downstream of the emergency pump station. However, concentrations of VOCs, SVOCs, PCBs, pesticides, and metals were low or not detected in surface water

samples from the NASA/Navy stormwater retention pond, indicating that the ponds are not likely the source of higher concentrations of these compounds in Steven's Creek.

Comment Number 2: Section 3.5, Page 3-5, Paragraph 1. "The mineralogy of Sunnyvale and Alviso clays is assumed to be mixed...". This assumption needs a reference. It is an assumption that leads the Navy to an important conclusion that greater attenuation of organic chemicals may occur in wetlands soils. Please provide scientific basis for this assumption.

Response: *The reference for the assumption that Sunnyvale and Alviso clay mineralogies are mixed has been added to the draft final document. The reference is the phase I sitewide qualitative habitat and receptor characterization report (WESCO 1993).*

Comment Number 3: Section 4.1.1, Page 4-1. Here, a criteria of 10% frequency detection is mentioned. Later in the document (Section 6.3.2.2), 5% is mentioned as the criteria. Please correct or explain this discrepancy.

Response: *The reference in Section 4.1.1 to 10 percent frequency of detection was an error and has been corrected in the draft final document. A frequency of 5 percent was used as a screening criterion.*

Comment Number 4: Section 4.2.1.1, Page 4-8, Last Paragraph. Explain why cobalt and beryllium would be present in a method blank. Are these metals typically used in laboratory analysis.

Response: *A "B" qualifier for inorganic data does not indicate that the analyte was detected in the associated method blank, as discussed in the draft report. Instead, a "B" qualifier for inorganic data indicates that the reported concentration is less than the contract required quantitation limit (CRQL), but greater than the instrument detection limit; therefore, the concentration is an estimated value.*

Validated data have been reevaluated for the draft final document and the sections describing metals concentrations have been rewritten to reflect the appropriate interpretation of the "B" qualifier.

Comment Number 5: Table 4-2. The detection of a compound in a blank does not necessarily eliminate it from a risk assessment calculation. It is dependent on the level detected compared to that allowed for a blank sample. The Navy should refer to the Quality Assurance Project Plan and justify why those contaminants which were detected in blanks are not considered legitimate samples.

Response: *The Navy applied EPA's "10 times blank" rule in eliminating common laboratory contaminants. This rule (EPA 1989) states:*

> *"If the blank contains detectable levels of common laboratory contaminants, then the sample results should be considered as positive results only if the concentrations in the sample exceed ten times the maximum amount detected in any blank." (Emphasis added)*

This rule was objectively applied to all common laboratory contaminants. All laboratory contaminants were eliminated as appropriate.

Comment Number 6: Section 5.3.1, Page 5-31, Paragraph 1. Please explain how it is possible that these volatile organic compounds (VOCs), after leaching into groundwater and surface water, will volatilize into the atmosphere when in groundwater.

Response: *The ability of a chemical to partition into the atmosphere or soil gas is governed by its vapor pressure and solubility. This interaction is expressed in Henry's Law Constant:*

$$H = \frac{P_x}{C_x}$$

where: H = *Henry's Law Constant in atm/(mol/m^3 water)*

P_x = *partial pressure of gas (atms at a given temperature)*

C_x = *equilibrium concentration of the gas in solution (mol/m^3 water)*

In general, when a Henry's Law Constant is greater than or equal to 10^{-3} atm•m^3/mol this indicates high volatility. As evidence by their Henry's Law Constant these compounds are moderately to highly volatile and are likely to partition to the vapor or air phase. Following dissolution into the groundwater or surface water these compounds will partition to soil gas or the atmosphere.

Comment Number 7: Section 5.3.3, Page 5-32, Last Sentence. This statement regarding degradation should be quantified with a time frame. Organic compounds have a wide range of degradation times.

Response: *The degradation rates for individual organic compounds are discussed in the summary for each compound in section 5.0 of the draft final document.*

Comment Number 8: Section 6.3.2, Page 6-6, Paragraph 2. Using frequency of detection as a screening criteria is not necessarily useful for large areas, such as OU6. One could easily see how this criteria could potentially be abused by sampling a certain distance from a known hot spot, thus increasing the number of samples and reducing the percentage of hits in this data set. It is more important to consider the contamination levels and the distribution of the contamination. A more health protective screening criteria is to compare the highest levels of contaminants detected to the PRG tables (see general comment #2).

