M60050.000121
MCAS EL TORO
SSIC # 5090.3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
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8 July 1993

Andy Piszkin
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Code 1811
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Subject: EPA Comments on the of the MCAS El Toro
Phase I RI Draft Technical Memorandum

Dear Mr. Piszkin:

This letter transmits EPA's comments on the MCAS El Toro Phase I Draft Technical Memorandum dated May 7, 1993. Please note that the comments need to be addressed at the time of the submittal of the final Remedial Investigation Report. These comments also need to be considered at the time of the preparation of the Phase II planning documents and Field Sampling Plan.

If you have any questions regarding the attached comments or if you wish to discuss other matters related to the RI/FS, please contact me at (415) 744-2391.

Sincerely,

John Hamill

John Hamill
Remedial Project Manager

Attachment

cc: Lt. Commander Larry Serafini, USMCAS El Toro
Joe Zarnoch, DTSC
John Broderick, RWQCB
John Dalegowski, CH2MHill

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Technical Review Comments
Phase I Remedial Investigation (RI)
Draft Technical Memorandum (5/7/93)
Marine Corps Air Station (MCAS) El Toro

A. INTRODUCTION AND COMMENTS PERTINENT TO OVERALL SITE CHARACTERIZATION

EPA reviewed the MCAS El Toro Phase I RI draft Technical Memorandum dated May 7, 1993. The objectives of the review were to assess the technical adequacy of the document and check its contents for compliance with EPA RI/FS guidance.

The Phase I effort, as discussed on pages 1-1 and 1-3 of the draft document, was directed at determining the source of VOC contamination in the regional groundwater west of the Station, and making an initial determination as to whether "contamination exists and is affecting the environment at 21 sites identified as potential sources of contamination" at MCAS El Toro.

As stated in the draft Technical Memorandum (page 1-1), the intent of the document is to present Phase I RI data and preliminary interpretations. Detailed analysis of the data collected is deferred until completion of the Data Quality Objective (DQO) process. Preliminary interpretations provided in the document are, therefore, qualified pending completion of that process. However, certain technical deficiencies are noted in Part A of this review. Until these deficiencies, which relate to overall site characterization, are resolved, the objectives of the Phase I RI may not be met. The major problem with the Technical Memorandum is its failure to provide adequate documentation of the rationale, criteria, and objectives used throughout the report. By providing additional documentation, most of these concerns can be alleviated.

EPA has also reviewed the preliminary baseline risk assessment provided in Section 7 of the draft Technical Memorandum, as well as Appendix H ("Risk Assessment Documentation"). The intent of developing the preliminary health risk assessment is to rapidly and inexpensively obtain a conservative estimate of potential risk. As stated in Part B of EPA's comments, the risk assessment approach reflected in the draft document does not strictly adhere to EPA guidelines and requires revision.

Also, the stated objectives of the ecological risk assessment were too broad and no supporting documentation was provided to demonstrate that these objectives were achieved.

Finally, EPA performed a detailed evaluation of the Phase I RI field activities, as documented in the draft Technical Memorandum to assess compliance with the MCAS El Toro draft final Phase I RI Draft Final Sampling and Analysis Plan (SAP) and the Draft Final Sampling and Analysis Plan Amendment (SAP Amendment). Overall, the field work for the MCAS El Toro Phase I RI was conducted in accordance with these documents. The results of this evaluation are presented in Part C of this review package.

Comments for Resolution

1. Characterization of the hydrogeologic system, as it relates to the occurrence and migration of contaminants, is a primary goal of the MCAS El Toro RI. A major deficiency of this report is not meeting that goal. The critical flaw here is that there is no clear description of how water and waterborne contamination migrate through the hydrogeological system. The confusing and poorly defined descriptions of the system characteristics provided in the report suggest that the investigators themselves do not have a clear understanding of the system. Examples illustrating this deficiency are provided below:

    - On page 3-2 (fourth paragraph), it is stated that the alluvium, underlying floodplain units, and the two marine units in the foothills of the Santa Ana Mountains (the Niguel Formation and the Oso Member of the Capistrano Formation), form a single hydrogeologic unit beneath the Station that is termed the "regional aquifer." However, on page 3-5, "consolidated and semi-consolidated low-permeability sedimentary rocks" encountered beneath portions of the Station during drilling operations are described as forming "a hydrogeologic unit distinct from the alluvial aquifers," and that "alluvium-bedrock in the foothills to the north and east (Santa Ana Mountains?) act as "a single hydrogeologic unit." Bedrock is defined on page 1-47 (third paragraph) as "pre-Quaternary, semi-consolidated, low-permeability sedimentary rocks" that comprises the "lower hydrogeologic system."

The draft Technical Memorandum also includes reference to several additional "aquifers" and "systems" with respect to the hydrogeologic regime beneath MCAS El Toro and its immediate vicinity (e.g., "alluvial aquifer," page 3-9, "alluvial-floodplain aquifer," page A1-24, "productive aquifer," page 3-5, "uppermost aquifer," page A-24, and "shallow aquifers," page 1-47). These "aquifers" are not defined in the draft Technical Memorandum and their relationships to the total hydrogeologic system are not discussed.

- The relationship of the hydrogeology beneath the Station with the "three general aquifer systems" off-site (page 1-42) is not adequately defined. It is not clear whether or not the unit that is referred to as the "regional aquifer" beneath the Station (page 3-2) is equivalent to the middle, or principal, aquifer zone off-site. The relationship of the "shallow aquifers" (page 1-47) to the off-site "perched aquifer system" is not stated. This is important, as groundwater contamination detected in the southwestern portion of the Station is said to be confined to the "uppermost permeable zone" (page A1-31), whereas off-site the contamination is said to occur within the strata of the principal aquifer.

- The draft document includes no discussion of historic conditions (e.g., water-level fluctuations, major pumping centers, land and water use changes) that might have influenced migration and distribution of contaminants as characterized during the Phase I RI. The brief reference that the water table has risen as much as 100 feet in 20 years (page 1-8) suggests that historic conditions varied significantly during the period that has elapsed between Station construction in 1942 and the present.

  Evaluation of the impact of these historic conditions should help in the understanding of the hydrogeologic system and provide insight into the location of contaminant sources, as well as migration pathways, that have resulted in the observed distribution of contaminants in groundwater. For example, the draft Technical Memorandum provides the explanation that TCE is "drawn down" into deeper zones "off-site" (page A1-34) in response to irrigation well pumping operations, but goes on to state that data collected during the RI were "inconclusive" (page 8-5). However, data

provided in the report suggest that a possible alternative explanation should be considered: i.e., that two separate plumes may be present in the subsurface. This alternate possibility should be addressed in the revised report.

A clear, consistent description of hydrogeologic units and subsurface conditions that is supported by reference to specific boring logs, downhole geophysical surveys, aquifer tests, etc., must be provided in the Technical Memorandum before a discussion of potential contaminant migration pathways in groundwater can be developed.

2. Closely related to the deficient characterization of the hydrogeologic system is the lack of development of a conceptual hydrogeologic model for MCAS El Toro. This is a basic tool needed before a preliminary risk assessment can be performed.

   Although Section 8.4.5 (pages 8-30 and 8-31) is titled "Hydrogeological Conceptual Model," it only describes, in a general way, two "primary" potential pathways to be considered in the assessment of off-Station contaminant migration in groundwater. The brief discussion of these pathways is followed by a statement that "Conceptual Site Models" (undefined) will be developed for each RI site during the DQO process.

   To assess migration of contaminants along either pathway described, a conceptual model of the hydrogeologic conditions impacting the pathways must be provided. For example, in each case, infiltration of contaminants from potential source areas is mentioned. It is implied that "infiltration" is from a surface source into the ground (i.e., the unlined channel of Agua Canyon, or from one of the yet-to-be defined sources in the southwest portion of the Station). If this is the boundary of the conceptual model, rates of infiltration from the ground surface into the subsurface or, alternatively, rates of infiltration of contaminants from the vadose zone through the water table, need to be determined. Because each "source" area is underlain by a substantial thickness of unsaturated materials (i.e., the vadose zone), the parameters controlling unsaturated flow (percolation) rates also need to be measured or estimated.

