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

March 10, 1998

Mr. Stephen Chao
Naval Facilities Engineering Command
Engineering Field Activity, West
900 Commodore Way, Bldg. 210
San Bruno, CA. 94066-2402

Re: *Revised Draft Final Station Wide Feasibility Study*, dated January 9, 1998

Dear Mr. Chao,

The U.S. Environmental Protection Agency (EPA) has received the subject document and provides the following comments. We appreciate the work that has been put into this version of the FS and believe we are getting closer to the final version. However, the report remains somewhat incomplete. One issue requiring additional work is the need to discuss all human health and ecological risks, even those based on conservative assumptions (HQs > 1 and risks within the "risk range" or those that result from background levels of compounds [metals]). The other is the necessity to provide more remedial alternatives. Reviewers of the report include Clarence Callahan of Technical Support and Steve Anderson of our Office of Regional Counsel.

This document is a "Revised Draft Final" version. As specified in the Federal Facility Agreement (FFA) §9.9, the period between the draft final and the final submittal of a primary document is considered an informal dispute period. If the regulatory agencies have any remaining issues that must be addressed, we typically are required to respond within 30 days to prevent the document from being finalized. Otherwise, the document automatically becomes final. For the record, we want to document the fact that the Base Closure Team (BCT) agreed to a 60 day comment period for this document due to the many differences from the previous version. Since there are still comments that need resolution, we remain in informal dispute. In order to save time and cost, we suggest informal responses to attempt resolution prior to the final version of the document. If you have any questions, please call me at 415-744-2385.

Sincerely,

Michael D. Gill

Michael D. Gill
Remedial Project Manager
Federal Facilities Cleanup Office

Attachment: PCB volatility study summary

cc: J. Chou (RWQCB), K. Eichstaedt (URS), T. Mower (TTEMI) (email), S. Olliges (NASA) (email), P. Strauss (PM Strauss and Associates) (email)

COMMENTS
Revised Draft Final Station Wide Feasibility Study, dated January 9, 1998

GENERAL COMMENTS

1. The FS does not provide enough choices from which to select a protective remedial alternative. During discussions at the RPM meeting in December, the regulators were asked to comment on a draft version of one of the document's tables (Table 9). At that time, we responded that even the most conservative modeled HQs (i.e. HQ_4) should be considered when developing remedial alternatives. The document provides many of the Theissen polygon maps, but the alternatives are not as complete.

2. In order to effectively communicate to the public what remediation according to HQs really means, the document should provide back calculations from HQs to cleanup levels. Levels of contaminants that will remain in the environment after remediation should be estimated.

3. EPA's comment #32 (letter of January 31, 1997) regarding COCs was apparently misunderstood. EPA believes that all calculated risks should be communicated in the FS, regardless of whether they are considered "acceptable risks" after a risk management decision. This means that all references to risks from metals to both human and ecological receptors should be put back into the document. After their mention as part of the total risk, if the Navy believes that certain contaminants are due to background (i.e. metals), then this should be stated. We have only been able to find mention of metals once in the main text (page 3) and then in Appendix B. Metals are dealt with in Appendix B (page B-6) by stating, "In conclusion, no remedial action is recommended for metals in the wetland areas of MFA, based on data for similar environments, as well as the lack of a site-specific source of metals and the general agreement of MFA metals concentrations with the composition of stormwater pond sediments and estuary sediments." The logic for eliminating metals from consideration in the FS appears sound. However, contaminants that contribute to the risk should not be eliminated from consideration before a risk management decision is made.

4. Some comments on the previous version of this document (EPA comments of January 31, 1997) were not addressed. The document has changed quite a bit, but some of these comments are still applicable. They are repeated below.

5. There are insufficient details provided for biological testing, chemical sampling, decision points and biological surveys. There is nothing provided to show when the Navy needs to stop monitoring or continue with monitoring. No information is provided to show how the various tests will be summarized or integrated to make any decisions.

