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NAVAL WEAPONS STATION CONCORD
LITIGATION AREA

NAVY RESPONSES TO AGENCY COMMENTS ON THE DRAFT QUALITATIVE ECOLOGICAL ASSESSMENT WORK PLAN

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NAVY RESPONSE TO AGENCY COMMENTS ON THE DRAFT QUALITATIVE ECOLOGICAL ASSESSMENT WORK PLAN

The following responses were prepared to address the comments provided by the U.S. Environmental Protection Agency (EPA) and the California Environmental Protection Agency (Cal EPA) Department of Toxic Substances Control (DTSC) and San Francisco Regional Water Quality Control Board (RWQCB). The agencies submitted comments regarding the draft qualitative ecological assessment work plan (QEAWP) for the Litigation Area, Naval Weapons Station Concord.

Most of these comments were addressed orally in discussions with the regulatory agencies held on February 9 and March 24, 1995. Meeting minutes of these discussions will be referred to when appropriate and are included as an attachment. The final workplan (QEAWP), draft final field sampling plan (FSP), and draft final quality assurance project plan (QAPjP) are being submitted on June 1, 1995. These documents incorporate revisions based on written comments received and discussions at the working meetings.

CRITICAL COMMENTS OF THE U.S. EPA ON THE DRAFT QUALITATIVE ECOLOGICAL ASSESSMENT WORK PLAN FOR THE LITIGATION AREA, NAVAL WEAPONS STATION CONCORD

GENERAL COMMENTS

Comment 1: **In general, this work plan provides an acceptable conceptual approach to the development of a qualitative ecological assessment at the Litigation Area. However, because the work plan was written in very general terms, it will be necessary to be considerably more specific about the how the conceptual approach will be implemented in the Field Sampling and Analysis Plan.**

Response: The final QEAWP and draft final FSP are more specific with regard to how the conceptual model and the field investigation are related. The conceptual approach, specific field activities, and approach for data interpretation described in the FSP were discussed in detail during the working meetings on February 9 and March 24, 1995 (see meeting minutes).

Comment 2: **Please refer to the Litigation Area, rather than to "LA", in the text to avoid confusion with the city of Los Angeles.**

Response: The text has been revised accordingly.

Comment 3: **Additional information, such as that reported in the AQUIRE and PHYTOTOX databases, will be necessary to develop appropriate toxicity reference values (TRVs) for the measurement endpoints identified in the conceptual site model.**

Response: Data will be obtained from the primary literature and from toxicity databases and will be organized into a database that will be used to develop toxicity reference values

(TRV) for assessment endpoint species at Concord. This information collection effort is being conducted jointly by PRC (Sabrina Russo), U.S. EPA (Barbara Smith), and DTSC (Laura Valoppi). The approach that will be used was discussed and agreed upon at the March 24, 1995 meeting (see meeting minutes) and other later discussions between PRC, EPA, and DTSC.

Comment 4: **The work plan does not adequately address the issue of incidental ingestion of contaminated soil/sediment by receptors. Please provide additional information about how exposure from this source will be accounted for in the exposure assessment.**

Response: Ingestion of soil will be addressed in the model used to estimate dose. The information incorporated into conservative estimates will come primarily from the literature (see section 9.2.2 of the final QEAWP for a summary of this approach).

Comment 5: **With respect to toxicity testing, the acceptance criteria and the criteria that distinguish between statistical and biological significance should be agreed upon, *a priori,* before data evaluation and interpretation take place.**

Response: The acceptance criteria were discussed in detail at the March 24, 1995 meeting and are summarized in section 6.6 of the draft final FSP.

Comment 6: **With respect to deriving TRVs, the toxic effect to be used as the baseline, the receptor, and the use of specific "adjustment factors" should be agreed upon, *a priori,* before data evaluation and interpretation take place.**

Response: Use of effects levels and adjustment factors was discussed at the March 24, 1995 meeting and is summarized in section 10.2.2 of the final QEAWP. The determination of appropriate TRVs and agreement on their use will be the result of a joint effort between the Navy and the regulatory agencies.

SPECIFIC COMMENTS

Comment 1: **p. 2-5 , Section 2.4: "land formations" referred to in the text are not reflected in Figure 1.**

Response: Reference to figure 1 was deleted from this paragraph.

Comment 2: **p. 2-6, Section 2.5.2: While "surface water" may be the source of drinking water at CNWS, please explain that it comes to the facility from the Contra Costa Water District, rather than leaving open the question of a source on the facility.**

Response: This section has been revised accordingly (see section 2.5.1 of the final QEAWP).

Comment 3: **p. 3-1, Section 3.3.1: Typo? "...wetlands in the <u>Tidal Area</u> comprise..."**

Response: The typographical error has been corrected.

Comment 4: **p. 4-5, Section 4.1.2: Please modify the text to read, "...shared the waste lagoons with the General Chemical Company Bay Point Plant..."**

Response: The text has been revised accordingly.

Comment 5: **p. 4-8 to 4-25, Sections 4.2.1.1 to 4.2.3: In the discussion of the effects of the contaminants of potential concern (COPCs), it is important to identify the specific biological effect linked with the reported concentration and provide the reference for that effect. General statements about toxicity "to marine organisms" are not as useful as those describing an effect that may be linked directly to the assessment and measurement endpoints, such as effects on reproduction of a fish suspected to inhabit the Litigation Area wetlands. It is understood that additional toxicological data will be compiled to develop appropriate TRVs. It is anticipated that proposed TRVs, with supporting documentation, will be agreed upon among all parties and appear in an addendum to the work plan and/or to the Field Sampling and Analysis Plan.**

Response: Specific effects on organisms closely related to assessment endpoint species will be preferred. All data incorporated into the toxicity database will be evaluated for its suitability and an effort will be made to minimize the use of adjustment factors. Allometric conversions will be used to estimate effects on related species as discussed at the meeting on March 24, 1995. These issues are detailed in section 10.2.2 of the final QEAWP. Also refer to the response to EPA general comment number 6.

Comment 6: **p. 5-6, Section 5.4.1: Due to the nature and size of the new water body in RASS 3, it may be more appropriate to describe it as a pond rather than a "lake."**

Response: This body of water will be referred to as a pond.

Comment 7: **p. 5-7, Section 5.4.2: Please provide the reference that supports the assertion that metals "generally do not biomagnify."**

Response: This sentence has been deleted. A separate sentence was added that discusses selenium as a contaminant of potential concern that has the potential to biomagnify.

Comment 8: **p. 7-3, Section 7.2: Please modify the text to read, "[m]etal bioavailability will be estimated by determining chemical concentrations in weak acid extracts of soils and sediments." Is the "separate field sampling and analysis plan" referred to in the text in addition to the one to be submitted for the Litigation Area Work Plan?**

Response: Two measures of leachability will be performed that are based on modifications of the waste extraction method (WET) test. These include extractions using dilute strong acid (0.5 normal hydrochloric acid) and deionized water (see section 9.1 of the final QEAWP and section 4.4.2 of the draft final FSP). There is only one FSP which is the draft final FSP submitted on June 1, 1995.

Comment 9: **p. 7-3, Section 7.2: Please provide the reference that supports the statement that plant roots, burrowing mammals, and burrowing clams are limited to the upper 18 inches of soil or sediment, for marshes in the Bay area. Lacking literature, it may be appropriate to document the depth of the root zone at the site and make appropriate revisions to the proposed sampling depth.**

Response: The issue of the depth of subsurface samples was discussed at the March 24, 1995 meeting and agreement was reached to sample to 18 inches depth at this time at all sediment locations and at 20 percent of soil locations. This depth is considered appropriate for ecological assessment purposes. The rationale for sampling to 18 inches depth is also discussed in section 7.2 of the final QEAWP.

Comment 10: **p. 7-3, Section 7.2: Typo? "...chemical and physical parameters..."**

Response: The typographical error has been corrected.

Comment 11: **p. 7-5, Section 7.3: Selenium and arsenic are commonly referred to as metalloids. Please modify the text to read, "...differs from other chemicals..."**

Response: The text has been revised accordingly.

Comment 12: **p. 7-5, Section 7.5: To what does the text refer with the statement that a "positive correlation greater than 0.50"? Does this refer to the value Kendall's rank correlation? If so, please rearrange the paragraph such that the 4th sentence becomes the 2nd sentence. If not, please explain further.**

Response: This section has been revised for greater clarity (see section 7.4 of the final QEAWP).

Comment 13: **p. 7-6, Section 7.6: The location of the proposed reference area may still be affected by contaminants arising from its proximity to the loading operations at the Navy's piers. What approach or chemical analyses will be used to distinguish between the presence of contaminants attributable to the industrial activities at the piers from that due to the historic contamination?**

Response: The proposed marsh reference area will not be used if unacceptable levels of contaminants are found. Criteria for acceptance of this area are detailed in section 4.6 of the draft final FSP. Efforts to distinguish sources of any contaminants found at the proposed reference area is not considered part of the ecological assessment goals.

Comment 14: **p. 8-3, Section 8.8.1: Please capitalize the word "state" when referring to California-specific species classifications.**

Response: The text has been revised accordingly.

Comment 15: **p. 8-3, Section 8.1.2: When will the "complete literature review" be available? In what document will it appear?**

Response: Extensive literature review is necessary for both the toxicological database for developing TRVs and the natural history database that will be used in estimating exposure. This is an ongoing process that will be summarized in the final qualitative ecological assessment report. Every effort will be made to keep the regulatory agencies aware of progress being made on these databases.

Comment 16: **p. 8-5, Section 8.1.3: Incidental ingestion of contaminated soils and sediments adhering to the bodies of prey items may potentially pose a significant route of exposure to the receptors of concern. How is this issue being addressed within the exposure scenarios and the calculations of the ingestion pathway? This exposure pathway would be of concern for the diving ducks, black rail and great blue heron, as well as the raptors and the grey fox.**

Response: Values of incidental soil ingestion will be incorporated into the high and low dose estimates calculated for each endpoint species. These values will be based on data from the literature or on conservative estimates (see section 9.2.2 of the final QEAWP).

Comment 17: **p. 8-5, Section 8.1.3: Typo? "...such as the grey fox and other raptors."**

Response: The typographical error has been corrected.

Comment 18: **p. 8-6, Section 8.1.4.2: Since benthic invertebrate abundance is to be sampled to estimate prey abundance, this may provide an opportunity to address the question of incidental ingestion of sediment by performing some limited empiric measures of the amount of sediments adhering to prey items, lacking information from the literature. A strategy to address this data gap should be developed, whether or not an empirical approach is taken.**

Response: Amphipods and fish collected for tissue residue analysis will have sediment adhering to them that will be included in tissue chemistry values. Literature values will also be used when available.

Comment 19: **p. 8-8, Section 8.2: The text first states that the waste extraction method (WET) uses a weak organic acid, then states that it uses a relatively strong acid. Which is correct? Please revise the text appropriately.**

Response: The text has been revised. See response to EPA specific comment number 8.

Comment 20: **p. 8-8, Section 8.2: The text states that samples which "exceeded the STLC by a factor of 10 but did not exceed the TTLC were analyzed by the WET method." Is this correct?**

Response: This statement is correct. Samples with values greater than the total threshold limit concentration (TTLC) and less than 10 times the soluble threshold limit concentration (STLC) values *were not* subject to WET method analysis while samples between 10 times the STLC and the TTLC values *were* subject to WET analysis.

Comment 21: **p. 8-8, Section 8.2: The proposal for the Tidal Area sites included Microtox assays of both solid phase and organic extracts of sediments. One chemical and three biological tests will be performed. Please modify the text to read, "The Navy has proposed using a suite of three biological and one chemical test to estimate bioavailability of contaminants (PRC 1994g). That study includes: (1) acid extracts of sediments to produce a labile fraction that may represent bioavailable contaminants; (2) solid-phase Microtox bioassays, to estimate toxicity of bioavailable organic and metal contaminants; (3) organic extract Microtox bioassays, to estimate toxicity of organic contaminants; and (4) P450 biomarker assays, to estimate toxicity of coplanar organic compounds, including polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), and dioxins (Columbia Aquatic Sciences 1994)." Please explain how the data for this approach will be used and its relationship to the bioassays proposed in Section 9.1.**

Response: The proposed approach for the Tidal Area sites is not directly relevant to the ecological assessment issues at the Litigation Area at this time. The text has been modified and no longer includes reference to this approach.

Comment 22: **p. 8-11, Section 8.3.1: The text states that, "the area within each contour will be ..quantified as a proportion of the total habitat..." This approach assumes that the concentration of contaminants is higher at the surface than at depth. Is this always the case? If not, areal contours should be based on the maximum concentration found at that sampling location, regardless of depth.**

Response: Areal contours will be based on maximum concentrations found at each location.

Comment 23: **p. 8-12, Section 8.3.2: The text states that, "conservative assumptions of soil ingestion rates will be used." Please be more specific. Are there empiric approaches that may be appropriate for this site?**

Response: See response to EPA specific comments number 16 and 18 and section 9.2.2 of the final QEAWP.