In either case, boundary conditions of the conceptual hydrogeological model need to be carefully defined and supported by site-specific data. Definition of the boundary conditions also need to be consistent with the characterization of the hydrogeologic system before the conceptual hydrogeological model can be a useful tool for the risk assessment analyses. The objective should be to assist in predicting possible exposure points. The authors should, therefore:

a. Present a clear description of the regional hydrogeology from existing information, providing references as appropriate, and relate site-specific findings to that regional description.

b. Obtain the knowledge (field data) necessary to develop a hydrogeological conceptual model that takes into account site-specific data, e.g. infiltration and percolation rates, groundwater velocity, etc.

3. Limited detection of contaminants in the vadose zone soil samples collected during Phase I of the RI implies, as stated on page 8-66 (first paragraph), that "the actual source of the TCE [contamination observed in regional groundwater west of the Station] has not been located." The draft Technical Memorandum does not address the level of confidence associated with the results of the vadose zone soil sampling program as implemented during Phase I of the RI. Thus, it is not clear whether the sampling program yielded representative data (i.e., that a minimal amount of contamination exists in the vadose zone beneath the Station) or that the sampling program results reflect the possibility that potential "hot spots" in the vadose zone have been missed.

The only discussion of the minimal detection of TCE in the draft Technical Memorandum is provided on page 8-67 (second paragraph). The discussion is, as stated, "speculative," and contains no reference to sampling rationale or guidelines that were used to select the vadose zone soil samples submitted for laboratory analysis. The discussion provided is also difficult to understand and uses nonstandard terminology (e.g., "solvents may have short-circuited to depth") in speculating that abandoned wells may have provided vertical conduits for contamination migration.

The significance of the Phase I RI vadose zone sampling results must be addressed in order to decide if additional, Phase II, vadose zone soil sampling is

necessary, or if, as stated on page ES-8, "that existing data on the regional VOC contamination (Site 18, OU-1) in groundwater as adequate to proceed directly to an OU-1 ... Record of Decision (ROD), without the necessity of a Phase II RI."

The following comments reflect concerns regarding the Phase I sampling and analysis procedures:

Volume 1:

a. Page 2-21. The method cited for storing the soil samples (stainless steel sleeves capped with teflon end caps and plastic covers) is not adequate for VOCs. Results from these samples should be viewed as inconclusive if not detected and low if detected. To ensure that all VOCs present in the soil sample when it is capped remain until it is extracted, the sample must be frozen after capping. Liquid CO_2 can be used for this purpose.

b. Page 2-35, Section 2.3.3. This is not an acceptable procedure. The field blank or a trip blank must accompany all VOC samples taken. For example, one blank per cooler is not required, but the blank used must have gone everywhere the associated samples have gone.

c. Page 4-49. A very high concentration of TCE in the groundwater implies that this site is a potential source area, yet TCE was not detected in the soil. As a result, the representativeness of the soil sampling program is questionable.

d. Page 6-29, paragraph 2. Are vinyl chloride units of grams per liter (g/L) correct or are micogram per liter (ug/L) meant? There are sufficiently high levels of TCE to have vinyl chloride present so the speculation made is incorrect. The extremely low levels of Dichloroethene (DCE) suggest either a relatively recent release, a highly oxidative subsurface, or that the main body of the plume is upgradient.

e. Page ES-4, paragraph 2. Tetrachloroethene (PCE) is a volatile organic. If it is found in surface soils within a moderately hot climate, then it is either the remnants of a recent spill or the soil gas from a substantial nearby

source. The stated conclusion is not necessarily true. The Navy should consider a soil gas survey in this area to identify the source location.

Generally, the Navy should consider soil gas surveys across all areas suspected of being VOC sources, not to determine groundwater plumes, but to locate hot spots that may act as sources

f. Page 2-26. The type of pumps chosen for the sampling are usually not suitable for VOC sampling but are generally acceptable for metals, depending upon how they are operated. The VOC concentrations in this report are likely to be understated. The recommended submersible pump pumping rate of 100 milliliters per minute (ml/min) may be difficult, to achieve. The use of bladder pumps or bailers is recommended for future sampling events to enable comparisons to the results reported previously.

g. Page 2-26, paragraph 1 - The factors that were considered in pump selection do not include minimizing the impact on sample integrity. The fact that these pumps are significantly heating the samples in some wells indicates that their suitability for sampling VOCs should be reviewed.

h. Page 2-25, paragraph 2 - The high temperature of the water samples collected is of great concern. Temperatures of 25+ degrees C are reported here and elsewhere temperatures of over 28 degrees C are reported (see Table A1-4). The heating of samples resulting in an increase of as much as 20 degrees F (11 degrees C), apparently by the submersible pumps, is unacceptable for samples collected for VOC analysis. The difficulty experienced in keeping such warm samples cool during shipping is an added concern.

i. There appears to be a substantial degree of VOC trip and method blank contamination present in the sampling program. Have the chemistry results been fully Contract Laboratory Program (CLP) validated using trip and method blanks for qualification and, if not, are they going to be?

j. Statements made to the effect that, since VOCs were not detected in the soil samples taken, then there is no VOC source in the landfill/suspected source area, need to be accompanied with a confidence statement. For example, how confident is the Navy that three or four shallow samples in a 20-acre site are representative and that hot spots have not been missed?

Volume 2:

k. Page A1-41, Section A1.4. Location 18BGMW02 has contaminated groundwater in part of the column. It, therefore, is suspect for even deeper horizons and should not be used. In addition, it is potentially downgradient from one of the source areas. Also, to say "typical," more than one sample point is needed. What is being compared to obtain this "typical"?

l. Page A1-30, Section 3.1.1. A soil gas survey should be performed on a fairly tight grid over the suspected source area to determine both source locations and whether the wells are placed correctly.

m. Page A2-5, paragraph 4. EPA guidance requires field filtering of samples. To send unfiltered samples to the laboratory, where they are then filtered and preserved, invites results that are less than those obtained when filtering the materials in the water at the time of collection.

Volume 3:

n. Appendix C1, tables in general. For some tables there is an obvious dilution problem with the detection limits of the maximum detected chemicals. The dilution detection limits should not be high for all samples unless the laboratory did not do an initial undiluted run. Lower detection limits should be achievable for some of the analytes in the list. Furthermore the detection limit stated in the far right column appears to be the Contract Required Detection Limit (CRDL), not the detection limit which was actually achieved. It would be useful to know how many samples in the range had good detection limits versus how many were elevated.

o. In general the mixture of chemicals detected is not consistent with what would be expected. For example: high benzene and xylenes, but no ethyl benzene or toluene; high Total Petroleum Hydrocarbon (TPH-diesel), but no 2-methylnaphthalene.

4. The draft Technical Memorandum does not include discussion of the criteria used to select the screened intervals for the 93 monitoring wells installed during the Phase I RI.

   Although Section 2.2.5.2 (page 2-22) includes the statement that the "subsurface lithology recorded on the boring logs was confirmed by the geophysical logs, and the information on the two logs was used to select the monitoring well depths and screen intervals," the criteria used for screened interval selection are not provided. It is therefore not evident how analytical results for a groundwater sample collected from a given well are to be related to the hydrogeologic system beneath MCAS El Toro, and how these results will be used to characterize (and track) the vertical distribution of contaminants in groundwater.

   Page 6-21, paragraph 3. The report states that "(n)o free hydrocarbons were detected in the regional groundwater or at any of the 21 sites investigated..." implying that the study has confirmed they do not exist. But, it does not appear that the well screen placement (many are below the water table) or pump position (at the bottom of the screen) would be appropriate for detecting free hydrocarbons if they did exist.

5. The discussion of background water quality (Section 6.1.6, page 6-22) is inadequate and, in some instances, contradictory.