SPECIFIC COMMENTS

6. Section 1.2.4.1, page 14, para 2. Please provide any updates to the OU1 construction schedule.

7. Section 1.2.4.2, page 14. Please describe the conclusions the BCT arrived at regarding beryllium in soil at OU2-East: even though beryllium is present in the soil, it poses "no unacceptable risks" to human health and the environment at these sites.

8. Section 1.2.4.4, page 15, para 2. Please provide any updates to the EATS construction schedule.

9. Section 1.2.4.5, page 15, para 3. Please add the statements made in Navy's response to old EPA comment #17 regarding how Site 12 groundwater is being addressed.

10. Section 1.2.4.6, page 17, para 6. This sentence should be changed to read: "The Northern Channel will be most likely be dredged by NASA in the next few years to maintain stormwater transfer capacity".

11. Section 1.2.5.2, page 23, para 2, sentence 2. This sentence states that PCBs "do not readily degrade or volatilize". Recent studies have shown that PCBs in sediment do have the ability to volatilize. Please review the attached summary of these studies and determine if they have any applicability to the PCBs in sediment at Moffett Field.

12. Section 1.3.1, page 24, para 1. Please describe the risks associated with the point (sample by sample) risk approach. How different were these risks from the exposure area approach?

13. Section 1.3.1. Text describing various exposure scenarios that appeared in the previous version of the FS (page 14) were deleted in this revised draft final. It provided helpful descriptions and should be considered for inclusion in the final.

14. Section 1.3.1.1, page 26. See old EPA comments #3 and #22 regarding risk range. This comment also applies to Tables 1 and 10. Even though these risks do not necessarily warrant action, they should still be communicated to the reader. Then the risk management decision can be made. EPA considers the risk point of departure to be 10^{-6}, not 10^{-4}.

15. Section 1.3.1.1, page 26, Occupational Scenario. Two of the four grid areas noted here (3974, 4312) are not in the Eastern Diked Marsh. Please correct this discrepancy.

16. Section 1.3.2.2, page 30, para 4. Please elaborate on NASA's work on soil removal in the stormdrain and the Lindbergh Avenue ditch. How much sediment was removed? When did the work occur? What cleanup level was used?

17. Section 1.3.2.2, page 31, para 1. Please provide a brief description of a congener-specific bioaccumulation factor (BAF).

18. Section 1.3.2.2. The use of HQs to set cleanup levels is a misuse of the approach because the method does not have enough accuracy (as calculated by the Navy) and precision (as applied by the Navy) to adequately define the concentrations of contaminants that pose a significant risk and therefore a clean-up level. Accuracy is called into question because for the sediment receptors, the Navy used the Long and Morgan (1991) numbers as "literature derived benchmarks" (see page 32) and it is not clearly stated here whether the ER-L or the ER-M was used. Either way, a bioassay approach is the most accurate approach for determining the exposure response relationship for the receptors at MFA.

EPA's old comment #36 questions the use of ER-Ls and ER-Ms in the process for setting clean-up levels. In Navy's February 5th response to comments letter, it is stated: "The discussion of effects range-low (ER-L) and effects range-medium (ER-M) have been removed from the SWFS". However, the use of these numbers has not apparently changed as evidenced by the statements and references in the text of the FS, (page 32, para 3). What is the truth? The citation is the document in which the ER-Ls and ER-Ms are published. What data are you citing? What table of information is used from the Long and Morgan document? If the Navy wants to use the ER-Ls for setting clean-up levels, the Navy will be cleaning up many areas that may not need cleaning. If the Navy is still using ER-Ms for setting clean-up levels, then the Navy is not following EPA nor NOAA guidelines and is not being exactly clear about the approach they are using.

If the Navy wants to use a set of benchmarks that are relevant geographically, i.e., San Francisco Bay, then the Water Board should be requested to provide numbers that are more relevant than the "national" numbers provided in Long and Morgan (1991).

Precision is called into question because the HQ process defined by the Navy (see page 33) provides a broad range of estimates of the HQ from HQ_1 to HQ_4 depending upon the input data. Although the Navy proposes that this range of estimates "provides more information", the use of four HQ estimates only increases the variability in the estimate of the HQ. A single HQ estimate should be used and EPA suggests HQ_4 is the appropriate one.