Comment 24: **p. 8-12, Section 8.3.3: Please be more specific about how data that measures bioaccumulation in liver and kidney tissues may be extrapolated to whole-body contaminant burdens of small mammals. Since mammal fur and bone is not digested by raptors, how will bioaccumulation data from small mammal femurs be used? In selection of the fish species for body burden analysis, what approach will be used to decide whether parameters such as size class, rather than fish species, are more important in deriving an estimate of exposure to the receptors of concern?**

Response: Every effort will be made to use the existing mammal tissue residue data to avoid having to sacrifice more animals. Conversion of tissue concentrations from liver and kidney to whole body burden may be possible; an exact approach is not known at this time. If reliable estimates cannot be made based on conversion of existing data, or if biomagnifying organic contaminants of concern are found, at these sites then

additional investigations of mammal tissue residues may be necessary. The issue of fish species and size classes to analyze for tissue residues was discussed at the March 24, 1995 meeting and a general consensus was reached that composite samples representing diets of endpoint species (such as the great blue heron) collected at a variety of locations is the best approach.

Comment 25: **p. 9-5, Section 9.1.4.2: It is important to agree upon criteria for acceptance prior to performing the bioassay tests. The use of a Bay area "Reference Sediment", identified by the San Francisco Bay Regional Water Quality Control Board, is recommended so that results of tests from this site may be viewed within the context of regional norms. The criteria that distinguish statistical significance versus biological significance should be agreed upon, *a priori*, to facilitate data evaluation and interpretation.**

Response: Criteria for interpretation of bioassays was discussed at the March 24, 1995 meeting and is summarized in the meeting minutes and in section 6.6 of the draft final FSP.

Comment 26: **p. 9-6, Section 9.2: Recognizing the limitations of available toxicity data, it may be necessary to use "adjustment factors" in deriving TRVs for the receptors of concern. The use of specific "adjustment factors" should be agreed upon, *a priori*, to facilitate data evaluation and interpretation.**

Response: Use of effects levels and adjustment factors was discussed at the March 24, 1995 meeting and is summarized in the meeting minutes and section 10.2.2 of the final QEAWP. Also, see response to EPA general comment number 6.

Comment 27: **p. 9-7, Section 9.2: What constitutes "appropriate TRVs" should be agreed upon, *a priori*, to facilitate data evaluation and interpretation.**

Response: Creation of the toxicity database and calculation of TRVs is a joint effort as described in the response to EPA general comment number 3 and general comment number 6 and will be the focus of ongoing discussions.

Comment 28: **p. 9-8, Section 9.3: The use of tissue residue data from small rodent femur, kidney and liver, and from the filter feeding clam, *Corbicula*, taken as part of the baseline conditions report, may not represent the best estimates of the "potential for ...trophic transfer" of contaminants, particularly if incidental ingestion of soil/sediment can be demonstrated to provide a significant exposure pathway. The utility of this data should be further evaluated before additional data of its type is collected.**

Response: This data will be used to the fullest extent possible. Additional information that will be incorporated into estimates of trophic transfer include tissue residue analysis of pickleweed, amphipods, and fish and estimates of incidental ingestion of soil.

Comment 29: **p. 9-10, Section 9.4: What is an "event tree"?**

Response: The term "event tree" has been deleted. A better term is "decision tree", which is a diagrammatic approach to identifying decision points in the evaluation of probable risk.

CRITICAL COMMENTS OF THE RWQCB ON THE DRAFT QUALITATIVE ECOLOGICAL ASSESSMENT WORK PLAN FOR THE LITIGATION AREA, NAVAL WEAPONS STATION CONCORD

GENERAL COMMENTS

Comment 1: **In general, additional rationale will need to be provided for the sampling design and strategy. Although the strategy for investigation has been discussed in several meetings amongst the agencies, the Navy and their contractor, the rationale must be explicitly stated in this document. Based on the conference call of February 9, 1995, it is acceptable to Regional Board staff to have the Navy address these comments in detail in the upcoming Field Sampling Plan.**

With regard to using published Toxicity Reference Values (TRVs) to characterize risk, any TRVs must be agreed upon by all parties prior to the risk assessment.

Response: The specific details discussed in the working meetings are provided in the final QEAWP, the draft final field FSP and draft final QAPjP. The approach to developing TRVs was discussed in the meeting on March 24, 1995 and is also summarized in section 10.2 of the final QEAWP. Also refer to the response to EPA general comment number 6 and specific comment number 5.

SPECIFIC COMMENTS

Comment 1: **page 3-6, Section 3.1.3, Non-tidal Wetland, para 1, sentence 3: This sentence states that RASS 3 has not been revegetated. The Navy should clarify that the area has not been *actively* revegetated; a number of plant species have become established on their own.**

Response: This area was reseeded with a grass mix and is also undergoing natural recolonization.

Comment 2: **page 4-3, Section 4.1.1, Known Chemical Contamination Data - Groundwater, para 1, sentence 1: The Navy should clarify what is meant by chromium, nickel, and silver *may be present,* based on 1989 samples.**

Response: Levels of some metals exceeded maximum contaminant level (MCL) criteria in groundwater from some locations.

Comment 3: **page 4-6, Section 4.1.3, Data Gaps for Total Chemistry, top of page: The Navy should clarify to what depth previous subsurface samples were taken in the "active" areas and generally describe the soil concentrations to clarify the statement that "...contamination does not extend below the soil surface."**

Response: Contamination was found to a depth of at least 3 feet bgs in the active areas. This information is summarized in Table 3 of the final QEAWP.

Comment 4: **page 4-23, Section 4.2.3, Toxicity Data Gaps: The section indicates that more detailed toxicological data will be provided for the COPCs and for identifying TRVs to be used in the exposure assessment. All parties should come to agreement up front on the extent of research to be performed for the toxicity profiles and on the appropriate TRVs for receptors at this site.**

Response: See response to EPA specific comment number 5 and general comment number 6.

Comment 5: **page 5-3, Section 5.2.1, Chemical Stressors, paragraph 1: The Navy should clarify why ER-Ls, ER-Ms, and AETs, typically used as benchmarks for sediments, were used here as screening levels for upland soils.**

Response: These criteria were used in the absence of appropriate soil criteria and with the goal of having consistent screening criteria across the Litigation Areas. This issue was discussed at the February 9, 1995 meeting.

Comment 6: **page 5-7, Section 5.4.1, Uplands Habitat, top of page: In terms of groundwater in RASS 4, the Navy should clarify what is meant by "...no *significant* contamination by the six metals has been identified."**

Response: This section has been revised to indicate that some metals were found at levels exceeding MCL criteria.

Comment 7: **page 5-7, Section 5.4.2, Food Chain Transfer: The Navy should provide the reference to confirm the statement that "Metals generally do not biomagnify..."**

Response: See response to EPA specific comment number 7.

Comment 8: **page 7-3, Section 7.2, Additional Chemical Sampling, first full paragraph and second paragraph: This section indicates that direct exposure to contaminated soils will probably be limited to the upper 18 inches of soil or sediment. The Navy should consider that the limit of the depth of exposure in soil may be greater than 18 inches for roots of upland plant species. In addition, samples deeper than 18 inches should be considered for a percentage of the samples to determine vertical extent, or consider deeper samples in locations where 18-inch samples indicated contamination above the screening levels. This may be**

relevant especially in areas of high flows or where significant storm events could potentially cause erosion and exposure of the deeper soils or sediments.

The Navy should provide the rationale for measuring chemical and physical parameters in only 20% of the 18-inch samples.

Response: Subsurface samples (to 18 inches bgs) will be collected at all slough, ditch, and pond locations and at 20 percent of soil locations. This issue was discussed at the February 9, 1995 meeting in regard to potential exposure of receptors of concern and the general hydrology and erosional environment of the Litigation Area. The Navy believes that this depth will be sufficient to characterize risk to ecological receptors. Sloughs and ditches are of the highest concern for sediment contaminant migration and deposition and will make up the majority of subsurface samples. Also refer to EPA specific comment number 9 and section 7.2 of the final QEAWP.

Comment 9: **page 7-3, Section 7.2, Additional Chemical Sampling, para 3 and 4: In addition to the sediment parameters listed here that will be measured, the Navy should also measure for salinity and ammonia, particularly in samples intended for bioassays. In the last paragraph, the Navy should clarify what is meant by "...randomly selected locations in *representative* areas of mosquito ditches and sloughs will be sampled..."**

Response: Salinity and ammonia will be tested for in bioassay sediment samples. Sampling locations were all selected with a stratified random methodology, which was discussed in the March 24, 1995 meeting.

Comment 10: **page 7-4, Section 7.3, Calculations of Hazard Quotients and Hazard Indices, para 1: The Navy must provide the rationale for using the higher of either the ER-L or established ambient values for metals in calculating the Hazard Quotient for sediments.**

Response: This approach was agreed upon in working meetings with the regulatory agencies in light of the fact that ambient values of some contaminants may exceed ER-L values and would therefore be more appropriate for use.

Comment 11: **page 7-5, Section 7.4, Ranking of Hazard Indices and use in Selection of Sites for Further Study, para 2: This paragraph states that HIs will be used to focus bioassays and bioaccumulation studies. Since HIs reflect toxic responses to chemicals, it is unclear how the HIs will be used to focus areas for bioaccumulation. The Navy should clarify why areas of high, medium, and low HIs will be used for this purpose. In addition, the last sentence should be modified since this approach is not a true indicator of ecological risk, as is stated.**

Response: This approach is no longer included in the final QEAWP. Locations for bioassay and tissue residue studies were selected in a stratified random fashion.

Comment 12: **page 7-6, Section 7.6, Chemical and Physical Criteria for Selection of Reference**

Sites, para 1: This paragraph indicates that a reference site will be established in the vicinity of station 1M57 because it has a low HI. The document should reflect that use of this station as a reference location will be contingent upon chemical and biological results, and upon agreement by all parties.

Response: See section 4.6 of the draft final FSP for criteria for acceptance of the proposed marsh reference area.

Comment 13: page 8-2, Section 8.0, Characterization of Exposure to Receptors, top of page: This Section discusses using a model which will produce a dose estimate which will then be compared with published TRVs. These TRVs must be agreed upon by all parties before the risk assessment is completed.

Response: See response to EPA specific comment number 5 and EPA general comment number 6.

Comment 14: page 8-4, Section 8.1.2, Natural History Relevant to Endpoint Selection, top of page: The Navy should indicate when the complete literature review for each species will be provided. The Navy contractors should indicate the scope of the review process, i.e., which databases or literature sources will be queried.

Response: See response to EPA specific comment number 15.

Comment 15: page 8-4, Section 8.1.3, Relationships Between Assessment and Measurement Endpoints, para 2, sentence 7: Surrogate species used to represent assessment endpoints must be agreed upon by all parties prior to beginning the assessment.

Response: The Navy plans to continue working closely with regulatory agencies in the creation of toxicity and natural history databases and in the evaluation of use of surrogate species.

Comment 16: page 8-5, Section 8.1.4, Reconnaissance Activities: The Navy should provide the agencies with any ecological information prior to finalizing the assessment and measurement endpoint selection.

Response: Qualitative surveys of birds, fish, and invertebrates will be conducted early in the schedule of field activities. The resulting information will be discussed with the regulatory community and will be used to finalize selection of measurement and assessment endpoint species.

Comment 17: page 8-5, Section 8.1.4.1, Salinity Measures: Salinity should be measured in the porewater of sediment, not the standing water in sloughs, if the objective is to select the appropriate test organisms for sediment bioassays.

Response: Interstitial salinity will be measured in sediment. Salinity will also be measured in surface waters of sloughs and ditches.

Comment 18: page 8-6, Section 8.1.4.3, Seasonal Use of Habitats by Birds: The paragraph

states that bird surveys will occur during February and May 1995 to determine seasonal use of the marsh and upland. February is late in the season to observe many of the migratory waterfowl which may utilize Concord NWS; a number of these species typically arrive in October and leave prior to February. However, surveys supplemented with databases from other sources (PRBO, Christmas Bird Counts, etc.) will be of great value. The May survey will be the optimum time to observe most upland migratory species.

Response: This section has been modified to focus on surveys in the reproductive season and the winter season. Details of the bird survey protocols can be found in section 3.3 of the draft final FSP. Data from the Audubon Society and National Biological Survey bird surveys were incorporated into the natural history tables in Appendix A of the final QEAWP.

Comment 19: **page 8-12, Section 8.3.2, Ingestion Rate and Diet, paras 2 and 3: These paragraphs discuss the need to estimate ingestion rates for various wildlife species where there is no actual data. Any assumptions proposed for soil ingestion rates will need to be provided and agreed upon by all parties.**

Response: All literature values used in models will include explicit discussions of the assumptions, uncertainty, and limitations of the data. Also refer to the response to EPA specific comment number 16.

Comment 20: **page 9-1, Section 9.1, Effects Assessment: Toxicity Tests: This work plan does not include a proposal to measure bioavailability of contaminants in sediment porewater. While there is a proposal to measure toxicity in whole sediment using the amphipod bioassay with survival as the endpoint, Regional Board staff have typically been requiring toxicity tests with at least two different endpoints for bulk sediment and porewater. Current literature, as well as studies performed at the Board through the Bay Protection Program, indicates that contaminants in sediments may be bioavailable in the porewater fraction. For marine and estuarine sediments, we are in favor of using the echinoderm test with percent normal larval development as the toxic endpoint. This test is considered reliable and reproducible in the San Francisco Bay. Porewater chemistry should be measured synoptically.**

Response: The final QEAWP and draft final FSP include the rationale for and description of the pore-water larval echinoderm bioassay now being proposed. This test was chosen in part for its reliability and interpretation in conjunction with other studies in San Francisco Bay.

