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RESPONSES TO COMMENTS

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Naval Facilities Engineering Command, Western Division
San Bruno, California 94066

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This report contains responses by the Department of the Navy to comments received after the Navy issued a public notice on 16 September 1988 that it had completed the proposed remedial action plan and a draft administrative record of the response to the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord.

By the same public notice, the Navy solicited oral and written comments and information necessary to evaluate the proposed remedial action plan, and the findings and conclusions which the Navy proposed to make concerning cleanup standards, decision rules and remedial action alternatives for the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy also solicited any information necessary

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19. ABSTRACT (Continued).

to complete the administrative record of the response to the release, and the threatened release, of hazardous substances on these parcels.

On 12 October 1988, the Naval Weapons Station, Concord, held a public meeting to solicit oral comments and information. On 19 October 1988, the Naval Weapons Station issued a public notice extending the deadline by which written comments and information must be received by the Navy until 18 November 1988. All comments submitted in response to the public notice were considered and the Navy's response to each comment is the subject of this report.

This report also contains responses by the Navy to comments received after the Navy issued a public notice on 7 March 1986, that it had completed a (Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, which screened, developed, and analyzed alternative remedial actions for contaminated portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the station. By this public notice, the Navy solicited written comments and information necessary to evaluate the seven remedial action alternatives analyzed in the (revised) final draft feasibility study report.

This report also contains responses by the Navy to comments received after the Navy issued a public notice on 8 August 1985, that it had completed a Final Draft Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, and a Final Draft Report of Feasibility Study of Contamination at Naval Weapons Station, Concord, California. By this public notice, the Navy solicited comments and information necessary to evaluate the release, and the threat of release, of hazardous substances.

In addition, errata are presented for the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives (September 1988) and Volume III: Figures (April 1988).

PREFACE

This report presents responses by the Department of the Navy to comments received after the Navy issued a public notice on 16 September 1988 that it had completed the proposed remedial action plan and a draft administrative record of the response to the release, and threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord.

This report also presents responses by the Navy to comments received after the Navy issued a public notice on 7 March 1986 that it had completed a (revised) final draft report of feasibility study of contamination remediation on the Naval Weapons Station, Concord. This report also presents responses by the Navy to comments received after the Navy issued a public notice on 8 August 1985 that it had completed a final draft report of remedial investigation of contaminant mobility at Naval Weapons Station, Concord, and a final draft report of feasibility study of contamination at Naval Weapons Station, Concord.

This study was conducted at the US Army Engineer Waterways Experiment Station (WES) by Dr. C. R. Lee, Soil Scientist, and Mr. Dennis Brandon, Statistician, Contaminant Mobility and Regulatory Criteria Group; Mr. M. John Cullinane, Jr., Research Civil Engineer, Water Supply and Waste Treatment Group; and Ms. L. Jean O'Neil, Wildlife Biologist and Ecologist, Resource Analysis Group, under the general supervision of Mr. D. L. Robey, Chief, Ecosystem Research and Simulation Division; Dr. R. L. Montgomery, Chief, Environmental Engineering Division; Dr. C. J. Kirby, Chief, Environmental Resources Division; and Dr. John Harrison, Chief, Environmental Laboratory.

Technical contributions in response preparation were received from Mr. J. M. Robertson, Esq., Litigation Office, Office of the General Counsel, Department of the Navy, San Francisco, CA.; Dr. K. D. Jenkins, Director, Molecular Ecology Institute, California State University, Long Beach, CA.; and Dr. R. J. Kendall, Environmental Toxicological Services, Bellingham, WA.

Editorial review was received from Mr. Larry Bird, Mr. Bobby Baylot, and Ms. Jamie Leach of the Environmental Laboratory.

Director of WES during the preparation of this report was COL Dwayne G. Lee, CE. Technical Director was Dr. Robert W. Whalin.

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EXECUTIVE SUMMARY

This report contains responses by the Department of the Navy to comments received after the Navy issued a public notice on 16 September 1988 that it had completed the proposed remedial action plan and a draft administrative record of the response to the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord. By the same public notice, the Navy gave public notice that it had completed the following reports in response to the release, and threatened release, of hazardous substances on Parcels 571, 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California:

- Final Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, Subtitle Appendix 2.5 - 1986/87 Data (June 1988)

- Final Report of Suitability of Sites for Hazardous Waste Disposal, Concord Naval Weapons Station, Concord, California (September 1988).

- (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives (September 1988).

- Final Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume II: Biological Assessment (July 1988).

- Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures (April 1988).

- Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California (16 September 1988)

By the same public notice, the Navy solicited oral and written comments and information necessary to evaluate the proposed remedial action plan, and the findings and conclusions which the Navy proposed to make concerning cleanup standards, decision rules, and remedial action alternatives for the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy also solicited any information necessary to complete the administrative record of the response to the release, and the threatened release, of hazardous substances on these parcels.

On 12 October 1988, the Naval Weapons Station, Concord held a public meeting to solicit oral comments and information. On 19 October 1988, the Naval Weapons Station, Concord issued a public notice extending the deadline by which written comments and information must be received by the Navy until 18 November 1988.

This report also contains responses by the Navy to comments received after the Navy issued a public notice on 7 March 1986 that it had completed a (Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, which screened, developed,

and analyzed alternative remedial actions for contaminated portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the station. By this public notice, the Navy solicited written comments and information necessary to evaluate the seven remedial action alternatives analyzed in the (revised) final draft feasibility study report.

This report also contains responses by the Navy to comments received after the Navy issued a public notice on 8 August 1985 that it had completed a Final Draft Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, and a Final Draft Report of Feasibility Study of Contamination at Naval Weapons Station, Concord, California. By this public notice, the Navy solicited comments and information necessary to evaluate the release, and the threat of release, of hazardous substances.

All comments submitted in response to the public notice were considered and the Navy's response to each comment is the subject of this report. Response to comments on the Final Draft Report of Assessment of Damage to Natural Resources at Naval Weapons Station, Concord, California are not included in this report.

Each comment is reproduced in topic sections and followed by the Navy's response to that topic. Exhibits presented by commenters are not reproduced but may be found in the Administrative Record.

In addition, errata are presented for the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives (September 1988) and Volume III: Figures (April 1988).

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1.1 COMMENTS SUBMITTED BY ALLIED-SIGNAL INC. IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 16 SEPTEMBER 1988, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Allied-Signal Comments-Introduction (21 November 1988):

INTRODUCTION

This document presents the comments of Allied-Signal, Inc. ("Allied") in response to the letter of September 16, 1988 from the Department of the Navy ("Navy") soliciting comments on the findings and conclusions which the Navy proposes to make concerning cleanup standards, decision rules, and remedial action alternatives regarding the alleged release and threatened release of hazardous substances on the Concord Naval Weapons Station.

Emcon Associates and Jones & Stokes Associates, on behalf of Allied, have reviewed some or all of the various documents produced by the Navy and have assisted in the preparation of these comments. The qualifications of those firms and the personnel from them who assisted are attached as Appendix A.

In September 1988, the Navy produced a series of documents relevant to the issues on which the Navy has requested comment. These documents include: Remedial Investigation ("RI"), Subtitle Appendix 2.5 (1986-87 Data); Feasibility Study ("FS"), Draft Final Report, Vol. I: Remedial Action Alternatives; Volume II, Biological Assessment; and Volume III: Figures; Proposed Remedial Action Plan ("RAP"); Suitability of Sites for Hazardous Waste Disposal, Concord Naval Weapons Station; and a Draft Administrative Record.. The Navy also provided a copy of the Biological Opinion issued by the federal Fish & Wildlife Service.

Because of the tremendous amount of information presented in all of these documents (implying nothing about its quality), and the short comment period granted (even with the short extension), Allied-Signal could only make its best effort to present its substantive comments herein. Many more constructive comments likely would have been included were more time available. Allied-Signal objects to the comment period being inadequate and reserves its right to submit additional comments after the deadline set by the Navy has passed. This problem is addressed more fully in a separate cover letter accompanying these comments addressed to Navy counsel, J. Martin Robertson, Esq.

As with Allied's two prior sets of comments, the

comments in this document are presented in three sections. The first section conveys our general observations. The second section reviews the Draft Final FS in detail and, by implication, the Proposed Remedial Action Plan. The third section addresses the other documents produced by the Navy in September, 1988, focusing primarily on the Biological Assessment.

Response to Allied-Signal Comments - Introduction (21 November 1988):

On 16 September 1988, the Navy issued a public notice soliciting oral and written comments and information necessary to evaluate the Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California, and the findings and conclusions which the Navy proposes to make concerning cleanup standards, decision rules, and remedial action alternatives for the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord. In the public notice the Navy also solicited any information necessary to complete the administrative record of the response to the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord. In the public notice, the Navy announced that it would accept comments and other information until 3 November 1988.

On 12 October 1988, the defendants in the cases styled United States v. Allied-Signal Chemical Corp. et al., C-83-5896 FNS (N.D. Calif.), and United States v. Chemical & Pigment Company, et al., C-83-5898 FNS (N.D. Calif.), requested that the Navy extend the period for submitting comments and other information until 19 December 1988. In response, the Navy issued another public notice on 19 October 1988, announcing that it would accept comments and other information until 18 November 1988. In addition, in a 19 October 1988 letter to the defendants, the Navy explained that the period which the Navy allowed to submit comments and other information was sufficient opportunity to submit comments and information regarding the proposed remedial action plan, as required by Section 113(k)(B)(ii) of CERCLA.

Allied-Signal Comments - 1.1 (21 November 1988):

1.1 THE NAVY'S FAILURE TO RESPOND TO PRIOR COMMENTS.

On page E.3 of the Draft Final FS, the Navy refers to the "comments" which it received in response to the March 1986 Revised Draft FS, suggesting that they were a reason for preparing yet another draft FS. However, as with the RI, the Navy apparently contemplates issuing a final FS and RAP before

it responds to the comments submitted on the drafts of those documents. This ill-advised procedure is itself deserving of comment.

First, Allied, as well as other defendants and government agencies, submitted numerous, substantive comments on the draft RI in September, 1985. The Navy did not provide any written response prior to its release of the Final RI in January, 1986. Nor does the Final RI reflect that the Navy gave much consideration to the comments. In fact, the Final RI, which is heavily relied upon in the latest Draft Final FS, is still subject to many of the same criticisms made by Allied-Signal and others when it was in draft form.

Even though the RI is now in final form, the Navy still has not responded to comments. The Navy simply has left parties such as Allied-Signal guessing as to why their comments have gone largely unheeded. The Navy also has failed to respond to the comments submitted regarding FS in September 1985 and again in April 1986 or the comments on the Proposed RAP submitted in April 1986. Accordingly, we hereby incorporate by reference all of our prior comments herein.

This one way communication has severely retarded the goal of the notice and comment procedure, which is to resolve differences of opinion regarding the proper interpretation of the data collected as soon as possible. Instead, the Navy's procedure ensures that such basic differences in opinion will continue into the later phases of the RI/FS process without resolution. As a result, the Navy is now compounding the problem by largely basing its FS on the questionable findings set forth in the Final RI. This non-responsive approach adopted by the Navy thus necessarily infects and brings into question whatever result is produced by the remedy selection process.

Aside from the practical problems caused by the Navy's failure to respond, however, the Navy may also be in violation of law. Pursuant to CERCLA § 113(k), 46 U.S.C. § 9612(k):

> The President shall provide for the participation of interested parties, including potentially responsible parties, in the development of the administrative record on which the President will base the selection of remedial actions and on which judicial review of remedial actions will be based. The procedures developed under this subparagraph shall include at a minimum, each of the following:
>
> . . .
>
> (iv) a response to each of the significant comments, criticisms, and new data submitted

> in written and oral presentations. (Emphasis added.)

Although there is no specific timetable set forth in the statute dictating when responses must be provided, the spirit, if not the letter of the law, militates strongly in favor of requiring that responses to comments be provided prior to the issuance of final reports. Only in this manner can it be ensured that the lead agency, in this case the Navy, has fully considered the comments and criticisms submitted and either changed the report as appropriate or explained its reasons for not doing so. Otherwise, the "participation of interested parties" through the submission of comments is reduced to a hollow, purely procedural matter.

The letter of J. Martin Robertson, Esq. to Norman La Force, Esq. of October 19, 1988 ("Robertson Letter") suggests that the latter view may be held by the Navy. While Robertson emphasizes the defendants' prior opportunities to comment on Navy studies, he provides no indication of the Navy's reaction to those comments or whether the Navy made any changes in subsequent iterations of those documents in response. Instead, defendants are simply asked by Navy counsel to believe that:

> The Navy carefully took into account the comments and information submitted by the defendants and other interested parties before preparing its [Final RI and all documents produced subsequently].

But how do we know this to be true? Defendants should not be required to rely on the word of an opposing attorney, regardless of his sincerity, as confirmation that their comments have been considered and, where appropriate, responded to through modification of the relevant document[1] This cannot have been the intent of Congress. On this basis, we contend that the Navy's silence to date is a violation of CERCLA § 113(k).

---

[1] The "three phases of consultation" referred to by Mr. Robertson are much less than they seem. First, because defendants were not provided with written responses to their comments, the Navy's consultants' positions on the relevant issues were unclear. Second, the Navy tightly controlled the "consultations" by unnecessarily requiring the presence of attorneys, having the proceedings transcribed, scripting the topics to be covered and limiting the length of the sessions. Third, one of the "consultations" pertained to the Navy's proposed response to the California Regional Water Quality Control Board's request for a surface and groundwater characterization plan. This did not pertain to the documents at issue now in the slightest, making Mr. Robertson's reference to it mere surplusage.

The only apparent explanation for this unfortunate decision by the Navy, (the Navy not having given any reason,) is that the Navy fears that responding to such comments might harm its ability to prevail in its pending litigation against defendants. The actual effect, however, is to drive the parties farther apart from any potential settlement and to require the Navy to defend its proposed, but objectionable remedy in court. To prevent this undesirable and expensive outcome, the Navy should reverse its procedure and provide responses to all comments submitted to date as soon as possible.

Response to Allied-Signal Comments - 1.1 (21 November 1988):

Section 113(k)(2)(B) and (C) of CERCLA provides that:

> (B) Remedial action. -- The President shall provide for the participation of interested persons, including potentially responsible parties, in the development of the administrative record on which the President will base the selection of remedial actions and on which judicial review of remedial actions will be based. The procedures developed under this subparagraph shall include, at a minimum, each of the following:
>
> (i) Notice to potentially affected persons and the public, which shall be accompanied by a brief analysis of the plan and alternative plans that were considered.
>
> (ii) A reasonable opportunity to comment and provide information regarding the plan.
>
> (iii) An opportunity for a public meeting in the affected area, in accordance with section 117(a)(2) (relating to public participation).
>
> (iv) A response to each of the significant comments, criticisms, and new data submitted in written or oral presentations.
>
> (v) A statement of the basis and purpose of the selected action.
>
> For purposes of this subparagraph, the administrative record shall include all items developed and received under this subparagraph and all items described in the second sentence of section 117(d). The President shall promulgate regulations in accordance with Chapter 5 of title 5 of the United states Code to carry out the requirements of this subparagraph.
>
> (C) Interim record. -- Until such regulations under subparagraphs (A) and (B) are promulgated, the administrative record shall consist of all items developed and received pursuant to current procedures for selection of the response action, including procedures for the participation of interested parties and the public. The development of an administrative record and the selection of response action under this

Act shall not include an adjudicatory hearing.

In addition, Section 117(a) and (b) provide that:

> (a) PROPOSED PLAN. -- Before adoption of any plan for remedial action to be undertaken by the President, by a State, or by any other person, under section 104, 106, 120, or 122, the President or State, as appropriate, shall take both the following actions:
>
> (1) Publish a notice and brief analysis of the proposed plan and make such plan available to the public.
>
> (2) Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the facility at issue regarding the proposed plan and regarding any proposed findings under section 121 (c)(4) (relating to cleanup standards). The President or the State shall keep a transcript of the meeting and make such transcript available to the public.
>
> The notice and analysis published under paragraph (1) shall include sufficient information as may be necessary to provide a reasonable explanation of the proposed plan and alternative proposals considered.
>
> (b) FINAL PLAN. -- Notice of the final remedial action plan adopted shall be published and the plan shall be made available to the public before commencement of any remedial action. Such final plan shall be accompanied by a discussion of any significant changes (and the reasons for such changes) in the proposed plan and a response to each of the significant comments, criticisms, and new data submitted in written or oral presentations under subsection (a).

Section 113(k)(2)(B)(ii) requires that the Navy give a reasonable opportunity to comment and provide information regarding the plan.

Section 117(a) requires that the Navy give a reasonable opportunity for submission of comments.

The Navy provided the defendants with sixty-three days to submit comments and other information regarding the proposed remedial action plan. Moreover, the Navy provided the defendants with a preliminary version of the proposed plan, known as the Proposed Remedial Action Plan, In Concept, for Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, on 7 July 1987.

Previously, from 8 August to 26 September 1985, the Navy gave the defendants and other interested parties the opportunity to submit comments and other information in response

to the Final Draft Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California (August 1985) and the Final Draft Report of the Feasibility Study of Contamination at Naval Weapons Station, Concord, California (August 1985). From 7 March to 10 April 1986, the Navy also gave the defendants and other interested parties the opportunity to submit comments and other information necessary to evaluate the (Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California. In addition, the Navy engaged in three phases of consultation with the defendants concerning its response on these parcels. Section P2, P4, and P5 of the Administrative Record record these three phases of consultation which the Navy has conducted with the defendants.

Sections 113(k)(2)(B)(iv) and 117 (b) of CERCLA require that the Navy make a response to each of the significant comments, criticisms, and new data submitted in written or oral presentation. These sections, though, do not require that responses to significant comments, criticisms, and new data be made before the selection of a final remedial action plan. These sections simply require that responses accompany a final remedial action plan.

The Navy has responded to each of the significant comments, criticisms, and new data submitted in written or oral presentations as required by Section 113(k)(d)(B)(iv) of CERCLA. The Navy carefully took into account the comments and information submitted by the defendants and other interested parties before preparing its Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California (January 1986); its (Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California (February 1986); its (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives (September 1988), and Volume III: Figures (April 1988); and its proposed remedial action plan. Moreover, the Navy gave the defendants extensive opportunities to communicate with the Navy concerning its response through the three phases of consultation described above.

This document contains the responses to each of the significant comments, criticisms, and new data submitted in written or oral presentations.

Allied-Signal Comments - 1.2 (21 November 1988):

1.2 THE ENVIRONMENTAL PROTECTION GOAL STATED BY THE NAVY.

The general environmental protection goal for

remediation established by the Navy:

> is to prevent or minimize the release or hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term. Draft Final FS, p. E.14.

With a few exceptions, this goal is fairly well stated given the requirements set forth in CERCLA and other relevant authorities.

Unfortunately, the Navy loses sight of this goal which appropriately incorporates balancing concepts for short and long term environmental and financial costs. Instead, the Navy applies different, less sophisticated standards, ones which are skewed towards the selection of a removal remedy. For example, in the Biological Assessment, the monitoring remedial action alternative is criticized on the grounds that:

> Implementation of this alternative also would leave the contaminated material in place and would affirm that the present condition is acceptable. B.A. at p 42.

This curt conclusion is a tremendous oversimplification which disregards the benefit to be obtained from leaving much of the marsh habitat undisturbed. It also reflects a bias in favor of removal remedies, regardless of associated environmental costs. Consistent application of the stated environmental protection goal would reject this type of biased analysis and would result in preservation of the existing, productive marsh habitat based on a more balanced consideration of the relevant data.

Response to Allied-Signal Comments - 1.2 (21 November 1988):

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely

impacting important wildlife habitat in the long term.[2]

(Second Revised) Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements (ARAR's) and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for Remedial Action Subsite (RASS) 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

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[2] The general environmental goal does not incorporate balancing concepts for short and long term financial costs.

Thus, the Navy has not demonstrated a "bias in favor of removal remedies, regardless of associated environmental costs", but has instead developed a rational and rigorous set of decision rules which address both the short-term and long-term potential for environmental impact. In developing the specific decision rules by which the areal extent of remediation would be determined, the Navy evaluated 18 criteria and five factors that had a bearing on the development of appropriate site specific action levels.

In fact, the Navy considered a wide range of potential remedial actions including the no action alternative, extensive monitoring, in situ treatment, and excavation. Contrary to the commenters opinion, the Navy has developed an unbiased methodology for developing and evaluating a range of remedial actions that may be appropriate to provide protection of the human health or the environment.

The Navy developed a rationale for determining the required extent of remediation that ensures that both the short term impacts of remediation and the long term impacts associated with leaving high levels of contamination in the environment are given equal weight in the evaluation process. Allied-Signal's attempt to simplify the decision making process used by the Navy, taken in conjunction with subsequent comments, indicates Allied-Signal's bias for implementing the no action alternative regardless of the environmental consequences associated with the release of hazardous substances.

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A, and 2-3A, in Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse, and California clapper rail the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A, and 2-3A, on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a Biological Opinion, which stated that:

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that

the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh on RASS 1 and RASS 2 without violating Section 7 of the Endangered Species Act.

The Fish and Wildlife Service also stated in its biological opinion that:

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.
>
> The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.
>
> The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

This opinion by the Fish and Wildlife Service indicates that, contrary to the comments of Allied-Signal, the proposed remediation is consistent with the Navy's stated goal of "preventing or minimizing the release of hazardous substances . . ." without adversely impacting important wildlife habitat in the long term. (Second Revised) Final Draft Feasibility Study Report, at page E.14.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

Allied-Signal Comments - 1.21 (21 November 1988):

1.21 THE STATED GOAL SHOULD BE AMENDED IN PART.

Allied-Signal would amend this stated goal to state more explicitly the need to evaluate alternative remedial actions on their short term impacts on both endangered species and their habitat living there as well as on their long term impacts on the habitat alone. Specifically, the Navy cannot ignore that the preferred alternative, excavation, in the short term will destroy more than 9 acres of valuable marsh habitat for the salt marsh harvest mouse ("SMHM"), an endangered species, and kill all the SMHM living there.

Before such a drastic remedy is selected, the Navy should be required to balance carefully the cost of the devastation of the habitat and taking of the mouse, which is certain to result, against the nature and gravity of the alleged threat to the mouse and its habitat from the existing contamination. The questionable ability of the Navy to return the marsh to its original state, inhabited by SMHM, within a reasonable period of time, must also be placed in the balance.

As the environmental goal is stated now, it does not adequately require consideration of the impacts associated with an excavation remedy. Nor does it adequately require the Navy to conduct the balancing process described above. These omissions skew the remedial action selection process toward a removal remedy since the most negative impacts of such a remedy are relatively short term (i.e., the mice are killed and the habitat destroyed in the first year.) The goal must be amended to more fully address these issues.

Response to Allied-Signal Comments - 1.21 (21 November 1988):

The general environmental goal for remedial action and the four specific objectives for remedial action are sufficient and should not be amended.

In the (Second Revised) Final Draft Feasibility Study Report, the Navy did "balance carefully" the short and long-term negative impacts of the proposed remedial action with the "nature and gravity" of the potential harm to the environment as identified in the Remedial Investigation. The results of the balancing included a recommendation to not actively remediate the entire area found to pose potential harm. These results were presented in the Biological Assessment prepared under consultation with the US Fish and Wildlife Service. In issuing a no-jeopardy opinion, the Service agreed with the Navy's balancing process, which did include consideration of the probability of successful restoration.

The Navy prepared a proposed remedial action plan pursuant to the authority of Sections 104, 120, and 121 of CERCLA. Section 121(a) of CERCLA provides that:

> The President shall select appropriate remedial actions determined to be carried out under Section 104 . . . which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response.

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:
>
> (A) the long-term uncertainties associated with land disposal;
>
> (B) the goals, objectives, and requirements of the Solid Waste Disposal Act;
>
> (C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;
>
> (D) short and long-term potential for adverse health effects from human exposure;
>
> (E) long-term maintenance costs;
>
> (F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and
>
> (G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.
>
> The President shall select a remedial action that is protective of human health and the environment, that is

cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

42 U.S.C. 9621(b).

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

> (d) Degree of Cleanup, - (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) provides that:

> (2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -
> (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
> (ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under

> section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.

Section 121(d)(4)(B) provides, in pertinent part; that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that
> . . .
> (B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options.

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

(Second Revised) Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial

action, the Navy identified potentially applicable or relevant and appropriate requirements (ARAR's) and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

In conducting the feasibility study and preparing the proposed remedial action plan, the Navy recognized the importance of the habitat in each remedial action subsite (RASS). Of particular concern were RASS 1 and RASS 2, which are habitat for endangered species. In conducting the feasibility study, the Navy balanced the short term impact of remediation and the long term impacts of leaving high concentrations of contaminants in the environment. For example, the Navy proposes to actively remediate, i.e., excavate and remove soil from, approximately 9.03 acres in RASS 1. On RASS 1, the Navy found that the short term impacts of active remediation on approximately 6.37 acres were unacceptably high when balanced against the long term impacts of leaving the high levels of contamination in place in this area. As a result of its balancing, the Navy proposed to leave approximately 6.37 acres on RASS 1 in which the concentrations of contaminants exceed the TTLC/STLC criteria. Approximately 20.42 acres in which statistically significant biological uptake of metals has been documented will not be

disturbed. Rather, in these areas, the Navy proposed to extensively monitor the environmental situation. The Navy proposed to undertake active remediation in these areas in the future only if necessary.

In conducting the feasibility study and preparing the proposed remedial action plan, the Navy proposed wetland restoration. Implementation of the wetland restoration plan will ensure the return of the wetland subjected to active remediation to productive habitat.

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A and 2-3A in Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse and the California clapper rail, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A and 2-3A on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion, which stated that:

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh without violating Section 7 of the Endangered Species Act.

The Fish and Wildlife Service also stated in its biological opinion that:

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.

The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.

The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

Allied-Signal Comments - 1.22 (21 November 1988):

1.22 THE NAVY DOES NOT CONSISTENTLY APPLY OR PURSUE ITS STATED GOAL.

The balancing elements of the stated environmental protection goal are often forgotten in the Navy's analysis of potential remedial action alternatives. Pursuant to the stated goal, the Navy need only take remedial action with regard to hazardous substances which are a "substantial danger" to the environment. Stated another way, the Navy need not select an aggressive, destructive remedy such as excavation where no "substantial danger" to the environment has been demonstrated.

Throughout the Revised Draft Final FS and the Draft RAP, however, the Navy's analysis leaps from the fact that certain contaminants exist on certain portions of the property in varying concentrations to the conclusion that the contaminants must be removed from the site by excavation. This leap of faith is over a chasm of missing cause and effect relationships. It also reflects an abandonment of any effort to define quantitatively what level of risk to the environment is "substantial," therefore requiring remediation.

Specifically, the Navy does not attempt to define by measurable criteria when it contends that the environment is subject to substantial danger. Absent such criteria, the Navy cannot make a clear demonstration, based on a rigorous examination of the data, that the environment, including the SMHM

and its wetland habitat, is in substantial danger from the contamination.

Allied contends that the Navy's failures are the result of the absence of any meaningful data on which the Navy could rely to support its contentions of unacceptable danger to the environment. As a result, the Navy lowers the threshold for the level of contamination requiring "active remediation" to something less than that which causes substantial danger. In so doing, the Navy abandons its sensible, balanced and stated environmental protection goal.

For example, in justifying its highest preference for excavation alternative 1-3c on RASS 1, the Navy states in the Revised Draft Final FS that:

> Removal of the contaminated soils and sediments from the RASS . . . is more reliable than the no action or environmental monitoring alternatives with respect to the elimination of the migration of metals and long term reduction of the public health and environmental risk. FS at E.25.

This justification says nothing about the need to remove the contaminants to address substantial danger to the SMHM. Rather, it speaks in the absolute terms of "eliminating" migration potential and "the long term reduction of . . . risk" to the environment. This constitutes the substitution of oversimplified removal criteria for the more balanced criteria set forth in the stated environmental protection goal. The Navy, in making this substitution, goes farther than required by law and clearly reveals its bias towards excavation remedies.

To the same effect is the Navy's justification for ranking environmental monitoring fifth among remedial alternatives:

> The soils and sediments found on RASS 1 have been contaminated with high concentrations of arsenic and heavy metals [not true as to all samples or all heavy metals]. Bioaccumulation of contaminants have been documented. Although the removal alternatives provide significantly greater protection of the public health and environment, an absolute minimal response would include implementation of an environmental monitoring program. FS at E.31.

Here, the Navy does not suggest, as Dr. O'Neil does in the

Biological Assessment, that the contaminants are affecting the population potential of the SMHM. Rather, the existence, bioaccumulation and migration of the contamination alone is apparently a sufficient basis for the Navy to prefer all excavation remedies over the monitoring alternative.

Of course, the fact that the existence, bioaccumulation and migration of the contaminants is relatively limited and does not present any substantial danger to the SMHM, or the environment generally, is not considered. Again, the authors are departing from their stated criteria for environmental protection and are demonstrating a generalized bias toward excavation remedies.

Response to Allied-Signal Comments - 1.22 (21 November 1988):

Substantial is defined at page xx of the Final Remedial Investigation Report as "a real, actual amount, not imaginary." Webster's New Collegiate Dictionary also defines substantial as "not imaginary or illusory."

The Navy has not substituted "oversimplified" removal criteria for the more balanced criteria set forth in stated environmental protection goals. Instead, the Navy identified specific objectives for remedial action which were consistent with the stated goal. The Navy then identified ARAR's and developed decision rules.

In fact, the Navy in its pursuit of its stated environmental goal consistently used measurable criteria. The Navy considered all the data available to weigh and balance short term and long term impacts of the existing contamination. The Navy relied on statistical criteria to quantitatively determine if significant differences existed. If significant differences were observed, then the potential toxicological impact of the contaminant migration was evaluated. While no widespread death of all plants and animals was observed in large areas, acute toxicity was observed in earthworms and plants exposed to soils from certain locations. The Final Remedial Investigation Report presented data to indicate that certain contaminants were migrating from the soil into surface water and into plants, earthworms, and clams. Additional studies of captured mice and voles indicated substantial bioaccumulation of certain contaminants. In addition, the numbers of soil invertebrates were substantially reduced in the contaminated area of RASS 1. While the exact cause of an effect may be difficult to determine, it is clear that certain effects were observed in specific locations in the RASS's. The effects included death of earthworms and plants, reduced numbers of soil invertebrates, bioaccumulation of certain contaminants in earthworms and clams, in specific locations in the RASS's and that these effects correlated with the presence of contaminants. These effects create potential harm to wildlife associated with the sites. Contaminants have also been shown to

be migrating from the soil into food items eaten by other organisms such as small mammals. This substantial migration also represents potential harm to the environment. Protection of the environment can be achieved by reducing the migration of contaminants through the removal and subsequent elimination of the source of the contaminant migration.

Sufficient data have been collected to indicate that a potential threat to wildlife resulted and continues to result from the contamination in specific locations. These locations are the areas proposed for remediation. The Navy was not biased toward the excavation alternative. Excavation is a reliable alternative that eliminates any potential migration of contaminants into the environment. The no action and monitoring alternatives do nothing to prevent the continued migration of contaminants into the environment.

Allied-Signal Comments - 1.23 (21 November 1988):

1.23 THE NAVY FAILS TO DEMONSTRATE THAT THE SMHM IS SUBJECT TO ANY SUBSTANTIAL DANGER REQUIRING ACTIVE REMEDIATION.

Allied contends that because the SMHM is an endangered species, the Navy cannot select a removal remedy in the marsh on RASS 1 unless it can show that the SMHM living in the area to be excavated are in substantial danger at this time. It is not enough to show that earthworms (which SMHM do not eat, see B.A. at pp. 22, B.1.) are bioaccumulating arsenic or that plant growth appears to be stunted in some locations (which has not been proven to be caused by contamination. See, B.A. p. 38.)

The prohibitions against the taking of endangered species set forth in the Endangered Species Act ("ESA") and the Cal. Fish & Game Code are ARARs which must be met. Secondary factors such as earthworm bioaccumulation and variable plant vitality (which are not ARARs) are only relevant to the extent they reflect a need for heightened concern about the effect of the contamination on the well-being of the SMHM.

The issue of whether the SMHM is in substantial danger at this time is not fully addressed in either the Revised Draft Final FS or the Draft Final RAP. Instead, this is the issue which lies at the heart of the Biological Assessment. The FS and RAP essentially incorporate and rely upon the "findings" alleged in the latter document to support the conclusion that at least some of the soil contamination in the marsh on RASS 1, about 10 acres, must be excavated. Close examination of the Biological Assessment, however, reveals that this reliance is unjustified.

Summarizing our comments on the Biological Assessment, which appear more fully in Part III of these comments, we contend

that although contamination in varying degrees has been demonstrated to exist on parts of RASS 1, allegations that this contamination presents substantial danger to the SMHM is based more on speculation than convincing evidence of cause and effect relationships.

Our criticism of the Biological Assessment is primarily based upon the very same evidence relied upon by the Navy to justify the destruction of the wetland and the SMHM. The evidence to which we refer is the data and observations reported by Harvey & Stanley and its sub-contractors, SRI International and California Analytical Laboratories, Inc. That evidence largely contradicts the Navy's conclusions.

After examining more than 36 mice and 13 voles taken from RASS 1 and RASS 2, SRI International concluded that:

> [n]o toxin-related gross findings were detected at necropsy. Histopathologically, various parasitic or inflammatory condition were encountered in [some of] the animals. However, none of these were deemed to be the result of exposure to toxic contaminants at the capture sites. (SRI International, July 1986.)

Thus, the contamination, which the Navy alleges has been onsite for at least 18 years, has had no demonstrable negative impact on the rodent inhabitants of that property. Therefore, there is little basis for suggesting that the contamination presents substantial danger to the SMHM or that an excavation remedy, which will certainly have a severe negative impact on resident rodent populations, is justified.

The justification given by the Navy for preferring excavation in areas having dense vegetative cover and resident SMHM populations is based on speculation and the bias of the investigators, not on the facts. This is apparent from the following key section of the Biological Assessment, written by Dr. L. Jean O'Neil:

> The nature of cumulative impacts from chronic exposure to contaminants is also a major concern. Unfortunately, most of the questions raised in Horak, Vlachos and Cline (1983) for addressing cumulative impacts of an action cannot be answered (especially for endangered species) <u>because of a lack of data</u>, e.g., what functional changes may occur in the community of small mammals with continued contamination. However, from an evaluation of habitat conditions, contaminant

> levels and bioavailability, and histopathology, it is clear that there are several factors acting to impose stress on the residents of RASS 1 and 2. This keeps them from reaching full reproductive potential and maximum population numbers. B.A. at p. 44. (Emphasis added.)

Dr. O'Neil's conclusions regarding the effect of the contamination on mouse populations are speculative, not proven. Moreover, Allied-Signal asserts they cannot be proven, particularly not with the data on which Dr. O'Neil apparently relied.

First, she admits to a lack of data on the exact issue she addresses, how exposure to contaminants may affect resident rodent populations. Thus, she cannot effectively rely on the authority of prior scientific studies regarding the effects of bioaccumulation of metals on animal populations since it is unclear how comparable the baseline conditions are in the prior studies with the conditions here. Nevertheless, she recites a few categories of data which she contends, but does not demonstrate, are "clearly" acting to impose "stress" on the SMHM. This conclusion is not based on any observed effects. Rather, it is speculation on the part of Dr. O'Neil.

Building on this speculative conclusion, again without reference to supporting data or other scientifically accepted authority, Dr. O'Neil further speculates that this "stress" is limiting the SMHM from reaching its full reproductive potential and maximum population numbers (without reference to any quantitative figures). This speculation upon speculation, however, does not withstand close scrutiny. The available evidence contradicts Dr. O'Neil's conclusions.

The SRI International histopathological findings in no uncertain terms reflect the conclusion that the contamination had caused no ill effects to the numerous mice and voles examined. Nor is there any suggestion by the authors of that report that they observed or expected any sub-lethal effects such as those suggested by Dr. O'Neil. Surprisingly, while Dr. O'Neil was quoted in the October 14, 1988 San Francisco Chronicle as acknowledging that none of the test animals had "suffered any ill effects" from increased metal levels in their tissues, Dr. O'Neil barely makes mention of this highly significant finding in the Biological Assessment.

Addressing the data which is relied on by Dr. O'Neil, we consider first the impliedly adverse "habitat conditions" being endured by the SMHM. With the exception of the few bare areas, which are not necessarily bare due to contamination, and some other small areas, most wetland ecologists walking over RASS

1 would conclude that it is a normally functioning wetland. Additionally, a number of mice were trapped on or near bare spots. The Navy's preferred excavation remedial alternative is not limited to such areas. Thus, other data cited by Dr. O'Neil must also be reviewed. Rodent trappings indicate active rodent populations are supported by the habitat. Thus, if the mice are subject to any "stress," it is not at all clear that it is having the effect on mouse populations which Dr. O'Neil suggests.

In short, the Biological Assessment relies on speculation by its author, unsupported by relevant data and contradicted in part by that same data, to demonstrate that the SMHM is in substantial danger as a result of the contamination. Speculation, however, cannot replace demonstrative proof of substantial danger to the resident rodent populations. We object to Dr. O'Neil's speculation which, because of its incorporation into the FS and RAP, improperly skews the remedial action selection process toward removal alternatives. Ironically, it is precisely that alternative which indisputably presents the clearest and most substantial danger to the mice since it will result in the death of all mice now living within the area designated for active remediation.

Response to Allied-Signal Comments - 1.23 (21 November 1988):

Contrary to the contention of defendant Allied, the Navy can select a remedial action plan which requires that soil contaminated with hazardous substances be excavated and removed from the marsh on RASS 1.

Section 121(b)(1) of CERCLA, which sets forth general rules for cleanup standards, requires that the Navy select a remedial action that is protective of the environment.

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

(Second Revised) Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three,

minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

Both the general environmental goal and the four primary specific objectives for remedial action address protection of the environment, which is by definition broader than not taking an action which jeopardizes the continued existence of endangered species. As stated in the Final Remedial Investigation Report and the (Second Revised) Final Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume II: Biological Assessment, many species of invertebrate and vertebrate animals comprise the environment and use the resources of Naval Weapons Station, Concord. State regulatory agencies expressed their concerns with contamination of surface water, ground water, and soils.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A and 2-3A in Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse and California clapper rail, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A and 2-3A on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a Biological Opinion, which stated that:

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh on RASS 1 without violating Section 7 of the Endangered Species Act.

The Fish and Wildlife Service also stated in its biological opinion that:

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.
>
> The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of

take in terms of habitat loss.

The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or

Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act provided that such taking complies with the conditions included in such statement.

Allied's comments about the Navy's bias towards removal remedies and the findings in the Final Biological Assessment Report reflect a lack of knowledge of the consultation which the Navy had to conduct with the Fish and Wildlife Service under Section 7 of the Endangered Species Act. The purpose of the Final Biological Assessment Report, which the Navy completed in the course of consultation, is to "evaluate the potential effects of the action on listed and proposed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action . . . . " The action evaluated in the Final Biological Assessment Report was the proposed remedial action.

Nine (9) acres, rather than ten (10), is the approximate number of acres the Navy proposed for excavation.

Allied-Signal raises the issue of whether the SMHM is in substantial danger at the present time. While quantification of this issue is an admirable goal, the state of the art has not developed to the point to allow this quantification to be accomplished under the conditions at this site. If a large number of dead SMHM were observed on site, this might be sufficient to quantify a substantial danger exists. Tissue analysis can give some indication of potential perturbations in metabolism. Other stress to the SMHM that is of sufficient danger to its well-being cannot be quantified at this time. Allied-Signal apparently agrees that the bioaccumulation data and the death of plants and earthworms in RASS 1 should heighten concern for the well-being of the SMHM. Moreover, these data independent of data on the SMHM are sufficient to require remediation to eliminate this situation. Consequently, the Navy chose to require remediation whenever there was a real potential danger to the SMHM and other wildlife associated with the site. Removal of the source of contamination was believed to be in the best interest of the SMHM and the other wildlife on site.

The SR International analysis did show some type of gross change in 12 animals from RASS 1 and 2 and in 2 animals

from the Reference Area, a ratio of 6:1 which is considerably higher than the 1.5:1 ratio of animals examined (30 and 19, RASS 1 and 2 versus Reference Area, respectively). This ratio, combined with the statistical differences in bioaccumulation and with the presence of extremely high levels of contaminants in selected individuals, does show the potential for harm to small mammals on site. Incidentally, the number of mice and voles examined was exactly 36 and 13, not more than.

Again, the Final Biological Assessment Report was not to justify the proposed remedial action. No reply is needed here on the availability of data because the Biological Assessment was very clear on that point. It was also very clear on the multiplicity of factors that went into the decision in the Feasibility Study which resulted in the proposed remedial action.

Allied states that the wetland appears to be a normally functioning wetland, except for a few barren areas and some other small areas. Everyone can agree that there is some type of wetland on RASS 1.

On the surface, much of RASS 1 is well vegetated and wildlife is present. But most of the functional aspects of a wetland are not visible to the unaided eye. The secretive vertebrate residents, the small invertebrates, the macrophytes, and the microorganisms combine to form the system whose surface we see. That is why the degraded appearance of the habitat is only one criterion used in the feasibility study to select a proposed remedy for the contamination.

Active remediation is proposed only for that portion of the wetland that meets the appropriate decision criteria and includes those areas identified by Allied-Signal.

In summary, the Navy prepared the Final Biological Assessment Report to provide a basis for the Fish and Wildlife Service to prepare a Biological Opinion concerning whether the proposed remedial aciton plan would jeopardize the continued existence of the salt marsh harvest mouse and the clapper rail. The proposed remedial action plan was developed during the feasibility study, prior to the preparation of the Final Biological Assessment Report. Preparation of the Final Biological Assessment Report and the (Second Revised) Final Draft Feasibility Study Report were coordinated; the Final Biological Assessment Report could not be prepared until the (Second Revised) Final Draft Feasibility Study Report was prepared. Upon examining the Final Remedial Investigation Report, the Final Feasibility Study Report, the Final Biological Assessment Report, and other data, including the analyses from SR International, the Fish and Wildlife Service issued its Biological Opinion. The opinion clearly differed from the opinion of Allied-Signal as to which situation presents the "clearest and most substantial

danger" to endangered species.

Allied-Signal Comments - 1.3 (21 November 1988):

1.3 THE CONTAMINATION DOES NOT PRESENT ANY DANGER TO THE PUBLIC HEALTH.

Although protection of the public health is part of the environmental protection goal stated by the Navy, the Navy need not overly concern itself with protection of the public's health in selecting its remedial action here. The data presented does not demonstrate that there is any migration pathway by which the contamination could result in any significant exposure to humans. There are a number of reasons which justify this conclusion.

First, the areas which are alleged to be contaminated were condemned by the government as part of its program to maintain a "explosive quantity--distance separation" arc around the Concord Naval Weapons Station. This arc is designed to prevent human habitation or development within any area which may be subject to destruction in the unlikely event of a disastrous explosion at the Weapons Station. Accordingly, since the sites have been fenced off from public access and because the Navy assiduously guards these properties and prevents unwarranted trespassers from entering, the likelihood of human exposure to any contaminants in the soils on these properties is highly unlikely. The Navy understates this situation:

> The potential for direct [human] contact is reduced somewhat by the isolated locations of several of the sites and land use controls implemented by the Navy. Revised Draft Final FS at p. 3.12.

Second, the nature of the contamination does not lend itself to easy mobility. For the most part, the contamination consists of heavy metals found in parts per million above the normal levels found in such soils. Much of the soil is of a wetland nature which is not subject to airborne mobility. Because there is little or no human habitation at or near the relevant property, it is unlikely that such limited contamination could mobilize by any means to cover the distance between the properties and the nearest residential development.

Third, the Navy itself has stated that it does not believe that there is any threat to public health raised by the alleged contamination. For example, at the public hearing held October 12, 1988, Dr. Charles R. Lee stated:

> "We also considered the exposure of humans to dust on these particular areas and concluded that there was no public threat due to dust

off the station." Hearing Trans. at p. 12.

Similarly, Navy lawyer J. Martin Robertson is quoted in the October 14, 1988 San Francisco Chronicle as saying that "[t]he contaminated soil poses no threat to people...."

There is no other factual data set forth in either the feasibility study or the remedial investigation which would otherwise support the conclusion that there is a threat to the public health from this contamination. See also Revised Draft Final FS at p. 3.33 ("[wind transport] is limited by the presence of sheltering vegetation, the cohesion of the sediment, and wetting due to high water table.")

Accordingly, the repeated references in the Revised Draft Final FS to the need to select a remedy which will protect public health are unnecessary. The contamination does not represent any significant threat to the public health. Thus, the make-weight references to such a threat should be deleted so as not to deemphasize the relevant issues.

Response to Allied-Signal Comments - 1.3 (21 November 1988):

Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, are within the inhabited building quantity distance safety arcs which the station established around operational facilities on the station. Human use of these parcels by station personnel and other persons is controlled, but human use is not prohibited. Some of these parcels have been used for agricultural purposes in the past. The use of the land may be altered in the future.

The Navy agrees that restrictions on public access to the contaminated areas reduce the danger to human health. However, Navy personnel require access to the site on various occasions and are exposed to the contamination. In addition, personnel controlling mosquitos and trespassers will be exposed to the contamination. The presence of the contamination will severely limit any future use of the site for anything other than a buffer zone. Remediation of the contamination will remove any danger or potential danger to human health presently existing.

Allied-Signal likewise understates the situation regarding the level of contamination observed on site. Not only parts per million of metals above normal soil levels, but rather thousands of parts per million above normal levels were found.

Dr. Lee did state that there appeared to be no public threat from dust off the station. That statement means that the threat of dust leaving the contaminated area and blowing off station and reaching the general public was insignificant. This does not mean that someone walking across the contaminated area,

especially the barren areas, would not be in danger of exposure to contaminated dust. The wind commonly gusts across the site. Fugitive dust has been observed on a number of occasions when the wind blows around the kiln debris and when someone walks across the barren areas. Standard procedures during sampling activities have been to walk around the barren areas and to always walk where there was vegetative cover during windy periods.

For the above reasons, the Navy disagrees with the commenter's statement that "the contamination does not represent any significant threat to the public health."

Allied-Signal Comments - 1.4 (21 November 1988):

1.4 THERE IS NO JUSTIFICATION FOR EXPANDING THE RASS'S TO ADMITTEDLY UNCONTAMINATED AREAS.

The Draft Final FS identifies new boundaries for the four RASS's. The area covered now is significantly greater due to the Navy's creation of a 3-tiered remedial action structure. Previously, the RASS's were defined by reference to areas where contamination had been located. Such contamination was either excavated and disposed of offsite, or monitored. Uncontaminated areas, such as Parcel 571, were not deemed to be in need of remediation and therefore were not included in any RASS.

Now, however, the Navy does not limit its proposed remedial action to contaminated areas. Instead, with respect to "contaminated" areas, the Navy plans either to actively remediate the area through excavation or to passively remediate the area through intensive monitoring, to be followed by excavation if necessary. The remainder of the property, whether contaminated or not, is to be subjected to monitoring. This is justified by the Navy on the grounds that migration of contaminants may result in the contamination of additional properties. This unbridled expansion of the RASS boundaries is unjustified. The RASS boundaries should be returned to only those areas where contamination has been demonstrated.

One reason for limiting RASS areas to areas of known contamination is that continued disturbance and interruption of the natural marsh ecology by persons conducting monitoring damages that ecology. Thus, in the absence of any demonstrated contamination, there is no reason why this critical marsh habitat should be subjected to such continuing intrusion.

Moreover, to the extent that the contaminated areas will be intensely monitored, there is no objective reason to believe that the uncontaminated areas will be subjected to any unreasonable risks from migrating contaminants without the parties first being able to correct the problem. Finally, the costs of monitoring the acreage added to the RASS's by the Navy

(263.37 acres) are not justified by the limited benefits which might be gained.

Response to Allied-Signal Comments - 1.4 (21 November 1988):

Previous comments by defendants in United States v. Allied-Signal Chemical Corp., et al., Civil No. C-83-5898 FMS (N.D. Calif.), and United States v. Chemical & Pigment Company, Civil No. C-83-5896 FMS (N.D. Calif.) suggested that the contaminated areas be separated into four remedial action subsites, i.e., RASS's in order to evaluate alternatives specific for each area. Each RASS contains the area of potential impact due to migration of contaminants from observed areas of contamination within the RASS. In this way, the contaminated area can receive active remediation, if required, or can be passively remediated, if required. The rest of the RASS that is not contaminated should receive a low level of monitoring to insure that the contamination has not spread further into the environment because of active remediation activities or through migration from passively remediated areas, or through new contamination.

Monitoring can be considered as a form of insurance. As the (Second Revised) Final Draft Feasibility Study Report states on page 3-83, "Passive remediation is designed to identify problems and trigger active remediation activities if necessary. The "if necessary" statement includes situations in which responsible parties delay actions to prevent the migration of contaminants. The Navy hopes that additional remedial action will not be necessary, but will need the results of monitoring to meet its responsibilities. The Navy disagrees that the costs of monitoring are not justified by the benefits to be obtained.

Passive remediation sampling will not cause disruption of the sensitive habitat. Care will be taken during any sampling conducted.

Allied-Signal Comments - 1.5 (21 November 1988):

> 1.5 THOUGH THE NAVY JUSTIFIES EXCAVATION ON RASS 1 BY REFERENCE TO HEAVY METAL BIOACCUMULATION IN MICE, ARSENIC DRIVES THE ACTIVE REMEDIATION AREA.

In discussing the decision rules for RASS 1, the Navy states in drawing the demarcation lines for active remediation:

> Of particular importance was the animal bioaccumulation data, which indicated the accumulation of significant body burdens of cadmium, lead, and selenium. FS p. 3.86-3.87.

Presumably this references the findings set forth in the

Biological Assessment regarding bioaccumulation of these metals in the tissue of a few of the mice and voles trapped, killed and analyzed by the Navy's consultants. Even assuming that this evidence of bioaccumulation of metals raised sufficient concern to justify active remedial action to remove the metals from the marsh on RASS 1, the decision rules established by the Navy for active remediation on RASS 1 have no relationship to this concern.

Specifically, the decision rules developed by the Navy provide for active remediation of those areas on which the soil metal content exceeds the TTLC/STLC criteria, modified in certain respects. In reviewing the sample analysis data, however, one finds that the boundary of the area designated for active remediation on RASS 1 by the Navy is defined not by samples where lead, cadmium or selenium exceed TTLC/STLC values, but samples where arsenic levels exceed those values. Selenium and cadmium were not found to be present on RASS 1 in any concentrations which might be of concern. As stated by the Navy in the Draft Final FS, "RASS 1 has extensive arsenic contamination and localized lead and copper contamination." FS p. E.8. The lead contamination referred to consists of only a two samples which exceeded TTLC values, and only one sample which exceeded the relevant STLC value.

Arsenic, despite its presence in the wetland habitat, does not present substantial danger to the SMHM living there. This fact was addressed in the Biological Assessment as follows:

> Results of clam bioassays showed movement of biologically available arsenic. While this has no direct effect on the species discussed in this document [SMHM], it does indicate potential bioaccumulation of contaminants migrating from the sites through a surface water. Arsenic was found in tissue analysis of the mice and voles, although the values were not at levels significantly higher than levels on the Referenced Area. B.A. at p. 35. (Emphasis added.)

There is no further discussion in the Biological Assessment which suggests that arsenic needs to be removed by excavation to protect the SMHM.

In summary, the area identified by the Navy for active remediation is driven by the presence of arsenic in excess of TTLC/STLC values. The Navy's justification for conducting this excavation at the cost of the wetland habitat which will be excavated and the endangered species that will be killed is that the habitat and endangered species are presently being "stressed" as a result of exposure to selenium, cadmium and lead. Clearly,

the justification asserted is unrelated to the remedial action being proposed. Absent this relationship, the proposal for active remediation on RASS 1 is unjustified.

Response to Allied-Signal Comments - 1.5 (21 November 1988):

The insertion in brackets of "SMHM" in the quote from the Biological Assessment is misleading. The Assessment was prepared for other species besides the salt marsh harvest mouse. Additionally, the continued emphasis placed on that one species by the commenters is inappropriate and does not reflect the decision-making process followed by the Navy.

The decision rule for RASS 1 considers data and information other than just TTLC/STLC arsenic values and is described in detail on page 3.86 of (Second Revised) Final Draft Feasibility Study Report. The data and information evaluated included soil metal analyses, plant and animal bioaccumulation, soil invertebrate abundance and diversity, plant and animal mortality, topographic and hydrologic characteristics, extent of barren areas, and extent of degraded habitat. It so happened that the TTLC/STLC criteria corresponded to the same area where the above data indicated remedial action was required. The most striking data were the substantial reduction in abundance of soil invertebrates observed in RASS 1 compared to the reference areas and the death of plants and earthworms observed in bioassay tests on soil samples from RASS 1. In addition, bioaccumulation data for plants, earthworms, mice and voles indicate migration of contaminants into foodchains associated with RASS 1. Consequently, foodchain contamination will result in more stress to wildlife, especially endangered species, than if no foodchain contamination was present. Active remediation is proposed only for this highly contaminated area. The remainder of the contaminated area will be passively remediated and monitored.

Allied-Signal Comments - 1.6 (21 November 1988):

1.6 THE NAVY IMPROPERLY APPLIES CERCLA SECTION 121(D) WHICH ESTABLISHES THE NECESSARY DEGREE OF CLEANUP.

At a minimum, at every site at which a CERCLA remedial action is to be selected, the action selected must attain a degree of cleanup of contaminants "which assures protection of human health and environment." CERCLA § 121(d)(1). In § 1.3 of these comments, we demonstrated why this site does not present any threat to human health. Thus, at this site, the Navy's legal duty under CERCLA § 121(d)(1) is to select a remedy which assures protection of the environment.

In the abstract, without reference to any statutory or regulatory standards pertaining to environmental protection, this environmental protection duty may seem rather vague. However,

Congress did not leave lead agencies without guidance. First, CERCLA provided that the Environmental Protection Agency ("EPA") would draft a National Contingency Plan ("NCP") to provide guidance to agencies overseeing CERCLA remedy selections. Second, Congress provided that if any contaminants are to remain onsite after the cleanup, as is necessarily the case here since heavy metals are naturally occurring, that legally applicable or relevant and appropriate standards (ARARs") must be attained. CERCLA § 121(d)(2).