A widely recognized concept of interpretation of the HQ is that the magnitude of HQ estimates and even increasing HQ values have little or no suggested toxicological significance and certainly not ecological significance. This viewpoint is shared by the Navy (see page 32) where it actually argues for limiting the use of the HQ approach to its original intended application (USEPA, 1986). Limitations to the quotient approach were reported very early by Urban and Cook (USEPA, 1986) who stated that, "...the ratio or quotient method for assessing risk (1) does not adequately account for effects of incremental dosages, (the basis for the Navy's statement above) (2) does not compensate

for differences between laboratory test and field populations, (3) cannot be used for estimating indirect effects of toxicants (e.g., food chain interactions), (4) has an unknown reliability, (5) does not quantify uncertainties, and (6) does not adequately account for other ecosystem effects (e.g., predator-prey relationships, community metabolism, structural shifts)".

If the Navy insists on using the HQ approach throughout the process, the conclusion based on the EPA position for use and interpretation of the hazard quotient is that the HQ_4 estimates presented by the Navy are generally sufficient to show a ranking of the potential risks. From these data, the Navy should show the distribution of HQ_4 above 1 as a continuum. Using this information along with other information (i.e., bioassays, contaminant type and distribution, receptor habitat and receptor distribution), the Navy should characterize the risk from low to high. The distribution of risk levels should be divided into intervals related to risk characterization such that numerous levels of risk are displayed (such as $HQ_4 > 1$, > 10, > 100) and then evaluated for clean-up using the nine criteria.

19. Section 1.3.2.2, page 33. The hazard matrix appears incorrect. HQ_2 and HQ_3 should be interchanged in the matrix.

20. Section 1.3.2.2, page 34. The third bullet that appeared in the last version of the document (describing metals) should be retained in this description of potential adverse effects. If the Navy believes that metals should not be considered because of background considerations, than add a reference to Appendix B. Communicating the risks of all COPECs should be done before eliminating them because of a risk management decision.

21. Section 1.3.2.2, pages 35, 36, Combined Results of HQs, HIs and Bioassays for Surface Water and Benthic Receptors. There is no reason to believe that the HIs or the HQs, for that matter are good predictors of biological response for the bioassays as the Navy seems to expect from the statements in this paragraph. This is analogous to switching the independent and dependent variables in a regression, such that the dependent variable is expected to predict the independent variable.

22. Section 1.3.2.2, page 36. References to metals should be included in the weight of evidence summary, as they appeared in the draft final version of the FS (in numbers 1, 6, 7). If applicable, reference Appendix B prior to making a risk management decision.

23. Section 1.3.2.2, page 37, HQs and HIs for Avian and Mammalian Receptors. The use of the various HQ estimates does not provide a range of risk, however, it does provide four different means for estimating an HQ. The use of four estimates of HQ by varying the ingestion and weight of the receptors provides less information than estimating a range of doses based on a range of exposure concentrations. The Navy is strongly encouraged to use the HQ_4 and vary the exposure concentration to estimate the risk.

The Superfund Guidance (EPA, 1997; page 7-3) states, "Where exposure-response functions are not available or developed, the quotient method of comparing an estimated exposure concentration to a threshold for response can be used... Whenever possible, however, presentation of full exposure-response concentration functions provides the risk manager with more information on which to base site decisions. This guidance has recommended the use of on-site contamination gradients to demonstrate on-site exposure-response functions." And from page 7-4 of the same document, "In addition to developing point estimates of exposure concentrations, as for the hazard quotient approach, it might be possible to develop a distribution of exposure levels based on the potential variability in various exposure parameters...".

24. Section 1.3.2.2, page 37, para 1. In response to a Navy request to look at Table 9 at the RPM meeting in December, the regulators stated that figures should be presented that show risk areas for HQs greater than 1, 10 and 100. This is especially important if a proposed remedy is to be based on a particular HQ (i.e. HQ_3). It is necessary to have this data to make an informed risk management decision. Cost data for the more conservative HQ remedies is also necessary to make an informed decision.