Comment 21: **page 9-5, Section 9.1.4.2, Criteria For Acceptance: It is unclear what the criteria for acceptance for test acceptability will be for this site (mean control survival of 80% or 90%); all parties should come to specific agreement prior to analysis of the data.**

Response: See response to EPA specific comment number 25.

Comment 22: **page 9-6, Section 9.2, Effects Assessment: Toxicity Reference Values: Please see comment #13.**

Response: See response to EPA specific comment number 5.

Comment 23: **page 9-6, Section 9.2, Effects Assessment: Toxicity Reference Values, bullet 4: Regarding dose levels where chronic NOAELs or LOAELs are unavailable, the Navy should provide rationale for the order of preference where chronic-nonlethal-adverse-effect-level is preferred over the no-effect-level.**

Response: The final QEAWP includes a discussion of the order of preference of effects data (see section 10.2.1). This issue was also discussed at the March 24, 1995, meeting.

Comment 24: **page 9-8, Section 9.3.2, Sampling of Tissue Residues: The Navy should report the results of the reconnaissance findings for sufficient biomass analysis prior to making the final determination for species inclusion.**

Response: Final determination of species or composites of species for tissue residue analysis will be made in conjunction with the regulatory agencies, as discussed in the March 24, 1995, meeting. Also, refer to response to EPA specific comment number 24.

Comment 25: **page 9-10, Section 9.4, Population and Community Level Responses, para 2, sentence 2: The Navy should elaborate on what an "event tree" is and how it would be used.**

Response: See response to EPA specific comment number 29.

Comment 26: **Table 6, Preliminary Assessment and Measurement Endpoints: column 3 Measurement Endpoints, 'amphipod bioassay *28-day chronic test*' - typo?**

Response: The final QEAWP proposes the use of the 10-day solid phase amphipod bioassay.

Comment 27: **page A-18, Appendix A-4, Natural History of Birds at WPNSTA Concord: (1) It would be useful to include breeding and nesting habitat for each species. (2) column 6, Concord Habitat, what does it signify where the box is blank (no 'upland' or 'marsh' designation) for some species? A designation such as 'open bay' or 'mudflat' may be relevant in terms of natural history and can be later factored into exposure pathways.**

Response: Additional information has been added to this table since the draft QEAWP. Breeding and nesting habitat information is being collected from the literature and will be available in the final report. Blank cells indicate that no information was available.

CRITICAL COMMENTS OF DTSC ON THE DRAFT QUALITATIVE ECOLOGICAL ASSESSMENT WORK PLAN FOR THE LITIGATION AREA, NAVAL WEAPONS STATION CONCORD

GENERAL COMMENTS

Comment 1: **The document is called a workplan, but contains elements of a workplan, a scoping assessment, and a Tier 1 assessment as described in DTSC guidance. Throughout the document, abbreviations are used which are not in common usage. This may save paper, but wastes time looking them up. Search and replace functions would make it easy to spell these out.**

Response: Every effort has been made to streamline and focus the final QEAWP, draft final FSP, and draft final QAPjP. A glossary of acronyms is provided in the front of each document. A description of each document's scope, purpose, and relationship to the other documents is also included.

SPECIFIC COMMENTS

Comment 1: **The last word on page 4-1 does not appear to belong in that sentence. If it is there intentionally, some explanation should be provided regarding how it relates to the rest of the sentence.**

Response: The last word has been deleted from that sentence.

Comment 2: **Chapter 2: There is no justification for the selection of the suite of analytes. It is important that this be agreed upon before the sampling and analysis takes place.**

Response: Discussions with the regulatory agencies about contaminants of potential concern included a review of historical use of the site to identify the potential for organic contaminants to be present. These discussions resulted in an agreement on the analytes to be tested for in each type of sample. These analytes are presented in the draft final FSP.

Comment 3: **Table 3: The results reported are impossible. Given the dilution inherent in the method, a result of 100 mg/kg total metal would give a result of 10 mg/l in the WET if the metal were 100% soluble. Thus the solubilities for the maximums detected in the 0 - 0.5 ft. samples in Table 3a are 8000%, 1291%, 1600% for Arsenic, Copper, and Lead, respectively. Similar results are found for the means and at other depths, and at other RASS. In table 3b, an incredible 7.55 kg of zinc were present in the 100 g of soil that were placed in the liter of extractant. Perhaps the units should be ug/l (however the results are normally**

reported in mg/l). The totals seem surprisingly high, several of the metals comprising 7-50% of the sample weight. I have difficulty relating Table 3 to Table 5. How many samples are included in a location mean? Is the maximum within a location really up to 125 times the mean?

Response: Results reported in Table 3 included a typographical error in units that has since been corrected. Please refer to the revised table in the final workplan (Table 3 in the final QEAWP).

Comment 4: **Page 4-4: The preferred approach to comparing measured concentrations with standards is to use the 95% upper confidence limit on the mean for each area. "Carbonate" in the last paragraph should probably be "carbamate".**

Response: Future data summaries will include the calculation of 95 percent confidence limits. The typographical error in the last paragraph has been changed.

Comment 5: **Page 4-17: The statement that bone is rarely consumed or digested should be either supported by literature or deleted. Bones are often given as calcium supplements to carnivores in zoological gardens and animal colonies.**

Response: This statement has been revised accordingly.

Comment 6: **Section 4.2.2.2 This discussion of total petroleum hydrocarbons illustrates why TPH is not a useful metric. Where there is an indication of contamination with petroleum or petroleum products, the individual components should be the focus of the assessment.**

Response: Chemical analysis at most locations will include the categories total petroleum hydrocarbons as gas (TPH-gas), TPH as diesel, and the benzene, toluene, ethylbenzene, and xylene components (BTEX). Please refer to the draft final FSP and draft final QAPjP. The Navy believes that this is sufficient at this time.

Comment 7: **Section 7.2: Bioavailability cannot be *measured* by surface extraction. It may be possible to estimate bioavailability by surface extraction, or to correlate bioavailability with the results of surface extraction. Likewise, although TOC, pH, and sediment grain size are undoubtedly *determinants*, measurements of these parameters do not allow one to *determine* bioavailability. The third paragraph is vague about what "measures of physical and chemical parameters" are to be measured.**

Response: This section has been modified to better explain the use of chemical and physical parameters in the estimation of bioavailability (see section 9.1 of the final QEAWP).

Comment 8: **Chapter 8, line 1: "Overlap" of territory with contaminated area is not sufficient for exposure to occur. There must also be an exposure pathway.**

Response: All estimates of risk will be based on complete exposure pathways.

Comment 9: **Section 8.1.3: Evaluation of effects on an assessment species must include not only transfer of contaminants to that species but also effects on its prey. Figure 3 lists the grey fox as an omnivore and shows its prey as pickleweed, insects, and oligochaetes, while Figure 13 shows it as a carnivore. Table 6 characterizes it as a top mammalian predator, feeding on marsh rodents.**

Response: The food web figures are somewhat generalized; natural history data being collected to support the exposure estimates will include comprehensive searches for information on diet proportions. These diet proportions and other parameters will be used to estimate "high" and "low" doses (see section 9.2.5 of the final QEAWP). Evaluation of risk to assessment endpoint species will also include effects on important prey species.

Comment 10: **Table 6 and Figures 3, 4, and 13: The food web models as depicted in figures 3 & 4 appear adequate. These factors need to be taken into account in assessing effects on assessment endpoints (Table 6). Since each level of the food web depends on the abundance of its prey, toxic effects at each level of the food web need to be evaluated as well as transfer of contaminants through the food web. For example, tissue residues in rodents are listed as for the grey fox, but the population of rodents should also be a measurement endpoint. The graphical depiction of the food web as in figures 3, 4, and 13 could convey the information in Table 6, and make the completeness of any evaluation of all measurement endpoints relevant to any given assessment endpoint immediately apparent. The components of the food web chosen as measurement endpoints and assessments endpoints could be indicated by highlighting their names in some way on the diagram. Figure 3 shows some 14 ecological guilds. From some, all or nearly all members are chosen as assessment endpoints, while from others, none are chosen. In particular, no assessment endpoints are based on fish. They are also not shown as measurement assessment endpoints in support of the great blue heron in Table 6.**

Response: See response to DTSC specific comment number 9. Fish will be assessed directly with tissue residue studies and will be used as a measurement endpoint to assess the risk to the great blue heron.

Comment 11: **Section 8.1.4.3: Please substitute the word "verify" for the slang "groundtruth".**

Response: The text has been revised accordingly.

Comment 12: **Section 8.2: Much of this section is verbatim repetition or paraphrasing of pages 4-23 and 4-24. In paragraph 6, it appears that "Tables 2a through 2c" should be "Tables 3a through 3c", and "bioavailability" should be "bioavailable". The relationship of the trio of tests to bioavailability needs to be better explained.**

Response: The table numbers in the text were corrected. The discussion of tests being conducted at the Tidal Areas does not at this time directly relate to concerns of the ecological assessment of the Litigation Area and has been deleted from this section.

Comment 13: **In the middle paragraph on page 8-11, the first sentence indicates that there will be two estimates, but the third sentence implies that there will be a single composite estimate. Please clarify. The discussion appears to apply only to the case in which the entire range is within the contaminated area.**

Response: This section has been revised for clarity (see section 9.2.1 of the final QEAWP).

Comment 14: **Section 9.1.4.3 contains the phrases "If toxicity tests are run..." and "Whenever possible." These and others like them make it impossible for a reader to know what *will* happen. Perhaps this flexibility is necessary, but DTSC must reserve the right to judge the final product. It is not clear why sublethal bioassays would not be possible.**

Response: This issue was discussed in the meetings on February 9, and March 24, 1995, and consensus was reached concerning the appropriate tests to be conducted. The ambiguity of this section has been eliminated as a result of these discussions.

Comment 15: **Section 9.2, bullet 3: Reproduction, growth and mortality are important, but *any* detrimental sublethal change can affect survival and the opportunity to reproduce, and therefore, ultimately, the population.**

Response: The text has been revised to reflect this sentiment.

Comment 16: **The last sentence in the first paragraph on page 9-9 is unclear. Concentration in what? Seeds? Exposure point concentration in what? What is being modeled? The next sentence starts with "These literature reviews." What literature reviews?**

Response: Tissue residue studies on seeds of upland plants has been eliminated from the proposed activities due to concerns that they are not an appropriate pathway to receptors of concern and the availability of seeds is limited. This text has been deleted from the final QEAWP.

Comment 17: **Section 10.2: The phrases "direct toxicity testing on measurement endpoints" and "the tests to be performed on measurement endpoints " distort the meaning of the term "measurement endpoints." A measurement endpoint is a specific test result or parameter that is logically related to the assessment endpoint. For example, for the assessment endpoint "mallard duck population stability" the measurement endpoint might be "egg production in mallards in a 60-day bioassay."**

Response: Measurement endpoints are specific parameters that are related to assessment endpoints; this section referred to taxa subject to toxicity tests or tissue residue analysis as measurement endpoints rather than the measured parameter itself. The Navy understands the distinction being made in this comment and will try to avoid this in the future.

Comment 18: **Section 10.3 contains a general discussion of Interactions, but does not state what**

will be done about them. The penultimate sentence is unclear. What binding sites are being referred to? How does saturation of binding sites with zinc permit rapid binding of cadmium?

Response: The issue of multiple stressors was discussed at the March 24, 1995 meeting. The group agreed to postpone decisions on approaches with multiple contaminants until the chemical sampling reveals the nature and extent of the problem. This issue will be discussed at that time with the regulatory agencies and a suitable approach will be developed.

Comment 19: Section 10.4: I reserve judgement on this until I see what multiple models are compared, what weight-of-evidence approach is proposed, etc.

Response: The final QEAWP and draft final FSP provide more detail concerning the interpretation of data and the weight-of-evidence approach.

WPNSTA CONCORD LITIGATION AREA
ECOLOGICAL ASSESSMENT WORK PLAN WORKING MEETING:
REGULATORY AGENCY COMMENTS AND NAVY RESPONSE
FEBRUARY 9, 1995
DRAFT MEETING MINUTES

The purpose of this meeting was to discuss the regulatory agencies' comments on the WPNSTA Concord Litigation Area qualitative ecological assessment draft work plan (QEAWP) and the Navy's response to those comments. The meeting was held by way of conference call, and participants are listed at the end of these minutes. Denise Klimas of the National Oceanic and Atmospheric Administration (NOAA) was unable to participate in the conference call, but her comments will be discussed at a later date with June Mire of PRC Environmental Management, Inc. (PRC) and the Navy. Susan Gladstone of the San Francisco Regional Water Quality Control Board (RWQCB) stated that Jim Haas of the U.S. Fish and Wildlife Service was also unable to participate. No handouts were distributed. A list of action items follows these minutes.