The Navy has given recognition to the applicability of both sources of guidance to its remedial action selection process in this matter. See Rev. Draft Final FS at pp.3.36-3.37. In fact, the Navy properly attempted to state its environmental protection goal (discussed at § 1.2 supra) based upon this guidance. In its stated goal, the Navy properly incorporated balancing concepts designed to take into account the potential benefits of alternative remedial actions as well as their potential costs, both environmental and monetary. This is in harmony with the requirements of CERCLA § 121(d)(2) and the NCP.

However, apparently because the Navy and/or its consultants approached the remedy selection process with a pre-existing bias towards excavation remedies, the Navy, in the Revised Draft Final FS, fails to fully meet its stated goal and fails to follow the guidance provided to it in the form of the requirements set forth in CERCLA § 121(d)(2) and the NCP. Instead, the Navy abandons its stated goal and uses the Revised Draft Final FS to "select" requirements of CERCLA § 121(d)(2) and the NCP which justify the three tier remedial action which the Navy and its consultants collectively reached through their "application of professional judgment." See Revised Draft Final FS at p.3.86. This approach is both illegal and an ineffectual means of selecting a remedy which best fulfills the Navy's duty to protect the environment.

Though the Navy has to some extent renounced its earlier "meat cleaver" approach to remediation of contamination by excavation, in part due to defendants' comments (see Revised Draft Final FS at p. 2.25-2.26), the Navy continues to think of excavation as its general remedy of preference. It is this mind set which leads the Navy and its consultants awry. It led to the following statement:

> Recognizing the lack of definitive criteria for cleanup of contaminated soils, the importance of existing habitat, the desirability of minimizing environmental disruption during the potential remediation process, and the qualitative nature of many environmental evaluations, relevant and appropriate criteria were selected that would

> result in sufficient environmental cleanup while minimizing short term impacts. This process is especially important for RASS's 1 and 2 because of the presence of endangered species on these subsites. This was accomplished by dividing each subsite into zones of active remediation, passive remediation and monitoring. Revised Draft Final FS at pp 3.82-3.83 (emphasis added.)

The essence of the Navy's remedial action selection process is very well described in this passage.

The most salient points regarding that passage are these:

1. The Navy recognizes that there are no requirements applicable by law to the cleanup of soil contaminated with heavy metals;

2. The Navy does not understand that if a requirement is relevant and appropriate, it simply applies. ARARs cannot be "selected" by the Navy.

3. The Navy correctly understands the importance of the potential negative impacts which excavation remedies can have on the environment, particularly with regard to endangered species. But the Navy does not understand how it properly may avoid implementing ARARs requiring inappropriate remedies. Such ARARs must be waived pursuant to a finding under CERCLA [121(4)(B) that "compliance with [the ARAR] at that facility will result in greater risk to...the environment than alternative options" or one of the other waiver provisions.

4. The Navy confuses its goal of environmental protection with "sufficient environmental cleanup" (ie: excavation.) This is the Navy's bias toward excavation remedies in action.

5. In unilaterally deciding upon a three tiered remedial action based upon the exercise of "professional judgment" (see Revised Draft Final FS at p.3.86), the Navy effectively reverses the CERCLA remedy selection process by naming its preferred remedy and then selecting ARARs which purport to justify it.

In contrast with the Navy's end-run of the statute, Allied-Signal contends that a proper application of the CERCLA process, keeping the environmental protection goal in mind,

results in the selection of a remedy which better meets that goal.

The first step in the CERCLA remedial action selection process, after identification of the environmental protection goal, is the identification of applicable or relevant and appropriate requirements. The requirements for identifying and applying ARARs are set forth in CERCLA § 121(d)(2)(A).

Response to Allied-Signal Comments - 1.6 (21 November 1988):

The Department of the Navy prepared a proposed remedial action plan pursuant to the authority of Sections 104, 120, and 121 of CERCLA, which the President delegated to the Secretary of Defense and which the Secretary of Defense in turn delegated to the Secretary of the Navy.

By Executive Order 12,580, the President delegated the functions with respect to the release, and the threat of release, of hazardous substances on facilities under the jurisdiction, custody, or control of the Department of the Navy, vested in the President by Sections 104(a), (b), and (c)(4); 113(k); 117(a) and (c); 119; and 121 of CERCLA to the Secretary of Defense. Executive Order 12.580, Section 2(d). The President, however, required that such functions be exercised consistent with the requirements of Section 120 of CERCLA.

Section 104(a) of CERCLA, as amended, provides that:

> Whenever (A) any hazardous substance is released or there is a substantial threat of such a release into the environment, or (B) there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare, the President is authorized to act, consistent with the national contingency plan, to remove or arrange for the removal of, and provide for remedial action relating to such hazardous substance, pollutant, or contaminant at any time (including its removal from any contaminated natural resource), or take any other response measure consistent with the national contingency plan which the President deems necessary to protect the public health or welfare or the environment.

Section 121(a) of CERCLA provides that:

> The President shall select appropriate remedial actions determined to be carried out under Section 104 . . . which are in accordance with this section and, to the extent practicable, the national contingency plan, and

which provide for cost-effective response.

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:
>
> (A) the long-term uncertainties associated with land disposal;
>
> (B) the goals, objectives, and requirements of the Solid Waste Disposal Act;
>
> (C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;
>
> (D) short and long-term potential for adverse health effects from human exposure;
>
> (E) long-term maintenance costs;
>
> (F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and
>
> (G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.
>
> The President shall select a remedial action that is protective of human health and the environment, that is cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

42 U.S.C. 9621(b).

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

> (d) Degree of Cleanup, - (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) provides that:

> (2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -
> (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
> (ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality

> criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.

Section 121(d)(4)(B) of CERCLA provides, in pertinent part; that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that
> . . .
> (B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options.

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [c]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

(Second Revised) Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord which it concluded are contaminated with hazardous substances.

In the Interim Guidance on Compliance with Applicable

or Relevant and Appropriate Requirements which it issued on 9 July 1987, the Environmental Protection Agency provided that:

> Applicable requirements means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.
>
> "Applicability" implies that the remedial action or the circumstances at the site satisfy all of the jurisdictional prerequisites of a requirement. For example, the minimum technology requirement for landfills under RCRA would apply if a new hazardous waste landfill unit (or an expansion of an existing unit) were to be built on a CERCLA site.
>
> Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.
>
> The relevance and appropriateness of a requirement can by judged by comparing a number of factors, including the characteristics of the remedial action, the hazardous substances in question, or the physical circumstances of the site, with those addressed in the requirement. It is also helpful to look at the objective and origin of the requirement. For example, while RCRA regulations are not applicable to closing undisturbed hazardous waste in place, the RCRA regulation for closure by capping may be deemed relevant and appropriate.
>
> A requirement that is judged to be relevant and appropriate must be complied with to the same degree as if it were applicable. However, there is more discretion in this determination: it is possible for only part of a requirement to be considered relevant and appropriate, the rest being dismissed if judged not to be relevant and appropriate in a given case.
>
> Non-promulgated advisories or guidance documents

> issued by Federal or State governments do not have the status of potential ARARs. However, as described below, they may be considered in determining the necessary level of cleanup for protection of health or environment.

Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements, Environmental Protection Agency (9 July 1987), at 2-3.

Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.[3]

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release,

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[3] The Defendant Allied contended that "ARAR's cannot be 'selected' by the Navy." In so contending, Defendant Allied apparently refers to the Navy's use of the term "selected" for the term "identified" in the (Second Revised) Final Draft Report of Feasibility Study of Contamination remediation at Naval Weapons Station, Concord, California (September 1988), at 7.125. The Navy stated:

> USEPA (1987) [referring to the EPA guidance] provides general guidance in the selection of ARAR's. A brief Summary of the potential ARAR's was presented in Section 3.3.1. The final selection of ARAR's is site specific. The major ARAR's selected for application to the potential remedial action subsites at NWS Concord are discussed below. This analysis is limited to the statutory ARAR's. It is presumed that all regulations, criteria, advisories, and guidance issued pursuant to these statutory requirements are implicitly included as ARAR's under the selected statutory ARAR. ARAR's identified to date are discussed briefly below.

The Navy actually identified, rather than selected, ARAR's. Item 2 of the Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California, reflects that.

and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

The Navy considered a variety of alternative remedial actions, ranging from the no action alternative to excavation of an extensive area. In its response the Navy has not demonstrated a bias towards excavation as a "preselected approach." In fact, the 3-tiered approach to which Allied-Signal objects is a rational and effective approach to the determination of both the appropriate remedy and the areal extent of the remedy. The 3-tiered approach was implemented in response to previous comments and allowed balancing of the long term benefits with the short term impacts of remediation. Implementation of the 3-tiered approach allowed the development of remedial action alternatives that are consistent with the requirements of CERCLA and the NCP, as well as other implementing guidance. Indeed, implementation of the 3-tiered approach allowed the Navy to avoid the "meat cleaver" approach to which Allied-Signal referred.

The Navy agrees that use of the word "cleanup" presents a perception that implementation of an active remedial action alternative was a primary concern. However, the Navy believes that "cleanup" as used here should be given the broadest possible interpretation so as to include the no action alternative and extensive monitoring. Upon review, a more appropriate word is "response."

Allied-Signal Comments - 1.61 (21 November 1988):

1.61 DESIGNATION AND APPLICATION OF ARAR'S.

In the Revised Draft Final FS, the Navy almost goes the distance in complying with the ARAR requirements of CERCLA § 121(d)(2). In some respects, such as in the identification of potential ARARs, the Navy and its consultants do an adequate job. However, elsewhere, as partially noted above, the Navy wholly fails to comply with either the letter or the spirit of CERCLA § 121(d)(2)(A).

In this section, we review the potential ARARs of most

importance and present a critical analysis of whether they have been properly identified as ARARs and, if so, whether the Navy has been objective in determining whether the alternative remedial options attain the applicable requirements.

First, we note that Tables 7.14, 7.16, 7.18 and 7.20, which purport to summarize the ARARs relevant to the 4 RASS's respectively, are identical. This is not remarkable except for the fact that RASS 4 has not been identified as habitat for any endangered species, thus rendering the Endangered Species Act ("ESA") irrelevant to any remedies being considered for that site. Since the Navy does not apply the requirements of the ESA ARAR to the remedial alternatives considered for RASS 4, we suspect that its listing as an "applicable" ARAR for RASS 4 on Table 7.20 is an unintentional oversight.

Second, as we mentioned before, and as the Navy recognizes, there are no "applicable" requirements pertaining to heavy metal or arsenic soil contamination. This means that a requirement must be found to be "relevant and appropriate" to be of concern here. There is a meaningful difference between requirements which are legally "applicable" and those which are only "relevant and appropriate." The EPA's Interim Guidance on Compliance With Applicable or Relevant and Appropriate Requirements (1987) states that:

> A requirement that is adjudged to be relevant and appropriate must be complied with to the same degree as if it were applicable. However, there is more discretion in this determination: it is possible for only <u>part</u> of a requirement to be considered relevant and appropriate, the rest being dismissed if not judged not to be relevant and appropriate in a given case.

Thus, in reviewing the requirements of any given statute or regulations promulgated pursuant thereto, a lead agency need not decide that all of the requirements set forth in the regulatory program are ARARs. It may conclude that only portions are relevant to the particular facts associated with their site. Given these ground rules, we now review the most significant potential ARARs.

<u>Response to Allied-Signal Comments - 1.61 (21 November 1988)</u>:

Table 7.20 of the (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California should be modified to indicate that Sections 7 and 9 of the Endangered Species Act are not applicable requirements for RASS 4. An unintentional oversight resulted in this inclusion in Table 7.20 in the report.

Allied-Signal Comments - 1.611 (21 November 1988):

1.611 FEDERAL CLEAN WATER ACT ("FCWA") § 402.

We do not believe that FCWA § 402 contains relevant and appropriate standards applicable to this site. FCWA § 402 controls discharges of pollutants from point sources to navigable waters of the United States. It is not applicable here because the contaminants in the soils are not a measurable point source for the discharge of pollutants and because any contaminants which may have migrated via surface water runoff have not been shown to have reached Suisun Bay, the closest navigable waterway. See Revised Draft Final FS at p. 3.22.

FCWA § 402 contemplates a wastewater discharge point which can be monitored to evaluate compliance with permit conditions. The permit conditions are not necessarily based on the national ambient water quality criteria set forth in the implementing regulations. They can be based on the pre-existing quality of the receiving waters and the nature and amount of the wastewater being discharged. Here, there is no discharge point which can be uniformly monitored for compliance. Nor are there any permit conditions which have been established on the basis of pre-existing water quality. Thus, there is no means to indicate when a "violation" has occurred. The framework of FCWA § 402 seems of little relevance to this matter and its application would not appear to be appropriate.

Moreover, the Navy has concluded that:

> "clam bioaccumulation data do not indicate that the water quality of Suisun Bay has been adversely impacted [by the contamination], even after flood conditions in the winter of 1986." FS at E.10.

Thus, the policy behind the FCWA, to prevent the degradation of navigable waters, is of limited relevance. In summary, we believe that FCWA § 402 should be discarded as a potential ARAR.

Also, the surface water quality data collected by the Navy does not lend itself to a proper comparison with the water quality criteria at issue. Specifically, as the Navy has noted:

> [T]hese data are all based on total acid extractable measurements, rather than dissolved measurements, [so] they may overestimate the actual concentration of bioavailable metals in the surface waters....Furthermore, with the limited number of samples, it is likewise difficult to determine the potential for movement of

these metals into the wetlands. Revised Draft final FS at p. 3.16-3.17.

Thus, even if this criteria were an ARAR, the Navy lacks data with which to determine its attainment by any given remedial action.

Finally, a very serious problem arises if these criteria are adopted as ARARs. If data is collected and water quality is below standard, how can a remedy be implemented without destroying the wetland where that water is found? This concern is one which pertains to waivers of ARARs, an issue discussed in detail below with respect to all ARARs.

Response to Allied-Signal Comments - 1.611 (21 November 1988):

Section 402 of the Clean Water Act is a relevant and appropriate requirement because it regulates the discharge of the same pollutants, i.e., arsenic, cadmium, copper, lead, selenium, and zinc as the Navy has detected on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, into media adjacent to these parcels (Suisun Bay).

The comments indicated that the "Navy data does not lend itself to a proper comparison with the water quality criteria issue" because the data are based on total acid extractable measurements, rather than dissolved measurements. However, the National Water Quality Criteria Documents for trace metals indicate that measurements of acid-soluble concentrations of metals are most appropriate. Moreover, none of the National Criteria Documents for trace metals recommend the use of dissolved methods. See, for example, the Ambient Aquatic Life Water Quality Criteria for Cadmium and Copper, USEPA (1986). Therefore, the Navy's surface water quality data for trace metals, based on acid extractable measurements, are directly relevant to the National Ambient Aquatic Life Water Quality Criteria.

Allied-Signal Comments - 1.612 (21 November 1988):

1.612 SOLID WASTE DISPOSAL ACT ("SWDA").

The SWDA (including RCRA) does apply to the off-site disposal of any excavated contaminants meeting the "hazardous waste" criteria.

However, while it is also true that some requirements of RCRA may be related to the concept of leaving contaminants on the site of a storage facility after its closure, it is not clear that each and every one of the requirements set forth in RCRA and its implementing regulations are relevant and appropriate here. One obvious ground for distinction is that none of the RASS's are

former waste storage sites with pre-existing containment facilities. Thus, this may be a situation calling for not more than the partial application of ARAR requirements as authorized by the EPA.

Referencing 40 CFR Part 264, Subpart G (General Closure and Post-Closure Requirements), one finds that Section 264.111 requires an operator to close the facility in a manner that:

> (a) Minimizes the need for further maintenance; and
>
> (b) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste . . . to the ground or surface waters or to the atmosphere; and
>
> (c) Complies with the closure requirements of this subpart, including but not limited to, the requirements of . . . § 280. . . .

These generic closure regulations may be relevant and appropriate. In fact, Section 264.111(b) is similar to the CERCLA § 121(d)(1) "degree of cleanup" standard.

Investigating further, the requirements of Section 264.112 that a closure plan be developed, and of Section 264.117 that a post-closure plan be developed, also appear to be relevant and appropriate to this site. For example, the latter section requires that the operator conduct monitoring and reporting on the site for up to thirty years, if required, that security arrangements be required if hazardous waste remains onsite and that limitations be placed on subsequent use of the property.

With regard to more specific RCRA closure requirements which might also be relevant and appropriate here, we believe that if any apply, it is the Land Treatment section, Subpart M. Land treatment contemplates the spreading of wastes containing low concentrations of contaminants over wide areas and having the contaminants become less bioavailable over time as they are bound up in the surrounding soils and vegetation. This is very similar to the situation at hand with the exception that the control mechanisms normally required for this process were not in place prior to the release of the contaminants.

Reviewing 40 CFR § 264.280, the closure provisions for land treatment facilities, we note that section 264.280(a)(1) requires the operator to continue all operations necessary to maximize the degradation, transformation and immobilization of hazardous constituents. However, this requirement is subject to the exception that if doing so would be inconsistent with the operator's simultaneous obligation to establish a vegetative

cover, the requirement need not be met. Subsections (2), (3), (4), (6) and (7) are not relevant because they pertain to the continuation of control mechanisms which never existed at this site in the first place. Subsection (5), which requires control of wind dispersal of hazardous waste, where required, may be relevant. The same analysis applies to the post-closure duties of the operator described in 40 C.F.R. § 264.280(c) (1)-(8).

In summary, portions of the RCRA closure requirements, including some of the general requirements and those specifically applicable to land treatment facilities, may be partially applicable ARARs. They may be utilized as standards which the alternative remedies being considered must attain, unless they are subject to waiver.

If some of these requirements are ARARs, the next step in the ARAR process is determining whether the three main remedial alternatives, no action, monitoring, and excavation, attain these requirements.

The no action alternative does not attain any of the RCRA closure requirements for areas where contaminants have been shown to exist in statistically significant concentrations above background. However, where no contamination has been shown to exist above background, as on much of the newly defined RASS 1, it appears that this alternative attains the requirements.

With regard to the monitoring remedial alternative, we believe that an intensive monitoring program can be developed which can fully attain both the general closure and post-closure requirements as well as the land treatment closure and post-closure requirements, all of which were described above.

Specifically, we believe that appropriate monitoring and reporting programs can be established. The necessary security requirements also can be met. Given the Navy's ownership and existing limitations on the use of the site, we believe that the necessary limitations on post-closure use also can be established and enforced. Moreover, we believe that required vegetative cover already has been established and that, where necessary, it can be improved. Finally, control of the potential for airborne mobility of contaminants, the need for which has been denied by the Navy (see Public Hearing Transcript at p. 12), can also be achieved, if necessary.

In summary, an intensive monitoring alternative ("passive remediation") should be given a high rating for its attainment of the relevant RCRA standards. We recommend it as the preferred remedial action alternative for areas of apparently contaminated but otherwise productive wetland which also serves as habitat for the SMHM.

Excavation alternatives may be capable of attaining the standards set forth in the RCRA regulations, but only at a severe cost in terms of both dollars and short and possibly long term environmental impacts. This is acknowledged by the Navy. See Revised Draft Final FS at pp. 3.63 and 3.82. Thus, while the excavation alternative may attain the requirement, it will not do so as effectively as the monitoring alternative.

Response to Allied-Signal Comments - 1.612 (21 November 1988):

The Navy agrees that the general closure provisions of 40 CFR Part 264, Subpart G, are relevant and appropriate to the development of remediation decision rules and the development and evaluation of remedial action alternatives for application to the site specific situations found on all RASS's included in this investigation. The Navy agrees that these standards are similar to those presented in CERCLA Section 121(d)(1). However, the Navy disagrees with the application of the more specific closure requirements found at 40 CFR Part 264 Subpart M to the circumstances found at the sites under investigation in this Feasibility Study. First, the Navy finds that contrary to the statements made by Allied, hazardous substances in relatively high concentrations were released on the sites under investigation. For example, on RASS 1, arsenic concentrations up to four times the TTLC and ten times the STLC criteria have been measured. Second, as stated by Allied, a variety of comprehensive control mechanisms normally required in the development of a land treatment system, are not in place on the sites under investigation. The Navy finds that whereas the closure requirements of Subpart M are based on the presumption of a well engineered land treatment facility, conditions on the sites under investigation are completely uncontrolled. This is particularly true in relation to the following engineering requirements for a land treatment system:

a. 40 CFR 264 (c)(2) requiring that the treatment zone be greater than 1 meter above the seasonal high water table.

b. 40 CFR 264.280(a)(2) maintenance of run-on control system.

c. 40 CFR 264.280(a)(3) maintenance of run-off management system.

The Navy has evaluated the ability of the various alternatives to obtain the RCRA ARARs. The Navy finds that the No Action and Environmental Monitoring alternatives do not attain the RCRA ARAR's. Both alternatives leave high levels of arsenic and heavy metals uncontrolled. Recognizing the importance of the wetland habitat in RASS 1, the Navy applies the environmental impacts waiver on a portion of RASS 1. Approximately 20 acres of

contaminated area will be left undisturbed. The Navy plans to implement the environmental monitoring alternative in this area. The remaining uncontaminated areas of the RASS will be monitored, although much less intensively than the contaminated areas, to ensure protection of the public health and environment.

Allied-Signal Comments - 1.613 (21 November 1988):

1.613 ENDANGERED SPECIES ACT.

With regard to Sections 7 and 9 of the ESA, we agree with the Navy (see Revised Draft Final FS at pp.7.126) that they are applicable to any remedial action which will result in the destruction or adverse modification of any endangered species' habitat or which will result in the taking of any such species (i.e., as the result of excavation on RASS 1 or 2.) It is in the application of these requirements to the proposed remedial actions where we disagree with the Navy.

In considering whether the monitoring remedial alternative meets these ARAR's for RASS 1, the Navy summarily concludes that:

> Failure to remove known high levels of contamination would have an adverse impact on [the SMHM]. Alternative 1-1 [monitoring] does not conform to this ARAR. Revised Draft Final FS at p. 7.127.

The Navy's conclusion regarding alleged adverse impacts to the SMHM is not supported by the data.

The contamination referred to by the Navy has existed in the marsh for up to 60 years, if the Navy's allegations about Allied's responsibility for the problem are correct. Yet, in the necropsy examinations of 36 mice and 13 voles, not one was found to be suffering from any harm attributable to the contamination which had been onsite for perhaps up to 60 years or more. SRI International (1986.) If the continuous exposure of these rodents and their many generations of ancestors before them (at least 23 generations over the last 18 years, see B.A. at p. 43) to the heavy metals and arsenic has not yet harmed them, when would the Navy have the reader believe they will?

Moreover, the ARAR's derived from the ESA are prohibitions against the destruction of the mice and their habitat. The monitoring alternative would fully attain these ARAR's requirement of no taking of endangered species and no destruction of their habitat. We believe that the monitoring alternative should be given a high compliance rating with the ESA ARAR's.

Of course, the Navy concludes that the excavation alternatives, which it prefers, deserve high marks for their attainment of the requirements of this ARAR, even though an excavation remedy will be a catastrophe for the habitat and the SMHM falling under the blades of the bulldozers. The Navy attempts to rationalize the obvious inconsistency between the ESA ARARs and the excavation remedies on the grounds that the severe short-term impacts will be balanced by the potential for long-term benefit.

First of all, the destruction of endangered species habitat and the taking of an endangered species are clear violations of the ESA ARARs. If the Navy wishes to conduct excavation on RASS 1 and 2 anyway, it must demonstrate that one of the CERCLA § 121(d)(4) waivers applies. It has not done this. Therefore, the Navy's Proposed Remedial Action Plan, which incorporates an excavation remedy for portions of endangered species habitat on RASS 1 and 2, is illegal.

Moreover, we do not believe that the Navy can show that any of the waivers apply. This is because we believe that in conducting its "balancing," the Navy underestimates the severity and certainty of the short-term impacts and overestimates the potential long-term benefits. These issues are addressed in detail in our comments on the Biological Assessment and we incorporate those comments here.

The excavation remedial alternatives deserve the lowest attainment rating for these ARARs since they are in direct conflict with their requirements.

Response to Allied-Signal Comments - 1.613 (21 November 1988):

Section 7(a)(2) of the Endangered Species Act provides that:

> (2) Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an 'agency action') is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A and 2-3A in Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse and California clapper rail, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A and 2-3A on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its Biological Aassessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion, which stated that:

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh without violating Section 7 of the Endangered Species Act.

The Fish and Wildlife Service also stated in its biological opinion that:

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.
>
> The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of

take in terms of habitat loss.

The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or

Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

Alternatives 1-1, 1-2, 2-1, and 2-2, by contrast, would not comply with Section 7 and 9 of the Endangered Species Act.

Allied-Signal has mistakenly altered the text of the (Second Revised) Final Draft Feasibility Study to limit discussion to the salt marsh harvest mouse. The quote includes the phrase "on these species," not "on the SMHM," and refers in this paragraph to the other subjects of the Final Biological Assessment Report.

The basis for the Navy's determination of potential harm to the endangered and other species present on RASS 1 and 2 is based on several findings, including the levels of contaminants in the soil; the occurrence of bioaccumulation in plants, earthworms, and clams and the knowledge of its effects on other organisms; and the indications of degraded habitat. The results of the analysis by SR International have been considered in the decision-making process. The animals examined in that study were live-trapped; no mortality study was conducted at NWS Concord. In the house mice and California voles examined, long-term exposure to contaminants was confirmed. On the graphic display of impacts of contaminants on organisms (Figure 1), this exposure is in the realm of sublethal effects. Figure 1 illustrates the relationship between contaminant exposure as measured by bioaccumulation and biological effects. At low levels of exposure as measured by statistically significant bioaccumulation, biological effects are expressed at the molecular and subcellular levels. As exposure increases, these effects can be manifested at the tissue level as histopathology. The bioaccumulation observed in the mice and voles is statistically significant and can have molecular and subcellular effects, but may not be sufficient to result in tissue level effects.

Allied-Signal Comments - 1.614 (21 November 1988):

1.614 EXECUTIVE ORDER 11,990.

We agree with the Navy that Executive Order No. 11,990, which requires that the destruction, loss or degradation of wetlands be minimized and the natural and beneficial values of wetlands be enhanced in the management of federal lands, is applicable because of the wetlands found on RASS 1, 2 and 4. As with the ESA, it is the application of this requirement to the alternative remedies where we disagree with the Navy.

With respect to the monitoring alternative, the Navy contends that:

> The [monitoring] alternative leaves significant levels of contamination on RASS [I, II, III and IV] and is expected to continue to have adverse impacts on the animal and vegetative populations on the RASS[s]. Implementation of an extensive environmental monitoring program will aid in the identification and evaluation of adverse impacts; however, such a monitoring program will not remove existing contamination nor prevent the continued migration of contamination. Alternative 1-2 does not conform to this ARAR. Revised Draft Final FS at p. 7.129.

Again, however, the Navy's conclusion is not well supported by the data.

The monitoring alternative will cause no destruction or loss of wetlands. To the extent the existing contamination has degraded portions of the wetlands on the various RASS's, the monitoring alternative will not result in any further degradation since there is no apparent source for any more contamination. To the contrary, the contamination will become less bioavailable over time, thereby resulting in the minimization of the degradation of the wetlands. Additionally, as the Navy recognizes:

> There would be some attenuation of the high levels of contamination because of dilution effects. Revised Draft Final FS at p. 5.12.

Accordingly, we believe that a monitoring alternative does attain this ARAR.

With respect to the Navy's excavation remedies, even though the Navy admits that excavation and filling activities will have to be conducted, and that these alternatives "will have a significant impact on the wetlands," the Navy still finds that these alternatives conform to this ARAR. They try to justify this conclusion in the same manner they tried to show attainment

of the ESA ARARs, by suggesting that the short-term adverse impacts are balanced by the potential for long-term benefit.

We disagree. Again, first of all, since excavation and the related disruption of the marsh unquestionably violate the requirements of Executive Order 11,990, the excavation remedies directly conflict with this ARAR. Thus, the Navy must demonstrate that a waiver provision applies before it can select this remedy. Since it has not made this showing, its proposed Remedial Action Plan is in violation of law.

Moreover, given the paucity of data reflecting any present damage to the wetlands resulting from the contamination, we again believe the Navy has overestimated the long-term benefits to be derived. Furthermore, whether the Navy can ever reconstruct the marsh to its original condition is subject to considerable question. Accordingly, since the Navy has failed to properly balance the disastrous short-term impacts with the likely negligible long-term benefits, we believe the ARAR conformance rating for excavation remedies should be low.

Response to Allied-Signal Comments - 1.614 (21 November 1988):

E.O. 11,990 does not preclude activities in the wetland. Quoting from Allied-Signal's statement, E.O. 11,990 requires that "destruction, loss or degradation of wetlands be minimized" and that "the natural and beneficial values of wetlands be enhanced in the management of federal lands." The Navy, through implementation of a strategy for balancing the long term impacts of leaving significant levels of arsenic and heavy metals in the environment with the short term impacts associated with positive control of the contaminants, finds that the requirements of E.O. 11,990 can be attained through the implementation of active remediation on 9.03 acres in RASS 1 and the environmental monitoring alternative on the remainder of the contaminated areas in the RASS.

This comment suggests that "[g]iven the paucity of data reflecting any present damage to the wetlands resulting from the contamination," the Navy has overestimated the long-term effects to be derived from implementation of the proposed remedial action plan. In fact, the data collected by the Navy in the Final Remedial Investigation Report demonstrate substantial accumulation of a number of toxic contaminants including arsenic and a number of trace metals in all four RASS's. The concentrations of these contaminants are statistically greater than those found in reference areas and exceed a number of relevant criteria, e.g., TTLC or STLC, at many of the sites sampled within these RASS's. These contaminants are mobile in surface waters and clam bioassays have demonstrated the potential for their bioaccumulation in aquatic species. Laboratory bioassays have demonstrated that these contaminants are also

bioavailable to both plants and soil invertebrates. Moreover, at several sites in these RASS's, soils containing these contaminants were found to be toxic to both plants and soil invertebrates. Finally, there were indications of phytotoxicity and reduced abundance of plants and soil invertebrates at some of the sites in these RASS's showing high concentrations of these contaminants. Taken together, these data indicate substantial potential for harm to the environment due to the presence of these contaminants in the soils, sediments and surface waters of the four RASS's.

In fact, the Navy has balanced the long-term benefits derived from removing major portions of this contamination against the short-term impact of the active remediation procedure. It was this balancing of long-term benefit versus short-term impact on the wetlands which led to the proposed remedial action plan which calls for selective active remediation and leaves significant concentrations of arsenic and heavy metals to be dealt with through passive remediation and monitoring. The Navy has concluded that this balanced plan will result in long-term benefits to the wetland ecosystem which outweigh the short-term impacts of the proposed remedial action plan. The Fish and Wildlife Service concurs in its biological opinion that indicates that although "13-15 acres of harvest mouse habitat will be eliminated for 3-5 years by the proposed active remediation work, habitat values likely would improve and surpass former conditions 3-10 years after the completion of the remediation activities."

Allied-Signal Comments - 1.615 (21 November 1988):

1.615 CAL. HEALTH & SAFETY CODE

The CHSC, which is implemented in part by regulations, including ones which establish TTLC and STLC values for the characterization of wastes for disposal purposes, are of questionable relevance and appropriateness to the present matter. As the Navy stated previously:

> [T]he [TTLC] criteria were established for chemical waste materials generated from a source and not for soil contaminated with chemical waste materials per se. Consequently,direct application of the TTLC to a mixture of soil and waste material may be questionable. In addition, the biological effects or impact of TTLC values have not been clearly demonstrated for soil/waste material mixtures and consequently the interpretation of the meaning of TTLC values to the biota of an ecosystem has not been established. Final Remedial Investigation (January 1986) at p.24.

We agree in large part with these conclusions about the limited value of soil sampling results when trying to determine what remedial action will best protect the environment while not also ruining it.

Even if reference to TTLC or STLC values were appropriate, and it would require excavation of endangered species habitat, we believe that the CERCLA § 121(d)(4)(B) waiver would apply. This section waives requirements such as the TTLC/STLC test where compliance with the requirement would result in greater risk to the environment than alternative options. CERCLA § 121(d)(4)(E) may also apply as a waiver if the state has not been consistent in application of its requirement that any wastes not meeting the TTLC/STLC be disposed of in Class 1 sites. These waiver provisions are discussed in detail below.

Response to Allied-Signal Comments - 1.615 (21 November 1988):

While it is true that the TTLC and STLC were developed to classify the hazardous nature of a waste material for landfill disposal, the resulting data corresponded well with most of the biological data collected. For example, soil samples that exceeded the TTLC/STLC criterion also showed adverse biological impacts such as plant and earthworm death, reduced soil invertebrate abundance, bioaccumulation of one or more contaminants in plants, earthworms, clams, mice and/or voles. Because of this apparent close relationship, the TTLC/STLC criterion was consistently applied to each RASS. Another advantage of this criterion is that it can be easily applied during active remediation to verify the success of the activity.

As the Navy stated in Item 3a and b of the Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California, full compliance with the ARAR's for RASS 1 and 2 will result in greater risk to the environment than alternative options. Because of that environmental risk, the remedial action need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 and 2 (to the extent that compliance with the ARAR's for RASS 1 and 2 will result in greater risk to the environment than alternative options). Accordingly, the Navy is waiving the requirement to comply with Section 25154 of the California Health and Safety Code to the extent that compliance with the ARAR's for RASS 1 and 2 will result in greater risk to the environment than alternative options pursuant to Section 121(d)(4)(B) of CERCLA.

Allied-Signal Comments - 1.616 (21 November 1988):

1.616 CALIFORNIA WATER CODE.
We do not believe the CWC is applicable because it is

not clear that any waters of the state are being significantly degraded. Moreover, even if Water Code requirements were violated in the wetlands, the CERCLA ARAR waiver provisions in CERCLA § 121(d)(4) would apply.

Response to Allied-Signal Comments - 1.616 (21 November 1988):

Section 13376 of the California Water Code and that part of Section 13261(b) California Water Code which pertains to the navigable waters of the United States are applicable requirements because they regulate the discharge of the same pollutants (arsenic, cadmium, copper, lead, selenium, and zinc) as the Navy has detected on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, into media adjacent to these parcels (Suisun Bay). Section 13261(b) of the California Water Code is a relevant and appropriate requirement because it regulates the discharge of the same pollutants (arsenic, cadmium, copper, lead, selenium, and zinc) as the Navy has detected on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, into media (wetlands) on these parcels.

The clam bioaccumulation data clearly indicated substantial migration of contaminants from soil into surface water of Nichols Creek at specific locations on RASS 3 and in the tidal creek draining RASS 1 and RASS 2.

Allied-Signal Comments - 1.617 (21 November 1988):

1.617 CALIFORNIA FISH & GAME CODE

We agree that the Fish & Game Code is likely applicable, but we disagree with the Navy over how it is to be applied to the alternative remedial options being considered. The Department of Fish & Game's interpretation of its own requirements is deserving of deference. That interpretation states in part:

> We consider any exposure, regardless of duration which causes mortality, or impairment of sensory, respiratory, or reproductive functions of fish or wildlife.... See F.S. at p. 3.53.

The Navy suggests that because data collected in the RI indicates that there was a discharge of contaminants in RASS 1, that the monitoring alternative cannot conform to this ARAR. This is a gross oversimplification.

First, the monitoring alternative attains the ARAR that no endangered species be taken. Moreover, the mere fact that there was a discharge of contaminants does not mean that those

contaminants will have the prohibited detrimental effect on wildlife. Again, the Navy attempts to assume this conclusion without reciting the data on which it relies. The Navy has not presented any data which would support the notion that this standard has been violated. Accordingly, the monitoring alternative would meet this ARAR, contrary to the Navy's allegation.

Second, the Navy reports that:

> The maximum Cd, Zn, Pb, and As tissue concentrations from this [clam] biomonitoring study did not exceed the Food and Drug Administration criteria for human consumption or the range of field collected Corbicula from non-contaminated areas (Lee, et al. 1985.) Remedial Investigation, Appendix 2.5-1986/87 Data at p.11.

Thus, the RASS's may not even be in violation of the Fish & Game Code pursuant to that agency's interpretation of its organic statute. Overall, we conclude that the monitoring alternative should be given a high ARAR conformance rating in this regard.

The Navy contends that the excavation remedies would conform with the ARARs set forth in the Fish and Game Code. Once again, they conclude that the long-term benefits of excavation would outweigh the short-term impacts. For the same reasons as set forth above with respect to the ARARs derived from Executive Order 11990 and the ESA, we strongly dispute this contention. We would give the excavation remedies a low ARAR conformance rating.

For all of the reasons stated above, the monitoring alternative is superior to the excavation remedies in terms of its conformance ratings to ARARs. On that basis, CERCLA requires that the monitoring remedy be given preference over excavation remedies. This conclusion is in direct contrast to the Navy's conclusions. However, our conclusion is well supported by the relevant data, while the Navy's is not. Accordingly, the Navy must reverse its preference ranking of the remedial alternatives.

Response to Allied-Signal Comments - 1.617 (21 November 1988):

Section 5650(f) of the California Fish & Game Code is a relevant and appropriate requirement because it regulates the discharge of substances which are deleterious to fish, plant life, or bird life into media adjacent to (Suisun Bay) or on (wetlands) Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord. The Navy has detected substances (arsenic, cadmium, copper, lead, selenium, and zinc) on these parcels which [may] be deleterious to fish, plant life, or bird life. The contaminants confirmed in RASS 1 and 2 are among those

which have been documented to cause "impairment of sensory, respiratory, or reproductive functions of fish or wildlife," either alone or in synergy. They are at levels that may cause such impairment, and have been found to be available to the organisms. Therefore, potential harm exists and the Navy believes that the California Fish and Game Code ARAR is fully met by the proposed remedial action plan. The State of California Department of Fish and Game stated, in comments of 19 September 1985, that "the conclusions in the Corps' reports thoroughly justify those remedial actions which not only remove further threats to fish and [sic] wildlife but which also result in no loss of our critically scarce wetland habitat."

Allied-Signal Comments - 1.62 (21 November 1988):

1.62 THE NAVY FAILS TO CONSIDER THE ARAR WAIVER PROVISIONS SET FORTH IN CERCLA § 121(D)(4)

Even though a particular statutory or regulatory requirement or standard may be applicable or relevant and appropriate to apply to a particular site, it does not necessarily mean that the remedy selected must conform to that ARAR. Rather, pursuant to CERCLA § 121(d)(4):

> The President may select a remedial action meeting the requirements of (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by § (2) . . ., if the President finds that . . .
>
> (A) the remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed;
>
> (B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options; . . .
>
> (E) with respect to a State standard...the State has not consistently applied (or demonstrated the intent to consistently apply) the standard...in similar circumstances at other remedial actions within the State . . .

This provision is highly relevant to the analysis of what remedial action is appropriate at this facility.

With regard to each of the RASS's, the Navy has selected as a remedial option the excavation and offsite disposal

of soil which exceeds the TTLC/STLC ARAR set forth in the regulations promulgated pursuant to the State Health & Safety Code.

Allied first contends that this criteria is not an ARAR for the reasons stated above. However, even if these criteria are an ARAR, while the criteria may be appropriate for upland areas, complying with this requirement by excavating wetland areas, habitat for endangered species, will result in greater risk and damage to the environment than the alternative option of monitoring. On this basis, we contend that the waiver of the STLC/TTLC ARAR should be invoked pursuant to CERCLA § 121(d)(4)(B). This is precisely the situation which Congress envisioned in incorporating this waiver provision into the SARA amendments to CERCLA.

Moreover, the Navy has not shown that the State has been consistent in its application of the TTLC and STLC standards in cases like this. Indeed, we believe that it has not. If it is, then the waiver provision of CERCLA § 121(d)(4)(E) may also apply.

Finally, since the proposed monitoring plan will also have a "trigger" mechanism requiring active remediation if necessary, then the waiver pursuant to CERCLA § 121(d)(4)(A) may apply. Monitoring may eventually result in the property attaining the TTLC requirement as the metals and arsenic become more dilute and less bioavailable.

As discussed at length above, the Navy has not demonstrated that the environment in the marsh habitat areas is subject to substantial danger by the presence of the contaminants. By implementing any excavation remedy, without question the Navy will be totally destroying the habitat excavated and will kill all species, endangered and otherwise, living within that habitat. In exchange, the Navy can only offer a promise to attempt to reconstruct the marsh and to return it to its original habitat quality within ten years. However, given the failure to demonstrate existing substantial danger and the known difficulties in reconstructing marsh to original habitat status, the Navy has not demonstrated the necessary long-term benefits to justify the short-term disaster that an excavation remedy represents. Thus, it is unlikely that the Navy can demonstrate that any of the waivers should apply to permit it to conduct excavation in areas of the wetland which are SMHM habitat.

Despite the obvious applicability of the CERCLA waiver section, the Navy fails to engage in any detailed discussion of it within the FS or RAP. This omission should be rectified. Also, given the applicability of these provisions, the Navy's conclusions regarding the necessity for excavation of wetland

areas must be reversed.

Response to Allied-Signal Comments - 1.62 (21 November 1988):

By Executive Order 12,580, the President delegated the function, with respect to the release, and the threat of release, of hazardous substances on facilities under the jurisdiciton, custody, or control of the Department of the Navy, vested in the President by Sections 104(a), (b) and (c)(4); 113(k); 117(a) and (c); 119; and 121 of CERCLA to the Secretary of Defense. Executive Order 12,580, Section 2(d).

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

> (d) Degree of Cleanup. -- (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and out of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) provides that:

> (2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -
> (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
> (ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous

substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.

Section 121(d)(4) provides that:

(4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that . . .

(A) the remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed;

(B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options;

(C) compliance with such requirements is technically impracticable from an engineering perspective;

(D) the remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method or approach;

(E) with respect to a State standard, requirement, criteria, or limitation, the State has not consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions within the State; or

(F) in the case of a remedial action to be undertaken solely under section 104 using the Fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under

consideration, and the availability of amounts from the Fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats. The President shall publish such findings, together with an explanation and appropriate documentation.

For each of the four RASS's, the Navy identified proposed ARAR's in Item 2 of the Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. Following that, as stated in Item 3 of the Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California:

> To attain the level or standard of control appropriate for the conditions on RASS 1, 2, 3, and 4, decision rules, which specify the criteria for the cleanup required, were developed for RASS 1, 2, 3, and 4.
>
> a. Decision Rules for RASS 1.
>
> Full compliance with the ARAR's for RASS 1 will result in greater risk to the environment than alternative options. Because of that environmental risk, the remedial action need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 (to the extent that compliance with the ARAR's for RASS 1 will result in greater risk to the environment than alternative options).
>
> The decision rules, which specify the criteria for cleanup required, for RASS 1[4] are:
>
> - Active remediation of those areas in which the soil metal content exceeds the TTLC/STLC criterion, modified as follows:
>
> - Reduce the area of active remediation, accounting for topography and the presence of wetlands and endangered species, to the area in the easterly most portion of the RASS.

[4] The decision rules for RASS 1 do not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 to the extent that compliance with the ARAR's would result in greater risk to the environment than alternative options.

- o Increase the area of active remediation to include those barren areas not contained within the boundaries of the TTLC/STLC criterion.

Limited monitoring in areas actively remediated.

- o Passive remediation, extensive monitoring, with the potential for future active remediation, in areas of contamination not actively remediated.

- o Monitoring, less intensively than in the passive remediation zone, in the remainder of the RASS.

Implementation of these criteria for cleanup in RASS 1 would result in actively remediating 9.03 acres, passively remediating 23.01 acres, and monitoring 177.74 acres.

b. Decision Rules for RASS 2.

Full compliance with the ARAR's for RASS 2 will result in greater risk to the environment than alternative options. Because of that environmental risk, the remedial action need not attain a level or standard of control at least equivalent to the ARAR's for RASS 2 (to the extent that compliance with the ARAR's for RASS 2 will result in greater risk to the environment than alternative options).

The decision rules, which specify the criteria for the cleanup required, for RASS 2[5] are:

- o Active remediation of those areas in which the soil metal content exceeds the TTLC/STLC criterion. Increase the area of active remediation to include those barren areas not contained within the boundaries of the TTLC/STLC criterion. Limited monitoring in areas actively remediated.

- o Passive remediation, extensive monitoring with the potential for future active remediation, in areas of contamination not actively remediated.
- o Monitoring, less intensively than in the passive remediation zone, in the remainder of the RASS.

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[5] The decision rules for RASS 2 do not attain a level or standard of control at least equivalent to the ARAR's for RASS 2 to the extent that compliance with the ARAR's would result in greater risk to the environment than alternative options.

Implementation of these criteria for cleanup in RASS 2 would result in actively remediating 4.17 acres, passively remediating 0.94 acres, and monitoring 8.21 acres.

c. Decision Rules for RASS 3.

The decision rules, which specify the criteria for the cleanup required, for RASS 3 are:

- Active remediation of those areas in which the soil metal content exceeds either the TTLC/STLC criterion or the statistically above reference area criterion. Limited monitoring in areas actively remediated.
- Passive remediation, extensive monitoring, with the potential for future active remediation, in areas of contamination not actively remediated.
- Monitoring, less intensively than in the passive remediation zone, in the remainder of the RASS.

Implementation of these criteria for cleanup in RASS 3 would result in actively remediating 4.68 acres, passively remediating 1.05 acres, and monitoring 65.48 acres.

d. Decision Rules for RASS 4.

The decision rules, which specify the criteria for cleanup required, for RASS 4 are:

- Active remediation of those areas in which the soil metal content exceeds either the TTLC/STLC criterion or the low pH criterion. Limited monitoring in areas actively remediated.
- Passive remediation, extensive monitoring with the potential for future active remediation, in areas of contamination not actively remediated.
- Monitoring, less intensively than in the passive remediation zone, in the remainder of the RASS.

Implementation of these criteria for RASS 4 would result in actively remediating 0.87 acres, passively remediating 0.11 acres, and monitoring 12.31 acres.

The Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that

environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in a greater risk to the environment than alternative options).

No information has been made available to the Navy concerning whether the State of California has consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria or limitation in similar circumstances of other remedial actions within the state. Accordingly, the Navy is not waiving the requirement to comply with the ARAR's for RASS 1, RASS 2, RASS 3, or RASS 4 pursuant to Section 121(d)(4)(E) of CERCLA.

The No Action and Environmental Monitoring alternatives do not attain the RCRA ARAR. Both of these alternatives leave high levels of arsenic and heavy metals uncontrolled.

Accordingly, the Navy is not waiving the requirement to comply with the ARAR's for RASS 1, RASS 2, RASS 3, or RASS 4 pursuant to Section 121(d)(4)(A) of CERCLA.

The demise of all species living within the wetlands of RASS 1 and 2 will not happen. It is necessary to make a distinction between the "killing" of a species and the killing of an organism or individual. First, the "killing" or loss of a species means extinction; no species will be "killed" or driven to extinction by the proposed remedial action, including the endangered salt marsh harvest mouse and California clapper rail. Indeed, the Fish and Wildlife Service issued a no-jeopardy opinion concerning the proposed action. Second, not all organisms living in the area to be actively remediated will be killed. Many are capable of movement and will avoid the equipment or leave the area entirely. Unfortunately, the natural mobility of the salt marsh harvest mouse is low so that most or all individuals of that species in the area to be actively remediated will be killed.

In fact, the Navy has demonstrated that "the environment in the marsh is subject to substantial danger by the presence of the contaminants." The data collected by the Navy in the Final Remedial Investigation Report demonstrates substantial accumulation of a number of toxic contaminants, including arsenic and a number of trace metals in the soils and sediments of all four RASS's. The concentrations of these contaminants are statistically greater than those found in reference areas and exceed a number of relevant criteria (e.g., TTLC or STLC) at many of the sites sampled within these RASS's. These contaminants are mobile in surface waters and clam bioassays have demonstrated the potential for their bioaccumulation in aquatic species. Laboratory bioassays have demonstrated that these contaminants

are also bioavailable to both plants and soil invertebrates. Moreover, at several sites in these RASS's soils containing these contaminants were found to be toxic to both plants and soil invertebrates. Finally, there are indications of phytotoxicity and reduced abundance of plants and soil invertebrates at some of the sites in these RASS's which contain high concentrations of these contaminants. Taken together, these data indicate substantial potential for harm to the environment due to the presence of these contaminants in the soils, sediments and surface waters of the four RASS's.

Allied-Signal Comments - 1.7 (21 November 1988):

1.7 THE NAVY IMPROPERLY UTILIZES NON-ARAR REQUIREMENTS AS "DECISION RULES."

In addition to the ARARs utilized by the Navy in evaluating alternative remedial actions, the Navy additionally considers a number of other "factors," including barren areas, soil pH, bioaccumulation and topography in determining the nature and extent of the remedial actions to be undertaken on the various RASS's. These factors, however, are wholly subjective, are not authorized nor required to be implemented by law as ARARs, and do not result in any additional significant benefit to the protection of human health or the environment. On these grounds, we believe they should be deleted from the remedial action selection process.

Response to Allied-Signal Comments - 1.7 (21 November 1988):

As stated above, Section 121(b)(1) of CERCLA provides that:

> The President shall select a remedial action that is protective of human health and the environment.

Section 121(d)(1) of CERCLA provides that:

> Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

The Navy used barren areas, low pH in soil, and bioaccumulation as criteria and topography as a factor in developing decision rules which specify the criteria for cleanup required, for RASS

1, RASS 2, RASS 3, and RASS 4. See Sections 121 (b)(1) and 121 (d)(1) of CERCLA which provide the Navy with the authority to use these criteria and this factor in developing decision rules for cleanup. Plates 3.2, 3.3, 3.4, and 3.5 in the (Second Revised) Final Draft Feasibility Study Report display the criteria and factors used in the Navy's decision-making process. The Navy disagrees that these items "do not result in any additional significant benefit to the protection of human health or the environment." Consideration of barren areas, soil pH, bioaccumulation, and topography do result in considerable benefits to the protection of human health and the environment.

Barren areas are the major sources of dust during windy periods. The larger barren areas do contain extremely high concentrations of contaminants. Remediation of these barren areas will eliminate the source of contaminated dust which threatens any person who walks across the area. This most certainly will benefit human health. Other barren areas were included in the remediation because of previous comments from Defendants who stated that if any areas require remediation, the barren areas are the ones. The Navy agrees with the defendants that remediation of the barren areas is appropriate. It now appears that the defendants have changed their minds. During active remediation, soil samples will be collected from sites of known high contamination as centers, and radiate diagonally at 20 ft. centers to more accurately define areas exceeding TTLC/STLC criteria.

Soil pH values are important for the protection of the environment simply because pH affects the chemical specification of metals and arsenic in the soils. Speciation, in turn, directly affects the bioavailability and toxicity of the metals. In particular, soil metal contents can become extremely toxic to plants and animals when soil pH values are 5.0 or below. This is common knowledge in the agricultural sciences (Lee and Craddock 1969). In addition, metals become substantially more soluble and mobile in soils with pH values of 5.0 or below and especially surface waters (Skogerboe et. al. 1987).

It is difficult to imagine that Allied-Signal cannot see any link between bioaccumulation and the requirement to protect the environment. Data collected during the remedial investigation identifies statistically significant bioaccumulation on all RASS's. Bioaccumulation is a prerequisite to metal or arsenic toxicity. The fact that increased bioaccumulation has been demonstrated in plants, earthworms, clams, and rodents exposed to soils, sediments, and waters from the RASS's indicates substantial potential for toxicity.

Topography is an important factor, not a criterion, in the evaluation of the technical feasibility of all active remediation alternatives, including, but not limited to, the

excavation alternatives. Topography impacts the technical feasibility of most of the alternatives including the in-situ treatment alternatives. Indeed, the difficult topography found in RASS 1 was one of the major factors in the decision to reduce the area of active remediation. In demonstrating the propensity for the no action alternative, Allied-Signal attempts to overlook the necessity for including a variety of factors in the evaluation process. As stated by the Navy, topography was not used as a decision criterion. However, the Navy did use topography as a factor in assessing the reasonableness of applying specific remediation technologies. Allied-Signal's apparent failure to recognize the importance of considering topography in the evaluation process again illustrates a bias towards no action, regardless of the environmental consequences of leaving high levels of arsenic and heavy metals in the environment.

Allied-Signal Comments - 1.71 (21 November 1988):

1.71 "BARE SPOTS"

On both RASS 1 and 2, the Navy concludes that active remediation should take place in those areas in which the soil content exceeds the TTLC/STLC criteria, with some modifications. One such modification is:

> b. Increase the area of active remediation to include those barren areas not contained within the boundaries of the TTLC/STLC criterion. Revised Draft Final FS at p. 3.88.

By the Navy's own description, these bare areas which are to be excavated are not areas of contamination by reference to TTLC/STLC standards. Therefore, the justification for excavating these areas is entirely unclear. More fundamentally, the "bare spot" criteria is not an ARAR. Thus, it has no force of law behind it. Nor is it a consideration which the EPA suggested was appropriate to consider in its guidance document (EPA 1986.) Thus, it has no place in this analysis.

In any case, the areas may be bare for reasons entirely unrelated to contamination. Rather than jumping to the conclusion that such areas must be excavated, Allied contends that such areas should be more closely examined to determine the cause of the lack of vegetation growth. For example, it is stated in the Biological Assessment that:

> Pickleweed at habitat site 3 [just west of RASS 1, edge of Suisun Bay] was a sparse stand of 9 inches. A third of the ground in site 3 was bare, with evidence of ponding. B.A. at p.19. (Emphasis added.)

Thus, it is not at all clear that either the bare spots exist because of contamination or that they need to be excavated. Rather, they may simply be the result of ponding caused by local topography.