   For example, as characterized on page 6-22, "Regional groundwater quality is generally poor in this area, with high concentrations of total dissolved solids (TDS), sulfate, nitrate, and selenium. Local groundwater areas may be high in magnesium, chloride, manganese, cadmium, and aluminum." However, in Section 6.1.6.1, the concentrations and occurrence of sodium, calcium, and magnesium, bicarbonate, sulfate, and chloride are highlighted as representative of background water quality, with no reference to the high TDS, nitrate and selenium concentrations previously mentioned.

Also, as describe on page 6-23, "most of the water is a mixed calcium-sodium-magnesium-bicarbonate-chloride-sulfate type"; however, this description of water quality is then qualified with the statement that "Anions are largely a mixture of bicarbonate and chloride with little sulfate influence." Thus, sulfate concentrations, previously described as "high" are discounted as of little influence on background water quality.

Furthermore, the "high" nitrate concentrations, described on page 6-22 as characteristic of regional groundwater quality, are attributed to "agricultural activities that occurred prior to the opening of MCAS El Toro" (page A1-27, third paragraph). However, "Previous studies [unreferenced] have indicated that the high nitrate [values, where the maximum nitrate concentration detected is approximately 64 mg/L are] related to agricultural practices and unsewered development activities" (page 6-22). Since current on-Station agricultural areas are characterized by "relatively low" nitrate concentrations in groundwater (page A1-27), the potential role of the "unsewered development activities" and ensuing MCAS El Toro sewage disposal practices should be investigated as potential sources of the high nitrate concentrations detected in "background" water quality samples.

Volume 2, Page A1-24. TDS discussion. The argument is presented that the TDS is high due to natural influences. The proof is from samples taken in the head waters of several areas in 1983 to 1984 (the text says 1993) which show high TDS. Yet is not the foothill section of the site with relatively low TDS the more directly equivalent part of the aquifer? And does not the relatively low TDS-bearing waters of the foothills lie between the head water region cited and the western portion of the site with the high TDS?

Finally, the revised document should provide a summary of the number of background water quality samples collected during the Phase I RI and the range of concentrations for each parameter. The specific monitoring wells sampled for characterization of background water quality should be presented on a map included with the main body of the report. The screened intervals of these wells should also be addressed and related to hydrogeologic conditions beneath the Station.

The importance of providing representative background water quality data cannot be overstated; it provides the standard by which all groundwater analytical results are compared for the purpose of identifying groundwater contaminants.

6. A procedure for the refinement of the "list of constituents of concern" is given in Section 3.1.1.2, page 3-5 of the 8/26/92 Draft Final SAP Amendment. However, this procedure has not been applied to evaluate COPC.

7. The air exposure pathway is dismissed as "not expected to be a major route of exposure" without providing site-specific data and/or references that support this contention. This exposure pathway cannot be eliminated from consideration until data (analyses of air quality samples) are provided that demonstrates that inhalation does not represent an exposure route for risk assessment consideration.

8. Have the sites in OU2 and OU3 been characterized?

Since samples have been taken at the 21 OU-2 and OU-3 sites, an <u>initial</u> determination of whether contamination exists at the individual sites has been accomplished. However, in the absence of a complete description of the previous screening activities that identified these sites and eliminated all others (e.g., records survey, interviews, and field screening such as soil gas survey) and without a description of the criteria applied in determining the numbers and locations of the Phase I sampling points, it is not possible to evaluate the completeness of the initial effort.

<u>Page 2-9, paragraph 3.</u> It is not clear whether the statement "(t)he surface and shallow sampling points were established by measurements from known locations" refers to a criteria of locating sampling points within a certain distance of suspected sources, or is describing the surveying technique used to record the location. The scale of Plate 2-1 does not allow individual site analysis and does not indicate where various chemical handling activities took place relative to the location of borings and wells. The location maps in Appendix B generally show the relationship of the sampling locations to buildings and other physical features, but not the rationale for selecting

particular locations; for example: "area where chemicals were delivered", "area of staining on air photo", or even "random locations or grid pattern designed to detected a release of a certain expected size". Without rationale supporting the numbers and locations of soil sampling points, it is difficult to assess the adequacy of the Phase I effort.

Page 4-1 to 4-3. The background information presented in Chapter 4 for Site 1 and the other sites is a repeat of the information presented in Chapter 1. The summary of findings is incomplete. Only VOC, SVOC, and TPH results are summarized and these are not the types of compounds expected at the site. Since Site 1 is an active disposal unit, why don't the findings show the metals, nitrated toluenes, sulfates, sulfur dioxide chlorosulfonic acid, and possibly low-level radioisotopes believed to exist at the site? Is the absence of these compounds, particularly in soil, an indication that the sampling locations were inadequate?

Page 6-31, paragraph 1 and page A2-6, paragraph 3. The amount of coverage angle borings provided under the washes is unclear. Figure 3-6, which shows boring locations, is at too small a scale to determine whether the borings were placed in the washes or to the side, and if the latter, how far from the banks. Borings drilled at a 30 degree angle would have a lateral "throw" of about one-half the borehole distance drilled and thus, a 60 foot hole would travel 30 feet to the side. Did this distance fully or partially traverse the wash channels? Also note that the indication of sample depth on Tables A2-1 and A2-5 appears to be the distance along the borehole, not depth below ground surface as indicated. True depths below ground surface would be less because of the drill angle (i.e., assuming level ground and a 30 degree angle, 10' along borehole = 8.7' bgs, etc.)

9. The report failed to provide sufficient documentation of prior information gathered to plan and support the field sampling efforts:

Page 1-12, paragraph 4. A fundamental element needed for the Agencies and the public to evaluate the completeness of the RI is a detailed explanation of the previous survey activities and results that support limiting the Phase I field activities to 22 sites. In this technical memorandum it is not clear exactly

which Station records were reviewed and whether any were not reviewed; how many interviews were conducted, who was interviewed, and what questions were asked; and what air photos were identified, which were analyzed, and how they were analyzed. It is also not clear whether any field surveys, such as soil gas, were conducted to verify the results of the records review, interviews, and air photo analysis, as well as to maximize the effectiveness of the soil and ground-water sampling.

The report should include a companion figure (or figures) of the Station itself which summarizes the preliminary screening activities (e.g., records search, interviews, airphoto analysis, field screening). This figure (or figures) should be at a scale which is sufficiently large to show the details which were important for directing the field investigation. For example, spill sites, disposal unit boundaries, buildings where chemicals were known to be used or may have been used or handled; other areas of specific types of land use that may be related to chemical uses (dust control areas, areas of pesticide or herbicide application); suspicious air photo features (stains, ponded liquids, disturbed ground); paved and unpaved areas, sensitive habitats, or areas of potential contact for sensitive receptors (housing, schools or daycare centers, play grounds, ball fields).

Overlays may be a useful method of presentation since past activities may be different from current activities at a particular location, and many kinds of information will have to be integrated to compile an overall picture of the current understanding of potential source areas and other key areas of the investigation. As an analytic and quality control technique, overlays would quickly identify areas in need of further screening or investigation. They would also communicate a comprehensive understanding of the current state of knowledge at MCAS El Toro in a way that the many details presented in the text do not.

Page 1-72, paragraph 2. The report cites "the BC and the JMM reports" as the sources for the background information on which the site-specific summaries, and presumably site identification and the design of the Phase 1 investigation are based. The report does not, however, elaborate on the specific activities

conducted by these previous investigators, or assess the completeness of the screening efforts or accuracy of the original sources.

Pages 1-72 to 1-85. It is difficult to understand what the total universe of chemicals that may exist at the Station is from the site-by-site descriptions of wastes and materials. In addition, not all of the site-specific summaries include information about the specific chemicals of concern that are associated with the various types of wastes and materials (e.g., munitions, low-level radioactive material, JP-5 fuel, paint, hydrocarbon carrier solution, lubricant oils, crankcase oil, antifreeze, transmission fluids, etc.). In order to determine the appropriateness of Phase I analyses, a table summarizing all of the wastes known or thought to be present at each of the sites, with a listing of the specific chemical constituents that would be expected to be found if the wastes are present is needed.

