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ALAMEDA POINT
SSIC NO. 5090.3

22 Oct 96

MEMORANDUM

From: Code 09KRE
To: Ken Spielman, Code 1831.4

Subj: INTRINSIC SEDIMENT PROCESSES STUDY, SITES 2 AND 17, NAS ALAMEDA, CONTRACT NO. N62474-94-D-7420, DELIVERY ORDER 004, SITE SPECIFIC HEALTH AND SAFETY PLAN REVIEW COMMENTS

Ref: (a) BERC Delivery Order 004 Submittal: Treatability Study Work Plan w/ Project Site Specific Health and Safety Plan dtd July 96 prepared by Allied Technology Group, Inc. (ATG)
(b) 29 CFR 1910.120 and 29 CFR 1926.65
(c) Code 1825 Industrial Hygienist Review Comments dtd 7 Oct 96

1. As requested, reference (a) was reviewed for compliance with reference (b) safety considerations. Comments provided by reference (c) was part of the review process. The proposed project Site Specific Health and Safety Plan was found acceptable for safety with the following exceptions:

a. **General Comment.** For the SHSP to be user friendly it is recommended that rather than referencing the applicable Section ___ of the BERC Program Health and Safety Plan and expecting the SHSP user to refer to the applicable section for requirements that either (1) the pertinent information of referenced sections of the BERC Program HSP be incorporated in the site specified SHSP, or (2) have the SHSP serve as an addendum to the Program HSP, and address only the site specified work, related hazards and controls. In both cases, the BERC Program HSP is required to be on site.

b. **Specific Comments.**

1. *Section 7 of Sampling and Analysis Plan SOPs.* At a minimum, each SOP should address required PPE (Level D or Modified Level D), and sample collecting procedures with a cross reference to the pertinent SSHP section rather than a blanket statement that a HSP has been prepared for this project. The blanket statement doesn't refer the user to Appendix C of Workplan.

2. *Site Specified Health and Safety Plan, Sec. 2.6.* Recommend adding a reference to the appointment of an alternate SHSO in the instances that Mr. Chiu's is absent from site.

3. *SSHP, Section 2.___.* Recommend adding a Field Personnel section that provides the anticipated number of field personnel and expected hours of work.

4. *SSHP, Sec. 3.2.* For each identifiable work task by Site, complete Figure 1, Hazard Analysis Form found in Section 3.2 of the BERC Program HSP, and provide as an attachment to the SHSP.

5. *SSHP, Sec. 3.2.2.* Recommend the inclusion of drilling (soil boring) activities.

Enclosure (1)

6. *SSHP, Sec. 3.2.2.3.* Recommend changing the section title to *Heat and Cold Stress* as section discusses both.

7. *SSHP, Sec. 4.* Recommend rephrasing Sentence 1 to reflect the need for 40 hours for some field personnel. Suggested rewording: 'All personnel entering the EZ or CRZ shall have completed at least 40 (or for some tasks, 24) hours of hazardous waste related training, as required by 29 CFR 1910.120(e) or T8CCR 5192. All field personnel must have received a minimum of three days of actual field experience under the direct supervisor of a trained, experienced supervisor.' Remove the exposure to PELs rationale as not being applicable.

8. *SSHP, Sec. 6, Para. 1, Sentence 4.* Recommend adding that the visitors to EZ must meet the same medical and training requirements as project field personnel.

9. *SSHP, Sec. 7, Attachment 7-4.* Recommend that required PPE be broken down by work operation (i.e., mobilization, drilling operations) rather than by zone. Respiratory protection is not addressed.

10. *SSHP, Sec. 9.1.* Initial air monitoring to determine personnel exposures and the required EPA PPE level is not addressed. Downgrading of respiratory protection is addressed in this section but not in the SSHP, Sec. 7.

11. *SSHP, Sec. 10.* Location of emergency (listed as miscellaneous on Attachment 7-4) supplies and equipment is not identified. The availability of drinking water and toilet facilities is not addressed.

12. *SSHP, Sec. 10.5.* Add that a copy of the completed Accident/Incident form will be provided to Navy Contact (ROICC) within the prescribed timetable.

13. *Appendix B, Acoustic Imaging Safety Plan dated 28 June 1996, Sec. 4.1, Par 2., Sentence 4, Pg. 6.* Recommend removal of sentence as not being applicable or correct reference. 29 CFR 1926.106 addresses Working Over or Near Water and not Live Electrical Work.

2. Please request Allied Technology Group, Inc. to review and address review comments. Recommended changes should be clearly identified.

3. Any questions or comments, please contact the undersigned at (415) 244-2955.

REGINA ENG

Copy to: 09K: Chron, Contract (w/ref b), 1825GN, RE
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MEMORANDUM
Job Order No. 96B62BIR
7 October, 1996

RPM Mr. Kenneth H. Spielman
Code 18314

From: Gilbert Nickelson, Jr., Code 18253

To: Kenneth H. Spielman, Code 18314

Subject: DRAFT SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR TREATABILITY STUDY, INTRINSIC SEDIMENT PROCESSES STUDY, AT SITES 2 AND 17, NAS ALAMEDA, CA, CONTRACT N62474-94-D-7430, DELIVERY ORDER (DO) 004

References: (a) Draft Site-Specific Health and Safety Plan for Treatability Study, Intrinsic Sediment Processes Study, at Sites 2 and 17, NAS Alameda, CA, Contract N62474-94-D-7430, Delivery Order (DO) 004
(b) 29 Code of Federal Regulations (CFR) 1910.120 (Hazardous Waste Operations and Emergency Response)
(c) 29 Code of Federal Regulations (CFR) 1926.65 Subpart D
(d) Navy/Marine Corps Installation Restoration Manual (February 1992)
(e) American Conference of Governmental Industrial Hygienist (ACGIH) 1995-1996 TLV Booklet

General Comments:

1. The subject document, reference (a) was prepared for ENGFLDACT by the Berkeley Environmental Restoration Center (BERC), Berkeley, CA and is dated 19 July, 1996. The method used for this review was to compare the Site-Specific Health and Safety Plan (SSHSP) for environmental health compliance, to federal requirements under the Occupational Safety and Health Administration (OSHA) regulations, and to the Department of the Navy requirements (see references (b) through (e), above). If there are any questions regarding my comments, please contact me at (415)-244-2577, DSN 494-2577. My comments are provided as follows:

Specific Comments:

(a) Page 4, Section 3.2, addresses "Hazard Analysis"

Comment: As an administrative comment, it is recommended to change sentence number 3, paragraph number 5, "....contaminants are sorbed to...." to read ...contaminants are absorbed in the soil..., or use adsorption... Some job hazard information is noted to be scattered through out Sub-Sections 3.2 and 3.3.

Enclosure (2)

Recommendation: We recommend using the three column hazard analysis format as noted in Figure 1-1, page 5, of the U.S. Army Corps of Engineers, Safety and Health Requirements Manual, EM 385-1-1, October 1992. This will facilitate the identification of site tasks and ensure clarity and completeness of each task-hazard analysis.

(b) Page 6, Section 3.2.2.3 addresses "Heat/Cold Stress"

Comment: Sentence one, paragraph one states that the standard safety procedures for heat stress-related hazards is contained in Section 12.15 of the BERC Health and Safety Plan (Boiler Plate) Program. All site personnel should be familiar with the symptoms of heat or cold stress and the information pertaining to the prevention, physiological monitoring, **signs/symptoms**, and appropriate field management of heat/cold injuries are not provided in reference (a), SSHSP.

Recommendation: Since heat/cold stress are the most likely hazards to be encountered on this site, all pertinent information, particularly for heat and cold stress should be provided in the final SSHSP. Additionally, since cold stress is anticipated as the most potential hazard, provide additional cold stress preventive measures in accordance with reference (e).

(c) Page 6, Section 4 addresses "Training Requirements"

Comment: Sentence one of paragraph one states that; "Work in the exclusion zones of the project will require completion of a 24 hour hazardous waste class since it is very unlikely that worker exposures will exceed applicable PELs." Assumptions concerning worker exposures above the PEL/TLV should not be made at any time, at IR sites if the worker spends 40 hours at the site in question.

Recommendation: Please define the amount of time and worker responsibilities involved in this project. Will the workers spend 6 to 10 hours per day or more conducting site tasks? If so we recommend that the workers complete the required 40 hour training in accordance with 29 CFR 1910.120 (e)(3)(i), in the case of workers on site only occasionally for a specific limited task then they shall receive a minimum of 24 hours of training in accordance with 29 CFR 1910.120 (e)(3)(ii), in accordance with references (b), and (c).

(d) Page 4, Sub-Section 3.2.1 addresses "Chemical Hazards," and Page 10, Section 9 addresses "Exposure Monitoring"

Comments:

a. Information is not provided indicating the location or the frequency of air-monitoring that will be performed at this site. What about sampling for other contaminants other than hydrogen sulfide, to include (VOCs), (SVOCs), metals, and

pesticides listed on page 4, sub-section 3.2.1, and Table 3-1. What air-monitoring equipment will be employed for these chemicals?

b. Information pertaining to calibration and maintenance of direct reading air-monitoring equipment is not provided.

c. A method to inform employees of monitoring results is not provided. Additionally, sample collection information such as date, time, weather conditions, and name of person collecting samples are not specified to be maintained in accordance with references (b) and (c).

Recommendations:

a. Include this information in the final HASP.

b. We recommend that all direct reading air-monitoring equipment be calibrated in accordance with the manufacturer's instructions and standard industrial hygiene practice, before and after each period of use.

c. Provide this information in the final SSHSP, and state the frequency and the location of the sampling that will be conducted by consolidating the air monitoring information.

(e) Page 7, Section 6, addresses "Site Control Measures"

Comment: Control methods, such as ensuring medical clearance, and training requirements in accordance with references (b), and (c), and that all employees and visitors are logged in, are not included.

Recommendation: Include appropriate site-control information for this SSHSP in the final document.

(f) Page 9, Section 8, addresses "Decontamination"

Comment: In sub-section 8.1 "Decontamination Procedures" there is no mention of a shower for workers as a part of good personal hygiene.

Recommendation: We recommend including a statement that workers should shower as soon as possible after leaving the CRZ, preferably prior to leaving the site.