Thus, even assuming that the Navy decides that it would like to improve wildlife habitat conditions at its own expense, there are many possible alternative remedies, short of excavation, which may remedy the perceived problem with less damage to the environment. However, there is significant question as to whether bare spots are necessarily poor habitat. In the Biological Assessment, it is noted that:

> On the other hand, Kovach and Voight (1986) unexpectedly showed good trap success on an area with 39 percent pickleweed, 29 percent bare ground, and average vegetation height of only 10 inches (grid 8 x 8W, Table 4). This was explained by multiple observations of mice using desiccation cracks in the old dredged material as escape routes and cover. B.A. at p.25. (Emphasis added.)

Thus, it is not demonstrated that all bare spots are in need of remediation.

Moreover, in extending the boundaries of active remediation to include bare spots, the Navy also includes areas which are not bare but which will be excavated simply because they lie between the bare spots and the border of the area defined by exceedance of TTLC/STLC criteria. There is no justification whatsoever for excavating these areas. Accordingly, they should be deleted from the area contemplated for active remediation.

Response to Allied-Signal Comments - 1.71 (21 November 1988):

Bare spots may be indicative of problems caused by the release of hazardous substances, particularly high concentrations of heavy metals. Clearly, the remediation of bare spots should be at least considered in the development of remediation decision rules. Furthermore, on several occasions, Allied-Signal suggested that barren areas would be an appropriate area for remediation. It seems that Allied-Signal now has second thoughts on the propriety of using this factor. The Navy agrees that excavation of bare spots may be inappropriate where contamination levels are not statistically above background and that other measures may be taken to improve the productivity of these areas. Further refinement of the excavation plan may result in the reduction of the area to be excavated.

The commenters have misread the location of site 3 in

their quote at the bottom of page 46. Instead of "just west of RASS 1, edge of Suisun Bay," this site is over a mile to the west of RASS 1 and 2 and south of Waterfront Road as indicated in the first full paragraph of page 19 of the Final Biological Assessment Report. The habitat evaluation sites such as 2 and 3 are on map Figure 3-5 in the Final Remedial Investigation Report. The Navy did not attribute the barren areas on RASS 1 and 2 to the effects of ponding, although in selected areas that is a possible explanation. At the initiation of the active remediation plan, further sampling and analysis would be conducted to refine the extent of the remediated areas. The barren areas and the areas between them and the border of the area defined by exceedance of TTLC/STLC criteria will be sampled to allow this refinement.

The "significant question as to whether bare spots are necessarily poor habitat" was answered in this specific case by the second half of the quote from the Final Biological Assessment Report given by the commenters. The barren areas on RASS 1 and 2 do not have desiccation cracks. Such cracks are common in dredged material disposed on land and allowed to dry, as was the case in the study cited. The result can be a honeycombed series of deep and narrow cracks, giving a small animal like a mouse many protected paths.

Allied-Signal Comments - 1.72 (21 November 1988):

1.72 SOIL pH VALUES

In describing the appropriate decision rules for RASS 4, the Navy again concludes that active remediation should take place in those areas where the soil metal content exceeds the TTLC/STLC criteria, but then goes on to expand that area to include areas which exceed "the low pH criterion." The Navy's justification for this expansion is that:

> Soils data indicated that a large portion of RASS 4 had low pH values that could contribute to the mobility of the metals found in the RASS. See FS at 3.96-3.97.

Soil pH values are not recognized as ARARs or by any other requirements pertinent to this matter. Thus, there is no legal or regulatory authority for their use in this matter.

Moreover, reliance on soil pH values to expand the area of active remediation simply does not make common sense. If you are excavating the soils with high metal content, then once those contaminants have been removed, there is no need to be concerned about low pH mobility pathways since there will be no contaminants to migrate.

For these reasons, we believe that the reference to low soil pH values as a decisional rule for RASS 4 is illegal and inappropriate and should be deleted.

Response to Allied-Signal Comments - 1.72 (21 November 1988):

Clearly, soil pH values are an important consideration in the development of remediation decision rules and the evaluation of potential remediation alternatives. Reduced pH has been shown to enhance the mobility of metals and directly impact plant growth and survivability. Since the pH of the soil directly impacts the likelihood that revegetation can occur, the CERCLA requirement to protect human health and the environment requires consideration of pH as an appropriate factor.

Moreover, the commenter misinterprets the description of active remediation as it refers to those areas in which the pH is reduced. As stated at page 6.64, low pH areas will be treated with an in situ application of lime to raise the pH to acceptable levels. There is no intent to excavate low pH soils that do not contain high concentrations of arsenic or metals. The use of in situ treatment technologies proposed by the Navy are appropriate in RASS 4.

Allied-Signal Comments - 1.73 (21 November 1988):

1.73 BIOACCUMULATION

The Navy, in justifying their three tiered remedial action plan state that:

> Of particular importance was the animal bioaccumulation data, which indicated that accumulation of significant body burdens of cadmium, lead and selenium. Revised Draft Final FS. at p.3.87-3.88.

Again, bioaccumulation, like pH values and bare spots, are not recognized as ARARs or as any other sort of requirement applicable to the selection of CERCLA remedies. Rather, this is more of the "professional judgement" of the Navy and its consultants. See Revised Draft Final FS at p.3.86. As such, it has no force of law behind it and should be excluded from the analysis.

In any case, the Navy's reliance on bioaccumulation as a justification for excavation in marsh habitat is misplaced. First, it ignores the accepted fact that:

> The environment has a certain assimilation capacity before an adverse impact occurs and in some areas of the contaminated sites an adverse environmental impact is not readily

apparent. Revised Draft Final FS at p. 3.64

Second, absent adequate information, bioaccumulation data is difficult to apply in a meaningful sense.

> Bioassay procedures using [mice and voles] to indicate potential toxicity and and bioaccumulation of hazardous substances could be used to establish cleanup criteria. However, because of the extensive and complex testing regimes that would be required to verify contaminant uptake and the variety of criteria that could potentially be applied. Revised Draft Final FS at p.3.70.

Thus, the Navy admits to the serious drawbacks to relying on bioaccumulation data as a primary basis for making remedial action selections.

Response to Allied-Signal Comments - 1.73 (21 November 1988):

CERCLA requires the protection of the human health and the environment. Even if no ARARs for a specific site are identified, remediation sufficient to meet the above requirement to protect the human health or the environment is appropriate.

It is difficult to imagine that Allied-Signal cannot see any link between bioaccumulation and the requirement to protect the environment. Data collected during the remedial investigation identifies statistically significant bioaccumulation on all RASS's. Bioaccumulation is a prerequisite to metal or arsenic toxicity. The fact that increased bioaccumulation has been demonstrated in plants, earthworms, clams, rodents exposed to soils, sediments, and waters from the RASS's indicates substantial potential for toxicity.

These data indicate that the environment is being impacted by the release of hazardous substances. Clearly, the CERCLA requirement for protection of the environment requires that the Navy consider such bioaccumulation in the evaluation process.

The quotes from the (Second Revised) Final Draft Feasibility Study Report concerning bioavailability are incorrect and taken out of context. The correct quote from page 3.70 concerning bioaccumulation and bioassay procedures should read "However, an application of a bioaccumulation criterion is difficult because of the extensive and complex testing regimes that would be required to verify contaminant uptake and the variety of criteria that could potentially be applied." This statement is meant to convey the fact that biological testing is inherently more difficult than simple soils or water testing, not, as the commenter attempts to portray, that such testing is

inappropriate in development of remediation decision rules. This statement simply states one of the attributes of biological testing.

Analysis of data obtained during the remedial investigation indicated that those areas in which the soil contaminant concentrations exceeded TTLC/STLC criteria were also indicative of those areas in which bioaccumulation was statistically significant.

Allied-Signal Comments - 1.74 (21 November 1988):

1.74 TOPOGRAPHY

Topography is perhaps the most mysterious of the factors relied on by the Navy in drawing its active remediation line. Again, topography is not an ARAR. The Navy gives little indication of what it does represent. Apparently, it relates to the Navy's ability to excavate in the marsh on RASS 1. See Revised Draft Final FS at p.3.88.

This appears to be a factor added on the professional judgment of the engineer responsible for conducting the cleanup. See Public Hearing Transcript at pp. 17:

> So that what we decided based upon the topography that this area in here is probably a little higher, a little easier to get to. That this could in fact be excavated. That if we extended out to the other areas of TTLC, it would involve a lot more environmental damage during the remedial process. Id.

In the Remedial Investigation, Subtitle Appendix 2.5, the marsh is described as a "gumbo" in which Navy drilling equipment became mired. Id. at p. 12. This raises serious questions about the ability of the Navy to conduct any excavation in the wetlands.

In short, however, topography, like the other non-ARAR factors before it, is not an appropriate decision criteria. The ESA, Executive Order 11990 and Fish & Game Code ARARs are, and they prohibit the excavation which the Navy propose to undertake in productive endangered species habitat. The Navy must amend its proposed Remedial Action Plan to reflect this.

Response to Allied-Signal Comments - 1.74 (21 November 1988):

Topography is an important factor, not a criterion, in the evaluation of the technical feasibility of all active remediation alternatives, including, but not limited to, the excavation alternatives. Topography impacts the technical

feasibility of most of the alternatives including the in-situ treatment alternatives. Indeed, the difficult topography found in RASS 1 was one of the major factors in the decision to reduce the area of active remediation. In demonstrating the propensity for the no action alternative, Allied-Signal attempts to overlook the necessity for including a variety of factors in the evaluation process. As stated by the Navy, topography was not used as a decision criterion. However, the Navy did use topography as a factor in assessing the reasonableness of applying specific remediation technologies. Allied-Signal's apparent failure to recognize the importance of considering topography in the evaluation process again illustrates a bias towards no action, regardless of the environmental consequences of leaving high levels of arsenic and heavy metals in the environment.

Topography is also an important factor in determining patterns of contaminant migration and identifying sources of contaminants and the ultimate fate of those contaminants. Ignoring the topography of the RASS's would make it impossible to understand the dynamic nature of the wetlands and make rational decisions as to remediation difficult, if not impossible.

In respect to the ability to excavate, the Navy points to the apparently failed remediation attempted by Allied. During this process, Allied-Signal states that lime was disced into the wetland. Based on the use of equipment for this process, the Navy believes that excavation can be successfully accomplished on RASS 1 and RASS 2. The reference to drilling equipment becoming "mired" is an inappropriate analogy to the ability to excavate.

Allied-Signal Comments - 1.8 (21 November 988):

1.8 THE NAVY'S DESCRIPTION OF THE NATURE AND EFFECT OF THE CONTAMINATION IS ERRONEOUS

On page E.4, the Navy suggests that the contamination found on Navy property most likely came from adjacent property (i.e., defendants' properties). Conveniently deleted from this discussion, as from all other discussions of possible sources by the Navy, is the former existence of Morton Brass Company on its property. The obvious potential for a brass foundry to contribute heavy metal contaminants to the surrounding environment, however, is somehow overlooked by the Navy. The "significant but localized copper contamination" on RASS 1 is very likely attributable to Morton Brass. See Revised Draft Final FS at p.3.4.

The Navy's own consultants have recognized that reference to Morton Brass is appropriate. Dr. Eugene Meyer, in a letter to Dr. Charles Lee dated June 15, 1985, conveyed his comments on the then draft - RI. He stated, in part:

> It is appropriate here to discuss the entire region as it impacts the NWS. Note the activities occurring near the NWS today, and those that occurred in the past. This has been an industrial area since 1910, in which several chemical plants have located, including those of Allied-Signal Chemical Corporation and Chemical & Pigment Company. Include a brief discussion of the history of the area dating back to the turn of the century, especially noting activities that relate to one or more of the metal contaminants (e.g., brass foundry activities connected with Morton Brass Company). See Repository Doc. No. WES024225.

This absence of any meaningful discussion of Morton Brass is apparently the result of litigation sensitive report writing. If a fact or a conclusion which is otherwise obviously relevant would nonetheless hurt the Navy's case against defendants, it is deleted. This approach impeaches the credibility of the studies performed by the Navy and makes the remedy selected by the Navy subject to suspicion as being self-serving rather than in compliance with legal requirements. This omission of potential sources other than defendants is continued in the discussion on pages E.7-8.

Moreover, the Navy is unsatisfied with simply omitting obvious potential sources. It also grossly overstates the case that defendants' operations, such as Allied's, caused the contamination. For example, the Navy cites "eight potential sources" of contamination on Allied's property. Why are they potential sources? -- because they are areas where heavy metals exist or once existed or are suspected of having existed on Allied's property, not because there is any possible way that such metals could have ever migrated to the Navy's property. As stated by Dr. Meyer in the letter referenced above, "I wonder how anyone can identify the sources of the contaminants." See Repository Doc. No. WES024225.

Allegations unsupported by facts establishing an actual relationship between the "potential source," the metals allegedly found there and the metals at issue in this case, are designed to cast defendants in the guise of the "bad guys" in the eyes of any first time reader. As such, they do not belong in this study which alleges to be a serious effort to study the problems at the site.

Response to Allied-Signal Comments - 1.8 (21 November 1988):

The Navy has obtained very limited information about any operations which the Morton Brass Company may have conducted

on or near the property now known as Parcel 572 on the Naval Weapons Station, Concord. None of the information which the Navy obtained confirmed that Morton Brass was a source of copper on Parcel 572 on the Naval Weapons Station, Concord.

In 1977-78, Allied Corporation constructed a dike around the area on the Bay Point Works where the eight potential sources of contamination are located. Until the construction of that dike, migration of contaminants from these potential sources on the Bay Point Works to Parcel 572 on the Naval Weapons Station, Concord, was unimpeded. Many of the contaminants present on the Bay Point Works were also detected in high concentrations on the Naval Weapons Station.

Allied-Signal Comments - 2.0/2.1 (21 November 1988):

2.1 BIOACCUMULATION IN TERRESTRIAL PLANTS AND ANIMALS

The section on page E.10 suffers from its brevity and from its use of the vague term "significant." First, it is highly misleading to suggest, as this section does, that all plant and animals studied demonstrated bioaccumulation of arsenic, cadmium, lead and selenium. In fact, only some plants and animals were found to have bioaccumulated some of these metals.

Second, it is unclear what "significant" bioaccumulation means. Is this sufficient bioaccumulation to present a real threat of damage or actual damage to the plant or animal, or does it simply mean that higher than background levels were found? We previously commented on this problem when it appeared in the RI, but the Navy has never provided any written response.

Given the great importance attached to the conclusions drawn about bioaccumulation, especially with regard to the endangered animal species on the property, this section is wholly unacceptable in the context of the Feasibility Study

Response to Allied-Signal Comments - 2.1 (21 November 1988):

This section does not say all plants and animals demonstrated bioaccumulation. It says "extensive studies were conducted." It also states that "significant bioaccumulation of arsenic, cadmium, lead, and selenium was demonstrated." "Significant" means statistically significant as defined in the Glossary of the Final Remedial Investigation Report. The Navy chose to use statistical methods to evaluate experimental data and determine where there were real differences among sampling sites. Statistical methods are standardly used in the scientific community to compare data sets and determine whether differences exist.

Allied-Signal Comments - 2.2 (21 November 1988):

2.2 UNSUPPORTED ALLEGATIONS AGAINST ALLIED

In the discussion of the tidal system on page 2.14, the Navy suggests, without reference to any supporting documentation, that the overflow of "waste lagoon sludge" from Allied-Signal onto the marsh plain raised the elevation locally. This is speculation on the part of the Navy and, without proof, is again simply an effort to prejudice the uneducated reader against defendants, including Allied.

If any material was discharged onto the Navy property,

it was water which had collected in the old alum ponds and overflowed onto the Navy property before the installation of the dike in January 1976. There is no evidence that "waste lagoon sludge" overflowed onto the Navy property or even existed in the ponds that held alum mud, a non-hazardous substance. Our point here was echoed by Navy consultant Dr. Eugene Meyer, who observed, in commenting on an earlier draft of the Feasibility Study that ". . .there may be actually little or no connection between the observed concentrations of arsenic in the specific areas of NWS and the [alleged] alum spill." See Repository Doc. No. WES009051. Moreover, there is a significant question existing as to when any such overflows occurred and how much water was involved. In some respects, the evidence gathered in discovery raised more questions than it answered.

Finally, Allied remedied much of the problem thought to have been caused by the occasional runoff of this acidic water by discing lime into the soil at that location, resulting in the return of ample vegetation. If any elevation changes occurred, it may have been due to this liming, but not the alleged discharge of "waste lagoon sludge."

The Navy again engages in unjustified attacks on Allied on page 2.22 There the Navy alleges that there have been past incidents of contamination of Navy property by defendants, including Allied. If so, the Navy should specifically identify the event and the documentation establishing that the event actually occurred and how it resulted in contamination of the Navy's property.

Response to Allied-Signal Comments - 2.2 (21 November 1988):

In 1977-78, Allied-Signal Corporation constructed a dike around the area on the Bay Point Works where the eight potential sources of contamination are located. Until the construction of that dike, migration of contaminants from these potential sources on the Bay Point Works to Parcel 572 on the Naval Weapons Station, Concord, was unimpeded. Evidence of overflow from the Bay Point Works to Parcel 572 on the Naval Weapons Station, Concord, includes, inter alia, an aerial photograph of the overflow in January 1973. FCL 0000347, and FCL 000035.

There is ample information demonstrating dike leakage and overflow of sludge and wastewater from the Allied-Signal waste lagoon. These include photographs of discharges from the Allied-Signal waste lagoon into adjacent wetlands on Navy property. See CTS 000006. In addition, when Bay Point Works acquired the property in approximately 1950, some reasons given for purchase of the land were:

(a) liquid from the alum pond had seeped through the

ground onto the property,

(b) acid tank car washings had drained onto this land until approximately 1947 causing an acid condition in the soil, and

(c) to protect "Allied" from a damage suit by a new owner because of the conditions described in (a) and (b). See AN029560.

In 1977, Allied-Signal Corporation applied lime to a portion of Parcel 572 on the Naval Weapons Station, Concord. The massive quantities of lime applied as remedial actions by Allied-Signal indicate the need to counteract the impacts of the substantial quantities of waste materials discharged from the waste lagoon. The lime was poorly disced into the soil as evidenced by thick layers of white material that appear to be lime within the surface foot of soil.

Allied-Signal Comments 0 2.3 (21 November 1988):

2.3 NATURE AND EXTENT OF PROBLEMS

A description of RASS 2 is given by reference only to the presence of kilns and kiln material. No mention of the alluvial fan is presented. However, when describing the chemical contamination, the FS alludes to the data from the alluvial fan which showed contamination in excess of the TTLC to a depth of 3 feet.

Similarly, for RASS 2, the Navy defines contamination (i.e., areas in excess of TTLC and STLC) of lead, cadmium, and zinc. and more limited contamination of copper and arsenic. Howe er, they do not point out that the extensive contamination of lead, cadmium, and zinc is entirely confined to the alluvial fan area of RASS 2, the more limited area of contamination referring to two samples in the kiln rubble area of RASS 2

Response to Allied-Signal Comments - 2.3 (21 November 1988):

Figures 14, 15, 16, 19, and 22 of the Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III, Figures clearly indicate that the area of concern on RASS 2 includes the "alluvial fan." The (Second Revised) Final Draft Feasibility Study Report considers RASS 2 in its entirety without regard to the specific subsets of contamination.

The Navy, however, agrees that the description of RASS 2 could have mentioned the alluvial fan which is included in the 13 acres. While a portion of the contamination was observed in the alluvial fan, there were other extensive areas showing contamination. This is obvious from Figure 23 of the Final

Remedial Investigation Report.

The area of contamination is not only defined as exceeding TTLC/STLC criteria but also includes those areas showing substantial bioaccumulation in plants and animals. Consequently, the area of contamination extends beyond the alluvial fan as shown in Figure 23 of the Final Remedial Investigation Report.

Allied-Signal Comments - 2.4 (21 November 1988):

2.4 DEFINITION OF HAZARDOUS SUBSTANCE

What is the definition of the term "hazardous substance." If it is a substance that produces a hazardous effect, then the term is misapplied at this site because no such effects have been shown.

Response to Allied-Signal Comments - 2.4 (21 November 1988):

Section 101(14) of CERCLA provides that:

> The term "hazardous substance" means (A) any substance designated pursuant to section 311(b)(2)(A) of the Federal Water Pollution Control Act, (B) any element, compound, mixture, solution, or substance designated pursuant to section 102 of this Act, (C) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress), (D) any toxic pollutant listed under section 307(a) of the Federal Water Pollution Control Act, (E) any hazardous air pollutant listed under section 112 of the Clean Air Act, and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to section 7 of the Toxic Substances Control Act. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

Allied-Signal Comments - 2.5 (21 November 1988):

2.5 DRAWINGS

The authors refer to "Drawings 6, 7, 8, 17, and 22" for

all soil sampling points investigated by WES. Other drawings are referenced throughout. We have not seen these drawings. What document are they in? We have the same questions for Drawings 9, 10, 77, 45, 20, and 23.

Response to Allied-Signal Comments - 2.5 (21 November 1988):

The term "Drawing" refers to the figures attached to the Conceptual Plans for Additional Investigation of Potential Surface Water and Groundwater Contamination on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California, which the Navy submitted to the State of California Regional Water Quality Control Board on 5 October 1987. This was explained on page 1.5 of the (Second Revised) Final Draft Feasibility Study Report.

Allied-Signal Comments - 2.6 (21 November 1988):

2.6 ALLEGED SIGNIFICANCE OF HEAVY METAL CONTAMINATION

In the RASS 1 area, copper and lead were found to be in excess of the STLC in only 2 and 1, respectively, soil sampling locations. This is out of a total of more than 80 locations. It is difficult to see how "significant" these findings are in terms of potential damage to the marsh ecosystem, especially in view of the fact that none of the more than 50 locations in RASS 1 exceeded the STLC when subjected to the EP toxicity test which simulates the worst-case leachability of metals in a more realistic manner than the DHS Waste Extraction Test. Similar comments apply to the significance of the results for RASS 2 and 4.

Response to Allied-Signal Comments - 2.7 (21 November 1988):

Any exceedance of a criterion requires evaluation. During active remediation, additional samples will be collected from known sites of contamination in a radiating sampling grid to determine the extent of the contamination. In RASS 1, exceedence of the TTLC/STLC criteria is not the only criterion used for defining the areas of active remediation. Eighteen other criteria and factors were considered. See Plate 3.2 of the (Second Revised) Final Draft Feasibility Study Report.

The Navy disagrees with the comments related to the EP toxicity test. The DHS suggested their Waste Extraction Test (WET) as being much more representative of the actual leachability of metals from waste materials. The WET data also related well to bioaccumulation of contaminants in plants and animals.

Allied-Signal Comments - 2.7 (21 November 1988):

2.7 POTENTIAL EFFECTS OF CONTAMINATION ON PREDATORS

Although uptake of metals to concentrations above background levels was observed for plants, worms, clams, and rodents, extension of these findings to uptake by predator species is highly speculative. It is very unlikely that predators of the mentioned species would be significantly influenced by the presence of contaminants in the marsh since such predators typically have a relatively large area over which their prey are taken. This marsh is simply much too small and the uptake of metals in excess of background too small to result in the bioaccumulation of metals at levels which might pose a significant risk to predators.

This is especially true for the results of the clam study and its implication of effects on Suisun Bay. In fact, in Section 3.1.3 the Navy states that metal input from the site via surface runoff was probably insignificant even after the runoff from the highest high tide ever recorded from the site.

Three points are important to keep in mind regarding the results of the clam bioassay experiments. The first is that, as the Navy states, both dissolved and sediment-bound metal mobility are being tested for by the use of clams and these cannot be separated from one another. Thus, the results will overestimate metal mobility and bioavailability for all nonfilter feeder species such as most aquatic microorganisms.

The second point is that despite this overestimation, metals were observed not to be leaving the marsh, even after the runoff from the highest tides ever recorded at the site.

Third, despite the fact that metal levels from some clams at the site were over background levels, it should be noted that the levels for arsenic, cadmium, and zinc are within the range sited by the Navy as typical for clams in the Suisun Bay (Table 2.5-D11 of Appendix 2.5) and for lead (Table-6, WES Remedial Investigation, 1986). This supports the belief that the marsh is not a source of metals to the bay ecosystem and that the environment for aquatic organisms in the marsh is no worse and probably better than in the Bay.

Thus, the argument about contaminant migration with its dire implications for the rest of the marsh/bay ecosystem is a hollow one in the absence of any evidence that anything more than somewhat elevated metal levels will be the net result.

Finally, as noted by a Navy consultant, Mr. Norman Page, "[a]rsenic is readily absorbed by shellfish and crustaceans. However, the organically bound Arsenic is readily

excreted in the urine of animals eating the shellfish." See Repository Doc. No. WES001259. Thus, any bioaccumulation of arsenic in clams will not necessarily be passed up the food chain.

Response to Allied-Signal Comments - 2.7 (21 November 1988):

Allied-Signal clearly agrees that bioaccumulation was observed in plants, worms, clams, and rodents. The bioaccumulation data indicate that the contaminants are migrating from the soil into surface water and into the foodchain. It is the Navy's opinion that this migration of contaminants into the foodchains represents a threat to wildlife associated with the contaminated areas, especially the endangered species. One of the species of concern is a rodent, the salt marsh harvest mouse.

While clams may be considered conservative and may overestimate contaminant migration, they do serve as excellent indicators of the movement of contamination in surface waters. Clams and mussels are used all over the world as indicators of water pollution. Allied-Signal appears to suggest that as long as metals do not migrate out into Suisun Bay, that local surface water contamination is acceptable. The Navy disagrees. Allied-Signal apparently does not appreciate that the background values used in comparing clam bioaccumulation data were from the reference areas on the shoreline of Suisun Bay (BK1161 and BK1162). Values from the literature were collected at different times and at various locations around the Bay including some near sources of pollution. The important fact is that substantial bioaccumulation was measured which is above the current level observed on the Bay shoreline at the Naval Weapons Station, Concord. While the marsh may not currently be a major source of metals to the Bay ecosystem, it is a source of metals for the foodchains associated with the wetland ecosystem where wildlife and especially endangered species live.

Allied-Signal does not appear to appreciate the environmental significance of measuring substantial bioaccumulation in a marsh ecosystem and the potential threat of harm to wildlife and especially endangered species due to that accumulation. While what Dr. Page stated about bioaccumulation of arsenic to high levels is occurring, exposure to arsenic can result in reproductive disturbances in breeding birds and mammals. The toxicological impact of arsenic on wildlife is presented in some depth in Section 4.4 of the Final Remedial Investigation Report.

Allied-Signal Comments - 2.8 (21 November 1988):

2.8 INTEGRITY OF WATER SAMPLE RESULTS

The text refers to surface water samples, but does not state who collected/analyzed them or when they were analyzed. We suspect that these were the samples the Navy contracted ERG to collect in 1981. These samples were extracted with acid prior to analysis and thus do not represent strictly dissolved metal concentration. It is thus not appropriate to apply the National Ambient Water Quality Criteria to these results and, as stated on page 3.16, it is not appropriate to draw any conclusions regarding mobility or bioavailability from these data.

Response to Allied-Signal Comments - 2.8 (21 November 1988):

The comments indicate that because the water "samples were extracted with acid prior to analysis" they "do not represent strictly dissolved metal concentrations". Based on this use of acid extracted metals rather than dissolved they argue that "It is thus not appropriate to apply the national Ambient Water Quality Criteria to these results". Allied-Signal is confused on this issue. The National Water Quality Criteria Documents for trace metals indicate that measurements of acid-soluble concentrations of metals are most appropriate. None of the National Criteria Documents for trace metals recommend the use of dissolved methods (see for instance the Ambient Aquatic Life Water Quality Criteria for Cd and Cu, US EPA, 1986).

However, because of the other concerns, clam biomonitoring was conducted to evaluate the potential for migration of contaminants into surface waters and the potential for bioaccumulation of those contaminants by aquatic organisms. These tests did show substantial migration of certain metals at specific locations on the RASS's.

Allied-Signal Comments - 2.9 (21 November 1988):

2.9 GROUND WATER

Although the three WES wells were down gradient of the kiln site, they were also down gradient of Nichols Creek, and thus any values above background cannot be assumed to have resulted from the presence of the kiln material.

The Navy also summarizes data obtained from groundwater samples drawn from hand-driven well points on Allied-Signal Chemical's property in January and February of 1977. While the Navy admits to the absence of quality control data, it should be emphasized that this study was plagued by sufficient analytical difficulties as to make it impossible to draw any conclusions regarding groundwater chemistry. The most serious problems

resulted from the fact that the samples came from drive points and no information is given which indicates that any precautions were taken to exclude soil particles from the samples. Thus, the results probably do not represent dissolved constituents in the ground water.

Response to Allied-Signal Comments - 2.9 (21 November 1988):

The purpose of the three WES wells was not to establish a link between contamination on RASS 2 and degradation of the groundwater, if any. The gradients in and around RASS 2 have not been established; however, they are presumed to be towards Suisun Bay. Assuming this to be the case, the WES wells are down gradient of both RASS 2 and Nichols Creek.

The January and February 1977 groundwater data were presumably collected by Allied-Signal Chemical or its contractor. As stated in the (Second Revised) Final Draft Feasibility Study Report, "No information is available on quality assurance/quality control (QA/QC) on sampling and analytical techniques or well construction methods used during this study." It should be noted that the data discussed here were developed by Allied. Any conclusion concerning the quality of these data is pure speculation, unless Allied-Signal has information not produced during discovery. The Navy believes, however, that the high contaminant concentrations found in groundwater from several of the wells and drive points used during this study are justification for conducting additional groundwater investigations using today's more rigorous QA/QC procedures. The Navy has initiated such studies on its property.

As stated several times in the (Second Revised) Final Draft Feasibility Study Report, the groundwater pathway is not considered to be a major pathway of concern for any of the four RASS's considered in the study. However, direct measurements to confirm this hypothesis are limited. The ongoing Navy groundwater study will provide additional information to resolve this issue.

Allied-Signal Comments - 2.10 (21 November 1988):

2.10 FEASIBILITY AND COST OF EXCAVATING MARSH

The Navy discusses the mechanics of the excavation process in 4.1.8. They mention that the use of conventional excavation equipment would probably not be feasible in the marsh, and then suggest that dredging might be the method of choice. However, the use of dredging introduces many factors not discussed in the text or accounted for in the costs estimation.

For example, specialized dredges that will operate on wetland (as opposed to water) are far more expensive than the

conventional excavation equipment used for cost estimation. Also, dredging involves the removal of solid material only as a watery slurry. If this is the method the Navy proposes, there is no discussion about how these slurries will be generated, where these large quantities of watery spoils will go or how they will be handled.

The Navy report suggests removal of the contaminated soils by dredging. Although this method of excavation is technically feasible, the cost and logistics of performing this type of operation were not adequately addressed. The excavation process would involve removal of the upper 1 foot of soil and, presumably, loading the excavated material onto earth-moving trucks. Measures to provide access for the trucks must be considered. A likely method to provide truck access involves the use of reinforcing geotextiles and aggregate baserock. Support for the dredging equipment must also be considered. Use of more geotextile and backfilling the executed area immediately after excavation may be required. Additionally, if the excavated soils are to be disposed off-site, an area to stockpile the wet soil to allow the material to dry before transporting must be provided. The stockpile area should be lined and equipped to collect excess fluids. Also, an adequate roadbase to allow for dumping the soil and reloading the dry soil onto Department of Transportation approved vehicles for transporting hazardous waste must be provided.

We conclude that the estimated excavation ($10 per cubic yard) is low, by at least a factor of 2. Other factors and constraints imposed by regulatory agencies could increase the excavation cost even more.

Response to Allied-Signal Comments - 2.10 (21 November 1988):

The intent of the discussion in section 4.1.8 of the (Second Revised) Final Draft Feasibility Study Report was to indicate that a variety of excavation techniques are available. There is no intent to select dredging as the method for excavation. Since a portion of RASS 1 has been deleted from the active remediation area, in all likelihood, conventional excavation methods will be utilized. Some additional design features may be required; however, scheduling of excavation during dry periods may make such design features unnecessary.

Allied-Signal, in its zeal to justify the no action alternative, appears to again misrepresent what is stated in the (Second Revised) Final Draft Feasibility Study Report. In regard to excavation and disposal, Section 4.1.8 of the (Second Revised) Final Draft Feasibility Study Report actually states the following: "The nature of some sites at Naval Weapons Station, Concord, i.e., wetlands, may preclude the use of traditional excavation techniques. In such cases, hazardous substances can

be removed by dredging." [Emphasis added.] A rational interpretation of the term "may preclude" does not include "probably not be feasible" as stated by Allied-Signal. Although the use of dredging is unlikely, Allied-Signal attempts to use the Navy's attempt at developing all necessary technical information to bias the analysis against any alternative other than no action. As a result, Allied-Signal leaps to the conclusion that all dredging involves hydraulic techniques that result in large volumes of slurried material. Mechanical dredging techniques similar to excavation with clamshells are also available. Allied-Signal also fails to mention that because of concerns over the ability to excavate in an environmentally sound manner, the Navy has reduced the area of active remediation by approximately 20 acres.

The possibility of implementing some or all of the design features discussed by Allied-Signal was considered in developing the cost estimates for the excavation alternatives. The excavation cost for wet materials is estimated to be $10./cu.yd. Cost estimates are subject to change based on the final design requirements. For RASS's 1 and 2, where excavation may be more difficult, the proposed remediation decision rule would result in the excavation of approximately 17,667 cu.yd. of soil. Assuming that Allied-Signal is correct and the cost escalates to $20./cu.yd. the excavation cost would increase by approximately $176,670. Note that the total contingency for RASS 1 and 2 is approximately $1,800,000. Thus, the assumed increase in excavation cost is well within the contingency allowance.

> It should be further noted that, although estimation of the true cost is important, the (Second Revised) Final Draft Feasibility Study Report evaluated comparative cost, i.e., cost effectiveness. Therefore, the most important aspect of cost estimating, from the (Second Revised) Final Draft Feasibility Study Report, is that all alternatives are evaluated on an equivalent basis.

Allied-Signal Comments 2.11 - (21 November 1988):

2.11 IMMOBILIZATION

The Navy proposed to remove a large quantity of soil from the marsh because it contains arsenic at concentration levels in excess of TTLC. However, the typical immobilization processes proposed by the Navy involve an increase in matrix pH, which usually results in increased, not decreased, mobility of arsenic. This fact, which represents a serious shortcoming of this treatment, while recognized (Revised Draft Final F.S. at p. 4.12) is subsequently disregarded by the Navy in their selection of preferred remedial alternatives.

Response to Allied-Signal Comments - 2.11 (21 November 1988):

The (Second Revised) Final Draft Feasibility Study Report reveals that the Navy has many concerns about the availability of technologies to chemically immobilize the contaminants, not only arsenic but the heavy metals as well. These concerns are particularly relevant in light of the California two tiered test (TTLC/STLC) and the use of the WET test (citric acid extraction), which is more aggressive than the EP or TCLP extractions. These concerns are adequately expressed in a variety of locations within the (Second Revised) Final Draft Feasibility Study Report. Concern over the ability to immobilize the contaminants is a primary reason that the preferred alternatives are proposed in the alternative, i.e., if contaminant immobilization is not successful, the Class I materials will be sent to a Class I facility.

Section 121 (b)(1) states a preference for "remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment." For materials containing arsenic and heavy metals, chemical stabilization/solidification has been proposed as a technology that could reduce the mobility of contaminants and fix the contaminants in the soil. The technology generally includes the addition, singly or in some combination, of Portland cement, lime and fly ash, cement or lime kiln dust. This technology has been successfully applied on some sites; however, the technology must be evaluated through the use of laboratory and field pilot testing.

Two alternatives on each RASS (1-3C, 1-3D, 2-3C, 2-3D, 3-3C, 3-3D, 4-3C, and 4-3D) included the concept of stabilization/solidification for immobilizing contaminants in the soil. Recognizing the uncertainties associated with the stabilization/solidification technology, the Navy conducted laboratory scale studies to determine the ability of various stabilization/solidification techniques to immobilize the contaminants. Samples of the contaminated soils were collected from RASS 1, RASS 2, and RASS 3 and treated with various ratios of Portland cement, lime fly ash, and cement kiln dust. Materials found on RASS 4 were concluded to be sufficiently similar to materials found on the other three RASS's to obviate the need for testing of these materials. The resulting specimens were tested using the State of California procedures described as the WET test. Values for both the Total Threshold Limit Concentration (TTLC) and the Soluble Threshold Limit Concentration (STLC) were determined. Although contaminants were shown to be partially immobilized, concentrations of arsenic, copper, lead, and zinc exceeded the STLC criterion. In some cases, the values exceeded the criterion by an order of magnitude. These results are

attributed to the following factors. First, the initial concentrations of contaminants are extremely high for some of the samples. This is particularly true for lead and zinc. Second, the State of California WET test, which uses a citric acid leachant, is much more aggressive than the standard Extraction Procedure Toxicity Test (EP) or the Toxicity Characteristic Leaching Procedure (TCLP) that are typically used by the U.S. Environmental Protection Agency to evaluate the toxicity of a hazardous waste.

Based on these laboratory tests, the Navy concludes that:

a. Although stabilization/solidification with cement and pozzolonic materials significantly reduced contaminant mobility, stabilization/solidification failed to produce a product that would pass the State of California WET test.

b. The stabilized/solidified contaminated soils are a Class I waste under State of California statutes and regulations.

c. As Class I wastes, the treated contaminated soils would require disposal in a Class I disposal facility.

d. Since the stabilized/solidified contaminated soil requires Class I disposal, the added cost of the chemical treatment process was not justified.

e. Alternatives including stabilization/solidification should be eliminated from further consideration based on technical and cost considerations.

Based on the above rationale, the Navy concludes that alternatives incorporating excavation and disposal in a Class I landfill, without stabilization/solidification, (Alternatives 1-3A, 2-3A, 3-3A, and 4-3A) are the preferred over alternatives incorporating stabilization/solidification for remediation of the release of hazardous substances on RASSs 1, 2, 3, and 4, Naval Weapons Station, Concord.

Allied-Signal Comments 2.12 (21 November 1988):

2.12 DISPOSAL AT CLASS III FACILITY

The likelihood of success of the disposal of the large quantities of material generated by immobilization is not encouraging. While California regulations allow for delisting of hazardous waste for disposal at a Class III facility, it is a course seldom taken, and thus cannot be relied upon to succeed. One of the reasons it is seldom tried is because of the long time (at least a year) usually required for State approval. A landfill willing to cooperate by accepting such "fixed" hazardous material is also necessary, but cannot be guaranteed.

Response to Allied-Signal Comments 2.12 (21 November 1988):

As pointed out in the (Second Revised) Final Draft Feasibility Study Report, decisions on the part of the California Department of Health Services and the Regional Water Quality Control Board are necessary to finalize appropriate disposal locations for excavated material. For cost estimating purposes, it has been assumed that materials exceeding the TTLC/STLC criteria would be sent to a Class I facility. Again, to accommodate this fact, the preferred alternatives were proposed in the alternative.

It should also be pointed out that on RASS 3, there is a large quantity of material that does not exceed the TTLC/STLC criteria. This material is assumed to be suitable for disposal in or as cover for a Class III landfill. The classification of this material will be developed in cooperation with appropriate state agencies.

Allied-Signal Comments - 2.13 (21 November 1988):

2.13 POTENTIAL CONSTRUCTION OF MONOFILL ON CNWS

It is difficult to comment on the Navy's rejection of siting a monofill on NWS property because insufficient information is presented. In the site screening report (Suitability of Sites for Hazardous Waste Disposal, Concord NWS, Concord, California, September 1987) the Navy used a test for soil permeability not generally employed in California. Thus, without appropriate data, it is not possible to verify the Navy's rejection of on-site disposal.

We note that the present and past Commanding Officers rejected the idea of a monofill on base because it was inconsistent with the base's mission. We are concerned that the monofill option received inadequate study due to its unpopularity with the Commanding Officers.

A letter from the Cal. Dept. of Health Services ("DHS") to Mr. Carl Schwab of the Navy dated 4/4/86 reflects that the DHS' preferred alternative remedial option includes disposal of excavated materials in <u>on-site</u> disposal facilities. The letter refers to EP toxicity testing to determine whether the excavated materials will be subject to RCRA regulations. We note that the results of the EP toxicity analysis performed by Navy contractors on samples from the site revealed that the RCRA hazardous waste criteria were not exceeded. Thus, we believe additional attention should be focused on the possibilities for on-site disposal.

Response to Allied-Signal Comments 2.13 (21 November 1988):

The construction of a monofill on Naval Weapons Station, Concord was fully evaluated in the feasibility study process.

Allied-Signal Comments - 3.1 (21 November 1988):

3.1 IT IS UNCLEAR WHETHER THE NAVY HAS PROVIDED DEFENDANTS WITH COPIES OF ALL REVIEW COMMENTS

On page 1, a number of individuals are identified as having reviewed and provided constructive comments on the Biological Assessment. However, in our review of the draft administrative record and other documents produced by the Navy to defendants, it is not clear that we have received documents reflecting all such comments. Review of those comments would add to our understanding of the Biological Assessment and assist our efforts to critically comment upon it. Accordingly, we request that the Navy immediately produce any such comments which it has not produced already.

Response to Allied-Signal Comments - 3.1 (21 November 1988):

All comments generated by Navy consultants which are not privileged have been produced to the defendants in United States v. Allied-Signal Chemical Corp., et al Civil No. C-83-5898 FNS (N.D. Calif.) and United States v. Chemical & Pigment Co., et al Civil No. C-83-5896 FNS (N.D. Calif.).

Allied-Signal Comments - 3.2 (November 1988):

3.2 FAILURE TO PROVE CAUSE AND EFFECT RELATIONSHIPS MAKES CONCLUSIONS SPECULATIVE

Throughout the Biological Assessment, the author refers to the absence or decreased vitality and variety of plant and animal species in areas of RASS 1 and 2 which are alleged to be contaminated with heavy metals and/or arsenic. Despite the absence of clear cause and effect relationships between the presence of the contamination and the absence or decreased vitality or variety of such species, the author nonetheless speculates that the contamination is indeed the cause for the perceived degradation of the environment. This speculation, however, is not well founded and is, in fact, contradicted by other findings.

For example, vegetation sampled on the east-central portion of RASS 1 indicated an area with 93 to 98 percent cover and average height of 14.5 inches. Further west, at site 6, vegetation height was 22 inches and cover was 100 percent. Similarly, data collected on vegetation from habitat evaluation

sites 4 and 5 on RASS 2 showed total percent cover of 89 to 99 percent and average height of 10 to 11 inches.

By comparison, referencing the Recovery Plan For The Salt Marsh Harvest Mouse, U.S. Fish and Wildlife Service (1984), the author suggests that:

> Recommendations for optimum pickleweed stands given in U.S. Fish and Wildlife Service (1984) include 100 percent vegetative cover, about 12 to 19 inches maximum height, at least 60 percent pickleweed, and some diversity from species such as fat hen and alkali heath. B.A. at p. 22.

The vegetation observed on RASS 1 and 2 closely approaches the recommendations for optimal pickleweed stands given in the U.S. Fish & Wildlife Service Plan. This contradicts findings elsewhere in the Biological Assessment suggesting that the vegetation is "sub-optimal," (B.A. at p. 27) or "degraded." (B.A. at p. 38.)

Moreover, the assertion that excavation is an appropriate remedy because "protective vegetative cover will be increased" (B.A. at p. 41) is also questionable given the existing vitality of the vast majority of the marsh.

The author implies that fewer SMHM were trapped on RASS 1 than RASS 2 because of factors "related to the contamination on-site," such as "the relatively open and short pickleweed stand and the small extent of transition zone vegetation, i.e.: lack of good cover."(B.A. at p. 26.) This interpretation is speculative, especially in relation to contamination on-site. High marsh and adjacent good quality upland may be the dominant factors resulting in fewer mice being trapped at the designated RASS 1 location.

Furthermore, the author admits that:

> Sequential air photos show that the extent of the barren areas, which do not provide habitat for any of the species discussed in this assessment, has been decreasing over time as vegetation colonization has occurred. If this continues at its current rate, and there is no additional release of hazardous substances, the bare areas will be covered in approximately 10 years. B.A. at p. 42.

Again, this observation supports the notion that the marsh on RASS 1 and 2 is a healthy one, improving over time, which will be severely and negatively impacted by excavation, not significantly

improved. Thus, alleged improvements to vegetative cover and quality present little in the way of future benefits which might justify selecting an excavation remedy.

Similarly, the suggestion that excavation will remove contaminated food for the SMHM in the form of pickleweed is speculative and unsupported by data. Specifically, the Biological Assessment focuses attention on the characteristics of common pickleweed "because of its importance to the salt marsh harvest mouse and California black rail." B.A. at p. 9. Pickleweed is a food source to the SMHM. The Navy, however, conducted no analysis of the uptake of heavy metals or arsenic by pickleweed on site. Instead, it analyzed TYPHA, a plant species not a confirmed food source to the SMHM. Thus, the Navy has presented no data regarding the uptake of arsenic or heavy metals by the primary food source of the endangered species of primary concern (the SMHM).

Reliance on Typha data alone is contrary to the recommendations of the Navy's own consultants. For example, Professor William H. Patrick, Jr. recommended "some analysis of...[p]ickleweed, especially, since it is a food source for the [SMHM.]" See Repository Doc. No. WES 001274. Dr. H.T. Harvey, another Navy consultant, stated in a similar vein that:

> Sort of a hindsight idea [is] that in addition to TYPHA on-site analyses it would have been helpful to have data on [pickleweed] because of its role as a food source for the [SMHM.] See Repository Doc. No. WES 006364.

Thus, we are not alone in our concern about this absence of relevant data.

Even where the Biological Assessment provides data suggesting that pickleweed on RASS 1 appears to be under stress, the precise cause and effect for the "apparently stressed pickleweed cannot be determined." B.A. at p. 38.

Specifically, in Appendix C: Height And Vigor Of Pickleweed At Habitat Evaluation Sites, it is stated that:

> Differences in height of pickleweed among study sites could be due to elevation, frequency of flooding, competition with other plants, affects of parasitism, or the effects of contamination. B.A., Appendix C, at p. C 1.

Additionally, vegetation in areas of high concentrations of contaminants is in some cases healthier than that found in areas

of lower concentrations.

Thus, the author's suggestion that "the levels of arsenic found in the soils on RASS 1 are sufficiently high to interfere with the availability of phosphorous to the pickleweed," B.A. at p. 38, is speculative as to the cause of the stress to the pickleweed.

Additionally, as noted by one of the Navy's consultants, Mr. Norwood Page, "[p]lants tend to be stunted or die before accumulating enough [arsenic] to be toxic to animals (usually 10 ppm.)" (See Repository Doc. No. WES 001257.) Thus, even if plants constituting food sources did uptake arsenic, they would not do so in amounts proving toxic to animals consuming them.

Therefore, the author's suggestion that the excavation remedy is justified by the long-term improvement in the quality of food consumed by endangered species on site (see B.A. at p. 41), again is based on speculation, not fact.

Similarly, the author implies at every opportunity that bare areas are caused by high contaminant concentrations. This conclusion, however, is also speculative and not well founded on existing data. The authors of the Revised Draft Final FS are more straightforward:

> The presence of areas on NWS Concord that do not support vegetation, perhaps because of elevations of concentrations of hazardous substances, is a subset of the habitat quality criterion. Id. at p. 3.76 (emphasis added.)

Throughout the Biological Assessment, however, the author fails to mention possible alternative causes for the bare spots.

For example, in discussing RASS 2, the author states that: "A little over one acre is barren." It is not stated that this one acre area was subjected to excavation previously to partially remove piles of kiln rubble at that location. The remaining kiln rubble presents an unsuitable soil matrix for vegetative growth. Its unsuitability appears unrelated to the presence of contamination. No mention of this is stated in the Biological Assessment. Instead, the reader is permitted to draw the inference that all bare areas are the result of heavy metal or arsenic contamination.

Other facts further suggest that bare spots may not be the result of contamination. For example, at an uncontaminated location just west of the northwest corner of RASS 1, it was observed that:

> "Pickleweed at habitat site 2 was 13" tall, but site 3 was a sparse stand of 9". A third of the ground in site 3 was bare, with evidence of ponding. B.A. at p. 19."

In this instance, contamination could not have been the cause of the bare spot. Rather, the bare spot impliedly was caused by a local topographical condition which resulted in ponding, precluding vegetative growth. The same phenomenon may account for at least some of the bare spots which the Navy proposes to excavate in its current remedial action plan.

Nowhere in the Biological Assessment is it stated that soil samples taken from bare spots which are proposed to be excavated reflect unacceptably high levels of heavy metals or arsenic on analysis.

Therefore, the suggestion that the "presence of bare areas" (B.A. at p. 34), is a justification for selecting an excavation remedy is unjustified. Similarly, the conclusion that the extent of bare ground suggests that the habitat on RASS 1 and RASS 2 is degraded is equally unfounded. B.A. at p. 38. Absent the demonstration of a relationship between the presence of contamination and the absence of vegetation, references to bare spots as justification for the selection of an excavation remedy should be deleted. Similarly, any areas designated for active remediation due to the absence of vegetation should be eliminated, absent sample analysis demonstrating the presence of unacceptably high levels of heavy metals or arsenic.

Additionally, to the extent that the bare spots are to be remedied on the grounds that they provide no habitat for the SMHM, this justification may also be without substance. First, it should be noted that trapping of animals near the one acre of barren land on RASS 2 resulted in the capture of 14 SMHM, many more than the Navy apparently expected, given the absence of vegetation. However, this should not have been so surprising. As stated elsewhere in the Biological Assessment:

> "On the other hand, Kovach and Voigt (1986) unexpectedly showed good trap success on an area with 39% pickleweed, <u>29% bare ground</u>, and average vegetation height of only 10" (Grid 8x8W, Table 4). This was explained by multiple observations of mice using desiccation cracks in the old dredged material as escape routes and cover. B.A. at p. 25." (Emphasis added.)

Thus, it is not clear that bare areas provide no habitat benefits to the local SMHM population. While bare spots do not provide vegetative food, they may well provide protective cover,

contradicting the author's belief. See B.A. at p. 38.

Moreover, excavation of bare spots may be an unnecessary exercise since it is suggested that vegetation colonization will result in the covering of all bare areas in approximately ten years. See B.A. at p. 42. Since re-vegetation after excavation will take a number of years, the resulting marginal improvement in the vegetation compared with the improvement expected from natural re-vegetation does not justify the expense and damage to the environment resulting from excavation.

The author's conclusions regarding reduced biotic diversity being related to contamination is also subject to question. Despite the knowledge of the Navy that allied conducted a remediation effort in January 1977 involving application of agricultural lime to much of the area used for a macrobenthic characterization, the Navy does not identify this episode as a possible cause for its findings of reduced biotic diversity compared with background. This, despite the recognition by Dr. Eugene Meyer, consultant to the Navy, that it is likely that the liming did affect "the growth of vegetation in the indicated areas of the NWS property." See Repository Doc. No. WES024227. Again, these findings should be discounted as a justification for selecting an excavation remedy. Other, less environmentally damaging and expensive remedies may be available if liming is the cause.

Finally, the correspondence of standards with biological effects on the sites or even elsewhere needs to be demonstrated or supported by references to other work if conclusions about such effects are stated. Plants and animals are expected to take up or bioaccumulate chemicals in their habitats, but cause and effect relationships demonstrating the actual health of biota living on-site were not produced.

Response to Allied-Signal Comments - 3.2 (November 1988):

This response must begin with several points of correction and clarification in the first paragraph of comments. First, "Throughout the Biological Assessment" is an overstatement. Discussion of the absence or decrease of vitality and variety of species is found in individual paragraphs on pages 19 (referring to a site over a mile away), 26, and 27; Section 4.4; pages 43-44; and Appendix C. Second, use of the word "alleged" is inappropriate because the Final Remedial Investigation Report documented a substantial degree of contamination. Third, the word "speculation" is inappropriate when adequate data exist with which to reach a conclusion. The Final Remedial Investigation Report documented the existence of contamination. Potential effects of the contamination were hypothesized and tested using bioassay of plants, earthworms, and

clams, and tissue analysis and histopathological examination of mice and voles. Data were collected on the characteristics of the vegetation and macrobenthic communities. The results of these and several non-biotic analyses were used in the (Second Revised) Final Draft Feasibility Study Report to evaluate remedial action alternatives, including the no-action alternative, and to select a preferred alternative known as the proposed remedial action plan.

Distinctions should be made among the meaning of vegetation, pickleweed, and habitat. Vegetation refers to the plants present on a site, and may be described by the numbers and kinds of species present, some measure of plant structure (e.g., average height or stem diameter), the distribution of plants, etc. Pickleweed is a species of plant, therefore a subset of the term "vegetation." Habitat refers to the sum total of features in the area where an animal lives. Although each species has different habitat requirements, vegetation, soil, water, topography, and other organisms are common features in habitat descriptions. Habitat may be designated as suboptimal for one or several reasons related to the presence and quality of features necessary to meet habitat requirements. For the salt marsh harvest mouse, an individual species of vegetation (pickleweed) is an important habitat component.

With these distinctions in mind, the second paragraph of this comment is accurate as far as it goes, but the conclusion drawn is inappropriate. The sites on the east-central portion of RASS 1 had 55% cover of pickleweed which was an average of 12 inches tall. As Appendix C of the Final Biological Assessment Report shows, there was also an abundance of "dead" stems (an average of 40.4% of all pickleweed stems) in sites 7, 8, and 12a; and 14% of the plants were infested with salt marsh dodder (Cuscuta salina). A third of the plants on site 8 were infested, and a 650-foot long strip adjacent to the Allied-Signal Corporation Bay Point Works dike had sufficient dodder to be cover typed as pickleweed/dodder. In addition, an expert on the salt marsh harvest mouse, Peter Sorensen, U.S. Fish and Wildlife Service, noted that the "density of pickleweed plants also appeared reduced in RASS 1 compared to comparable marsh areas" (Biological Opinion page 3).

While the vegetation on site 6 to the west is indeed tall and dense, there is no pickleweed; therefore, it cannot be called a pickleweed stand for comparison with the Service recommendations. Vegetation sampling on RASS 2 (not just sites 4 and 5) showed pickleweed at 26% cover. But the dominant plant species are grasses, as seen in Figure 26 in the Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures. A relatively small percent of RASS 1 and 2 can be called a pickleweed stand (cover types 1-5 on Figure 26). Other factors

contributing to the suggestion of suboptimal or degraded habitat are given in the Final Biological Assessment Report on page 38.