Response: *There are no known sources in OU6. Therefore, it is not possible or likely to "abuse" the criteria of frequency of detection. However, it should be noted that if the reasoning underlying this comment is that sampling for the risk assessment should have focussed on potential areas of contamination or hot spots, such sampling would have been inappropriate. As previously*

discussed, purposive sampling strategies should not be used to estimate risks. The rationale is further explained in response to DTSC's general comment number 4.

Comment Number 9: Section 6.4.2, Page 6-15, Paragraph 2. The last sentence in this paragraph states that VOCs at OU6 will likely be completely volatilized in the near future. Is this based on scientific evidence? Please evaluate risk due to inhalation of VOCs or provide scientific evidence to prove why it is not necessary.

Response: *Methylene chloride and chloroform are extremely volatile compounds. The volatility factors associated with these two compounds indicates that they will be completely volatilized in the future. However, the risk associated with these VOCs were calculated and presented in the HHRA in Table 6-48.*

Comment Number 10: Section 6.4.2, Page 6-18, Paragraph 3. Why was no hot spot analysis performed?

Response: *A cursory evaluation of the data indicated that a more time-consuming hot spot analysis was not warranted.*

Comment Number 11: Section 6.4.2, Page 6-18, Paragraph 3. The statement that the occupational and recreational receptors are only in contact with soils and sediments in warmer months (May through September) is unacceptable. During a recent ecological assessment visit in mid February, there were many potential receptors: joggers, cyclists, walkers and golfers. The weather at this site is mild enough year round to justify using a full year exposure scenario in the risk assessment.

Response: *This comment is addressed in the response to DTSC specific comment number 10.*

Comment Number 12: Section 6.6.1, Page 6-43, Paragraph 1. The statement that EPA currently considers a carcinogenic risk between 10^{-6} and 10^{-4} to be an acceptable risk range should be supplemented with a statement that EPA Region 9 considers risk in this range to be a potential risk in some cases. Therefore Region 9 maintains the right to consider site specific data when determining whether remedial action needs to be taken.

Response: *This statement will be incorporated. However, it should be noted that as the lead agency, it is the Navy's responsibility to determine what remedial action needs to be taken. EPA has approval authority.*

Comment Number 13: Section 6.6, Page 6-43, Paragraph 2. Please include a table for the chemical specific toxicity factors used and explain the rationale behind the adjustment of toxicity factors by gastrointestinal (GI) absorption factors of 40 and 5 percent (organic and inorganic, respectively).

Response: *The chemical-specific toxicity factors have been presented in full in tables 6-62 and 6-63. The methodology and rationale used to modify toxicity factors are explained in RAGS Appendix A (EPA 1989). Dermal absorption factors are presented in the exposure parameter tables. Gastrointestinal absorption factors are presented in the footnotes of risk characterization tables for dermal exposure to soils.*

Comment Number 14: Section 6.6.4, Page 6-49, Paragraph 2. It was noted in our comments on the OU6 RI work plan (dated October 18, 1993) that the use of Monte Carlo simulation to carry out quantitative uncertainty assessment is not necessary for this case. To reiterate those comments, Monte Carlo simulation of uncertainty is in fact, not that widely used because it is not fully understood. The database has not been established and is a fairly expensive analysis for little return. If the Navy is interested in saving the taxpayer money, it should not use this procedure because its statistical value is yet to be proven.

Response: *The Navy disagrees that Monte Carlo simulations are not widely used. Many EPA regions are using and have regularly used them. Furthermore, records of decisions at some sites have been based solely on Monte Carlo results. PRC is currently assisting EPA Region 8 in the development, application, and interpretation of Monte Carlo simulations in several risk assessments. In parallel to these efforts, EPA Headquarters has also recently awarded a grant to the Harvard's Center for Risk Analysis to further develop the use of Monte Carlo simulations to provide additional information to risk managers.*

The Navy carried out a Monte Carlo simulation for OU6 after identifying, through a sensitivity analysis, those exposure pathways presenting the predominant site risk. The results of the Monte Carlo simulations were found not to significantly diverge from the results using single point estimates for average and reasonable maximum exposures. Consequently, the Navy decided not to include these results in the HHRA since it would not provide any additional information for risk managers.

Comment Number 15: Section 6.6.4, Page 6-49, Paragraph 3. EPA understands from DTSC that the CalTOX model for risk is still in a draft form. If this is still the case, it is premature for the Navy to be using it in discussions regarding uncertainty.