(g) Page 11, Section 10, addresses "Emergency Response"

Comments:

a. Information regarding who is to provide emergency first aid/CPR support on-site is not provided.

b. Information concerning emergency decontamination is not provided.

c. Information regarding the availability of emergency response equipment, i.e., emergency eyewash equipment, first aid kits, or supplemental personal protective equipment (PPE) is not provided.

d. On page 11, Section 10, sentence two, paragraph two, it is stated that, "All personnel not trained in spill control cleanup shall evacuate the area." The additional training requirements for the spill responders is not provided.

Recommendations:

a. It is recommended that a minimum of two persons, trained and certified in adult first aid/CPR be on-site during hours of operation. In addition, these personnel need to receive training in Bloodborne Pathogens in accordance with 29 CFR 1910.1030.

b. Please provide this information in the final SSHSP.

c. It is recommended that information be provided to include; the type and location of all emergency response materials. Equipment such as emergency eyewash units/deluge showers, must meet the criteria of the American National Standards Institute (ANSI) standard Z358.1-1990, or most the recent updated version.

d. I suggest that if BERC personnel are going to provide emergency response, include information regarding the additional training they will have been provided, in accordance with references (b) and (c).

2. Please review and consider the provided environmental health comments and recommendations. Recommended changes should be clearly identified by the following methods; (a) by submitting revised pages with reasons for the changes noted, and (b) by the use of shading and italics, or by cover letter stating how comments have been addressed. Final acceptance of this SSHSP by this office is dependent upon the safety compliance review by Ms Regina Eng, Safety and Occupational Health Specialist, Code 09KRE.

Gilbert Nickelson, Jr., Code 18253
Industrial Hygienist

PRC COMMENTS ON
TREATABILITY STUDY WORKPLAN
INTRINSIC SEDIMENT PROCESSES STUDY
SITES 2 AND 17
NAVAL AIR STATION, ALAMEDA
ALAMEDA, CALIFORNIA

General Comments

The Intrinsic Workplan primarily addresses characterization studies for detailed and non-standard sediment chemistry and biological toxicity (or bioaccumulation). As such, it is suggested the title could be changed to "Intrinsic Sediment Processes Study", and the two treatability studies (discussed below) could be a key chapter of the document rather than the focus of the title.

The "Treatability Study Workplan, Intrinsic Sediment Processes Study for Sites 2 and 17" (Intrinsic Workplan) does not provide typical and recommended elements of a treatability study workplan. Treatability study workplans should include: (1) concise and detailed objectives that can be measured and shown to support a developer's claims (such as for a technology), (2) stated measurements that will determine either success or failure for the study, and (3) a positive link between the objectives and measurements. Objectives and measurements of treatability studies should be quantifiable to determine success or failure of a technology.

Two treatability studies are included in the Intrinsic Workplan for (a) evaluating the intrinsic transformation of polynuclear aromatic hydrocarbons (PAH) and polychlorinated biphenyls (PCB) in anaerobic sediments and (b) evaluating the transformation of PAHs and PCBs in vadose zone soil plots. For these two treatability studies, the standard operating procedures (SOP) provide most of the necessary treatability study elements. Each of the SOPs should include statements addressing the expected percent change that would determine success or failure for the treatability study.

Treatability studies do not need to include the detailed information provided in Section 2.0 of the Intrinsic Workplan. A brief statement of the problem to be addressed supported with tables and figures is more typical. Section 3.0 and 5.0 should be combined to make the workplan more focused on the studies to be conducted. As it is, Section 3.0 provides much of the rationale for conducting the work, and Section 5.0 also provides some rationale. Instead, Section 3.0 could provide all rationale, and Section 5.0 could provide only the methods to be used for measurement. Additionally, Section 5.0 and the SOPs are repetitive; perhaps Section 5.0 could be reduced to providing the SOPs along with tables and figures showing experimental setup, measurement points, or other physical details about the studies.

Enclosure (3)

Much of the characterization proposed in the Intrinsic Workplan may provide data that could aid in the evaluation of a "no action/natural recovery" remedy proposal in the feasibility study for the Seaplane Lagoon. Some of the bulk chemistry and metal speciation work may aid in the evaluation of physical/chemical treatment of sediment or the dredge remedy. The following bulleted items are examples of technical considerations that may be addressed in the feasibility study for the Seaplane Lagoon; these considerations are partially addressed by the work proposed in this Intrinsic Workplan.

- What are the current and past rates of sedimentation and sediment mixing zone depths?
- What are the rates of abiotic processes of contaminant degradation?
- What are the rates of biologically mediated contaminant degradation?
- What humic or other organic substances are in the sediments and what are their effects on the availability and/or toxicity of hydrophobic organic compounds and metals?
- What is the effect of dredging on the mobilization of contaminants?
- What are the metal species and metal complexes in the sediment?
- How much gas production might occur beneath an engineered cap over the sediment?
- How much settlement might occur beneath a cap?

Specific Comments

Table 2-6. The PRC data in Table 2-6 are from 28-day bioaccumulation tests, not organisms collected from the site. The text (on page 3-7) and table are unclear on this point; the table should be corrected. These data should also be summarized in the section discussing the bioaccumulation tests to be conducted during this intrinsic work.

Figure 2-8. This figure represents monitoring wells and boring locations. Eight monitoring wells are shown to have been installed by "E&E, 1983." This may be an error in references. A 1983 report by Harding Lawson Associates, titled "Final Submittal, Sanitary Landfill Site Study, Naval Air Station Alameda, Alameda, California", includes discussion and a figure for some, but not all, of these wells as installed by Harding Lawson. E&E did not conduct field work at NAS Alameda.

Section 3.7, Page 3-9, first paragraph. Can the lead-210 profiling distinguish between sediment

that has come from storm drain outfalls and sediment that has migrated into the Seaplane Lagoon from outside?

Section 3.7, Page 3-9, second paragraph. It has been determined that there is most likely an upward groundwater gradient in the Seaplane Lagoon. The most useful information for evaluating the implementability of capping will be to show how the magnitude of the upward gradient changes across the 110-acre site. Perhaps this could be the issue addressed during this study.

Section 3.7, Page 3-9, third paragraph. (A) Tidal influence cannot be determined with slug tests. (B) It has already been determined that the groundwater is in contact with landfill material. It is not the tidal fluctuations that cause direct groundwater contact with the landfill material. A suggested means of determining contaminant flux between the landfill and the wetlands is to install passive diffusion groundwater monitoring wells (manufactured by Wheelabrator Water Technologies, Inc.).

Section 3.7, Page 3-10, first paragraph. It has already been determined that the seawall does not prevent hydraulic connection between the bay and the perimeter monitoring wells; this knowledge is based on (a) analytical data for total dissolved solids (TDS) that show TDS concentrations in groundwater wells mimic seawater and (b) tidal influence observed in the wells. It is suggested this not be focus of the proposed study.

Section 4.0, Page 4-1, third paragraph. The text states that initial cores will be examined to "confirm that the cores are representative of expected site conditions", and also to determine whether the "sediment column appears homogeneous". The criteria for making these determinations are not provided, and it is not clear how one would view a sediment core and know whether it is representative of site conditions or homogeneous.

Section 4.0, Page 4-2, third paragraph. Please clarify whether or not the soil gas samples will be collected from vadose zone soil.

Section 5.3.1.1, Page 5-12 and SOP 25.3. The porewater extraction method involves centrifuging the sample at 2,500 g (is g the correct unit?) and then filtering the sample prior to analysis. Also, the text in Chapter 5 and the SOP indicate that centrifuged samples will be filtered. Recently, the regulators requested the Navy evaluate the treatment of porewater samples being collected under the remedial investigation/ecological assessment; the regulators questioned whether a centrifuge speed of 2,500 or 10,000 g was appropriate. The Navy proposed a speed of 10,000 to reduce total solids in the elutriate. It appears that BERC proposes to filter the sample to reduce solids in the elutriate. Because BERC and PRC want to share data as much as possible, the treatment of porewater samples should be consistent between the two programs, and efforts should be made to coordinate the treatment of porewater samples.

Section 5.5.4, Page 5-29, first and second paragraphs. While the text does not state that the culvert will be blocked during this study, it is implied. Blocking the culvert is unacceptable because the birds that feed in the wetlands are sensitive to the rise and fall of the water level in the pond; it is not possible to determine how an instantaneous changes in hydrology may affect the bird feeding habits. Also, please refer to comment on Section 3.7, pages 3-9 and 3-10.

Section 5.6.1, Page 5-30, second paragraph. Please remove the reference to Seaplane Lagoon dredge material being placed on the West Beach Landfill Wetlands unless a confirmed source can be identified.

Section 5.6.2, Page 5-37, second paragraph. The text states, "The carbon isotope ratio data from these studies will demonstrate whether intrinsic biotransformation of petroleum hydrocarbons is occurring in Seaplane Lagoon sediments, and provide some indication of the microbial processes that occur in the sediments."

If this technique is capable of determining whether or not biodegradation is occurring, then it seems that this should be the only technique used now, instead of conducting the other tests proposed. The investigator should be able to provide a level of confidence for this claim, and reference other situations where this determination has been made. Quantifiable goals should be stated.

However, the quoted sentence seems self contradictory because it indicates the technique can demonstrate intrinsic biotransformation, but then qualifies that statement by saying the technique should "provide some indication" of microbial processes.

Section 5.6.6, Page 5-42. This is a promising treatability study. However, this study should be conducted in containerized plots and **not** in the native soil on the surface of the site. The containerized plots should be lined by using commercially available plastic containers (like baby swimming pools), and provisions should be made to ensure that soil and drainage water cannot contact the actual soil surface. If such provisions cannot me made, the study should be conducted at the laboratory. Adding contaminants to the surface of the site may not be acceptable to regulatory agencies.

The SOP for this treatability study should state the expected observed percent change that will determine whether or not there is actually a decrease in contaminant concentrations.

SOP 25.1. Sediment collection techniques assumes the use of a boat. Recent observations in the wetland indicate that the southern pond is dry and the northern pond has an average depth of about 20 inches, so the use of a boat is not practical. A separate SOP should be prepared for collecting sediment cores in the wetland area.

Additional Comments

If BERC is planning to sample before the rainy season, then they should focus on the northen pond only because it is the only pond with ample water in it. It is suggested that BERC and PRC coordinate their tissue and sediment sampling locations in the wetlands. To facilitate this, PRC could mark locations LW002, LW003, LW004, and LW005 during field efforts so BERC can locate them later. LW005 is the location containing the highest PCB, DDT and metal concentrations.