Allied-Signal has reversed cause and effect - excavation is not an appropriate remedy because of the increase of protective vegetative cover, rather, the predicted environment after excavation and restoration will include such cover. Both the barren areas and patches of thin or short pickleweed will be improved. The Navy recognized the "existing vitality of the vast majority of the marsh" expressed in vegetative growth and in the areal extent of wetlands in its decision to reduce the acreage of active remediation and to leave some contamination in place.

It is the Navy's belief, based on data and a knowledge of the habitat requirements of the salt marsh harvest mouse, that fewer mice were trapped on RASS 1 than on RASS 2 for the reasons given and as stated in the Final Biological Assessment Report on page 26. The "transition zone vegetation," largely absent in RASS 1, is probably the same thing as Allied-Signal's high marsh, which is by definition connected to adjacent upland vegetation.

Designating the marsh on RASS 1 and 2 as healthy overlooks the fact that contamination is present. Vegetation cover is in effect cosmetic. Again, Allied-Signal is reminded that the Final Biological Assessment Report was not used to justify the excavation alternative.

The plant and earthworm bioassay indicated migration of contaminants from soil into the foodchains. Mouse and vole tissue analyses confirmed that foodchains were contaminated. Analysis of pickleweed on site is not necessary to demonstrate contaminated foodchains. Typha was selected as an indicator of plant contamination because it was widespread across all RASS's and occurred at both reference areas. This is not true for pickleweed, which is more limited in its distribution across only two RASS's and did not exist in all reference areas.

The discussion in the Final Biological Assessment Report of cause and effect on the apparently stressed pickleweed is accurate as written and requires no comment. However, the Navy would appreciate receiving further information on the statement by Allied-Signal that "vegetation in areas of high concentrations of contaminants is in some cases healthier than that found in areas of lower concentrations."

Considerable research has shown that arsenic in concentrations similar to those observed in RASS 1 has substantially interfered with the phosphorus metabolism in plants (Woolson, 1972; Woolson et. al. 1971). This interference results in reduced plant productivity.

While Dr. Page stated accurately that "plants tend to

be stunted or die before accumulating ough arsenic to be toxic to animals", this refers to acute toxicity effects on animals. The concern with arsenic and other contaminants is not just toxicity, but sublethal effects that may result in lowered reproduction, overall ability to function, and therefore individual fitness. In addition, to the extent that arsenic has stunted or killed favored species of plants, it has lowered habitat quality by reducing vegetative food and cover, which also leads to a decrease in individual fitness by decreasing available food and allowing higher predation rates.

Again, Allied-Signal is reminded that statements in the Final Biological Assessment Report were not used to justify the excavation alternative. The quantity and quality of food referenced in the Final Biological Assessment Report refers to the presence of uncontaminated plants and invertebrates. Data from bioassays conducted during the Final Remedial Investigation Report showed bioaccumulation of contamination by earthworms and plants, and invertebrates were found to be severely decreased in sampling conducted on RASS 1. Thus, the Navy's conclusions were based on data, not speculation.

The extent of comments on the barren areas of RASS 1 and 2 is puzzling. In previous communications with the defendants, the Navy received the impression that the barren areas were considered a problem or that "a bare spot may need something done to it" (transcribed comments by Mr. Andres, meeting among Navy and defendants, July 16, 1987, page 231) but were of fairly little consequence in a cleanup, i.e., they could be easily remediated.

It was not the purpose of the Final Biological Assessment Report to explain the cause of conditions on site, e.g., to present alternative causes. The Final Remedial Investigation Report, based on data available at the time, documented the levels and locations of contamination. Both the (Second Revised) Final Draft Feasibility Study Report and Final Biological Assessment Report use this information. If Allied-Signal will reread Section 2.0 of the Final Biological Assessment Report, "Description of Remedial Action Subsites", they will find the 1-acre barren area discussed in context of describing site conditions such as cover and wildlife observations. As an aside, it seems that Allied-Signal is speculating when it says the "unsuitable soil matrix for vegetative growth ... appears unrelated to the presence of contamination," because the dust from the kiln site has been found to be contaminated.

It is possible that some barren areas are the result of ponding, especially on the northeast part of RASS 1. As sediments accumulate in a low spot over time and the surface elevation rises, vegetation can establish, leading to the decrease in extent of bare ground seen there in recent years. The topographic relief of the barren areas on RASS 2, however,

logically precludes ponding as an explanation. As for weight to Allied-Signal's argument, it has misread the location of site 3 in its quote. Instead of being "just west of the northwest corner of RASS 1," this site is over a mile to the west of RASS 1 and south of Waterfront Road.

In answer to concerns about the actual level of contamination on the barren areas, portions of two large areas, one on each of RASS 1 and 2, are encompassed by sampling locations with metal concentrations in excess of TTLC/STLC. Dust from the rubble pile on RASS 2 is contaminated and probably distributed around the pile by water and wind. The additional sampling and analysis scheduled to occur prior to implementation of remediation will identify other specific locations that require remediation. If some barren areas themselves do not show contamination sufficient to require excavation, another form of treatment can be defined.

The appearance of degraded habitat, taken in context with other evidence of contamination and its effects, served as a criterion in the decision-making process described in the (Second Revised) Final Draft Feasibility Study Report, not in the Final Biological Assessment Report. Whatever the reason for the lack of vegetation on the barren areas, they provide no positive habitat features for the species of concern and potentially some harm; therefore, they contribute to a characterization of degraded habitat. They do not provide cover for feeding or reproduction or escape, nor do they provide vegetative food itself. (The Navy is missing information from the defendants on the results of some invertebrate sampling conducted in 1987 on and adjacent to the barren areas on RASS 2, which would be helpful for answering questions about the availability of insects, etc., as food). Some bare surface may serve as a dust bath for birds to rid themselves of pests, but the dust itself is contaminated and can be taken into the body, directly or through grooming. The concept of the barren areas on RASS 1 and 2 providing cover in the form of desiccation cracks was addressed in answer to comment 1.71.

Although the barren areas may be covered with vegetation in time, without active remediation the contamination will remain and be available to plants and animals on the site. The Navy does not find this acceptable.

Although the exact location of the 1977 work is not known, it apparently overlaps with areas in RASS 1 that exceed TTLC/STLC levels. The reduced biotic diversity, whether caused by currently high levels of contamination or by the 1977 attempts at remediation, is just one of several indications of degraded habitat which were considered in the (Second Revised) Final Draft Feasibility Study Report. The magnitude of the difference between invertebrate populations on RASS 1 and from the Reference

Area is convincing evidence that a problem exists. The remediation effort in 1977 either did not work, or was superseded by new contamination.

Note that the discussion at page 71 of the Allied-Signal comments is an admission that the use of in situ remediation techniques such as liming may result in decreased biotic diversity. This is one of the primary reasons that such techniques were discounted as being appropriate for this site. In addition, the use of in situ techniques requires reapplication on a periodic basis.

While direct cause and effect relationships of contamination and biological effects are ideal, in a complex environment such as RASS 1 and RASS 2, these relationships are often difficult to define. Correlations in the data, however, provide a clear indication of the potential environmental impact of the contaminants. For example, soil invertebrates were observed to be significantly reduced in abundance in an area of RASS 1 that also contained the highest soil content of arsenic. Plant and earthworms died in soil from this same area. Whether problems stem from the high contamination or the excessive amount of lime applied to correct the original discharge of hazardous materials, the Navy proposes to restore this area to its original productivity.

Allied-Signal Comments - 3.3 (21 November 1988):

3.3 THE NAVY FAILS TO PROPERLY CONSIDER THE RISK OF INABILITY TO RECONSTRUCT SIMILAR MARSH HABITAT.

Part of the Navy's present Remedial Action Plan contemplates excavation of marsh on RASS 1 and subsequent reconstruction of the marsh to prior habitat quality. The success of the reconstruction effort is crucial to the Navy's justification for excavation. The Navy contends that since it will be able to reconstruct a better marsh than the one that exists today, the short term devastation to the wetland habitat and resident endangered species will be outweighed by the long-term benefits of the reconstructed and improved marsh. Clearly, if the Navy cannot reconstruct the marsh so that it provides habitat equal or superior to the existing marsh, the justification for excavation fails.

The risk of successfully restoring wetland habitat is recognized in the Biological Assessment report, and some of the literature identifying concerns about the success of restoration is cited (Id. at p. 44). However, concerns about success of restoration do not seem to affect the long-term production of the environment after active remediation is completed (See B.A. at p. 41). It is implied in Section 5.3 that active remediation will result in a higher quality, more productive habitat and that the

mouse and rail populations should increase. But published comment on the end results of wetland restoration cast significant uncertainty on predictions made in the Biological Assessment and Feasibility Study reports.

The success of the use of wetland habitat restoration in the mitigation of impacts of development on wetlands has stimulated considerable controversy among knowledgeable technical specialists working in this subject area. The success of restoration in the San Francisco Bay area was questioned by Dr. Roce (1985), Mrs. Eliot (1985) and other conclusions were disputed to some extent by Drs. Harvey and Josselyn (1986) who are recognized wetland restoration experts in the Bay Area. This type of controversy between experts prompted the San Francisco Bay Conservation and Development Commission (BCDC) to initiate an analysis of tidelands restoration projects in San Francisco Bay (BCDC, March 1988).

After analyzing the results of 14 wetland habitat mitigations in the Bay Area, conclusions were reported which only add to the uncertainty of success in wetland restoration if one intends to reproduce and improve the habitat that existed prior to restoration.

It was discovered that the principal standards for judging success were subjective and created to meet the administrative needs of the report and that ecological data and standards were generally not available to compare pre- and post-project success. The principal standard of success was: "successful programs were those that had fully met the permits mitigation requirements and had created valuable Bay resources. Six of the 14 mitigation programs (49 percent) were judged to be successful by this standard.

One can infer from the report it is difficult to measure success for several reasons, two of which are: (1) "there is no agreement regarding the relative value of various Bay resources." (Thus no firm standards for comparison of values), and (2) "there is no certainty that any given tidal restoration program will fully meet all of its mitigation goals (BCDC, March 1988)." Recommendations about how to resolve some of the uncertainties are given in the report.

In all of these and other reviews (e.g., Niesen and Josselyn, 1981; and M. Josselyn, ed. 1982) one can quickly recognize that habitat restoration to achieve specific habitat and wildlife use objectives is a developing and evolving science and art. Based on knowledge of hydrology, elevation, soil types and geographic area one can design and implement wetland habitat. To predict the end result especially in specific terms describing functional use of the wetland by wildlife seems very risky. The number of uncertainties controlling and influencing future

results are too great.

We are not the only observers who are concerned. Navy consultant Dr. Eugene Meyer, in commenting on an earlier version of the (Second Revised) Final Draft Feasibility Study Report, stated:

> It is undoubtedly true that wetland restoration is an art rather than a science, but it would probably be best to not provide that information to the defendants. Let them uncover the point for themselves. Telling them that it is an art allows them to have a basis for discouraging wetland restoration altogether. See Repository Doc. No. WES009051.

While we do not disparage all efforts to restore wetlands, which in some cases may be appropriate, we do question its use to justify destruction of otherwise healthy, productive marsh which has adapted to levels of contamination in it.

We contend that the Navy fails to consider adequately the likelihood that it will not be able to successfully and timely reconstruct a marsh which can be inhabited by endangered species. First, it will be difficult to reproduce the vegetative cover now existing in the marsh on RASS 1 since "a distinctive feature of the wetland is its diverse and patchy composition (Figure 26)." See B.A. at p. 9. There are numerous species of vegetation located on the areas to be excavated and precise reproduction of existing conditions is unlikely to occur. Conditions of vegetative cover are important to endangered species habitat requirements. See B.A. at p. 21.

Despite the likely difficulties which will be encountered in reconstructing the marsh, the Navy has not yet seen fit to draft a detailed restoration program, putting it off until a later date. See B.A. at p. 12. Generally, the Navy describes its reconstruction program as follows:

> Clean soil would be brought in, soil amendments added if necessary, the area graded to appropriate elevation and contours, and planted with native species. Although several marsh species such as pickleweed invade new substrates (Knutson and Woodhouse (1982), rapid vegetative cover is desired., thus, planting may be necessary. B.A. at pp. 12-13.

This description, however, raises more questions than it answers.

With regard to the "clean soil" to be brought in, what

will be its characteristics and where will it be brought from? With regard to "soil amendments," how will the Navy determine if they are needed, what kind will be used and how much will be added? As to grading "to appropriate elevation and contours," what criteria will be used to determine what elevations and contours are appropriate? Finally, with regard to the planting of "native species," what is the likelihood of success of new plantings and what is the likelihood that original vegetative cover patterns can be duplicated? These are serious questions relevant to the likelihood of overall success of the reconstruction effort which have not been addressed by the Navy. Accordingly, the Navy cannot fully evaluate the risks associated with the plan. Thus, the overall justification for selecting the excavation alternative is weakened.

Our concerns in this regard are not mere speculation. As the author herself recognizes:

> The risk associated with successfully restoring wetland in transition zone habitat is less clearly understood. Recent literature has raised concerns about both the administrative and technical ability to restore wetlands (e.g., Josselyn (1982), Eliot (1985), Race (1985). See also Harvey and Josselyn (1986), Race (1986), Quammen (1986), Steinhart (1987), Zenter (1987). B.A. at p. 44.

Thus, the literature suggests that there are serious obstacles to overcome in reconstructing a wetland. Given the failure of the Navy to draft a detailed restoration plan, the Navy cannot be assured the obstacles can be cleared. Despite this, little comment is made in the Draft Final F.S. regarding the potential inability of the Navy to reconstruct the marsh. Instead, it is largely assumed that reconstruction will succeed, thereby, justifying selection of the excavation remedy. Given the doubts raised herein, however, this justification should be reconsidered.

The Navy is gambling with high stakes. The marsh which it plans to excavate has been designated as a Wetland Preserve under a Memorandum of Understanding between the Navy and the Fish and Wildlife Service. See B.A. at p. 19. Quoting Allied's consultants, the Navy has recognized the importance of this area:

> Jones and Stokes Associates (1984) recognize the importance of Middle Point Marsh, stating it "appears to support the greatest diversity of wetland wildlife" at NWS Concord. See B A. at pp.20-21.

Furthermore, with regard to the SMHM, the Navy notes that:

> Its present status "appears to be a few thousand animals at the peak of their number each summer, distributed around the Bay marshes in small, disjunct populations" (U.S. Fish and Wildlife Service 1984). Reasons for the decline of the [SMHM] are related to fragmentation of marshes remaining within its range, and loss of suitable habitat from land subsidence, changes in solenity, filling of high marsh, and resulting vegetational change. B.A. at p. 2.1.

Although the presence of wetlands, listed species, and topography was reportedly considered, the obvious high value of the extant wetlands as habitat for the SMHM and other species is not reasonably recognized and discussed. Thus, the destruction of wetland habitat and endangered species living there without assurance of the ability to reconstruct that habitat and repopulate it with new members of the endangered species presents a tremendous risk.

Under the proposed plan, restoration will be attempted on 13 acres and re-vegetation on the remainder. B.A. at p. 12. The Navy anticipates that recolonization would be by individuals not injured during cleanup activities or by movement of animals from other parts of the marshes at NWS Concord. B.A. at p. 13. No indication is provided, however, how long this recolonization is expected to take. In fact, there may be a significant question as to whether any recolonization will take place since "the harvest mouse has a very spotty distribution." See B.A. at p. 21.

The proposed excavation and associated disruption of adjacent marsh areas may completely decimate any SMHM community now existing on RASS 1, thereby eliminating any possibility of recolonization. It is recognized by the Navy that:

> Repopulation of restored marshes by trapping and relocating mice is not recommended because of lack of success in previous attempts (pers. comm., T. Harvey 8 Nov. 86, Harvey and Stanley Associates, Alviso, CA). B.A . at p. 13.

Certainly the SMHM population after excavation would not match present population levels within 5 years. Though the Navy makes no projection how long recolonization will take before current numbers of SMHM are matched, at a minimum it suggests that the wetlands in transition zone will not be fully functional for between 2 to 5 years, based on reported time for natural

establishment of pickleweed. B.A. at p. 40.

We believe, however, that recovery of the habitat in 2 to 5 years to conditions that support the SMHM is speculative and highly uncertain. The establishment of habitats supporting a population of mice and voles at apparent densities observed by Harvey and Stanley (1985) is equally uncertain and overly optimistic. The aging of the habitat may be again an important feature. It may take several years for immigration to repopulate the area, assuming this discrete population survives the initial excavation.

Response to Allied-Signal Comments - 3.3 (21 November 1988):

A cohesive response to this comment is difficult because of the organization of the comment. However, three themes emerged and will be addressed. They include the recurring misunderstanding that wetland restoration was used to justify the proposed remedial action, the lack of standards for judging success, and uncertainty about the success of wetland restoration.

The proposed remedial action alternative includes wetland restoration as an integral part of the plan, not as a justification as Allied-Signal repeatedly states. Following requirements for consultation with the Fish and Wildlife Service under Section 7 of the Endangered Species Act of 1973, the Navy prepared a Final Biological Assessment Report in which the preferred remedial action alternative and two other remedial action alternatives developed in the feasibility study, were evaluated for their effect on endangered species and candidates for listing as endangered. The Final Biological Assessment Report was provided to the Fish and Wildlife Service along with the Final Remedial Investigation Report, the (Second Revised) Final Draft Feasibility Study Report, and copies of other data to present all pertinent information for the Fish and Wildlife Service to use in determining whether the proposed remedial action would jeopardize the continued existence of the endangered species. The no-jeopardy Biological Opinion which the Fish and Wildlife Service issued dealt with the question of wetland restoration and made recommendations. Even with the uncertainty that exists in the area of wetland restoration, the Fish and Wildlife Service, the California Department of Fish and Game, and the San Francisco Bay Conservation and Development Commission prefer the proposed remedial action to the status quo.

As has been observed, criteria for evaluating the success of wetland restoration have been inconsistent and often unclear. Allied's exhibits 5 and 6 (Race 1985, Eliot 1985) did not use clear definitions, but attempted to match current project status with stated project objectives. In exhibit 7 (San Francisco Bay Conservation and Development Commission 1988), criteria for success were:

> "determining whether the mitigation project,... met the specific mitigation requirements of the permit authorized by the Commission," or "determining whether the mitigation program had either created or enhanced valuable Bay resources that were comparable to the resources found in similar natural, relatively undisturbed Bay tidelands."

Zedler (1980) presented two criteria:

> "(1) comparison of what actually developed with what was promised and
>
> (2) comparison of what developed with what was and is still needed in the region."

Zentner (1988) also used two criteria:

> "the functional capability of the restored wetland and the perceived success of the project by scientists involved in project planning."

These criteria range from administrative to ecological in nature.

Three difficulties in measuring success by the definition originally chosen were cited by San Francisco Bay Conservation and Development Commission (1988) and partially quoted by Allied-Signal in the sixth paragraph of this comment. These difficulties do not apply to the proposed wetland restoration. (It should be noted that the Commission was able to determine and apply criteria for measuring success).

The first difficulty, "few of the evaluated projects and their associated environmental documents contain detailed information on the resources lost or disturbed as a result of the authorized fill project," has been met by the detailed documentation prepared by the Navy of contamination present and affected resources of the Naval Weapons Station, Concord. The second item, "early mitigation efforts appear to have been largely designed to create a desired habitat (in most cases, a cordgrass marsh) rather than replacing resources lost as a result of authorized fill," is not pertinent because the wetland goal in this case is to replace resources, not to create a different habitat. The resource of concern is a pickleweed marsh and associated transition zone vegetation. The other often-selected plant species, Pacific cordgrass (Spartina foliosa), which is less reliably established, is not the target species. The third difficulty, "there is no agreement regarding the relative value of various Bay resources," does not apply because a decision on

relative value is not required. We are not trading mud flat for marsh, for instance, which is a common reason for disagreement.

Having consulted local experts, other consultants, and many pieces of literature regarding the success of wetland restoration, the Navy is confident that the restoration portion of the proposed remedial action can be accomplished. The Navy also recognizes the risks and uncertainty. Because of that, the Navy will show great care in proceeding. A detailed restoration plan will be developed during the design phase of the remedial action, following the advice contained in literature such as Allied-Signal mentions and other sources of which it is apparently unaware.

Four sources are particularly instructive: Allied-Signal's Exhibit 7, San Francisco Bay Conservation and Development Commission (1988), Quammen (1986), Winfield (1988), and Zedler (1988). The latter is a chapter titled "Salt Marsh Restoration: Lessons from California" in John Cairn's book Rehabilitating Damaged Ecosystems, Volume I, CRC Press, Boca Raton, FL. Quammen's article is in the Sept-Oct 1986 issue of the National Wetlands Newsletter. Winfield wrote in the Proceedings of a symposium on Mitigation of Impacts and Losses held in 1986 in New Orleans, LA. The advice from these sources, written for a regional approach, is interpreted below for specific conditions on RASS 1 and 2. This response to comments expands on related points made in the Final Biological Assessment Report.

The restoration plan will include a clear statement of the goals of restoration and a detailed and complete plan for accomplishing the goals, including provision for:

(1) Coordinating with knowledgeable individuals during design, construction, and monitoring, including wetland biologists and ecologists, hydrologists, and engineers;

(2) Assuring effective engineering methods, equipment, and access;

(3) Placing compatible fill material as substrate for plant growth;

(4) Attaining correct final substrate elevation for growth of pickleweed and companion plant species;

(5) Maintaining existing hydrological conditions, e.g., freshwater inflow from Nichols Creek, tidal access from the Bay, adequate circulation, cycles of flooding;

(6) Supplementing the expected colonization of pickleweed with planting if needed;

(7) Planting the transition zone vegetation;

(8) Incorporating experimental elements;

(9) Preparing a maintenance plan;

(10) Defining success in an objective and quantitative manner;

(11) Monitoring progress over sufficient time to assure success;

(12) Incorporating adjustments to the plan as needed;

(13) Using monitoring techniques that are compatible with similar activities in the Bay area;

(14) Publishing methods and results in peer-reviewed outlets.

The topics of other recommendations do not apply to RASS 1 and 2 wetland restoration and thus do not present problems:

(1) Decisions that must be made in permit mitigation situations such as on-site versus off-site restoration or in-kind versus out-of-kind resources are not required in this case;

(2) Control of adjacent development, which is normally difficult to attain but important to success, can be accomplished at Naval Weapons Station, Concord;

(3) There is often no long-term commitment to a project, but that commitment exists here, expressed in plans for long-term monitoring and the intent and ability to make adjustments as needed.

In addition to the themes that run through comment 3.3, there are specific points that cry for an answer. One is found in the eighth paragraph, where it is stated that the "healthy, productive marsh ... adapted to levels of contamination in it." The Navy would like Allied-Signal to expand on that statement with data and expert opinion.

Because the wetland restoration will be designed to be functional, some of Allied-Signal's points are inappropriate and show a lack of understanding of wetland ecology. For example, in the ninth paragraph of this comment, it refers to the difficulty of reproducing "the vegetative cover now existing in the marsh" and go on to suggest we are interested in the vegetative composition that exists to the west of the area to be actively remediated. The majority of vegetation in the area of RASS 1 to

be actively remediated is pickleweed, which, with appropriate substrate and tidal inundation, will naturally recolonize in a short period of time. In RASS 2, much of the area to be remediated is bare of vegetation, which is definitely not a condition to replace. No reasonable person would try to obtain "precise reproduction of existing conditions." Because "conditions of vegetative cover are important to endangered species requirements," this is precisely why the Navy proposes replacing the contaminated substrate and pickleweed of RASS 1 with clean material and fresh vigorous pickleweed.

Specifications for the mechanics of obtaining suitable fill material, determining necessary soil amendments, etc., will be based on the years of experimentation and practice by personnel at the Army Corps of Engineers Waterways Experiment Station and wetland restoration experts in the Bay area. These and many other points will be presented in the detailed restoration plan. The Navy disagrees with Allied-Signal's assertion that the risks associated with the plan cannot be adequately evaluated at this time.

Allied-Signal refers to documentation of the value of the marsh and uses that support the maintenance of the status quo (contaminated conditions). But that argument is backwards. The proposed remedial action plan was developed because of the value of the area and concern over the health and future well-being of wildlife on site. In response to the charge that the Navy did not reasonably recognize and discuss the extant wetlands and their value, Allied-Signal is advised to reread Section 7.0 of the Final Biological Assessment Report. In addition, the Fish and Wildlife Service issued its Biological Opinion of no-jeopardy because "habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities."

Successful restoration of the functions of a wetland is indeed more difficult to predict and assure than structural success, and Allied-Signal is correct in pointing out some missing information such as recolonization rates of the salt marsh harvest mouse. The monitoring plan is very important in providing the framework for regular examination of the wetland during the restoration process, including obvious features such as hydrological regime and less obvious indications of function such as invertebrate colonization.

Allied-Signal Comments - 3.4 (21 November 1988):

3.4 THE NAVY SHOWS NO "HARM" OR "DAMAGE" - ONLY UNQUANTIFIED "POTENTIAL RISK" AND "CONCERN"

In attempting to justify the selection of an excavation remedy on RASS 1 and 2, the author of the Biological Assessment

uses a variety of terms to describe the effect which he believes the contamination found on those properties is allegedly having on the SMHM. These descriptions range from "concern" to actual "harm" or "damage." Nowhere, however, is any quantitative measure provided of the alleged risk, damage or harm allegedly being suffered by the SMHM as a result of its exposure to contamination. Thus, the allegations of harm or damage are purely speculative and allegations of concern or potential risk are vague and ambiguous.

For example, in one passage, the author states:

> During the decision process, the harm to the environment resulting from the release and threatened release of hazardous substances was weighed against the harm would result from active remediation. Harm to the environment in the first case is chemical and biological, and includes the uptake of hazardous substances by plants and wildlife in a contaminated area. B.A. at p. 12. (Emphasis added.)

This suggests that the author has reviewed data demonstrating that the resident SMHM population has been examined and found to have incurred visible injury as a result of exposure to contaminants. Similarly, the author later states that:

> [F]rom an evaluation of habitat conditions, contaminant levels and bioavailability, and histopathology, it is clear that there are several factors acting to impose stress on the residents of RASS 1 and RASS 2. B.A. at page 44.

Again, the reader is left to imply that the author has made observations of the SMHM demonstrating that they are under stress.

In fact, however, neither harm nor stress is demonstrated by any of the data provided. To the contrary, only varying descriptions of heightened "risk" or "concern" are established. We suggest that the word "harm" should be replaced with the word "risk." The use of the word "harm" (B.A. at p.44) is a presumptive judgment which is not altogether supported by the on-site observations and data.

For example, the author states that "chronic long-term effects of exposure to the contamination on site is expected to result in unacceptable risk and impact to wildlife species." B.A. at p. 5. This sentence reveals that the author cannot point to any observed damage which has occurred. Moreover, it implies

that the author does not believe that the SMHM are presently being faced with unacceptable risk and that such risk will only occur in the long-term. This contradicts the earlier statements implying that harm presently is being done to the SMHM.

Use of the phrase "is expected to result in unacceptable risk and impact to wildlife species" also indicates a bias to prejudging circumstances from a particular regulatory viewpoint. Extant conditions on-site that counter the regulatory viewpoint receive little attention. Certainly the risk may be called unacceptable, but if plants and animals living on-site are productive and the risk is diminishing with time, what are the ecological criteria for determining unacceptability? Considering the history of the site and the present state of habitat and wildlife populations, can the magnitude of some future catastrophe be described to quantify the risk? Although present contamination elicits concern and recognition that there is a level of risk to wildlife, no data are presented to show a future more detrimental to wildlife, especially the SMHM, than the present.

Moreover, given that contaminants have been decreasingly bioavailable in the recent past and will continue to become less bioavailable in the future, the data would not support the author's pessimistic view of the SMHM's future at the site.

It is highly revealing that the author does not reference by name perhaps the most significant study conducted to determine whether the SMHM have been harmed or damaged. A pathological study was conducted by SRI International in May and June of 1986. After thoroughly examining 36 mice and 13 voles taken from RASS 1 and RASS 2 (37 different body orifices and tissues were examined on each rodent), SRI International concluded that:

> [N]o toxin-related gross findings were detected at necropsy. Histopathologically, various parasitic or inflammatory conditions were encountered in [some of] the animals. However, none of these were deemed to be the result of exposure to toxic contaminants at the capture sites. SRI International (July 1986).

This scientific conclusion that on-site contamination has not caused damage to the resident rodent population earned only the following reference in the Biological Assessment:

> Long-term exposure during one generation has been verified in the mice and voles trapped on RASS 1 and RASS 2. This exposure has

> apparently been insufficient to cause pathological problems that are lethal (no mortality study was conducted), but could cause more subtle, sub-lethal effects. B.A. at p. 43.

The author makes no direct reference to the SRI International study. Rather, she implies that its conclusions are doubtful by suggesting that the absence of damage was only "apparent" and that visual observations may have missed "more subtle, sub-lethal effects." However, the author presents no data to substantiate her claims. Even with regard to such sub-lethal effects, the author can only suggest that they are "of concern." B.A. at page 44. She cannot prove that such effects actually are occurring.

The existing data on bioaccumulation of metals and arsenic by animals living on contaminated soils is insufficient to use as a basis for selecting excavation as a remedial action. Even if the Navy believed that bioaccumulation was the proper criterion for selecting a remedial action, and tried to develop the necessary toxicological data, the Navy has recognized that it would have grave difficulties applying the criteria. See Revised Draft Final FS at p. 3.70.

In summary, the Biological Assessment implies that harm and damage is occurring to the resident SMHM populations due to exposure to contaminants. But, in fact, the author can suggest only that risk levels have been or will be increased by some unstated quantum. The Draft Final F.S. heavily relies on the findings in the Biological Assessment of allegedly significant bioaccumulation of selenium, cadmium and lead in plants and animals to justify the selection of an active remedial action. Yet, without some evidence that this bioaccumulation is causing harm or presents a substantial danger of harm to the SMHM, evidence not presented in the Biological Opinion, this reliance is misplaced. Accordingly, the proposed selection of an excavation remedial alternative in the Draft Final F.S. must be reconsidered.

Response to Allied-Signal Comments - 3.4 (21 November 1988):

The Final Biological Assessment Report sets forth the effects of the proposed Federal action on the endangered species.

As was documented in the Final Remedial Investigation Report and reviewed in the Final Biological Assessment Report, the mice and voles that were analyzed for metal content of their tissues and histopathological condition were found to have statistically significant elevated concentrations. That, by the way, is a quantitative measure based on data, not speculation. Because the salt marsh harvest mouse (as well as the California clapper and black rail) share habitat and food habits with the

mice and vole, they are all being exposed to contamination that caused the elevated body concentrations.

The Navy stands by the words in the Final Biological Assessment Report on page 12 which portray some of the thought that went into the decision on remediation. 'There can be no denying that some harm has occurred from the contamination, as evidenced by increased bioaccumulation of contaminants by plants, invertebrates, and rodents, and by increased plant and earthworm mortality. Clearly some harm will occur with excavation of wetland habitat. Again, Allied-Signal is reminded that more factors of the environment than the salt marsh harvest mouse were evaluated in the (Second Revised) Final Draft Feasibility Study Report, and that the harvest mouse was not directly sacrificed and analyzed for metal concentrations. The data collection process was clearly spelled out so that no reader should have the implication that the salt marsh harvest mouse was so examined.

The quote in the fourth paragraph of this comment (which is on page 35 of the Final Biological Assessment Report) is correctly worded because future conditions are being discussed. Those conditions are based on documentation of elevated metal concentrations from the past in soils, plants, clams, and earthworms; movement of the contamination; and its persistence over time. The Navy's grammar was not intended to confuse Allied-Signal.

Comments in the fifth and sixth paragraphs show a bias toward the no-action alternative, which the Navy, based upon its thorough evaluation, has found to be unacceptable, even though Allied-Signal acknowledges concern about the present contamination. On what basis does Allied-Signal find that the "risk is diminishing with time," or that "contaminants have been decreasingly bioavailable in the recent past and will continue to become less bioavailable in the future," since the contamination is composed of metals which are not biodegradable? It bears repeating that the extant condition of the wetlands was considered in the decision process by the Navy and by other commenters, such as the Fish and Wildlife Service and the San Francisco Bay Conservation and Development Commission.

If Allied-Signal will read Appendix A in the Final Biological Assessment Report, it will find the SRI work referenced, with additional comment: "Eight mice and six voles showed some type of gross change. This included two mice and five voles from RASS 1, five mice from RASS 2, and one mouse and one vole from the Reference Area." That work was also furnished to the Fish and Wildlife Service for its review and consideration during the preparation of the Biological Opinion. Figure 1 illustrates the relationship between contaminant exposure as measured by bioaccumulation and biological effects. At low levels of exposure as measured by statistically significant

bioaccumulation, biological effects are expressed at the molecular and subcellular levels. As exposure increases, these effects can be manifested at the tissue level as histopathology. The bioaccumulation observed in the mice and voles is statistically significant and can have molecular and subcellular effects, but may not be sufficient to result in tissue level effects.

The Navy's process for selecting a remedy for the contamination at Naval Weapons Station, Concord did not rely solely on bioaccumulation data from animals living on the contaminated soil. Please see Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report for a description of the criteria and factors used. Because of the complexity of the site, multiple considerations were necessary and were used.

In summary, it is not true that the "Draft Final Feasibility Study heavily relies on the findings in the Final Biological Assessment Report," but on the findings of the Final Remedial Investigation Report, which showed not "allegedly" but actual, statistically significant increases in the bioaccumulation of arsenic, selenium, cadmium, and lead in plants and animals. Evidence for harm to the species on site comes from studies such as those cited in Section 4.4 of the Final Biological Assessment Report and described in Section 4.0 of the Final Remedial Investigation Report. Accordingly, the proposed selection of an excavation remedial alternative is considered the one that best meets the environmental goal.

Allied-Signal Comments - 3.5 (21 November 1988):

3.5 INSUFFICIENT DATA EXISTS TO SUPPORT CONCLUSIONS REGARDING THE IMPACT OF CONTAMINATION ON RESIDENT SMHM POPULATIONS

A major justification for the Navy's preference of an excavation remedy is the conclusion of the Biological Assessment that:

> [S]everal factors [are] acting to impose stress on the residents of RASS 1 and RASS 2. This keeps [the SMHM] from reaching their full reproductive and maximum population numbers. The accumulative beneficial effects of this remedial action and other management efforts under way for these species will be substantial. B.A. at p. 44.

This conclusion implies that the author has compared data for projected normal population levels for this marsh with actual population levels, and found that actual levels are lower due to a demonstrated cause and effect relationship with contamination on site. However, this is not at all the case.

No measures of population density or growth are used on this site in comparison to a cited standard. A standard for density and growth has not been described in the Biological Assessment. Population limitations caused by the contamination are only speculative at present. If one could compare the present density or growth conditions over time to a standard, is the present condition normal or depressed by 3, 10, or 70 percent?

The author admits to having little knowledge regarding either existing or optimal population numbers. For example, although Harvey & Stanley Associates conducted trapping on RASS 1 and 2, the number of individual mice trapped did not provide a population estimate. See B.A. at p. 14. Additionally, the SMHM population is seasonal, with populations reaching their peak each summer. See B.A. at p. 21. Overall, "the [SMHM] has a very spotty distribution." B.A. at p.21. Thus, there is no baseline data regarding existing SMHM populations from which any objective observer could conclude that existing populations are below expected levels.

Nonetheless, the author of the Biological Assessment does not hesitate to speculate that excavation of 10 acres of wetland habitat, resulting in the death of all SMHM living there, will eventually result in "significant population growth." See B.A. at p. 27 and p. 41.

The speculative nature of this conclusion is revealed by the absence of any reference to either the amount by which current populations are below expected levels or the amount by which maximum population numbers will increase as a result of the excavation and marsh reconstruction efforts planned by the Navy. Absent such quantitative figures, or any data to which reference can be made to extrapolate such quantitative figures, these conclusions are nothing more than the speculation of the author and are discredited as a basis for preferring an excavation remedial alternative.

The recorded facts demonstrate that much of the wetland habitat designated for active remediation supports a relatively large population of mice and voles, including the SMHM. Evidence has not been produced to demonstrate that these populations are harmed, only that they are subject to an increased level of risk. Visual observation of the wetland and signs of wildlife use of the habitat indicate a productive ecosystem, as do the data produced by Harvey & Stanley and SRI, International. Although such observations seem to contradict common assumptions used in assessing heavy metal contamination, they should induce a viewpoint directed toward identifying and weighing both the benefits being derived presently from the existing wetland and the risk factors. Both viewpoints need to be presented for a balanced judgment about the amount of wetland, if any, to receive

active remediation.

Another example of uncorroborated speculation by the author is her conclusion that the "stress" placed on the SMHM by various factors "keeps them from reaching their full reproductive potential." See B.A. at p. 44. Earlier, the author stated that:

> Reproductive potential of this species is apparently low, with an average litter size just under four, and possibly only one litter a year (Fisler 1965), i.e., per mouse, because most mice die before 12 months. B.A. at p. 26.

No data is produced suggesting that the SMHM on RASS 1 or RASS 2 now has an even lower reproductive potential than those of normal SMHM due to exposure to contamination. Accordingly, to suggest that their naturally low reproductive potential will somehow be increased by removal of some marginally contaminated habitat is unsupported.

Response to Allied-Signal Comments - 3.5 (21 November 1988):

There is no implication intended or given that actual population levels for the salt marsh harvest mouse were analyzed - NO POPULATION STUDIES HAVE BEEN CONDUCTED. As most basic biology texts will state, if individuals in a population are stressed, the survival and reproductive rates for individuals and the population over time are diminished. That in turn causes population levels to decline, and that can cause the species as a whole to decline in numbers and fitness. This is true for all species. When endangered species are involved, the danger can become immediate. The population growth that could occur after remedial activities obviously refers to future generations of animals that are not living under direct or indirect stress due to metal contamination.

As has been stated, the "increased level of risk" for the residents of the wetland, which Allied-Signal acknowledged in its comments, constitutes potential harm to them and is therefore reason to consider remedial action. The Navy takes issue with Allied-Signal's statement that visual observation is sufficient to indicate the productivity level of an ecosystem. See response to comment 1.23.

The acknowledged lack of data on actual reproductive rates and population levels of the salt marsh harvest mouse is indeed a hindrance. However, a good scientist can, when necessary, rely on extrapolation from relevant data. For the salt marsh harvest mouse, that extrapolation resulted in a decision by the Fish and Wildlife Service that the species would be better off if the contamination were cleaned up. By the way,

the word "marginal" to describe the degree of contamination is something of an understatement.

Allied-Signal Comments 3.6 (21 November 1988):

3.6 THE NAVY IGNORES FACTS THAT NO CONTINUING SOURCE EXISTS AND THAT CONTAMINATION WILL DECREASE IN BIOAVAILABILITY OVER TIME.

Allied-Signal contends that because no significant risk is presented to the SMHM at this time by the existence of the contamination, an intensive monitoring plan designed to determine whether any significant risk is ever presented should be a preferred alternative over the more environmentally damaging excavation remedies. A major justification for this preference is that is no continuing source of additional contamination to the property. It is logical to conclude that over time, as the existing contamination is bound up with soils and vegetative matter, it will become less bioavailable and therefore less of a risk to the SMHM living on the site.

This conclusion is impliedly recognized in the Biological Assessment in the following passage:

> Another 23 acres would be subjected to passive remedial action [monitoring]. A sampling and analysis program would be conducted to determine any changes in contaminate level or distribution over time. If, as expected, excavation removes the majority of the source, monitoring should show <u>decrease</u> contamination. If this is not observed and contamination levels reach a pre-defined status, additional active remedial action would be required. B.A. at p. 13. (Emphasis added.)

While the reference to excavation removing the "source" is misleading, since no new contaminants are being introduced into the marsh, the conclusion regarding the likelihood that monitoring will reflect decreasing contamination is correct. Thus, even in the areas of highest contamination presently, future monitoring should show decreased contamination.

It is important to consider the Navy's allegations that operations at the former Allied-Signal facility are responsible for the existence of the contaminants on the property. If correct, contaminants may have existed on the property since the time the facility first began operations, in the mid-1910s. Alternatively, the Navy suggests that the arsenic contamination may be the result of disposal of lead arsenate along the Allied-Navy boundary in the 1940s. Although Allied-Signal denies

that it is the cause of the contamination, if the Navy's allegations in this regard are correct, then the arsenic contamination about which the Navy is so concerned has been on site, "stressing" the resident SMHM populations for nearly 45 years.

The author of the Biological Assessment, however, reaches conclusions on the apparent assumption that this contamination was recent and that the "chronic long-term effects of exposure to the contamination is yet to occur." (See B.A. at p. 35.) This conclusion is contrary to the Navy's contentions regarding the alleged liability of Allied-Signal for the presence of the contamination. Thus, the author's conclusion that exposure to contaminants, for additional periods, "could cause more subtle, sub-lethal effects," do not make sense. If the mice have not suffered any such sub-lethal effects after more than 40 years of exposure, as is confirmed by the results of the SRI International study, then when would the author have us believe that such effects will develop? See B.A. at p. 43.

The author herself suggests that:

> The release of hazardous substances now documented on RASS 1 and RASS 2 occurred before the Navy acquired the land, that acquisition was basically complete in January 1970 and that the maximum lifespan of most [SMHM] is 10 months (Fisler 1971), with one litter produced, at least 23 generations of mice have been exposed to contamination from January 1970 through May 1988. B.A. at p. 43.

Having been exposed to the contamination for a minimum of eighteen years, the latest of the 23 generations of mice seemingly should be demonstrating the "sub-lethal effects" referred to by the author. However, no such harm has been observed.

Accordingly, the Navy's own contentions regarding the source of the contamination directly conflict with the author's conclusions regarding the effects of that contamination on the resident SMHM populations. In truth, the risk to the SMHM from the contamination is decreasing, not increasing. Although it is true that "the metals confirmed to be present in the soil and biota of NWS Concord are not biodegradable," B.A. at p. 38, they become less bioavailable over time, which may serve the same ecological function in reducing toxicity.

Moreover:

> The environment has a certain

> assimilation capacity before an adverse impact occurs and in some areas of the contaminated sites an adverse environmental impact is not readily apparent. Revised Draft Final FS at p. 3.64

Dr. O'Neil makes no reference to this capacity anywhere in the Biological Assessment.

The existing community of healthy plant and animals seems to confirm the diminishing bioavailability of lead, cadmium, arsenic, and other heavy metals. Decreases in the bioavailability of toxic forms may occur by formation of chemical compounds, adsorption and absorption into conservative particulate matter, overcovering by sediment and organic debris, and dissipation from the site. To provide balance to the conclusion drawn by the author, the question of diminishing bioavailability, and thus toxicity in this case, also should have been investigated and reported. The fact that it is not reveals the underlying bias in the report towards justification of an excavation remedy.

Response to Allied-Signal Comments - 3.6 (21 November 1988):

Allied-Signal attempts to downplay environmental concerns over the prior discharge of hazardous substances into the wetlands. In fact, these areas of high contamination are a source of continued contamination and potential contamination to other areas in the wetland that have not yet suffered impacts. Allied-Signal is somewhat misleading in forcing a very restrictive definition on the term "source." These areas of highly concentrated arsenic and other contaminants are directly analogous to an uncontrolled hazardous waste site in which no new wastes are being disposed; however, contaminants continue to migrate into the surrounding environment.

As the (Second Revised) Final Draft Feasibility Study Report states, and Allied-Signal agrees, the levels of contamination are expected to decrease. Unfortunately, because the contaminants of interest are conservative, this is not a true decrease, but one resulting from the spread of the contaminants over a wider area, including presently uncontaminated wetlands and possibly Suisun Bay.

In Allied-Signal's discussion of diminishing bioavailability, the term "dissipation from the site" is an admission by Allied-Signal that the contaminants are likely to migrate from the site, potentially causing bioaccumulation over a wider area, including Suisun Bay.

The Navy's experts understand that metals do not biodegrade. The decrease in contamination expected by the Navy

after active remedial action refers to concentrations on the site overall. If 80% of a metal is removed from part of RASS 1, then the "site average" for RASS 1 will be lowered. Therefore, if the average concentrations did not show a decrease during monitoring, the interpretation would be that either (1) the full percentage did not get removed, or (2) a new source of contamination was present. The word "source" does not contain temporal implications, but refers to a point of origin or generative factor. If the contamination remains in place, it remains a source, in this case, of potential harm to the biota that use the site. If additional contamination occurs, that too is a source. Because of concern about potential additional sources of contamination, the Navy would be interested in seeing results of permeability tests of the dike that separates RASS 1 and the Bay Point Works of Allied.

While the Navy cannot condone the levels of arsenic it found on its property, the values of arsenic in mice and vole tissue were not significantly different from those of the Reference Area. As was stated, the arsenic found "has no direct effect on the species discussed in this document," referring to the Final Biological Assessment Report at page 35 and its limited list of species. The presence of elevated arsenic in clams and earthworms, however, indicates that the arsenic is migrating into surface water and foodchains, and that does cause concern for other species and the overall health of the environment.

Figure 1 illustrates the relationship between contaminant exposure as measured by bioaccumulation and biological effects. At low levels of exposure as measured by statistically significant bioaccumulation, biological effects are expressed at the molecular and subcellular levels. As exposure increases, these effects can be manifested at the tissue level as histopathology. The bioaccumulation observed in the mice and voles is statistically significant and can have molecular and subcellular effects, but may not be sufficient to result in tissue level effects.

Visual effects of contamination are indeed lacking over a large portion of RASS 1, the scope of the discussion in the (Second Revised) Final Draft Feasibility Study Report at page 3.64, perhaps reflecting the assimilation capacity of the environment. However, the Final Biological Assessment Report focuses on the area of active remediation of RASS 1 and RASS 2, which does not show visible improvement. This area does not seem to be recovering on its own.

The Navy considered a variety of remedial action alternatives including extensive monitoring and no action. Based on a detailed analysis conducted in accordance with the requirements of CERCLA and implementing regulations and guidance, the excavation alternatives are the most feasible alternatives

that offer a long term permanent solution to the site specific conditions. As previously discussed, the Navy did not preselect nor weight the evaluation process to require excavation.

Allied-Signal Comments - 3.7 (21 November 1988):

3.7 THE PREFERRED EXCAVATION REMEDIAL ALTERNATIVE IS NOT WELL-DESIGNED TO ADDRESS ALLEGED PROBLEMS.

Allied-Signal Comments - 3.71 (21 November 1988):

3.71 LOW pH AREAS NEED NOT BE EXCAVATED.

In the draft final FS, a decision rule for RASS 4 calls for excavation of any soils found to have a pH of less than 5. This is justified on the grounds that low pH increases the potential for metal mobility in soils.

However, in the Biological Assessment, in describing the proposed remedial action for RASS 4, the author states that "areas with low pH (less than 5.0) would be limed to pH 6.5 to 7.0." See B.A. at p. 14. Moreover, in a letter dated November 29, 1986 from Dr. Charles R. Lee to other Navy consultants, Dr. Lee states that the CP site "should be limed to pH 6.5 to decrease metal availability and monitored as passive remediation." See Repository Doc. No. HYD000381. It is unclear why these recommendations were ignored in the final RAP selection process.

To the extent that any low pH soils require any remediation, we agree that the appropriate action would be liming, not excavation. The prior Allied effort on a portion of RASS 1 using agricultural lime resulted in nearly complete vegetative recovery.

Response to Allied-Signal Comments - 3.71 (21 November 1988):

This comment is factually incorrect. Low pH areas will be treated with lime to raise the pH and increase the probability of successful re-vegetation. Re-vegetation will result in decreased loss of soil and improved habitat. See page 5.122 of the (Second Revised) Final Draft Feasibility Study Report. Only areas where the soil contaminant concentrations exceed the TTLC/STLC criteria will be excavated.

It should be noted that prior comments (Allied-Signal comment 3.2) indicate that the unsuccessful attempts to remediate RASS 1 using liming resulted in decreased diversity and had potentially adverse impacts on the environment.

Allied-Signal Comments - 3.72 (21 November 1988):

3.72 IT IS UNNECESSARY TO EXCAVATE 12 INCHES OF SOIL WHEN CONTAMINATION IS ONLY 6 INCHES DEEP.

The draft final FS states that contamination on RASS 1 and RASS 4 goes no deeper than 6 inches. Yet, on both RASS 1 and RASS 4 the proposed remedial action plan would result in excavation of soil to a depth of 12 inches over nearly 10 acres. See B.A. at pp. 12, 14. This would in turn result in a doubling of the amount of soils which will have to be disposed of off site.

Given the serious concerns raised by the California Department of Health Services over the depletion of limited remaining Class 1 waste site capacity by disposal of marginally contaminated soils such as these, this aspect of the proposed remedial action is unacceptable. See Draft Final FS at E.30. Over half of the soil disposed of would not be contaminated by the Navy's own admission. The costs for excavating, transporting and disposing of twice as much material will be significantly higher. Moreover, it would increase the costs associated with reconstruction efforts since additional soils will have to be brought in to reproduce the former contours at the site. For all of these reasons, except where the analysis of samples reflects that contamination is more than 6 inches deep, any excavation should only be 6 inches deep.

Response to Allied-Signal Comments - 3.72 (21 November 1988):

The feasibility study is designed to evaluate the feasibility of alternatives on a comparative basis. The overall concept of the alternatives that include excavation as a major technology should attempt to minimize the waste soils generated, consistent with the protection of human health or the environment. As a result, the Navy included provisions for further testing and classification of excavated materials as part of the alternatives. During the design phase, a detailed excavation plan will be developed to ensure that only those materials that exceed the remediation decision rule criteria will be excavated.

The Navy has prepared a (Second Revised) Final Draft Feasibility Study Report to evaluate alternatives for remediation of contaminated areas on Parcels on Parcels 572, 573, 574, 575, 576, 579D, and 581 on Naval Weapons Station, Concord. The Final Remedial Investigation Report identified soil contamination resulting from discharges from adjacent properties and operations on the parcels prior to acquisition by the Navy. On-site contamination in the form of surficial deposits of metal contaminants resulting from drainage or overflows of wastewaters to surface drainages or to flat wetland areas from adjacent

properties has been identified as the primary potential on-site sources. The surficial deposits have been evaluated and found to contain high levels of arsenic, lead, cadmium, copper, and zinc. To date, organic chemical contamination has not been identified as a problem in these areas. In addition, off-site contamination on adjacent properties in the form of deposits of metal contaminants has been identified as potential off-site sources of contamination.

During development of the (Second Revised) Final Draft Feasibility Study Report, a range of potential remediation alternatives were evaluated. Among the alternatives considered were several that incorporated the concept of excavation and disposal.

The Navy considers the feasibility study as a means of evaluating the conceptual feasibility of potential remedial action alternatives. The conceptual excavation alternatives are based on the current state of knowledge of the levels and extent of contamination on the four RASS's considered in the (Second Revised) Final Draft Feasibility Study Report. During the design process, detailed plans will be developed to implement the concepts presented in the (Second Revised) Final Draft Feasibility Study Report. During the remedial action design process, particular attention will be given to those areas in which contaminant concentration levels are known to be high. The detailed excavation plan would be designed to limit the amount of materials to be excavated, consistent with the overall goal of protecting human health or the environment.

The following assumptions are used in the development of the conceptual excavation plan.

a. All materials that have contaminant concentrations equal to or greater than the State's TTLC/STLC criteria will be disposed of in a Class I facility.

b. All materials with contaminant concentrations less than the State's TTLC/STLC criteria will be disposed of in a Class III facility.

c. None of the materials found on site are regulated under the Federal Solid Waste Disposal Act, i.e., the contaminant concentrations in soils do not exceed the Extraction Procedure Toxicity Test (EP).

d. Removal of contaminated soils will be consistent with the decision rules presented in the (Second Revised) Final Draft Feasibility Study Report (Section 3.5.3).

e. The removal of contaminated soils will be minimized consistent with protection of human health and the environment.

f. Transportation to disposal facilities will be accomplished using appropriately controlled truck or rail facilities.

g. Contamination in most areas is in the upper 6-12 in. of the soil; however, deeper contamination has been located in scattered areas.

h. Excavation can be conducted in 6 in. lifts, with some difficulty.

The conceptual excavation plan is summarized below.

a. Beginning at points of known contamination, i.e., current sampling locations where contaminant concentrations are equal to or greater than the decision rule criteria, a grid of sampling locations would be established. A grid composed of sampling points located 20 ft. on centers and radiating from the points of known high contaminant concentrations will be established.

b. A sampling point in each grid would be sampled to a depth of 3 ft. Distinct subsamples would be collected for each 6 in. horizon. Based on a 20 ft. grid, each sampling point/sampling horizon would represent approximately 10 cu. yds. of soil.

c. The 0-6 in. horizon will be analyzed for the contaminants of concern.

d. Grid squares in which contaminant concentrations are equal to or greater than the decision rule criteria will be excavated to a depth of 6 in.

e. In excavated squares, the next 6 in. horizon would be analyzed. If the results exceed the remedial action decision rules, the next 6 in. horizon will be excavated.

f. Item d. and e., above, would be repeated until the sampling and analyses indicate that the soils in each grid meet the remediation decision rules.

Allied-Signal Comments - 3.8 (21 November 1988):

3.8 THE IMPORTANCE OF EARTHWORM DATA IS OVERRATED SINCE IT IS NOT A FOOD SOURCE FOR RESIDENT ENDANGERED SPECIES.

The Navy relies, in part, on evidence of bioaccumulation of metals in earthworms to justify excavation of soils in certain locations. With respect to the wetlands designated for "active remediation," however, such bioaccumulation is largely irrelevant

since, according to the Navy's own consultants:

> There are probably no earthworms in the wetland, yet the summary discusses the impact on earthworm-eating animals. Some statement should be made that the earthworm is used as a model of other soil dwelling animals, and not that it is the primary fuel source on the sites.

See Repository Doc. No. WES001275 (Letter of Dr. Michael Josselyn dated June 9, 1985).

