



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

August 1, 2001

Richard Mach, Jr., P.E.
BRAC Environmental Coordinator
for Hunters Point Shipyard
Southwest Division, Naval Facilities Engineering Command
1220 Pacific Coast Highway
San Diego, CA 92132-5190

RE: **Draft Field Sampling Plan/Quality Assurance Project Plan for Parcel E Data Gaps Investigation, Hunters Point Shipyard, San Francisco, California, April-June 2001**

Dear Rich,

Please find enclosed EPA's review of: *Draft Field Sampling Plan/Quality Assurance Project Plan for Parcel E Data Gaps Investigation, Hunters Point Shipyard, March 7, 2001*, and attachments dated April 6, 2001, revised figures dated April 26, 2001, and revised figures and tables dated June 29, 2001.

Portions of this document are very general, for example, the attachments do not specify sampling locations or sample identification numbers. Also, the document states that it includes the Parcel C Quality Assurance Plan (QAPP) by reference, but the agency status on this document is unknown, particularly since the responses to the last set of EPA comments indicate that the QAPP should be revised.

Please feel free to contact me at 415-744-2392 if you have any questions or comments.

Sincerely,

A handwritten signature in black ink that reads "Michael Work".

Michael Work
Remedial Project Manager
Superfund Division (SFD-8-3)

Attachment

cc: (see Distribution List)

Distribution List HPS Parcel E

David Demars
Lead RPM (Hunters Point Shipyard)
US Navy, Naval Facilities Engineering Command
SW Division
1230 Columbia Street, Suite 1100
San Diego, CA 92101-8571

Martin Offenhaur
Project Manager Parcel E (Hunters Point Shipyard)
US Navy, Naval Facilities Engineering Command
SW Division
1230 Columbia Street, suite 1100
San Diego, CA 92101-5571

Chein Ping Kao, P.E.
Office of Military Facilities
Department of Toxics Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710-2721

Brad Job
California Regional Water Quality Control Board
SF Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Amy Brownell
City and County of San Francisco
Department of Public Health
1390 Market Street, Suite 210
San Francisco, Ca 94102

Karla Brasaemle
TechLaw
530 Howard Street, Suite 400
San Francisco, CA 94105

**EPA Comments on the
Draft Field Sampling Plan/Quality Assurance
Project Plan for Parcel E Data Gaps Investigation
Hunters Point Shipyard
April - June 2001**

GENERAL COMMENTS

1. The approach using the Parcel C QAPP is acceptable if sufficient information to successfully conduct the field investigation is included in the integrated FSP/QAPP for the Parcel E Data Gap Investigation. Based on the EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5, EPA/240.B-01/003), this information must include tables listing all proposed primary samples, sample depths, duplicate samples, MS/MSD samples, field rinse blanks, etc. In addition, criteria for location and sample numbering are not presented. All equipment needed to perform the investigation should be listed in the text or in tables, and all of the procedures and methods should be discussed or referenced in SOPs, which should be provided. Field documentation requirements should be specified. All of this information is important so that the field personnel have the everything necessary to conduct the field investigation and so that the regulatory agencies can evaluate the adequacy of the integrated FSP/QAPP and be assured that the field program will be conducted in a manner that will insure the integrity of the data. Please include tables listing all proposed primary samples, duplicate samples, MS/MSD samples, field rinse blanks, etc. Also, please include criteria for location and sample numbering, a list of all equipment needed to perform the investigation and all of the procedures and methods that will be used. Please specify field documentation requirements.

This document states that the Parcel C QAPP is included by reference and applies to the sites to be investigated. However, none of the attachments cite this QAPP, and it is not listed in the reference sections of each attachment. Please reference the specific and relevant sections of the Parcel C QAPP in each attachment and include the QAPP in the list of references in each attachment.

2. There are several locations where surface sampling was done and additional sampling is recommended to evaluate the horizontal extent of contamination. It is unclear why sampling to evaluate the vertical extent of contamination is not also proposed; samples collected at 1.0, 1.5 or 2.0 feet would provide a useful evaluation of the vertical extent of contamination. Please review all locations where sampling is only proposed at 0, 0.25, 0.3, or 0.5 feet and consider adding deeper samples to evaluate the vertical extent of contamination. If deeper samples will not be collected, please explain why it is not necessary to understand the vertical extent of contamination.