Response: *The Navy did not use the CalTox model in the uncertainty section, but rather in the general discussion of uncertainty in risk assessments. It should also be noted that few guidance documents are ever formally finalized. For example, even though RAGS (EPA 1989) was prepared 5 years ago, it is still considered only an interim final document. For this reason, draft documents are frequently referenced. It should be emphasized that the Navy did not use the CalTox methodology or any information contained in the draft document to estimate human health risks.*

Comment Number 16: Section 7.3, Page 7-3. For completeness, the Navy should reiterate in this section why a residential scenario was not included in this OU6 baseline human health risk assessment (HHRA).

Response: *The Navy has explained in Section 6.0 the rationale for not including a residential scenario. Section 7.0 summarizes the nature and extent of contamination, fate and transport, and risks associated with OU6. Methodologies and rationales are more appropriately presented in earlier sections of the document.*

4.0 ADDITIONAL NAVY MODIFICATIONS TO THE HHRA

In addition to the changes listed above, the Navy has made the following modifications have been made to tables, text and calculations presented in the OU6 HHRA in Section 6.0 of the draft final RI report.

Table 6-1. Because the following chemicals were infrequently detected and one half of the detection limit was used to calculate the average concentration, the calculated average and upper confidence limit (UCL) concentrations exceeded the maximum detected concentration. Therefore, the maximum concentration was used as the average and UCL concentration.

The average and 95 UCL concentrations for thallium were changed to 0.2 mg/kg from 0.7 mg/kg. Thallium was detected in one out of 63 soil and sediment samples and one out of 21 soil samples.

The average and 95 UCL concentrations of bis(2-ethylhexyl)phthalate (BEHP) were changed to 0.7 mg/kg from 17.9 mg/kg (average) and 36.3 mg/kg (95 UCL). BEHP was detected in one of 43 soil and sediment samples.

The average and 95 UCL concentrations of benzo(a)pyrene were changed to 0.14 mg/kg from 18.0 (average) and 36.0 mg/kg (95 UCL). Benzo(a)pyrene was detected in one out of 45 soil and sediment samples.

Table 6-2. Because concentrations changed after validation, the value for antimony was changed from 4.4 to 4.8 mg/kg for soil. The concentration for soil and sediment changed from 18.0 to 17.4 mg/kg. Antimony was detected in 26 of 31 sediment samples and in 8 of 28 soil samples.

Concentrations for Arochlor 1254 and Arochlor 1260 were recalculated because values changed after validation. The average and 95 UCL concentrations for Arochlor 1260 in soils and sediments are 0.703 mg/kg (average) and 1.2 mg/kg (95 UCL). Arochlor 1260 was detected in 26 out of 63 soil and sediment samples. The average and 95 UCL concentrations for Arochlor 1260 in soils are 1.8 mg/kg (average) and 3.2 mg/kg (95 UCL). Arochlor 1260 was detected in 13 out of 21 soil samples. The average and 95 UCL concentrations for Arochlor 1254 are 0.575 mg/kg (average) and 0.979 mg/kg (95 UCL) in soil and sediment samples. Arochlor 1254 was detected in 15 out of 63 soil and sediment samples. Concentrations for Arochlor 1254 in soils are 1.5 mg/kg (average) and 2.7 mg/kg (95 UCL). Arochlor 1254 was detected in 8 out of 21 soil samples.

Table 6-13. The RME inhalation rate for a recreational receptor was changed from 1.25 m^3/hr to 2.5 m^3/hr. Corresponding CDI and risk calculations were also adjusted.

Table 6-7 and Table 6-14. The dermal absorption factor for PCBs has been changed to 14 percent from 6 percent. Corresponding CDI calculations presented in Tables 6-19, 6-26, and 6-27 were changed accordingly. An absorption factor of 14 percent was also used to calculate average CDIs. Corresponding risk calculations were revised using the corrected CDIs.

Tables 6-6 through 6-16. Average exposure parameters were added to these tables for future occupational and recreational receptors.

CDIs for the average exposure scenarios are presented in the same tables as the RME CDIs for comparison. Average risks, calculated using the average CDI and appropriate toxicity value, are presented in Tables 6-48 though 6-52 for the future occupational scenario and in Tables 6-53 through 6-57 for the future recreational scenario.

Table 6-9 and 6-17. Volatilization factors were added to Tables 6-9 and 6-17. Volatilization factors were calculated as outlined in RAGs-Part B (EPA 1991).

Tables 6-7 and 6-12, 6-10 and 6-14. The future RME surface area for occupational and recreational receptors has been changed to 5,800 cm^2. The CDI and risk calculations have been revised accordingly.