The SMHM "is almost exclusively herbivorous." See B.A. at p. 22. Moreover, Appendix B to the Biological Assessment reflects the results of a Food Habit Study of the [SMHM]. A study of the fecal pellets collected from live traps which caught SMHM reflected that "all pellets contained vegetative material, with no evidence that animal matter was eaten." B.A., Appendix B at p. B.1.

Similarly, the black rail's major food items are small invertebrates and seeds, which impliedly does not include earthworms.

Accordingly, since neither the SMHM nor the black rail eats earthworms, whether earthworms have bioaccumulated arsenic or heavy metals is not relevant to potential bioaccumulation of arsenic and heavy metals by those endangered species. Despite this obvious conclusion, the author states that:

> Because bioaccumulation was also found in earthworms and plants, both the quantity and quality of food available to the mice and rails on these sites have been reduced. B.A. at p.35. (Emphasis added)

With respect to earthworms, this statement is not logical.

In any case, it is unclear that there is any significant population of black rails near the contaminated area. B.A. at p.32.

Response to Allied-Signal Comments - 3.8 (21 November 1988):

Use of the earthworm in bioassays provides an indication of conditions for other soil invertebrates, and is a widely accepted and applied technique, as was discussed in the Final Remedial Investigation Report. Note that Dr. Josselyn's comment reflected this. The Navy is puzzled by the direct jump made by Allied-Signal from an animal bioassay to food for the herbivorous harvest mouse. Plant bioassays are more appropriate

references there.

The bioassay results described in the Final Biological Assessment Report as to quantity and quality of food items for residents of the site stand as written. In addition, because the earthworm bioassay provides an indication of conditions for other soil invertebrates, a connection can be made to food consumed by the black rail whether they eat earthworms or not.

There is no reference on page 32 or anywhere in the Final Biological Assessment Report as to whether the black rails on site constitute a "significant population." Data are presented on page 16 and Figure 32 that indicate a resident population of black rails on RASS 1.

Allied-Signal Comments - 3.9 (21 November 1988):

3.9 THE BIOLOGICAL ASSESSMENT IS A JUSTIFICATION FOR EXCAVATION, NOT AN ASSESSMENT OF THE LIKELY IMPACTS.

On p.12 of the Biological Assessment, it is stated that:

> During the monitoring process, the harm to the environment resulting from the release and threatened release of hazardous substances was weighed against the harm that would result from active remediation . . . . Because of the presence of wetlands and endangered species on RASS/s 1 and 2, the extent of remediation there would be tempered to minimize disturbance. B.A. at p.12.

The balancing of the costs and benefits is an important concept in the maximization of the benefits of any remedial action, whether passive or active. Interpretation of where the most beneficial boundaries lay between active and passive remedial areas in this instance, however, is subjective and thus open to question. We suggest that a balanced interpretation of the benefits and adverse risks show that a smaller active remediation area is needed than is designated in the feasibility study. The concept cited above is important to finding solutions that recognize risk but at the same time recognize the importance of not destroying reasonably productive SMHM habitat.

Unfortunately, throughout both the Feasibility Study and the Biological Assessment, the balancing approach is abandoned. For example, Section 7.0 of the biological Assessment, entitled "Perspectives," suggests that "[t}he benefits of this proposed remediation exceed the disadvantages because of several factors." B.A. at p.45. However, in the entire "Perspectives" section, the only disadvantage referred to

is the risk associated with attempting to restore wetland habitat. No mention is given to the fact that a potentially large number of endangered species are going to be killed, SMHM which have not been shown to be subject to even a substantial risk of harm. Instead, the author tries to put the remedial action in "temporal context" by suggesting that on-site contamination which has not hurt the mice after nearly 20 years of exposure may present some unknown quantum of risk to the mice in another 20 years. This is a far cry from an objective balancing of risk designed to maximize the benefit of the remedial action taken.

Response to Allied-Signal Comments - 3.9 (21 November 1988):

In complaining that the Navy "justified" the excavation alternative and did not balance benefits and adverse risks, Allied-Signal seems to have ignored its own quote regarding the reduction in area suggested for active remediation, which was partially based on the existence of wetlands and endangered species. The Navy does not know any clearer way to explain its decision process which included a balance between cleaning up and leaving contamination. Would Allied-Signal have the Navy ignore its data, Federal requirements, and comments from regulatory agencies, to clean up only the bare areas?

The death of salt marsh harvest mice from the proposed remedial action is mentioned twice in the Final Biological Assessment Report, numerous times in the (Second Revised) Final Draft Feasibility Study Report, and three times in the Biological Opinion.

Allied-Signal Comments - 3.10/3.10.1 (21 November 1988):

3.10 PROBLEMS ASSOCIATED WITH THE PLANNED EXCAVATION

3.10.1 OFF-SITE DISPOSAL LIMITATIONS

> "Once this material is excavated and removed it is no longer a concern of this assessment". B.A. at p.12.

Does this sentence mean that the balancing of the trade-off impacts (e.g., cost and consumption of space in permitted disposal sites, a limited resource) are not germane to the Biological Assessment process? We certainly content that it is as contaminated soil that is excavated may become someone else's environmental problem in the future.

Response to Allied-Signal Comments - 3.10.1 (21 November 1988):

The balancing of the trade-off impacts of disposal are not germane to the Biological Assessment process. Disposal,

wherever it is, is not suggested for an area occupied by the species discussed in the Final Biological Assessment Report. See previous responses regarding the purpose of a Biological Assessment.

Allied-Signal Comments 3.10.2 (21 November 1988):

3.10.2 GROUNDWATER MONITORING WELLS

Page 12 specifies that installation of ground water monitoring wells prior to the actual remediation. Page 39 indicates that suggested well locations are in the vegetated portions of areas to be actively remediate. The wells may be damaged during soil removal or contouring.

Response to Allied-Signal Comments - 3.10.2 (21 November 1988):

The Navy fully recognizes the possibility that groundwater monitoring wells may be damaged during construction. In such cases, the wells will be replaced if necessary. In addition, as stated several times by the Navy, the groundwater pathway is not considered significant on the sites under investigation.

Allied-Signal Comments 3.10.3 (21 November 1988):

3.10.3 INABILITY OF SMHM TO ESCAPE THE REMEDIATION

The endangered species primarily threatened by the proposed remediation of the Concord Naval Weapons Station is the SMHM. Other species impliedly can escape death or injury from excavation activities, but not the SMHM. It is stated that remediation is to be timed to avoid breeding and high tide seasons. Such timing may reduce the impact on mobile species but will offer little benefit to the SMHM given its low mobility and the extensive areas of its habitat proposed to be actively remediated.

Response to Allied-Signal Comments - 3.10.3 (21 November 1988):

The Fish and Wildlife Service in its Biological Opinion stated that incidental take of the salt marsh harvest mouse was anticipated and allowed. Measures were suggested to minimize the incidental take.

Allied-Signal Comments - 3.11 (21 November 1988):

One beneficial use of wetland preserves and refuges is long term scientific study in areas protected from human intrusion. The preserve and potential refuge status and the Navy's buffer area requirements, coupled with the existing contamination, offer unusual opportunities for assessing

ecological relationships between contamination, effects on biota, and natural tolerance for and remediation of these conditions.

Heavy metal contamination of wetlands resulting from wastewater, solid waste and agricultural drainage discharges is an ongoing issue that could be clarified to some extent by the study of conditions on RASS 1. Answers to questions about impacts from heavy metals and arsenic in these cases are generally speculative and unsatisfactory when one attempts to engineer systems that tolerate, at acceptable levels, inputs of heavy metal contamination. RASS 1 offers an excellent opportunity to evaluate the ecology of heavy metal contamination, effects on biota, natural remediation and other factors. This scientific research could be a very beneficial use of circumstances that seem to exist at levels of contamination that can be tolerated by the ecosystem and society.

Response to Allied-Signal Comments - 3.11 (21 November 1988):

Based on a detailed evaluation that balanced the short term impacts of active remediation with the long term benefits of removing substantial quantities of hazardous substances from the environment, the Navy proposed a remedy for RASS 1 and 2 that leaves approximately 23 acres of contaminated area and 6.37 acres in which the soil arsenic and/or metal concentrations exceed the TTLC/STLC hazardous waste criteria. As part of the remediation concept, the Navy further proposed to extensively monitor areas on which contamination is left, as well as adjacent areas onto which there is a likelihood of contaminant migration. In addition, the Navy proposes to restore approximately 10.5 acres of wetland on RASS's 1 and 2.

As a result of the above, the remedial action proposed by the Navy provides an avenue of scientific study for a variety of issues, not the single issue proposed by Allied-Signal. First, sufficient contamination is left in place to perform the studies suggested by Allied-Signal. Second, by monitoring adjacent areas the migration of contaminants by surface and biological phenomena can be studied. Third, the recovery of the biota in the actively remediated area can be evaluated. Thus, the remedial action proposed by the Navy results in an opportunity to increase scientific knowledge on at least three important issues, rather than the single issue that could be evaluated if active remediation is not implemented on RASS's 1 and 2.

1.2 COMMENTS SUBMITTED BY CHEMICAL & PIGMENT COMPANY IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 16 SEPTEMBER 1988, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Chemical & Pigment Comments - Introduction (17 November 1988):

I. INTRODUCTION

This document presents the comments of Chemical & Pigment Company on the following Navy documents:

(1) Final Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California;

(2) Final Report of Suitability of Sites for Hazardous Waste Disposal, Concord Naval Weapons Station, Concord, California;

(3) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives;

(4) Final Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume II: Biological Assessment;

(5) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures;

(6) Proposed Remedial Action Planned for the Release, and the Threatened Release, Of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on Naval Weapons Station, Concord, California; and

(7) The Endangered Species Formal Consultation on Remediation of Heavy Metals Contamination at Concord Naval Weapons Station, Contra Costa County, California, prepared by the United States Fish and Wildlife Service.

These comments reflect in part the opinions of its retained consultants who include: David Todd Consulting Engineers, James Byard, and Professor Duane Mikkelson. Although Chemical & Pigment previously provided the Navy with their curriculum vitaes, copies are included as Exhibit 1.

Chemical & Pigment Comments - II/IIA (17 November 1988):

II. COMMENTS ON THE NAVY'S PROCESS AND PROCEDURE

A. THE NAVY DOES NOT HAVE THE AUTHORITY TO SELECT A REMEDIAL ACTION PLAN

The Navy maintains that the Environmental Protection Agency (EPA) has delegated to the Department of Defense, and consequently to the Navy, the power and jurisdiction to prepare remedial action plans, review and approve said plans, and require potentially responsible parties to clean up allegedly contaminated sites. Chemical & Pigment, however, maintains that the delegation of duty to the Navy only extended to its ability and power to prepare clean-up plans and engage in clean-ups of its own property at its own expense. The law clearly did not provide the Navy with any delegation of the EPA's authority to act and to sue, as the agent of the EPA, other parties as potentially responsible parties. Nor did the law delegate to the Navy the jurisdiction and authority to prepare remedial action plans and review them independent of any review of the EPA. Consequently, the Navy's process by which it seeks to impose clean-up costs on the defendants through a remedial action plan that it has prepared, reviewed, and authorized is without basis in the law.

Response to Chemical & Pigment Comments IIA (17 November 1988):

The Department of the Navy prepared a proposed remedial action plan pursuant to the authority of Sections 104, 120, and 121 of CERCLA, which the President delegated to the Secretary of Defense and which the Secretary of Defense in turn delegated to the Secretary of the Navy. In preparing its proposed remedial action plan, the Navy consulted with the Environmental Protection Agency.

By Executive Order 12,580, the President delegated the functions vested in the President with respect to the release, and the threat of release, of hazardous substances on facilities under the jurisdiction, custody, or control of the Department of the Navy by Sections 104(a), (b), and (c)(4); 113(k); 117(a) and (c); 119, and 121 of CERCLA to the Secretary of Defense. Executive Order 12,580, Section 2(d). The President, however, required that such functions be exercised consistent with the requirements of Section 120 of CERCLA.

Section 104(a) of CERCLA, as amended, provides that:

> Whenever (A) any hazardous substance is released or there is a substantial threat of such a release into the environment, or (B) there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare, the President is authorized to act, consistent with the National Contingency Plan, to remove or arrange for the removal of, and provide for remedial action relating to such hazardous substance, pollutant, or contaminant at any time (including its removal from

any contaminated natural resource), or take any other response measure consistent with the National Contingency Plan which the President deems necessary to protect the public health or welfare or the environment.

Section 121(a) of CERCLA, as amended, provides that:

> The President shall select appropriate remedial actions determined to be necessary to be carried out under Section 104 . . . which are in accordance with this section and, to the extent practicable, the National Contingency Plan, and which provide for cost-effective response.

Section 120 (a) of CERCLA, as amended, provides that:

> (a) Application of Act to Federal Government --
> (1) In general. -- Each department, agency, and instrumentality of the United States (including the executive, legislative, and judicial branches of government) shall be subject to, and comply with, this Act in the same manner and to the same extent, both procedurally and substantively, as any nongovernmental entity, including liability under section 107 of this Act. Nothing in this section shall be construed to affect the liability of any person or entity under sections 106 and 107.
> (2) Application of requirements to federal facilities. -- All guidelines, rules, regulations, and criteria which are applicable to preliminary assessments carried out under this Act for facilities at which hazardous substances are located, applicable to evaluations of such facilities under the National Contingency Plan, applicable to inclusion on the National Priorities List, or applicable to remedial actions at such facilities shall also be applicable to facilities which are owned or operated by a department, agency, or instrumentality of the United States in the same manner and to the extent as such guidelines, rules, regulations, and criteria are applicable to other facilities. No department, agency, or instrumentality of the United States may adopt or utilize any such guidelines, rules, regulations, or criteria which are inconsistent with the guidelines, rules, regulations, and criteria established by the Administrator under this Act.
> (3) Exceptions: -- This subsection shall not apply to the extent otherwise provided in this section with respect to applicable time periods. This subsection shall also not apply to any requirements relating to bonding, insurance, or financial responsibility.

Nothing in this Act shall be construed to require a State to comply with section 104(c)(3) in the case of a facility which is owned or operated by any department, agency, or instrumentality of the United States.

(4) State laws: -- State laws concerning removal and remedial action, including State laws regarding enforcement, shall apply to removal and remedial action at facilities owned or operated by a department, agency, or instrumentality of the United States when such facilities are not included on the National Priorities List. The preceding sentence shall not apply to the extent a State law would apply any standard or requirement to such facilities which is more stringent than the standards and requirements applicable to facilities which are not owned or operated by any such department, agency, or instrumentality.

Section 211(a) of CERCLA, as amended, provides that:

(a) Environmental restoration program --

(1) In General. -- The Secretary of Defense shall carry out a program of environmental restoration at facilities under the jurisdiction of the Secretary. The program shall be known as the "Defense Environmental Restoration Program".

(2) Application of section 120 of CERCLA. -- Activities of the program described in subsection (b)(1) shall be carried out subject to, and in a manner consistent with, section 120 (relating to Federal facilities) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (hereinafter in this chapter referred to as "CERCLA")(42 U.S.C. 9601 et seq.).

(3) Consultation with EPA. -- The program shall be carried out in consultation with the Administrator of the Environmental Protection Agency.

(4) Administrative Office within OSD. -- The Secretary shall identify an office within the Office of the Secretary which shall have responsibility for carrying out the program.

Section 211(c)(1) of CERCLA, as amended, provides that:

(c) Responsibility for response actions. --

(1) Basic responsibility. -- The Secretary shall carry out (in accordance with the provisions of this chapter and CERCLA) all response actions with respect to releases of hazardous substances from each of the following:

(A) Each facility or site owned by, leased to, or otherwise possessed by the United States

and under the jurisdiction of the Secretary.

(B) Each facility or site which was under the jurisdiction of the Secretary and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination by hazardous substances.

(C) Each vessel owned or operated by the Department of Defense.

Although the Navy included proposed findings and conclusions concerning decision rules for cleanup of the release, and the threatened release, of hazardous substances on the four rights-of-way which transect Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, in the proposed remedial action plan and findings and conclusions concerning decision rules for cleanup of the release, and the threatened release, of hazardous substances on the four rights-of way which transect the parcels on the station in its final remedial action plan, the Navy acknowledges that it does not have the authority to conduct the remedial actions on the four rights-of-way. In its final remedial action plan, however, the Navy did determine that remedial actions must be undertaken on the four rights-of-way.

Chemical & Pigment Comments - IIB (17 November 1988):

B. THE NAVY'S REMEDIAL ACTION ALTERNATIVE IS INCONSISTENT WITH CERCLA AND THE NATIONAL CONTINGENCY PLAN.

Section 104 of Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA) states in relevant part:

> Whenever . . . any hazardous substance is released or there is a substantial threat of such a release into the environment . . . the president is authorized to act, consistent with the National Contingency Plan, to remove . . . and provide remedial action relating to such hazardous substance . . . or take any other response measure consistent with the National Contingency Plan which the president deems necessary to protect the public health or welfare or the environment."

(42 U.S.C. section 9604(a)(1).) Section 104 authorizes the President to take remedial action only when necessary to protect public health, welfare, or the environment. It does not authorize remedial plans simply for the sake of remediation when such remediation is not necessary to protect public health, welfare, or the environment.

The National Contingency Plan (NCP) similarly provides that remedial actions are allowed only when necessary to protect public health and the environment. Section 300.68 of the NCP provides that agencies must evaluate different criteria in determining the appropriate extent of remedial action that may be required at sites, including the extent to which substances pose a danger to public health, welfare, or the environment. 40 C.F.R. section 300.68(e)(2)(i) (1984). The Navy studies establish that no remedial action can be justified because the data indicate existing conditions present no threat to public health or the environment.

The Navy has also utterly failed to select a cost-effective remedial action by balancing the costs and the public health and environmental benefits of the alternatives it has proposed. The Navy must conduct a cost-benefit analysis of the proposed remedial action alternatives.

Even more important, the NCP requires that only the cost-effective remedial action can take place at a site:

> "The appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e., the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection to public health, welfare, or the environment."

(40 C.F.R. section 300.68(j)(1984).) (Emphasis added.)

The Navy has failed to consider cheaper cost alternatives which are technologically feasible and reliable and which effectively mitigate and minimize damage while providing protection to the environment. Indeed, the Navy has instead selected high-cost alternatives without demonstrating their feasibility and reliability. These alternatives are also highly destructive to the environment.

Response to Chemical & Pigment Comments IIB (17 November 1988):

> Section 121(d) of CERCLA in pertinent part, provides that:
>
> The President shall select appropriate remedial actions determined to be necessary to be carried out under

section 104 . . . which are in accordance with this section and, to the extent practicable, the National Contingency Plan, and which provide for cost-effective response.

42 U.S.C. 9621(a).

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions, the President shall, at a minimum, take into account:
>
> (A) the long-term uncertainties associated with land disposal;
>
> (B) the goals, objectives, and requirements of the Solid Waste Disposal Act;
>
> (C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;
>
> (D) short-and long-term potential for adverse health effects from human exposure;
>
> (E) long-term maintenance costs;
>
> (F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and
>
> (G) the potential threat to human health nd the environment associated with excavation, transportation, and redisposal, or containment.
>
> The President shall select a remedial action that is protective of human health and the environment, that is cost effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to

> the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

42 U.S.C. 9621(b).

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

> (d) Degree of Cleanup. -- (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health nd the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) of CERCLA provides that:

> (2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if --
>
> (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
>
> (ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for

> such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.

Section 121(d)(4) of CERCLA provides, in pertinent part; that:

> (4) the President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that . . .
>
> (B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options;

Neither CERCLA, nor the NCP, nor applicable guidance require the Navy to conduct a cost-benefit analysis of remedial action alternatives. CERCLA does not require that the Navy balance costs and protection of human health or the environment to determine a cost effective remedy. To determine cost effectiveness, environmental goals and cleanup criteria are developed which will effectively mitigate and minimize damage to and provide adequate protection for human health or the environment. After the allowable level of contamination is established (by using the protection of human health or the environment as the guide), the lowest cost remedy that is technologically feasible and reliable which will meet the goals and criteria for protection of human health and the environment is determined to be cost effective.

The Navy found that the hazardous substances which have been released, or which threaten to be released, on RASS 1, 2, 3, and 4 threaten the environment. The data collected by the Navy showed continued migration of high concentrations of contaminants into a sensitive habitat containing endangered species. Further, the data collected by the Navy in the Final Remedial Investigation Report demonstrated substantial accumulation of a number of contaminants on all four RASS's. The concentrations of these contaminants were statistically greater than those found in reference areas and exceeded a number of relevant criteria, e.g., TTLC or STLC, at many of the sites sampled within these RASS's.

These contaminants are mobile in surface waters and clam bioassays have demonstrated the potential for their bioaccumulation in aquatic species. Laboratory bioassays have demonstrated that these contaminants are also bioavailable to both plants and soil invertebrates. Moreover, at several sites in these RASS's soils containing these contaminants were found to be toxic to both plants and soil invertebrates. Finally, the Navy detected indications of phytotoxicity and reduced abundance of plants and soil invertebrates at some of the sites in these RASS's which showed high concentrations of these contaminants. Taken together, these data indicated substantial potential for harm to the environment due to the presence of these contaminants in the soils, sediments and surface waters of the RASS's.

The Navy screened remedial action technologies, developed and screened remedial action alternatives, and evaluated in detail remedial action alternatives for the contamination on RASS's 1, 2, 3, and 4 in its (Second Revised) Final Draft Feasibility Study Report in compliance with CERCLA; the NCP; and applicable guidance. The Navy, in its (Second Revised) Final Draft Feasibility Study Report, evaluated an array of alternatives ranging from the no action alternative to highly innovative technologies such as soil washing. The preferred remedial action alternatives identified in the (Second Revised) Final Draft Feasibility Study Report and the Proposed Remedial Action Plan were not the highest cost remedial action alternatives evaluated.

As discussed in the (Second Revised) Final Draft Feasibility Study Report, the remedial action alternatives evaluated would have short term impacts on the environment. Balancing the short term impacts on the environment with the long term benefits the remedial action alternatives evaluated would have on the environment, the Navy finds that the overall impact upon the environment will be positive, resulting in a decrease in the risk to the environment caused by the release of hazardous substances.

Chemical & Pigment did not describe any remedial action alternatives, which are lower in overall cost and which provide the same degree of reliability as the alternatives evaluated by the Navy, which could be implemented. The Navy gave all of the defendants the opportunity to submit remedial action alternatives for the contamination on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Station. On 15 May 1986, the Navy invited the defendants to:

> Describe, in concept, any remedial action alternative which the defendants recommend be evaluated by the Navy in formulating a remedial action plan for such parcels,

and

> Analyze, in detail, the reliability, implementability, technical effectiveness, environmental concerns, safety, operation and maintenance, costs, regulatory requirements, and public acceptance of such remedial action alternatives.

Administrative Record, Section P.3.a.

None of the defendants, however, identified any remedial action alternatives which they recommended the Navy consider.

Chemical & Pigment Comments - IIC (17 November 1988):

C. THE NAVY'S LACK OF A RESPONSE TO PRIOR COMMENTS OF DEFENDANTS DENIES CHEMICAL & PIGMENT A FULL AND COMPLETE OPPORTUNITY TO COMMENT ON THE NAVY'S PLANS.

Chemical & Pigment believes the Navy has implemented a process that denies Chemical & Pigment a full opportunity to review the documentation provided to it concerning alleged contamination and proposed remedial action plans. Because of this, the Navy has denied Chemical & Pigment due process of law.

The Navy has never responded to the comments of any of the parties it has sued as potential responsible parties (hereinafter "defendants") which were submitted to the Navy regarding the previous drafts of the documents it now requests comment on. Hence, it is difficult for Chemical & Pigment to respond with comments at this point without knowing what the Navy's consideration and views are concerning prior comments. Many of these prior comments called into question the Navy's evaluation procedures, the standards for interpreting the data it had accumulated, and the validity of the data itself. Obviously, all prior comments by all defendants are incorporated herein by reference, and Chemical & Pigment expects a full and thorough response to all comments.

Response to Chemical & Pigment Comments IIC (17 November 1988):

The Navy has complied with CERCLA in responding to comments submitted by interested persons in response to its proposed remedial action plan and draft administrative record.

Section 117(a) and (b) of CERCLA establishes the opportunity for submission of written and oral comments regarding the proposed remedial action plan and any proposed findings under Section 121(d)(4) of CERCLA which the Navy must provide persons before the Navy selects a final remedial action plan and the

requirement for the Navy to respond to comments submitted by interested persons. Section 117(a) and (b) provide that:

> (a) PROPOSED PLAN. -- Before adoption of an plan for remedial action to be undertaken by the President, by a State, or by any other person, under section 104, 106, 120, or 122, the President or State, as appropriate, shall take both the following actions:
>
> (1) Publish a notice and brief analysis of the proposed plan and make such plan available to the public.
>
> (2) Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the facility at issue regarding the proposed plan and regarding any proposed findings under section 121 (c)(4) (relating to cleanup standards). The President or the State shall keep a transcript of the meeting and make such transcript available to the public.
>
> The notice and analysis published under paragraph (1) shall include sufficient information as may be necessary to provide a reasonable explanation of the proposed plan and alternative proposals considered.
>
> (b) FINAL PLAN. -- Notice of the final remedial action plan adopted shall be published and the plan shall be made available to the public before commencement of any remedial action. Such final plan shall be accompanied by a discussion of any significant changes (and the reasons for such changes) in the proposed plan and a response to each of the significant comments, criticisms, and new data submitted in written or oral presentations under subsection (a).

In addition, Section 113(K)(2)(B) and (C) of CERCLA establishes the opportunity for submission of comments regarding the draft administrative record and the requirement for the Navy to respond to comments submitted by interested persons. Section 113(k)(2)(B) and (C) provides that:

> (2) Participation procedures. --
>
> (A) Removal action. -- The President shall promulgate regulations in accordance with chapter 5 of title 5 of the United States Code establishing procedures for the appropriate participation of interested persons in the development of the administrative record on which the President will base the selection of removal actions and on which judicial review of removal actions will be based.
>
> (B) Remedial action. -- The President shall provide for the participation of interested persons, including potentially responsible parties, in the development of the administrative record on which the

President will base the selection of remedial actions and on which judicial review of remedial actions will be based. The procedures developed under this subparagraph shall include, at a minimum, each of the following:

(i) Notice to potentially affected persons and the public, which shall be accompanied by a brief analysis of the plan and alternative plans that were considered.

(ii) A reasonable opportunity to comment and provide information regarding the plan.

(iii) An opportunity for a public meeting in the affected area, in accordance with section 117(a)(2) (relating to public participation).

(iv) A response to each of the significant comments, criticisms, and new data submitted in written or oral presentations.

(v) A statement of the basis and purpose of the selected action.

For purposes of this subparagraph, the administrative record shall include all items developed and received under this subparagraph and all items described in the second sentence of section 117(d). The President shall promulgate regulations in accordance with Chapter 5 of title 5 of the United States Code to carry out the requirements of this subparagraph.

(C) Interim record. -- Until such regulations under subparagraphs (A) and (B) are promulgated, the administrative record shall consist of all items developed and received pursuant to current procedures for selection of the response action, including procedures for the participation of interested parties and the public. The development of an administrative record and the selection of response action under this Act shall not include an adjudicatory hearing.

Sections 117(a) and (b) and 113(k)(2)(B) and (C) do not require the Navy to respond to comments submitted by interested parties before selecting a final remedial action plan.

The Navy gave interested persons the opportunity to submit written and oral comments in response to its proposed remedial action plan and draft administrative record by the public notice it issued on 16 September 1988. Previously, the Navy gave interested persons the opportunity to submit comments in response to its (Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, by the public notice it issued on 7 March 1986. The Navy also gave interested persons the opportunity to submit comments in response to its Final Draft Report of Feasibility Study of Contamination at Naval Weapons Station, Concord, California, and its Final Draft Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station,

Concord, California, by the public notice it issued on 8 August 1985.

This document contains the Navy's responses to the comments which interested persons submitted in response to the proposed remedial action plan and draft administrative record and the Navy's responses to the comments which interested persons submitted previously in response to the Navy's (Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord; Final Draft Report of Feasibility Study of Contamination at Naval Weapons Station, Concord; and Final Draft Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord. The Navy took into account the comments previously submitted by interested persons before preparing its proposed remedial action plan; its (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives, and Volume III: Figures; its (Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord; and its Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord.

Chemical & Pigment Comments - IID (17 November 1988):

D. CHEMICAL & PIGMENT HAS HAD A LACK OF SUFFICIENT TIME TO RESPOND

The Navy has taken almost five years to prepare its final reports. It took the Navy over a year from the date it allowed defendants to comment on its last draft to prepare this final report. Despite the length of time the Navy took preparing its final report, the Navy has only granted defendants approximately 63 days to provide their comments on the final reports. These documents run into the thousands of pages and when stacked are over three feet high. Given that the Navy has taken over a year to prepare its final report, Chemical & Pigment believes that the amount of time provided it to make final comments is too short and has highly prejudiced its ability to respond adequately and fully to the Navy's documents. As such, the Navy has violated not only the requirements of CERCLA but also this defendant's due process rights.

Response to Chemical & Pigment Comments IID (17 November 1988):

The Navy has complied with CERCLA in providing interested persons a reasonable opportunity for submission of written and oral comments regarding its proposed remedial action plan and its proposed findings under Section 121(d)(4) of CERCLA and regarding its draft administrative record.

Section 117(a) and (b) of CERCLA establishes the

opportunity for submission of written and oral comments which the Navy must provide persons before the Navy selects a remedial action plan. See response to Chemical & Pigment Comment II-C above.

Section 113(k)(2)(B) and (C) of CERCLA establishes the opportunity for submission of comments regarding the draft administrative record before the Navy selects a remedial action plan. See response to Chemical & Pigment Comment II-C above.

The Navy gave interested parties sixty-three days to submit comments regarding its proposed remedial action plan and it proposed findings under Section 121(d)(4) of CERCLA and regarding its draft administrative record.

Chemical & Pigment Comments - IIE (17 November 1988):

E. THE NAVY HAS SUPPLIED RELEVANT DATA LATE OR NOT AT ALL

Despite the fact that the Navy released these reports as final reports, certain data upon which the Navy intends to rely have not yet been supplied to defendants or have been given to them late. The Navy only released the latest clam bioassay data on October 19, 1988, about one month after it had released the final report and fewer than 30 days from the extended date upon which comments are due. Chemical & Pigment maintains that these data may not properly be included in the final report since they were not released on the Navy's designated release date for the final reports. In any event, the failure of the Navy to release these data at the time it released the final report so as to provide defendants with a full time to review them is contrary to CERCLA and violates defendant's due process rights.

The Navy has also yet to release certain data concerning its latest soils analysis following sampling done in March 1988. In a letter dated October 19, 1988 to all counsel, the Navy admitted it had not yet submitted the data. To the extent that these data were relied upon or used by the Navy in preparing its final report, the failure of the Navy to release these data at the time of the final report has highly prejudiced this defendant's ability to respond to the final report, violates CERCLA, and violates its due process rights.

Chemical & Pigment reserves the right to provide additional comments following receipt of these data.

Response to Chemical & Pigment Comments IIE (17 November 1988):

The Navy has released all relevant data which it used to prepare the (Second Revised) Final Draft Feasibility Study Report.

Chemical & Pigment Comments - III/IIIA (17 November 1988):

III. COMMENTS ON THE NAVY'S STANDARDS FOR SHOWING NECESSITY FOR REMEDIAL ACTION PLAN

A. THE STANDARDS USED ARE NOT RELEVANT TO THE AREAS IN QUESTION.

The Navy relies upon a standard it refers to as "statistically above reference area" or "statistically above background" (hereinafter referred to as "STARA"). This standard has no relevance to any human use on the litigation parcels. It was based upon taking sample data and comparing them to background values for crop land, the maximum allowable soil concentration values established for sewage sludge applications (MASSA) and the California total threshold limit concentrations (TTLC). Since the Navy purchased this property as part of a program to establish a buffer zone between any human presence and its munitions magazines at the Concord Naval Weapons Station, the litigation parcels are not an area for human habitation and use. Indeed, the Navy strictly prohibits entry onto this property. At the public meeting held in October 1988 concerning the release of this final report, Dr. Richard Lee stated:

> "We also considered the exposure of humans to dust on these particular areas and concluded that there was no public threat due to dust off the station."

(Transcript of public meeting concerning proposed remedial action plan, October 12, 1988, p. 12:21-23.) As for agricultural use, it is clear that under the above circumstances, no such uses are likely on the litigation parcels. Hence, none of these standards are relevant to the area under consideration, and the Navy has failed to explain how they are relevant.

Response to Chemical & Pigment Comments IIIA (17 November 1988):

Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, are within the inhabited building quantity distance safety arcs which the station established around operational facilities on the Station. Human use of these parcels by station personnel and other persons is controlled, but human use is not prohibited. Some of these parcels have been used for agricultural purposes in the past. The use of the land may be altered in the future.

The standards considered by the Navy were all inclusive to evaluate the release and potential release of hazardous substances into the environment. The standard "statistically above reference area" was considered because it is scientifically sound and represents values at which a real difference was

observed in the collected data after site variability had been taken into account. The MASSA criterion was considered but not used as a final decision criteria for remediation. While the land use currently is a buffer zone for the installation, past history clearly indicates animal grazing was practiced on these parcels. Should the Navy desire to allow animal grazing on these parcels, remediation of all contaminated soil in excess of the MASSA criteria would have to be conducted prior to the implementation of this land use. The TTLC/STLC criteria was considered in order to determine the appropriate type of landfill required for disposal of the contamination.

Consideration was given to the exposure routes for contaminants observed on each RASS. While exposure to humans off-site through contaminated dust appeared to be insignificant, exposure of contaminated dust to humans on-site appeared to be more significant. Soil and dust ingestion was therefore considered using the EPA soil criteria of 500 ppm lead (EPA, 1977). Human exposure is currently restricted because of the present use of the property as a buffer zone. However, should the Navy change these restrictions and desire to allow humans freer access to these areas, exposure to contaminated dust could become more significant and remedial actions would have to be taken to protect humans on-site.

Exposure routes to wildlife were also evaluated using surrogate bioassay organisms. Substantial migration of contaminants from soil and surface water into plants, earthworms, clams, and mice at certain locations was observed. Only bioaccumulation that was statistically above that observed in reference areas was considered as a real potential harm to wildlife, especially endangered species associated with these parcels. Each organism clearly indicated that certain metals were migrating into the foodchains associated with these parcels.

The decision criteria for remediation on each RASS were described in detail in the (Second Revised) Final Draft Feasibility Study Report (pages 3.84-3.97). The area of contamination consisted of sample sites where soil concentrations and bioaccumulation of metals were found to be statistically above those observed in sample sites of the reference areas. Comparison of the TTLC/STLC data to the bioaccumulation data revealed that many sites both showed bioaccumulation and exceeded TTLC/STLC criteria. In addition, TTLC/STLC criteria could be applied quicker and easier than use of a bioassay during active remediation to evaluate the success of the remediation. Consequently, the decision criteria adopted for remediation were TTLC/STLC criteria. In addition to these primary criteria, other considerations were included, such as barren areas. Previous comments by the Defendants indicated their preference to restore barren areas. This appeared to be a worthwhile comment because a lack of vegetation is associated

with decreased habitat quality on these areas, so barren areas were added to the active remediation area if they were not already included and were adjacent to an active remediation area.

Other items that were evaluated in the process were the presence of wetlands and endangered species and topography. Wetlands are sensitive habitat and endangered species are to be protected. The active remediation area was reduced to minimize destruction of sensitive habitat and to take advantage of topography such as drainage ditches and to allow heavy equipment to accomplish the work with minimum effort. The areas of active remediation for RASS 1 and RASS 2 were determined after balancing the above considerations. The decision criteria for RASS 3 considered TTLC/STLC for the same reasons as discussed above. However, since RASS 3 was a source of contamination for RASS 1 and RASS 2, it was decided that soil containing metals statistically above reference areas should also be included in the active remediation area. This would eliminate the potential future release of contaminants from RASS 3 onto RASS 1 and RASS 2. In addition, the wetland plants present in RASS 3 are resilient to intrusive remedial action and are not inhabited by endangered species. Topography of RASS 3 was also factored into the final active remediation area. The decision criteria for RASS 4 considered TTLC/STLC as for the other RASS's. However, RASS 4 soil pH values were observed to be extremely low at a number of sampling sites. Since metals such as cadmium, zinc, copper and lead can become extremely mobile at soil pH values of 5.0 or below, low soil pH was considered in the decision criteria. Consequently, soils exceeding TTLC/STLC will be excavated and other areas of low soil pH will be limed to pH 6.5-7.0 as active remediation.

The standards used in the decision criteria reflect to the greatest extent possible the biological impact of the existing contamination on each RASS. These standards should provide adequate protection of the environment from the release or potential release of hazardous substances from Navy property.

Chemical & Pigment Comments - IIIB (17 November 1988):

B. THE NAVY APPLIES VARIOUS STANDARDS IN AN ARBITRARY MANNER.

The Navy uses the STARA standard and independently of that the TTLC standard to justify its remedial action proposals on the litigation parcels. It applies them, however, in an arbitrary manner. For example, for portions of RASS's 1 and 2, which are wetlands and which contain levels of heavy metals above the TTLC and STARA standards, the Navy does not propose any clean-up. Yet in areas of RASS 3 which are below the TTLC and STARA standards, the Navy proposes a clean-up in excess of 90 percent.

The Navy claims that it does not propose a clean-up of portions of the wetland areas containing levels of heavy metals above the TTLC or STARA standards because those areas are to be protected as wetlands. Yet, the Navy took great pains to obtain a non-jeopardy opinion from the U.S. Fish and Wildlife Service which it relies upon to justify the destruction of 15 acres of wetland in RASS 1. Chemical & Pigment submits that the Navy is acting arbitrarily and capriciously when it proposes clean-up of areas below the TTLC and STARA standards while leaving other areas untouched that are above those levels. The Navy is also arbitrary in claiming that it can destroy some wetland areas because they will be restored while refusing to conduct similar destruction operations at other wetlands in order to remove alleged heavy metal contamination because those areas would be destroyed.

On the one hand, the Navy plan demonstrates a haphazard, irrational approach to the various parcels. On the other hand, the Navy's approach could mean, in reality, that its claims of a potential actual harm to the environment are not present or overstated. In either case, the Navy's proposed clean-up lacks a rational basis.

Response to Chemical & Pigment Comments IIIB (17 November 1988):

These comments are factually incorrect. The Navy undertook a comprehensive evaluation of the biological impact of the contaminants that have been discharged into the environment by former and adjacent landowners. The situation was complex with a number of interactions that had to be considered. The criteria and factors considered, as described above in the response to Chemical & Pigment Comments III-A, incorporated as many interactions as deemed necessary. Consequently, balancing the important factors for short term and long term impacts resulted in appropriate environmentally wise remediation as described in the (Second Revised) Final Draft Feasibility Study Report. The approach used was systematic and rational.

Other factors that were evaluated in the process were the presence of wetlands and endangered species and topography. Wetlands are sensitive habitat and endangered species are to be protected. The active remediation area was reduced to minimize destruction of sensitive habitat and to take advantage of topography such as drainage and to allow heavy equipment to accomplish the work with minimum effort. The areas of active remediation for RASS 1 and RASS 2 were determined after balancing the above considerations. The decision criteria for RASS 1 and RASS 2 were determined after balancing the above considerations. The decision criteria for RASS 3 considered TTLC/STLC for the same reasons as discussed above. However, since RASS 3 was a source of contamination for RASS 1 and RASS 2, it was decided that soil containing metals statistically above reference areas,

should also be included in the active remediation area. This would eliminate the potential future release of contaminants from RASS 3 onto RASS 1 and RASS 2. In addition, the wetland plants present in RASS 3 are resilient to intrusive remedial action and are not inhabited by endangered species. Topography of RASS 3 was also factored into the final active remediation area. The decision, criteria for RASS 4 considered TTLC/STLC as for other RASS's. However, RASS 4 soil pH values were observed to be extremely low at a number of sample sites. Since metals such as cadmium, zinc, copper and lead can become extremely mobile at soil pH values of 5.0 or below, low soil pH was considered in the decision criteria. Consequently, soils exceeding TTLC/STLC will be excavated and other areas of low soil pH will be limed to pH 6.5-7.0 as active remediation.

The Navy did not request a biological opinion from the Fish and Wildlife Service to "justify the destruction of wetland." On 28 June 1985, the Navy requested the initiation of formal consultation under Section 7 of the Endangered Species Act concerning the impact to endangered species on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, from the implementation of remedial action for the release, and the threatened release, of hazardous substances on these parcels. On 5 July 1988, the Navy prepared a final report of the biological assessment of the impact to endangered species on these parcels from the implementation of the proposed remedial action plan for these parcels and submitted the report to the Fish and Wildlife Service. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion which stated that:

> It is our Biological Opinion that the proposed remediation of heavy metal contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or the California clapper rail.

The biological opinion also stated that:

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.
>
> The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance

associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.

The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

Chemical & Pigment Comments - IV (17 November 1988):

IV. TESTING ON PARCELS TO THE WEST OF PARCEL 579D

SHOWS LEVELS OF HEAVY METALS ABOVE THE TTLC AND STARA STANDARDS. BECAUSE THESE PARCELS WERE NOT DESIGNATED FOR CLEAN-UP, THE NAVY'S PROPOSED REMEDIAL PLANS ARE ARBITRARY AND CAPRICIOUS.

To the west of Parcel 579D lie several parcels under Navy ownership or control identified as 579A, 579B, and 579C. For ease of reference, we will refer to these as one parcel known as "West-579D." The Navy has failed to test this area as part of its action against defendants. The Navy has apparently not investigated this parcel even though runoff from portions of this parcel will discharge into low areas and will ultimately empty onto RASS 3. If one accepts the Navy's claims regarding runoff and migration of sediments and heavy metals, then the Navy should be investigating whether heavy metal contamination exists on Parcel West-579D and whether clean-up of this parcel is warranted as part of its remedial action plan for the litigation parcels.

Chemical & Pigment submits that there is ample evidence available to the Navy that this parcel should have been included in any clean-up. First, aerial photography shows a former auto junkyard on a portion of the site. The Navy's own experts have testified that junkyards are sources of lead and cadmium contamination along with other heavy metals.

Second, the same aerial photographs show that a brick factory was located on this parcel. This raises the question whether this brick factory contains debris or created debris that might contain heavy metals.

Third, Dr. Duane Mikkelson, one of this defendant's experts, has conducted sampling on the parcel. As part of this sampling, he walked the parcel and easily and quickly determined that it contains iron pyrite and other debris that resemble the debris located on the kiln site in RASS 2. Dr. Mikkelson made the initial discovery both visually and by smell. He found kiln debris similar to that on RASS 2 buried on this parcel. At the time of this sampling and inspection, Dr. Mikkelson was accompanied by the Navy's attorney in this litigation, Mr. J. Martin Robertson, and its lead soil scientist, Richard Lee. In fact, Mr. Robertson and Mr. Lee carefully watched Dr. Mikkelson and even took photographs of Dr. Mikkelson's sampling. Amazingly, despite Dr. Mikkelson's easy identification of this debris, the Navy has failed to take any sampling of West-579D or propose any clean-up.

More significant, however, Dr. Mikkelson has conducted sampling of soils and rye grass on West-579D. The results of this sampling show that areas on the parcels have levels of heavy metals that are above the TTLC and STARA standards which the Navy has applied to the litigation parcels. The test results are submitted as Exhibit 2 along with a map showing sampling

locations not only for this parcel but on the litigation parcels as Exhibit 3. At one location, for example, Dr. Mikkelson's sampling reveals arsenic levels 30 times higher than the Navy's STARA standard. Similarly at other points, lead shows values in excess of the Navy's STARA standard.

If a clean-up is warranted on the litigation parcels for the reasons the Navy has advanced, which include claims that heavy metal levels exceed the STARA standards, then the Navy should also propose a clean-up on its own Parcel West-579D. Since the Navy has not called for such a clean-up, its proposed clean-up on the litigation parcels is arbitrary and capricious.

More troublesome, however, than the arbitrary and capricious character of the Navy's decision to seek clean-up of litigation parcels is an attempt to hide the fact that its own property contains kiln debris similar to that found on the kiln site. Indeed, throughout this litigation, the Navy has studiously avoided even mentioning Parcel West-579D despite the fact that runoff from this parcel ultimately enters onto RASS 3. Since the Navy insists that the kiln site on RASS 2 is a contaminated site that requires massive excavation and removal, the Navy's unwillingness and, indeed, failure to deal with similar kiln debris on Parcel West-579D clearly demonstrates a completely arbitrary and capricious action on the part of the Navy in requiring a clean-up of the litigation parcels and an attempt to impose clean-up costs related to those litigation parcels on this and other defendants.

Chemical & Pigment notes at this point that it makes no representation that any of the debris found on West-579D came from or was originally on the kiln site on RASS 2.

Along similar lines and equally unsettling is the fact that the Navy does not propose a clean-up of the interior of Parcel 575 despite the fact that the Navy knows this site was once an auto junkyard. Hence, while the Navy proposes that the defendants pay for clean-up costs of the litigation parcels, it has refused to conduct sampling on the interior of Parcel 575 or propose any clean-up of that parcel.

Chemical & Pigment submits that the Navy cannot act in a rational manner so long as it fails to propose clean-up of Parcels West-579D and 575 and so long as it maintains that a clean-up on the litigation parcels is justified because levels of heavy metals allegedly exceed the TTLC and STARA standards.

Response to Chemical & Pigment Comments IV (17 November 1988):

These comments are factually incorrect. Information obtained prior to 1984 from soil samples in the area west of Parcel 579D did not show contamination of concern (Anderson

Geotechnical Consultants, 1984). Consequently, this area did not need further evaluation.

While Mr. Robertson and Dr. Lee did observe Dr. Mikkelsen's sampling of a few sites near the main gate of the Naval Weapons Station, Concord, they were not allowed to observe any sampling on the area west of 579D. Dr. Mikkelsen had entered this area, unescorted by Navy personnel, the morning prior to the time scheduled by Chemical & Pigment for Mr. Robertson and Dr. Lee to observe the sampling. He had finished the sampling before Mr. Robertson and Dr. Lee arrived. Dr. Mikkelsen did walk over the area with Mr. Robertson and Dr. Lee to show where soil samples were collected after the fact. Consequently, this comment is clearly factually incorrect.

Chemical & Pigment obviously did not look at or understand what sampling Dr. Mikkelsen did, because these comments are factually incorrect. Exhibits 2 and 3 do not show ryegrass sampling on West-579D; only soil was sampled. Chemical & Pigment must be looking at other data than that presented in Exhibits 2 and 3, or even the tabulated data submitted with these comments because the example cited of "one location revealing arsenic levels 30 times higher than the Navy's STARA standard" is factually incorrect. The highest arsenic value shown in Exhibit 2 is 60 ppm (J 10A), while another sample collected at the same location (J 10) showed ND, no detectable arsenic. The Navy's STARA standard (Statistically Above Reference Area) for arsenic is 544 ppm. The value 60 ppm is in no way 30 times higher than the STARA standard; instead, it is only 11% of the STARA. This comment is factually incorrect. In addition, the comment that lead shows values in excess of the Navy's STARA standard is incorrect. The Navy does not have a STARA standard for soil lead. The soil lead criterion considered by the Navy was 500 ppm lead in relation to soil ingestion, not STARA. Even so, the highest value of soil lead on West-579D presented on Exhibit 2 is 77 ppm (K 9, K 9A). These values are almost an order of magnitude below the EPA criteria of 500 ppm and do not appear to indicate any contamination of this area that is of concern. None of the data presented in Exhibits 2 and 3 indicate levels of contamination that require clean-up as stated by the commenter based on exceedance of STARA standards. This comment is factually incorrect. Consequently, Chemical & Pigment's allegation that the Navy's proposed clean-up on litigated parcels is arbitrary and capricious is obviously unfounded and cannot be supported by its own data.

Previous data presented in the Administrative Record Section N(98), Figure 18, and data presented in the Final Remedial Investigation Report and in Figure 19 of the Administrative Record, Section N(98), indicate no contamination of concern in the area described by the commenter as West-579D. Sampling performed by PEL and subsequently by WES was designed to

determine any potential release of contamination from this area. All sample data for locations 4M-1, 4M-2, 3M-1, 4N-1 in Figure 18 and locations 4O-1, 4N-1, 3O-1 in Figure 19 of the Administrative Record Section N(98) show no contamination of any concern and therefore no migration of contaminants from the area West-579D. Consequently, since West-579D is not a source of contamination to the litigated parcels, there is no need for further sampling and evaluation in that area. However, the data provided by Chemical & Pigment are appreciated and support the Navy's earlier conclusions that West-579D is not contaminated.

If West-579D was previously a brick factory as alleged by Chemical & Pigment, it is not surprising that brick debris might be found on the site. However, to state that the presence of brick debris that appears to Dr. Mikkelsen to be similar to the debris observed at the kiln site means contamination is present is factually incorrect. Data presented by Chemical & Pigment do not support this statement. The reason the brick debris on the kiln site is contaminated is due to the activities of burning materials that contained contaminants in the kilns. Brick, itself, usually is not contaminated. However, materials that are burned in kilns built with bricks have contaminated the brick debris left after kiln demolition on the kiln site. The comments appear to be a desperate attempt by Chemical & Pigment to find contamination where there is no contamination.

The Navy sampled and tested soil from Parcel 575 in its remedial investigation because there was reason to believe contamination might be present. The data, however, indicate very little contamination and no exceedance of decision criteria (Figure 19 of the Administrative Record, Section N(98)). Consequently, no remediation of the interior of Parcel 575 is required. Chemical & Pigment is apparently confused in thinking that the presence of an auto junk yard in the past means the site requires clean-up, despite data to the contrary.

The Navy has acted in a rational and scientifically sound manner in evaluating all contamination related to the Parcels. The Navy has considered all pertinent data and has determined the appropriate contaminated areas that require remediation to protect human health and the environment.

The Navy is concerned with the manner in which Dr. Mikkelsen conducted his sampling and evaluation of contamination. First, the scope of work that was provided the Navy by Chemical & Pigment for sampling plant and soil on Navy property was not followed, but was drastically changed in the field. Dr. Mikkelsen was not equipped to complete the sampling on the days when clearance was requested. He had to return on a second trip to accomplish what he attempted on the first trip. On the second trip, Dr. Mikkelsen collected most of the samples prior to the arrival of Navy personnel and its technical consultant. Second,

plant sampling conducted by Dr. Mikkelsen was haphazard and was poorly documented on Exhibit 3. The locations of the sampling appear in straight line transects on Exhibit 3. This is factually incorrect. Dr. Mikkelsen wandered all over the area searching for ryegrass to sample. In many cases, he did not find ryegrass where he wanted to find it, and had to look around for the closest available sample site. Consequently, all locations on Exhibit 3 are not correct. Third, the labelling of samples was conducted in a haphazard manner and no chain of custody papers were prepared for any plant or soil samples collected from Navy property. Fourth, the greenhouse plant growth study was conducted in a less than sound scientific manner. The plant growth study was conducted with only two replicates. The minimum number for any agronomic plant pot study is three. A study with two replicates will most likely show no statistical differences between contaminated and reference areas selected by Dr. Mikkelsen. This type of finding would be extremely beneficial to Chemical & Pigment. Fifth, there apparently were no project specific QC samples included in the chemical analysis of the samples (i.e., spikes or duplicates).

Chemical & Pigment Comments - V - (17 November 1988):

V. COMMENTS ON THE NAVY'S DISCUSSION OF MIGRATION OF HEAVY METALS.

The Navy proposes a massive clean-up of the RASS 3 area in part because it maintains that heavy metals in sediment in RASS 3 will migrate into RASS's 1 and 2. The Navy's own report, however, indicates that it can find no significant migration of heavy metals into the Bay. Nor has its sampling revealed migration into the groundwater. One of its own experts, Mr. Michael Josselyn, has also opined that there is probably low mobility at this time. Mr. Josselyn stated:

> "Finally, since the 'spills' or contamination occurred over 10 to 20 years ago, it may be that the contamination initially spread rapidly but we are now seeing relatively low mobility due to stabilization of the spill or contamination."

(Draft Administrative Record (DAR), Vol. V, K. 7, p. WES 12774.)

Chemical & Pigment's own data show that there is little to no migration of heavy metal entrained sediment from RASS 3 to other areas. One of the many channels or mechanisms in the past for such movement was through a culvert that allowed water from the RASS 3 to discharge onto the kiln site to the north of the Santa Fe Railroad tracks. The Navy's own experts, however, have testified that this culvert is blocked and does not provide a major pathway for migration of water or sediments. In fact, one

could probably block this culvert and completely stop migration onto RASS's 1 and 2, assuming that such migration actually does occur.

Finally, the Navy's report erroneously claims that when Nichols Creek overflows onto the Chemical & Pigment property, this causes sediment to discharge into Nichols Creek and that this sediment contains heavy metals. The actual evidence is to the contrary. Eyewitness testimony from the deposition of Mr. Marvin Phelps taken by the Navy in the litigation on this case has shown that over the years, Nichols Creek has actually deposited sediment onto the Chemical & Pigment property. In the deposition testimony of Mr. Phelps, he stated that over the years he has noticed an accumulation on the western side of the property. (See deposition of Marvin Phelps, Vol. II, May 5, 1987, p. 187:6-12, incorporated herein by reference.) Chemical & Pigment also denies there is any release or threatened release of hazardous substances from its property. If, as the Navy claims, there was significant sediment transport off the property, we should not expect to find an accumulation of sediment on that portion of the property over the years. Hence, the Navy's claims regarding the transport or migration of sediment are not supported by the evidence in the Navy's own record and eyewitness testimony.

Response to Chemical & Pigment Comments V (17 November 1988):

The Navy has performed extensive sampling of the surface waters on RASS's 1, 2, 3, and 4. To date, testing indicates that contaminants have not migrated into Suisun Bay. However, migration of contaminants into the surface waters of Nichols Creek and other unnamed waters has been documented.