The regulatory agencies and the Navy agreed that the final, approved minutes from this conference call and the conference call itself would function as the comments and the response to comments on the QEAWP. Mutually agreed upon changes will be incorporated into the field sampling and analysis plan (FSAP).

Barbara Smith of the U.S. Environmental Protection Agency (EPA) led the discussion, asking Jim Carlisle of the California Department of Toxic Substances Control (DTSC) to present his major comments on the draft QEAWP. Jim Carlisle stated that, although he had not finished reading the QEAWP, he had identified a few areas of concern and that he would forward written comments to the Navy. Jim Carlisle found the purpose of the WP vague in that it seems to be both a report, in its presentation and analysis of data, and a work plan, in its recommendations for further investigation. In general, he suggested including more specificity in the FSAP in order to address methodological gaps in the work plan.

Susan Gladstone supported Jim Carlisle's comment concerning specificity needed in the FSAP. She added that the rationale for selecting the technical approaches presented in the QEAWP should be described in more detail, especially the particulars of field work, and that they should also be discussed in the FSAP. Susan Gladstone presented her specific comments on the QEAWP (presented below) and agreed to fax her hand-written comments to the Navy (received February 16, 1995).

1. Susan Gladstone stated that she supports the comment made by Barbara Smith, in her letter dated December 15, 1994, that assumptions about the toxicity reference values (TRV) to be used in the calculation of hazard quotients (HQ) and the methods used to derive the TRVs must be agreed upon by the regulatory agencies and the Navy before finalization of the FSAP.

2. She further stated that the rationale for the use of the NOAA effects range-low (ER-L) and apparent effects threshold (AET) (selenium only) as screening criteria for upland soils should be presented in the QEAWP (page 5-3, section 5.2.1). June Mire responded that even though the ER-Ls and AETs were designed for sediments, they were used as preliminary screening criteria for soils in the QEAWP for several reasons: first, because no approved screening criteria for soils currently exist; second, because the ER-Ls and AETs would provide

conservative screening values for the protection of sensitive species; and third, because the use of the ER-Ls and AETs in both the upland and wetland areas would provide consistency across the Litigation Area. The group agreed that these reasons were legitimate, and that they should be stated in the QEAWP.

3. Susan Gladstone stated that the rationale for choosing sample depths of 18 inches should be explained in the QEAWP (page 7-3, section 7.2). She explained that the potential for exposure of plant roots at depths of 18 inches and greater may exist. Furthermore, in areas of high flow and in storms, erosion may expose sediments below 18 inches, possibly releasing contaminants that may be at depth. Mary Gleason (PRC) explained that the sampling plan currently calls for samples at the surface and at 18 inches deep at all locations in the sloughs. In the marsh and upland areas, all stations will be sampled at the surface, and 20 percent of the stations will be sampled at 18 inches.

   June Mire added that erosion would probably be most pronounced in the sloughs and that eroded soil and sediment may be deposited in the sloughs. Barbara Smith suggested discussing the hydrology of the site with Larry Fishbain of Phillip Williams and Associates to identify areas and rates of erosion. Barbara Smith also emphasized that the long-range time frame for the investigation should be considered in light of erosion rates. For instance, contaminants at 18 inches would be expected to be exposed in 18 years if the erosion rate were 1 inch per year. June Mire agreed to contact Larry Fishbain and to ensure that the hydrology of WPNSTA Concord is incorporated into the sampling rationale.

4. Susan Gladstone suggested that the rationale for using hazard quotient methodology in the risk characterization be presented in the QEAWP (page 7-4, section 7.3), including the reasons for using the higher of either the ER-L or the San Francisco Bay means (presented in the San Francisco Bay RWQCB Pilot Regional Sediment Monitoring Program Final Report) as a screening criterion. Susan Gladstone thought the work plan should also explain why the hazard index (HI) methodology was chosen to select areas in which toxicity testing and tissue residue analysis would be performed, especially since bioaccumulation has little relationship to toxicity. June Mire responded that the HI methodology described in the plan was chosen to distribute sampling locations over a range of potential toxicities.

5. Susan Gladstone commented on the reference site selection as described on page 7-6, saying that the final decision on a reference station should be based on the results of the next sampling effort and agreement between the Navy and the regulatory agencies. June Mire clarified that the language of the QEAWP was not meant to imply that a final decision will be made without consultation with the regulatory agencies, but that the results of the exploratory sampling as well as consensus among regulatory agencies and the Navy will be used to evaluate the feasibility of this reference site.

Barbara Smith emphasized that the QEAWP should be explicit enough for an objective third party to

be able to understand it. The group agreed that any previous verbal agreements should be included in the work plan text to improve its understandability.

Barbara Smith raised the question of TRV selection and offered to represent the regulators on this issue and to meet with the Navy and PRC to develop a methodology for selection of TRVs. This process will include reviewing databases, such as EPA's AQUIRE database, and scientific literature. She also suggested a possible technique to allow for interpretation of the range of chemical intake values that may result from the exposure model. For each contaminant of potential concern (COPC), two TRVs could be identified, a stringent, conservative value that would serve as a basis for determining a no-effect concentration and a less conservative value that may represent median or low-level toxicity. Using two TRVs representing different effect levels may help in the toxicological interpretation of the chemical data, especially if sampling results show a wide range of chemical concentrations.

Barbara Smith reiterated that the regulatory community has had technical difficulties with the HQ approach and wants to define the terms and assumptions of the methodology before the FSAP is in final version to prevent future difficulties. The group agreed that the team approach to discussing and resolving this technical issue was the most efficient and appreciated this gesture made by the EPA. June Mire agreed to designate an ecological risk assessor at PRC to work directly with Barbara Smith and to discuss scheduling a meeting at a later date.

The group discussed the revision of the QEAWP and the submission of the FSAP. The regulators stated that they preferred the Navy not to spend time and money revising and finalizing the QEAWP, but rather to incorporate any changes and responses to comments into the FSAP. June Mire stated that the Navy will consider whether the QEAWP should be revised and finalized or whether the changes to the QEAWP will be incorporated into the FSAP without revision of the QEAWP. June Mire also stated that the field work will commence in the end of March or early April and that the Navy hopes for phased agreement on the FSAP so that field work can begin as soon as possible. She added that additional field work may be performed in the fall to fill gaps caused by seasonality.

June Mire discussed specific changes to the WP proposed by the Navy.

1. After research and consultation with various biological laboratories, the Navy has not been able to identify a germination and growth bioassay for pickleweed (*Salicornia virginica*). The U.S. Corps of Engineers at Vicksburg has attempted a few pickleweed bioassays, but has little confidence in them due to the seed's slow growth and susceptibility to fungus. The only standard marsh plant bioassays are with *Spartina*, a plant that has less relevance to the marsh at WPNSTA Concord than pickleweed.

   Consequently, the Navy is proposing to perform tissue residue analysis on pickleweed shoots and roots instead of the pickleweed bioassay. The shoots and roots will be analyzed

separately to address different exposure pathway scenarios. Mary Gleason explained that the shoots will be cut in the field, and the roots will be cored. The group generally agreed that performing tissue residue analysis on pickleweed would be preferable to conducting bioassays on a less relevant marsh plant like *Spartina*. Barbara Smith offered to provide references for methodologies for conducting tissue residue analysis on clonal plants that involve determining biomass on a surface area basis.

2. The Navy proposes not to perform the tissue residue analysis of rye grass and coyote brush seeds because the pathway involving these plants is incomplete, based on the distribution and diet of granivorous species. Furthermore, because the upland area is marginal habitat relative to the marsh, species that might feed in the upland area would probably preferentially use the marsh. The timing of seed release in the fall by these plants might also complicate the schedule of the field work.

June Mire emphasized that the Navy still proposes to perform the rye grass bioassays, but not to perform the tissue residue analysis of the seeds of rye grass and coyote brush. Barbara Smith and Jim Carlisle recommended reviewing the toxicity literature and standards for spreading sewage sludge on croplands to discover whether rye grass is highly tolerant of contaminants. If rye grass is tolerant, it may not be an appropriate plant on which to conduct bioassays, especially if the soil concentrations exceed the soluble or total threshold limit concentrations.

Barbara Smith suggested pore water bioassays as an alternative to both the rye grass bioassay and the rye grass and coyote bush seed tissue residue analysis. The pore water bioassay could be conducted on a diatom, measuring the potential for photosynthetic interruption; however, she is open to a pore water bioassay with a plant or invertebrate, depending on the sensitivity. Barbara Smith also recommended the *Ceriodaphnia* 7-day brood test as another possible pore water bioassay.

June Mire asked whether a pore water bioassay with fish would be acceptable to the regulators. Susan Gladstone added that she had wanted to discuss the bioavailability of contaminants in pore water and that the selection of the fish species to be used would be an important consideration. June Mire stated that both sculpins and sticklebacks are present in the sloughs at WPNSTA Concord. Barbara Smith responded that sticklebacks are not sensitive enough to be good measures of low level toxicity. Jim Baker from PRC stated that the *Ceriodaphnia* bioassay would probably be more sensitive than the fish bioassay. Barbara Smith stated that she would review the *Ceriodaphnia* bioassays for their applicability to WPNSTA Concord with regard to physical and chemical conditions and duration of the test.

The group agreed that because of the relatively greater areal proportion of wetland to upland habitat, the ecological assessment effort should focus on the wetland habitat, especially since there are fewer upland-specific receptors of concern at WPNSTA Concord.

June Mire responded to two of Barbara Smith's comments dated December 15, 1994, concerning small mammal whole body burdens and incidental soil ingestion. June Mire stated that the Navy had not arrived at a methodology for extrapolating whole body burdens from organ and bone tissue concentrations in small mammals. However, the Navy will develop a methodology based on scientific literature and present it in the FSAP. June Mire stated that the Navy will send Barbara Smith copies of the scientific studies on which it will base assumptions about incidental ingestion of soil and sediment by receptor species. Barbara Smith agreed to contact Jim Haas and to ask him to be the technical contact person for the issue of incidental ingestion of soil and sediment. June Mire emphasized that the Navy will use food web analysis of important exposure pathways to identify points at which ingestion of media may be a concern, and then use the scientific literature to arrive at estimates of that incidental ingestion.

The group discussed final selection of assessment endpoints. Barbara Smith stated that resolving the methodology for TRV selection may help indicate which species of those proposed would be the most appropriate assessment endpoints. Barbara Smith also added that the HQ methodology of risk characterization often forces the risk assessor to choose assessment endpoints for which toxicity data exist, which detracts from that methodology. Mary Gleason responded that the Navy has been considering dividing the assessment endpoints into two groups. In the first group of assessment endpoints, a quantitative assessment of exposure and effects would be performed based on exposure modeling and HQ calculation. In the second group of assessment endpoints, a qualitative exposure assessment would be performed based on the data from the assessment performed on the first group. Assessment endpoints in the first group would be species of ecological relevance to the site on which toxicity and natural history data needed for the quantitative exposure and effects assessment are available. Assessment endpoints in the second group would also be species of ecological relevance; however, the exposure and effects assessment for these species may defy quantitation. For example, the second group may consist of species having special conservation status on which toxicity data necessary for a quantitative exposure and effects assessment may not be available. Furthermore, even though these species' degree of site use may be minimal compared with other receptors, their conservation status indicates that they should be considered as assessment endpoints, if only in a qualitative assessment of exposure and effects.

June Mire clarified for Roy Santana (U.S. Navy) that quantitative data on exposure and effects are necessary to perform a qualitative assessment of risk and that the data needed to perform a quantitative assessment of risk would be of considerably greater detail than that being collected at WPNSTA Concord.

At this time the conference call was ended because most of the participants from the regulatory agencies had to leave the call. Arrangements were made to receive by fax written comments from Jim Carlisle and Susan Gladstone.

WPNSTA CONCORD LITIGATION AREA
ECOLOGICAL RISK ASSESSMENT WORK PLAN MEETING:
REGULATORY AGENCY COMMENTS AND NAVY RESPONSE
FEBRUARY 9, 1995
DRAFT MEETING MINUTES (Continued)

Conference Call Participants:

Barbara Smith (EPA)
Jim Carlisle (DTSC)
Jim Pinasco (DTSC)
Susan Gladstone (RWQCB)
Roy Santana (U.S. Navy)
June Mire (PRC)
Mary Gleason (PRC)
Jim Baker (PRC)
Sabrina Russo (PRC)
Anjana Vig (PRC)

Action Items:

1. June Mire will call Denise Klimas and Jim Haas to discuss their comments on the draft QEAWP individually, since they were unable to participate in the meeting.

2. Susan Gladstone will fax her hand-written comments on the draft QEAWP to the Navy.

3. Jim Carlisle will fax his comments on the draft QEAWP to the Navy.

4. June Mire will contact Larry Fishbain to discuss rates of erosion at the Litigation Areas.

5. Barbara Smith will act as the regulatory contact person to coordinate agreement on developing of the methodologies for toxicity reference value derivation and for risk characterization using hazard quotients.

6. June Mire will send Barbara Smith copies of the literature being used to evaluate incidental ingestion of soil and sediment by ecological receptors.