Figure B1-1 et seq. The detailed site maps in Appendix B do not show the locations of disposal areas, where chemical handling activities may have taken place, or other evidence for locations of possible chemical releases such as air photo features. Therefore, the adequacy of the number and locations of the soil sampling points cannot be evaluated.

10. Results from the MCAS El Toro Phase I RI as reported in the draft Technical Memorandum were compared to the eight general objectives described in the SAP and SAP Amendment. Each of the eight objectives is addressed separately below:

Objective 1: Obtain initial samples of soil, sediment, surface water, and groundwater at the 21 identified on-Station sites to allow a preliminary assessment of the presence and nature of contaminants.

Although the Phase I RI sampling efforts resulted in detection of contamination at the on-station sites, the representativeness of the sample analytical results has not been established; the draft Technical Memorandum urges caution in making any DQO decisions based on the results of only one groundwater sampling round. Also, as discussed in Comment 3 (Part A),

without a discussion of the level of confidence for analytical results for vadose zone soil samples, the adequacy of the sampling effort cannot be established.

Objective 2: At sites where contamination is demonstrated, make an initial evaluation of the main pathways on the conceptual site model.

As discussed in Comments 1 and 2, (Part A) the document does not reflect an understanding of the hydrogeologic regime and potential contaminant pathways in groundwater.

Objective 3: Collect sufficient analytical information to perform a preliminary baseline risk assessment.

Although site contaminants were identified in the Preliminary Baseline Risk Assessment section, detected chemical concentrations were not considered in the process. Also, reference Comment 6 (Part A). In essence, a preliminary baseline risk assessment was not performed (Part B of this package).

Objective 4: Collect sufficient analytical information to assess whether MCAS El Toro operations have caused contamination of local agricultural supply wells that are west of MCAS El Toro (Site 18 investigation).

Reference comment for Objective No. 1.

Objective 5: Refine the conceptual model for the regional investigation by characterizing the source and transport pathways of VOC contamination.

The source of the main area of chlorinated VOC contamination in regional groundwater is still uncertain. Reference Comment No. 3 (Part A).

Objective 6: Gather preliminary data to establish viable remedial action alternatives.

The text states that adequate data have been gathered to allow establishment of remedial action alternatives during the Feasibility Study. However, no preliminary alternatives have been proposed in the report and, in many cases, the source of contamination detected at a particular site is unknown. This objective has not been met for all sites.

Objective 7: Determine whether emergency removal actions are necessary.

The text states that emergency removal actions do not appear to be necessary at any site at this time. However, free product was recently observed at a MCAS El Toro site during the ongoing RFA. The presence of this free product may be cause for initiating an emergency removal action.

Objective 8: Provide several lines of evidence to allow the list of contaminants of potential concern (COPC) to be reduced at a given site so that, while the number of samples collected at a site during Phase II may increase, the number of analyses required may decrease.

As noted in Comment No. 6, the draft Technical Memorandum does not provide the criteria for evaluation of detected analytes as COPC in a suitable summary format.

B. COMMENTS PERTINENT TO PRELIMINARY BASELINE (RISK) ASSESSMENT

Introduction

EPA reviewed the Preliminary Baseline Risk Assessment (PBRA), which comprises Section 7.0 of the MCAS El Toro Phase I Remedial Investigation, Draft Technical Memorandum dated 7 May 1993. The objective of the review was to evaluate the technical adequacy of the PBRA. The review included Appendix H1 and H2.

The stated objective of conducting the PBRA was to develop risk-based concentrations for chemicals of potential concern (COPC) in selected environmental media. Risk-based concentrations are defined as concentrations that, based on certain exposure assumptions and current knowledge of the toxicity of the chemicals involved, will not adversely affect human health and the well-being of nonhuman organisms or will not produce cancer in humans at an unacceptable rate. According to the PBRA, the risk-based concentrations, along with other applicable standards and criteria, will, at some future date, be compared with the measured concentrations of COPC at the sites within the Facility.

Conclusions

EPA has concluded that the human health section of the PBRA is not acceptable because one of the major elements of Superfund-type risk assessments--risk characterization--was not included. The purpose of a preliminary health risk assessment should be to rapidly and inexpensively obtain a conservative estimate of potential risk. The idea is to overestimate risk by a margin large enough that all parties would then be comfortable if the results indicate that the chemicals do not present a significant risk. On the other hand, if the preliminary assessment indicates risk is significant, the validity of those risk estimates would be questionable because of the highly conservative assumptions used. Results suggesting significant risk would generally lead to the performance of a definitive risk assessment using site-specific information where such information can readily be obtained and more reasonable assumptions to obtain estimates of reasonable risk. This effort may require collecting additional information, and may involve using sophisticated pollutant transport models.

In contrast, the goal of the MCAS El Toro preliminary risk assessment presented in Section 7.0 was to obtain estimates, in various environmental media, of the highest concentration of each chemical that would not present a significant health risk or hazard. Their plans are to then compare these concentrations with measured concentrations and to draw conclusions regarding risk on the basis of the comparisons. Such comparisons are not recommended by EPA as a substitute for assessing risk.

Comments for Resolution

1. **The risk assessment approach does not adhere strictly to EPA guidelines for assessing risk.**

   The PBRA is not a standard baseline risk assessment. A standard assessment, performed according to EPA guidelines for Superfund risk assessments, would have produced estimates of risk to the population(s) at risk, i.e., it would have characterized risk. The PBRA does not do this. Rather, it produced estimates of COPC concentrations that, if exceeded, would cause risk <u>for individual chemicals</u> to exceed "acceptable" levels. Although developing risk-based concentrations is a necessary part of the RI/FS process and should occur during the scoping process, its development and use should not be confused with assessing risk. Reasons for not including risk characterization should be provided in this section, or the title of the section on human health evaluation should be changed. A suggested title is: Development of Health-Related Preliminary Remediation Goals.

   Although the PBRA identifies that Part B of the Superfund Human Health Evaluation Manual, Development of Risk-based Preliminary Remediation Goals, as one of the documents used in the performance of the risk assessment, the procedures described in that document were not developed to assess risk but to aid in decisions regarding cleanup.

2. **Reasons for certain statements need to be expanded; evidence in support of the statements needs to be provided. Specific issues are identified below.**

   - State why essential nutrients were not evaluated in the PBRA (page 7-4, paragraph 2). The EPA (1989) Superfund human health evaluation manual

(RAGS) recommends eliminating essential nutrients only if (1) they are present at low concentrations (at or slightly above background) and (2) they are toxic only at very high doses (higher than those associated with concentrations at the site). Provide evidence that these conditions have been met; otherwise, include the nutrients in the risk assessment.

- State why data from soil samples below 10 feet were not used. (Page 7-43, first complete sentence).

- Identify the criteria by which pathway completion was determined. (Page 7-70, paragraph 4).

- The reason why future residents are expected to be the maximally exposed population needs to be expanded (Page 7-101, paragraph 1). A comparison of exposure assumptions is needed to support the statement.

- Explain the basis of the professional judgment used in choosing the water ingestion rate of 5 ml/hour (Page 7-107, Table 7-13). If exposure time is 2 hours per day, the volume of site water ingested during that time would be 10 milliliters. Over a year, using the value of 26 days/year for trespassing frequency, it would be 260 ml or about 9 fluid ounces, which is about one normal-sized water glass. Are these volumes reasonable? How was the value of 26 days/year for trespassing frequency obtained or derived?

- The concept of Toxicity Equivalency Factor (TEF) is not well explained (Page 7-125). Among other things, it is important to state that the TEF expresses the toxicity of the dibenzodioxins and dibenzofurans relative to the toxicity of 2,3,7,8-TCDD. The statement "<u>if</u> 2,3,7,8-TCDD has a TEF of 1" is not accurate. The TEF for that compound is 1 by definition.

3. **Tabulated information differs from information presented in the text. Examples:**

- In Table 7-10, residential exposure to surface water is not identified as a pathway for several sites (e.g., 1, 8-10, and others); however, the fourth bullet on page 7-101 indicates that dermal contact with surface water was an exposure route for all residential scenarios.