SPECIFIC COMMENTS

3. **Table 3 and Figure 2, IR01/21:** Polychlorinated Biphenyls (PCBs) were also detected in the IR01MW58A boring, but are not included as analytes for nearby data gaps samples. Please include PCB analysis for locations IR01B440 and IR01B441.
4. **Table 3 and Figure 3, IR01/21:** It is unclear why samples from the 1 foot depth will not be analyzed in borings IR01B430, IR01B431 and IR01B436, given that Aroclor 1260 was detected at 4.9 mg/kg in the 1.25 foot samples from IR01MW44a. Please add PCB analyses at the 1 or 1.25 foot depth in IR01B430, IR01B431 and IR01B436.
5. **Table 3, Site IR-02C:** It is not clear why samples from IR02B405 and IR02B411 will be analyzed for dioxin. Please explain why samples from these borings are proposed for dioxin analysis. Please consider including dioxin results on Figure 4.

Also, proposed location IR02B409 is much closer to RA 02C-3 (30 feet) than it is to RA 02C-2 (225 feet), but the recommendation states this location will be sampled to provide information about the extent of contamination surrounding RA 02C-2. Please review the location of this boring and revise Table 3 as necessary.

6. **Figure 6:** Table 3 refers to specific remediation areas (RAs), but some of the RAs are not labeled on this figure. Please label all of the RAs on Figure 5.

It is not clear why location IR03B386 was dropped from the original plan, when no sampling has been done north of IR03SS368. Please add this location back into the sampling plan or explain why it was dropped.

7. **Table 3, IR-04:** The recommendations for IR04B073, IR04B074, IR04B075 and IR04B076 specify analyses for "Cr IV" when "CR VI" is probably intended. Please rewrite the recommendations to specify the correct analysis.

It is unclear why samples from location IR04B102 are not also proposed for Polynuclear Aromatic Hydrocarbon (PAH) analyses when this boring and borings IR04B083 and IR04B084 are intended to provide additional information about the area surrounding IR04B030. All of the samples from the borings in this area should be analyzed for PAHs. Please add PAHs to the analyses for IR04B102.

IR04B103 is near IR04B041, not IR01MW367A. Please revise the recommendation for IR04B103 to specify the correct boring.

8. **Figure 8:** IR04B104 and IR04B105 are missing from Figure 8. IR01MW367A is cited in the recommendations but is not shown on Figure 8. Please revise Figure 8 to include all of the borings recommended and discussed in Table 3.

9. **Figure 9:** It is unclear why data from the borings in de-minimus areas DA-4 and DA-5 are not posted on Figure 9 when additional work is proposed in these areas. Please post the data for the borings that resulted in the identification of DA-4 and DA-5.

Also, the Industrial Hits tables for borings IR05B049 (in DA-5) and IR05B050 (in DA-4) do not recommend further characterization for these two areas. It appears that PAHs were either detected at concentrations below the Preliminary Remediation Goals (PRGs) or not analyzed in these areas because these boring locations are not shown of the PAH non-detect figures. If PAHs were not analyzed in these borings, this should be noted in Table 3.

10. **Table 3, IR11/14/15 and Figure 10:** Location IR11B044 is in the middle of IR14; it appears that this location ID should be IR14B044. Please renumber this boring location on Figure 10 and in Table 3.

It is unclear why samples are not proposed west of RA IR11/14/15-2 because samples are proposed to the north, northeast and south of this area. Please add at least one sample to the west of this RA.

In the vicinity of IR14SS05, it appears that only surface sampling was done. PCBs and metals were detected above screening criteria, but the vertical extent of contamination is not known in this area. Please add deeper samples (at either 1.0, 1.5, or 2 feet) to locations IR14B025, IR14B029, IR14B031, and IR14B032 or explain why the vertical extent of contamination is not a data gap.

Also, it is confusing for two borings in the same combined site to end in the same digits. For example, IR11B039 and IR14B029; IR11B043 and IR14B043, etc. In some cases borings with the same last 3 digits are only 100 feet or less apart. EPA recommends that the last 3 digits in the location identifiers be unique for sites that are typically discussed together in reports and presented together in work plans.

11. **Figure 10:** It appears that previous sampling locations were omitted from this figure within the IR11/14/15 boundaries. Please add all of the former sampling location symbols to this figure.

12. **Table 3, IR11/14/15:** PAHs were also detected in the sample collected from IR14SS09, but proposed locations IR14B023, IR14B034 and IR14B038 are not proposed for PAH analysis. Please add PAH analysis to IR14B023, IR14B034 and IR14B038.

Also, the explanation and sampling depths are missing from the entry for IR14B026.