If sampling is to be conducted after the rainy season, both ponds could be sampled. In this case, the suggested locations would be those containing the highest concentrations of PCB and DDT (LW003, LW005, LW009, LW006). Alternatively, to sample over a range of contaminant levels, locations LW007 and LW011 are suggested.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, CA 94105-3901

MEMORANDUM

SUBJECT: Review of Draft Treatability Study Work Plan for Intrinsic Sediment Processes Study, Sites 2 and 17, Naval Air Station Alameda, August 1996.

FROM: Ned Black, Ph.D. (H-9-3) JNB
Technical Support Team

DATE: 22 October 1996

TO: James Ricks (H-9-1)
Remedial Project Manager

I have reviewed the document referenced above and have the following comments.

1. Pg. 3-8, last paragraph of Section 3.6. I would like more information on the model, parameters and uncertainties which will be used to evaluate equilibrium partitioning. It is not clear that direct measurements of partitioning would not be better.

2. Pg. 3-11, last paragraph of Section 3.8. Will field spikes of PCBs be necessary?

3. Pg. 5-1, Section 5.0. This section would be easier to read if the individual project sections referenced the appropriate Standard Operating Procedures in Appendix B by number.

4. Pg. 5-7 to 5-8, Section 5.2.4. The work plan should provide data to support the claim that drying and subsequent handling will not affect the chemical state of the samples (see Comment #7). If this data exists within the references cited, please make this explicit.

5. Pg. 5-14, Section 5.3.2. To avoid confusion, the work plan should make clear that the depths of the 0-, 1-, and 2-m samples indicate depths within the sediments.

6. Pg. 5-40, Section 5.6.4. Will the reactors be sampled anaerobically? See Comment #8.

7. Appendix B, SOP 26.3, Sediment Bulk and Mineralogical Analyses, Section 5.2. Oxidation can take place in the absence of water. The work plan should include data or references to support the claim that the samples will not chemically affected by air during the grinding, or make some provision to perform the grinding under a protective atmosphere.

8. Appendix B, SOP 30.3, Intrinsic Transformation of PAHs and PCBs in Anaerobic Sediments, Section 5.0. Step 1; What is the third gas in the mixture which will be used to purge the headspace of the reactors? Steps 2, 7, & 8; Will the reactors be sampled anaerobically? What steps will be taken to protect the redox sensitive chemical species until analysis?

Enclosure (4)

Battelle
Putting Technology To Work
Ocean Sciences
397 Washington Street
Duxbury, Massachusetts 02332
Telephone (617) 934-0571

November 15, 1996

Ms. Karla Duttlinger
Naval Facilities Engineering Services Center (NFESC)
Code ESC414
1100 23rd Avenue
Port Hueneme, CA 93043

Dear Ms. Duttlinger:

Battelle has reviewed the draft work plan (dated August 1996) entitled "Treatability Study Work Plan: Intrinsic Sediment Processes Study, Sites 2 and 17 Naval Air Station Alameda, Alameda, California," and this review is summarized in this letter. Dr. Jerry Neff had previously reviewed Section 5, the main technical section (Methods and Analyses) of this Work Plan, and provided his review comments in a fax to Paul McDaniel on November 6, 1996. The main text in this letter covers the review of the other sections of the Work Plan, as well as an overall summary. However, Dr. Neff's review of Section 5 is included as Attachment 1 in order to keep this letter a complete review of the Work Plan. Additionally, Dr. Neff's review is of the primary technical section of the Work Plan, and therefore contains the most important technical findings and suggestions from the Work Plan reviews.

GENERAL COMMENTS

The investigation described in this Work Plan is an ambitious undertaking, that could conceivably generate some very interesting scientific data. The work appears to be thoroughly planned, with a wealth of supporting documentation. The experimental plan is well developed and the work is to be performed at well respected institutions, which lends credibility to the studies. Additionally, the Work Plan is a generally well organized document and includes all the typically required sections for planning and performing an investigation such as this, and also includes more useful background information and descriptions of the sites to be investigated than one typically sees in these types of Work Plans. It is a well researched Work Plan.

However, despite the breadth of the Work Plan and the rigor of the proposed studies it is not clear if and how the data generated in these studies can be directly used in the decision making processes for addressing the potential contamination issues at the Seaplane Lagoon and West Beach Landfill at NAS Alameda. This may, to some degree, be due to a lack of linkage in the Work Plan between the studies, the generated data, and the potential site remediation (i.e., inadequate explanation of exactly how the data will be used to answer the key questions), but there is also some question as to the actual usefulness of the data that may be generated. Parts of the Work Plan are cumbersome to follow, and the value of specific tests in meeting the end goal is often unclear or simply not addressed at all.

The primary objectives of the studies described in this Work Plan (as listed in Section 3.0) are to:

- assess the toxicity and migration of chemicals present in the sediment layers
- assess the rate of degradation of PCB and PAH in the sediment
- evaluate the short term effects of remedial strategies on the toxicity and mobility of chemicals in the sediment layers

The investigators propose to answer these questions using some rather sophisticated techniques, when it is likely that equally reliable answers can be obtained with already existing data or with simpler, although less "innovative," methods. Some innovative approaches are proposed for the scientific investigations, but it is unclear how, if at all, this will feed into the larger goal of developing and applying innovative remediation technologies?

More importantly though, it is not clear that these are the most important questions that need to be answered at this point in time. For one thing, it is not clear that PCB and PAH are the contaminants of primary concern in the sediment — butyltins and some chlorinated pesticides may, for instance, be equally, or more, important. A cursory review of the reported PRC data reported in the Work Plan seems to indicate that the metals lead and chromium, organotins, some chlorinated pesticides, PAH, and PCB may be of concern in the Seaplane Lagoon sediment. Based on the tissue data, most toxic metals in the sediment were not readily available to the test animals, with the possible exception of arsenic (concentrations of arsenic are typically naturally high in tissues of marine animals), while organotins and chlorinated pesticides did accumulate at notable levels. At the West Beach Landfill the contamination appears to be fairly well confined to on-land, with relatively low contaminant concentrations being measured in the nearby sediment. Higher, and more variable, levels of chlorinated pesticides, PCB, and PAH were measured in soil samples collected at the landfill (soil metals data were not listed).

The rates of degradation and mobility of PAH, PCB, and most of the other contaminants of potential concern are already fairly well described in the scientific literature, and there should be little reason to study these processes specifically for NAS Alameda. Solid chemical and basic geochemical/geophysical data should be sufficient to estimate the association of the contaminants with the subject sediment. Although the microelectrode (i.e., redox chemistry) and pore water extraction procedures, linked with contaminant measurements and toxicity testing, may provide information about intra-sediment fluxes and the associated chemical and toxicological characteristics, this level of detail should not be necessary to advice the site remediation decision makers.

Evaluation of potential short-term toxicity and mobility effects as a result of remediation (the third "objectives bullet") is often valuable when assessing different alternatives, and is appropriately included in this Work Plan. Different standardized procedures are available, and the approach proposed should provide the needed information.

Although some of the preliminary data suggest that there may be isolated on land areas at the West Beach Landfill that may warrant future actions, the Work Plan does not well address the particulars of this location (even though it is part of the Work Plan title). Some useful preliminary data were generated in earlier studies — data that can be used to further focus the investigation. What still appears to be needed is a more exact characterization of the extent (horizontal and vertical) and the magnitude of

contaminants of concern, and a final definition of the contaminants of concern, and this should possibly be the focus of the next phase of the NAS Alameda site investigation. Once the scope and objectives of this study have been more clearly defined, the title should probably be changed to better represent the work.

Proposed Studies Should be Questioned and their Rational Better Explained.
The usefulness of the data that would be generated in this work should be challenged by the sponsors of the work, and should be more thoroughly explained and supported by the investigators. Is an understanding of the theoretical aspects of the intrinsic sediment processes what is needed to best guide the potential remediation, and, if so, why and how will the data be of help to this end? Can the data that will be generated easily feed into the decision making process and technology to be applied by the Clean Contractor, and, if so, how? Will the knowledge gained and information generated in this study be useable by engineers, and other decision makers, or are they too theoretical/academic for practical use?

Can we actually learn how much sediment- to water-phase movement of contaminants there will be during different remediation scenarios using the proposed technical approach? Why will the proposed methods for testing phase transport and toxicity provide more reliable and useful data than standard sediment testing regimes (e.g., as listed for dredged material testing in: U.S. EPA and U.S. Army Corps of Engineers. 1994. *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. — Testing Manual (Draft): Inland Testing Manual.* Document: EPA-823-B-94-002. June 2, 1994.)

Is it likely that the intrinsic processes at Seaplane Lagoon are transforming or immobilizing chemicals of concern so differently at this location from what can be deduced from published data? Is the likelihood of significant site-specific differences so great that their study is warranted? Will knowledge of these intrinsic processes have a great impact on the direction of the site remediation, and, if so, how? It may be risky to assume that further knowledge of the intrinsic processes in the Seaplane Lagoon sediment will significantly enhance the needed knowledge base and guide the actual remediation approach.

SPECIFIC COMMENTS

Section 1.3 Intrinsic Sediment Processes Study Decision Process. Under bullet "2", PCBs are incorrectly referred to as a subset of petroleum hydrocarbons, along with PAH. I assume this is a typo, and that the totally different origins of PCB contamination, and the separate environmental issues with PCB as compared with PAH and other petroleum hydrocarbons, is well understood and will be accommodated for. The statement that petroleum hydrocarbons influence the rates of transformation of chemicals and the mobility of other organic compounds and metals is not well substantiated, and at most "typical environmental contaminant levels" other organic compounds (e.g., various biogenic materials) in the sediment play a much greater role than the lower levels of petroleum hydrocarbons in controlling the availability of toxic organic compounds and metals. However, PAH are a class of environmental contaminants that are of concern in their own right, and not because they may have a minor affect on the availability of other contaminants.

Section 2.2.3 Previous Investigations. Were any reference locations (from general vicinity but outside the lagoon) sampled and analyzed during the 1993 PRC study? Was the sedimentation rate of the lagoon determined (i.e., were the cores dated, like proposed in Section 5.5 of this Work Plan)? Such data would be useful for reviewing the reported data.

Section 2.2.4 Summary of Analytical Data. How do the method detection limits from these past data sets compare with known levels of environmental effects (the 1993 PRC study appears to be the most useful)? Does "not detected" mean "not present at level of concern"? For instance, tributyltin has been demonstrated to have adverse effects on a variety of marine species at water concentrations of low ng/L; organotin was detected at up to 103 µg/L (really high level) in storm water, and may be a significant risk factor at the Seaplane Lagoon. The butyltins are, however, much less persistent than most of the other contaminants of potential concern, and the toxicity varies significantly for the different butyltins.