7. The Navy will distribute to the regulatory agencies copies of these draft meeting minutes.

WPNSTA CONCORD LITIGATION AREA
QUALITATIVE ECOLOGICAL ASSESSMENT
FIELD SAMPLING PLAN PRESENTATION
March 24, 1995
MEETING MINUTES

The purpose of this meeting was to discuss the field sampling plan (FSP) for the qualitative ecological assessment at the Litigation Area at Naval Weapons Station (WPNSTA) Concord, California, with representatives of the regulatory and trustee agencies. Attendees are listed on page 7.

Handouts Distributed:

Agenda
Revisions to the Field Activities Presented in the Draft QEAWP
Table 1: Samples and Analyses by RASS and Habitat
Table 2: Analytical Parameters
Table 3: Sample Location Identification, Depth, and Analyses
Exposure Model Dose Estimates
Derivation of Toxicity Reference Values
Decision Criteria for Identifying Risk
Data Analysis and Interpretation
Correlational Analysis

The order of business in the agenda was changed to accommodate the schedules of Jim Polisini of the California Department of Toxic Substances Control (DTSC) in Sacramento and Michael Martin of the California Department of Fish and Game (CDFG), who could not stay for the entire meeting. Therefore, introductory remarks were postponed so that agenda items of greatest importance could be addressed the earliest. These meeting minutes reflect the actual order of events of the meeting, rather than that in the agenda.

SAMPLE LOCATIONS AND CHEMICAL AND BIOLOGICAL ANALYSES

The group began by discussing the sampling map, and a few recommendations were made on improving the reproducibility of the map. Barbara Smith of the U.S. Environmental Protection Agency (EPA) remarked that using a stratified random sampling design is a significant improvement in the selection of sampling locations, including the bias towards the sloughs and ditches. Jim Polisini also confirmed that a stratified random sampling design focused on the sloughs is a good approach based on his work on a private site in San Francisco.

June Mire of PRC Environmental Management, Inc., (PRC) explained the sampling map, demonstrating its coordination with Table 1 (Samples and Analyses by RASS and Habitat), Table 2 (Analytical Parameters), and Table 3 (Sample Location Identification, Depth, and Analyses). Table 1 shows the total number of samples in each remedial action subsite (RASS), each habitat, and for each analytical parameter. Table 2 shows the analytical parameters to be measured in each type of sample medium: sediment, water, pore water, and tissues. Table 3 shows the depth and the biological and chemical analyses to be performed at each individual sampling location.

Barbara Smith recommended that the "Marsh Reference" column of Table 1 be relabeled "Proposed Marsh Reference," since the chemical and biological data from future sampling will validate the choice of this area as a reference site. Jim Polisini asked which samples would be taken at depth. June Mire explained that 20 percent of all samples of the marsh surface and all locations in the sloughs and ditches were to be sampled at depth as well as at the surface. All samples in the proposed marsh reference area will be sampled at both surface and depth.

Susan Gladstone of the San Francisco Regional Water Quality Control Board (RWQCB) suggested that disturbing the oxic/anoxic layers in the sediment samples is an important consideration. June Mire replied that, according to John Collins of PRC, sediment depths greater than 2 centimeters are generally anoxic anyway, so samples taken at depth (12 to 18 inches) and samples taken on the surface (0 to 6 inches) will contain anoxic sediments. Furthermore, the composited samples that will be used for chemical and biological analyses (except for volatile organic analytes and semi-volatile organic analytes) will be aerated in the process of compositing, thus mimicking disturbed sediments. Barbara Smith requested that reduction/oxidation potential (Eh) be measured in the field using hand-held probes so that the depth to the anoxic layer is accurately identified at each location. Jim Polisini and Barbara Smith both preferred using a probe rather than visually determining the depth to the anoxic layer. The Navy agreed to add field measurement of Eh using a hand-held meter.

Michael Martin asked whether the Navy was relying on old data to identify the vertical extent of contamination. June Mire responded that samples taken in the active area to depths of 3 feet were contaminated. However, Dr. Mire emphasized that the ecological assessment was not focused on the definition of the vertical extent of contamination, but rather on the potential exposure of receptors to contamination. If examination of potential contamination at depth is necessary from an ecological perspective, then it will be done using a phased approach. Furthermore, Larry Fishbain of Phillip Williams and Associates stated that the marsh at the Litigation Areas is building, not eroding, making exposure of sediment at depths greater than 18 inches unlikely. He also stated that if the marsh did start eroding, he would be concerned about the feasibility of the remedial action and restoration, since they were designed to prevent such erosion. Barbara Smith confirmed this, stating that most of the sloughs and ditches run parallel to the shoreline. June Mire also added that Larry Fishbain observed minimal sediment loading of the outgoing tide.

Barbara Smith asked whether there was any station at which all of the biological and chemical analyses are to be conducted so that the relationship of the bioassay and tissue residue results could be evaluated at one location. June Mire responded that a few stations have several bioassays because of random assignment. Some analyses could be redistributed to create a few sampling locations where all analyses are performed. A few suggested sampling locations were: 1L02 (amphipod and fish tissue residue); 1L08 (amphipod and echinoderm bioassays); 2L01, 2L02, and 2L03 (echinoderm bioassay and amphipod and fish tissue residue). Jim Polisini stated that changing the randomly selected locations would not be a good idea; it would be preferable to add bioassays and tissue residues to selected points. June Mire stated that for cost purposes, the Navy could only do that on a limited basis and at sampling locations that already call for the most bioassays. June Mire also pointed out that these "added, nonrandom" points should be kept separate from the random population of points for statistical purposes.

The group discussed the proposed bioassays (amphipod whole sediment, echinoderm pore water, and ryegrass) and tissue residue analyses (amphipods, fish, and pickleweed). Barbara Smith pointed out that the proposed pickleweed bioassay was removed from future investigations because of difficulties

in obtaining a standard, reliable protocol. Furthermore, pickleweed toxicity testing does not address the question of mobilization of contaminants accumulated in pickleweed once pickleweed shoots die and decay. On the other hand, measuring pickleweed tissue residue as proposed in the work plan and the FSP will address this question. Residues measured from the upright shoots will address salt marsh harvest mouse exposure, while residues measured in lateral shoots that are likely to fall off and decay will address mobilization of contaminants bioconcentrated in pickleweed. Michael Martin agreed that this strategy was appropriate.

Michael Martin also inquired whether any areas of obvious surficial accumulation of detritus could be sampled to address the release of contaminants through decay of organic matter. The group agreed that sampling of pickleweed tissue would address this exposure and transport pathway. Susan Gladstone also mentioned that soil samples taken beneath vegetation would include detritus.

Jim Polisini inquired about the echinoderm development test, and June Mire responded that it is a 48- to 96- hour development test of the purple sea urchin, *Strongylocentrotus purpuratus*. Jim Polisini also asked whether amphipod tissue residue analysis would be performed on field-collected amphipods. June Mire responded that amphipods were to be collected at the selected locations and their tissue concentrations measured directly. Amphipods in all size classes were to be collected at each location to ensure obtaining enough mass to perform chemical analyses (semivolatile organic analytes [SVOA], polychlorinated biphenyls [PCB]/pesticides, and metals) and to mimic the foraging behavior of fish, shorebirds, and waterfowl.

June Mire also asked the group whether the individual chemicals to be analyzed for in the tissue could be prioritized so that if the mass of amphipods obtained at a sampling location was insufficient for all three analyses, then the most important analyses could be performed. The group agreed on the following order of importance: PCBs/pesticides, metals, SVOAs.

Barbara Smith asked whether the group considered compositing amphipods across locations as a possible alternative. In response, June Mire presented the proposed method for collecting amphipods at each location. The sampling location would actually consist of a 10 meter length including the surveyed sampling point in the middle (5 meters "up slough," 5 meters "down slough," with the surveyed point at "zero"). When collecting amphipods, the sampler would begin at the surveyed point and incrementally step "up slough" and "down slough" as necessary to obtain a sufficient mass of amphipods. Using this method, the data may have to be normalized back to a standard area. However, the group preferred this method to moving to different locations in order to obtain enough amphipod mass.

Susan Gladstone asked whether collecting all size classes of amphipods might make it difficult to model exposure to different receptors. June Mire responded that the exposure models are not really accurate to that level of detail. Michael Martin asked whether the Navy intended to use the old Army Corps of Engineers data, to which Mary Gleason (PRC) responded that all existing data will be used to the fullest extent possible.

The group discussed the fish to be selected for tissue residue analysis, including species and size class. June Mire noted that during the December site visit, sticklebacks were plentiful, mosquitofish of both sexes were found, and the sculpin were just post-larval. Barbara Smith said that the fish collected should be consistent with the feeding preferences of the piscivorous receptors of concern, such as the great blue heron. Michael Martin agreed, but added that the fish themselves should be

considered receptors of concern. He also agreed to provide some information on the dietary preferences of great blue heron in the San Francisco Bay area. Jim Polisini supported this approach, and then signed off the conference call.

Continuing the discussion on fish, June asked the group whether it would be better to collect all fish that herons eat or to estimate the prey that would contribute the greatest exposure and collect only these. Barbara Smith answered that if enough mass is available to analyze different species, then having species-specific contaminant levels would be useful. However, she noted a trade off between sampling a greater number of locations and sampling a greater number of species. June Mire stated that although having species-specific contaminant levels would be useful, considering a heron's feeding strategy, it might be more useful to have greater spatial coverage in sampling locations.

Michael Martin agreed with this perspective, stating that the most practical approach would be to identify important prey species and make a composite sample of that diet, spreading locations throughout the marsh. He recommended focusing on the PCBs/pesticides analysis for fish, especially since fish do not readily accumulate polycyclic aromatic hydrocarbons (PAH), which are included in the SVOA analysis.

Anju Vig (PRC) pointed out that there is a 54-day holding period for fish tissue and that the chemistry laboratory could provide the results from the sediment and surface water chemical sampling within that time. June Mire and Mary Gleason suggested a phased approach to the sampling of fish tissue so that the chemical sampling results could be used to indicate which chemistry analyses should be performed on the tissue; the Navy would then decide whether to sample for species-specific chemical data.

Barbara Smith discussed detection limits in the WPNSTA Concord Tidal and Inland Areas. Metals will be analyzed using contract laboratory procedures (CLP). For SVOA and PCBs/pesticides, the Navy will fund analysis using the low-detection-limit methodology, and EPA will back up that data by providing the CLP analyses for the same samples. In this way, data quality objectives will be met, while the useability of a new method is evaluated.

Susan Gladstone asked how sulfides in sediment are being addressed. June Mire responded that the Navy is performing extractions of sediment using two methods: (1) dilute strong acid (0.5 normal hydrochloric acid) as a modified version of the acid volatile sulfides/simultaneously extractable metals (AVS/SEM) method; and (2) deionized water in a modified waste extraction test (WET) method. Barbara Smith added that the role that oxic and anoxic sediments play in the AVS/SEM methodology is not understood well enough to be applied in risk assessment. June Mire went on to say that the molar ratio between AVS and SEM as proposed in the current methodology is also not well understood. Anju Vig added that the quality assurance project plan details the modified methods to be used. Michael Martin stated that he would provide the Navy with the sediment and tissue analytical techniques that the CDFG laboratory uses.

Michael Martin asked whether soils and sediments are being analyzed for dioxins and dioxofurans. Barbara Smith and June Mire stated that there are no known sources of dioxins in the Litigation Area, although dioxins and dioxofurans are being sampled for in the Wood Hogger site (Site 11) in the Tidal Area. The group agreed that dioxins and dioxofurans will be addressed after the Navy has evaluated the chemical results from the Wood Hogger site.

INTRODUCTION (Postponed)

June Mire provided a brief introduction for the group and discussed the purpose of the meeting. She acknowledged everyone's participation and support in designing the approach to the ecological assessment at the Litigation Area. The group also discussed the proposed changes to the work plan as detailed in the handout. Dr. Mire also discussed the purpose of the meeting, that is to preview the FSP for the regulators and to discuss issues needing group resolution. Any changes agreed upon in this meeting will be incorporated into the FSP before submittal to the regulatory community. Therefore, the FSP will be submitted to the regulators as a "draft final" document in order to expedite production of a final plan. All field work will be performed by PRC, with the exception of a bird survey, for which a subcontractor will work with Sabrina Russo (PRC).

DATA ANALYSIS AND INTERPRETATION

June Mire asked the group for feedback on the proposed method for interpreting data for risk characterization. First, the group discussed the interpretation of bioassays in terms of the hypothetical bioassay data represented in the handout. The group agreed that a sample station would be considered toxic if there was a greater than 20 percent difference between the reference area and the sample station bioassay results. A reference area would be considered clean if the survival was greater than 90 percent and if the results were not significantly different from the control.

Michael Martin expressed uncertainty in the bioassay's relationship to reality. He thought the approach for interpretation of bioassay data sounded reasonable, but stated that he would verify the approach with CDFG toxicologists and statisticians. June Mire emphasized the importance of agreeing on decision criteria and data interpretation methods ahead of time, and that in the end risk will be characterized using a weight-of-evidence approach that combines a variety of sets of data.

The group discussed the use of correlations to identify good indicators of toxicity. June Mire stated that correlations between the variables described in the handout will be analyzed to identify covariates and variables having strong relationships. She also reiterated that the correlation analysis will not be used to infer cause and effect.