13. **Table 3, IR12 and Figure 11:** It is not clear why samples are not proposed east or

northeast of IR12MW19A. Proposed locations IR12B026 and IR12B027, which are designated to evaluate the extent of contamination for IR12MW19A are west of IR01SS49, as well as 150 feet south west and 165 feet west of IR12MW19A, respectively. Please add at least one location east of IR12MW19A (in the R&D/Industrial Buffer Zone) for PCB analysis.

14. **Table 3, IR13:** The sampling depth(s) and explanation are missing for IR13B016. Please add the missing information.
15. **Table 3, IR13 and Figure 12:** It is unclear why IR13B025, IR13B026, and IR13B027 will be 40 feet away from IR13MW11A; all of the other data gaps sample locations in IR13 will be only 25 feet away from the location that triggered the data gap. For consistency, please move locations IR13B025, IR13B026, and IR13B027 closer to IR13MW11A.
16. **Table 3, IR36:** IR36B184 and IR36B185 are depicted on figure 13, not figure 14 as shown in Table 3. Please revise the table to indicate the correct figure.
17. **Figure 15:** The RAs are not labeled on this figure, but RA 36-1 is listed in Table 3. Please label the RAs on Figure 15.
18. **Table 3, IR56:** Locations IR56B044 and IR56B045 are most likely intended to investigate the extent of contamination in the vicinity of PA56B004, but the explanation in Table 3 cites PA56B044. Please review the table and Figure 17 and revise the table as necessary to eliminate this discrepancy.

GENERAL COMMENTS ON ATTACHMENTS

1. The attachments are missing information critical to the successful implementation of the Data Gaps field investigation. For example, the location of each proposed boring or probe, and the numerical designation of each boring/probe and sample should be included within each attachment. Boring/probe locations for each proposed investigation should be included on a figure in each attachment; given the scale of the figures, the symbol will likely be 15 or 20 feet in diameter, which should give sufficient leeway to select locations in the field. If necessary, a site walk should be conducted to select locations prior to submission of the Draft Final or Final version of this document. Each boring/probe location should be numbered on the figure and the numbering scheme should be explained in the text. A table summarizing the rationale for the location of each probe/boring should also be included.
2. The attachments do not include a description of how sample designations will be assigned, do not indicate sampling depth(s) and generally do not include the number and type of quality assurance/quality control samples to be collected for each investigation.

The table summarizing sample locations, sample IDS, sample depths, analytes, and quality assurance samples is missing from each attachment. Please provide these missing tables, including the designations for field rinsate blanks, duplicate samples and matrix spike/matrix spike duplicate samples as appropriate.

3. The decision rules do not always include rules for step out sampling. The decision rules should include an *if...then* description of how it will be determined that step out sampling or additional sampling is required and how these additional locations will be chosen.
4. Most of the attachments do not specify the method for sample collection or the equipment to be used as required in Section 3.3.2 of the EPA Requirements for Quality Assurance Project Plans EPA QA/R-5 (EPA/240/B-01/003, March 2001). This information is critical to ensure that field personnel have the correct equipment and collect the samples correctly.

Attachment A, Parcel E Shoreline Rip Rap Characterization

SPECIFIC COMMENTS

1. **Section 2.0, Page A-3, Table:** The table states that there are five areas of “Light Riprap, Predominantly Concrete”, but only four areas are shown on Figure A-1; the areas shown on Figure A-1 are labeled C, E, F, and G. Please revise the table or figure as appropriate.

The “Metallic Debris Reef” is not shown on Figure A-1; please include this reef on the figure.

2. **Section 2.0, Page A-4:** Please describe the metallic debris in more detail to clarify why it is unlikely that there are any oils and greases within the debris (for example, discuss whether the equipment is massive and could still contain residual oil or is thin-walled and rusted, suggesting that oil and grease would have been released to the environment in the past). Also, please clarify whether the gauges could or did contain mercury. Please include a complete description of each sample in the field notes or log, including whether the sample appears oily or greasy and the type of debris in the vicinity of the sampling location.
3. **Table A-1, Step 4:** The term “low-tide mark” should be defined, because it will vary daily, and over the course of a month will change significantly. Please define “low-tide mark.”

Step 5: Decision rules should be developed to identify whether additional sampling is warranted. For example, if debris containing oil or another fluid is observed, provision should be made to collect a sample.