25. Section 1.3.2.2, page 37, paras 2, 3. Again, metals should be included in discussions here concerning HQs in order to provide the reader a complete picture of the risk. In paragraph 3, it is stated that HQ_4 ranged "from below unity to more than 11,000 when metals were involved". The previous version of the FS (page 21) said that the upper range was 600,000. This discrepancy seems to be the result of removing pesticides from the calculation. Please include all COPECs in the discussion. A risk management decision will be made after the discussion of the risks.

26. Section 1.3.2.2, page 38, para 3. EPA would challenge the statement that, "...the most common benthic macroinvertebrate fauna in south bay area mud flats are polychaetes, bivalves, and amphipods." The Navy neither sampled these areas in sufficient detail to make this statement nor are there any citations or data to support the statement.

27. Section 1.3.2.2, page 39. Key outputs of the risk characterization are contaminant concentrations in each environmental medium that bound the threshold for estimated adverse ecological effects given the uncertainty inherent in the data and models used.

28. Section 1.3.2.3, page 39, Summary of Ecological Risk. EPA disagrees with the statements made in paragraph two which suggests that the "ecosystem" was characterized. Habitats and areas of similar characteristics were sampled. Ecosystem is too broad of a term to describe the habitats at MFA. Secondly, the Navy is suggesting that physical characteristics rather than contaminants were the primary factors that resulted in the "low density and diversity of benthic in-fauna" when one observation was made and no samples were collected and examined in a laboratory setting. Under these conditions, nothing could be observed smaller than a 2mm size, which greatly limits the possible observation of the biological organisms in sediments, even at MFA.

29. Section 1.3.2.3, page 41, Soil. Please include the risks from lead in soil and its effect on the burrowing owls. These were on page 25, paragraph 2 of the previous version of the FS. A risk management decision can then follow the full discussion of the risks.

30. Section 1.3.2.4, page 41. Please include discussions of risks from metals in all three areas at Moffett, as was done in the previous version of the FS.

31. Section 2.1, page 42, Remedial Action Objectives (RAOs). Although, the RAOs are stated for sediments, there should be some also for the upland habitats and the surface water. The statement, "There is only one set of RAOs because sediments are the only medium of interest" is inaccurate because it infers that other resources are on no interest. This idea needs further explanation.

We agree with the Navy's statement from the last version (draft final) of the document, "In general, the RAO for sediments is to adequately protect human health and the environment by limiting exposure to COCs." What is not obvious in this document is the transfer of the information from the SWEA to define the exact RAOs. The Feasibility Study should incorporate the results of the risk assessment by identifying the level of risk to the site receptors identified in ERA as significant risk. The levels of risk established during this ERA should be used as a basis for identifying areas of the site as acceptable, such that the site receptors will not be significantly impacted, thereby limiting the risk to the assessment endpoints.

The Navy estimates of risk are presented as various HQs calculated by different combinations of exposure to the receptors yielding HQs ranging from low protection, HQ_1, to a high level of protection, HQ_4. Intuitively, this is a good approach, but the input data to estimate the various HQs must be of high quality. Based on the work performed to date by the Navy, EPA would suggest that the cleanup levels, i.e., concentrations, be based on a risk level associated with HQ_4. Various options should be presented for ranges of HQ_4, that is $HQ > 1$, $HQ > 10$, $HQ > 100$. Concentrations must then be back calculated from these various levels of risk and then plotted on the maps for comparison to known concentrations i.e., sampled areas.

32. Section 2.1.1, page 43. As above, additional justification is required for concluding that sediment is the only medium of interest in Section 2.1.1. For example, the first paragraph of Section 1.3.1 states that there were elevated human health risks from exposure to COCs in groundwater while Section 1.2.4.8 discusses migration of plumes onto MFA from upgradient sources. The rationale why groundwater in not a medium of interest for this FS should be stated in Section 2.1.1, as is stated in Section 2.1.5.