The PAH data are reported as total PAH. However, it is important to understand the PAH composition when assessing the significance of the measured PAH levels. For instance, the lower molecular weight petrogenic PAH (e.g., naphthalene and phenanthrene) are more toxic in traditional short-term tests than the higher molecular weight pyrogenic PAH (e.g., fluoranthene, pyrene, benzo[b]fluoranthene, benzo[a]pyrene), which may have other longer term effects.

Section 2.2.4.2 Sediment Quality (top of pg. 2-12). Unit for total organotin concentration listed as 97 mg/µg should probably be µg/kg.

Section 2.3.5.2 Surface Soil and Sediment Quality (top of pg. 2-22). Aroclor 1260 is not a PCB isomer, but a mixture (formulation) of more than 50 different chlorinated biphenyl compounds (congeners), which include a large number of isomers of different levels of chlorination of the biphenyl.

Section 3.3 Physical Characterization of Sediment. A good understanding of the sediment type, mass, and distribution may be important come future remediation, and the described work should provide this information. Some of this information appears to have already have been generated (Section 2), and it should be verified that redundant work is not performed.

Section 3.4, 3.5, 3.6, 3.7, 3.8 Various pore water and sediment processes studies. As discussed earlier, it is my feeling that although the technical procedures described appear sound, the level of detail in the information that would be obtained in many of these studies is not needed. Additionally, it appears that the eventual use of these data is not well thought through or, at best, not well explained.

Section 4.0 Sampling Approach. The sampling approach does not appear to have been well developed. If the sampling is to be performed primarily to support laboratory based sediment processes studies, such as those described in Sections 3.4 through 3.8, then much detail may not be needed. However, if a more thorough contaminant assessment is part of the goal, then a well planned and more thorough sampling strategy should be developed.

Section 5.0 Methods and Analyses. See Attachment 1.

Section 6.0 Integration. This section should more directly present **how** the specific data will be used to answer specific questions, how they will meet the study objectives, and how they will assist decision makers.

SUMMARY

Although many of the studies proposed in this Work Plan are likely to provide interesting data that can potentially be useful for a variety of people, it may not provide the information that is needed to make decisions about site remediation at NAS Alameda. It is likely that much of the data generated will not be helpful for directing the remediation solution.

The Work Plan is quite verbose, and it is often unclear what the true objectives are and how the described work will meet those objectives. The Work Plan would benefit from clarifications and direct explanations of how each data set are to be used. The Work Plan should describe how the data will contribute to answering specific question(s), could include general discussions of different results scenarios (e.g., what results would lead to what conclusions), and should show how the data will benefit the eventual remediation decisions. It is only fair to all parties involved that the investigators clarify their intended objectives, and more clearly state how the data will be used to meet these objectives and answer the most important questions at hand. This improved focus of the work from the onset would clarify the purpose of the various tasks, and would probably "weed out", or significantly modify, several tasks that are currently not likely to provide much more than academically "interesting" information.

Much of the end information that is proposed to be generated in this study can be generated by applying already available data to a solid set of sediment chemistry and toxicity data. It is unlikely that the processes in Seaplane Lagoon are so unique that already available sediment processes information cannot be used. A more complete spatial characterization of the sites is still needed, as is a final determination of which are the contaminants of real concern, and this should possibly be the focus of the next investigation. Along with this, simpler studies could be designed to determine if the contaminants in the sediment are present in chemical forms and concentrations that are mobile, bioavailable, and toxic to local marine biota or to human users of the area. The necessary sediment contaminant release studies of different remediation scenarios could be performed concurrently, as well as a determination if removal of the sediment will render the contaminants remaining in the sediment more or less mobile and bioavailable.

Please do not hesitate to contact either Dr. Jerry Neff or myself at (617)934-0571 if you have any questions at all.

Sincerely,

Gregory S. Durell
Principal Research Scientist

cc: K. Spielman (EFA West)
T. McEntee (NFESC)
G. Wichramanayake (Battelle)
D. Norstrom (Battelle)

Attachment 1

Dr. Jerry Neff's Review of Work Plan Section 5.0 — Methods and Analyses

Review of Section 5.0

● **Comments:** I have reviewed Section 5 of the Treatability Study Work Plan for the Seaplane Lagoon and the West Beach Landfill Wetlands at NAS Alameda. The investigators are proposing an extensive and elegant piece of work on the site. Although all the proposed work appears to be technically sound and may yield much scientific information about the forms and fates of chemical contaminants in site soils and sediments, I'm not sure how much of the information can be used effectively for risk assessment and for making decisions about site remediation and cleanup. For example, phase associations and speciation of metals at different depths in sediments and soils at the sites can be inferred from current published scientific information. The elegant studies to determine metal binding and speciation will not significantly add to the knowledge needed to decide what to do about the metals in the sediments and soils.

Page 5-1. Do you anticipate having to dredge the seaplane lagoon and the wetland? If not, what is the reason for collecting and analyzing sediment core samples from a depth of 2 m? It is highly likely that metals and highly nonpolar organic chemicals buried deep in these marine sediments and waterlogged wetland soils are tightly bound or precipitated and are not likely to migrate into the bay if the sediments and soils are left in place. Perhaps these studies are needed to prove that this is the case.

Section 5.1.1 Acoustic Imaging. The purpose of this survey is unclear. Contaminants in subtidal marine sediments are unlikely to migrate deep into the sediments and then seep into the bay. It seems to me that all that is needed is information on the sediment stratigraphy of the seaplane basin representing the sediments that were deposited there since the basin was constructed. It is highly unlikely that sediments would migrate down through several sediment strata to a ground water aquifer and then be transported in it out into the bay. Efflux from the sediment into the overlying water column is possible, particularly if there are cyclic (e.g., seasonal) changes in the depth of the redox potential discontinuity. However, this efflux involves only the upper 10 to 20 cm of the sediment column. Contaminants buried deeper just don't go anywhere.

Section 5.2.1 Microelectrode Measurements of Sediment Core Pore Waters. This appears to be an unproven method for marine sediments in which concentrations of competing ions are likely to be high. Dissolved Fe(II), Mn(II), S(II) and O_2 concentrations in pore water can be estimated with an adequate level of certainty to model metal binding based on redox potential measurements alone. However, ratios of Fe(II) plus Mn(II) to S(II) may be useful for estimating precipitation of sulfides of metals released by dissolution of iron and manganese hydrous oxides under low redox conditions in the sediment. It may also be possible to predict formation of soluble polysulfides of some metals. Therefore, if validation experiments are performed at the outset that show that the method will work with sediments of the types present at Alameda, the method should be used on a trial basis.

Section 5.2.2 Pore Water Constituent Measurements. This analysis may provide more information than is needed to make decisions about site remediation. Phase associations and speciation of metals in the sediment pore water can be inferred from information about marine sediments in the scientific literature. The dominant species of all the metals to be analyzed are already known pretty well. The anions to be measured should include carbonate (CO_3^{-2}). Can pore water samples be collected, squeezed, and analyzed without disturbing the redox potential? If not, the data will be of little value.

Section 5.2.3 Sediment Bulk Mineralogical and Chemical Analyses. The detailed mineralogy of sediment strata is not ordinarily needed to understand the forms and phase associations of metals in sediments. In most marine sediments that contain organic matter, most metal sorption is to organic coatings on sediment particles. Knowledge of the mineral forms of the particles often is not important to understanding phase associations and metal binding.

Section 5.2.4 Sediment Metal Speciation Analysis. The level of understanding of metal speciation in the sediments is not ordinarily needed to make decisions about sediment remediation. Much of this can be modeled with existing models using existing published information. I doubt that the REACT model described in Section 5.2.5 requires the detailed information that will be generated in this section and previous ones. Will arsenic and mercury be analyzed by these methods? It is unclear how the results of modeling (Section 5.2.5) can be used to estimate conditions resulting from proposed remediation strategies. This should be explained in greater detail.

Section 5.3.2 Sediment/Water Interface Corer (SWIC) Test. This is a most interesting test for evaluation the potential toxicity of "intact" surficial sediments. However, it looses something when used to evaluate sediments from the 1-m and 2-m sediment horizons. Is this really the best way to evaluate the toxicity of these deeply buried sediments? Is this information really needed?

Section 5.3.3 Pore Water Toxicity Identification Evaluations (TIE). The investigators should also consider the effect of pore water salinity on toxicity to marine organisms. In several coastal marine sites, pore water of subtidal sediments may have a low salinity because of subsurface runoff from land. Most of the test organisms used for sediment pore water toxicity tests are sensitive to low salinity.

Section 5.3.4 Acid Volatile Sulfide and Simultaneously Extracted Metal. The investigators should be aware that not all metals in hypoxic/anoxic sediments are complexed to acid-labile sulfides. For example, chromium is not known to form any stable sulfides. Organic matter in anoxic sediments competes strongly for binding of several metals, such as mercury.

Section 5.4.1 Bivalve Bioaccumulation This test should also be used to evaluate the bioavailability of metals in the sediments. In fact, this test is better than all the tests proposed earlier in this work plan for characterizing the forms of metals in sediments, because it identifies unequivocally that fraction of the total of each metal that is bioavailable. This is the information that is needed to make decisions about remediation of metals contamination of the marine sediments.

Section 5.4.2 Digestive Fluid Extraction. This assay has a serious flaw in that is assumes that any chemical solubilized by digestive juices of *Arenicola* is bioavailable and will be bioaccumulated. This is not true. Most chemicals, particularly highly nonpolar organic chemicals such, as most PCBs and DDT, have an assimilation efficiency from the gut of marine animals that is substantially less than 100 percent. Therefore, this test will tend to overestimate the bioavailability of several sediment contaminants. For some contaminants, such as some high molecular weight PAHs, which have assimilation efficiencies from the gut of 10 percent or less, the error will be large.

Section 5.4.3 Sediment/Water Partitioning Evaluation. There is a vast and rapidly growing scientific literature on sediment organic carbon/water partition coefficients for marine and freshwater sediments. Although log K_{oc}s for nonpolar organic chemicals may vary somewhat depending on the nature of the organic matter in the sediment and the pore water salinity, the differences among sediments are not large

enough to significantly affect estimations of the concentrations of these chemicals in solution in the pore water. The problem with the Raoult's law relationship is that you have to estimate the "average" molecular weight of the nonaqueous phase in which the organic chemical of interest is dissolved. If that nonaqueous phase is petroleum, then estimates of partitioning based on Raoult's law considerations are similar to those estimated based on log K_{ow} considerations.