The Navy has not conducted extensive ground water sampling to date. An extensive ground water sampling program is currently being implemented. As discussed in the (Second Revised) Final Draft Feasibility Study Report, it is anticipated that hydrologic conditions found in the areas under investigation militate against the ground water as a major migration pathway. However, this has not been confirmed by direct sampling and analysis.

And as also discussed in the (Second Revised) Final Draft Feasibility Study Report, the Navy concludes that the culverts, under the Southern Pacific railroad, connecting RASS 3 and RASS 2 are a potential pathway for migration of contaminants from RASS 3 to RASS 2. Although the culverts are partially obstructed by sediment, a substantial opening remains that would allow massive amounts of water and contaminants to migrate from RASS 3 onto RASS 2. Site work conducted in conjunction with implementing the preferred alternatives would include drainage improvements that would eliminate the culverts.

Soil and sediment sampling data clearly indicate the Chemical & Pigment property is a highly probable source of past contamination and a potential source of future contamination on Navy property. It is likely that both erosion and sedimentation phenomenon affect Chemical & Pigment property.

Chemical & Pigment Comments - VI (17 November 1988):

VI. THE NAVY HAS FAILED TO DEMONSTRATE CONTAMINATION OR DAMAGE TO THE ENVIRONMENT THAT WOULD JUSTIFY THE CLEAN-UP THE NAVY PROPOSES

The Navy's basis for a clean-up rests on a combination of factors which taken separately and, ultimately, together do not justify the remedial action plan as proposed. To begin with, the Navy has never demonstrated that the STARA standard demonstrates or proves an actual or potential harm to the environment. By itself, the Navy's STARA standard only serves as one baseline for comparing levels of heavy metals. It is a far lower standard than even the TTLC standard.

Since human use is not an issue, it is highly questionable whether even the TTLC standard should apply and certainly the use of the STARA standard as it concerns potential or alleged effects on humans is inappropriate. The Navy fails to mention in its report that it owns the property and purchased the property initially as a buffer zone for its munitions magazines located to the west of the properties. Indeed, entry to the public is strictly forbidden. In fact, members of the public can and have been challenged to halt with the possibility of being shot and killed for failing to do so. There is simply no evidence that these areas would ever be used for human habitation or any significant human use. Any use on the property is already illegal and a trespass.

In addition, while the Navy has discussed risk to humans in the report, it is mainly in terms of risks with regard to the excavation part of its own remedial action plan. If excavation is not used or only limited excavation is used, the Navy could reduce this supposed risk significantly, assuming it really is a risk.

Indeed, it is questionable whether this really is a risk. Immobilized heavy metals do not present a real human health problem. The Navy has provided no data to show that any of the current employees at the Chemical & Pigment and Allied facilities nearby have suffered any significant diseases or health risks due to alleged heavy metal contamination.

Since neither the STARA nor the TTLC standard by itself shows damage or harm to the environment, and since we have no human use on the site, we must look to other evidence which the

Navy uses to support its claim that a massive clean-up as it has proposed is warranted.

The Navy has also relied heavily on a mouse tissue analysis. However, the Navy's own consultants in the Draft Administrative Record have stated quite emphatically to the Navy that these studies demonstrate no correlation of a pathological nature between levels of heavy metals on site and the alleged heavy metals found in the mouse tissue. (DAR, Vol. IV, J. 4, p. MSE 709.) If even the Navy's own biological experts deny a correlation, then how can the Navy maintain that there is one for purposes of a remedial action plan.

Moreover, a comparison of the trapping rate for the salt marsh harvest mouse on RASS 2 with all the non-RASS wetlands shows a rate for RASS 2 of 2.8 as opposed to 2.3 in other non-RASS wetlands. These data suggest that the density of salt marsh harvest mice in RASS 2 is no different from the density in the Bay Area wetlands presumed to have background levels of heavy metals.

Similarly, the Navy has used both earthworm and clam bioassays to analyze levels of heavy metals in the soil and their alleged bioavailability through uptake. Clams, however, are not indigenous to the parcels and merely demonstrate accumulation of heavy metals. They are notorious as very sensitive accumulators of heavy metals. They do not, however, measure actual uptake of the metal in the food chain. Nor do they reflect real conditions. Likewise, earthworms are not indigenous to the area and do not measure actual uptake of a metal in the food chain.

In fact, the Navy's expert, S. Anderson Peoples, states:

> "I cannot agree that the area is a hazard to birds. The area involved is so small compared to the total area available to them, it would seem improbable that they would feed there more than once, by chance. A single feeding on a plant or little animal is not likely to cause poisoning from any of the metals."

(DAR, Vol. V, K. 16, p. ADV 1.) Dr. Peoples goes on to state:

> "The possible effect of contamination on the Carquinez Straits from the effluent from this area with resultant damage to fish also seems highly unlikely, due to the dilution factor involves."

(Id.)

Dr. Peoples has also concluded:

> "The NWS Concord in its present state does not present a serious hazard to the environment or danger to animal and human health."

(DAR, Vol. VI, K. 28, p. WES 8182.)

As to bioavailability, Dr. Michael Josselyn has criticized the Navy's claims regarding deaths in its greenhouse plant experiment as evidence of damage. He states:

> "Although greenhouse plants died, weren't plants found in the field at these various sites? If so, the conclusion relevant to toxicity in the field may not be true."

(DAR, Vol. V, K. 7, p. WES 1275.)

In fact, Chemical & Pigment's own rye grass testing of levels of heavy metals shows no phototoxicity effect and actually demonstrates that other factors unrelated to any alleged heavy metal contamination have played an equal or more important role in any problems that may be observed in plant life. For example, at sample point on the litigation parcels of 600C, which is a bare area, metals are below the TTLC levels, yet plant growth in Chemical & Pigment's pot experiment was low at an average of 2.18. In other areas where supposedly there are concentrations of heavy metals, there is plant growth on an average of 3.00 and above. These plant growth statistics are found in Exhibit 4.

The Navy's own use of typha or cattails also fails to demonstrate any correlation or cause and effect relationship between alleged contamination and damage to the plant. Dr. Josselyn commented:

> "Typha community occurred in the least abundance, but was selected to represent the plant community metal uptake."

(DAR, Vol. V, K. 7, p. 1277.) Chemical & Pigment, however, has clear evidence that supposed contamination has not affected cattail growth in the area immediately adjacent to Chemical & Pigment's property. Running along the western border of Chemical & Pigment's property is Nichols Creek. The Navy has consistently claimed and alleged that heavy metals leave the property and enter the creek as sediment. If this is true, and Chemical & Pigment emphatically denies it, then we should expect to see significant damage to the cattails along Nichols Creek adjacent to Chemical & Pigment's property. This has not been the case. Eyewitness accounts show that cattail growth in Nichols Creek

adjacent to Chemical & Pigment's property is so luxurious that it is necessary to remove the cattails on a periodic basis so they will not block the flow of Nichols Creek through the culverts that run beneath various embankments nearby. (See deposition of Marvin Phelps, supra, pp. 224-226, incorporated herein by reference.) Chemical & Pigment has repeatedly requested that the Navy clean up cattails on its property because they cause flooding on Chemical & Pigment's property. In 1984, the Navy did in fact excavate such cattails. Since then, the cattails have returned in abundance and despite requests last year, the Navy has refused to clean them out.

Thus, the evidence to date does not support a claim that there has been potential or actual harm to the environment that would justify the kind of clean-up the Navy proposes. Indeed, it may well be that a no-action alternative is even more appropriate under the circumstances. In fact, one has to question the Navy's claim that a clean-up is necessary when its own trapping of mice for purposes of the tissue analysis has shown an abundant salt marsh harvest mouse population. Chemical & Pigment submits that for the Navy to claim that this abundant mouse population demonstrates a damage or harm to the environment is simply contrary to the numbers.

Response to Chemical & Pigment Comments VI (17 November 1988):

The Navy concluded, in its Final Report of Remedial Investigation of Contaminant Mobility of Naval Weapons Station, Concord, California, that portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord are contaminated with hazardous substances, including arsenic, cadmium, copper, lead, selenium, and zinc.

The standards considered by the Navy were all inclusive to evaluate the release and potential release of hazardous materials into the environment. The standard "statistically above reference area" was considered because it is scientifically sound and represents values at which a real difference was observed in the collected data after site variability had been taken into account. The TTLC/STLC criteria was considered in order to determine the appropriate type of landfill required for disposal of the contamination.

Consideration was given to the exposure routes for contaminants observed on each RASS. While exposure to humans off-site through contaminated dust appeared to be insignificant, exposure of contaminated dust to humans on-site appeared to be more significant. Soil and dust ingestion was therefore considered using the EPA soil criterion of 500 ppm lead (EPA, 1977). Human exposure is currently restricted because of the present use of the property as a buffer zone. However, should the Navy change these restrictions and desire to allow humans

freer access to these areas, exposure to contaminated dust could become more significant and remedial actions would have to be taken to protect humans on-site.

Exposure routes to wildlife were also evaluated using surrogate bioassay organisms. Substantial migration of contaminants from soil and surface water into plants, earthworms, clams, and mice at certain locations was observed. Only bioaccumulation that was statistically above that observed in reference areas was considered as a real potential harm to wildlife, especially endangered species associated with these parcels. Each organism clearly indicated that certain metals were migrating into the foodchains associated with these parcels.

The decision criteria for remediation on each RASS were described in detail in the (Second Revised) Final Draft Feasibility Study Report (pages 3.84-3.97). The area of contamination consisted of sample sites where soil concentrations and bioaccumulation of metals were found to be statistically above those observed in sample sites of the reference areas. Comparison of the TTLC/STLC data to the bioaccumulation data revealed that many sites both showed bioaccumulation and exceeded TTLC/STLC criteria. In addition, TTLC/STLC criteria could be applied quicker and easier than use of a bioassay during active remediation to evaluate the success of the remediation. Consequently, the decision criteria adopted for remediation were TTLC/STLC criteria. In addition to these primary criteria, other considerations were included, such as barren areas. Previous comments by the Defendants indicated their preference to restore barren areas. This appeared to be a worthwhile comment because a lack of vegetation is associated with decreased habitat quality on these areas, so barren areas were added to the active remediation area if they were not already included and were adjacent to an active remediation area.

Other items that were evaluated in the process were the presence of wetlands and endangered species and topography. Wetlands are sensitive habitat and endangered species are to be protected. The active remediation area was reduced to minimize destruction of sensitive habitat and to take advantage of topography such as drainage ditches and to allow heavy equipment to accomplish the work with minimum effort. The areas of active remediation for RASS 1 and RASS 2 were determined after balancing the above considerations. The decision criteria for RASS 3 considered TTLC/STLC for the same reasons as discussed above. However, since RASS 3 was a source of contamination for RASS 1 and RASS 2, it was decided that soil containing metals statistically above reference areas should also be included in the active remediation area. This would eliminate the potential future release of contaminants from RASS 3 onto RASS 1 and RASS 2. In addition, the wetland plants present in RASS 3 are resilient to intrusive remedial action and are not inhabited by

endangered species. Topography of RASS 3 was also factored into the final active remediation area. The decision criteria for RASS 4 considered TTLC/STLC as for the other RASS's. However, RASS 4 soil pH values were observed to be extremely low at a number of sampling sites. Since metals such as cadmium, zinc, copper and lead can become extremely mobile at soil pH values of 5.0 or below, low soil pH was considered in the decision criteria. Consequently, soils exceeding TTLC/STLC will be excavated and other areas of low soil pH will be limed to pH 6.5-7.0 as active remediation.

The standards used in the decision criteria reflect to the greatest extent possible the biological impact of the existing contamination on each RASS. These standards should provide adequate protection of the environment from the release or potential release of hazardous materials from Navy property.

The Navy prepared a proposed remedial action plan pursuant to the authority of Sections 104, 120 and 121 of CERCLA. Section 121(a) provides that the Navy must select appropriate remedial action which it in accordance with Section 121 of CERCLA; which is to the extent practicable, in accordance with the National Contingency Plan; and which provides for cost-effective response.

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:
>
> (A) the long-term uncertainties associated with land disposal;
>
> (B) the goals, objectives, and requirements of the Solid Waste Disposal Act;

(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;

(D) short and long-term potential for adverse health effects from human exposure;

(E) long-term maintenance costs;

(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

42 U.S.C. 9621(b).

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

(d) Degree of Cleanup, - (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) of CERCLA provides that:

(2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -

(i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or

(ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is

> relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of thee release or threatened release.

Section 121(d)(4)(B) of CERCLA provides, in pertinent part; that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to the legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that . . .
>
> (B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

(Second Revised) Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of

contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

Chemical & Pigment suggests that "the Navy has failed to demonstrate contamination or damage to the environment that would justify the clean-up". Chemical & Pigment suggests that no actual or potential harm to the environment has been demonstrated.

The mouse tissue analysis is just one of several factors the Navy relied on in its deliberations. The Navy did not maintain the existence of a correlation, as stated by Chemical & Pigment. The evidence of bioaccumulation presented by California Analytical Laboratory was examined in conjunction with earthworm, clam, and plant tissue and analyses. The data collected in the Final Remedial Investigation Report demonstrate substantial accumulation of a number of toxic contaminants

including arsenic and a number for trace metals at all four RASS's. The concentrations of these contaminants are statistically greater than those found in reference areas and exceed a number of relevant criteria (e.g., TTLC or STLC) at many of the sites sampled within these RASS's. These contaminants are mobile in surface waters and clam bioassays have demonstrated the potential for their bioaccumulation in aquatic species. Laboratory bioassays have demonstrated that these contaminants are also bioavailable to both plants and soil invertebrates. Moreover, at several sites in these RASS's soils containing these contaminants were found to be toxic to both plants and soil invertebrates. Finally, there were indications of phytotoxicity, and reduced abundance of plants and soil invertebrates at some of the sites in these RASS's showing high concentrations of these contaminants. Taken together, these data indicate substantial potential for harm to the environment due to the presence of these contaminants in the soils, sediments, and surface waters of the four RASS's.

Because no population studies have been conducted on the salt marsh harvest mouse on the Naval Weapons Station, Concord, insufficient data exist to discuss the density of the mouse.

Chemical & Pigment Comments - VII (17 November 1988):

VII. THE NAVY HAS FAILED TO CONSIDER MANY OTHER FACTORS THAT ARE OR COULD BE THE CAUSE OF ALLEGED PROBLEMS ON THE LITIGATION PARCELS.

We find instead that many of the locations with poor or low plant growth are characterized by acidic soil conditions. The acidic conditions are the more likely reason for low plant growth as opposed to alleged heavy metal contamination. Indeed, in several bare areas with no heavy metal contamination or with heavy metal levels that are far below the TTLC level, one finds extremely acidic pH values in the range from 3.5 to 5. The Navy has not even looked at the pH values as an explanation for low plant growth on RASSes 2 and 3.

The Navy has also not investigated other possible environmental factors that would result in the soil conditions it observes on site. In addition to soil pH, the other possible factors include the soil texture, the moisture relationships, the mineralogical nature of the clay fraction of the soil, the pedological fabric of the plow layer and its sensitivity to depredation, the clay fabric, particularly the soil layers in relation to water movement and whether water-saturated layers exist on site, the soil organic matter content and coefficients of physical degradation in the soil organic matter layer, and the biological activity of the soil.

Second order factors must also be considered. These factors relate to the nature of clay minerals, clay content, and cation content, the state of the humic acid content of the soil organic fraction, soil permeability, salt accumulation, and buffering systems present in the soil such as the presence of carbonic acid/carbonates, carbonic acid/silicates, mineral acid/clays, mineral acid/aluminum and iron and other sesquioxides and organic acid/organic matter.

Formulas for forecasting the intensity of soil sensitivity to alternative action plans and remediations have been published, but none of these have been applied to this location. Coefficients of sensitivity should be used in developing a rational remediation program, however, none have been used here.

Bioavailability requires consideration of concepts of quantity and intensity as described by Bray and Schofield. Quantity, "Q," is considered the amount of mass of a compound expressed as moles or as kilograms. Intensity, "I," is an intensity variable referring to the chemical or to a chemical potential of the metal of interest. Detailed information of Q and I relationships of contaminating metals would greatly contribute to an understanding and evaluation of contaminant availability to organisms.

In addition to Q and I, mobility may also play a role. There are mutual influences between compound behavior and organism behavior. There are many conditions in soils with compound behavior, for example, root extraction ability, root exclusion ability, and an organism's regulate compound behavior. Evaluation of the fate of inorganic compounds in soil and water requires a detailed consideration of the chemical and biological process involved such as complexation, absorption, coagulation (precipitation), oxidation-reduction, ion exchange complex in formation, acid-base reaction, and biological factors. The Navy's analysis has failed to address any of these factors.

In fact, the Navy's own consultants have identified other conditions as having more of an effect on soils and plants than the alleged heavy metal contamination. Mr. H. Thomas Harvey has commented:

> ". . . even if the soil moisture was maintained suitable levels of other factors, (food, aeration, etc.) may have been limiting rather than heavy metals in the test soils."

(DAR, Vol. V, K. 13, p. WES 6403.)

Response to Chemical & Pigment Comments VII (17 November 1988):

It is true that low pH can adversely impact plant growth. This is especially significant when metals are present below TTLC values because more of the existing metals are more soluble and mobile. Therefore, soil contents of metals as observed in the active remediation area can be extremely mobile and bioavailable. Clam bioassays clearly indicated migration of certain metals into surface water of RASS 3 and substantial bioaccumulation. The Navy agrees that there are many factors that influence migration and bioavailability of contaminants in such a complex wetland/upland environment. There are many approaches to predicting bioavailability of which Bray and Schofield is one. The Navy elected to use biological organisms such as plants, earthworms, and clams to integrate all of the factors mentioned by Chemical & Pigment to determine actual observable bioaccumulation and migration of contaminants from soil into surface water and foodchains. Bioassays are being used all over the world to indicate pollution problems and the need to clean up the pollution.

Dr. Harvey's comment was taken out of context. He referred to the earthworm bioassay test results and in relation to mortality of the earthworms at certain locations on Naval Weapons Station, Concord. Mortality was observed in soils that appeared to be coke pile material from RASS 4 with poor moisture holding capacity and pH values of 4.0 However, consistent mortality of earthworms was observed in RASS 1 with soil containing 3000 ppm of arsenic. In both these cases, soil conditions were not suitable for earthworm survival. The soil condition appeared to result from the discharge of hazardous waste and partial remediation activities.

Chemical & Pigment questioned the relationship between the chemical form of the contaminant metals in the soils of the RASS's and their potential toxicity. The main issue here is whether these metals exist in a soluble form which would be bioavailable or in an insoluble form which would be less accessible to organisms. The comments suggest that chemical speciation models should have been used by the Navy to address this issue. While chemical speciation models can give some information which is relevant to metal bioavailability, the state of the art in this field does not allow precise predictions about metal bioavailability in complex mixtures like soils and sediments to be made at this time. For this reason the Navy took a more direct approach in which bioavailability of metals was determined by measuring the actual accumulation of those metals in native organisms and in surrogate species implanted on site or exposed to the actual soils and sediments in laboratory bioassays. Data from these studies have clearly demonstrated substantial potential for metal bioaccumulation by aquatic species, soil invertebrates, and plants.

Chemical & Pigment Comments - VIII (17 November 1988):

VIII. THE NAVY HAS FAILED TO CONSIDER WHETHER A LOCALIZED PROBLEM EXISTS

The Navy's own data suggest that if there is any alleged heavy metal contamination, it is highly localized. In the DAR, Vol. VI, K. 32, p. WES 23895, the Navy has a map showing those areas on the litigation parcels that are above the TTLC boundary. If this standard is the only one used, then one can see that we have a highly localized problem. This, of course, assumes that, even at a TTLC level, we have heavy metal contamination and actual or potential harm to the environment. The Navy has failed to consider whether remediation of such localized areas with other less expensive methods for dealing with runoff and discharge would substantially remedy any alleged problem.

Response to Chemical & Pigment Comments VIII (17 November 1988):

The Navy has extensively evaluated the nature, magnitude, and extent of contamination on all four RASS's considered in the (Second Revised) Final Draft Feasibility Study Report. Data have been displayed on a number of maps, including displays of the TTLC and STLC data on RASS 3. Indeed, the area found to exceed the TTLC/STLC standard is localized to several locations. As described in the (Second Revised) Final Draft Feasibility Study Report, however, the remediation decision rules developed for RASS 3 are not related to the TTLC/STLC criterion. For the reasons described in the (Second Revised) Final Draft Feasibility Study Report, the decision rule developed for RASS 3 is related to the statistically above background criterion. This results in an estimated active remediation area of approximately 4.66 acres on RASS 3.

The Navy considered a variety of remedial action alternatives during the development of the feasibility study ranging from the no action alternative to excavation and soil washing. The Navy considered technologies for implementing drainage improvements and selecting a decision rule that would limit the area of active remediation. Drainage improvement, as the sole remedial technology, was eliminated during the initial screening process. However, drainage improvements are incorporated into the preferred alternatives presented in the (Second Revised) Final Draft Feasibility Study Report.

Chemical & Pigment Comments - IX (17 November 1988):

IX. THE NAVY HAS FAILED TO EXPLORE OTHER LESS DAMAGING REMEDIAL ACTION METHODS WHICH WOULD BE MORE COST-EFFECTIVE

The Feasibility Study describes various remedial alternatives without fully evaluating all possible plans. The remedial alternatives summarized at pages E20-E41 need to be reevaluated to show that other, more viable alternatives exist. Several additional optional plans should be analyzed which may involve a series of remedial measures to adequately deal with the alleged contamination. Some alternatives include correction of contamination on a site-specific basis judged by soil and environmental factors which relate to barren soil conditions, soil pH, soil texture, moisture relationships, soil infertility, etc. Other plans not considered include removal of contamination from localized areas of contamination and use of detoxification measures such as ion reduction, reduction of contaminant mobility and bioavailability and in-site contaminant immobilization. Others include grading and revegetation, fill material in sites, and surface water diversion.

Land may be restored to productivity and made acceptable for specific uses by a variety of remedial practices not adequately evaluated in the Feasibility Study. For example, fertilizers with phosphates can reduce heavy metal uptake. Application of lime or calcium phosphate can also prevent or reduce heavy metal uptake without causing significant environmental damage. The chemical data which the Feasibility Study presents are meaningful only if they are evaluated in relation to the type of habitat where the alleged contamination exists. A chemical or heavy metal which is unacceptable in one place is not necessarily unacceptable in another and the remedy applied can differ. An additional remedy would be to apply materials to raise soil pH in those places where it is highly acidic.

In addition, it is usually not the total soil content of a heavy metal that governs its environmental hazard; the hazard has more to do with its active form and the condition under which it occurs. Contaminant effects depend upon the soil phase affecting the gaseous, liquid, or solid condition of the soil, sometimes all three. Usually it is the occurrence of heavy metals in a soluble form that is most important as to environmental consequences. In this case, however, we do not have heavy metals in soluble form. The total amount of heavy metal present in the soil may be distributed over various chemical forms such as precipitate as an insoluble mineral, absorbed on the soil solid phase material, or dissolved in the soil solution. None of these are even mentioned in the report. Chemical speciation models can be used to calculate the distribution of a heavy metal compound over different chemical forms. These models are very controlled as to pH and EH (oxidation-reduction). The Navy has failed to employ or use any of these models.

Heavy metal toxicity is very significantly reduced when

soils are limed to pH to 7.0 or slightly higher. This could easily be done on site and has been done in the past. The Navy does not consider this.

The Navy's final report discusses excavation, immobilization, and disposal off site for active remediation of RASS 2 and RASS 3. The California TTLC/STLC criteria for hazardous waste are used as the primary determinant of soils to be excavated. Barren areas outside the TTLC/STLC boundary are also included for excavation. Wetlands and RASS 2, which are within the TTLC/STLC boundary, are excluded from excavation in order to prevent disruption of habitat critical to endangered species according to the Navy. There are many inconsistencies with this proposal.

To begin with, the Navy fails to explain why barren areas outside the TTLC/STLC boundary should be excavated. If they are barren due to the concentration of metals, then why are the soils with metal concentrations above the TTLC/STLC criteria vegetated? In fact, the Navy's own studies show little or no toxicity at the TTLC/STLC levels. A more likely explanation for the lack of vegetation in these sediment deposits is the lack of nutrients and/or extremes of pH. Remediation of barren areas outside the TTLC/STLC boundaries should first be tried with soil amendments to assess their effectiveness before considering alternatives. The Navy's final report, however, fails to even address this as an issue or to discuss these alternatives as remedies. This is despite the fact that the Navy proposes holding off on certain remediation plans in order to conduct further monitoring. It would make more sense to Chemical & Pigment for the Navy to begin with less environmentally destructive and more cost-effective measures such as it has suggested and monitor those results, rather than begin with the most extreme proposal which is excavation.

The proposed remediation calls for immobilization of excavated soil prior to disposal. However, the metals in question are already tightly bound to soil particles and therefore are immobile. This immobility can be seen in the Navy's own data from the shallow wells in RASS 2. High levels of metals were measured in soils down to at least three feet, but barely any metals were detected in the water at five feet. Because of the immobility of these metals in soil, further immobilization is unnecessary. Yet, the Navy fails to even discuss this as an issue or problem.

In one part of the document, the soils excavated are considered suitable for a Class 3 landfill, but elsewhere are implied to be suitable only for a Class 1 landfill because of uncertainties as to the permanence of the immobilization and acceptability by local agencies at a Class 3 landfill site. Hence, all immobilized soils above the TTLC/STLC standard would

have to be considered suitable for disposal only at a Class 1 landfill.

The study discounts the use of a soil cap in RASS 3 because the minimum four foot increase in elevation would have a negative impact on fresh-water wetlands. This option is too readily discounted by the Navy. These wetlands appear to have been created artificially by the construction of the Southern Pacific railroad tracks. Hence, elevation in this area would represent a more appropriate restoration to upland area. Appropriate routing of surface drainage can prevent erosion of the soil cap. Again, however, the Navy fails to discuss this as a viable alternative.

Indeed, the remedial action for RASS 3 includes excavation of soil to a depth of 12 inches when there does not appear to be any explanation as to how this depth was derived.

For RASS 3, the Navy has failed to consider treating the contaminated soil with lime by in-situ mixing, followed by placement of a clean soil cap. In conjunction with this, one could channelize Nichols Creek and its tributaries into concrete-lined ditches or channels. At the same time, any culvert or discharge point from RASS 3 to the kiln site could be blocked off. The Navy has not considered this or explained why it has failed to consider this remedy.

Another alternative would be to reduce the treatment acreage by using the TTLC/STLC criteria to remediate only such "hot spots" and monitor the remaining area. The Navy completely dismisses the option of a cap in the RASS 3 area on the grounds that it would be technically infeasible to construct a RCRA cap on site and impossible to control soil washing or to prevent migration of contaminants in the washing fluid. However, a RCRA cap may not be necessary.

Response to Chemical & Pigment Comments IX (17 November 1988):

The Navy screened a total of 24 technologies and 12 to 14 alternatives for each RASS. These technologies and alternatives were screened and evaluated in detail in accordance with "Guidelines for Feasibility Studies Under CERCLA," and to the extent practicable, in accordance with the NCP. A range of alternatives was considered. Included in the alternatives considered during the alternative screening process was an alternative described as in situ contaminant immobilization. This alternative is essentially the alternative suggested by Chemical & Pigment that should be evaluated in more detail. Alternatives that incorporate in situ immobilization were discarded during the alternative screening process. Although such alternatives have been proposed, there appears to be little available data to perform a detailed evaluation. For the sites

under investigation in which the hydrology is quite dynamic, these technologies were considered to be inappropriate. Another negative factor militating against the use of the in situ immobilization technologies is the need for continued maintenance and reapplication of the immobilization agents. In addition, as indicated by Allied-Signal, application of such technologies or alternatives may have resulted in continued reduction of the quality and diversity of the habitat. Grading and revegetation is included in all alternatives considered. Restoration is included on RASS 1 and RASS 2. Surface water diversion was considered as an appropriate technology and is included in the site work portion of all alternatives. Total diversion of surface water was discarded as an appropriate alternative because of the permanent impact on wetlands found in RASS 3.

On numerous occasions, Chemical & Pigment has been requested to provide detailed information on alternate remediation technologies and detailed plans for there implementation. Such information has not been provided.

The area proposed for active remediation currently includes the barren areas on RASS 1 and RASS 2. Since the evaluation at this stage is primarily for feasibility, it is prudent to include the barren areas as part of the area to be actively remediated. Development and implementation of a detailed excavation plan may reduce the area of excavation. Other areas may simply be treated to enhance the probability the vegetation will recover. It should be noted that prior discussions with several PRP's led to the conclusion that remediation of barren areas was appropriate.

No conflict exists in the decision rules presented in the (Second Revised) Final Draft Feasibility Study Report. The decision rules were developed on a site specific basis to accommodate the various topographic, contaminant, and habitat features of each RASS. Early on in the process, it was realized that RASS 1 and RASS 2 contain sensitive habitat that should be protected. A balancing process resulted in the selection of the decision rules for implementation on each RASS. In the case of RASS 1, the approximately 6.37 acres of wetland that exceed the TTLC/STLC criterion were exempt from active remediation. These 6.37 acres are distinguished from the area in RASS 1 to be actively remediated because they are located in an area that would be more difficult to actively remediate and which, if actively remediated, would probably result in substantially more disruption of the wetland than those proposed for active remediation.

Although at the present time the metals appear to be tightly bound to soil, there is no assurance that this condition will continue. The fact remains that when the soil is subjected to the regulatory test, TTLC/STLC, metals tend to be leached from

the soils in sufficient quantities so as to fail the TTLC/STLC criterion. Immobilization via solidification/stabilization has been shown to be an effective remediation alternative for metals. However, there is some question as to the effectiveness of this technology when subjected to the California TTLC/STLC tests.

Section 121 (b)(1) states a preference for "remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment." For materials containing arsenic and heavy metals, chemical stabilization/solidification has been proposed as a technology that could reduce the mobility of contaminants and fix the contaminants in the soil. The technology generally includes the addition, singly or in some combination, of Portland cement, lime and fly ash, cement or lime kiln dust. This technology has been successfully applied on some sites; however, the technology must be evaluated through the use of laboratory and field pilot testing.

Two alternatives on each RASS (1-3C, 1-3D, 2-3C, 2-3D, 3-3C, 3-3D, 4-3C, and 4-3D) included the concept of stabilization/solidification for immobilizing contaminants in the soil. Recognizing the uncertainties associated with the stabilization/solidification technology, the Navy conducted laboratory scale studies to determine the ability of various stabilization/solidification techniques to immobilize the contaminants. Samples of the contaminated soils were collected from RASS 1, RASS 2, and RASS 3 and treated with various ratios of Portland cement, lime fly ash, and cement kiln dust. Materials found on RASS 4 were concluded to be sufficiently similar to materials found on the other three RASS's to obviate the need for testing of these materials. The resulting specimens were tested using the State of California procedures described as the WET test. Values for both the Total Threshold Limit Concentration (TTLC) and the Soluble Threshold Limit Concentration (STLC) were determined. Although contaminants were shown to be partially immobilized, concentrations of arsenic, copper, lead, and zinc exceeded the STLC criterion. In some cases, the values exceeded the criterion by an order of magnitude. These results are attributed to the following factors. First, the initial concentrations of contaminants are extremely high for some of the samples. This is particularly true for lead and zinc. Second, the State of California WET test, which uses a citric acid leachant, is much more aggressive than the standard Extraction Procedure Toxicity Test (EP) or the Toxicity Characteristic Leaching Procedure (TCLP) that are typically used by the U.S. Environmental Protection Agency to evaluate the toxicity of a hazardous waste.

Based on these laboratory tests, the Navy concludes

that:

a. Although stabilization/solidification with cement and pozzolonic materials significantly reduced contaminant mobility, stabilization/solidification failed to produce a product that would pass the State of California WET test.

b. The stabilized/solidified contaminated soils are a Class I waste under State of California statutes and regulations.

c. As Class I wastes, the treated contaminated soils would require disposal in a Class I disposal facility.

d. Since the stabilized/solidified contaminated soil requires Class I disposal, the added cost of the chemical treatment process was not justified.

e. Alternatives including stabilization/solidification should be eliminated from further consideration based on technical and cost considerations.

Based on the above rationale, the Navy concludes that alternatives incorporating excavation and disposal in a Class I landfill, without stabilization/solidification, (Alternatives 1-3A, 2-3A, 3-3A, and 4-3A) are the preferred over alternatives incorporating stabilization/solidification for remediation of the release of hazardous substances on RASSs 1, 2, 3, and 4, Naval Weapons Station, Concord.

The classification of contaminated soils (treated and/or untreated) will be developed in cooperation with appropriate state agencies. For planning purposes, several alternatives assume the disposal in existing Class III landfills in the state. As pointed out in the (Second Revised) Final Draft Feasibility Study Report, this may not be allowed and the alternative is disposal in existing Class I facilities.

Use of a soil cap in RASS 3 was considered in the initial alternative development process and screened out as a result of technical and environmental considerations. RASS 3 contains considerable wetlands. The capping and surface water diversion alternatives proposed as alternate remedies would result in the loss of essentially all the wetlands in this RASS. This permanent environmental loss is particularly true in the case of the proposal to place a clean soil cap in the wetlands and to channelize and realign Nichols Creek and its tributaries into concrete lined ditches and channels. On the other hand, the alternatives proposed by the Navy, although causing short term impacts, would result in the continuation of the wetland environment in RASS 3.

All capping alternatives in RASS 3 would be difficult because of the topography and hydrology. Capping would result in permanent loss of wetland. As concluded in the (Second Revised) Final Draft Feasibility Study Report, capping is not an appropriate remedy for RASS 3.

The Navy considered several technologies commonly referred to as in-situ immobilization. The primary means of effecting such immobilization is the addition of lime, organic materials, and/or phosphates. In-situ immobilization has not been shown to be a permanent remedy and, indeed, the process would have to be repeated periodically to ensure its effectiveness. It should be noted that liming was attempted in RASS 1 by Allied Chemical. Data collected during the remedial investigation indicates that the liming was not successful in eliminating the bioavailability of arsenic. In addition, as admitted by Allied, the process of liming itself may have resulted in decreased diversity of the habitat.

The Navy has considered the flow of water onto RASS 2 from RASS 3 via the culverts under the Southern Pacific railroad tracks. Elimination of these culverts and general drainage improvements would be included in the site work element of the proposed remedial actions.

Chemical & Pigment Comments - X (17 November 1988):

X. THE NAVY HAS NOT ADEQUATELY CONSIDERED A MONOFILL WITH OTHER LESS COSTLY AND LESS ENVIRONMENTALLY DESTRUCTIVE METHODS.

Given the problems of cost, transport, and permits for moving hazardous waste to an off-site location, reconsideration should be given to construction of a monofill on Concord Naval Weapons Station property. Benefits would include lower transport and disposal costs, less regulatory oversight, avoidance of continuing liability at a permitted landfill, and complete isolation from public access. With metal contamination-soil waste only, there would be no technical problems in designing a monofill with impermeable liners above and below, provision for drainage, and surrounding monitoring program.

In fact, immediately south of Parcels 573 and 574 on Navy property is West-579D, which contains the remains of what appears to have been a brick plant, including remnants of bricks, metalliferous ores, and asphalt paving. This area would be suitable for a monofill site.

In conjunction with this, the Navy should consider the construction of berms and channelization of Nichols Creek and the tributary to the west into concrete-lined channels. The present creek bed would be cleaned and excavated to a shallow depth and

the removed soil placed adjacent to the creek to form a berm. Then after compaction, the channels would be lined with concrete. The channel would be trapezoidal and shaped as shown in Figure 42 sketch and designed to provide capacity for a 25-year flood event. Nichols Creek would be channelized from Port Chicago Highway north to the Sacramento Northern Railroad and Santa Fe Railroad culverts and on the unnamed tributary crossing under the Southern Pacific Railroad. The tributary would be channelized from the Santa Fe Railroad to the downstream side of the Southern Pacific Railroad bridge.

Response to Chemical & Pigment Comments X (17 November 1988):

The Navy considered a variety of alternatives ranging from the no action alternative to extensive active remediation. Surface drainage improvements and capping were discarded as appropriate remedies on RASS 3 for a variety of reasons. First, the nature and extent of contamination did not lend itself to effective capping. Second, the extensive surface water drainage improvements proposed by Chemical & Pigment would result in the permanent loss of wetlands.

In fact, the Navy has evaluated in detail the construction and operation of a monofill on Naval Weapons Station, Concord. Advantages and disadvantages of such a monofill were evaluated, including the potential for reducing transportation costs. Although transportation costs would be reduced, the Navy determined that other advantages suggested by Chemical & Pigment are largely illusionary. First, it is doubtful that construction and operation of a monofill would receive less regulatory oversight. Second, construction and operation of a monofill would not relieve the Navy of any potential future liabilities associated with failure of the landfill. Third, any potential savings in transportation and disposal costs are offset by the operational cost associated with operation of the monofill. Finally, although access to Naval Weapons Station, Concord is restricted, the Navy could not ensure that any monofill would remain isolated from the public. For these and the variety of reasons presented in the (Second Revised) Final Draft Feasibility Study Report, the Navy rejected construction of a monofill on Naval Weapons Station, Concord as an appropriate remedy.

Chemical & Pigment Comments - XI (17 November 1988):

XI. THE NAVY HAS NOT PROPOSED A COMPLETE PLAN AT THIS TIME

The Navy's plan for remediation is incomplete because it has failed to deal with the discharge from the concrete channel of the Bureau of Reclamation which lies west of Parcel 578. The Bureau's channel discharges water from a

concrete channel onto the westernmost portion of the RASS 3 area. If, as the Navy contends, there is migration of heavy metals from RASS 3, then the Navy must also consider how to handle the Bureau's discharge onto RASS 3. Nowhere in the Navy documents is this source of water discussed. Hence, the Navy's plan remains incomplete at this time.

Response to Chemical & Pigment Comments XI (17 November 1988):

The remedial action alternatives proposed by the Navy remove existing contamination from RASS 3. Discharge from other sources, including the discharge from the Bureau of Reclamation canal, are being evaluated. Since the discharge from the Bureau of Reclamation canal is a raw water source for a drinking water supply, heavy metal contamination from this source is unlikely. A more likely source is the continued release from areas of high metal concentrations found on Chemical & Pigment property adjacent to RASS 3.

Chemical & Pigment Comments - XII (17 November 1988):

XII. THE NAVY HAS NO EVIDENCE TO SHOW THAT WETLAND RESTORATION PLANS HAVE WORKED OR WILL RESULT IN ACTUAL RESTORATION.

The Navy justifies much of the excavation program with a claim that it will restore the wetlands, riparian habitat, and other areas following excavation with restoration programs. Yet the Navy can cite no successful current wetland restoration program or plan. Indeed, the current analysis shows that in the Bay Area, such programs have not been successful. Three reports have questioned the success of restoration programs in the Bay Area. Professor Race at Stanford has criticized wetland restoration programs in her paper entitled "Mitigation and Wetlands Restoration." (Exhibit 5.) The State Coastal Conservancy has issued a report entitled "Implementing Mitigation Policies in San Francisco Bay: A Critique." (Exhibit 6.) Finally, San Francisco Bay Conservation and Development Commission has recently issued a staff report entitled "Litigation: An Analysis of Tideland Restoration Projects in San Francisco Bay." (Exhibit 7.) The Navy itself has admitted that restoration programs are an art. Put differently, one plays roulette, hoping for a good result. This is simply not a method for deciding upon a remedy pursuant to the National Contingency Plan or CERCLA.

Response to Chemical & Pigment Comments XII (17 November 1988):

As a point of clarification of the Navy's decision process, the proposed alternative includes wetland restoration as an integral part of the plan, not as a justification.

As most review articles on wetland restoration observe, criteria for success have been inconsistent and often unclear. However, examples of determinations of success are available. Exhibit 6 (Elliot 1985:932) references Hayward Marsh and Benicia Marina. Exhibit 7 (San Francisco Bay Conservation and Development Commission 1988) categorizes Muzzi Marsh, Benicia Marina Marsh, Marina Bay Marsh, Atlantic Oil Company, Mill Valley Marsh and Hoffman Marsh as successful. An additional four sites (including Hayward Marsh) are called partially successful, defined as creating and enhancing Bay resources. Zentner (1988) categorized five projects as successful (in Coastal Management, Vol. 16 pp. 47-67).

The likelihood of successful establishment of the target plant species at Naval Weapons Station, Concord (pickleweed, Salicornia virginica is evidenced by information in Exhibit 5 (the published version is Race 1985) for the Faber Tract, Salt Pond 3, and Muzzi Marsh. Harvey and Josselyn (1986) in a published response to Race (1985) state that "given appropriate substrate and tidal inundation, pickleweed will naturally recolonize a site in San Francisco Bay." It should also be mentioned that the preparer of Exhibit 7, the San Francisco Bay Conservation and Development Commission, expressed enthusiastic support for the proposed remediation plan in comments dated November 1, 1988.

The work done in wetland restoration on the west coast, as chronicled in the reports cited by the commenters and others in the Final Biological Assessment Report, offers meaningful suggestions for assuring success. These recommendations will be followed in developing the restoration and monitoring plans.

Chemical & Pigment Comments - XIII (17 November 1988):

XIII THE NAVY HAS FAILED TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT OR ASSESS IMPACTS PURSUANT TO SECTION 404 OF THE CLEAN WATER ACT.

The Navy's proposals are not adequately analyzed for their cumulative impacts and other impacts on the environment pursuant to the National Environmental Policy Act and the requirement for an Environmental Impact Statement. (42 U.S.C. § 4331 et seq.) No impact statement has been done to analyze the environmental impact of hauling away great amounts of allegedly Class 1 material from this site. Nor has any environmental impact study been performed to determine the environmental impact of the excavation programs or a comparison of less intrusive and equally effective methods as outlined by defendant.

Finally, under Section 404 of the Clean Water Act (33 U.S.C § 1334), the Navy is also required to conduct an extensive analysis of various alternatives to dredge and fill

activities. It has utterly failed to do this, and we have no understanding of what the true impacts will be absent this analysis.

Response to Chemical & Pigment Comments XIII (17 November 1988):

The Navy is not required to comply with the National Environmental Policy Act to select or implement a remedial action under CERCLA. The Navy evaluated alternatives to restoring the excavated wetlands in the (Second Revised) Final Draft Feasibility Study Report.

Chemical & Pigment Comments - XIV (17 November 1988):

XIV. THE U.S. FISH AND WILDLIFE SERVICE ANALYSIS IS BASED ON A FAULTY ASSUMPTION

The U.S. Fish and Wildlife Service has issued a non-jeopardy opinion, stating that the destruction of 15 acres of wetland will kill all salt marsh harvest mice in those areas. This is an amazing admission of intentional destruction of the environment and an endangered species! It is justified only on the ground that a restoration program will work. But that is an unproven assumption. Without that assumption, we have no scientific evidence that the end result will be restored habitat. Instead, the Navy proposes to kill the endangered species to save it!

Response to Chemical & Pigment Comments XIV (17 November 1988):

The Navy complied with Section 7 of the Endangered Species Act before it issued its Proposed Remedial Action Plan for the Release, and the Threatened release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California on 16 September 1988.

On 28 June 1985, the Navy requested the initiation of formal consultation under Section 7 of the Endangered Species Act concerning the impact to endangered species on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, from the implementation of remedial action for the release, and the threatened release, of hazardous substances on these parcels. On 5 July 1988, the Navy prepared a final report of the biological assessment of the impact to endangered species on these parcels from the implementation of the proposed remedial action plan for these parcels and submitted the report to the Fish and Wildlife Service. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion which stated that:

> It is our biological opinion that the proposed remediation of heavy metal contamination at Concord

Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or the California clapper rail.

The biological opinion also stated that:

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.
>
> The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.
>
> The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.
>
> The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:
>
> 1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.
>
> 2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.
>
> 3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

1.3 COMMENTS SUBMITTED BY ESI CHEMICALS, INC. IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 16 SEPTEMBER 1988, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

ESI Comment I (18 November 1988):

These comments are submitted on behalf of ESI Chemicals, Inc. in response to the Remedial Investigation, Feasibility Study, Remedial Action Plan and Administrative Record for the Concord Naval Weapons Station.

ESI Chemicals, Inc. contends that the Proposed Remedial Action Plan has been prepared in the absence of compliance with both the Comprehensive Environmental Response, Compensation and Liability Act, and the National Contingency Plan. The Navy has failed to adequately consider and analyze potential alternative remedies as required by law.

The parcels of property which are the subject matter of the proposed action are located within the explosive arc surrounding the Naval Weapons Station. This explosive arc defines a zone of safety to ensure that if an event of catastrophic proportions were to occur on the Naval Weapons Station, resultant damage to human life would be minimized. No humans inhabit this area and the land use is anticipated to remain unchanged. There is no threat to human health caused by the presence of the metals on the remedial action subsites. The disruption to the habitat which will result from the proposed remedy is greater than the risk of harm to the environment which currently exists on the sites.

ESI Chemicals, Inc. further contends that the proposed remedy is arbitrary, capricious and contrary to the law because there is no rational correlation between the remedy chosen and the information obtained during the remedial investigation and

feasibility study processes.

Response to ESI Chemicals Comments I (18 November 1988):

The Department of the Navy prepared the Proposed Remedial Action Plan for the Release, and the Threatened Release of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California, in compliance with the Comprehensive Environmental Response Compensation, and Liability Act, as amended; the National Oil and Hazardous Substances Pollution Contingency Plan; Guidance on Feasibility Studies under CERCLA, EPA/540/G-85/003; Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements, EPA; and Draft CERCLA Compliance with Other Laws Manual, OSWER Directive 9234.0-3

Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, are within the inhabited building quantity distance safety arcs which the station established around operational facilities on the station. Human use of these parcels by station personnel and other persons is controlled, but human use is not prohibited. Because the hazardous substances on these parcels may constitute a risk to human health, users of these parcels may be exposed to risk. Moreover, data in the Final Remedial Investigation Report indicated substantial potential for harm to the environment.

A rational correlation does exist between the proposed remedial action and information from the Remedial Investigation that includes a balancing between the contamination found and the harm to the environment that would be caused by a more extensive remedial action.

ESI Chemicals Comments II (18 November 1988):

II. IN THE SCREENING AND ANALYSIS OF ALTERNATIVE REMEDIAL ACTIONS THE NAVY HAS NOT COMPLIED WITH THE REQUIREMENTS OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT.

The rules pertaining to clean-up standards and selection of appropriate remedial actions under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 42 U.S.C. § 9601 et seq., hereinafter "the Act") are set forth in section 9621 of the Act. In assessing alternative remedial actions, the following factors must, at minimum, be taken into account:

(1) the long-term uncertainties associated with land disposal;

(2) the goals, objectives, and requirements of the Solid Waste Disposal Act [42 U.S.C. § 6901 et seq.];

(3) the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances;

(4) the short and long-term potential for adverse health effects from human exposure;

(5) long-term maintenance costs;

(6) the potential for future remedial action costs if the alternative remedial action were to fail; and

(7) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

42 U.S.C. § 9621(b)(1).

Prior to the selection of a remedy, all of the above factors must be considered and balanced.

The National Contingency Plan (40 C.F.R. § 300.1 et seq., hereinafter "NPC") serves to further define the response powers and responsibilities created by the Act. 40 C.F.R. § 300.1. An initial screening of alternative remedies is required prior to reducing the number of potential remedial actions to be analyzed in greater detail. Where an alternative is eliminated during the initial screening process, the rationale for the elimination must be documented within the Feasibility Study. 40 C.F.R. § 300.68(g). A detailed analysis is required for the alternatives remaining after the initial screening process. 40 C.F.R. § 300.68(h).

Based on the foregoing rules pertaining to the selection of alternative remedies, the Feasibility Study fails to adequately discuss and the Navy has failed to adequately consider the following alternative remedial actions.

Response to ESI Chemicals Comments II (18 November 1988):

The Navy prepared its (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California in compliance with CERCLA, the NCP, and applicable guidance.

ESI Chemicals Comments II-A (18 November 1988):

II-A THE REMEDIAL ACTION OF SURFACE WATER DIVERSION AND/OR COLLECTION WAS NOT ANALYZED IN THE FEASIBILITY STUDY.

Section 4 of the Feasibility Study deals with the initial screening of remedial alternatives. In this initial screening process, surface water diversion and/or collection is identified as a potential alternative remedy. (FS p. 4.5) In fact, the Navy has identified contaminant migration resulting from surface water runoff as a major concern at the sites in question. The Feasibility Study states: "Since surface water diversion and collection technologies directly address this problem, these technologies will be evaluated for incorporation into remedial action alternatives during the alternative screening process." (FS p. 4.6)

However, this potential alternative remedy is never analyzed or even discussed within the Feasibility Study. In fact, neither Section 5, Remedial Action Alternative Development and Initial Screening, nor Section 6, Detailed Description of Alternatives mention in any manner the alternative of surface water diversion and/or collection.

Therefore, the most basic of options, the removal of a potential transport mechanism, was not analyzed. Because there has been no detailed analysis of an alternative which by the Navy's own conclusion required further consideration, the Feasibility Study does not meet the requirements of the NCP. 40 C.F.R. § 300.68(h). Furthermore, in selecting its Proposed Remedial Action Plan, the Navy has not considered this potential option, and, thus, the Proposed Remedial Action Plan also does not comply with the requirements of the NCP.

ESI Chemicals, Inc. reserves its right to comment on this alternative remedy, both as an independent option and one potentially to be utilized in combination with other alternative remedies, at such time as the Navy properly analyzes and considers it.

Response to ESI Chemicals Comments II-A (18 November 1988):

The Navy considered the use of surface water diversion and/or collection in the technology assessment phase of the (Second Revised) Final Draft Feasibility Study Report. Because the primary pathway of concern is direct contact with contaminated soils and the potential for bioaccumulation by plants and animals coming into direct contact with the soils, this technology was not considered as sufficient, on a stand alone basis, to meet the requirement of Section 121(b) of CERCLA for selecting a remedial action that is protective of human health and the environment. As stated in the technology assessment section, this technology would be included as an element of other, more comprehensive alternatives. Surface water diversion will be an important aspect of the final remediation alternative selected. Surface water diversion is considered as an essential element of the site work element of all alternatives

resulting in positive cleanup actions. For example, for RASS 3, consideration was given to making drainage improvements that will eliminate the culverts under the Southern Pacific railroad tracks. These improvements will be included in the final remedial design.

Implementation of the drainage improvements, along with the removal of contamination from RASS 3 will preclude the further migration of contamination from RASS 3 and protect human health and environment by preventing the possibility of direct contact with the contaminated soils.

ESI Chemicals Comments II-B (19 November 1988):

II-B. THE ALTERNATIVE REMEDY OF IN SITU STABILIZATION AND IMMOBILIZATION OF CONTAMINANTS WAS REJECTED AT THE INITIAL SCREENING PHASE WITHOUT ADEQUATE ANALYSIS.

Although in situ contaminant immobilization was considered in the initial screening of remedial action technologies phase of the Feasibility Study, this potential alternative was summarily rejected for all of the remedial action subsites with the exception of RASS 4. (FS pp. 4.13-4.14) When an alternative is eliminated during the initial screening process, at a minimum three broad criteria must be considered. These criteria include cost, acceptable engineering practices and the effectiveness of the option. 40 C.F.R. § 300.68(g). Each of these criteria will be discussed further, below.

Acceptable Engineering Practices - At best, only a cursory analysis of the acceptable engineering practices regarding in situ immobilization is presented. (FS p. 4.13; pp. 5.113-5.116) Statements are made that there is some concern that this technology may not be appropriate for sites where arsenic is mixed with other heavy metals. The reason given is that in raising the pH to decrease the mobility of other metals, the mobility of arsenic may be increased. However, this rationale is inapplicable to RASS 3, where arsenic has not been identified as a problem. The statement is also made that some immobilizing agents potentially are pollutants themselves or may yield toxic by-products. No analysis is presented as to either the identification of the toxic by-products or whether the immobilizing agents or possible by-products would be biologically available.

While the Feasibility Study states that in situ immobilization would reduce the availability of the contaminants, it also assumes that contaminant migration would occur. (FS p. 5.114) There is no discussion of the interaction of a combination

of remedial options, such as surface water diversion and in situ immobilization which would have the desired effect of reduced bioavailability coupled with lack of migration due to altered hydraulic processes.

Likewise, there is no meaningful analysis of the use of innocuous substances such as sodium carbonate, which are of proven effect in binding metals in a form that is not biologically available to plans and can only be taken up by animals through soil ingestion. In the small animal trapping performed as a part of the Remedial Investigation, RASS 3 was not included as a part of the study area indicating the lack of concern that small mammals were ingesting soils in the Rass 3 area. In fact, chemical stabilization of metals in the soils will effectively remove their availability to the ecosystem. This form of chemical stabilization includes pH adjustment and oxidation-reduction potential correction to optimize the effectiveness of the chemical addition.

Conclusory statements are made regarding the addition of binder materials for physical stabilization of the soils and the conclusion is drawn that the addition of these binder materials in sufficient quantities would probably have environmental consequences similar to capping alternatives. (FS p. 5.114) These statements indicate that the Navy has assumed it would be necessary to cement the soils to provide a structural base in which to stabilize them. However, there is no need to physically immobilize the soils after the metals have been stabilized because other options are available. For example, in situ immobilization when combined with an effective monitoring program is both cost effective and does not result in negative impact. Additional options include in situ immobilization in conjunction with surface water diversion.

Effectiveness - Because no meaningful evaluation of this remedial action is given, the Feasibility Study does not consider the potential environmental benefits to be gained by implementation of this option.

Cost - Because the analysis of this alternative remedial action was based on incorrect assumptions regarding acceptable engineering practices, the conclusions made regarding costs were also incorrect.

Mere conclusory statements such as those given by the Navy to support its justification for refusing to consider In Situ Stabilization as a viable remedy do not provide the degree of analysis required by the Act. Because there was no meaningful discussion of the acceptable engineering practices and effectiveness of this alternative remedy prior to the Navy eliminating it as an alternative, the Navy has not complied with the NCP.

Response to ESI Chemicals Comments II-B (18 November 1980:

The Navy did not "summarily reject" in-situ contaminant immobilization in the initial screening of technologies. In-situ immobilization was included in the development of Alternatives 1-6A, 2-6A, 3-6A, and 4-6A. These alternatives were screened in accordance with the requirements of the NCP.