Sabrina Russo explained the proposed hazard quotient (HQ) method for identifying risk to high trophic level receptors and special conservation status species, specifically discussing toxicity reference values and exposure and effects modeling (handouts). Briefly, estimates of high and low contaminant doses would be used with high and low toxicity reference values to calculate four HQs. These HQs would be used to identify the extremes of potential risk: no probability of risk and high probability of risk. These two extremes could then be moved at an early stage into either no further action (no probability of risk) or feasibility study (high probability of risk).

Regarding the exposure model, Michael Martin asked how the Navy would address the situation in which feeding on one particularly contaminated prey item caused adverse effects even though the majority of other prey items consumed were not contaminated at levels that would produce adverse effects. He mentioned an unnamed site in which bald eagles experienced adverse effects from consuming DDT in seals at levels that were not present in other eagle prey, such as waterfowl.

Barbara Smith suggested, as an alternative, assuming in the exposure model that a receptor consumes pure soil or sediment contaminated maximally. Sabrina Russo pointed out that this approach would

not be protective of receptors exposed to bioaccumulating contaminants, for which soil or sediment concentrations may be less than concentrations in prey. June Mire added that risk is a function of both severity of the effect and the probability that the effect will occur and that we can acknowledge but not model the possibility of catastrophic exposure.

Michael Martin also asked how the model addressed exposure to multiple contaminants. Sabrina Russo replied that the method calculates an HQ for each contaminant of potential concern (COPC) and receptor. Barbara Smith recommended summing HQs for contaminants having similar chemical and toxicological properties to calculate a hazard index (HI), which would indicate risk due to multiple contaminant stressors. June Mire mentioned that calculating HIs assumes that effects are all additive, which may not always be the case.

Michael Martin pointed out that if a relative ranking of sites is of interest, it is important to consider whether a site has only one very high HQ for a single contaminant or several "borderline" HQs for multiple contaminants. The latter site may also be hazardous to wildlife. Barbara Smith added that use of HIs can be evaluated at a future date, depending on the results of the weight-of-evidence approach to risk assessment. The group agreed to postpone deciding whether to use HIs and to do some research individually on the application of the HI method, specifically, in terms of which contaminants can be grouped.

Sabrina Russo explained the method for deriving toxicity reference values (TRV), as described in the handouts. A core data set of toxicological literature data will be assembled, from which TRVs will be derived using uncertainty factors and allometric conversion. Low and high TRVs for each receptor and COPC representing very conservative and less conservative chronic, no-effect levels will be selected. The precise types of uncertainty factors and their numerical values and the allometric conversions that will be used will be decided upon when the core set of toxicological data has been identified. This way, uncertainty factors and allometric conversions will be tailored to the needs of the data, avoiding unnecessary multiplication of these adjustment factors.

Barbara Smith stated that collecting toxicological data applicable to the San Francisco Bay Area is an important goal. June Mire pointed out that the attendees all have access to different data sets and that the group needs to coordinate the creation of a toxicity database for the Bay Area, beginning with the data collected for WPNSTA Concord. Michael Martin agreed to help out in this endeavor.

June Mire led a brief discussion of the weight-of-evidence approach, pointing out that the weight-of-evidence approach will be focused on addressing the "gray areas" for which data are equivocal. She called on the collective professional judgements of the whole team to help characterize risk. The next step after identifying risk and qualitatively characterizing it is to evaluate the ecological impacts of contaminants left in place versus the ecological impacts of potential remedial alternatives. The meeting was adjourned. The Navy informed the regulatory community that they would be notified for the schedule for submission of the qualitative ecological assessment final work plan and draft final FSP.

Attendees:

Roy Santana, EFA WEST
Barbara Smith, U.S. EPA
Jim Pinasco, DTSC
Susan Gladstone, SFRWQCB
Jim Polisini, DTSC Sacramento (by phone)
Michael Martin CDFG (by phone)
June Mire, PRC
Mary Gleason, PRC
Sabrina Russo, PRC
Anju Vig, PRC
Cindi Rose, PRC

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY, WEST
NAVAL FACILITIES ENGINEERING COMMAND
900 COMMODORE DRIVE
SAN BRUNO, CALIFORNIA 94066-5006

IN REPLY REFER TO:

5090
Ser 1841.1/5054
1 June 1995

From: Commanding Officer, Engineering Field Activity West, Naval Facilities Engineering Command
To: Distribution

Subj: QUALITATIVE ECOLOGICAL ASSESSMENT(QEA) WORK PLANS, NAVAL WEAPONS STATION (NWS) CONCORD, CA

Encl: (1) QEA Litigation Area Sites Final Work Plan, dtd 31 May 1995
(2) QEA Litigation Area Sites Draft Final Field Sampling Plan, dtd 31 May 1995
(3) QEA Litigation Area Sites Draft Final Quality Assurance Project Plan, dtd 31 May 1995
(4) Navy Responses to Regulatory Agency Comments, dtd 31 May 1995

Ref: (a) USEPA ltr to EFA WEST, dtd 15 December 1994
(b) DTSC ltr to EFA WEST, dtd 8 March 1995
(c) EFA WEST ltr Ser 09ER4RS/5227, dtd 23 March 1995
(c) EFA WEST ltr Ser 1841.1/5038, dtd 18 May 1995

1. The qualitative ecological assessment (QEA) Final Work Plan, Draft Final Field Sampling Plan, and Draft Final Quality Assurance Project Plan for the Litigation Area Sites at NWS Concord are forwarded, as enclosures (1) through (3), for review and comment. The work plans incorporate the regulatory agency comments of references (a) and (b), and the additional regulatory input and concerns documented in the meeting minutes submitted by references (c) and (d).

2. Enclosure (4) provides a formal response to the comments of references (a) and (b).

3. The 9 Feb 1995 meeting [see reference (c)] addressed the Draft QEA Work Plan (WP) comments and responses. It was mutually agreed at that meeting that finalization of the QEAWP would not be necessary since any required changes to the Draft QEAWP would be incorporated into the upcoming field sampling plan (FSP). Nevertheless, the Navy has opted to revise the Draft QEAWP to maintain consistency between documents, and the QEAWP is submitted as a "final" document.

4. The 24 March 1995 meeting [see reference (d)] included a presentation of the Navy's proposed FSP, and comments and input from the regulatory and trustee agencies. It was agreed to incorporate the requested changes into the FSP before submittal to the regulatory community, and to thus submit the FSP as a "draft final" document in order to expedite production of a final plan

5090
Ser 1841.1/5054
1 June 1995

Subj: QUALITATIVE ECOLOGICAL ASSESSMENT(QEA) WORK PLANS, NAVAL WEAPONS STATION (NWS) CONCORD, CA

5. Request comments, if any, be provided within 30 days of receipt of this letter. Though there is a 30-day formal review period for the draft final workplans, the Navy would like to begin field activities in mid June 1995, and would welcome early comments.

6. If there are any questions regarding this correspondence, please contact the undersigned at (415) 244-2523.

ROY E. SANTANA
By direction

Distribution:
U.S. Environmental Protection Agency (Attn: Barbara Smith) [2 copies]
Department of Toxic Substances Control, Sacramento (Attn: James Pinasco)
California Regional Water Quality Control Board, Oakland (Attn: Susan Gladstone))
National Oceanic and Atmospheric Administration (Attn: Denise Klimas)
Department of Fish and Game (Attn: Michael Martin)
U.S. Fish and Wildlife Service (Attn: Jim Haas)
Bay Conservation and Development Commission (Attn: Eric Larson)

Copy to:
WPNSTA Concord (Attn: Richard Pieper) [w/encl]
PRC (Attn: Mary Gleason, Barbara Sootkoos) [w/o encl]

DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY, WEST
NAVAL FACILITIES ENGINEERING COMMAND
900 COMMODORE DRIVE
SAN BRUNO, CALIFORNIA 94066-5006

IN REPLY REFER TO:

5090
Ser 1841.1/5197
2 Oct 1995

From: Commanding Officer, Engineering Field Activity West, Naval Facilities Engineering Command
To: Distribution

Subj: FIELD SAMPLING PLAN FOR THE QUALITATIVE ECOLOGICAL RISK ASSESSMENT (QEA), LITIGATION AREA, NAVAL WEAPONS STATION (NWS) CONCORD, CA -- MODIFICATIONS

Encl: (1) Modifications to the Field Sampling Plan for the Qualitative Ecological Assessment at the Litigation Areas, Naval Weapons Station, Concord, 26 Sept 95

Ref: (a) EFA WEST letter Serial 1841.1/5054, dated 1 June 1995
(b) RWQCB SFBAY letter 2119.1142(sfg), via DTSC, dated 21 June 1995

1. Modifications to the field sampling plan are forwarded, as enclosure (1), for your information and record.

2. Reference (a) forwarded the draft final qualitative ecological assessment (QEA) project plans. Reference (b) forwarded comments on the draft final field sampling plan (FSP). The comments are being incorporated into the fieldwork, and will be addressed in the QEA Report. No other written regulatory comments were received.

3. In accordance with the provisions of the Federal Facilities Site Remediation Agreement, the draft final project plans became final thirty (30) days after receipt by the regulatory agencies; fieldwork to implement the QEA project plans began early July 1995. Most of the field investigation will be complete by 15 October 1995, though some of the components may extend into the winter season, such as collection of fish and invertebrate tissue for tissue analysis, and winter bird surveys.

4. Knowledge gained from the fieldwork to date has necessitated changes to the field sampling plan (FSP). These modifications to the FSP are described in enclosure (1), and are being provided at this time to the addressees to summarize in one document the field changes to date. They were incorporated to improve the overall quality of the data obtained during the field investigation and were based on discussions with representatives of the regulatory agencies and the contract laboratories, when possible.

Ser 1841.1/5197
2 Oct 1995

Subj: FIELD SAMPLING PLAN FOR THE QUALITATIVE ECOLOGICAL RISK ASSESSMENT (QEA), LITIGATION AREA, NAVAL WEAPONS STATION (NWS) CONCORD, CA -- MODIFICATIONS

5. If there are any questions regarding this correspondence, please contact the undersigned at (415) 244-2523.

ROY E. SANTANA
By direction

Distribution:
U.S. Environmental Protection Agency (Attn: Barbara Smith)
Department of Toxic Substances Control, Sacramento (Attn: James Pinasco)
California Regional Water Quality Control Board, SF Bay (Attn: Susan Gladstone)
National Oceanic and Atmospheric Administration (Attn: Denise Klimas)
Department of Fish and Game (Attn: Michael Martin)
U.S. Fish and Wildlife Service (Attn: Jim Haas)
Bay Conservation and Development Commission (Attn: Eric Larson)

Copy to:
WPNSTA Concord (Attn: Richard Pieper) [w/encl]
PRC (Attn: Mary Gleason, Barbara Sootkoos) [w/o encl]

September 26, 1995

MODIFICATIONS TO THE FIELD SAMPLING PLAN FOR THE QUALITATIVE ECOLOGICAL ASSESSMENT AT THE LITIGATION AREAS, NAVAL WEAPONS STATION, CONCORD

Qualitative Benthic Invertebrate Survey (section 3.1): One additional sampling location was added in the pond at remedial action subsite (RASS) 3 and in the wetland in RASS 4, for a total of three locations in each of those areas. The size of the core being used for invertebrate sampling is 3.25 inches wide by 10 inches, rather than 10 cm by 20 cm as indicated in the draft final FSP. The depth of the oxic layer is being estimated visually using a long plastic tube approximately 2 cm in diameter rather than using an Eh (redox potential) meter. A field Eh meter is not commercially available, and PRC believes that Eh estimates based on chemical measurements are imprecise in sediments with high clay content.

Qualitative Bird Survey (section 3.3): Based on verbal comments from the regulatory agencies that the morning bird surveys did not sufficiently assess the use of the site by all types of birds, the bird survey was expanded to include limited numbers of focused surveys for nocturnal birds, raptors, and birds that use the sloughs throughout the marsh.

Soil/Sediment Sampling Methods and Equipment (section 4.2): The equipment being used to collect sediment and soil samples is slightly different than was indicated in the draft final FSP. Sediment samples are being collected with a Geoprobe core (2-inch diameter) with acetate liners that is pushed by hand into the substrate. Soil samples are being collected with a hand auger in soft soils and with a soil corer (6 inches in length and 2 inches in diameter) with brass sleeves in harder soils. Large volumes of sediment required for pore-water bioassays are being collected from deep sloughs with a large polyvinyl chloride (PVC) corer that is 6 inches in diameter and 5 feet in length.

Soil/Sediment Samples Collected from Locations in Uplands, Marsh Surface, and Ponds (section 4.2.1): To be consistent with the monitoring program and to collect the large volumes of soil and sediment required for all of the chemical, physical, and biological analyses, a 1- by 1- meter grid is not being used at the surveyed sampling location to randomly select a quadrat for sampling as described in the FSP. Instead, the sampling team is collecting soil and sediment using the same method as under the monitoring program (CTO 0009), where a random quadrat from the 100- by 100-foot grid is selected, and the soil is collected from within that 1- by 1-meter area until sufficient volume is obtained.