The sampling method described in Step 6 is not always judgmental, particularly when it is equally probably to find contamination at one of several locations. For “Heavy Riprap, predominantly concrete,” there are two sampling designs described; the first is systematic sampling along a transect, and the second is simple random sampling using a grid. Also, for areas with “Light Riprap, predominantly concrete,” systematic sampling along a transect has been proposed. Tolerable limits on decision errors can be determined for these methods and should be used to ensure that a sufficient number of samples will be collected to resolve the data gap in this area. Please specify the tolerable limit on decision errors in Step 6 of Table A-1 and revise the Text in Step 6 to indicate that not all of the sampling is judgmental. Also, please calculate the number of samples needed to meet the specified limit, review the number of proposed samples to ensure that a sufficient number of samples is collected, and revise the number of proposed samples if necessary.

The bullets in Step 7 do not contain consistent information; for example, the last two bullets do not specify the total number of samples to be collected. The last bullet does not specify the analyses to be conducted for samples collected from the Metallic Debris Reef area. Please revise these bullets to contain consistent information.

The method for selecting random grid nodes is not specified. In addition, the grids should be depicted in a figure and the random sample locations should be indicated. If necessary, a decision rule for selecting another grid node in the event that a selected node cannot be sampled should be developed. Please describe the method for selecting random grid nodes (random number generator, picking grid node designators from a hat, etc.), include the grids on a figure, specify the sample locations and identifiers, and provide a decision rule to select another grid node when a sample cannot be collected from a specified node.

Bullet 3 should specify four areas not five areas; see Specific Comment 1 above. Please revise the text in this bullet to specify “four” areas.

4. **Section 5.0, Page A-8, item 1:** In the fifth sentence, the term “square area” is used; it is unclear what is meant by this term. Please specify the square area mentioned in the fifth sentence.

Item 3: This item should specify four areas, not five areas; see Specific Comment 1 above. Please revise item 3 to specify four areas.

5. **Section 5.0:** There is no discussion of how sample locations will be numbered or how sample identification numbers will be assigned. In addition, there is no table listing all of the samples to be collected; this table should include QC samples. Please include a table that describes the rationale for the selection of sample locations (by sample identification number) in each area; this rationale should indicate how DQOs will be met. Also, please

discuss how sample locations will be numbered, and how sample identification numbers will be assigned.

6. **Section 6.0:** There is no information specifying the frequency of collection of quality assurance/quality control (QA/QC) samples. Please discuss the type and number of QA/QC samples to be collected. Also, please provide a table listing all sample identification numbers, analytes, and quality assurance control sample identification numbers so that this information is readily available to field personnel.

The list of equipment and discussions of methodology for sample collection, decontamination, special handling, and disposal are missing. Please describe how samples will be collected and specify the equipment to be used. Discuss whether samples will be homogenized. Also, please describe decontamination and disposal procedures. To aid field personnel in conducting the investigation successfully, please discuss any special handling requirements, for example, for chromium VI samples. Please specify the field data to be recorded (for example, sample color, staining, odor, composition, time of sample collection, etc.). Metallic debris in the vicinity of samples should be described, and, if possible, photographed.

ATTACHMENT B, Lateral Extent of Parcel E Landfill

SPECIFIC COMMENTS

1. **Figure B-1:** The extent of debris line on this figure is different than the extent of debris line on Figure 4.2-5 of the Draft Final Parcel E Remedial Investigation Report (RI). It does not appear that any additional sampling was done or that any additional information was collected after the RI was completed that would justify revising the extent of debris line, particularly in the west and northwest. Please explain why the debris line was revised or revise the figure to be consistent with Figure 4.2-5 in the RI.
2. **Table B-1, Step 3:** Boring and test pit logs, geophysical surveys, radiation surveys, etc. should be specifically listed as inputs to the decision; it is not sufficient to simply list "results from previous investigations." Please revise this column to include boring logs, test pit logs, geophysical surveys, scintillation surveys, soil gas survey data, etc.
3. **Table B-1, Step 7:** The locations of the initial borings should be depicted on Figure B-1. Also, the second bullet does not explain how to evaluate whether waste is present and will not provide enough information to conduct this investigation in the field. Please depict the locations of the initial borings on Figure B-1 and discuss how the presence of waste will be ascertained and what quantity of waste will be considered sufficient to merit a step-out boring. Also, please include an if...then decision rule to define when step out sampling should be implemented.