Tables 6-13 and 6-17. The RME inhalation rate for recreational receptors was changed to 2.5 m^3/hr. All corresponding CDI and risk calculations have been revised.

Cancer Slope Factors (CSFs) and RfDs were verified and corrected as necessary for the following chemicals: arsenic, beryllium, nickel, chloroform, cobalt, methylene chloride, and 2-Butanone.

5.0 REFERENCES

ATSDR. 1990. Toxicological Profile for Polycyclic Aromatic Hydrocarbons.

California Environmental Protection Agency. 1994. Preliminary Endangerment Assessment (PEA), Guidance Manual. Draft. State of California. Department of Toxic Substances Control.

Casarett, L.J. and J. Doull. 1975. Toxicology - The Study of Poisons. Macmillan Publishing Inc.

Davis, A., Ruby, M.V., and Bergstrom, P.D. 1992. "Bioavailability of Arsenic and Lead in Soils from the Butte, Montana, Mining District." Environmental Science and Technology, Vol. 26, No. 3.

Department of Toxic Substances Control (DTSC). 1992. "Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities." State of California Environmental Protection Agency, Department of Toxic Substances Control.

Menzie, C.A., B.B. Potoki, and J. Santodonato. 1992. "Exposure to Carcinogenic PAHs in the Environment." Environmental Science and Technology, Vol. 26, No. 7.

National Research Council. 1989. Proceedings of the National Academy of Sciences.

PRC Environmental Management, Inc., and James M. Montgomery Engineers (PRC and JMM). 1992a. Field Sampling Plan, Naval Air Station Moffett Field, California. November.

PRC and JMM. 1992b. Quality Assurance Project Plan, Naval Air Station Moffett Field, California. July.

PRC and JMM. 1993. Final Operable Unit 6 Baseline Human Health Risk Assessment Field, California. November.

U.S. Environmental Protection Agency (EPA). 1989. Risk Assessment Guidance for Superfund, Volume I Human Health Evaluation Manual (Part A), Interim Final. EPA/540/1-89/002. December.

EPA. 1990. Federal Facilities Agreement (FFA) under CERCLA Section 120 Between the U.S. Environmental Protection Agency Region IX and the U.S. Department of the Navy and the State of California represented by the California Department of Health Services and the California Regional Water Quality Control Board. San Francisco Bay Region (August 1990).

EPA. 1991. Human Health Evaluation Manual, Supplemental Guidance: Stanard Default Exposure Factors, Memorandum from Timothy Fields, Jr., Acting Director Office of Emergency and Remedial Response. PB91-921314, OSWER Directive 9285.6-03. March 25.

EPA. 1992. Dermal Exposure Assessment: Principles and Applications. EPA/600/8-91/011B. Office of Health and Environmental Assessment. Washington, D.C. January.

EPA. 1993. "Clean Water Act Regulatory Programs: Rule 404." Federal Register. Volume 58, No. 163,

EPA. 1994. Region IX Preliminary Remediation Goals (PRGs), First Quarter. 1993. Memorandum from: Stanford J. Smucker.

Wester, R.C., Maibach, H.I., Sedik, L., Melendres, J., and Wade, M. 1993a. "In Vivo and in Vitro Percutaneous Absorption and Skin Decontamination of Arsenic from Water and Soil." Fundamental and Applied Toxicology. 20, 336-340.

Wester, R.C., Maibach, H.I., Sedik, L., Melendres, J., and Wade, M. 1993b. "Percutaneous Absorption of PCB's from Soil: In Vivo Rhesus Monkey In Vitro Human Skin, and Binding to Powdered Human Stratum Corneum." Journal of Toxicology and Environmental Health, 39:375-382.

Western Ecological Services Company, Inc. (WESCO). 1993. Phase I Sitewide Qualitative Habitat and Receptor Characterization, NAS Moffett Field. October.

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May 4, 1994

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CLEAN Contract Number N624744-88-D-5086
Contract Task Order 0236

Subject: **Response to Comments on Draft Operable Unit 6 (OU6)**
Naval Air Station (NAS) Moffett Field

Dear Stephen and Camille:

Please find enclosed three copies of the subject document prepared by PRC Environmental Management, Inc. (PRC). Copies have also been forwarded to regulatory agencies and project personnel for review and comments. The draft final OU6 remedial investigation report was sent yesterday.

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

Sincerely,

Lynn A. Davies
Lynn A. Davies
Project Geochemist

Michael N. Young
Michael N. Young
Project Manager

LAD/lad

Enclosures

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