Section 5.5.3 Measurement of Seepage Fluxes in Seaplane Lagoon. Is it really important to measure this for subtidal sediments. Where is the water seeping through the sediments going? And is it likely to transport significant amounts of contaminants with it. There is no drinking water aquifer under the bay and, even if there was, it would not communicate with water seeping through subtidal marine sediments. I am not aware of the use of piezometers for subtidal marine sediment studies.

Section 5.6.4 Intrinsic Transformation of PAHs and PCBs in Anaerobic Lagoon and Wetland Sediments. Degradation rates will be estimated *in situ* in tasks described earlier. Thus, this laboratory experiment is not needed. There is a pretty extensive scientific literature on anaerobic degradation of PAHs and PCBs in anaerobic marine sediments. Degradation is pretty slow. Some reductive dechlorination of the PCBs may occur. Generally natural biodegradation of PAHs and PCBs in anaerobic sediments is too slow to justify the intrinsic bioremediation approach to site remediation, unless the compounds are immobile and unlikely to ever be exposed at the surface. This is probably the case at Alameda, unless there is a plan to dredge the seaplane basin. The dredging may be needed to support future use of the seaplane basin, but probably can not be justified as a remediation alternative. (The metals and organic contaminants in the basin sediments and probably also in the wetland soils are tightly bound and relatively immobile. Unless the bioaccumulation and toxicity studies show differently, most of the contaminants have limited bioavailability *in situ*). I don't feel that this experiment will contribute much information that will be useful for decisions about remediation.

Section 5.6.5 Constraints on Microbial Transformations of PAHs and PCBs in Lagoon Sediments. Comments on the previous section apply to this one also. It is unclear how information gathered in this investigation can and will be used to make decisions about site remediation. The physical/chemical data generated in earlier sections can be used to pretty well predict what the limiting factors are for biodegradation of the contaminants in the lagoon sediments. The main limiting factor in systems like this nearly always is oxygen. Most marine sediments are sulfidic and methanogenesis occurs only in highly reduced deep sediment layers. This is in contrast to freshwater sediments and soils, which usually contain low concentrations of sulfur and in which methanogenesis is the main pathway of anaerobic degradation of organic matter.

Section 5.6.6 Transformation of PCBs and PAHs in Vadose Zone Soil Plots. In a true wetland, there is little or no true vadose zone. By definition, wetland soils are water-saturated all or most of the time. Therefore, it is unclear how important short periods when the wetland soils dry out are to the rates of transformation of highly nonpolar PAHs and PCBs. As the authors point out, the heterogeneous distribution of contaminants in the soils will make it difficult to demonstrate degradation rates, especially if concentrations of contaminants are low and near reporting limits. If concentrations are this low, is remediation likely to be necessary? Use of homogenized soils to aid in statistical analysis renders the experimental setup atypical of the *in situ* situation and is likely to compromise the results.

Summary. In summary, many of the studies proposed for the seaplane lagoon and the land fill wetland will not provide information actually needed to make decisions about site remediation. Marine sediment systems tend to be simpler to model than freshwater systems or soils. In marine sediments, concentrations of total organic carbon, sulfur, iron, and manganese usually are high. These compounds pretty much control the speciation and phase associations of the metals in predictable ways depending on redox potential. Similarly, the behavior of nonpolar organic contaminants, such as PAHs and PCBs can be modeled to an adequate level of precision and accuracy with equilibrium partitioning theory. The studies proposed here would provide a greater understanding of the geochemical and biochemical processes occurring in the site sediments; however, it is doubtful whether this greater understanding is really needed for making decisions about site remediation. The overall objectives of the site assessment studies should be tightly focused and then kept in mind when designing studies. The key questions are: Are contaminants in in place sediments at the sites present in chemical forms and concentrations that are mobile, bioavailable, and toxic to local marine biota or to human users of the area? Will removal of the sediments (dredging) render the contaminants remaining in the sediments more or less mobile and bioavailable?

ENVIRONMENTAL SCIENCES DIVISION

SERIAL	COMMANDING OFFICER NCCOSC RDTE DIV 52 53475 STROTHE ROAD RM 231 SAN DIEGO CA 92152-6335
DATE 10/21/96	
TIME	FACSIMILE TRANSMISSION COVER SHEET

TO: Ken Spielman	LOCAL PHONE NO. 415 244-2539	TELECOPIER PHONE NO. 415 244-2654
ACTIVITY EFA WEST	CODE 1831.4	TOTAL NO. OF PAGES (INC. COVER SHEET) 7
FROM: Jim Leather	LOCAL PHONE NO. (619) 553-6240	TELECOPIER PHONE NO. (619) 553-6305
ACTIVITY NCCOSC RDT&E Division	CODE 52	TELECOPIER TYPE HP FAX-310
SUBJECT: Comments on BERC workplan		

OPERATOR	DATE	TIME	CODE	THIS BLANK INTENTIONALLY LEFT BLOCKED.

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Ken,

here are some comments. Overall I think the workplan addresses some important questions that should be answered before the navy does any remediation. I will be up at EFA WEST on Wed 10/23 to attend a meeting on Regional Sediment Screening Model that EFA WEST has been working on.

Jim

Enclosure (6)

Initial Comments on the BERC Plan for Seaplane Lagoon Work

These initial comments on the proposed workplan by the BERC group address mainly the Seaplane Lagoon work. Since I have been involved in an NRaD effort to apply sediment field screening techniques in the Seaplane Lagoon I can offer some related comments.

Overall, the workplan provides a coordinated approach to address many of the questions concerning assessment and remediation of sediments. The few specific concerns I have are arranged in roughly the order they are addressed in the workplan.

Pg. 1-2) The workplan is proposed to address intrinsic processes, those occurring in a "natural, undisturbed sediment system". Some in situ methods should be considered to ensure the coring process as proposed will result in the least disturbed cores for the laboratory study. For example, microelectrode studies done in situ at one site next to a removed core (as done in Brendel and Luther, 1995) would validate pore water chemistry studies. This could be done at a shallow wetlands site and would show, at least for metals such as Fe and Mn, that measured in situ levels are the same in later extracted pore water.

Pg. 2-7 to 2-13) Additional review of the previous data might help in elucidating relationships and allow better sampling to address specific processes. During earlier discussions with regulators about NRaD screening efforts in Seaplane Lagoon, questions were raised about whether screening efforts would be measuring the contaminants that were causing the toxicity observed in collected samples. Because concentrations of many of the sediment contaminants covary with sediment grain size, it is often difficult to assign toxicity to particular contaminants. Figure 1 shows that the best correlation between amphipod bioassay data and any other measurements is found with grain size. This relationship also raises concern about artifacts including grain size effects, ammonia, etc. that might cloud the interpretation of the relationships between contaminants and toxicity. These artifact questions are reinforced by the fact that the greatest amphipod toxicity was found at the reference site in S.F. Bay, far outside the influence of NAS Alameda contaminants. However, taking the data at face value and looking at just the Seaplane Lagoon and other offshore NAS Alameda sites for comparison, there are some interesting relationships. These observed relationships can help in selecting sites for additional work. The two outlier points in Figure 1 are interesting because they indicate cases where the relationships commonly present in the majority of the data do not apply. Figure 2 shows that these two outliers have greater than expected amphipod toxicity possibly due to organic contaminants. Sample E7 is from the Oakland Inner Harbor and contains elevated PAHs. Sample S2 has slightly elevated PAHs, and bioaccumulation studies showed the highest uptake of PCBs at this site. Figure 3 shows Nickel data, the metal with the best correlation to amphipod toxicity data. This correlation may again be related to grain size since Figure 4 shows Nickel concentration in sediments is strongly related to grain size. The main point of looking at these data is that many contaminants covary, and this may result in problems with proposed studies to determine the cause for toxicity. By looking at the available data it may be possible to select sampling sites that emphasize certain contaminant types. For example, sample S3 has high metals and PAH levels. Sample S6 has elevated PAHs, but only moderate metals levels. Sample S2 has the most amphipod toxicity but comparatively lower contaminant levels. It would be interesting to see additional data on ammonia or other unreported natural toxicants to see their relationships to amphipod toxicity at these three sites. A toxicity identification evaluation (TIE) done at these sites might reduce the number of contaminants that covary and simplify the TIE process. Since PRC is currently obtaining additional cores in Seaplane Lagoon more data may be available before BERC's sampling efforts.

Pg. 3-9) Water transport (and therefore chemical transport) through lagoon sediments may not be accurately measured without looking at the possible role of sediment organisms. Bioirrigation, the advection of water through burrows, may enhance the movement of pore water contaminants back into the lagoon. In addition to the chemical and physical measurements, some method of estimating the role of biology should be considered. I think PRC has some data on benthic populations in their 1994 work that might indicate if bioirrigation is a possibility.

Pg. 4-2) As mentioned above, PRC is collecting a large number of cores and will have a much better idea about contaminant levels from this data. Will BERC's sampling occur before or after this data is available?

Pg. 5-11) The TIE procedure will be conducted on pore water removed from the sediment, so it is important that pore waters reflect in situ chemistries. In situ microelectrode comparisons (mentioned above) could show this for at least Fe, Mn, sulfide, etc. How will pore water be extracted? If by core squeezer can you obtain the resolution required not to mix redox zones (shown be high resolution microelectrode studies)? Centrifugation is often preferred for organic contaminants because filtering (with loss of trace organics) is not required at high g-forces. Will zeolite removal of ammonia not affect trace organics?

Pg. 5-19) Will bioavailability evaluation (Section 5.4) include metals?

As stated above, this effort appears very complete and the individuals involved are well qualified. The questions being addressed in this proposal are important for the Navy to answer before conducting any remediation efforts.