4. **Section 5.0:** The information provided is not sufficient to successfully conduct this investigation in the field. There is no list of necessary equipment to conduct this investigation. There is no description of how samples will be examined and logged, and no description of how the presence of waste will be evaluated to determine the need for step out borings. Please specify the equipment to be used to drill the borings and evaluate the samples (e.g., hollow stem auger drill rig, split spoons, OVA, etc.) and include an SOP for drilling and logging. Please discuss how samples will be collected, examined and logged, and discuss criteria for determining if there is sufficient waste to require a step out boring. Please discuss whether photographs will be taken and specify monitoring instruments to be used, and discuss whether these monitoring instruments will be used to determine if waste is present. Please discuss whether there is any provision for analytical samples if unusual conditions are encountered.

Attachment C, Landfill Gas Monitoring

GENERAL COMMENT

1. There do not appear to be any procedures in the work plan for collecting landfill gas samples. Please provide a reference for the Standard Operating Procedure (SOP) to be used by Navy personnel to collect the landfill gas samples. If no SOP exists for surface and subsurface sampling of landfill gas at Hunters Point, please adopt the procedures contained in the South Coast Air Quality Management District (SCAQMD) Rule 1150.1, or stricter, for all landfill gas sampling at Hunters Point.

SPECIFIC COMMENTS

1. **Table C-1:** It is not clear how driving force will be determined. Please briefly specify how the driving force will be determined. If pressure measurements are required, please describe the criteria for measuring pressure buildup.

Step 3: The results from the gaseous organic analysis are not included in the list of inputs to the decision. Please add the results of the gaseous organic analysis to the list of inputs to the decision.

Step 5: It is unclear whether installation of the landfill gas collection system is included as part of the data gaps investigation. Please clarify whether installation of the landfill gas collection system is part of this effort; if not, please indicate that this will be part of another removal action.

Step 7, First Bullet: The locations of the soil gas survey points are not shown on any figure; please include the soil gas survey points on Figure C-1.

Step 7, Last Bullet: The description of sampling locations specified in the last bullet “two soil gas probe locations on the northern edge of the landfill” and “two locations will be selected at random” does not agree with the text in the bullet at the top of page C-3 “one within the landfill and one on the northern perimeter of the landfill (taken from an existing well and a soil-gas probe, respectively).” Please revise either the text in the Step 7 bullet or the text on page C-3 to be consistent.

Also, the northern edge of the landfill is not the area where the highest concentrations of Volatile Organic Compounds (VOCs) have been historically detected in groundwater. The locations with the highest historic concentrations of VOCs in groundwater include IR-1B0275, IR01B021, and IR-01MW38A; these locations are in the central and southeast central part of the landfill. At least one soil gas sample for organic compound analysis should be collected from this area of historically higher groundwater VOC concentrations. The landfill cover has several high spots, and there are a number of monitor wells that penetrate the cap. Please collect soil gas samples for organic compound analysis from wells close to the high points of the landfill cap.

2. **Section 5.2:** There is no provision for confirmation sampling and analysis if methane is detected in a structure. Also, the second to the last sentence implies that the only buildings within 300 feet of the landfill are in IR-76, but there are buildings within 300 feet of the landfill in IR-75 and IR-56. Please consider collecting at least one methane confirmation sample; if this will not be done, please explain why. Also, please revise the second to the last sentence to include IR-56 and IR-75.
3. **Section 5.3, Boundary of Facility:** The text states that the landfill is 43 years old and has not received any new waste for 27 years, and thus it is likely that landfill gas generation has slowed at the site. However, because much of the waste in the landfill is submerged, landfill gas generation at the facility would likely be much slower than at a normal landfill. Please revise the work plan to discuss how quickly the submerged waste at the facility will decompose and the impact this will have on long term monitoring of the site.
4. **Section 5.4, General Characterization Design:** U.S. EPA agrees that the most likely location for landfill gas to leave the landfill is from the highest edge of the geomembrane cover. Also, the landfill cap is “faceted”, so there are numerous surfaces with different slopes and several “high spots.” Please include a topographic map of the landfill showing the elevations of the geomembrane and specify sample locations to assure that the highest elevations of the geomembrane edge are surveyed for methane.
5. **Section 5.4, General Characterization Design:** Other potential landfill release locations for methane are at the highest overall elevation of the geomembrane (and any local high spots) and at any geomembrane penetrations (e.g., well boots). Please revise the work plan to include a surface survey of the landfill cover at the highest elevations

and at all known geomembrane penetrations.