- Gasoline is listed in Table 7-16, but its toxicity is not discussed in the section on fuel toxicity (page 7-125). On the other hand, the toxicity of JP-4 and kerosine are discussed in that section, but neither fuel is listed in Table 7-16.

4. **Some of the statements in the PBRA are incorrect. Examples:**

- Page 7-111. "The toxicity assessment involves identifying the COPC to (sic) cause adverse health effects in exposed individuals." This statement is incorrect. Toxicity assessment involves identifying the toxic effects of COPC, not the COPC that are toxic. All chemicals have the potential for causing toxic effects.

- Page 7-111. "Chemicals posing cancer risks frequently have noncancer effects, also." This statement is also incorrect; the reverse is true. All chemicals possess the ability to cause noncancer effects, only some have the ability to cause cancer.

5. **Objectives for the ecological risk assessment are inappropriate and no evidence that objectives were achieved is provided.**

The stated objectives of the ecological risk assessment are unique and inappropriate. A more conventional objective of an ecological risk assessment, and this also applies to human health risk assessments, is to estimate the potential risk of COPC to organisms at risk. Risk assessment, *per se,* cannot reduce risk or protect the organisms of concern. Such is accomplished only through risk-management decisions. The assessment of ecological risk did not appear to achieve the stated objectives. Section 7.2.5, Conclusions and Limitations, did not state whether or not the stated objectives of the assessment were achieved; nor were the results relative to the objectives discussed. The objectives should be revised and their achievement discussed.

6. **Some of the toxicity values are questionable.**

- An air inhalation rate of 20 m^3/day was used to calculate the inhalation dose of VOCs from soil; however, a rate of 15 m^3/day was used to calculate the inhalation dose of VOCs from water. The EPA recommended rate,

regardless of source is 20 m^3/day. Why was 15 m^3/day used? See page 7-104, Table 7-12).

- The last sentence beginning on p. 7-234 states that other toxicity values were used (to calculate "safe" concentrations) when chronic NOAELs and LOAELs were not available. Identify and explain how toxicity estimates other than chronic NOAELs and LOAELs were used. How were these values obtained? Were safety factors applied?

- According to the text, the toxicity values in Tables 7-30, -31, and -32 are NOAELs, LOAELs, LC50s, lethal doses, and concentrations that have been observed to produce toxic effects, and the values were taken directly from the literature. The values are incorrectly identified as criteria protective of animals. Only NOAELs can be considered potentially protective. All of the other values are not protective as they have been observed to be toxic. Revise the title and column headings appropriately.

Comments for Consideration Only

1. Page 7-1, Section 7.1.1. Care must be exercised in the use of risk-based concentrations to assess risk as these concentrations are chemical specific. One cannot conclude that risk is acceptable if, say, 10^{-6} were established as being the highest acceptable cancer risk, and none of the carcinogens were found at concentrations exceeding risk-based concentrations based on a 10^{-6} cancer risk. Such a conclusion cannot be made because the approach does not account for total cancer risk which is the sum of the risks presented by each chemical by each exposure pathway. If only one of the COPC were carcinogenic, the approach would work. If there are two carcinogens, and both were found at concentrations corresponding to a cancer risk of 10^{-6}, the overall cancer risk presented by both carcinogens would be 2×10^{-6}, which exceeds the acceptable level. When risk-based concentrations are used to assess risk, the concentrations corresponding to an acceptable risk level for each chemical must be divided by the number of COPC for noncancer analyses and by the number of carcinogens for cancer analyses.

2. Page 7-50, last paragraph. Consideration might be given to stating whether or not existing drinking water wells are up- or down-gradient of the site and if they draw water from aquifers that are or could be contaminated by site COPC.

3. Page 7-1, Section 7.1.4.3. It would be helpful to the reader to include a summary paragraph to this section that identifies the chemicals that have the greatest propensity, given the physical properties and constants discussed in the section, to migrate to groundwater and air or to bioaccumulate.

4. Page 7-50, last paragraph. Are the drinking water wells threatened? Are they down-gradient of the site?

5. Page 7-79, paragraph 5. Describe how exposure to groundwater and subsurface soil might occur. What activities or conditions would cause exposure to occur? Digging? Installing and drinking water from a well? Also, make sure there is agreement with information in the tables and text. Table 7-10 indicates that future workers and residents could be exposed to subsurface soil and to chemicals that volatilize from subsurface soil. These pathways are not

mentioned in this section. Note: the elements of the above comments apply to the entire section (7.1.4.4).

6. Page 7-112, paragraph 1. Please check to determine if 1) toxicological effects other than cancer, or 2) structure-activity relationships, or 3) physical/chemical properties are actually considered by EPA in the process of assigning chemicals to a cancer group (i.e. weight-of-evidence) and revise the paragraph appropriately. EPA does not believe that those factors are involved in the process.

7. Page 7-113, paragraph 2. The date (1992) in the reference to IRIS, suggests that IRIS was searched in 1992 for the toxicity values used in the risk assessment and thus casts doubt as to whether changes made in 1993 were used. Removal of the reference in paragraph 2 and inclusion of month and year in the reference column in Tables 7-15 and 16 that each IRIS value was obtained would remove such doubt.

8. Page 7-215, last paragraph. Birds also ingest soil (large sizes) to facilitate food digestion.

9. Page 7-216-217, biological uptake. Consider identifying the log Kow value above which bioaccumulation might elicit concern. Also consider stating that Kow does not apply to inorganic chemicals.

10. Appendix H1, page, H1-10, diffusivity equation. What is the definition of Pt^2 and what is its value?

11. Table 7-18, et seq. Universal use of the double dash (--) is misleading. Consider using "not applicable" (NA) in the target cancer risk concentration columns for noncarcinogens. Use of NA will inform the reader that the absence of risk-based concentrations for noncarcinogens is due to nonapplicability rather than to unavailability of a toxicity value.

12. Appendix H2, Table H2-2. The equation for calculating the target concentration for groundwater is incorrect. The units produced by that equation, for the target concentration, are μg/L where as they are listed as mg/L. Also, K is not unitless. It has the units of L/m^3.

13. Appendix H1 This appendix is listed as containing the equations used to calculate the risk-based concentrations; however, they are not the same as those described in Appendix H2, which are the equations actually used to calculate the risk-based concentrations. The equations described in Appendix H2 should be moved to Appendix H1.

C. Comments Pertaining to RI Field Procedures

Overall, the field work for the MCAS El Toro Phase I RI was conducted in accordance with the Draft Final Sampling and Analysis Plan (SAP) (February 28, 1991) and the Draft Final Sampling and Analysis Plan Amendment (SAP Amendment) (August 26, 1992). In general, significant changes in the field such as the relocation of or reduction of the number of monitoring wells that resulted from an increased knowledge of the underlying hydrology were justified and warranted. In many cases, changes in field work were minor in scope and did not have an adverse or detrimental impact on the sampling objectives. However, changes which are considered to significantly impact the sampling objectives are noted below.

For evaluation of compliance with the SAP and SAP Amendment, the attached tables present the proposed field work with the work actually performed. Additionally, a brief evaluation of each site is provided below.

1. Site 1 - Explosive Ordinance Disposal Range

No significant deviation from SAP or SAP Amendment.

2. Site 2 - Magazine Road Landfill

Downgradient monitoring well was relocated to reflect new groundwater flow-direction information. Due to insufficient rainfall, only 4 of the proposed 6 locations were sampled for surface water runoff. Analysis for herbicides for the upgradient and downgradient wells should be performed in subsequent sampling rounds since herbicides have been detected in soil at or near the surface and at depth and only 1 of the 4 monitoring wells were analyzed for herbicides.

3. **Site 3 - Original Landfill**

Due to a collapsed borehole, one downgradient monitoring well was relocated. Only two of the proposed four downgradient wells were installed with no explanation or rationale given. This should be clarified.