33. Section 2.1.4, page 43. The Navy lists the Allowable Exposure Levels Based on Risk Assessments (AEL). The Navy has proposed the use of HQs for benthic invertebrates of less than 100 for the COPECs, total PCBs, total chlordane, DDD, and DDE in the Northern Channel, Eastern Diked Marsh and storm water retention ponds areas and

alternative proposals that the AEL be set to the combined concentrations of all COPECs to HQ_4 greater than 100 or HQ_4 greater than 10 for the avian and mammal receptors for total PCBs, total chlordane, DDD, and DDE. Again, the Navy has not provided a range of risk estimates, i.e., HQs such that the acceptable range of risk can be identified. The above levels should not be accepted or rejected at this point, but considered by comparison with the other options using the nine criteria.

34. Section 2.1.4, page 43, 44. The point of departure for risk is 10^{-6}, not 10^{-4}. This needs to be considered when developing the Allowable Exposure Levels (AELs).

35. Section 2.1.4, page 44, para 4. Proposals for AELs should also include HQs greater than 1 to allow a more informed risk management decision.

36. Section 2.1.7, pages 46, 47, Potential Federal and State Action-Specific ARARs.

(a) "California Water Quality Standards for Inland Bays" are discussed on pages 47-48, but are not listed as a potential ARAR at the top of page 47 and are not listed in the ARARs table. Please correct this discrepancy.

(b) Are there any wetlands regulations issued by San Francisco Bay Area agencies, such as BCDC, that should be considered in the FS? While requirements of a local agency, as opposed to those of a state agency, would not be ARARS, they might contain useful standards that should be included in the ARARs discussion as "to be considered."

37. Section 2.1.8, page 48. Please explain why a reduction in exposure to metals are not part of the RAOs.

38. Section 2.2.1.1, page 49, para 1. Sediment exposure areas should be identified as those posing risks in excess of 10^{-6}; that is, greater than the point of departure. A proposed remediation goal for each exposure area should then be back-calculated to a cleanup level.

39. Section 2.2.1.2, page 51, para 1. Explain why metals are not considered in the total potential risk in sediments.

40. Section 2.2.1.2, page 51, Areas of Attainment Based on the SWEA. This paragraph is aimed at the correct approach, but not the correct scale for describing risk. The scale or "system" to evaluate risk as proposed by the Navy based on Menzie et al (1993) is not acceptable as stated. The use of validated estimates of risk (defined here as HQ values) is appropriate. The key word in this acceptance is "validated" because the estimate of risk must be representative of the actual risk on site. As stated elsewhere, the most reasonable estimate of risk presented in the Navy document is the HQ_4 estimate, not HQ_1. EPA still believes that bioassays represent the most accurate estimate of effects

from which potential risk can be estimated.

41. Section 2.2.1.2, page 51, 52. This list of areas proposed for remediation should be broadened to include HQs greater than 1, especially HQ_4. This was requested by the regulators in our December 17th phone call (between EPA and TTEMI).

42. Section 2.2.2, page 54, Mitigation. Please elaborate on the rationale used to define how mitigation is done; that is, what drives the acre-for-acre mitigation offset? How did this rationale lead to the proposals presented in Section 2.3.2.7?

43. Section 2.3.2, page 55, para 2, Screening of Remedial Technologies. EPA would agree with the Navy, that "A technology is considered applicable if it can reduce the toxicity, mobility, or volume of sediments to be remediated." This position also recognizes that a suitable method for evaluating the efficacy of the remedial technology must be identified and used.

44. Section 2.3.2.4, page 59, Innovative Technologies. Any proposal for biodegradation of PCBs or any other contaminant using *Phanerochaete chrysosporium* must be well described and shown to be a viable option. The efficacy of this method, of course, must be verified with appropriate techniques including chemistry and bioassays to show that the method is effective to reduce the toxicity to soil/sediment organisms. Some research performed through the SITE program gave mixed results using this technique for PAH and PCP contaminants. This may not be a viable approach. Any material received by the Navy should be considered highly preliminary and very much dated.

45. Section 2.3.2.7, page 60. The habitat mitigation described here is a reasonable attempt at in-kind, on-site mitigation. Several considerations are:

- The habitat quality of these sites, particularly the Stormwater Retention Pond, is marginal and may not provide enhanced habitat even following mitigation;

- MFA is an active airfield and probably discourages the enhancement of wildlife habitat, particularly for birds, within its operational zone because of airplane safety;

- There may be a potential for recontamination of the mitigation in the northwestern corner of the Stormwater Retention Pond from Stevens Creek.