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Fig. 1

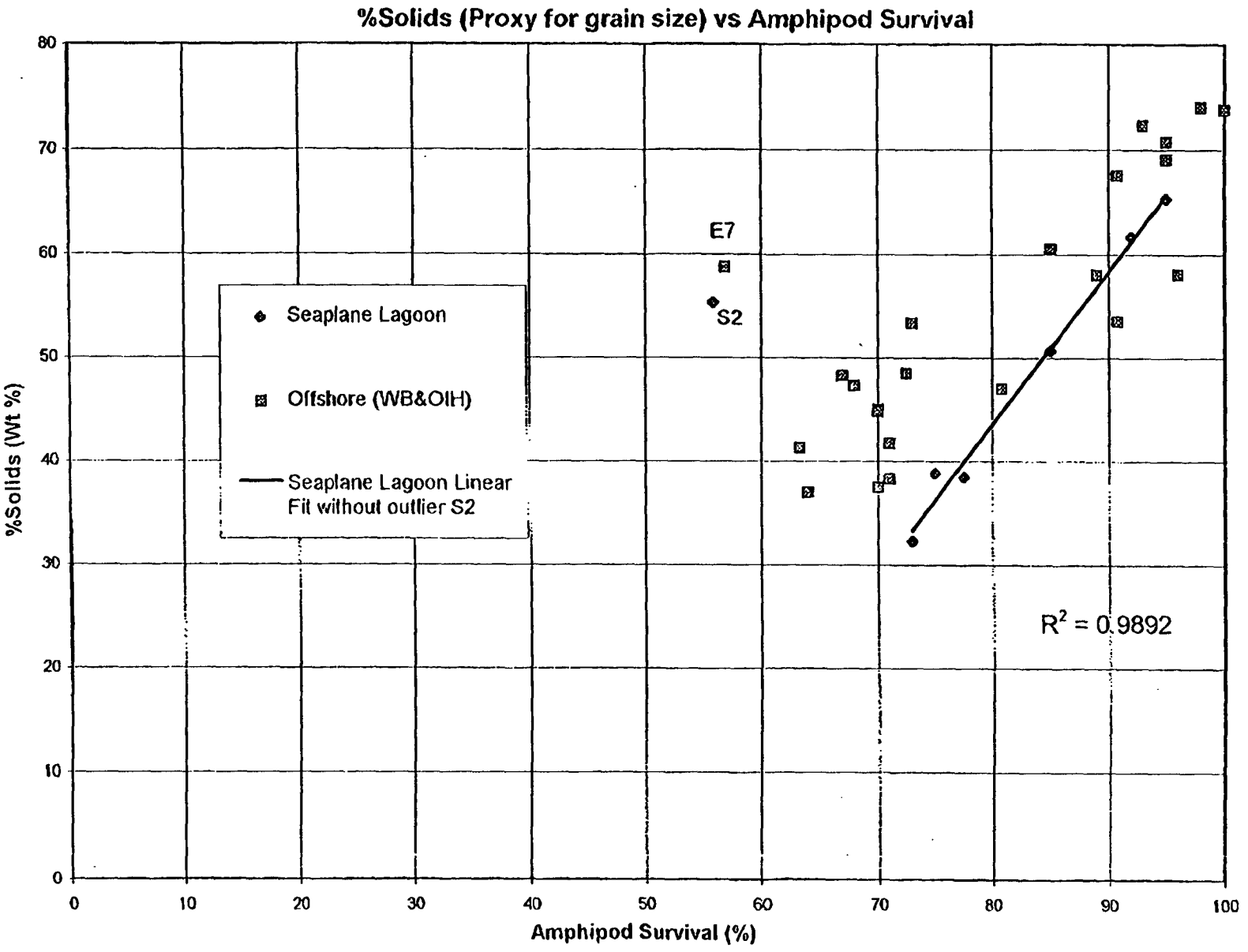

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Fig. 2

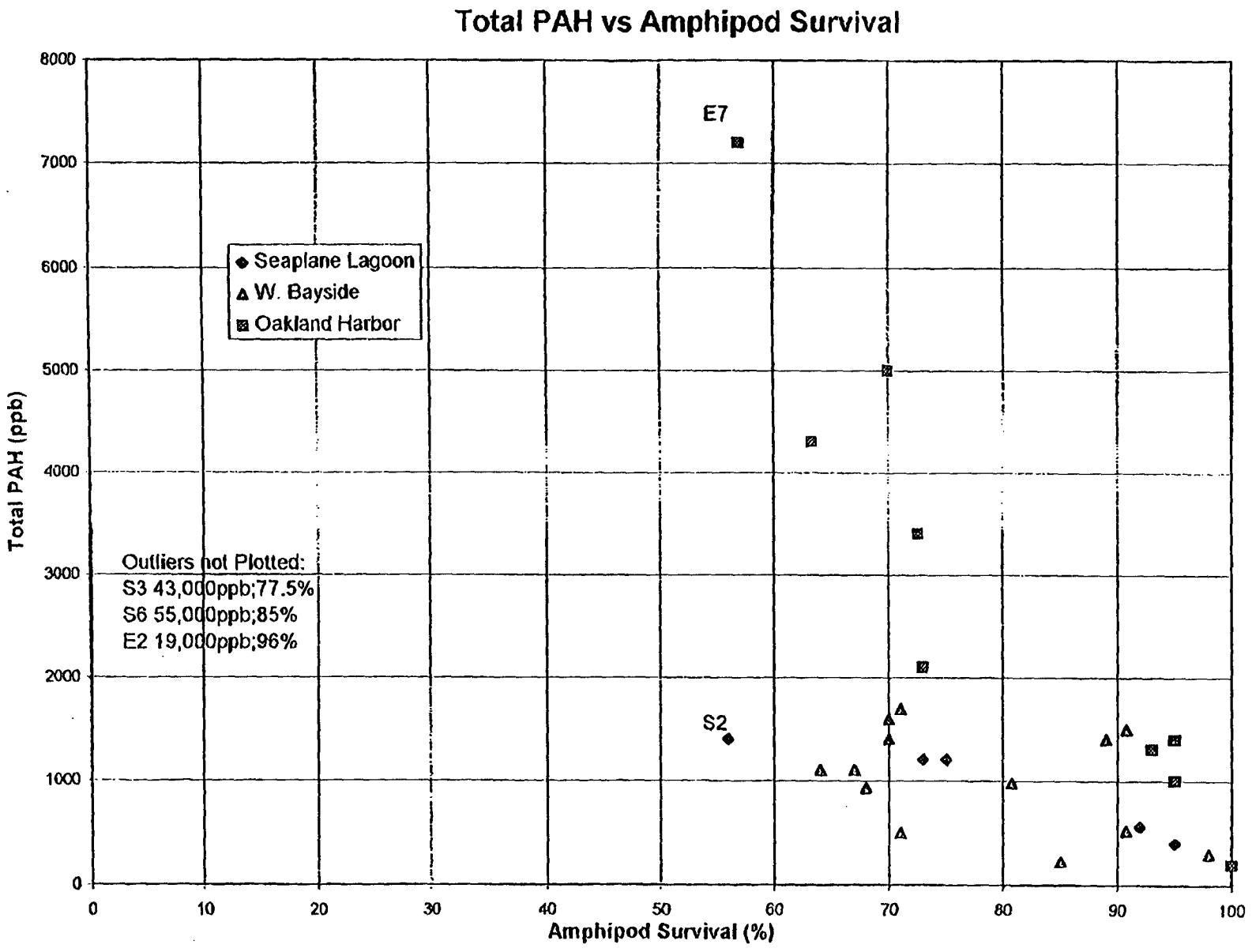

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Fig. 3

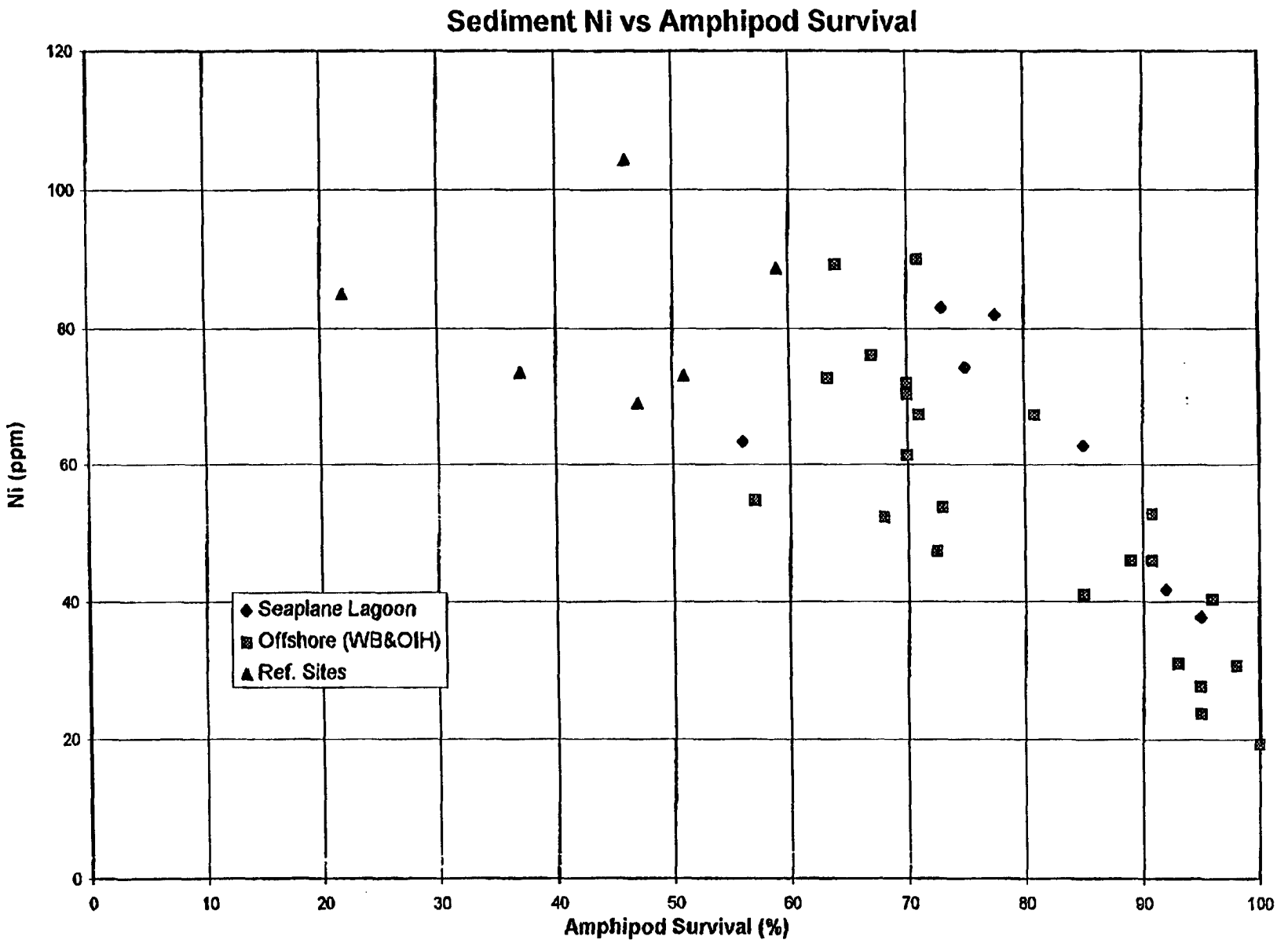

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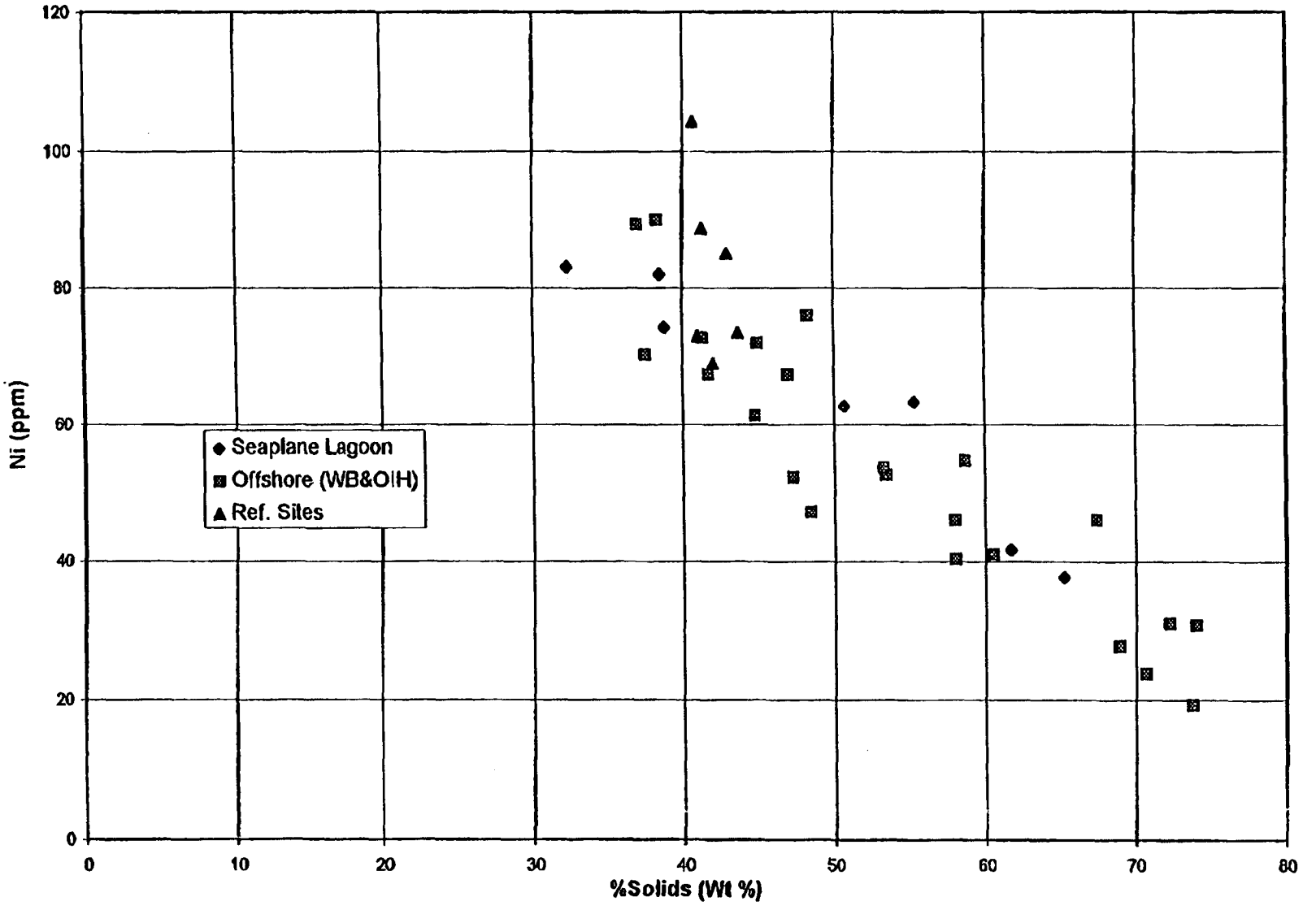
Fig. 4

Sediment Ni vs %Solids (proxy for grain size)



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Review
of
BERC
Treatability Study Work Plan
Intrinsic Sediment Processes Study
Sites 2 and 17
Naval Air Station Alameda, Alamenda, California

GENERAL COMMENTS

The overall effort is very ambitious. From a research perspective, a lot of interesting information will be obtained. However, from the Navy's perspective, the usefulness of the data, in terms of the Navy's objectives, has not been adequately described. The value and usefulness of the information to be obtained compared to the cost to obtain needs to be examined. The best tool for doing this is the Data Quality Objectives (DQO) process. The DQOs presented (both BERC's and PRC's) are not adequate to make this assessment. The reporting requirements should be in terms of addressing the DQOs, not what is convenient for researcher assignments.

There are inconsistencies between the various sections of the work plan and the Sampling and Analysis Plan (SAP). In the work plan, references are made to various studies and analyses that only appear once and are not fully described or included in the overall task identification. There is some duplication or overlap between sections 2, 3, 5 and the SAP, and the information is not consistent. The specific studies to be performed and the methodologies to be used needs to be identified clearly in one place, then summarized in the work plan. The studies that are only mentioned in briefly in the text, such as soil gas, field scale flow studies, etc. need to be included in detail as part of the overall study. All of the studies need to identify the data to be obtained and how that data will be used as discussed in the paragraph above.

SPECIFIC COMMENTS

The following comments are presented in the order in which they were noted during the first reading of the Work Plan. The comments represent places in the text where a question occurred (which may have been answered later in the text), or a point of confusion occurred due to conflicting information or lack of information.

Page 1-1, Para. 1 (Section 1.0) States: "The study will evaluate whether intrinsic processes (those that occur in the natural, undisturbed sediment systems) are transforming or immobilizing chemicals released by past operations into sediments at Sites 2 and 17." Is this the purpose of the study? This implies that data from the study data is to be used to support a decision to take no remedial action (yes or no - this is a DQO item), other than allowing intrinsic processes to proceed undisturbed..

Enclosure (1)

Page 1-2, Para. 3 (Section 1.1) States: ".....Study will also estimate rates at which chemicals are likely to move from sediments into surrounding waters under disturbed conditions." The paragraph goes on to state "The study will characterize the following conditions and intrinsic processes:

(1) Toxicity and bioavailability of chemicals in sediments under existing conditions
(2) geochemical transformations within the sediments
(3) biological transformations within the sediments
(4) chemical transport out of the sediments, and
(5) toxicity and bioavailability of chemicals released from the sediments

The first part of the paragraph implies a remedial option that requires disturbing the sediments, yet the end of the paragraph again implies intrinsic remediation (no disturbance) as did page 1-1. Is the purpose of this study to support all potential remediation technologies or only intrinsic bioremediation?