4. **Site 4 - Ferrocene Spill Area**

Downgradient monitoring well was relocated to reflect new groundwater flow-direction information. No significant deviation from SAP or SAP Amendment.

5. **Site 5 - Perimeter Road Landfill**

Since no surface soil samples were analyzed for total fuel hydrocarbons, an evaluation of the presence of TFH contamination cannot be made. This should be addressed in the next phase of field work.

6. **Site 6 - Drop Tank Drainage Area No. 1**

No significant deviation from SAP or SAP Amendment.

7. **Site 7 - Drop Tank Drainage Area No. 2**

Sediment sample from the catch basin was not collected due to lack of accessibility. Surface water or sediment should be sampled since surface water is considered one of the most likely potential contaminant migration pathways.

8. **Site 8 - DRMO Storage Area**

Surface soil sample for the 25-ft soil boring was not collected. Surface and shallow soil samples from Strata 1 and 2 were not analyzed for herbicides. Considering the presence of the various contaminants in the surface and near-surface soils at this site, such as pesticides, PCBs, TPH, VOCs, SVOCs, and heavy

metals, additional samples should be taken to evaluate the possible presence of herbicides.

9. Site 9 - Crash Crew Pit No. 1

A 25-ft boring in the upgradient pit was drilled and sampled, even though the SAP Amendment specified that it was to be eliminated. The deep boring was repositioned to improve downgradient coverage and the dioxin/furan sample was collected at 20 rather than 10 feet. No significant deviation from SAP or SAP Amendment.

10. Site 10 - Petroleum Disposal Area

Upgradient well was eliminated due to access problems and improved understanding of the groundwater flow direction. Instead, a deep boring from Site 7 was completed as a monitoring well to provide upgradient coverage of Site 10. One of the downgradient wells was eliminated since monitoring wells at Site 9 and 22 would provide adequate coverage of Site 10.

11. Site 11 - Transformer Storage Area

No significant deviation from SAP or SAP Amendment.

12. Site 12 - Sludge Drying Beds

Surface soil sample for the 25-ft boring was not collected. An additional surface sample was collected at the drainage ditch of a tar-like substance. Numerous samples were not analyzed for cyanide, including most from the deep boring. Consequently, a vertical assessment of cyanide contamination cannot be made. Considering the nature of the material handled at this site, consideration of additional vertical sampling for cyanide should be given.

13. Site 13 - Oil Change Area

No significant deviation from SAP or SAP Amendment.

14. Site 14 - Battery Acid Disposal Area

No significant deviation from SAP or SAP Amendment.

15. Site 15 - Suspended Fuel Tanks

No significant deviation from SAP or SAP Amendment.

16. Site 16 - Crash Crew Pit No. 2

Upgradient and downgradient monitoring wells were relocated to reflect new groundwater flow-direction information. No significant deviation from SAP or SAP Amendment.

17. Site 17 - Communication Station Landfill

The deep boring was not converted into a monitoring well due to drill refusal on presumed bedrock and no presence of water at refusal depth. Only one of the three proposed downgradient wells were installed due to severe weather conditions. To provide adequate downgradient coverage of Site 17, additional wells should be installed.

18. Site 18 - Regional VOC Investigation

It appears that only 41 of the 62 proposed wells were installed during the Phase I RI for this site. Unlike the sections for sites in OU2 and OU3, the text does not discuss in detail deviations from the SAP and SAP Amendment. This lack of accountability or rationale for the elimination of certain wells is crucial in determining the adequacy of the sampling program.

19. Site 19 - ACER Site

Upgradient and downgradient monitoring wells were relocated to reflect new groundwater flow direction information. No significant deviation from SAP or SAP Amendment.

20. Site 20 - Hobby Shop

Upgradient monitoring well was relocated to reflect new groundwater flow-direction information.

21. Site 21 - Material Management Group

No significant deviation from SAP or SAP Amendment. Sediment sample from the catch basin was not collected. Surface water or sediments should be sampled since surface water drainages is considered a potential contaminant migration pathway.

22. Site 22 - TADFS Area

No significant deviation from SAP or SAP Amendment.

Site 1 - Explosive Ordinance Disposal Range

PROPOSED	ACTUAL	COMMENTS
Monitoring Well (2 total) (2) downgradient, 4 soil samples, 2 water	Monitoring Well (2 total) (2) downgradient, 5 soil samples, 2 water	
Surface samples (4 total) (3) random across stratum (1) upgradient area	Surface samples (4 total) (3) random across stratum (1) upgradient area	
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 2 - Magazine Road Landfill

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (4 total) (3) downgradient, 6 soil samples, 3 water (1) upgradient, 2 soil samples, 1 water	Monitoring Wells (4 total) (3) downgradient, 10 soil samples, 3 water (1) upgradient, 2 soil samples, 1 water	02_DGMW60 moved according to new GW info
Shallow borings (3 total) (3) random across stain/fill area, 6 samples min	Shallow borings (3 total) (3) random across stain/fill area, 7 samples	
Surface samples (5 total) (3) random landfill stratum (1) deep boring area (1) upgradient well location	Surface samples (5 total) (3) random landfill stratum (1) deep boring area (1) upgradient well location	
Surface Water Locations (6 total)	Surface Water Locations (4 total)	
Sediment Sample Locations (6 total)	Sediment Sample Locations (6 total)	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No herbicide analysis for upgradient and 2 down-gradient wells No TOC analysis for screened interval for upgradient well No TPH analysis for 2 samples from shallow boring No CN analysis for 2 surface waters

Site 3 - Original Landfill

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (6 total) (4) downgradient, 8 soil samples, 4 water (1) upgradient, 2 soil samples, 1 water (1) deep boring between trenches, 9 soil, 1 water	Monitoring Wells (4 total) (2) downgradient, 9 soil samples, 2 water (1) upgradient, 2 soil samples, 1 water (1) deep boring between trenches, 9 soil, 1 water	Two wells eliminated
Surface samples (5 total) (3) random across stratum (1) deep boring area (1) upgradient well location	Surface samples (5 total) (3) random across stratum (1) deep boring area (1) upgradient well location	
Surface Water Locations (3 total)	Surface Water Locations (3 total)	
Sediment Sample Locations (3 total)	Sediment Sample Locations (3 total)	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No TOC analysis for screened interval for 2 down-gradient wells No metals or CN analysis for 2 surface runoff samples No pesticides/PCB, TPH, TFH, metals analyses for 1 upgradient well soil sample

Site 4 - Ferrocene Spill Area

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (3 total) (1) upgradient, 2 soil samples, 1 water (1) downgradient, 2 soil samples, 1 water (1) deep boring, 9 soil samples, 1 water	Monitoring Wells (3 total) (1) upgradient, 2 soil samples, 1 water (1) downgradient, 2 soil samples, 1 water (1) deep boring, 9 soil samples, 1 water	Relocated to reflect groundwater flow
Shallow Borings (7 total) (3) Strata 1, 6 samples min (3) Strata 2, 6 samples min (1) upgradient well location, 2 samples min	Shallow Borings (7 total) (3) Strata 1, 9 samples (3) Strata 2, 9 samples (1) upgradient well location, 2 samples	
Surface Sample (1 total) (1) deep boring	Surface Sample (1 total) (1) deep boring	
Sediment Sample (1 total)	Sediment Sample (1 total)	
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 5 - Perimeter Road Landfill

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (4 total) (2) downgradient, 4 soil samples, 2 water (1) upgradient, 2 soil samples, 1 water (1) deep boring between trenches, 9 soil, 1 water	Monitoring Wells (4 total) (2) downgradient, 4 soil samples, 1 water (1) upgradient, 4 soil samples, 1 water (1) deep boring between trenches, 8 soil, 1 water	
Surface samples (5 total) (3) random across stratum (1) deep boring area (1) upgradient well location	Surface samples (5 total) (3) random across stratum (1) deep boring area (1) upgradient well location	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No TOC analyses for screened interval for downgradient well and deep boring No TFH analyses for 4 soil samples No herbicide and alpha/beta analyses for upgradient well No pesticide and metal analyses for upgradient well soil samples