Based upon these considerations, it might be worthwhile looking at some off-site mitigation options. In any case, any mitigation will have to be closely coordinated with the appropriate natural resource agencies.

46. Section 2.3.3.1, page 64. Under the No Action Alternative, natural attentuation is deemed unlikely to reduce organic contaminant concentrations to an acceptable level over

the short term. It would be helpful for the FS to provide a slightly more thorough evaluation of natural attentuation. A simplified approach to predicting what the concentrations would be within a given timeframe (e.g., 10 or 20 years) would be adequate and would provide useful information for remedial decision making, especially in light of the recent studies on volatility of PCBs in sediment (see attachment).

47. Section 3.1, page 75, 76. The alternatives outlined here describe active remediation options for the Eastern Diked Marsh and Northern Channel. Previous discussions (e.g., Section 1.3.2.4, Section 2.1.4, Section 2.2.1.2) and Figures 15 through 22 also show areas of concern located in the Stormwater Retention Pond as well as in the Western Diked Marsh. It is unclear why remedial alternatives were not considered for the Stormwater Retention Pond and the Western Diked Marsh. Please provide rationale for this decision.

48. Section 3.1, page 76. This section should also include alternatives that consider biotreatment or removal of sediments that protect receptors in areas with various HQs greater than 1. The alternatives should present cleanups that will remove or biotreat sediments exceeding the HQ levels.

In the previous version of this FS, the alternatives proposed different amounts of excavation, based on meeting different HQ requirements. In this version, excavation is always down to one foot. What is the rationale for excavating down to one foot? Can the Navy show that only acceptable contamination levels exist below one foot and that ecological receptors will be unimpacted? Provide references to back up any claims.

The depth of contamination in the sediment profile is not adequately discussed. There are a few statements concerning the depth of contamination (e.g., page 70, para 2; page 70, bullet for Alternative 3; Appendix D), but no analysis of the subject is provided. An analysis of the extent of contamination in terms of depth in the sediment profile is required for a proper evaluation of remediation alternatives.

As mentioned previously, the effectiveness of biotreatment using white rot fungus is not well documented, yet half of all of these alternatives depend on this technology. Alternatives should be developed that either provide for a contingency if the white rot fungus does not work or that do not rely so much on this unproven technology. One possibility is to propose alternatives that are similar to those presented before, that is, using various HQs, propose different amounts of acreage excavation followed by restoration. Then verify that the remaining sediment does not pose an unacceptable risk to receptors by back-calculating cleanup levels (from the HQs) and show through ecological monitoring that these contaminant levels do not exist.

49. Section 4.1, Cost. In several locations in this section, Table 11 is referenced. When compared to Table D-1 in Appendix D (also a cost table), they are not really consistent. Either provide a range of costs or a fixed cost in both cost tables.

50. Table A-2. Add California Water Quality Standards for Inland Bays, as discussed on pages 47-48 of text.

51. Page C-1. The "short-term monitoring" as described by the Navy is really validation sampling and should be called this. The Navy appears to recognize this in the third sentence in stating the objective of "short term monitoring."

52. Page C-1, Long-term monitoring. Monitoring is not performed to "verify that no additional adverse changes to the habitat are occurring", but rather to verify that the remedial actions taken are sufficient to protect the assessment endpoints identified for the site. This may be a subtle point, however, the CERCLA process and the ecological risk assessment guidance in particular identify the focus of the process to be the assessment endpoints, which is more comprehensive than focusing on just the habitat or the receptors. The statement of purpose should be clarified to include a more comprehensive goal rather than the limited target of the habitat.

53. Page C-2, Chemical Monitoring. The Navy should identify the contaminants of concern as identified from the baseline ecological risk assessment. The Navy does not identify the required "decision points" that will be used to determine if and when further sampling should be performed. A "significant increasing trend in concentration" is very vague and does not clearly state how the decision will be made to stop or to continue further monitoring.