6. **Section 6.1, Page C-8:** It is unclear how the evaluation to determine driving force or “significant probe pressure” will be done. Please specify the equipment and method to be used to evaluate the driving force or probe pressure.
7. **Section 6.2, Page C-8:** It is unclear whether the Teflon tubing will be evacuated before the sample is collected. Please specify that the Teflon tubing must be evacuated before each sample is collected and explain how this will be done.
8. **Section 6.2, Volatile Organic Compound Sampling, Page C-9:** In addition to analyzing soil gas samples for the indicated parameters, please also analyze the samples for oxygen content and carbon monoxide. Please consider having the samples analyzed for carbon dioxide. The purpose of analyzing for oxygen is to see if an oxygen deficient atmosphere, evidence of decomposition, is present. The purpose of analyzing for carbon monoxide is to assess if the landfill is still smoldering. The purpose of analyzing for carbon dioxide is to assess if anaerobic decomposition is occurring.
9. **Section 6.2, Volatile Organic Compound Sampling, Page C-9:** The work plan indicates that random gas samples will be collected in the event that no elevated Organic Vapor Analyzer (OVA) readings are detected. Rather than random locations, in the event that no elevated OVA readings are recorded, please collect the soil gas samples as near as possible to the locations where elevated methane concentrations were detected.

In addition, please consider collecting an additional sample near the area where the highest concentrations of VOCs were previously (or currently, if more recent groundwater sampling results are available) detected in groundwater (please see Comment 1, step 7 above).

In the second bullet, IR01MW16A “was selected to represent the approximate center of landfill gas generation.” This well is located near beyond the north edge of the landfill, so it is unclear how it is the center of landfill gas generation. Please explain this statement.

9. **Section 6.3:** The range of seasonal water table elevations and the waste depths are not provided. To facilitate field work, please specify the range of seasonal water table elevations and provide a map of waste depths.

Attachment D, Liquefaction Potential at Parcel E

GENERAL COMMENTS

- ii The attachment provides the basis for conducting an extensive evaluation of liquefaction potential in the subsurface soils lying between the Hunters Point Parcel E industrial waste landfill and San Francisco Bay. There is little doubt that liquefaction will occur at this site. The California Division of Mines and Geology Seismic Hazard Map dated November 17, 2000 indicates the entire shoreline at Hunters Point is likely to experience liquefaction. Borings installed in the vicinity of the industrial waste landfill indicate there are deposits of saturated, loose cohesionless materials present along the shoreline adjacent to the industrial waste landfill. The site is fairly close to the San Andreas fault and the thick deposits of Bay Mud underlying the site could significantly amplify the bedrock response. The Navy's main concern regarding liquefaction at the site, given the absence of structures at the site and the lack of any identifiable strata that could lead to a catastrophic flow slide which might cause an uncontrolled release of hazardous constituents into the Bay, appears to be lateral spreading damaging some of the existing environmental controls present at the site. These environmental controls include the multi-layer cap over the landfill and a vertical groundwater barrier installed between the landfill and the Bay.

Given the heterogeneous nature of the subsurface deposits at Hunters Point, it is unlikely that the Navy will be able to identify all of the liquefiable strata at the site that might cause damage to the existing environmental controls. Thus, even if liquefaction mitigation measures are implemented at the site, the existing environmental controls are likely to be damaged in an earthquake. In addition, even if all of the liquefiable strata could be identified, it is likely the cost of mitigating the liquefaction hazard would be greater than the cost of repairing or replacing the existing environmental controls. This assumes that nothing can be done to prevent liquefaction beneath the landfill cap (where the Navy has not proposed any liquefaction studies) and that damage to the cap would be minimal in any case. Thus, there is some doubt that the proposed study can be justified on a cost/benefit basis as the cost of conducting the study, let alone the cost of any liquefaction mitigation, is likely to be similar to the cost of repairing any future liquefaction damage and there will probably be liquefaction damage regardless of any mitigation efforts implemented at the site. Please revise the report to include an analysis of the cost/benefit of conducting the proposed work. This analysis should assume that the vertical groundwater barrier between the landfill and the Bay will require replacement after the design earthquake event and compare the cost of this replacement to the cost of conducting the proposed work and the cost of implementing soil improvements at the site that would prevent the damage to the vertical barrier.

2. The Navy appears to have discounted the possibility that a flow slide could occur at the site. A flow slide could occur if there were a continuous strata of liquefiable material underlying the landfill which had a residual shear strength less than the shear stress that would be developed in the liquefiable strata during the design earthquake event. As this event would pose a severe hazard to the environment, please revise the attachment to discuss whether there is the potential for a flow slide at this site. If there is a potential for a flow slide at the site, please discuss what steps the Navy will take to prevent it from

occurring.

3. If the Navy concludes that the liquefaction study is justified, please include a schedule for preparing the study work plan. Please include a schedule for all field activities in the work plan. Please indicate if the soil borings or Cone Penetrometer Testing (CPT) will be conducted first during the field program.