Page 1-3, para. 2 (Section 1.2) States DO 4 authorizes for Site 17:

(1) preparation of a coordinated SAP
(2) implementation of SAP
(3) SAP report
(4) participation at meetings

What does the DO say about the purpose of the study and end use of data? It also says that because Site 2 was added, the scope was reduced to study only intrinsic processes in sediments. How does this reduced scope affect page 1-2 paragraph 3?

Page 1-3 to 1-4 Lists data to be collected by the various participants - how do these tasks relate to those listed on page 1-2? Also, what data is PRC collecting in relation to this effort?

Page 1-4, para. 1 (Section 1.3) States low levels of contaminants are due to intrinsic remedial processes - how is this known? Are current contaminant levels lower than past higher measurements? How are measured levels affected by other processes such as dredging (has the lagoon been dredged? how often? to what depth? etc.) or new sedimentation? States metals may be sorbed or present in a solid state - any data to support this statement or is this a general statement applicable to any sediment?

Page 1-4, para. 2 (Section 1.3) This paragraph now implies the purpose of this study is to evaluate sediment remediation options, and goes on to say the scope of the study will center on division of effort between the two sites and the contaminants PAHs and PCBs. This seems to differ from the scope presented on page 1-2, items (1) through (5). How will data from this study be used to evaluate remediation options?

Table 1-1 Who's SOPs/SQPs are these ? - that needs to be identified in the table as well as a source from which to obtain these documents.

Page 2-5, para. 2 (Section 2.2.1) Reference to Figure 2-6 - the Sewer Outfalls are not labeled A-G as the text implies. Confusing.

Page 2-8, para.1 (Section 2.2.3) Was the lagoon ever dredged? How often? To what depth? How do past dredging operations impact data (depth of samples compared to depth of dredging)? What are sedimentation buildup rates for the lagoon and the sources of sedimentation? How does that affect the data ? How was the lagoon used? What operations were conducted in it?

Page 2-8, para. 4 (Section 2.2.4) Last sentence refers to this as a treatability study, but according to Section 1 it is not; it appears to be more of a characterization study, at a basic research level. Confusing.

Page 2-12, para. 4 (Section 2.2.4.2) This is the first mention of radiation measurements to be taken. Why were measurements taken? Radiation has not been discussed as a contaminant of concern, nor

has a source been mentioned. How do these readings compare to naturally occurring background levels in surrounding sediments and sediment source soils? Has RASO (the Navy's Radiological Affairs Support Office) been contacted?

Page 2-15, first line Refers to Section 2.3.2, probably should refer to Section 2.3.3. Also, goes on to refer to a "variety of wildlife" - are any US Federal rare, threatened or endangered species present? Any State of California protected or sensitive species present? Is habitat for any of above present? If present, how will the conduct of the studies be modified to prevent ESA (Endangered Species Act) violations?

Page 2-15, para. 2 & 3 References previous studies/investigations done, specifies the study, but does not summarize results/findings of these previous studies, nor does it say how previous results impact or influence the studies planned in this work plan. Does this study build on previous studies? Does it plan to fill in data gaps?

Page 2-16, top of page References Figure 28 - there is no Figure 28. Again, results/findings of previous studies not discussed in reference to this planned study.