Soil/Sediment Samples Collected from Ditches and Sloughs (section 4.2.2): The draft final FSP described a sampling method of laying a transect and selecting random points for sampling. This method is not feasible in slough locations, especially when sampling from a boat. Instead, sampling teams start sampling in the center of the slough or ditch at the point closest to the surveyed stake (the northeast corner of the 100- by 100-foot grid) and proceed upstream if additional volume is needed. Sediment or soil from these cores is then composited.

Bulk Chemistry (section 4.4.1): The draft final FSP indicated that the CLP (Contracts Laboratory Program) method for chemical analysis would be used at all locations. Based on discussions with the regulatory agencies on the merits of using the low detection limit method versus the CLP method for chemical analysis, it was decided to use the low detection limit method at the proposed Marsh Reference and Upland Reference Areas and the CLP method at all other locations. The use of the low detection limit method at these areas provides detection limits comparable to sediment screening criteria (such as effects range-low), which will ensure that these areas satisfy requirements of

Encl (1)

reference sites. This approach will also allow comparison to chemistry data being collected with the same quantitation limits at the proposed Tidal Area Marsh reference area. In addition, volatile organic compounds will not be tested for in the reference areas as indicated in the draft final FSP, as there is little evidence to suggest that these compounds could persist long enough to be deposited in these areas.

The plan outlined in the draft final FSP left a data gap in the assessment of organic contaminants and toxicity in the area just west of the active area of RASS 1. For this reason, four waterway stations currently being tested for metals contamination under the monitoring plan (CTO 0009), will be tested for contamination by organics (polychlorinated biphenyls/pesticides and semivolatile organic compounds) and will be subject to toxicity testing using the amphipod solid-phase bioassay under CTO 0295. These locations include one slough location and three ditch locations near the active area of RASS 1 (location identification numbers R01SH077, R01DH067, R01DH099, and RO1DH100). These locations were selected randomly from the pool of waterway stations in that area.

Table 3 of the draft final FSP contained some errors in sample identification. In addition, some specific analyses were changed for some locations based on field observations and further discussions with the regulators. Due to the presence of an oily substance that was observed during benthic invertebrate sampling in the sediment of the RASS 3 pond and the slough that drains it, additional total petroleum hydrocarbon (TPH) analyses are being focused on that area. The total number of analyses for organotins was reduced from 56 to 36; these will be focused on the main sloughs, ditches near the bay, and the RASS 3 pond. The revised Table 3, enclosed with this letter, identifies all analyses of soil, sediment, and surface water being conducted at each sampling location. The changes described above also affect the total number of analyses depicted in Table 1 of the draft final FSP; a revised version of Table 1 is also enclosed.

Tidal Marsh Surface Water Sampling Locations (section 5.1.1): The draft final FSP did not indicate specific locations for analysis of surface water chemistry. Thirty-five surface water sampling locations were selected to include bioassay locations and additional randomly selected locations. Five monitoring program waterway locations (R01SH077, R01DH067, R01DH099, R01DH100, and R01DH120) are included in this total. Specific analyses being conducted in each location are detailed in the revised Table 3.

Locations of Sediment Collection for Invertebrate Bioassays (section 6.2): The specific locations of sediment collection for toxicity testing were modified slightly. The amphipod solid-phase bioassay are being conducted with sediment from eight slough locations in RASS 1, nine marsh surface locations in RASS 1, three ditches near the active area of RASS 1, two locations in the pond at RASS 3, one location in the wetland at RASS 4, and three marsh surface locations in the proposed Marsh Reference Area (see the revised Table 3). The echinoderm pore-water bioassays are being conducted at eight slough locations in RASS 1 and two locations in the pond at RASS 3. The specific sample locations of these toxicity tests are indicated in the revised Table 3.

***Eohaustorius estuarius* 10-day Whole Sediment Bioassay (section 6.5.1):** Based on verbal comments from the regulatory agencies, the analysis of ammonia and sulfides in the sediments used for the amphipod bioassays was added to the testing protocol to facilitate interpretation of bioassay test results.

Pore Water Sea Urchin (*Strongylocentrotus purpuratus*) Development Test (section 6.5.2): Because the sea urchin requires higher salinity than is present at the litigation areas, large amounts of additional salts have to be added to the pore water to conduct this test. To control for potential effects of these added salts, a "salt control" was added to the protocol. This treatment includes the same water as in the regular laboratory control with the addition of the amount of salts necessary to achieve the salinity required under the testing protocol. Ammonia and sulfides are also being measured in pore-water bioassays.

Testing Procedures for the Plant Bioassay (section 7.5): Current testing procedures are under review due to a confounding effect not anticipated by the test protocol. Indigenous seeds of ryegrass found naturally in the collected soils are germinating along with the laboratory-introduced test seeds. It is not possible for the laboratory personnel to distinguish between these seeds. PRC will discuss this problem with the appropriate regulators and decide on a course of action.

Test Organisms for Tissue Residue Studies (section 8.1): Pickleweed tissue will be collected in early October and will be analyzed for metals only, as was indicated in the draft final FSP. Amphipods are not currently being found in numbers sufficient for tissue residue analysis. PRC is considering other options and will discuss these with the regulatory agencies. Preliminary fish surveys indicate that sculpins and gobies are present in sufficient quantity and of sufficient size to be suitable for tissue residue studies. The collection of organisms for fish tissue and invertebrate tissue analysis will await preliminary soil and sediment and surface water chemistry data from the analytical laboratory. This will enable us to determine if organic contaminants are present. Only those organic contaminants present in the environmental media will be tested for in the tissue of fish and invertebrates.

Sample Identification System (section 10.2): Due to database constraints, some sample type abbreviations have been changed from those presented in the FSP.

Tables: Tables 1 and 3 in the FSP have been revised to reflect changes to the field investigation described above. The revised Table 1 and Table 3 (separated by environmental media into Tables 3A, 3B, and 3C) are attached.

Revised Table 1
Numbers of Chemical and Biological Analyses by RASS and Habitat

	RASS 1[a]			RASS 2	RASS 3[b]		RASS 4		Marsh[c] Reference	Upland Reference	TOTALS				Grand Totals
	Soil	W/S Ditch	W/S Slough	Soil	Soil	W/S Wetland	Soil	W/S Wetland	Soil	Soil	Soil	W/S Ditch	W/S Slough	W/S Wetland	W/S
Total Locations	22	13/23	14/23	1	12	5/7	1	3/3	5	5	46	13/23	14/23	8/10	35/104
Surface (sediment)	22	23	23	1	12	7	1	3	5	5	46	23	23	10	104
Depth (sediment)[d]	4	20	22	0	2	5	0	3	5	5	16	20	22	8	66
Total (Surface and Depth)	26	12/43	13/45	1	14	5/12	1	3/6	10	10	62	13/43	14/45	8/18	35/170
Chemical Analyses															
VOA	0	0	0	0	2	0/5	0	0	0	0	2	0/0	0/0	0/5	0/7
SVOA/PAHs	26	13/43	14/45	1	14	5/10	1	3/6	10	10	62	13/45	14/53	8/18	35/166
Pesticides/PCBs	26	13/43	14/45	1	14	5/10	1	3/6	10	10	62	13/45	14/53	8/18	35/166
Metals	26	13/43	14/45	1	14	5/10	1	3/6	10	10	62	13/45	14/53	8/18	35/166
TPH-gas	0	0/0	2/10	1	14	3/10	0	0	10	10	35	0/0	2/10	3/10	5/55
TPH-diesel	0	0/0	2/10	1	14	3/10	0	0	10	10	35	0/0	2/10	3/10	5/55
Organotins	0	6/10	9/16	0	0	5/0	0	0	10	0	10	6/10	9/16	5/0	20/36
Surface Extractions															
WET (Delonized Water)	13	6	24	0	4	6	0	0	10	0	27	6	24	6	63
WET (0.5 Normal HCl)	13	6	24	0	4	6	0	0	10	0	27	6	24	6	63
Bioassays															
Amphipod whole sediment	9	3	8	0	0	2	0	1	3	0	12	3	8	3	26
Sea urchin pore water[e]	0	0	8	0	0	2	0	0	0	0	0	0	8	2	10
Ryegrass soil	0	0	0	0	6	0	1	0	0	3	10	0	0	0	10
Tissue Residue															
Amphipod	0	0	5	0	0	1	0	0	0	0	0	0	5	1	6
Fish	0	0	5	0	0	1	0	0	0	0	0	0	5	1	6
Pickleweed	0	0	0	0	0	0	0	0	3	0	3	0	0	0	3

Notes:

a For some stations in RASS 1, metals analysis and field measurements will be conducted under the monitoring plan.

b For RASS 3, the two samples for VOA will be taken at depth.

c The marsh reference area is a proposed reference area.

d Depth is 12 to 18 inches. All slough, wetland, ditch, and reference area sample locations will be sampled at the surface and at depth. 20 percent of all other soil/sediment samples will be sampled both at surface and at depth.

e For all sediment pore water bioassays, SVOA/PAHs, pesticides, PCBs, metals, pH, salinity, sulfides, and ammonia will be analyzed in pore water.

HCl Hydrochloric acid
PAH Polynuclear aromatic hydrocarbon
PCB Polychlorinated biphenyl
SVOA Semivolatile Organic Analytes
TPH Total Petroleum Hydrocarbons
WET Waste Extraction Test
W/S Number of water samples/number of sediment samples
VOA Volatile Organic Analytes

Sept ber 19, 1995

REVISED TABLE 3A
CONCORD LITIGATION AREA QEA
SOIL SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Other[b]	AWS	RGS
RASS 1 - Totals		0	26	0	0	13	9	22	26	9	0
R01SS009	0-0.5		1					1	1		
R01SS010	0-0.5		1					1	1		
R01SS011	0-0.5		1				1	1	1	1	
R01SS016	0-0.5		1				1	1	1	1	
R01SS017	0-0.5		1			1		1	1		
R01SS017	1.0-1.5		1			1			1		
R01SS024	0-0.5		1				1	1	1	1	
R01SS034	0-0.5		1			1	1	1	1	1	
R01SS034	1.0-1.5		1			1			1		
R01SS044	0-0.5		1					1	1		
R01SS045	0-0.5		1					1	1		
R01SS071	0-0.5		1					1	1		
R01SS072	0-0.5		1					1	1		
R01SS076	0-0.5		1				1	1	1	1	
R01SS078	0-0.5		1			1	1	1	1	1	

REVISED TABLE 3A
CONCORD LITIGATION AREA QEA
SOIL SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Other[b]	AWS	RGS
R01SS078	1.0-1.5		1			1			1		
R01SS084	0-0.5		1			1	1	1	1	1	
R01SS088	0-0.5		1					1	1		
R01SS091	0-0.5		1			1	1	1	1	1	
R01SS095	0-0.5		1				1	1	1	1	
R01SS103	0-0.5		1					1	1		
R01SS104	0-0.5		1			1		1	1		
R01SS104	1.0-1.5		1			1			1		
R01SS108	0-0.5		1			1		1	1		
R01SS138	0-0.5		1			1		1	1		
R01SS143	0-0.5		1			1		1	1		
RASS 2 - Totals		0	1	1	0	0	0	0	1	0	0
R02SS151	0-0.5		1	1					1		
RASS 3 - Totals		2	14	14	0	4	0	0	14	0	6
R03SS167	0-0.5		1	1					1		

REVISED TABLE 3A
CONCORD LITIGATION AREA QEA
SOIL SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Other[b]	AWS	RGS
R03SS168	0-0.5		1	1					1		
R03SS169	0-0.5		1	1					1		
R03SS169	1.0-1.5	1	1	1					1		
R03SS171	0-0.5		1	1		1			1		1
R03SS173	0-0.5		1	1					1		1
R03SS174	0-0.5		1	1		1			1		1
R03SS174	1.0-1.5	1	1	1		1			1		
R03SS175	0-0.5		1	1					1		
R03SS176	0-0.5		1	1					1		1
R03SS177	0-0.5		1	1					1		1
R03SS178	0-0.5		1	1		1			1		1
R03SS179	0-0.5		1	1					1		
R03SS182	0-0.5		1	1					1		
RASS 4 - Totals		0	1	0	0	0	0	0	1	0	1
R04SS198	0-0.5		1						1		1

REVISED TABLE 3A
CONCORD LITIGATION AREA QEA
SOIL SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Other[b]	AWS	RGS
UPLAND REF - Totals		0	10	10	0	0	0	0	10	0	3
UDRSS001	0-0.5		1 (LDL)[4]	1					1		1
UDRSS001	1.0-1.5		1 (LDL)	1					1		
UDRSS003	0-0.5		1 (LDL)	1					1		
UDRSS003	1.0-1.5		1 (LDL)	1					1		
UDRSS004	0-0.5		1 (LDL)	1					1		1
UDRSS004	1.0-1.5		1 (LDL)	1					1		
UDRSS005	0-0.5		1 (LDL)	1					1		
UDRSS005	1.0-1.5		1 (LDL)	1					1		
UDRSS007	0-0.5		1 (LDL)	1					1		1
UDRSS007	1.0-1.5		1 (LDL)	1					1		
MARSH REF - Totals		0	10	10	10	10	3	5	10	3	0
MHRSS001	0-0.5		1 (LDL)	1	1	1	1	1	1	1	
MHRSS001	1.0-1.5		1 (LDL)	1	1	1			1		
MHRSS002	0-0.5		1 (LDL)	1	1	1		1	1		

REVISED TABLE 3A
CONCORD LITIGATION AREA QEA
SOIL SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Other[b]	AWS	RGS
MHRSS002	1.0-1.5		1 (LDL)	1	1	1			1		
MHRSS003	0-0.5		1 (LDL)	1	1	1	1	1	1	1	
MHRSS003	1.0-1.5		1 (LDL)	1	1	1			1		
MHRSS004	0-0.5		1 (LDL)	1	1	1		1	1		
MHRSS004	1.0-1.5		1 (LDL)	1	1	1			1		
MHRSS005	0-0.5		1 (LDL)	1	1	1	1	1	1	1	
MHRSS005	1.0-1.5		1 (LDL)	1	1	1			1		
GRAND TOTALS		2	62	35	10	27	12	27	62	12	10

Notes:

a All analyses use contract laboratory procedures unless specified as low detection limit (LDL).

b Geotechnical parameters are total organic carbon, pH, and grain size for all locations; sediment locations also include interstitial salinity and sediment oxygen demand.