54. Page C-3, Proposed number of Samples. EPA can't evaluate these sample numbers because there are no locations shown. Sample locations need to be identified on maps and justified with respect to the baseline results and the remedial actions proposed. The number of samples may or not be sufficient because of lack of information provided.

55. Page C-2, Biological Monitoring. The Navy should not change the type of bioassay from those used in the baseline assessment because there are no direct connections between the monitoring proposal described by the Navy in this document and the baseline results. Without an adequate description of this relationship, there will be a disconnect between the two efforts. The Navy does not describe the method proposed to complete this effort. The title presented is insufficient as the Navy is suggesting that bivalve larvae be substituted for amphipods in the 10-day Static Sediment Toxicity Test. What is the basis for this substitution? Where is the documentation to suggest that this substitution can be made?

56. Page C-4, Reference site. The Navy's suggestion for the reference site at Hunters Point is inappropriate as it was inappropriate for Hunters Point. If a reference site is needed, then another location should be identified by the Navy.

57. Page C-4, Random sampling. The use of random sampling is not justified as stated here. Why and on what basis should a random sampling approach be used for the monitoring

effort?

58. Page C-4, Tissue sampling. The Navy must provide a justification for no further plant sampling based on the results of the baseline data. EPA believes that plants may not have been sampled adequately which is the likely reason for no observed contaminants in plant tissue. This is an area for further discussion.

59. Page C-4. The Navy must identify what species and approach will be used for the bioaccumulation. The reference to the ASTM standard guide is not specific enough.

60. Page C-4, Biological Surveys. EPA does not agree with the proposal as written. There is little if any detail provided that demonstrates a difference from what was done in the previous effort. The previous effort was not sufficient to show the presence or absence of organisms that birds might feed on. The Navy is strongly advised against, "a detailed cataloguing of the entire biological community at the various habitats." This is another area that needs further discussion. Lastly, if the survey is performed after the remedial action, what will be the benchmark to determine that the action was effective?

61. Table D-1. Identical costs are shown for the alternatives that use biotreatment, yet different amounts of sediment are being biotreated. In addition, the cost of off-site sediment disposal is always estimated to be the same, even though different amounts of sediment will be hauled offsite. Please explain.

EDITORIAL COMMENTS

62. Section 1.2.4.6, page 16, 17. Please correct the spelling of Lindbergh Ave. ditch in this section (at least 4 instances).

63. Section 1.2.4.6, page 17, para 4. The "SWEA" acronym needs to be corrected.

64. Appendix D. The notation of "HQ" is incorrectly used in place of "HQ_3" at various spots in this appendix (e.g. page D-1 [Alt.3], Table D-1 [Alt. 4], page D-10 [title]. Please correct these errors.

Literature cited:

Long, E.R. and L.G. Morgan. 1991. The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program. National Oceanic and Atmospheric Administration (NOAA) Technical Memorandum NOS OMA 52. Seattle, Washington. August, 1991.

Urban, D.J. and N.J. Cook. 1986. Hazard Evaluation Division Standard Evaluation Procedure Ecological Risk Assessment. EPA-540/9-85-001. Office of Pesticides Programs. Washington,

D.C. June, 1986.

USEPA, 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. EPA 540-R-97-006. OSWER 9285.7-25. PB97-963211. June 1997.

Attachment to EPA Comments on the
Revised Draft Final Station-Wide Feasibility Study

NIEHS/EPA Superfund Basic Research Program 'Research Brief'

Title: Research Points to Need for Reassessment of PCB Volatility

For decades, conventional wisdom has led many environmental scientists and engineers to believe that once polychlorinated biphenyl compounds (PCBs) are sorbed to soils and sediments, the compounds are relatively immobile in these media. Because PCBs are considered hydrophobic and practically insoluble in water, many current remediation technologies also assume that water hinders the movement of PCBs in the environment. Until recently, few have questioned these beliefs.