Upon closer examination, it was found that the in situ immobilization alternative was inappropriate for application on RASS 1, 2, and 3. A variation of in-situ immobilization, liming of soils, was used as an element of the remedial alternative developed for RASS 4. The technical feasibility of applying in-situ immobilization techniques in an active hydrologic environment such as those found in RASS's 1, 2, and 3 is questionable. In addition, there is no guarantee that the contaminants can be reliably immobilized in place. Another factor used to discount the feasibility of in-situ immobilization is the requirement to reapply the binding agents, thus increasing the operation and maintenance requirements associated with such alternatives.

Implementation of in-situ immobilization technologies in conjunction with surface water diversion would effectively change the character of the RASS's. Such an alternative would effectively change the character of RASS 3 from freshwater wetland to upland. Such an alternative would not comply with the requirements of Executive Order 11,990 regarding protection of wetlands. The technology which would be used in the preferred alternative remedial action, employing excavation and removal of contaminated soils, is a more effective and reliable technology than those that leave the contaminated soils in place. Although there would be impacts during execution of the preferred alternative remedial action, these impacts would be of short duration. Because of the requirement of periodic reapplication of the in-situ immobilization chemicals, disruption of the environment would be on a continuous basis if such a remedy were implemented.

While sodium carbonate may bind some metals, the sodium ion could release exchangeable metals from the soil and cause an increase in the plant available metals and substantial migration of metals into biota on the site. This effect would require evaluation prior to implementing a sodium carbonate treatment.

The accuracy of the screening level costs developed in (Second Revised) Final Draft Feasibility Study Report are consistent with the requirements of the NCP and guidance on feasibility studies under CERCLA.

ESI Chemicals Comments II-C (18 November 1988):

II-C. THE ALTERNATIVE REMEDY OF EXCAVATION OF DISCRETE AND INDIVIDUALLY IDENTIFIABLE AREAS WITH INCREASED CONCENTRATION OF METALS WAS NOT CONSIDERED.

The alternative remedy of excavation of those specific and individually identifiable areas ("hot spots") showing increased concentrations of metals which have been identified through the remedial action process as causing danger was also not considered in the Feasibility Study. The rationale for "hot spot" excavation is presented in Section III, below. This potential alternative remedy should be analyzed in combination with other potential remedial actions such as, for example, monitoring.

Response to ESI Chemicals Comments II-C (18 November 1988):

The Navy prepared a (Second Revised) Final Feasibility Study Report to evaluate alternatives for remediation of contaminated areas on Parcels 572, 573, 574, 575, 576, 579D, and 581 on NWS Concord. The Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California identified soil contamination on these parcels resulting from discharges from adjacent properties and operations on the parcels prior to acquisition by the Navy. Onsite contamination in the form of surficial deposits of metal contaminants resulting from drainage or overflows of wastewaters to surface drainages or to flat wetland areas from adjacent properties has been identified as the primary potential onsite source. The surficial deposits have been evaluated and found to contain high levels of arsenic, lead, cadmium, copper, and zinc. To date, organic chemical contamination has not been identified as a problem in these areas. In addition, offsite contamination on adjacent properties in the form of deposits of metal contaminants has been identified as a potential offsite source of contamination.

During development of the (Second Revised) Final Draft Feasibility Study Report a range of potential remediation alternatives were evaluated. Among the alternatives considered were several that incorporated the concept of excavation and disposal.

The Navy considered the feasibility study as a means of evaluating the conceptual feasibility of potential remedial action alternatives. The conceptual excavation alternatives were based on the current state of knowledge of the levels and extent of contamination on the four RASS's considered in the feasibility study. During the remedial action design process, detailed plans

will be developed to implement the concepts presented in the feasibility study. During the remedial action design process, particular attention will be given to those areas in which contaminant concentration levels are known to be high. The detailed excavation plan will be designed to limit the amount of materials to be excavated, consistent with the decision rules.

The following assumptions were used in the development of the conceptual excavation plan:

a. All materials that have contaminant concentrations equal to or greater than the State's TTLC/STLC criteria will be disposed of in a Class I facility.

b. All materials with contaminant concentrations less than the State's TTLC/STLC criteria will be disposed of in a Class III facility.

c. None of the materials found on site are regulated under the Federal Solid Waste Disposal Act, i.e., the contaminant concentrations in soils do not exceed the Extraction Procedure Toxicity Test (EP).

d. Removal of contaminated soils will be consistent with the decision rules presented in the FS (Section 3.5.3).

e. Transportation to disposal facilities will be accomplished using appropriately controlled truck or rail facilities.

f. Contamination in most areas is in the upper 6-12 in. of the soil; however, deeper contamination has been located in scattered areas.

g. Excavation can be conducted in 6 in. lifts, with some difficulty.

The conceptual excavation plan is summarized below.

a. Beginning at points of known contamination, i.e., current sampling locations where contaminant concentrations are equal to or greater than the decision rule criteria, a grid of sampling locations would be established. A grid composed of sampling points located 20 ft. on centers and radiating from the points of known high contaminant concentrations will be established.

b. A sampling point in each grid would be sampled to

a depth of 3 ft. Distinct subsamples would be collected for each 6 in. horizon. Based on a 20 ft. grid, each sampling point/sampling horizon would represent approximately 10 cu. yds. of soil.

c. The 0-6 in. horizon will be analyzed for the contaminants of concern.

d. Grid squares in which contaminant concentrations are equal to or greater than the decision rule criteria will be excavated to a depth of 6 in.

e. In excavated squares, the next 6 in. horizon would be analyzed. If the results exceed the remedial action decision rules, the next 6 in. horizon will be excavated.

f. Item d. and e., above, would be repeated until the sampling and analyses indicate that the soils in each grid meet the remediation decision rules.

ESI Chemicals Comments III (18 November 1988):

III. THE CONCENTRATION OF ZINC IN SOIL IS NOT A MEANINGFUL CRITERION TO DETERMINE THE PARAMETERS OF EXCAVATION IN RASS 3.

In its determination of selected cleanup criteria for RASS 3, the Navy concluded that because RASS 3 was identified as a source or pathway for migration of lead, cadmium and zinc on to RASS 2 and potentially RASS 1, the more stringent criterion of "statistically above reference area" would be applied.[1] (FS p. 3.92)

Figures 35 through 41 of Volume III of the Feasibility Study are used to delineate the areas on RASS 3 where concentrations of metals are located. These figures do not provide the data demonstrating the various concentrations of the individual metals themselves. Instead, all of the metals detected are included within the criterion used. In other words, there is no differentiation between either the presence or the concentrations of the various individual metals. However, to ascertain the quantities of specific metals on RASS 3, it is necessary to refer to Figures 18 through 21 of the Environmental Data Displays included in the Administrative Record at section N(98). This section of the comments will discuss the

[1] ESI Chemicals, Inc. strongly disputes the conclusion that RASS 3 is a source for migration of metals on to RASS 2 and potentially RASS 1 and this issue is discussed further in Section V, infra.

inappropriateness of using zinc concentrations to determine the extent of excavation on RASS 3.

ESI Chemicals Comments III-A (18 November 1988):

III-A. LOCATIONS OF INCREASED ZINC LEVELS IN SOILS OF RASS 3 ARE DISCRETE AND SEPARABLE FROM INCREASED LEVELS OF LEAD.

Figure 19 of the Environmental Data Displays identifies the data and locations for soil samples collected from RASS 3 between 1984 and 1987 on RASS 3. (Administrative Record section N(98) It is necessary to refer to this figure to ascertain the concentrations and locations of the specific individual metals on RASS 3. Overlays, attached hereto as Volume II to the comments submitted by ESI Chemicals, Inc. and made a part of the administrative record, use data from sampling points analyzed by the Navy during the Remedial Investigation. The overlays identify the locations within the area circumscribed for excavation in RASS 3 which have in metal concentrations in excess of the total threshold limit concentration. Additionally, the specific metals are individually identified.[2]

In the following discussion TTLC values are used rather than STLC values. The use of STLC values is not appropriate for the conditions of RASS 3 because the test uses citric acid in order to simulate conditions in a municipal landfill, and the conditions of a municipal landfill have no relationship to the site specific conditions of RASS 3. To simulate actual on site conditions, it is appropriate to utilize

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[2] We cannot locate any documents or data within the Administrative Record identifying the concentrations of metals in soils which were determined by the Navy to represent values statistically greater than remote reference areas. Likewise, based on the available data it is not possible to determine the statistical relationship used by the Navy to develop this criterion and the relationship between the background level and the areas chosen for remediation. Therefore, for purposes of this discussion concentrations of metals in excess of TTLC levels are utilized. ESI Chemicals, Inc. hereby requests that the Navy make a part of the Administrative Record the individual concentration levels it has determined were statistically above remote reference area levels and all information pertaining to the statistical relationship, the manner in which it was derived, and the harm or risk of harm which corresponds to the statistical difference. ESI Chemicals, Inc. reserves the right to make additional comments within a reasonable time after the Navy makes this information available.

a substance such as surface water collected from the site or water from Suisun Bay. Based on the record, the Navy has performed only one test using water from Suisun Bay (see page AGC 000088). The results of this test indicated that copper and lead were not detected in the extract from a simulated WET test, utilizing water from Suisun Bay rather than citric acid. This test demonstrates the stability of the metals under actual on site conditions. Adequate data is not available to define the areas with elevated concentrations of metals based on WET tests utilizing either Suisun Bay water or surface water. Because the data is not available to define areas where metals might be leaching into surface water under actual site conditions, the STLC values are not indicative of site specific criterion and therefore are neither appropriate nor applicable.

As is demonstrated through use of the overlays, attached hereto in Volume II, if TTLC values are examined for the presence of lead, the areas of elevated concentration redefine a zone of reasonable concern. That zone is comprised of two primary areas, one near the 8P series of samples and the other by the 1101/1201 series of samples. In addition, isolated hot spots are observed at certain sampling sites. Thus, discrete and identifiable locations with elevated concentrations of lead can be defined.

The entire area to the west of the 8P series of sampling points, although currently proposed to be excavated by the Navy, has no values in excess of TTLC criterion for lead (with the sole exception of point 6P2 which has a value only 5% in excess of the established criterion). (Administrative Record, Section N(92), Figure 19) In fact, the only constituent metal with a concentration greater than the established criterion is zinc in this entire area. Furthermore, the area delineated by zinc concentrations in excess of TTLC criterion is substantially smaller than the area currently proposed to be excavated by the Navy. Thus, an area in size equal to approximately one third to one half of the total area currently proposed to be excavated on RASS 3 is based solely on levels of zinc. However, as is explained in subsection B, infra, there is no established site specific harm or risk of harm which has been demonstrated to be caused by the presence of zinc. Therefore, it is not necessary to excavate those areas where zinc is present at levels either above the TTLC criterion or, in the alternative, below the established level.

Response to ESI Chemicals III-A (18 November 1988):

The Final Remedial Investigation Report provides a listing of soil metal concentrations (pages 190-211) and a discussion of the statistical analysis (page 23). Additional data are listed in the Final Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord,

California, Subtitle Appendix 2.5 1986-1987 Data and in site maps provided in the Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures. Three samples were randomly collected at eight sites south of Port Chicago Highway (BK133) and two sites (BK116) northwest of the ESI property. These sites are unimpacted by any contaminants leaving the Chemical & Pigment property. These sites constitute the reference areas. Three random samples were also collected at twenty-eight other sites. These sites may have been impacted by contaminants from adjacent properties.

The analysis of variance (ANOVA) was used to evaluate the contaminant concentrations from all 38 sites. The null hypothesis assumes the mean contaminant concentration from all 38 sites to be equal. The alternate hypothesis is the assumption that at least one mean contaminant concentration is not equal to the 37 other mean contaminant concentrations. If one rejects the former assumption (i.e. null hypothesis), Duncan's New Multiple Range Test is used to identify those mean contaminant concentrations which are not equal. Duncan's New Multiple Range Test was conducted at the 0.05 level of significance. Those sites identified by Duncan's Multiple Range Test as unequal to all sites from the reference area and having a mean contaminant concentration greater than all reference mean contaminant concentrations were characterized as statistically above reference.

The Duncan's New Multiple Range Test results are presented in the Final Remedial Investigation Report (2.4 Appendixes). For instance, the soil analysis results appear in Table 2-A1 of the Final Remedial Investigation Report (page 192). In this table, mean contaminant concentrations which are not equal are followed by different letters. The ten arsenic mean contaminant concentrations from the reference area are followed by the letter E. The site AASCW16X4 mean contaminant concentration of 544.2 is followed by the letters CD. This site would be characterized as statistically above the reference area. Results from the soil analysis, 1984 clam bioassay, 1986 clam bioassay, field analysis, plant upland and flooded bioassays, and earthworm bioassay are summarized in Table 1 below. These data imply that sites which have mean contaminant concentrations that are equal to or greater than the tabulated value are statistically greater than all reference mean contaminant concentrations and have been impacted by sources not found in the reference area. In addition, a statistical difference observed was interpreted to mean that there is a substantial difference that is real and not imaginary. These results were the basis of the exposure and toxicological evaluation in Section 4.4 of the Final Remedial Investigation Report, which concluded there was a real potential for harm to wildlife associated with the contaminated areas. Table 1 follows:

Table 1. Values Statistically Above Reference*

	AS	CD	CU	PB	NI	SE	ZN
Soil Analysis	544.2**	12.7	344.6	---	---	---	2511.4
Clam Analysis(84)	---	1.39	---	3.21	---	---	199.6
Clam Analysis(86)	2.22	3.27	---	5.46	---	---	183.3
Field Analysis	0.37	1.26	---	15.5	6.22	---	123.8
Greenhouse Flooded	10.9	4.27	14.7	---	---	---	219.3
Greenhouse Upland	---	---	---	---	---	---	---
Earthworm Analysis	26.5	19.8	53.4	33.4	---	36.4	---

* Results of ANOVA and Duncan's New Multiple Range Tests (p 190-199, Lee et. al. 1986.)
** All contaminant concentrations are reported in parts per million.

The STLC criterion was used to determine if the contamination observed in the soil would leach out of the soil if placed in a landfill. The California State Department of Health Services suggested the use of STLC as well as TTLC to determine what type of landfill would be appropriate for disposal of the contaminated soil from Navy property. It so happened that many of the sample locations that showed bioaccumulation also showed values of STLC extracted metals from contaminated soil that exceeded the STLC criterion. A weak acid like citric acid can give a better estimate of bioavailable metals than water. Potential exposure of the biota to available metals over a period of time can be estimated more accurately using an extract like citric acid rather than water. This is well documented by Lee et. al. 1978 and Lee et. al. 1983. In fact, Dr. Duane Mikkelsen, who was retained by Chemical & Pigment Company to evaluate contamination on RASS 3, collected additional soil and plant samples during the 1988 growing season. He used a weak organic acid, DTPA, to evaluate bioavailable metals rather than water.

ESI Chemicals referenced one test result in AGC 000088 that showed no detectable copper and lead in the water extract. The detection limits for these data are high for each metal, i.e., 10 ppm. This concentration exceeds chronic water quality

criteria for these metals. Therefore, these data should not be interpreted as having no biological impact on water quality just because no detectable metal was observed.

The overlays provided in Volume II show lead exceeding TTLC values in all but 3 of the 10 locations sampled that showed zinc exceeding TTLC values. Accordingly, by these overlays only 3 locations containing zinc and not lead can be determined.

In addition, the two primary areas plus the isolated hot spots at certain sampling locations actually define the flow path of Nichols Creek. Samples were collected periodically along the Creek to determine the general extent of contaminant migration. Consequently, while available data may suggest isolated areas of contamination, it is most probable that if samples were collected between the hot spots in the Creek flow path, these samples would exceed soil criteria values. During remediation, additional soil samples will be collected to verify the level of contamination and the need to remove soil from that location. See response to ESI II-C.

While it is true that only one sample site showed the TTLC for lead exceeding the criterion and numerous sites exceeding TTLC for zinc, the area of active remediation considers more than just the TTLC criterion. It includes all metals that were statistically higher than reference areas. This active remediation area also corresponds to areas where substantial bioaccumulation was observed. The potential harm of such extremely high soil concentrations of zinc to the environment is discussed later. See response to ESI III-B.

ESI Chemicals Comments III-B (18 November 1988):

III-B. THE PRESENCE OF ZINC DOES NOT CREATE A SITE SPECIFIC RISK OF HARM.

Biological tests were selected by the Navy to be utilized instead of chemical extraction tests for the reason that chemical extraction tests have little, if no, relationship to the bioavailability of the constituents of concern under actual on site conditions and, furthermore, chemical extraction test data are difficult to interpret to determine actual biological effects. (RI p. 13)

A review of the results of the biological testing data, as discussed below, demonstrates the lack of harm or risk of harm as caused by the presence of zinc.

Based on the earthworm bioassays, the Navy concluded that the concentration of zinc in soils at the Naval Weapons Station was not high enough to cause either acute or chronic harm. Furthermore, as the Navy concluded, the potential effects

of metal bioaccumulation in soft-bodied soil invertebrates upon invertebrate-eating animals may be of concern only insofar as to the presence of arsenic, lead, cadmium and selenium. (RI p. 120) In fact, copper and zinc probably pose no threat to earthworms and other soil dwelling invertebrates. (RI p. 120)

As the Feasibility Study indicates, the actual value of the clam biomonitoring analysis lies in its use as an indicator for determining the potential for redistribution and resuspension of metals in surface water. Because the clam biomonitoring data tends to overestimate the actual bioavailable fraction of metals on the sites in question, the analysis cannot be used to measure harm or risk of harm. Additionally, the Navy has concluded, based on the analysis, there was no indication of adverse impact on the water quality of Suisun Bay, even after the flooding event of 1986.

As a further indication of the absence of identifiable harm or risk of harm to the environment caused by zinc as demonstrated by the biological testing utilized during the remedial investigation phase, the Navy did not analyze the small mammals captured on RASS 1 or RASS 2 and killed to determine the quantifiable levels of metals within their bodies, for the presence of zinc. In fact, as the Feasibility Study states, the contamination of concern known from soil sampling to be present were cadmium, lead, selenium and arsenic. (FS Vol. II p.7) Therefore, the presence or lack thereof of zinc was of not concern to the Navy in its biological testing of small mammals[3].

The results of plant bioassay data for zinc indicated only a few plant samples had tissue contents of zinc in an amount greater than those from the remote reference areas. (RI p. 51) However, these differences did not appear to be of practical significance. (RI p. 69) Likewise, the Navy concluded based on the data from the greenhouse plant bioassay to ascertain the plant uptake of heavy metals, that even though some plant uptake did occur, the extremely large variability in soil contents results in no statistical differences as compared to the remote reference areas. (RI p. 91) Although data from the plant bioassays indicated that a few of the sampling points had zinc values which would cause a 25% reduction in yield (RI p. 91), this factor would not justify the extent of excavation which the Navy proposes to undertake.

Because the Navy has not established the need to remove zinc based on toxicological or biological reasons, there is no reason to excavate soils in areas which contain zinc in excess of TTLC criterion levels. And, there is no basis to excavate soils

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[3] Copper also was not a metal of concern in this biological test

in areas where zinc is present at values less than that of established TTLC criterion.

Response to ESI Chemicals Comments III-B (18 November 1988):

While the concentration of soil zinc may not result in acute or chronic harm to earthworms or other soil invertebrates, excessive soil zinc has been shown to adversely affect the growth and metabolism of plants. Indeed, in an attempt to focus our analysis as requested by the defendants in previous comments, the Navy did not analyze the mammals trapped on RASS 1 and 2 for zinc because zinc was not present in RASS 1 and 2 in concentrations of concern.

The clam biomonitoring data indicate that metals are migrating in surface water at certain locations on Navy parcels. The use of molluscs to indicate pollution of surface water is employed throughout the world in the Mussel Watch. Bioaccumulation of contaminants by molluscs is used to make decisions about the need to clean up pollution of surface water. This approach is widely accepted by the scientific community. The clam biomonitoring data at Naval Weapons Station, Concord indicates migration of metals into surface water and a substantial potential for harm to aquatic organisms. The migration of metals into surface waters has been limited to certain parcels on Navy property and fortunately does not appear to have moved out into Suisun Bay. While the Bay waters may not have been adversely impacted, surface waters on Navy property have been and are continuing to be substantially impacted. The clam biomonitoring data indicate that exposure of wildlife and aquatic organisms to these impacted surface waters can result in potential harm to them (See Section 4.4 of Final Remedial Investigation Report.)

The comments made on pages 15-16 of the ESI Chemicals Comments are taken out of context and are factually incorrect. Plant data referred to in the Final Remedial Investigation Report (page 51) were those for Typha colonizing Navy property. Those few plant samples that were significantly more contaminated than plants in the reference areas were collected on Parcels 573, 574, and 575, where some of the highest soil contamination was observed. These data were related to plant contents observed on other contaminated soils after the soils were allowed to dry out See Final Remedial Investigation Report (page 69) Under these conditions, plant uptake of metals such as zinc and cadmium have been extremely high. In this context, the data for Typha appeared to be of little practical significance. However, this is not to say that Typha is not taking up contaminants or are not contaminated. They have not reached the extremes that have been observed on dried soils. Should the soils in Nichols Creek dry out, then substantially more uptake of metals would be expected to occur.

In fact, samples of ryegrass growing on Parcels 573 and 574 on the station were collected by Dr. Duane Mikkelsen, Chemical & Pigment Company's consultant in 1988, during an extremely dry year. These samples show substantial plant contamination of zinc as high as 831.2 ppm adjacent to Nichols Creek on Parcel 574 and as high as 824.8 ppm of zinc in ryegrass on Parcel 573. Plants usually show reduced growth and yield when tissue contents reach 290 ppm of zinc and can show phytotoxicity when tissue contents increase above 500 ppm of zinc.

The active remediation area is not just related to plant zinc content. It is related to soil metal contents that were observed to be statistically higher than reference areas. This area also included areas of substantial bioaccumulation in plants, earthworms, clams, and areas exceeding TTLC and STLC soil criteria. In addition, zinc is not the only metal exceeding criteria on Parcels 573, 574 and 575 on the station. Cadmium, lead, and copper have been observed in a number of soil samples to exceed the STLC criteria. See Administrative Record, Section N(98), Figure 20. In fact, lead values in some sites were 40 times greater than the STLC criterion. These data indicate substantial amounts of mobile and potentially bioavailable lead.

ESI Chemicals Comments III-C (18 November 1988):

III-C. ADDITIONAL FACTS DEMONSTRATE THE LACK OF HARM OR RISK OF HARM ASSOCIATED WITH THE PRESENCE OF ZINC.

Maximum Contaminant Levels and Maximum Contaminant Level Goals proposed or promulgated under the Safe Drinking Water Act are discussed in the Feasibility Study. (FS p. 3.72) Although these levels pertain to drinking water and have no direct application to the site specific situation of metals in soil, the Maximum Contaminant Levels are, nevertheless, an indicator of potential toxicity or risk of harm of the specific constituent in question.

Pursuant to the 1986 amendments to the Safe Drinking Water Act (42 U.S.C. § 300f, et seq.), the EPA was authorized to delist up to seven contaminants and replace the delisted substances with seven substitutions if it was determined that the regulation of the substitutions was more likely to be protective of public health than regulation of the substances being replaced. 42 U.S.C. § 300.g-1 (b)(2)(A). Specifically, in July of 1987, the EPA proposed to delist zinc because currently available data indicated no adverse health effects were associated with exposure 52 Fed.Reg. 25720 (July 8, 1987). Furthermore, the EPA concluded that zinc is nutritionally essential and the possibility of detrimental health effects arising from zinc consumed in food and drinking water was

extremely remote. 52 Fed.Reg. at 25724.

On January 22, 1988, EPA determined that it would remove zinc from the list of regulated contaminants for the reasons stated above. 53 Fed.Reg. 1892 (January 22, 1988).

California has followed an approach similar to that of the EPA. Zinc is not included on the Maximum Contaminant Levels of Inorganic Chemicals listing of those substances posing a risk to health of humans. Cal.Admin.Code, tit. 22, § 64435. Zinc is included on the Secondary Drinking Water Standard list as a substance which may be objectionable because of taste, odor or appearance, but is generally not hazardous to health. Cal.Admin.Code, tit.22, § 64473.

Response to ESI Chemicals Comments III-C (18 November 1988):

The information related to the recent changes in the status of zinc as related to the Maximum Contaminant Levels (MCL's) promulgated under the Safe Drinking Water Act is appreciated. However, as stated in Table 3.19, zinc was included as a result of the Secondary Drinking Water Standards. As stated in the comment, zinc remains as a secondary standard. It should be further noted that the MCL's were not used as a criterion in developing the remedial action decision rules.

The environmental impacts from zinc in addition to the human health impacts from zinc required evaluation. Zinc can suppress biological processes when present in such enormous concentrations as observed in certain soil locations on RASS 3. Excessive uptake of zinc can result in inhibition of plant growth and abnormal metabolism in plants.

Moreover, zinc is currently listed by the Environmental Protection Agency as a priority pollutant. Data in this document demonstrate that aquatic organisms can begin to experience chronic toxicity when exposed to concentrations of zinc that are less than 100 ppb.

ESI Chemicals Comments IV (18 November 1988):

IV. AVAILABLE DATA DOES NOT SUPPORT THE CONCLUSION THAT SOILS ON RASS 3 SHOULD BE EXCAVATED TO A DEPTH OF 12 INCHES.

The Detailed Description of Alternatives section of the (Second Revised) Final Draft Feasibility Study Report states that approximately 4.66 acres would be excavated to a depth of 12 inches in RASS 3. (FS pp. 6.48-6.49; FS p. 6.52) Based on current data, only a small portion of the area proposed to be excavated in RASS 3 (1.92 acres of the total amount of 4.66

acres) exceeds the established TTLC/STLC criterion levels.

The number of samples in RASS 3 which indicate the presence of increased concentration of metals at a depth greater than 6 inches is very limited. For example, one sampling point at 8P7 shows the presence of zinc and lead at the 6- to 12-inch depth; however, all of the sampling points to the west of the 8P series do not indicate the presence of increased concentrations of metals at the 6- to 12-inch depth. Therefore, if the Navy determines that it will proceed with the remedial action plan as currently proposed, there is no justification for excavating soils to a depth of 12 inches at locations to the west of the 8P series where there is no indication of the presence of metals.

Although sampling points 1103 and 1201 indicate the presence of zinc or lead below the 6-inch range, the remainder of the data from this area does not demonstrate the presence of increased concentrations of metals below this depth. In fact, with the sole exception of the sampling point 13L4, no other sampling points demonstrate the presence of increased concentrations of metals at depths greater than 6 inches throughout the area currently proposed to be excavated in RASS 3. The data do not establish any need or reason to excavate soils in this area to a depth of 12 inches.

Response to ESI Chemicals Comments IV (18 November 1988):

The Final Draft Feasibility Study Report was based on the available data related to the level and areal extent of contamination on RASS 3. The detailed excavation plan based on the concepts presented in the Response to ESI Chemicals Comments II-C above will limit the amount of materials to be excavated, consistent with the decision rules.

ESI Chemicals Comments V (18 November 1988):

V. THE AVAILABLE DATA DOES NOT SUPPORT THE CONCLUSION THAT RASS 3 IS A SOURCE OF CONTAMINATION TO RASS 2 AND POTENTIALLY RASS 1.

As explained in Section VII of these comments, the Navy is a potentially responsible party (hereinafter "PRP") as that term is defined under the Act. Because of the activities on or near the Kiln Site during the Navy's ownership, it is in the Navy's interest to shift responsibility for increased concentrations of metals at the kiln site (RASS 2) to another area, e.g., RASS 3. This subject matter is important in the determination of a remedy because as stated in the Feasibility Study, "RASS 3 was identified as a source or pathway for migration of contamination of lead, cadmium and zinc onto RASS 2 and potentially RASS 1." (FS p. 3.92) Based on this rationale,

the Navy has justified applying the more stringent criterion to RASS 3 of "statistically above reference areas." However, as is demonstrated by the following subsections, the data do not support this conclusion.

ESI Chemicals Comments V-A (18 November 1988):

V-A. THE DATA FROM SURFACE WATER ANALYSES CONTRADICTS THE NAVY'S CONCLUSIONS.

Figures 25 and 26 of the Environmental Data Displays included in the Administrative Record at section N-98, indicate surface water quality data collected on RASS 1, 2 and 3 in 1983 and 1985. As demonstrated by the data, sampling points from RASS 3 at G1-1 and K2-2 show concentrations of zinc to be 0.51, 0.57, and 0.87, 0.39 mg/1, respectively, during March and April of 1985. However, values from sampling points K-2 and K-3, located on RASS 2, indicate values of 2.4, 13, and 120 mg/1, respectively, during March and April of the same year. Likewise, the concentrations of cadmium were at lower levels on the G1-1 and K2-2 sampling points located in RASS 3 than on the sampling points K2 and K-3, located within the RASS 2 area. The importance of this data is explained in the following paragraph.

If, in fact, RASS 3 were to be a source or pathway of contamination to RASS 2, as the Navy has concluded, the primary pathway of migration has been alleged to be the culverts which run beneath the train tracks in the general area of the sampling points referred to in the preceding two paragraphs. However, if the culverts were serving as a potential transport mechanism, the data would indicate concentrations of metals greater than, or at least equal to, those amounts entering the culverts on RASS 3 when compared to the amounts detected near the alleged exit point of the culverts on the Kiln Site at RASS 2. However, the data clearly shows just the opposite situation. Therefore, contrary to the Navy's conclusion, the existing surface water data in fact indicates that RASS 3 is not a source or pathway for migration of contamination of lead, cadmium and zinc onto RASS 2 and potentially RASS 1.

Response to ESI Chemicals Comments V-A (18 November 1988):

The conclusion drawn by ESI Chemicals does not follow from the discussion presented. It is highly likely that discharges of ESI Chemicals' wastes, known to contain high concentrations of zinc and cadmium, were discharged on an intermittent basis. If the "slug" of wastes passed the upstream point prior to sampling, it is highly conceivable that downstream concentrations would be higher than upstream concentrations.

ESI Chemicals Comments V-B (18 November 1988):

V-B. THE KILN SITE ITSELF IS A SOURCE OF INCREASED CONCENTRATIONS OF METALS AND ARSENIC.

The basis for this discussion is included in section VII (B) of these comments and is incorporated herein as if set out in full.

Response to ESI Chemicals Comments V-B (18 November 1988):

No response is required to this comment.

ESI Chemicals Comments V-C (18 November 1988):

V-C. THE EFFECT OF TIDAL ACTION ON RASS 1 AND RASS 2 CREATES THE POTENTIAL TO DISTRIBUTE METALS FROM RASS 2 AND RASS 1 ONTO RASS 3.

Portions of deposition testimony given by the Navy's hydrologist, Mr. Robert Coats, indicate that, in his opinion tides of a certain magnitude would cover RASS 1 and RASS 2 and flow in a southerly direction through a trestle, thereby entering the RASS 3 area. It is probable that this tidal flow from RASS 1 and RASS 2 would carry entrained within it sediment and dissolved metals from the RASS 1 and RASS 2 areas onto RASS 3. Therefore, the conclusion is inescapable that RASS 1 and RASS 2 serve as a potential source or pathway for the migration of metals onto RASS 3. The current Feasibility Study fails to adequately analyze and resolve this situation.

Response to ESI Chemicals Comments V-C (18 November 1988):

The Navy agrees that this is a potential pathway of contaminant migration.

ESI Chemicals Comments VI (18 November 1988):

VI. IN SELECTING THE REMEDY THE NAVY HAS NOT COMPLIED WITH THE REQUIREMENTS OF CERCLA.

Pursuant to the general rules regarding cleanup standards under the Act, remedial actions incorporating treatment which permanently and significantly reduces either the volume, toxicity or mobility of the hazardous substances are to be preferred over remedial actions which to not involve such treatment. The off-site transport and disposal of hazardous substances without such treatment is the least favored alternative remedial action where there are other practicable treatment technologies available. 42 U.S.C. § 9621(b)(1). In

addition, the appropriate remedial action selected must, to the extent practicable, provide for a cost effective response. 42 U.S.C. § 9621(b)(1).

Among other requirements, in the determination of a remedial action plan, the Navy is required to, at a minimum, consider and analyze the long-term uncertainties associated with land disposal and the potantial threat to human health and the environment associated with excavation, transportation, and redisposal. 42 U.S.C. § 9621(b)(1).

As described below, in selecting the proposed remedy the Navy has not adequately considered these factors and additional ones as required by the NCP.

Response to ESI Chemicals Comments VI (18 November 1988):

The Navy prepared the proposed remedial action plan in compliance with CERCLA; the NCP; and "Guidance on Feasibility Studies Under CERCLA."

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:
>
> (A) the long-term uncertainties associated with land disposal;
>
> (B) the goals, objectives, and requirements of the Solid Waste Disposal Act;
>
> (C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;
>
> (D) short and long-term potential for adverse

health effects from human exposure;

(E) long-term maintenance costs;

(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

42 U.S.C. 9621(b).

ESI Chemicals Comments VI-A (18 November 1988):

VI-A. THE NAVY HAS NOT BEEN CONSISTENT IN ITS ANALYSIS REGARDING THE DISPOSAL OF EXCAVATED SOILS.

The Navy is proposing to undertake the remedy of excavating approximately 4.68 acres to a depth of 12 inches in RASS 3. To obtain a greater understanding of the quantity of soils which are currently proposed to be excavated, 4.68 acres are equivalent to approximately 203,000 square feet of land. When this 203,000 square foot area is converted to volume by considering an excavation to the one-foot depth currently proposed to be excavated in RASS 3, the massive quantity of soil proposed to be relocated becomes readily apparent.[4]

In analyzing the options pertaining to the disposal of the excavated soils, the Navy has determined that there are two primary options. These include: (1) disposal of the soils within an existing licensed facility; or (2) disposal in a monofill constructed on the Naval Weapons Station. (FS pp. 5.4-5.7)

Although the rationale utilized by the Navy is the same for all of the RASS areas, for purposes of this discussion, only RASS 3 will be considered.

The Navy has selected as its remedy of choice for RASS 3 Alternative 3-3C, which includes excavation of the soils, immobilization of metals after the soils have been excavated, and disposal at an existing landfill. The Navy proposes to solidify and stabilize the metals after the soils are excavated to enable disposal in a Class III landfill facility. For purposes of cost estimating, it is assumed that Class III disposal permits will be obtained from the requisite government licensing agencies. (FS pp. 6.50-6.52)

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[4] The quantity of soil does not even include the amounts proposed to be excavated from the additional RASS locations.

However, in considering the construction of a monofill on the Naval Weapons Station, the Navy determined that the monofill would have to meet the requirements and engineering standards of a Class I disposal facility. (FS p. 6.53) One of the reasons expressed by the Navy as to why the monofill would be constructed to the specifications of a Class I facility (rather than a Class III facility) is because of concern over the long-term durability of the solidified/stabilized soils. (FS p. 6.53) However, this same concern has not been expressed if the excavated soils were to be disposed of in a facility located off site from the Naval Weapons Station.

Furthermore, the Navy has assumed for purposes of its selected remedy that solidification/stabilization process will be applied to the excavated soils, although there is no discussion of what these processes will consist of. It is only assumed that the processes will somehow be "cost-effective." There can be no meaningful analysis of costs involved because the solidification/stabilization process itself has not been determined.

Response to ESI Chemicals Comments VI-A (18 November 1988):

Excavation and removal of heavy metal contaminated soils is considered to be the most reliable means for remediation on RASS 3. As discussed above in the response to ESI comment II-C the 12 in. excavation depth is conceptual and based on the current level of data related to contamination on RASS 3. A detailed excavation plan developed during the plans and specifications phase will be used to minimize the amount of soil that will be removed, subject to the overriding concerns related to the protection of the public health and the environment. Under the 12 in. conceptual plan it is estimated that 32,463 cu. yds. of soil will be excavated and removed from Naval Weapons Station, Concord (RASS's 1, 2, 3, and 4). Of this quantity, approximately 7520 cu.yds. would be removed from RASS 3. Although execution of the excavation alternative in accordance with the detailed excavation plan may result in changes (either increases or decreases) in the amount of material to be excavated, the 12 in. depth is considered as a reasonable estimate for determining the feasibility of the alternative. Excavation in 6 in. lifts on RASS 3 may result in some minor cost savings, while maintaining an acceptable level of environmental protection. It is acceptable to include excavation in 6 in. lifts as an element of the excavation and removal plan.

The amount of excavation planned for RASS 3 is consistent with the environmental consequences of discharging heavy metals to the environment over a number of years.

Solidification/stabilization studies were conducted to assess the feasibility of immobilizing the contaminants

sufficiently in Class III landfills to meet the requirements of the California DOHS and Regional Water Quality Control Board.

Section 121 (b)(1) states a preference for "remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment." For materials containing arsenic and heavy metals, chemical stabilization/solidification has been proposed as a technology that could reduce the mobility of contaminants and fix the contaminants in the soil. The technology generally includes the addition, singly or in some combination, of Portland cement, lime and fly ash, cement or lime kiln dust. This technology has been successfully applied on some sites; however, the technology must be evaluated through the use of laboratory and field pilot testing.

Two alternatives on each RASS (1-3C, 1-3D, 2-3C, 2-3D, 3-3C, 3-3D, 4-3C, and 4-3D) included the concept of stabilization/solidification for immobilizing contaminants in the soil. Recognizing the uncertainties associated with the stabilization/solidification technology, the Navy conducted laboratory scale studies to determine the ability of various stabilization/solidification techniques to immobilize the contaminants. Samples of the contaminated soils were collected from RASS 1, RASS 2, and RASS 3 and treated with various ratios of Portland cement, lime fly ash, and cement kiln dust. Materials found on RASS 4 were concluded to be sufficiently similar to materials found on the other three RASS's to obviate the need for testing of these materials. The resulting specimens were tested using the State of California procedures described as the WET test. Values for both the Total Threshold Limit Concentration (TTLC) and the Soluble Threshold Limit Concentration (STLC) were determined. Although contaminants were shown to be partially immobilized, concentrations of arsenic, copper, lead, and zinc exceeded the STLC criterion. In some cases, the values exceeded the criterion by an order of magnitude. These results are attributed to the following factors. First, the initial concentrations of contaminants are extremely high for some of the samples. This is particularly true for lead and zinc. Second, the State of California WET test, which uses a citric acid leachant, is much more aggressive than the standard Extraction Procedure Toxicity Test (EP) or the Toxicity Characteristic Leaching Procedure (TCLP) that are typically used by the U.S. Environmental Protection Agency to evaluate the toxicity of a hazardous waste.

Based on these laboratory tests, the Navy concludes that:

a. Although stabilization/solidification with cement and pozzolonic materials significantly reduced contaminant

mobility, stabilization/solidification failed to produce a product that would pass the State of California WET test.

b. The stabilized/solidified contaminated soils are a Class I waste under State of California statutes and regulations.

c. As Class I wastes, the treated contaminated soils would require disposal in a Class I disposal facility.

d. Since the stabilized/solidified contaminated soil requires Class I disposal, the added cost of the chemical treatment process was not justified.

e. Alternatives including stabilization/solidification should be eliminated from further consideration based on technical and cost considerations.

Based on the above rationale, the Navy concludes that alternatives incorporating excavation and disposal in a Class I landfill, without stabilization/solidification, (Alternatives 1-3A, 2-3A, 3-3A, and 4-3A) are the preferred over alternatives incorporating stabilization/solidification for remediation of the release of hazardous substances on RASSs 1, 2, 3, and 4, Naval Weapons Station, Concord.

The costs presented for the solidification/ stabilization processes are based on the results of detailed studies conducted for the Environmental Protection Agency.

The Navy carefully evaluated the advantages and disadvantages of disposal in existing landfills versus construction of a monofill on Naval Weapons Station, Concord.

Alternatives 1-3D, 2-3D, 3-3D, and 4-3D would require construction of a monofill on the Naval Weapons Station, Concord, for the disposal of soils after immobilization of the hazardous substances in such soils. Under these alternative remedial actions, the monofill would be constructed to meet Class I site engineering standards because of uncertainties over the long-term stability of the solidification or stabilization of the contaminated soils which would be disposed of. The monofill would be constructed to meet Class I engineering standards to minimize the operational and maintenance requirements which would result from construction and maintenance of a landfill on the station.

The Navy has conducted a detailed evaluation of potential monofill sites on Naval Weapons Station, Concord. The results of this investigation are referenced in the (Second Revised) Final Draft Feasibility Study Report and presented in detail in the Final Report of the Suitability of Sites for

Hazardous Waste Disposal, Concord Naval Weapons Station, Concord, California.

Disposal requirements for both untreated and solidified/stabilized contaminated soils will be determined by the California DOHS and Regional Water Quality Control Board. The long term durability of solidified/stabilized wastes has not been quantified, indeed, standard procedures have not been developed to evaluate long term durability. In fact, the Navy considered the long term durability of solidified/stabilized soils in both the monofill and Class III landfill environment. However, long term durability is only one consideration in the evaluation of the disposal alternative. Concerns in the selection of an appropriate disposal site included the following, all of which were considered by the Navy.

a. Hydrogeological and topographic conditions on the Naval Weapons Station, Concord did not favor construction of landfills.

b. The Navy has no expertise in the construction and/or operation of landfills constructed to contain hazardous (treated or untreated) wastes.

c. Construction of a monofill on the Naval Weapons Station, Concord, would require the Navy to accept potential future liabilities resulting from the discharge of hazardous substances onto the Naval Weapons Station, Concord by other parties.

d. The Navy would lose the area of the landfill for other potential land uses.

e. The codisposal of contaminated soils (treated or untreated) with municipal wastes in an existing Class III landfill would raise concerns about the potential for mobilization of heavy metals.

f. Operators of existing landfills are experienced and aware of the construction and requirements associated with the operation of the landfill.

g. Appropriate state agencies will provide oversight to ensure that disposal in existing landfills will be conducted in accordance with all environmental requirements.

ESI Chemicals Comments VI-B (18 November 1988):

VI-B. THERE HAS BEEN NO ANALYSIS OF THE ADVERSE ENVIRONMENTAL IMPACTS WHICH WILL RESULT FROM

THE SELECTED REMEDY.

Any adverse environmental impacts associated with the remedy are required to be evaluated prior to the selection of the remedy. 40 CFR § 300.68(h)(vi).

A remedy may be selected which does not attain a level equivalent to an ARAR if compliance with that requirement will result in greater risk to the environment than alternative options. 42 U.S.C. § 9621(d)(4)(B).

In analyzing the proposed remedy, the Navy has not considered the risk to the environment in RASS 3 caused by the remedy itself. These risks include the disruption to the habitat and ecosystem resulting from the proposed excavation. This factor should be considered and analyzed as a part of the discussion for all of the alternative remedial actions prior to the selection of the proposed remedy.

Additionally, in analyzing the specific potential adverse environmental impacts associated with the remedy of the massive excavation of soils proposed to be undertaken by the Navy, the analysis should include a meaningful discussion of the long-term uncertainties associated with land disposal. Factors such as the current capacity and projected future capacity of disposal facilities should be included. The analysis must include a consideration of the effects of utilizing rapidly diminishing land fill space for soils which are not even categorized as hazardous waste material through the use of established criterion levels.

Because the Feasibility Study has failed to analyze and consider the adverse environmental impacts associated with the proposed remedy, there has been no compliance with either the Act or the NCP.

Response to ESI Chemicals Comments VI-B (18 November 1988):

The Navy prepared its (Second Revised) Final Draft Feasibility Study Report and its proposed remedial action plan in compliance with CERCLA; the NCP; and applicable guidance.

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

> (d) Degree of Cleanup, - (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and

the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) provides that:

> (2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -
>
> (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
>
> (ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of thee release or threatened release.

Section 121(d)(4)(B) of CERCLA provides, in pertinent part that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least

equivalent to legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that . . .

(B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options

The risk of permanent damage to the environment of RASS 3 from the implementation of the proposed remedial action plan is nearly zero. As explained in the (Second Revised) Final Draft Feasibility Study Report, the wetland system of RASS 3 is composed of species such as cattail and willow which are tolerant of disturbance. As long as the substrate remains within the zone of hydrologic influence, wetland vegetation and soils will reestablish. This was considered in the decision to propose excavation as the recommended alternative.

ESI Chemicals Comments VII (18 November 1988):

VII. IT WOULD BE MANIFESTLY UNJUST TO LIMIT THE JUDICIAL REVIEW OF THE PROPOSED RESPONSE ACTION TO THE ADMINISTRATIVE RECORD.

Based on the facts of the instant case, it would be manifestly unjust to limit the judicial review of the proposed response action to the administrative record. The following examples, while not all inclusive, serve to demonstrate the reasons for this statement.

Response to ESI Chemicals Comments VII (18 November 1988):

Section 113(k) of CERCLA provides that:

(1) Administrative record. -- The President shall establish an administrative record upon which the President shall base the selection of a response action. The administrative record shall be available to the public at or near the facility at issue. The President also may place duplicates of the administrative record at any other location.

(2) Participation procedures. --

(A) Removal action. -- The President shall promulgate regulations in accordance with chapter 5 title 5 of the United States Code establishing procedures for the appropriate participation of interested persons in the development of the administrative record on which the President will base the selection of removal actions and on which judicial review of removal actions will be based.

(B) Remedial action -- The President shall provide

for the participation of interested persons, including potentially responsible parties, in the development of the administrative record on which the President will base the selection of remedial actions and on which judicial review of remedial actions will be based. The procedures developed under this subparagraph shall include, at a minimum, each of the following:

(i) Notice to potentially affected persons and the public, which shall be accompanied by a brief analysis of the plan and alternative plans that were considered.

(ii) A reasonable opportunity to comment and provide information regarding the plan.

(iii) An opportunity for a public meeting in the affected area, in accordance with section 117(a)(2) (relating to public participation).

(iv) A response to each of the significant comments, criticisms, and new data submitted in written or oral presentations.

(v) A statement of the basis and purpose of the selected action.

For purposes of this subparagraph, the administrative record shall include all items developed and received under this subparagraph and all items described in the second sentence of section 117(d). The President shall promulgate regulations in accordance with chapter 5 of title 5 of the United States Code to carry out the requirements of this subparagraph.

(C) Interim record -- Until such regulations under subparagraphs (A) and (B) are promulgated, the administrative record shall consist of all items developed and received pursuant to current procedures for selection of the response action, including procedures for the participation of interested parties and the public. The development of an administrative record and the selection of response action under this Act shall not include an adjudicatory hearing.

(D) Potentially responsible parties. -- The President shall make reasonable efforts to identify and notify potentially responsible parties as early as possible before selection of a response action. Nothing in this paragraph shall be construed to be a defense to liability.

42 U.S.C. 9613(k)

Section 113(j) of CERCLA provides that:

(1) Limitation. -- In any judicial action under this Act, judicial review of any issues concerning the adequacy of any response action taken or ordered by the President shall be limited to the administrative record. Otherwise applicable principles

of administrative law shall govern whether any supplemental materials may be considered by the court.

(2) Standard. -- In considering objections raised in any judicial action under this Act, the court shall uphold the President's decision in selecting the response action unless the objecting party can demonstrate, on the administrative record, that the decision was arbitrary and capricious or otherwise not in accordance with law.

(3) Remedy. -- If the court finds that the selection of the response action was arbitrary and capricious or otherwise not in accordance with law, the court shall award (A) only the response costs or damages that are not inconsistent with the national contingency plan, and (B) such other relief as is consistent with the National Contingency Plan.

(4) Procedural errors. -- In reviewing alleged procedural errors, the court may disallow costs or damages only if the errors were so serious and related to matters of such central relevance to the action that the action would have been significantly changed had such errors not been made.

42 U.S.C. 9613(j).

ESI Chemicals Comments VII-A (18 November 1988):

VII-A. THE NAVY HAS PERFORMED ADDITIONAL SAMPLING AND ANALYSES OF THE SITES IN QUESTION WHICH DATA ARE NOT INCLUDED WITHIN THE ADMINISTRATIVE RECORD.

On October 19, 1988, the Navy transmitted documents to the document depository which has been established for this case. The transmitted documents contained the results of additional clam bioassays and are Bates-stamped WES 031007-031028. The description of work to be performed during March 9-11, 1988 and April 6-8, 1988 included a field clam bioassay study as well as additional surface water sampling. (WES 031007)

However, based on our knowledge, the documents transmitted to the depository included data from the clam bioassay only and did not include the results of the surface water analyses. While this is the most recent indication of data which has not been included within the Administrative Record, there is no reason to conclude that it is the only instance in which it has occurred. Without the results of the investigations performed as a part of the remedial investigation and feasibility study process, it becomes difficult to adequately comment on the remedy as currently proposed by the Navy.

Response to ESI Chemicals Comments VII-A (18 November 1988):

All of the data used in preparing the (Second Revised) Final Draft Feasibility Study Report have been produced.

ESI Chemicals Comments VII-B (18 November 1988):

VII-B. THE NAVY IS A POTENTIALLY RESPONSIBLE PARTY UNDER THE ACT.

Although Section 2.3.5 of the Feasibility Study lists sources of potential contamination on properties adjacent to the Naval Weapons Station, there is no comparable section which lists potential sources of contamination on the Naval Weapons Station itself. (FS pp. 2.34-2.36)

For example, the United States acquired, on behalf of the Navy, Parcel 572 in 1969. This parcel includes the Kiln Site, currently known as RASS 2. Ten large industrial kilns, known as Herschoff ovens, were located on the site at the time it was acquired by the Navy. The kilns were demolished on site in or about 1974. (FS 2.32) Thus, the Navy was the owner of the property at the time the demolition occurred. The deposition of Charles Christianson was taken on December 17, 1986 and testimony was given regarding the burial on site of rubble and bricks remaining after the demolition of the Kilns.

The kiln brick and rubble has been analyzed by the Navy to determine its composition. The data from the rubble and brick analysis indicated that the material is comprised in part of the very same metals of concern in this case. (RI, Subtitle Appendix 2.5 - 1986/1987 Data) Furthermore, iron pyrite ore was roasted in the kilns over a long period of time and the pyrite ore is comprised in part of the same metals of concern.

Any person who, at the time of disposal of any hazardous substance, owned the facility where the disposal occurred is liable for the cleanup costs. 42 U.S.C. § 9607(a). Thus, a rationale exists for the Navy to attempt to shift responsibility under the Act to other PRPs. Furthermore, although the Navy is itself a PRP the Navy has contended it has control over all of the processes and responsibilities required to be carried out under the Act. In a situation such as this, it is manifestly unjust to limit the judicial review of the proposed remedy to the administrative record.

Considering the facts of this situation where information and data which were obtained by the Navy during the remedial action/feasibility study process was not made available to the defendants, the review of the remedy should not be limited to the administrative record.

However, even if all of the documents and information obtained were to be made available to the defendants, the

Administrative Record is still inadequate for that reason that both the Act and the National Contingency Plan require that in the determination of an appropriate remedy certain actions must be performed, factors properly considered and weighed, and meaningful analyses of alternative actions undertaken. To the extent the requisite actions, as described within these comments, have not been performed, the Administrative Record is inadequate as a matter of law.

Response to ESI Chemicals Comments VII-B (18 November 1988):

The Navy did not purport to apportion responsibility or liability for response costs under Section 107 of CERCLA in its proposed remedial action plan or in its (Second Revised) Final Draft Feasibility Study Report. Sections 2.3.1, 2.3.2, 2.3.3, and 2.3.4 of the (Second Revised) Final Draft Feasibility Study Report, however, describe the four Remedial Action Subsites (RASS's) on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, and the four rights of way which transect these parcels, where the Navy detected contamination.

RASS 2 includes an area identified as the Kiln Site. RASS 2 encompasses areas on Parcel 572 on the Naval Weapons Station, Concord and areas on rights-of-way adjacent to this parcel which have been owned and operated by Atchison, Topeka, and Santa Fe Railway Company and Southern Pacific Transportation Company. Ten large industrial kilns, known as Herschoff ovens or furnaces, were placed on the rights-of-way owned and operated by ATSF on or about 1963. The kilns were demolished by Charles Christenson on or about 1974, and the debris from the demolition was spread over the ATSF right-of-way and Parcel 572 on the Naval Weapons Station, Concord.

The United States, on behalf of the Navy, is seeking to recover the costs the Navy has incurred or will incur in responding to the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord from the defendants in two actions brought under CERCLA. Those cases are styled United States v. Allied Chemical Corporation, et al., Civil No. C-83-5896 (N.D. Calif.). The Navy has given each of the defendants in these cases the opportunity to review and submit comments and other information in response to its proposed remedial action plan.

1.4 COMMENTS SUBMITTED BY ERM WEST IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 16 SEPTEMBER 1988, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

ERM Comments - I (18 November 1988):

The following general comments on the FS briefly

identify our key concerns. Most critical of these are the need for riskbased cleanup criteria, the need for definition of contamination boundaries, and the need for clear program goals. Without addressing these concerns, the remedy proposed by the Navy in the FS is not technically justified or cost effective.

ERM Comments - I.1 (18 November 1988):

I.1 DEVELOPMENT OF CLEANUP LEVELS SHOULD BE DERIVED FROM RISK-BASED CRITERIA.

The cleanup levels specified in the FS are not linked to the actual risks posed by site contamination. Because there are no absolute standards for the cleanup of contaminated soil (unless PCBs are involved), the remedial action objectives for the site should be directly tied to localized environmental factors and any potential risks to public health and safety. The isolated location of the site poses a relatively minor public health risk. Protocols such as those listed in the EPA's Public Health Evaluation Manual should be used to generate riskbased cleanup level criteria appropriate to the site. Using this criteria, the no action alternative (Environmental Monitoring) may be more appropriate than cleanup based on California Department of Health Services TTLC/STLC or "Statistically Above Background" criteria.