AWS Amphipod whole sediment
Pest/PCB Pesticides/Polychlorinated biphenyl
RGS Rye grass soil
SVOA Semivolatile organic analytes
TPH-e Total extractable petroleum hydrocarbons
TPH-p Total purgeable petroleum hydrocarbons
WET Waste extraction test
VOA Volatile organic analytes

REVISED TABLE 3B
CONCORD LITIGATION AREA QEA
SEDIMENT SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Others[b]	AWS	EPW
RASS 1		0	88	10	26	30	15	47	88	11	8
Ditch		0	43	0	10	6	3	24	43	3	0
R01DH007	0-0.5		1		1			1	1		
R01DH007	1.0-1.5		1		1				1		
R01DH018	0-0.5		1					1	1		
R01DH018	1.0-1.5		1						1		
R01DH019	0-0.5		1		1	1		1	1		
R01DH019	1.0-1.5		1		1	1			1		
R01DH020	0-0.5		1		1			1	1		
R01DH020	1.0-1.5		1		1				1		
R01DH021	0-0.5		1					1	1		
R01DH021	1.0-1.5		1						1		
R01DH026	0-0.5		1					1	1		
R01DH026	1.0-1.5		1						1		
R01DH027	0-0.5		1		1			1	1		
R01DH027	1.0-1.5		1		1				1		

REVISED TABLE 3B
CONCORD LITIGATION AREA QEA
SEDIMENT SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Others[b]	AWS	EPW
R01DH030	0-0.5		1					1	1		
R01DH030	1.0-1.5		1						1		
R01DH035	0-0.5		1					1	1		
R01DH035	1.0-1.5		1						1		
R01DH040	0-0.5		1		1	1		1	1		
R01DH040	1.0-1.5		1		1	1			1		
R01DH049	0-0.5		1					1	1		
R01DH049	1.0-1.5		1						1		
R01DH056	0-0.5		1					1	1		
R01DH056	1.0-1.5		1						1		
R01DH057	0-0.5		1					1	1		
R01DH058	0-0.5		1					1	1		
R01DH058	1.0-1.5		1						1		
R01DH066	0-0.5		1					1	1		
R01DH066	1.0-1.5		1						1		
R01DH067c	0-0.5		Pest/PCB, SVOA only				1	1	1	1	
R01DH073	0-0.5		1					1	1		

REVISED TABLE 3B
CONCORD LITIGATION AREA QEA
SEDIMENT SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Others[b]	AWS	EPW
R01DH086	0-0.5		1					1	1		
R01DH086	1.0-1.5		1						1		
R01DH087	0-0.5		1					1	1		
R01DH087	1.0-1.5		1						1		
R01DH096	0-0.5		1					1	1		
R01DH096	1.0-1.5		1						1		
R01DH099c	0-0.5		Pest/PCB, SVOA only				1	1	1	1	
R01DH100c	0-0.5		Pest/PCB, SVOA only				1	1	1	1	
R01DH117	0-0.5		1			1		1	1		
R01DH117	1.0-1.5		1			1			1		
R01DH124	0-0.5		1					1	1		
R01DH124	1.0-1.5		1						1		
Slough		0	45	10	16	24	12	23	45	8	8
R01SH015	0-0.5		1		1			1	1		
R01SH015	1.0-1.5		1		1				1		
R01SH023	0-0.5		1		1	1	1	1	1		1

REVISED TABLE 3B
CONCORD LITIGATION AREA QEA
SEDIMENT SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Others[b]	AWS	EPW
R01SH023	1.0-1.5		1		1	1			1		
R01SH028	0-0.5		1			1	1	1	1	1	1
R01SH028	1.0-1.5		1			1			1		
R01SH029	0-0.5		1	1	1	1	1	1	1	1	1
R01SH029	1.0-1.5		1	1	1	1			1		
R01SH033	0-0.5		1		1	1	1	1	1	1	
R01SH033	1.0-1.5		1		1	1			1		
R01SH038	0-0.5		1					1	1		
R01SH038	1.0-1.5		1						1		
R01SH043	0-0.5		1		1	1	1	1	1	1	
R01SH043	1.0-1.5		1		1	1			1		
R01SH046	0-0.5		1		1			1	1		
R01SH046	1.0-1.5		1		1				1		
R01SH048	0-0.5		1					1	1		
R01SH048	1.0-1.5		1						1		
R01SH050	0-0.5		1					1	1		
R01SH050	1.0-1.5		1						1		

REVISED TABLE 3B
CONCORD LITIGATION AREA QEA
SEDIMENT SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Others[b]	AWS	EPW
R01SH055	0-0.5		1					1	1		
R01SH055	1.0-1.5		1						1		
R01SH065	0-0.5		1					1	1		
R01SH065	1.0-1.5		1						1		
R01SH074	0-0.5		1	1	1	1	1	1	1	1	1
R01SH074	1.0-1.5		1	1	1	1			1		
R01SH075	0-0.5		1			1		1	1		
R01SH075	1.0-1.5		1			1			1		
R01SH077c	0-0.5		Pest/PCB, SVOA only				1	1	1	1	
R01SH081	0-0.5		1					1	1		
R01SH081	1.0-1.5		1						1		
R01SH082	0-0.5		1			1	1	1	1		1
R01SH082	1.0-1.5		1			1			1		
R01SH097	0-0.5		1			1	1	1	1	1	
R01SH097	1.0-1.5		1			1			1		
R01SH111	0-0.5		1					1	1		
R01SH111	1.0-1.5		1						1		

REVISED TABLE 3B
CONCORD LITIGATION AREA QEA
SEDIMENT SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Others[b]	AWS	EPW
R01SH118	0-0.5		1	1		1	1	1	1		1
R01SH118	1.0-1.5		1	1		1			1		
R01SH130	0-0.5		1					1	1		
R01SH130	1.0-1.5		1						1		
R01SH131	0-0.5		1	1	1	1	1	1	1	1	1
R01SH131	1.0-1.5		1	1	1	1			1		
R01SH134	0-0.5		1	1		1	1	1	1		1
R01SH134	1.0-1.5		1	1		1			1		
RASS 3		5	10	10	0	6	3	5	10	2	2
R03WD153	0-0.5		1	1		1	1	1	1	1	
R03WD153	1.0-1.5	1	1	1		1			1		
R03WD154	0-0.5		1	1		1	1	1	1	1	1
R03WD154	1.0-1.5	1	1	1		1			1		
R03WD155	0-0.5		1	1				1	1		
R03WD155	1.0-1.5	1	1	1					1		
R03WD156	0-0.5		1	1		1	1	1	1		1

REVISED TABLE 3B
CONCORD LITIGATION AREA QEA
SEDIMENT SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Others[b]	AWS	EPW
R03WD156	1.0-1.5	1	1	1		1			1		
R03WD157	0-0.5		1	1				1	1		
R03WD157	1.0-1.5	1	1	1					1		
RASS 4		0	6	0	0	0	1	3	6	1	0
R04WD199	0-0.5		1					1	1		
R04WD199	1.0-1.5		1						1		
R04WD203	0-0.5		1					1	1		
R04WD203	1.0-1.5		1						1		
R04WD204	0-0.5		1				1	1	1	1	
R04WD204	1.0-1.5		1						1		
TOTALS		5	104	20	26	36	19	55	104	14	10

Notes:

a All analyses follow contract laboratory procedures unless specified as low detection limit (LDL).

b Geotechnical parameters are total organic carbon, pH, and grain size for all locations; sediment locations include interstitial salinity and sediment oxygen d

c For some stations in RASS 1, metals analyses and field measurements will be conducted under the monitoring project.

AWS Amphipod whole sediment
EPW Echinoderm pore water
Pest/PCB Pesticides/Polychlorinated biphenyl
TPH-e Total extractable petroleum hydrocarbons
TPH-p Total purgeable petroleum hydrocarbons
WET Waste extraction test

REVISED TABLE 3B
CONCORD LITIGATION AREA QEA
SEDIMENT SAMPLES AND BIOASSAYS

Location	Depth (feet)	Chemical Analyses[a]					Geotechnical Parameters			Bioassays	
		VOA	Pest/PCB,SVOA, Metals	TPH-e, TPH-p	Organo-tins	WET Tests	Ammonia, Sulfides	Eh	Others[b]	AWS	EPW

RGS Rye grass soil
SVOA Semivolatile organic analytes
VOA Volatile organic analytes

REVISED TABLE 3C
CONCORD LITIGATION AREA QEA
SURFACE WATER SAMPLES

Location	Laboratory Analyses[a]					Field Measurements				
	Pest/PCB, SVOA	Metals	TPH-p, TPH-e	Organotins	BOD	Temp.	pH	Salinity	DO	Cond.
RASS 1	27	22	2	15	22	22	22	22	22	22
R01DH019	1	1		1	1	1	1	1	1	1
R01DH021	1	1		1	1	1	1	1	1	1
R01SH023	1	1		1	1	1	1	1	1	1
R01DH026	1	1		1	1	1	1	1	1	1
R01DH027	1	1		1	1	1	1	1	1	1
R01SH028	1	1		1	1	1	1	1	1	1
R01SH029	1	1		1	1	1	1	1	1	1
R01DH030	1	1		1	1	1	1	1	1	1
R01SH033	1	1		1	1	1	1	1	1	1
R01DH035	1	1		1	1	1	1	1	1	1
R01SH043	1	1		1	1	1	1	1	1	1
R01DH049	1	1			1	1	1	1	1	1
R01DH056	1	1			1	1	1	1	1	1
R01DH066	1	1			1	1	1	1	1	1
R01DH067[b]	1									
R01SH074	1	1	1	1	1	1	1	1	1	1
R01SH075	1	1		1	1	1	1	1	1	1
R01SH077[b]	1									

REVISED TABLE 3C
CONCORD LITIGATION AREA QEA
SURFACE WATER SAMPLES

Location	Laboratory Analyses[a]					Field Measurements				
	Pest/PCB, SVOA	Metals	TPH-p, TPH-e [f]	Organotins	BOD	Temp.	pH	Salinity	DO	Cond.
R01SH082	1	1		1	1	1	1	1	1	1
R01SH097	1	1		1	1	1	1	1	1	1
R01DH099[b]	1									
R01DH100[b]	1									
R01SH118	1	1			1	1	1	1	1	1
R01DH120[b]	1									
R01SH130	1	1			1	1	1	1	1	1
R01SH131	1	1	1		1	1	1	1	1	1
R01SH134	1	1			1	1	1	1	1	1
RASS 3	5	5	3	5	5	5	5	5	5	5
R03WD153	1	1	1	1	1	1	1	1	1	1
R03WD154	1	1	1	1	1	1	1	1	1	1
R03WD155	1	1		1	1	1	1	1	1	1
R03WD156	1	1	1	1	1	1	1	1	1	1
R03WD157	1	1		1	1	1	1	1	1	1
RASS 4	3	3	0	0	3	3	3	3	3	3
R04WD199	1	1			1	1	1	1	1	1
R04WD203	1	1			1	1	1	1	1	1
R04WD204	1	1			1	1	1	1	1	1

REVISED TABLE 3C
CONCORD LITIGATION AREA QEA
SURFACE WATER SAMPLES

Location	Laboratory Analyses[a]					Field Measurements				
	Pest/PCB, SVOA	Metals	TPH-p, TPH-e	Organotins	BOD	Temp.	pH	Salinity	DO	Cond.
TOTALS	43	38	8	25	38	38	38	38	38	38

Notes:

Samples are only collected at slack or low tide.
All analyses use contract laboratory procedures unless specified as low detection limit.
a All analyses use contract laboratory procedures unless specified as low detection limit.
b For some stations in RASS 1, metals analyses and field measurements will be conducted under the monitoring project.

BOD Biological oxygen demand
Cond. Conducti conductivity (cond).
DO Dissolved oxygen
Pest/PCB Pesticides/Polychlorinated biphenyl
SVOA Semivolatile organic analytes
TPH-p Total purgeable petroleum hydrocarbons
TPH-e Total extractable petroleum hydrocarbons
Temp Temperature