Site 6 - Drop Tank Drainage Area No.1

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (2 total) (1) upgradient, 2 soil samples, 1 water (1) downgradient, 2 soil samples, 1 water	Monitoring Wells (2 total) (1) upgradient, 2 soil samples, 1 water (1) downgradient, 2 soil samples, 1 water	
Shallow Borings (10 total) (3) Strata 1, 6 samples min (3) Strata 2, 6 samples min (3) Strata 3, 6 samples min (1) upgradient well location, 2 samples min	Shallow Borings (10 total) (3) Strata 1, 6 samples (3) Strata 2, 6 samples (3) Strata 3, 7 samples (1) upgradient well location, 2 samples	
Deep Boring (1 total) (1) deep boring, 8 samples	Deep Boring (1 total) (1) deep boring, 8 samples	
Sediment Sample (1 total)	Sediment Sample (1 total)	
Surface Sample (1 total) (1) deep boring location	Surface Sample (1 total) (1) deep boring location	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No CN analysis for upgradient well

Site 7 - Drop Tank Drainage Area No. 2

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (4 total)	Monitoring Wells (6 total)	
(2) downgradient, 4 soil samples, 2 water	(3) downgradient, 6 soil samples, 3 water	07_DGMW91 moved west of MW72
(2) deep borings, 18 soil samples min, 2 water	(3) deep borings, 26 soil samples, 3 water	07_DBMW100 added to southern edge
Shallow Borings (15 total)	Shallow Borings (15 total)	
(3) Strata 1, 6 soil samples min	(3) Strata 1, 8 soil samples	
(3) Strata 2, 6 soil samples min	(3) Strata 2, 8 soil samples	
(3) Strata 3, 6 soil samples min	(3) Strata 3, 7 soil samples	
(3) Strata 4, 6 soil samples min	(3) Strata 4, 6 soil samples	
(3) Strata 5, 6 soil samples min	(3) Strata 5, 6 soil samples	
Surface Soils (1 total)	Surface Soils (1 total)	
(1) deep boring location	(1) deep boring location	
Sediment Sample (1 total)	Sediment Sample (0 total)	Inaccessible
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 8 - DRMO Storage Area

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (3 total) (2) downgradient, 4 soil samples, 2 water (1) upgradient, 2 soil samples, 1 water	Monitoring Wells (3 total) (2) downgradient, 4 soil samples, 2 water (1) upgradient, 2 soil samples, 1 water	
Deep Boring (1 total) (1) deep boring, 8 soil samples min	Deep Boring (1 total) (1) deep boring, 10 soil samples	
Shallow Borings (13 total) (3) Strata 1, 6 soil samples min (3) Strata 2, 6 soil samples min (3) Strata 3, 6 soil samples min (3) Strata 4, 6 soil samples min (1) upgradient well location, 2 soil samples	Shallow Borings (13 total) (3) Strata 1, 7 soil samples (3) Strata 2, 7 soil samples (3) Strata 3, 8 soil samples (3) Strata 4, 9 soil samples (1) upgradient well location, 2 soil samples	
Surface Soils (2 total) (1) 25-ft boring location (1) deep boring location	Surface Soils (1 total) (0) 25-ft boring location (1) deep boring location	 Sample omitted
25-ft Borings (4 total) (4) 25-ft borings, 20 soil samples min	25-ft Borings (4 total) (4) 25-ft borings, 20 soil samples	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No herbicide analyses for upgradient well No herbicide anlayses for Stratum 1 & 2 samples

Site 9 - Crash Crew Pit No. 1

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (2 total) (1) downgradient, 2 soil samples, 1 water (1) deep boring, 9 soil samples, 1 water	Monitoring Wells (2 total) (1) downgradient, 2 soil samples, 1 water (1) deep boring, 9 soil samples, 1 water	Relocated for improved downgradient coverage dioxan and furan sample collected at 20 ft
Surface Soils (3 total)	Surface Soils (3 total)	
25-ft Borings (1 total) (1) 25-ft boring, 5 soil samples	25-ft Borings (1 total) (1) 25-ft boring, 5 soil samples	
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 10 - Petroleum Disposal Area

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (3 total)	Monitoring Wells (1 total)	
(1) upgradient, 2 soil samples, 1 water	(0) upgradient, no samples	Access problems, improved GW flow direction
(2) downgradient, 4 samples, 2 water	(1) downgradient, 2 samples, 1 water	Eliminate 1 down gradient well, adequate coverage
Shallow borings (7 total)	Shallow borings (6 total)	
(3) Strata 1, 6 samples	(3) Strata 1, 9 samples	
(3) Strata 2, 6 samples	(3) Strata 2, 6 samples	
(1) upgradient, 2 samples	(0) upgradient, no samples	Replaced by Site 7 boring
Deep Boring (1 total)	Deep Boring (1 total)	
(1) stratum 1, 8 samples	(1) stratum 1, 8 samples	
25-ft Boring (1 total)	25-ft Boring (1 total)	
(1) Stratum 2, 5 samples	(1) Stratum 2, 5 samples	
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 11 - Transformer Storage Area

PROPOSED	ACTUAL	COMMENTS
Shallow Borings (6 total)	Shallow Borings (6 total)	
(3) around pad, 9 soil samples	(3) around pad, 7 soil samples	Two borings did not reach 4-ft depth
(3) drainage stratum, 6 soil samples	(3) drainage stratum, 6 soil samples	
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 12 - Sludge Drying Beds

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (2 total) (1) upgradient, 2 soil samples, 1 water (1) deep boring in western area, 9 soil samples, 1 water	Monitoring Wells (2 total) (1) upgradient, 2 soil samples, 1 water (1) deep boring in western area, 9 soil samples, 1 water	
Surface Soils (2 total) (1) location of deep boring (1) location of 25-ft boring	Surface Soils (2 total) (1) location of deep boring (0) location of 25-ft boring (1) tar-like material SW portion of site	Omitted
25-ft boring (1 total) (1) eastern area, 5 samples	25-ft boring (1 total) (1) eastern area, 4 soil samples	
Sediment (1 total) (1) drainage area	Sediment (1 total) (1) drainage area	
Shallow borings (10 total) (3) Strata 1, 6 samples min (3) Strata 2, 6 samples min (3) Strata 3, 6 samples min (1) upgradient well location, 2 samples	Shallow borings (10 total) (3) Strata 1, 8 samples (3) Strata 2, 7 samples (3) Strata 3, 9 samples (1) upgradient well location, 2 samples	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No CN analysis for upgradient well, deep boring and numerous samples No herbicide analysis for upgradient well and Two samples from 1 shallow boring

Site 13 - Oil Change Area

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (3 total) (1) upgradient, 2 soil samples, 1 water (1) downgradient, 2 soil samples, 1 water (1) deep boring center of new stratum, 9 soil, 1 water	Monitoring Wells (3 total) (1) upgradient, 2 soil samples, 1 water (1) downgradient, 2 soil samples, 1 water (1) deep boring center of new stratum, 9 soil, 1 water	
Surface Soils (2 total) (1) location of deep boring (1) location of 25-ft boring	Surface Soils (2 total) (1) location of deep boring (1) location of 25-ft boring	
25-ft boring (1 total) (1) center of open area, 5 samples	25-ft boring (1 total) (1) center of open area, 5 samples	
Shallow borings (7 total) (3) Strata 1, 6 samples min (3) Strata 2, 6 samples min (1) upgradient well location, 2 samples	Shallow borings (7 total) (3) Strata 1, 8 samples (3) Strata 2, 7 samples (1) upgradient well location, 2 samples	
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 14 - Battery Acid Disposal Area