SPECIFIC COMMENTS

1. The work plan is missing many of the elements that will be necessary to assure that useable data is obtained from the field program. Please revise the work plan to include:
 - ii Procedures to be used to assure that Standard Penetration Test (SPT) blow counts are measured in a repeatable fashion across all borings. At a minimum this would require specifications requiring that all SPT equipment be in good condition, that the same operator conduct all SPT testing using the same equipment, and that the same procedures be used at every boring (automatic SPT hammers should be used) and that the SPT sampler be inspected between tests to assure it has not been damaged. Often, these types of subsurface exploratory programs use load cells to assess how much energy is being imparted to the SPT sampler by the drop hammer.
 - ii Procedures to be used by field personnel to log borings. Assure that field personnel record the angularity of coarse grained soil deposits, gradation of materials, any cementation noted, soil color in accordance with a standard (e.g., Munsel color charts) which may be useful for establishing stratigraphy, the presence of organic materials, vapor analyzer readings (both head space and borehole values), staining, et cetera.
 - ii Procedures to be used by field personnel to document the conduct of the SPT testing (blow counts per minute, dimensions of drop hammer [to verify weight], length of drill string, presence of sampler liner, dimensions of the sampler [length, outside and inside diameters], personnel conducting the test, equipment used, turns of the rope around the pulley, any problems encountered [e.g., caving of the borehole, loose soil in the sample, rocks or other detritus that may have affected the blow counts, damage to the sampler, delays during the actual conduct of the test which may have allowed the soils to set up, partial hammer falls, changes in equipment et cetera], procedures used to calibrate the load cell, if used, et cetera).
 - ii Procedures to be used by field personnel to log and store subsurface samples for later review by senior geologists. At a minimum, samples of every potentially-liquefiable strata should be saved for later review. Please expand on the soil tests specified in Table D-1 to include sieve analyses by ASTM D422 (needed to obtain D_{10} and D_{50}) and delete relative density testing as the results will be meaningless

for disturbed soil samples.

- e. Procedures to be used to calibrate the Cone Penetrometer Test (CPT) tip and side resistance values to soil types. At a minimum, one CPT probe should be advanced directly adjacent to a continuously sampled boring to provide sufficient data to calibrate the CPT site-specific soil correlation.
 - f. A discussion of the CPT-soil correlation to be used to develop subsurface profiles.
 - g. Procedures to be used in the event that the CPT probe cannot be advanced through near-surface rubble.
 - h. Maps showing the approximate locations of all proposed subsurface penetrations (CPT and SPT) with respect to the features (e.g., the subsurface groundwater barrier) that are believed to be potentially susceptible to liquefaction damage.
 - i. Procedures to be used to clear boring locations for utilities and other subsurface features (e.g., the groundwater extraction system by the groundwater barrier).
 - j. A health and safety plan should be included or referenced.
2. In addition to collecting field data, the Navy should also assess the history of the site. If the landfill is built on fill, the Navy should provide a description of how the land was created and the source of the fill used to create the land.

MINOR COMMENT

Page D-2: The report indicates that “Graded soils are less likely to liquefy than are well-graded soils because of the smaller pore spaces.” This appears to be a typographic error as well-graded soils have smaller pore spaces than poorly-graded soils and are less likely to liquefy. Please evaluate this statement and revise it for clarity.

Attachment E, Small Arms Firing Range Characterization

SPECIFIC COMMENTS

1. **Section 2.0, Page E-2:** Useful information could be provided by also collecting known volumes (or weights) of soil and sieving to evaluate the amount of spent rounds, bullet fragments, and casings that are present. Please consider including this evaluation for visible evidence of firing range activities and discuss whether this activity will be included.
2. **Section 5.0, Page E-3:** Information critical to successfully complete this investigation is

missing. The figure that shows the grids and sampling locations is missing. The method for selecting the random sampling locations should be presented. Please discuss the method to be used to select the random grid nodes, include a figure with the grids superimposed on it and indicate the random nodes selected for sampling. Also, please include a table listing all sampling locations, sample Ids , sample depths, rinse blanks, duplicate samples and MS/MSD samples.