Page 2-16, para 1 & 2 Findings of PRC-conducted SWAT not presented. What is relationship of current study to SWAT results, otherwise why mention?

Page 2-17, last paragraph What is the source of this data - who's study?

Page 2-19, para. 4 Again, refers to this as a treatability study - conflicting with Section 1.

Page 2-19, para. 5 Refers to data summary tables - which tables and where are they?

Page 2-20, para. 2, 3, & 4 Reference the study - name of study, who did, and date.

Page 2-21, para. 4 (bullet 4) Radiation levels need to be compared to naturally occurring levels in sediment and source soils, otherwise what does it mean?

Page 2-22, para. 1 Reference for ecological study - who did and when?

Page 3-1, para. 1 Now refers to this as work plan for site characterization and treatability study with objectives listed as (1) assess toxicity and migration of chemicals in sediment layers; (2) assess rate of degradation of PAHs and PCBs in sediments; and (3) evaluate sort-term effects of remedial strategies on toxicity and mobility of chemicals in sediment layers. Slightly different than those on pages 1-2 and 1-3. Why only PAHs and PCBs? What about other previously detected contaminants? Which contaminants are of the greatest concern based on action levels or risk assessment/ecological assessment compared to BRAC reuse plans? What about metals?

Page 3-1, para. 3 Acoustic imaging to define stratigraphy is difficult in two such similar materials as the fill and Bay Mud - usually requires cores to "ground truth" the acoustic signals. How will this be addressed?

Page 3-1, para. 4 States " develop data to simulate ..... sediment disturbance ". Is this referring to developing a computer simulation model? How does development relate to variously stated (pages 1-2, 1-3, 3-1, etc.) scope/objectives of study?

Page 3-2, top of page Implies this is an experiment is using these methods at a few selected locations, with site-wide application later if initial trial is successful? Is this true? Then this is not an effort to complete characterization of the sites? How does this relate to stated objectives/scope?

Page 3-3, para. 1 States Navy sources contributing to metal load is not known. Did PRC do studies on background/reference levels of metals in soils/sediments? (They usually do.) Also states ecological effects of releases not known, yet earlier an ecological study was discussed. Confusing/conflicting information.

Page 3-3, para. 3 (Section 3.2) Another statement of purpose of study - assess speciation, toxicity and natural (intrinsic) processes occurring in lagoon and wetlands. No mention of characterization of sites, evaluation of remediation options.

Page 3-4, Section 3.3 to 3.9 How do these tasks and their results relate to objectives on page 1-2, page 3-1, to DQOs, etc.?

Page 3-4, para. 2 & 3 See comment on Page 3-1, para. 3 about acoustic survey. Also, what about shallow water effects and echoes off sea walls, "fuzzy" signals near walls, etc.

Page 3-4 to 3-12 (Sections 3.3 to 3.9) Need to identify/relate these tasks to objectives, to DQOs, show how data will be used and decision that can be made as a result (this is done is some cases, but not in others).

Page 3-7, para. 1 To compare toxicity between pore water only and sediment contact only, when testing toxicity using sediment core, is all pore water removed? If not, how will the distinction be made? This is confusing.

Page 3-8, para. 3 (Section 3.7) States "The data for evaluating chemical transport in sediments will be obtained from measurements on sediment cores." What measurements, how done?

Page 3-9, para 1 The measurement of sediment properties as described are standard tests that can be run by any good commercial geotechnical testing laboratory, so why do they need to be run at a research lab?. Why should research laboratory costs be paid for these tests? What about permeability tests?

Page 3-10, para. 1 (Section 3.8) The last sentence refers to a remediation alternative - sediment capping. Have the remediation alternatives been identified already? Why haven't they been presented in this work plan, especially since the plan sometimes refers to the objective of evaluating remedial options? Is the purpose of additional data (both PRC and BERC) to help select the remedy from identified alternatives? Then the work plan objectives and DQOs should be related to these remedial options from the beginning, the remedial alternatives should be identified up front. How do these options relate to the reuse plan (Alameda is a BRAC facility) ? At this point in time, any Navy funds spent should contribute to implementing the BRAC reuse plan.

Page 3-12, para. 1 & 2 (Section 3.9) How does this task relate to tasks in Sections 3.5 and 3.6? Can they be combined? Why is this broken out separate? How will this data be used?

Figures 3-1 and 3-2 This information needs to be related to the stated objectives, remediation alternatives and BRAC reuse plan. In fact, a matrix showing relationships between BRAC reuse plan, remediation alternatives, DQOs, objectives of this study, the tasks identified in section 3.3 to 3.9, and the data to be obtained and how it will be used should be developed.

Page 4-1, para. 1 States ".....expected lateral heterogeneity of samples." Yet Section 3.0 on page 3-1, paragraph 4 implies a computer model will be developed from data to predict chemistry and toxicity associated with sediment disturbance. How can a model be developed that will apply site-wide in light of lateral heterogeneity? How will heterogeneity be addressed?

Page 4-1, para. 2States " Establishing accurate depth profiles of chemical distribution, chemical speciation, sediment toxicity, and deposition history ....." These data requirements are not specified in the tasks in Section 3. Under which task and with which tests/analyses will the above information be gathered. What existing information is available on dredging history, sedimentation rates, etc.?

Also states grab samples are appropriate where some disturbance is acceptable - depending on how "grab" samples are taken, they can be highly disturbed, especially as they are brought up through the water column.

A 4-inch diameter gravity corer, depending on core barrel length and trip wire length required, will probably not function in water depths of 8 to 14 feet.

Considering the highly specialized, research level analyses to be done, great care should be taken with the sampling and sample handling efforts. Typical estimates from the EPA indicate that 80% of data error is due to the sampling process as opposed to analytical processes.

There is no indication that contingency samples will be taken. Due to the expense of remobilization and resampling, suggest extra samples be taken beyond any replicates planned.

Page 4-3, para. 3First mention of soil gas testing to be done - which task in Section 3 will this fall under? Who will be doing the sampling? How will analysis be done - a field lab? Who will set up and operate? QA/QC for field lab? How will data be used?

Section 5 - How do these tests/analyses descriptions relate to tasks in Section 3? to objectives? to DQOs ? etc. How will data be used?

Not all tests/analyses mentioned in the work plan appear in Section 3 or Section 5. Soil Gas? Stratigraphy and sedimentation history? Field scale water flow studies? Develop simulation model?

Page 6-1, para. 1Project objectives now stated as: (1) determine toxicity and migration pathways for chemicals of concern; (2) establish the time course of past and future intrinsic remediation; (3) evaluate the impacts and issues associated with potential remedial strategies.

This is another statement of objectives for the study outlined in the work plan. (also on page 1-2, 1-3, 3-1, Sections 3.3 to 3.9, figures 3-1 and 3-2, etc.). They are all somewhat similar, but different which gives the impression the study objectives have not been thought out or clearly defined, especially in light of the ultimate purpose which is to implement the BRAC reuse plan.

Page 6-1, para. 2States chemicals of concern are PAHs, PCBs and organochlorine pesticides and trace metals. This is the first mention of pesticides. On page 3-1, paragraph 1, only PAHs and PCBs are cited for study. Will pesticides specifically be studied also?

Page 6-1, para. 3Last sentence says " ... sediment ingestion..." - is "ingestion" intended, could direct contact also be a factor?

Page 6-2, top of page What, if any, "special precautions" can be taken?

Page 6-2, para. 1Last sentence does not make sense - is this implying sediment disturbance alone can be toxic - is this the disturbance of contaminated sediments or uncontaminated sediments?

Page 6-2, para. 2How will this information be used to help select a remedial technology?

Page 6-2, para. 2 States "....assuming there has been no disturbance of the sediment profile" - how will this be determined? Any background information on dredging or other operations conducted in the lagoon (storm impacts, anchor dragging, underwater testing of Navy devices, dumping, etc.) that would cause disturbance? What historical information is available from NAS Alameda, past employees, etc.?

Page 6-2, para. 3 States " .... field scale water flow studies...." this is the first mention of this study. Which task in Section 3 does it fall under? Who will be conducting study? How will data from study be used? Study description does not mention losses through evapotranspiration. The 'infiltration test" - is this a percolation test? Not described in Section 5.

Page 6-3, para. 3 Discusses intrinsic remediation of fuel hydrocarbons in relation to study of PAHs and PCBs. This is the first mention of this contaminant. Why isn't it discussed in Section 3, or on page 1-4, where PAHs and PCBs are specifically cited? What tests/analyses will be done? How will data be used?

Page 6-4, para. 1 Since "lateral heterogeneity" is expected (page 4-1, para. 1), how can the assumption be made that intrinsic bioremediation rates can be assessed?

Page 6-5, para. 1 States ".....estimates of consolidation" is this the same as "compressibility" discussed on page 3-9. Are both of these referring to geotechnical consolidation tests?

Table 7-1 These DQOs are very generic, not appropriate at this stage of the effort. The information in Tables 5-1 and 5-2, and in Figures 5-1 to 5-3 should be specifically addressed in the DQOs (especially the column labeled "Information to be obtained" in the tables - that information should be in the DQO "Identifying Inputs " step). The DQO problem statement is a statement of a research problem, not the Navy's problem. The Navy's problem is to determine, based on the BRAC reuse plan, if remediation is required, and if so, select an appropriate remedial technology that will most expeditiously allow the BRAC reuse plan to be implemented. A set of DQOs should be developed for each remedial alternative considered. The DQOs developed by PRC are closer to what is required. There should be one set of DQOs coordinated by PRC. The DQOs need work in terms of how much of the BERC data is necessary and how it will be used.

Page 8-1 The reports need to be related to the DQOs and present studies and results in terms of how the information will be used to make the decisions identified in the DQOs. Are reports the only deliverables? What about the computer model? Who will retain analytical data and for how long?

SAP For the SWIC, under Specialized Equipment, a reference is made to the Work Plan Section 5.3.2 for a description; but the Work Plan in Section 5.3.2 refers to the SAP for equipment description. SWIC equipment is not described anywhere.

SAP There is nothing on the soil gas tests, the field scale water flow studies and several others mentioned in the work plan.

SAP The relationship of the contents of the SAP, Section 5 and Section 3 of the Work Plan needs to be explained. Some studies/tests/analyses are only mentioned in one place and appear to "fall between the cracks" in terms of the overall effort.

HSP The HSP is good; it is concise yet contains the necessary information.

HSP No mention of protective requirements for samples that might contain radionucleides as discussed in the Work Plan