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (2 total) (1) downgradient, 2 soil samples, 1 water (1) deep boring in ditch, 9 soil samples, 1 water	Monitoring Wells (2 total) (1) downgradient, 2 soil samples, 1 water (1) deep boring in ditch, 9 soil samples, 1 water	
Surface Soils (1 total) (1) location of deep boring	Surface Soils (1 total) (1) location of deep boring	
Shallow borings (6 total) (3) Strata 1, 6 samples min (3) Strata 2, 6 samples min	Shallow borings (6 total) (3) Strata 1, 6 samples (3) Strata 2, 7 samples	
Sediment (1 total) (1) drainage catch-basin	Sediment (1 total) (1) drainage catch-basin	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No CN analyses in deep boring and downgradient monitoring well samples No TOC analysis for screened interval for deep boring

Site 15 - Suspended Fuel Tanks

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (1 total) (1) deep boring in large stain area, 9 soil, 1 water	Monitoring Wells (1 total) (1) deep boring in large stain area, 9 soil, 1 water	
Surface Soils (1 total) (1) location of deep boring	Surface Soils (1 total) (1) location of deep boring	
Shallow borings (4 total) (3) Strata 1, 6 samples (1) upgradient, 2 samples	Shallow borings (4 total) (3) Strata 1, 7 samples (1) upgradient, 2 samples	
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 16 - Crash Crew Pit No. 2

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (3 total)	Monitoring Wells (3 total)	
(1) upgradient, 2 soil samples, 1 water	(1) upgradient, 1 soil samples, 1 water	Relocated according to new groundwater flow info
(1) downgradient, 2 soil samples, 1 water	(1) downgradient, 2 soil samples, 1 water	Relocated according to new groundwater flow info
(1) deep boring in fuel/water pit, 9 soil, 1 water	(1) deep boring in fuel/water pit, 7 soil, 1 water	
25-ft Boring (1 total)	25-ft Boring (1 total)	
(1) field fire ext train pit, 5 samples	(1) field fire ext train pit, 5 samples	
60-ft Angle Boring (1 total)	60-ft Angle Boring (1 total)	
(1) NW of pit, 10-ft intervals, 6 samples	(1) NW of pit, 10-ft intervals, 6 samples	
Surface Soils (4 total)	Surface Soils (4 total)	
(3) area of disturbed soil/filled pits	(3) area of disturbed soil/filled pits	
(1) location of deep boring	(1) location of deep boring	
Shallow borings (7 total)	Shallow borings (8 total)	
(3) unfilled pit, 6 samples min	(3) unfilled pit, 9 samples	
(3) drainage ditch stratum, 6 samples min	(3) drainage ditch stratum, 8 samples	
(1) upgradient, 2 samples	(2) upgradient, 4 samples	Upgradient boring added for relocated well
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No TOC analyses for screened interval for deep boring and upgradient well No metals analyses for downgradient well soil sample

Site 17 - Communication Station Landfill

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (4 total) (3) downgradient, 6 soil samples, 3 water (1) deep boring, 9 soil samples, 1 water	Monitoring Wells (1 total) (1) downgradient, 3 samples, 1 water (1) deep boring, 8 samples, not converted to MW	Severe weather prevented 2 wells Drill refusal
Shallow borings (3 total) (3) stain stratum, 6 samples min	Shallow borings (3 total) (3) stain stratum, 9 samples min	
Surface samples (4 total) (3) random (1) deep boring area	Surface samples (4 total) (3) random (1) deep boring area	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No gross alpha/beta analysis for downgradient well sample No VOC for 2 surface soil samples

Site 18 - Regional VOC Investigation

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (62 total)	Monitoring Wells (41 total)	No explanation
Angle Borings (10 total)	Angle Borings (10 total)	
Surface Water Sampling (33 total from 12 locations)	Surface Water Sampling (35 total from 11 locations)	
Sediment Sampling (33 total from 12 locations)	Sediment Sampling (26 total from 11 locations)	
Analyze per Amended SAP	Analyzed per Amended SAP	

Site 19 - ACER Site

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (4 total)	Monitoring Wells (4 total)	
(1) upgradient, 2 samples, 1 water	(1) upgradient, 2 samples, 1 water	Relocated according to new groundwater flow info
(2) downgradient, 4 samples, 2 water	(2) downgradient, 4 samples, 2 water	Relocated according to new groundwater flow info
(1) deep boring deep excavation, 9 soil, 1 water	(1) deep boring deep excavation, 9 soil, 1 water	
25-ft Boring (3 total)	25-ft Boring (3 total)	
(1) new stratum to NE, 5 samples	(1) new stratum to NE, 5 samples	
(1) shallow excavation, 5 samples	(1) shallow excavation, 5 samples	
(1) north of open excavation, 5 samples	(1) north of open excavation, 5 samples	
60-ft Angle Boring (2 total)	60-ft Angle Boring (2 total)	
(1) opposite side of deep exc, 10-ft intervals, 6 samples	(1) opposite side of deep exc, 10-ft intervals, 6 samples	
(1) opposite side of deep exc, 10-ft intervals, 6 samples	(1) opposite side of deep exc, 10-ft intervals, 6 samples	
Surface Soils (4 total)	Surface Soils (4 total)	
(3) 25-ft boring location	(3) 25-ft boring location	
(1) location of deep boring	(1) location of deep boring	
Shallow borings (7 total)	Shallow borings (7 total)	
(3) Strata 1, 6 samples	(3) Strata 1, 6 samples	
(3) Strata 3, 6 samples	(3) Strata 3, 7 samples	
(1) upgradient, 2 samples	(1) upgradient, 3 samples	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No VOC or SVOC analyses for 25-ft boring surface soil sample

Site 20 - Hobby Shop

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (3 total) (1) upgradient, 2 samples, 1 water (1) downgradient, 2 samples, 1 water (1) deep boring next to ditch, 9 soil samples, 1 water	Monitoring Wells (3 total) (1) upgradient, 2 samples, 1 water (1) downgradient, 2 samples, 1 water (1) deep boring next to ditch, 9 soil samples, 1 water	Relocated according to new groundwater flow info
Surface Soils (1 total) (1) location of deep boring	Surface Soils (1 total) (1) location of deep boring	
Shallow borings (13 total) (3) Strata 1, 6 samples (3) Strata 2, 6 samples (3) Strata 3, 6 samples (3) Strata 4, 6 samples (1) upgradient, 2 samples	Shallow borings (13 total) (3) Strata 1, 9 samples (3) Strata 2, 9 samples (3) Strata 3, 9 samples (3) Strata 4, 7 samples (1) upgradient, 2 samples	
Sediment (1 total) (1) small drainage basin	Sediment (0 total) (0) small drainage basin	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No TOC sample at screen interval for downgradient and deep boring

Site 21 - Material Management Group

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (3 total) (1) upgradient, 2 soil samples, 1 water (1) downgradient, 2 soil samples, 1 water (1) deep boring next to ditch, 9 soil samples, 1 water	Monitoring Wells (3 total) (1) upgradient, 2 soil samples, 1 water (1) downgradient, 2 soil samples, 1 water (1) deep boring next to ditch, 9 soil samples	
Shallow borings (4 total) (3) randomly among interior of site, 6 samples (1) upgradient, 2 samples	Shallow borings (4 total) (3) randomly among interior of site, 8 samples (1) upgradient, 2 samples	
Sediment (1 total) (1) small drainage basin	Sediment (1 total) (1) small drainage basin	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No herbicide analyses for upgradient well

Site 22 - TADFS Area

PROPOSED	ACTUAL	COMMENTS
Monitoring Wells (1 total) (1) deep boring in stratum 1, 9 soil samples, 1 water	Monitoring Wells (1 total) (1) deep boring in stratum 1, 9 soil samples, 1 water	
Shallow borings (6 total) (3) old TAFDS, 6 samples (3) new TADFS, 6 samples	Shallow borings (6 total) (3) old TAFDS, 6 samples (3) new TADFS, 8 samples	
Surface samples (1 total) (1) deep boring area	Surface samples (1 total) (1) deep boring area	
25-ft Boring (1 total) (1) Stratum 2, 5 samples	25-ft Boring (1 total) (1) Stratum 2, 5 samples	
Analyze per Amended SAP	Analyzed per Amended SAP with exception of:	No pesticide/PCB analyses for 2 samples in Stratum 2