A commentary in the February 1998 issue of Environmental Health Perspectives argues that under select conditions "semivolatile" PCBs are much more volatile and mobile in the environment than generally recognized. Researchers at SUNY-Oswego and the University at Albany challenge some of the commonly held tenets of PCB behavior based on the results of a series of laboratory experiments conducted on microbially degraded sediments collected from the St. Lawrence River.

In the series of bench scale experiments, PCB volatility was strongly correlated with evaporative losses of water. More than 75 percent of the total PCBs in samples collected from St. Lawrence River sediments were lost through volatilization when the contaminated sediments were maintained underneath a layer of water over a five to seven day period. Most of the losses occurred when the water overlying the contaminated sediments evaporated. The contaminated sediments were particularly susceptible to volatile losses of PCBs because the PCBs had been extensively modified by reductive, microbial dechlorination. This microbial activity resulted in the production of more volatile, as well as more water soluble compounds.

Additional field experiments, not reported in the commentary, provide supplementary evidence that PCBs exhibit a high degree of volatility. A field experiment conducted by SUNY-Oswego researchers at a New York State Superfund site suggests that PCB volatilization occurred at depths of several centimeters below the land surface. Volatilization not only decreased the total PCB concentrations in contaminated industrial casting sands at this site, but also resulted in significantly altered congener patterns. Specifically, the congener patterns showed a reduction in the lower chlorinated congeners which tend to be more water soluble and mobile in the environment.

What is now clear is that PCBs, particularly microbially altered PCBs, are highly susceptible

to volatilization in the environment. Large quantities of these compounds may be transferred to the atmosphere as the water overlying contaminated sediments evaporates and when moisture laden, contaminated sediments dry. The potential releases resulting from large scale removal of PCB-contaminated sediments in the Hudson and St. Lawrence Rivers of New York, and other contaminated areas of the world, could be responsible for redistributing large quantities of semivolatile compounds to the atmosphere.

These studies provide evidence for a potential redistribution of large quantities of PCBs and other semivolatile compounds. Atmospheric redistribution of a variety of semivolatile contaminants - including polyaromatic hydrocarbons, some pesticides, and other chemicals - is likely responsible for the increasing concentrations of chemical contaminants in remote areas of the world. Ironically, several commonly used remediation technologies may be contributing to the global redistribution of semivolatile compounds. There is a possibility that select aerobic biodegradation remedial technologies - including land farming, composting, and other processes which employ cultivation, mixing and watering - may be redistributing contaminants to the atmosphere.

Many scientists do not yet recognize the volatile potential of PCBs. A review of recent bioremediation journal and proceedings articles indicates that the majority of reported experiments did not control for volatile losses. Reductions in contaminant concentrations in the experimental systems were attributed solely to microbial processes. However, in the case of PCBs, not only would the total contaminant concentration change through volatile loss, but the congener pattern would also be altered. Beginning in the laboratory and proceeding to the design and implementation of remedial protocols, volatile losses have typically not been distinguished from microbial processes.

The findings discussed in the Environmental Health Perspectives commentary are likely to have a significant impact on the remediation processes of PCBs. Based on a strong foundation of scientific evidence, this compelling commentary suggests that volatility should be integrated into all experimental and remedial protocols in which atmospheric redistribution of contaminants is possible.

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To learn more about this area of research please refer to the following articles:

Chiarenzelli J., R. Scrudato, B. Bush, D. Carpenter and S. Bushart. 1998. Do large-scale remedial and dredging events have the potential to release significant amounts of semivolatile compounds to the atmosphere? Environmental Health Perspectives 106 (2): 47-49.

Chiarenzelli J., R. Scrudato, G. Arnold, M. Wunderlich, D. Rafferty. 1996. Volatilization of polychlorinated biphenyls from sediment during drying at ambient conditions. Chemosphere 33:899-911.

Chiarenzelli J., R. Scrudato, M. Wunderlich, G. Oenga, O. Lashko. 1997. PCB volatile loss and the moisture content of sediment during drying. Chemosphere 34:2429-2436.

Chiarenzelli J., R. Scrudato, M. Wunderlich. 1997. Volatile loss of PCB Aroclors from subaqueous sand. Environ. Sci. Technol. 31:597-602.