3. **Section 5.0, Page E-4:** The last sentence states that “additional samples may be collected to characterize areas of concern identified during the field event,” but does not specify the criteria that will be used to determine if additional sampling is necessary. It is also unclear how additional locations would be selected. Please specify the criteria to be used to determine if additional sampling is warranted and include these criteria as a decision rule. Please discuss how additional locations will be selected and how the number of additional samples will be determined.
4. **Table E-1, Step 6:** The proposed sampling method is actually simple random sampling using a grid, not judgmental sampling as stated in the text in the Step 6 column. Tolerable limits on errors can and should be specified for this sampling method. Please revise the text that describes the sampling method in Step 6 and specify the tolerable limits on errors.

Attachment F, Parcel E Wetlands Delineation Work Plan

GENERAL COMMENTS

1. Generally, the wetland delineation approach presented in the Work Plan is adequate. However, additional detail would allow the reviewer to determine whether the proposed activities represent a comprehensive delineation process. Please provide additional detail to supplement the delineation where COE procedures will not be followed.
2. Copies of the field data forms that are proposed to be used in the field should be included for agency review. Please provide copies of all field data forms.

SPECIFIC COMMENTS

1. **Section 2.0, Project and Task Description, Page F-2:** The first sentence states that all areas previously identified as having wetlands will be surveyed, and presumably evaluated. Please revise the text to state that all potential wetland areas will be evaluated, including newly identified areas described in Section 1.2.
2. **Table F-1, Data Quality Objectives Steps, Page F-5:** The term used to describe the vegetation is incorrect. Please revise the last bullet in Step 2 from “...support prevalent

vegetation.” to “...support hydrophytic vegetation.”

The review and evaluation of county soil survey information is missing. Please revise Step 3 to include a review and evaluation of county soil survey information and hydric soils lists. The next-to-last bullet mentions points of interest; please revise the text of later sections to include a discussion of points of interest (i.e., it is assumed that points of interest correspond to observation points prescribed by the COE guidance). The last bullet indicates that sample core tubes will be used, presumably to determine the depth to saturated soil; please clarify the intent of the text in this bullet. Although Section 6.0 indicates that a variety of methods may be used to determine soil and hydric conditions, the COE guidance states that a soil pit is the method by which soils and hydrology are evaluated. Please revise the text to identify soil pits as the method by which soils and hydrology will be evaluated or provide specific methodology to be used when the COE guidance will not be followed.

All potential wetland areas should be evaluated as described in Section 1.2 (see Comment 3). Please revise the first and second bullets in Step 4 to include newly identified areas.

The third bullet is unclear. Please revise the third bullet in Step 5 to read “If no indicators of wetland hydrology are present, then wetland hydrology is not present.”

3. **Section 6.0, Sampling Methods, Page F-6:** A discussion of site specific issues that will influence sampling is needed. Please revise this section to include a discussion of site-specific issues that will influence sampling, such as the approximate sizes of each of the areas to be evaluated, whether normal circumstances are anticipated, or whether atypical situations exist at the study areas. The text lists various sample collection methods that may be used to determine soil and hydric conditions; however, the COE guidance states that a soil pit is the method by which soils and hydrology are evaluated. If certain site conditions may require deviation from COE guidance, please revise the text to describe the site-specific conditions that would necessitate the use of sample methods other than digging soil pits (i.e., hand auger or hand operated sampling tube). Alternatively, the text should identify soil pits as the method by which soils and hydrology will be evaluated.

Critical information should be recorded on field data forms. Please revise the third paragraph to state that the presence or absence of indicators of wetland hydrology will be recorded on the field data forms.

The fourth paragraph states that observations will be performed along a transect line perpendicular to site contours. The proposed method is not in strict accordance with the guidance. Depending on the size of the area, transect lines may not be needed, or more than one may be needed. Step 4 and Step 20 of Section D, Subsection 2 of the COE guidance specify that observation point locations should be based primarily on vegetation community types. Please revise the text to reflect this aspect of the guidance. In addition please revise and expand the fourth paragraph to adhere to and describe the step-wise

process prescribed by the COE guidance.

4. **Section 6.0, Sampling Methods, Page F-7:** The text states that hydrologic indicators will be assessed primarily by visual observation. However, tidal fluctuations (frequency, duration, and elevation of inundation) will likely not be fully characterized during field observations. It is recommended that a continuous tidal gauge station be installed to measure the frequency, duration, and elevation of tidal inundation. Alternatively, the text should be revised to specify the “background data” (e.g., district COE files) that will be used to estimate the long-term and seasonal hydrology.

Additionally, the text states, “if soil cores are inconclusive, the wetland... boundary will be determined based on coverage of hydrophytic vegetation”. Please revise the text to describe what characteristics would make soil cores inconclusive, and indicate whether this result is expected based on previous experience on the site.