Response to ERM Comments - I.1 (18 November 1988):

CERCLA requires that the Navy's response protect human health and the environment. The Navy agrees, and so states in the (Second Revised) Draft Final Feasibility Study Report, that because of the location of the sites under investigation, immediate threats to human health are not a major concern to the development of remediation decision rules. However, the Navy finds that there are both current and potential threats to the environment resulting from the past release of hazardous substances on the sites under investigation. Because human health is not the major issue driving the remediation requirement on these sites, the protocols and procedures contained in the EPA Public Health Evaluation Manual are not directly applicable. However, the Public Health Evaluation Manual was reviewed for general guidance concerning the toxicity of contaminants found on the sites under investigation.

ERM Comments - I.2 (18 November 1988):

I.2 AREA AND VOLUME TO BE CLEANED UP SHOULD REFLECT THE CONTAMINATION DEPOSITION PATTERN.

In order to protect wildlife and vegetation, minimize excavated volumes and reduce cleanup costs, cleanup should be limited to only those areas where actual contamination has

occurred. As documented in the 30 April 1987 Declaration of Richard W. Stone, Ph.D., P.E., in Support of Motion for Summary Judgement (pages 4, 79), the contamination on RASS 2 and 3 has resulted from two specific causes: 1) the hydraulic transport of contaminated particulates into topographic depressions on Navy and Railroad properties during rain events and high tides via stream flow and overland flow, and 2) demolition of the kilns. In many areas where specific data are not available, the FS assumes that contamination exists in areas outside the kiln site and the topographic depressions. According to flow pattern data presented as Exhibits A and C in the above referenced Declaration in Support of Motion for Summary Judgement (page 3), property outside the kiln site and the topographic depressions is not likely to contain contaminants.

If excavation of soil is ultimately carried out at CNWS, additional sampling and analysis should be conducted to clearly identify the actual nature and extent of contamination. The FS does not present a specific plan for confirming the precise boundaries of the contaminated soil to be excavated. Additional sampling and analysis is needed to refine horizontal and vertical cleanup boundaries so that 1) cleanup efforts can be tied to actual areas of contamination, and 2) the cleanup work plan can identify precise field excavation methods that can ensure against crosscontamination.

Response to ERM Comments - I.2 (18 November 1988):

The intent of both the conceptual plans developed in the (Second Revised) Final Draft Feasibility Study Report, and any detailed plans developed to implement the selected remedy are to minimize the volume of excavated material consistent with the requirements for the protection of the human health or the environment. The Navy has prepared a (Second Revised) Final Draft Feasibility Study Report to evaluate alternatives for remediation of contaminated areas on Parcels 572, 573, 574, 575, 576, 579D, and 581 on Naval Weapons Station, Concord. The Final Remedial Investigation Report identified soil contamination resulting from discharges from adjacent properties and operations on the parcels prior to acquisition by the Navy. Onsite contamination in the form of surficial deposits of metal contaminants resulting from drainage or overflows of wastewaters to surface drainages or to flat wetland areas from adjacent properties has been identified as the primary potential onsite source. The surficial deposits have been evaluated and found to contain high levels of arsenic, lead, cadmium, copper, and zinc. In addition, offsite contamination on adjacent properties in the form of deposits of metal contaminants has been identified as a potential offsite source of contamination.

During development of the (Second Revised) Final Draft Feasibility Study Report, a range of potential remediation

alternatives were evaluated. Among the alternatives considered were several that incorporated the concept of excavation and disposal.

The Navy considered the feasibility study as a means of evaluating the conceptual feasibility of potential remedial action alternatives. The conceptual excavation alternatives have been based on the current state of knowledge of the levels and extent of contamination on the four RASS's considered in the (Second Revised) Final Draft Feasibility Study Report. During the design process, detailed plans will be developed to implement the concepts presented in the (Second Revised) Final Draft Feasibility Study Report. During the remedial action design process, particular attention will be given to those areas in which contaminant concentration levels are known to be high. The detailed excavation plan will be designed to limit the amount of materials to be excavated, consistent with the overall goal of protecting the human health and the environment.

The following assumptions are used in the development of the conceptual excavation plan.

a. All materials that have contaminant concentrations equal to or greater than the State's TTLC/STLC criteria will be disposed of in a Class I facility.

b. All materials with contaminant concentrations less than the State's TTLC/STLC criteria will be disposed of in a Class III facility.

c. None of the materials found on site are regulated under the Solid Waste Disposal Act, i.e., the contaminant concentrations in soil samples do not exceed the Extraction Procedure Toxicity Test (EP).

d. Removal of contaminated soils will be consistent with the decision rules presented in the FS (Section 3.5.3).

e. The removal of contaminated soils will be minimized consistent with protection of human health or the environment.

f. Transportation to disposal facilities will be accomplished using appropriately controlled truck or rail facilities.

g. Contamination in most areas is in the upper 6-12 in. of the soil; however, deeper contamination has been located in scattered areas.

h. Excavation can be conducted in 6 in. lifts, with some difficulty.

The conceptual excavation plan is summarized below.

a. Beginning at points of known contamination, i.e., current sampling locations where contaminant concentrations are equal to or greater than the decision rule criteria, a grid of sampling locations would be established. A grid composed of sampling points located 20 ft. on centers and radiating from the points of known high contaminant concentrations will be established.

b. A sampling point in each grid will be sampled to a depth of 3 ft. Distinct subsamples will be collected for each 6 in. horizon. Based on a 20 ft. grid, each sampling point/sampling horizon will represent approximately 10 cu. yds. of soil.

c. The 0-6 in. horizon will be analyzed for the contaminants of concern.

d. Grid squares in which contaminant concentrations are equal to or greater than the decision rule criteria will be excavated to a depth of 6 in.

e. In excavated squares, the next 6 in. horizon will be analyzed. If the results exceed the remedial action decision rules, the next 6 in. horizon will be excavated.

f. Items d. and e., above, will be repeated until the sampling and analyses indicate that the soils in each grid meet the remediation decision rules.

ERM Comments - I.3 (18 November 1988):

I.3 CLEANUP CONFIRMATION SAMPLING PROCEDURES ARE NOT IDENTIFIED.

The FS does not outline the process by which cleanup confirmation will be made after soil has been excavated. Confirmation sampling should be done in order to insure all contaminated soil has been removed from the site. These procedures must be clearly outlined as part of the FS, as they can have a significant impact on cleanup schedule and cost.

Response to ERM Comments - I.3 (18 November 1988):

Confirmation sampling is included in the detailed excavation plan presented above.

ERM Comments - I.4 (18 November 1988):

I.4 TECHNICAL VIABILITY AND AGENCY APPROVAL SHOULD BE

ESTABLISHED PRIOR TO IMPLEMENTATION OF PREFERRED ALTERNATIVE.

The FS proposes a preferred alternative for remediation at all sites (Excavation/Immobilization/Disposal in a Class III Landfill/Revegetation), but it does not include any bench/pilot scale data to support the technical and economic viability of the immobilization process. Bench/pilot scale studies are typically part of the RI/FS process as outlined in EPA guidance documents. In the absence of bench/pilot scale demonstrations of the technical and economic viability of the immobilization technology, state agency approval of the final disposition of the contaminated soil in a Class III landfill site cannot be presumed. California waste disposal is governed by both the Regional Water Quality Control Board (RWQCB) (in the case of landfill permitting) and by the Department of Health Services (DHS) (in the case of hazardous waste classification). Both agencies, as well as the Class III disposal site, must approve proposed disposal methods for the material.

Response to ERM Comments - I.4 (18 November 1988):

Section 121 (b)(1) states a preference for "remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment." For materials containing arsenic and heavy metals, chemical stabilization/solidification has been proposed as a technology that could reduce the mobility of contaminants and fix the contaminants in the soil. The technology generally includes the addition, singly or in some combination, of Portland cement, lime and fly ash, cement or lime kiln dust. This technology has been successfully applied on some sites; however, the technology must be evaluated through the use of laboratory and field pilot testing.

Two alternatives on each RASS (1-3C, 1-3D, 2-3C, 2-3D, 3-3C, 3-3D, 4-3C, and 4-3D) included the concept of stabilization/solidification for immobilizing contaminants in the soil. Recognizing the uncertainties associated with the stabilization/solidification technology, the Navy conducted laboratory scale studies to determine the ability of various stabilization/solidification techniques to immobilize the contaminants. Samples of the contaminated soils were collected from RASS 1, RASS 2, and RASS 3 and treated with various ratios of Portland cement, lime fly ash, and cement kiln dust. Materials found on RASS 4 were concluded to be sufficiently similar to materials found on the other three RASS's to obviate the need for testing of these materials. The resulting specimens were tested using the State of California procedures described as the WET test. Values for both the Total Threshold Limit Concentration (TTLC)

and the Soluble Threshold Limit Concentration (STLC) were determined. Although contaminants were shown to be partially immobilized, concentrations of arsenic, copper, lead, and zinc exceeded the STLC criterion. In some cases, the values exceeded the criterion by an order of magnitude. These results are attributed to the following factors. First, the initial concentrations of contaminants are extremely high for some of the samples. This is particularly true for lead and zinc. Second, the State of California WET test, which uses a citric acid leachant, is much more aggressive than the standard Extraction Procedure Toxicity Test (EP) or the Toxicity Characteristic Leaching Procedure (TCLP) that are typically used by the U.S. Environmental Protection Agency to evaluate the toxicity of a hazardous waste.

Based on these laboratory tests, the Navy concludes that:

a. Although stabilization/solidification with cement and pozzolonic materials significantly reduced contaminant mobility, stabilization/solidification failed to produce a product that would pass the State of California WET test.

b. The stabilized/solidified contaminated soils are a Class I waste under State of California statutes and regulations.

c. As Class I wastes, the treated contaminated soils would require disposal in a Class I disposal facility.

d. Since the stabilized/solidified contaminated soil requires Class I disposal, the added cost of the chemical treatment process was not justified.

e. Alternatives including stabilization/solidification should be eliminated from further consideration based on technical and cost considerations.

Based on the above rationale, the Navy concludes that alternatives incorporating excavation and disposal in a Class I landfill, without stabilization/solidification, (Alternatives 1-3A, 2-3A, 3-3A, and 4-3A) are the preferred over alternatives incorporating stabilization/solidification for remediation of the release of hazardous substances on RASSs 1, 2, 3, and 4, Naval Weapons Station, Concord.

ERM Comments - I.5 (18 November 1988):

I.5 THE METHOD FOR CLASSIFYING EXCAVATED SOIL IS UNCLEAR.

The FS does not explain the criteria to be used in

classifying the excavated soils as either Class I, Class II or Class III. The FS also fails to describe the criteria that will dictate whether the excavated soil will be approved for Class II or Class III disposal. There is expected to be a significant shortage of Class II landfill availability, and, as a result, the cost for Class II disposal could easily approach the cost of Class I disposal. Therefore, the cost estimates listed in the FS for disposal may be extremely low.

Response to ERM Comments - I.5 (18 November 1988):

TTLC/STLC criteria will be used to classify soils for disposal in Class I or Class III landfills.

ERM Comments - I.6 (18 November 1988):

I.6 ADDITIONAL DETAILS ARE NEEDED CONCERNING PURPOSE AND USE OF MONITORING PROGRAM DATA.

The FS does not explain how data collected during the passive remediation monitoring program are to be used. Program goals should be clearly established prior to program implementation. Moreover, it is not clear how the environmental monitoring data would be analyzed, how decisions would be made regarding changes in operation and maintenance for the site, how potential additional remedial activity would be triggered, or, finally, how the passive remediation costs would be apportioned.

Response to ERM Comments - I.6 (18 November 1988):

The Navy is developing the monitoring plan. The monitoring plan will describe program goals and objectives as well as the parameters and media which will be sampled and tested. The monitoring plan will discuss interpretation of the analyses of the samples, as well as triggers for undertaking additional remediation.

ERM Comments - II (18 November 1988):

II. RASS - SPECIFIC COMMENTS

The following comments apply specifically to RASS 2 and 3. Our comments focus again on the clarification of contamination boundaries and on the critical need for source control.

ERM Comments - II.1 (18 November 1988):

II.1 RASS 2 SOIL CLEANUP.

RASS 2 comprises 1) the kiln storage and demolition area, and 2) an area contaminated by overland flow from RASS 3

(the alluvial fan, downstream of a culvert). The FS cleanup plan for RASS 2 specifies active remediation in an area that is larger than the area of these two sites. As mentioned above, a sampling and analysis program that further defines the horizontal and vertical boundaries of the contamination could prevent the unnecessary removal and disposal of relatively uncontaminated soil.

Response to ERM Comments - II.1 (18 November 1988):

The detailed excavation plan, implemented in accordance with the general guidelines described above in response to ERM Comments I.2, will address the issue raised by this comment.

ERM Comments - II.2 (18 November 1988):

II.2 RASS 3 SOIL CLEANUP.

As in the case of RASS 2, cleanup strategies at RASS 3 require further refinement of the volume of contaminated soil to be removed. Instead of arbitrarily removing 12 inches of soil from the railroad portions of the site (as required in the FS), it is proposed that the railway subsites be investigated further with respect to the areal extent and depth of contamination prior to excavation. This comment reinforces the general comment made about taking into account the overland flow patterns of deposition on the site when making final determinations of the horizontal and vertical extent of cleanup.

Response to ERM Comments - II.2 (18 November 1988):

The detailed excavation plan, implemented in accordance with the general guidelines described above in response to ERM Comments I.2, will address the issue raised by this comment.

ERM Comments - II.3 (18 November 1988):

II.3 RASS 3 SOIL CLEANUP LIMITS ARE UNCLEAR.

RASS 3 soil cleanup limits are stated to be based on the areas which show levels of metals "statistically above" those of the reference areas. There is no information presented in the FS showing the method by which these limits are set or what those limits actually are.

Response to ERM Comments - II.3 (18 November 1988):

The Final Remedial Investigation Report provides a listing of soil metal concentrations (pages 190-211) and a discussion of the statistical analysis (page 23). Additional data are listed in the Final Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord,

California, Subtitle Appendix 2.5 1986-1987 Data and in site maps provided in the Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures. Three samples were randomly collected at eight sites south of Port Chicago Highway (BK133) and two sites (BK116) northwest of the ESI property. These sites are unimpacted by any contaminants leaving the Chemical & Pigment property. These sites constitute the reference areas. Three random samples were also collected at twenty-eight other sites. These sites may have been impacted by contaminants from adjacent properties.

The analysis of variance (ANOVA) was used to evaluate the contaminant concentrations from all thirty-eight sites. The null hypothesis assumes the mean contaminant concentration from all thirty-eight sites to be equal. The alternate hypothesis is the assumption that at least one mean contaminant concentration is not equal to the thirty-seven other mean contaminant concentrations. If one rejects the former assumption (i.e. null hypothesis), Duncan's New Multiple Range Test is used to identify those mean contaminant concentrations which are not equal. Duncan's New Multiple Range Test was conducted at the 0.05 level of significance. Those sites identified by Duncan's Multiple Range Test as unequal to all sites from the remote reference area and having a mean contaminant concentration greater than all reference mean contaminant concentrations were characterized as statistically above reference. The Duncan's New Multiple Range Test results are presented in the Final Remedial Investigation Report (2.4 Appendixes). For instance, the soil analysis results appear in Table 2-A1 of the Final Remedial Investigation Report (page 192). In this table, mean contaminant concentrations which are not equal are followed by different letters. The ten arsenic mean contaminant concentrations from the reference area are followed by the letter E. The site AASCW16X4 mean contaminant concentration of 544.2 is followed by the letters CD. This site would be characterized as statistically above the reference area. Results from the soil analysis, 1984 clam bioassay, 1986 clam bioassay, field analysis, plant upland and flooded bioassays, and earthworm bioassay are summarized in Table 1 below. These data imply that sites which have mean contaminant concentrations that are equal to or greater than the tabulated value are statistically greater than all reference mean contaminant concentrations and have been impacted by sources not found in the reference area. In addition, a statistical difference observed was interpreted to mean that there is a substantial difference that is real and not imaginary. These results were the basis of the exposure and toxicological evaluation in Section 4.4 of the Final Remedial Investigation Report, which concluded there was a real potential for harm to wildlife associated with the contaminated areas. Table 1 follows:

Table 1. Values Statistically Above Reference*

	AS	CD	CU	PB	NI	SE	ZN
Soil Analysis	544.2**	12.7	344.6	---	---	---	2511.4
Clam Analysis(84)	---	1.39	---	3.21	---	---	199.6
Clam Analysis(86)	2.22	3.27	---	5.46	---	---	183.3
Field Analysis	0.37	1.26	---	15.5	6.22	---	123.8
Greenhouse Flooded	10.9	4.27	14.7	---	---	---	219.3
Greenhouse Upland	---	---	---	---	---	---	---
Earthworm Analysis	26.5	19.8	53.4	33.4	---	36.4	---

* Results of ANOVA and Duncan's New Multiple Range Tests (p 190-199, Lee et. al. 1986.)
** All contaminant concentrations are reported in parts per million.

ERM Comments - II.4 (18 November 1988):

II.4 RASS 2 & 3 SOURCE CONTROL IS NOT ADDRESSED.

As documented in the 30 April 1987 Declaration of Richard W. Stone, Ph.D., P.E., in Support of Motion for Summary Judgement (Pages 5-7), the sole source of contamination in RASS 3 and a major source of contamination in RASS 2 are contaminants which have been carried by storm flow and overland flow from the Chemical and Pigment Company (CPC) onto RASS 3 and into RASS 2. Even the FS acknowledges that CPC is a potential source of contamination (Page 2.35). Without this essential component of final remedial action, any remedial efforts undertaken at RASS 3 and RASS 2 will be futile, since the contaminants will continue to migrate from CPC property.

It must be noted that contacts made to both the RWQCB and DHS led us to conclude that both subsources mentioned in the FS (i.e., stormwater pond and drum storage/disposal sites) are not being given the level of priority required to address offsite migration of contaminants. Moreover, we believe that CPC's "Preliminary Conceptual Plan Closure of Impoundment, June 1988," submitted to the RWQCB per requirements of the California Toxic

Pits Cleanup Act of 1984, supports our conclusion that the CPC site may be even more subject to offsite migration of contaminants after implementation of the proposed closure plan. We strongly urge that the Navy review CPC's closure plan and, after review, adopt a source control plan as part of the FS.

In the case of the drum storage/disposal site, DHS could not provide us with any substantial evidence of progress in site investigation/cleanup. DHS does not believe this site has high enough priority to require investigation and cleanup at this time. The Navy should contact DHS to determine a plan of action for this subsource as well.

It should be obvious that it is in the best interest of all concerned that adequate source control measures are implemented at the CPC site. We are greatly concerned that the CPC sites are being overlooked by the Navy, by DHS, and by the RWQCB. Clearly, it would be fruitless to remediate RASS 3, and a great portion of RASS 2, if adequate control measures are not implemented at the CPC site.

Response to ERM Comments - II.4 (18 November 1988):

Control of actual and potential sources is of extreme concern to the Navy. The Navy has and intends to continue to pursue all available avenues to ensure that sources of contamination are positively controlled.

1.5 COMMENTS SUBMITTED BY STATE OF CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 16 SEPTEMBER 1988, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Comments of State of California Regional Water Quality Control Board (28 December 1988):

This letter is written to confirm statements I made to you by telephone on November 17, 1988 as follows:

Feasibility Study, Volume I: Remedial Action Alternatives, Draft Final Report, September, 1988.

1. page 3.86- The following statement is contained in the report:

   "Qualitative balancing of short-term and long term impacts associated with implementation of this criteria indicated that a further reduction of the cleanup criteria is in order."

   The area of Active Remediation was reduced from

about 15.4 acres to about 9 acres for RASS I based upon this statement. I can find no detailed discussion that provided specific documentation, referenced to specific data points, supporting this reduction in area. The area to be remediated is delineated by a specific line drawn on the plates. How was that line drawn? The Final Remedial Action Plan needs to be supported by this kind of specificity.

2. I could find no description of the trigger mechanism or specific criteria to be used for a decision to move from passive to active remediation. This should be provided in the Final Report or a date and process whereby it will be developed should be included.

As you are aware, this case is currently UNASSIGNED within the Regional Board's Toxic Cleanup Division. As such, staff have been able to give minimal guidance on the remedial investigations and feasibility studies for this site necessary to comply with the California Water Code and the Regional Boards Basin Plan. However, staff has no objection to you taking whatever steps toward site cleanup you believe are appropriate, such as those contained in the subject Remedial Action Plan. Additional investigations and/or cleanup may be required once the Regional Board has reviewed this matter. Please call me at (415) 464-0503 to discuss.

Response to Comments of State of California Regional Water Quality Control Board (28 December 1988):

The reduction in area from 15.4 to 9 acres for RASS 1 was based collectively on data indicating plant and earthworm mortality in laboratory bioassays, reduced soil invertebrate abundance and diversity in field collected data, soil arsenic contents exceeding either the TTLC or STLC criterion, and topographic features such as the presence of a drainage ditch which is the line drawn on the plates. Also included in the active remediation area were barren areas devoid of vegetation. Since this contaminated area is in the midst of wetland habitat for endangered species, especially the salt marsh harvest mouse, the Navy, in consultation with the Fish and Wildlife Service, decided not to destroy any additional wetland to the west of the drainage ditch shown on the plates. However, passive remediation in the form of intensive monitoring of the area west of the drainage ditch will be performed to determine any migration of contaminants through and out of this area.

The need for additional active remediation will be based on the monitoring data and the trigger mechanism in the detailed monitoring plan for each RASS.

1.6 COMMENTS SUBMITTED BY SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 16 SEPTEMBER 1988, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Comments of San Francisco Bay Conservation and Development Commission (1 November 1988):

We appreciate the opportunity to comment on the Proposed Remedial Action Plan for Hazardous Substances at the Naval Weapons Station at Concord. Commission staff previously commented on the Feasibility Study of Contamination Remediation at the Concord site. Staff comments are based upon the McAteer-Petris Act, the state legislation which established the Commission, and the San Francisco Bay Plan which adopted policies for the Bay. The federal government has approved these policies as California's coastal management program for San Francisco Bay.

The Commission's bay jurisdiction includes the tidal areas off Suisun Bay, of which tidal wetlands are considered part of the bay, and the shoreline area 100 feet inland from the line of highest tidal action of the Bay. Portions of the contaminated areas appear to be within the Commission's jurisdiction. Those portions of the project within the Commission's bay and 100-foot shoreline band jurisdiction will require that the Navy submit a consistency determination for Commission review and concurrence. A site plan showing the relationship of the project to the tidal areas and the 100-foot shoreline band should be included with a request for consistency determination so that staff can determine the extent of the Commission's jurisdiction. A draft consistency determination should be prepared and a meeting should be set up as soon as possible to discuss the submittal.

The San Francisco Bay Plan includes policies on Water Quality of the Bay. Bay Plan policies on Water Quality, in part, state: "Approval of projects involving shoreline areas polluted with hazardous substances should be conditioned so that they will not cause harm to the public or the beneficial uses of the Bay." This project proposes to excavate contaminated soil on approximately 19 acres, dispose of the material at an off-site location, and import clean replacement soils. We believe that removal of contaminated soils from tidal wetlands and adjacent areas and disposal in proper landfills will improve the water quality of the bay. The action plan includes the installation of groundwater monitoring wells and the sampling and analysis of the groundwater. Staff believes these actions are necessary to ensure that Bay water quality will be maintained. 1

Bay Plan policies on Marshes and Mudflats of the Bay, in part, state: ". . . the quality of existing marshes should be improved by appropriate measures whenever possible." It appears

that portions of tidal wetlands degraded by heavy metals will be excavated. We are concerned that a wetland restoration plan be adopted which will create site conditions conducive to successfully reestablishing wetland plant and animal communities. We believe that without such a plan, wetland habitat may experience difficulty in becoming reestablished. We believe a wetland restoration plan is necessary because of known Endangered Species in the project area.

In conclusion, we are enthusiastic about this major clean up project to remove hazardous soils at the Concord Naval Weapons Station, which will be of benefit to the Navy and to the public. We look forward to working with you further on the project. Should you have any questions about information which should be included in a request for consistency determination, please call.

Response to Comments of San Francisco Bay Conservation and Development Commission (1 November 1988):

Section 121(e) of CERCLA provides that:

> No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial actin is selected and carried out in compliance with section.

The Navy is not required to submit a consistency determination concerning the implementation of the Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California, because the proposed remedial action plan will be conducted entirely on the Naval Weapons Station, Concord. The implementation of the remedial action plan will not directly affect Suisun Bay.

2.0 COMMENTS SUBMITTED IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 7 MARCH 1986, AND THE NAVY'S RESPONSES TO THOSE COMMENTS

2.1 Environmental Protection Agency Comments (10 April 1986):

The Environmental Protection Agency (EPA) requests that the comment period be extended and that you provide additional information for our review of the Final Draft Report Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, February, 1986.

The subject report, and the related reports, Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord (Final Report), 1986 and Assessment of Damage to Natural Resources at Naval Weapons Station, Concord (Preliminary Final Draft), 1985 rely extensively on data collected during previous investigation efforts. One of the primary references cited is the Confirmation Study Report 2 NWS Concord (Draft), 1984.

EPA requests that the Navy provide the Confirmation Study Report 2 NWS Concord so that we may complete our review of the subject report. In addition, EPA requests that you provide any and all sampling data pertaining to this site. We request that you extend the comment period for the subject report until such time as we receive and have reviewed the requested document(s).

As discussed between Carl Schwab and Nicholas Morgan, we understand the sensitive nature of the remedial work occurring at this site. EPA regulations governing confidentiality of business information are set forth in Part 2, Subpart B of Title 40 of the Code of Federal Regulations (CFR). For any portion of the information submitted which is entitled to confidential treatment, please assert a confidentiality claim in accordance with 40 CFR § 2.203(b). If EPA determines that the information so designated meets the criteria set forth in 40 CFR § 2.200, the information will be disclosed only to the extent and by means of the procedures specified in 40 CFR Part 2, Subpart B. EPA will construe the failure to furnish a confidentiality claim with your response to this letter as a waiver of that claim, and information may be made available to the public by EPA without further notice.

EPA also requests to be informed and invited to any meetings being held with any regulatory agencies or the public concerning contamination by hazardous substances at this site.

I look forward to your cooperation in this matter as a means of fostering the good working relationship already developed in our mutual areas of concern. If you have any questions regarding this letter, please contact me at

415-974-7518 or Mr. Morgan at 415-974-8918.

Response to Environmental Protection Agency Comments (10 April 1986):

The Environmental Protection Agency requested to be invited to meetings the Navy held with regulatory agencies or the public concerning contamination by hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord.

Section 211(a) and (b) of CERCLA provides that:

(a) Environmental restoration program --

(1) In General. -- The Secretary of Defense shall carry out a program of environmental restoration at facilities under the jurisdiction of the Secretary. The program shall be known as the "Defense Environmental Restoration Program".

(2) Application of section 120 of CERCLA. -- Activities of the program described in subsection (b)(1) shall be carried out subject to, and in a manner consistent with, section 120 (relating to Federal facilities) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (hereinafter in this chapter referred to as "CERCLA")(42 U.S.C. 9601 et seq.).

(3) Consultation with EPA. -- The program shall be carried out in consultation with the Administrator of the Environmental Protection Agency.

(4) Administrative Office within OSD. -- The Secretary shall identify an office within the Office of the Secretary which shall have responsibility for carrying out the program.

(B) Program goals -- Goals of the program shall include the following:

(1) the identification, investigation, research and development, and cleanup of contamination from hazardous substances, pollutants, and contaminants.

(2) Correction of other environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment.

(3) Demolition and removal of unsafe buildings and structures, including buildings and structures of the Department of Defense at sites formerly used by or under the jurisdiction of the Secretary.

The Navy has conducted consultation concerning its response to the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, with the Environmental

Protection Agency as required by Section 211(a)(3) of CERCLA. 10 U.S.C. 2701(a)(3).

2.2 Entrix Comments (on behalf of ESI Chemicals, Inc.) (26 March 1986):

This letter is in reference to our telephone conservation today. I am writing to request a copy of the draft report: "Remedial Investigation of Contamination Mobility at Naval Weapons Station Concord, CA," prepared by the US Army Waterways Experiment Station. Please send it to me at the above Concord address. Thank you very much.

Response to Entrix Comments (on behalf of ESI Chemicals, Inc.) (26 March 1986):

The Navy provided Entrix with a copy of the Final Draft Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California.

2.3 Dee Kilcoyne Comments (27 March 1986):

I spoke to you by telephone at the end of February in regard to the above mentioned Final Report and requested that a copy be sent to me. You suggested that I place a written request.

Since that time, I've noticed that an additional report has been issued (Revised Final Draft of the Feasibility Study), and would appreciate receiving copies of both reports.

I enjoyed speaking to you and would like to thank you in advance for the reports. My address is listed above.

Response to Dee Kilcoyne Comments (27 March 1986):

The Navy provided Dee Kilcoyne with copies of the Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, and the (Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, on 2 April 1986.

2.4 State of California State Lands Commission (7 April 1986):

The State Lands Commission would like to thank you for the opportunity to comment on the Feasibility Study of Contamination Remediation at the Naval Weapons Station, Concord, California. Both this study and the Investigation of Contaminant

Mobility which preceded it are excellent work samples, and clearly outline the Navy's options in this difficult matter.

From the point of view of the State Lands Commission, Alternative 5B is the most favorable. The statewide loss of valuable wetland habitat is clearly documented, and the rare opportunity to restore close to 30 acres of prime habitat should be taken. We would recommend that Alternative 5C be held in reserve; if the restoration proposed in 5B fails, then other lands could be purchased to mitigate the loss of habitat.

Under Alternative 3, we recommend that 3C not be eliminated. Although the time constraints mentioned could be a problem, the disposal of contaminated material on the NWS site would go a long way toward overcoming the public resistance discussed in Section 8.1.8. We would also suggest that a site on the Inland portion of the NWS be evaluated, in addition to the CP site.

Again, thank you for the opportunity to provide comments on this important matter. If you have any questions on our response, feel free to contact Goodyear K. Walker of our Division of Research and Planning at (916) 322-0530.

Response to State of California State Lands Commission (7 April 1986):

Alternative 3C was not eliminated and was further evaluated because of these comments. Sites inland were evaluated as suggested in these comments.

2.5 Woodward-Clyde Comments (on behalf of ESI Chemicals, Inc.) (9 April 1986):

ESI Chemicals, Inc., has retained Woodward-Clyde Consultants to prepare comments on Feasibility Study of Contamination Remediation at NEW, Concord, California. The report, which follows in this letter, contains our comments on this document. These comments are filed pursuant to the Public Notice issued 7 March 1986 by the Naval Facilities Engineering Command, Western Division.

The authors deserve compliments for the improvements made in the revised final draft. However, quantitative evaluation of the various alternatives is still lacking. In particular, there is still no estimate of how many Salt Marsh Harvest Mice (SMHM) are actually in the affected areas, how many individuals would be killed by earthmoving activities, how many would be permanently displaced and how many more could live there if the status quo ante were somehow restored. Such quantitative information is necessary for rational decision making.

In the revised final draft, the authors have added a scheme to reduce the number of SMHM deaths during earthmoving activities. We feel that their remedial scheme is either inconsistent with the assumptions they have used in carrying out the study or inappropriate. The need for remedial action at NWS, Concord, is mostly justified by the alleged threat arsenic and the various heavy metals pose for the SMHM population in the effected areas. Implicit in this justification is the assumption that the SMHM population is limited by suitable habitat. That is, the population occupies all suitable areas within its range and is in Malthusian equilibrium in these areas. The report suggests trapping the mice and relocating them to another salt marsh, conducting the earthmoving, restoring the marsh, then trapping and relocating them back. If the assumption of limited habitat is true, relocating mice will only result in a net loss to the SMHM population, i.e. The death rate in the recipient marshes will increase due to disease and starvation. If the assumption is not correct, protection of the affected individuals can be achieved by relocating them permanently. The authors need to provide more information on the feasibility of trapping and relocating the mice during earthmoving activities or provide more justification for the proposed remedial actions.

Response to Woodward-Clyde Comments (on behalf of ESI Chemicals, Inc.) (9 April 1986):

When the Navy initiated consultation with the Fish and Wildlife Service regarding potential remedial action activities and their effects on the endangered and candidate species found on site, a survey was conducted to verify the presence of suspected species. The survey was not designed as a population study, therefore exact population levels cannot be stated. The Final Biological Assessment Report prepared for consultation reviewed the results of trapping for the harvest mouse at other sites and times, for a relative but general indication of populations. Obtaining a population estimate for a rare species requires extensive study; neither the Navy nor the Fish and Wildlife Service felt that this was necessary.

Because of the low mobility of the salt marsh harvest mouse, most or all the individuals in the area of RASS 1 and RASS 2 will be killed during remediation. The suggestion of trapping and relocating the salt marsh harvest mouse has been deleted on the advice of Dr. Thomas Harvey. His experience shows that this is not a viable practice.

2.6 National Oceanographic and Atmospheric Administration Comments (28 March 1986):

NOAA wishes to thank the Naval Facilities Engineering Command, Western Division for the opportunity to review and

comment on the Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California.

In discharging its responsibilities as a natural resource trustee under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), NOAA has two areas of concern relative to the remediation/restoration alternatives proposed in the NWS Concord Feasibility Study. The first is the preservation of fresh and saltwater wetland habitats that support living marine resources for which NOAA may act as a trustee. The second concerns the potential for contamination of adjacent marine waters through the implementation of certain remediation alternatives.

Of the five remedial action functional groups discussed in the report, NOAA agrees that both the "no action" and "increased monitoring" do the least to satisfy environmental goals and objectives. The remaining three functional groups offer five viable remediation/restoration alternatives. However, implementation of any of these alternatives needs additional studies; as stated above, NOAA favors alternatives which would best preserve wetlands and would through their implementation be least likely to impact adjacent marine waters.

With the Feasibility Study remedial action objectives, goals, and remediation technologies as a guideline, I have reviewed the five viable alternatives emphasizing NOAA's trusteeship concerns. Alternatives 3A, 4A, and 4B are least favored due to either the short term loss of wetlands and the potential for contamination of adjacent marine waters through wetland excavation, or due to the complete loss of wetlands. NOAA's concerns are better addressed by the remaining alternatives. Alternative 5B preserves wetlands through complete habitat restoration although it risks contamination of adjacent marine waters through wetland excavation. Further information on the potential for offsite migration of contaminated material during excavation is required. Alternative 5C appears to satisfy both of NOAA's trusteeship concerns. It provides for the preservation of wetlands through acquisition of equivalent resources and does not involve remedial technologies that would spread contamination into marine waters.

As the Feasibility Study stated, before any remedial action alternatives can be implemented, additional studies must be conducted prior to engineering design. NOAA would like to continue to provide input into studies aimed at environmental concerns associated with specific remedial action alternatives.

For further information concerning this matter please correspond or call Lawrence Keister at 206-526-6272 or Robert Pavia at 206-526-6319.

Responses to National Oceanographic and Atmospheric Administration Comments (28 March 1986):

The Navy considered these comments in preparing the (Second Revised) Final Draft Feasibility Study Report. The active remedial action will include provisions for avoiding contamination of Bay waters.

2.7 San Francisco Bay Conservation and Development Commission Comments (9 April 1986):

Thank you for the opportunity to comment on the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California (Study). The Commission has not had the opportunity to review the Study, but the staff is providing the following comments based on the McAteer-Petris Act and the policies of the Commission's Bay Plan, which have been approved by the federal government as the enforceable policies of California's coastal management program for the San Francisco Bay segment of the California coastal zone.

Because the contaminated sites are on federal property and because a federal agency will carry out the remediation project, the Navy will not need to obtain a Commission permit. However, Section 307(c)(1) of the Coastal Zone Management Act [16 U.S.C. Section 1456(c)(1)], requires that all federal activities that directly affect land or water uses within the coastal zone must be consistent to the maximum extent practicable with the coastal management program for that area. The Commission is the coastal management agency for the San Francisco Bay segment of the California coastal zone. All of the alternatives proposed for the remediation of the contaminated sites will directly affect the coastal zone because of the possible migration of toxicants into the Bay, the production of sediments from construction-induced erosion, or loss of wetland habitat. Therefore, federal regulations and the Commission's federally-approved management program require that at least 90 days prior to the Navy's commencing any action on the project the Navy must submit a consistency determination for Commission review. To ensure that the Commission's review and comments can be accommodated, the Navy should submit the consistency determination at the earliest practicable time.

Our staff has followed the remedial investigation and has reviewed the alternatives contained in the Study. Based on this analysis, we find alternative 5B to be the preferred alternative because it will assure long-term containment of toxicants and mitigation of affected wetlands. Although this alternative may cause short-term mobilization of toxicants, careful planning and implementation of the remedial action should result in keeping the release of toxicants to acceptable levels.

Alternative 5C raises concerns regarding long-term containment of toxicants because caps used to seal toxicants in the wetland sites must be able to withstand tidal and riparian induced erosion in perpetuity.

While the short-term costs of Alternative 5B may be greater than Alternative 5C, the long-term costs of monitoring and maintaining the wetland area caps required by 5C may be far greater than the costs associated with 5B.

The other alternatives mentioned in the study are not acceptable because they either do not assure containment of toxicants, do not include restoration of affected areas, or do not mitigate permanent losses of wetland areas.

For the reasons mentioned briefly in this letter, our staff recommends that the Navy adopt Alternative 5B, as described in the Study, as the preferred strategy to remediate areas of toxic contamination at the Concord Naval Weapons Station.

Response to San Francisco Bay Conservation and Development Commission Comments (9 April 1986):

The Navy considered these comments in preparing the (Second Revised) Final Draft Feasibility Study Report. Implementation of the remedial action on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, will not directly affect Suisun Bay. The active remedial actions will include provisions for avoiding contamination of Bay waters

2.8 Contra Costa County Mosquito Abatement District Comments (8 April 1986):

I have reviewed the Feasibility Study of Contamination Remediation and Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord Ca. with concern for human exposure to these contaminants. Contra Costa Mosquito Abatement employees perform surveillance and control work on the Naval Weapons Station which includes both application of pesticides, installation and cleaning of drainage ditches and stocking of mosquitofish, for mosquito control. There is reference to human risk as stated on page 3.12 of the Feasibility Study (Section 3.15) under direct exposure which states "There is potential for direct contact to on site contaminated materials. Potential receptors include personnel working at the site during remedial activities, general site trespassers and personnel employed at adjacent industrial and agricultural activities." But there is no follow up expected level of exposure based upon time or site of exposure.

I'd like to request information regarding the

solubility of these contaminants, the dermal, oral or respiratory toxicity for these materials, as is commonly done with pesticides in Material Data Safety Sheets and an assessment of the hazard to personnel working in and around the contaminated sites

Response to Contra Costa County Mosquito Abatement District Comments (8 April 1986):

Exposure to personnel walking across the contaminated barren areas near the kiln site is of concern. Personnel entering these areas should wear paper suits, protective gloves, boots, and dust respirators when working near barren areas.

2.9 Southern Pacific Transportation Company Comments - Introduction (9 April 1986):

INTRODUCTION.

This report presents a critique of the Final Draft Report, dated February 1986, of a Feasibility Study for the Naval Weapons Station, Concord (NWS Concord) prepared by ERM-West, Inc. and ERM Southwest, Inc. on behalf of Southern Pacific Transportation Company. This critique is submitted in response to the Department of Navy Public Notice and solicitation of comments dated 7 March 1986. Due to the limited comment period and non-availability of some support documents, Southern Pacific reserves the right to make subsequent comments in addition to the primary conclusions summarized below.

Southern Pacific Transportation Company Comments - 1 (9 April 1986):

1. The Department of the Navy is to be complimented for its efforts toward improving the Feasibility Study (FS) from that contained in the August 1985 draft. Nonetheless, it remains apparent that major flaws in the analysis persist.

The primary flaw is the evident lack of data to support the contention that the alleged heavy metal contamination actually poses a significant risk to public health, welfare or the environment. While the Navy has made an additional effort to explain its concern that the alleged contamination may affect public health, welfare or the environment, the data to support such speculation has not been provided.

Furthermore, except for the No Action and Increased Monitoring alternative, the alternatives "assumed... to meet the environmental protection goal developed in Section 3.3" (FS, page 5.3) and evaluated in the FS entail severe "short term" environmental damage and, based on experience elsewhere, probably irreparable long term impacts on the habitat and sensitive

species that are supposed to be protected. Consequently, none of the alternatives evaluated can satisfy the environmental goal "to minimize or eliminate the continued release and potential release of hazardous substances into the environment" while in themselves not posing "a significant long term adverse impact to important wildlife habitat".

Response to Southern Pacific Transportation Company Comments - 1 (9 April 1986):

The data collected by the Navy have demonstrated that concentrations of contaminants in soils, sediments, and surface waters are statistically greater than those found in reference areas. Increased bioaccumulation of these contaminants has been demonstrated in plants, soil invertebrates, and aquatic organisms. Therefore, there is substantial potential for harm to the environment due to the presence of contaminants.

Impacts to the wetland as a result of the active remedial action are expected to be of short duration. In the long term, the benefits of a cleaner environment will offset the short-term impacts.

Southern Pacific Transportation Company Comments - 2 (9 April 1986):

2. The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sets forth as the goal of any remediation the protection of public health, welfare and the environment. Accordingly, the revised National Contingency Plan (NCP), 50FR47950-47979 November 20, 1985, defines remedial actions as those "responses to releases...to prevent or minimize the release of hazardous substances...so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment" [40 CFR 300.68 (a)(1)].

The NCP further requires "the gathering of sufficient information to determine the necessity for and proposed extent of remedial action" [40 CF@ 300.68(d)]. As documented in our previous comments to the Navy dated September 1985, it is evident that the Navy has neither substantiated its contention that the alleged contamination and releases actually pose a current or potential danger nor that sufficient data exist to define the extent to which mitigation is required to minimize the suspected (but undocumented) releases in order to preclude "substantial danger" to public health, welfare or the environment.

Some examples of specific instances in which the data are lacking are provided below:

a. No attempt has been made to actually monitor nor predict volitization or fugitive dust levels

associated with the alleged contamination. Based on the metal concentrations in the soil and efforts to estimate and monitor emissions at other superfund sites (e.g., Crystal Chemical), it appears that ambient concentrations would not exceed either published ambient criteria or threshold limit values (TLV's) for occupational exposure. Consequently, while personnel working at NWS Concord may be exposed to dusty conditions, such conditions do not necessarily pose a danger.

b. The heavy metals of concern are readily adsorbed on sediments or precipitated in relatively insoluble compounds (F5, page 3-4). Even if such sediment or precipitates were carried via surface water runoff, it is not evident that this would result in increased releases to the environment. Natural sediments contain these heavy metals. Especially in brackish tidal environments, they are not readily taken up by plants or animals in concentrations that affect these individuals or other animals that prey upon them. In particular, the clam bioassays performed to support this FS indicated that clam tissue levels did not exceed naturally occurring levels (as discussed in our previous comment No. 21). Consequently, it has not been substantiated that migration of heavy metals will pose a danger to public health, welfare or the environment. In fact, no effort has been made to quantify or document the Navy's speculation that significant migration via surface water erosion is occurring.

c. No evidence of groundwater aquifer contamination has been obtained. Yet the revised FS draft still alleges that such contamination may occur, apparently because sufficient sampling and analyses have yet to be completed. Nonetheless, sufficient hydrogeologic data in combination with leachate data exist to evaluate whether leachate migration could affect groundwater resources. The Navy previously elected to omit such an evaluation since the risk was so unlikely but now states in the revised FS draft that additional groundwater samples should be tested.

d. The revised FS draft states that "Potential release of contaminants <u>can occur</u> through plant uptake at levels <u>exceeding normal tissue contents</u>" (FS, page 3.11). While such an occurrence is hypothetically possible, no evidence has been presented to document that such uptake is

occurring, is resulting in above normal levels, or that such levels pose a threat to public health, welfare, or the environment.

e. The revised FS draft contends that "migration of contaminants from each area is occurring" (FS, page 3.13) yet such migration has not been documented. Clearly, the NCP requires documentation of migration and substantiation of endangerment; not just potential concerns and endangerment scenarios as described by Lee, et al.

Response to Southern Pacific Transportation Company Comments - 2 (9 April 1986):

Section 121(a) of CERCLA provides that:

> The President shall select appropriate remedial actions determined to be carried out under Section 104 . . . which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response.

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:
>
> (A) the long-term uncertainties associated with land disposal;
>
> (B) the goals, objectives, and requirements of the Solid Waste Disposal Act;
>
> (C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous

substances and their constituents;

(D) short and long-term potential for adverse health effects from human exposure;

(E) long-term maintenance costs;

(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

The President shall select a remedial action that is protective of human health and the environment, that is cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

(d) Degree of Cleanup - (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) of CERCLA provides that:

(2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -

(i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or

(ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation,

> including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of thee release or threatened release.

Section 121(d)(4)(B) of CERCLA provides, in pertinent part; that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that . . .
>
> (B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options.

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

Sufficient data have been collected to indicate that there is substantial potential adverse impact on wildlife associated with the contaminated sites. The mouse and vole tissue analyses show significant bioaccumulation of toxic metals. Figure 1 illustrates the relationship between contaminant exposure as measured by bioaccumulation and biological effects.

At low levels of exposure as measured by statistically significant bioaccumulation, biological effects are expressed at the molecular and subcellular levels. As exposure increases, these effects can be manifested at the tissue level as histopathology. The bioaccumulation observed in the mice and voles is statistically significant and can have molecular and subcellular effects, but may not be sufficient to result in tissue level effects. The clam biomonitoring data clearly indicate toxic metals are migrating into surface waters and can accumulate in aquatic animals. While it does not appear that hazardous substances have been released into Suisun Bay to date, there remains the potential for release as long as the hazardous substances remain in an environment which is subject to flooding and tides.

2a. No air quality data have been collected on site. Only personal observations of dust generation from barren areas have been made.

2b. While it is true that natural sediments contain heavy metals, the concentrations found under natural conditions are orders of magnitude lower than those concentrations found in the sediment from the contaminated areas on Naval Weapons Station Concord. The clam biomonitoring data clearly indicate certain toxic metals such as cadmium, lead, and zinc are migrating into surface waters and can migrate into food chains associated with the site. While it does not appear that hazardous substances have been released into Suisun Bay to date, there is still the potential for release as long as the hazardous substances remain uncontrolled in an environment which is subject to flooding and tides.

2c. Because of concerns raised by the State of California Regional Water Quality Control Board, the Navy undertook additional groundwater investigation.

2d. Substantial uptake of cadmium, lead, and zinc was detected in field collected plant samples on Parcel 574 on Naval Weapons Station Concord (K-2). In addition, recent native plant sampling and analysis conducted by Dr. Duane Mikkelsen (on behalf of Chemical & Pigment Company) indicated zinc concentrations in leaves as high as 831.2 ppm on Parcel 574 on Naval Weapons Station Concord. Plants usually show reduced growth and yield when zinc tissue content increases above 290 ppm.

2e. Clam data, showing the bioaccumulation of contaminants above bioaccumulation in reference areas, indicated the migration of contaminants into surface waters on the RASS's.

Southern Pacific Transportation Company Comments - 3 (9 April 1986):

3. The NCP requires a "detailed analysis of alternatives" [40CFR 300.68 (h)]. In particular, the analysis should include "an assessment of the extent to which the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of public health and welfare and the environment" [40 CFR 300.68 (h)(2)(iv)] analysis provided in the revised FS continues to rely on a cursory and speculative discussion rather than on an assessment.

In fact, in a number of instances, the text of the FS clearly states that the alternatives considered further are "assumed...to meet the environmental protection goal" (FS, page 5.3) and that the FS was "designed to develop and evaluation (sic), on a preliminary basis, site specific remedial action alternatives" (FS, page 10.1). It is clear that the existing knowledge about the site "is rather limited" (FS, page 10.1). Consequently, selection of any remedial alternative be the Navy at this time is premature.

Response to Southern Pacific Transportation Company Comments - 3 (9 April 1986):

The methodology for evaluation of technologies and alternatives in the (Second Revised) Final Draft Feasibility Study Report has been substantially enhanced to provide a detailed assessment of a range of alternative remedial actions. Alternatives are evaluated in accordance with the requirements of CERCLA.

Southern Pacific Transportation Company Comments - 4 (9 April 1986):

4. The NCP also requires as part of the detailed analysis, "an analysis of any adverse environmental impacts, methods for mitigating these impacts, and costs of mitigation" [40 CFR 300.68(h)(2)(vi)]. The identification of adverse impacts, rather than a real analysis of adverse impacts, as done in the revised FS is insufficient to provide a legitimate basis with which to evaluate the net effectiveness of the alternatives or balance the positive and adverse impacts. The revised FS even recognizes the need for additional studies prior to engineering design. However, in many instances such studies are necessary to provide a valid basis to assess the effectiveness, evaluate the real economic and environmental costs, and analyze the adverse impacts of the various alternatives. Such studies are provided for by the NCP [40CFR 300.68(h)(3)]. Studies not included in the Navy lists but which are required to evaluate and select the appropriate remediations, if any, include documentation of:

a. The current exposure levels and potential exposure levels associated with remedial implementation

b. probability of injury, death or exposure associated with transportation of removed soils

c. effect of the stirring up of sediments on biota during removal

d. probability of successful wetland restoration

e. probability of whether sensitive species can be successfully trapped and relocated

f. probability that recolonization will occur

g. whether a discernable and measurable reduction will actually occur in the long term dangers alleged at the site with implementation of any if the alternatives

h. whether the acquisition of offsite wetlands is possible

i. and whether any of the alternatives have been proven effective in similar applications.

Response to Southern Pacific Transportation Company Comments - 4 (9 April 1986):

The methodology for evaluation of technologies and alternatives in (Second Revised) Final Draft Feasibility Study Report has been substantially enhanced to provide a detailed assessment of a range of alternative remedial actions. Alternatives are evaluated in accordance with the requirements of CERCLA, as amended.

Southern Pacific Transportation Company Comments - 5 (9 April 1986):

5. It appears to be inconsistent with the NCP and wholly irrational to consider the acquisition of offsite wetlands to mitigate remedial actions supposedly intended to protect wetlands.

Response to Southern Pacific Transportation Company Comments - 5 (9 April 1986):

In the (Second Revised) Final Draft Feasibility Study Report, acquisition of offsite wetlands is eliminated from consideration during the alternative screening process. However, considering the characteristics of the documented release of hazardous substances on the sites under investigation, mitigation in response to the loss of habitat quality is reasonable, even if the no action alternative is selected. In the case of the

preferred alternatives, mitigation will be in the form of wetland restoration on RASS's 1 and 2.

Southern Pacific Transportation Company Comments - 6 (9 April 1986):

6. Consideration should be given to a much less extensive remedial alternative that might entail selective removal of the most highly contaminated soils, perhaps capping and erosion control of certain "hotspot" areas, drainage improvements in others, and as remediation for wetland areas. It seems reasonable to expect that such an alternative would drastically reduce the potential for migration while providing considerable savings over those alternatives intended to eliminate unnecessarily any possible migration.

Response to Southern Pacific Transportation Company Comments - 6 (9 April 1986):

As a result of this and similar comments, the Navy has conducted an extensive evaluation of the requirements for remediation on the sites under investigation. During preparation of the (Second Revised) Final Draft Feasibility Study Report, the Navy developed a three-tiered remedial action plan. Using this three-tiered approach, the Navy divided each RASS into three areas: an area to be monitored, an area of passive remediation, and an area of active remediation. The areal extent of each of these subareas was quantified by balancing the potential for harm associated with leaving the contaminants in place with the long term benefits of remediation and the short term impacts associated with active remediation. As a result of the above approach, a total of approximately 18.75 acres will be actively remediated.

Other areas in each RASS, totalling 25.11 acres, will be passively remediated. Passive remediation will include intensive monitoring which will be conducted on all environmental media and on all potential pathways. Because of the nature of the environmental concerns, the Navy finds that it is appropriate to sample surface water, groundwater, sediments, soils, and biota. The proposed monitoring program, conducted in two phases, is designed to be time limited. Phase 1, consisting primarily of simple observation and monitoring of the various environmental media, is conducted annually for the first five years following remediation. Phase 2, consisting of more complex evaluation of bioaccumulation, is conducted if Phase 1 test results indicate further monitoring is required. After the initial five years of annual sampling, monitoring is conducted every five years as required by CERCLA.

In addition to the extensive monitoring conducted in areas of known high concentrations of arsenic and heavy metals,

less extensive monitoring will be conducted in adjacent areas to evaluate the migration of contaminants.

The Navy has prepared a feasibility study to evaluate alternatives for remediation of contaminated areas on Parcels 572, 573, 574, 575, 576, 579D, and 581 on NWS Concord. The Final Remedial Investigation Report identified soil contamination resulting from discharges from adjacent properties and operations on the Parcels prior to acquisition by the Navy. Onsite contamination in the form of surficial deposits of metal contaminants resulting from drainage or overflows of wastewaters to surface drainages or to flat wetland areas from adjacent properties has been identified as the primary potential onsite source. The surficial deposits have been evaluated and found to contain high levels of arsenic, lead, cadmium, copper, and zinc. In addition, offsite contamination on adjacent properties in the form of deposits of metal contaminants has been identified as a potential offsite source of contamination.

During development of the feasibility study, a range of potential remediation alternatives were evaluated. Among the alternatives considered were several that incorporated the concept of excavation and disposal.

The Navy considers the feasibility study as a means of evaluating the conceptual feasibility of potential remedial action alternatives. The conceptual excavation alternatives are based on the current state of knowledge of the levels and extent of contamination on the four RASS's considered in the feasibility study. During the design process, detailed plans will be developed to implement the concepts presented in the feasibility study. During the remedial action design process, particular attention will be given to those areas in which contaminant concentration levels are known to be high. The detailed excavation plan would be designed to limit the amount of materials to be excavated, consistent with the overall goal of protecting human health or the environment.

The following assumptions are used in the development of the conceptual excavation plan:

a. All materials that have contaminant concentrations equal to or greater than the State's TTLC/STLC criteria will be disposed of in a Class I facility.

b. All materials with contaminant concentrations less than the State's TTLC/STLC criteria will be disposed of in a Class III facility.

c. None of the materials found on site are regulated under the Federal Solid Waste Disposal Act, i.e.,

the contaminant concentrations in soils do not exceed the Extraction Procedure Toxicity Test (EP).

d. Removal of contaminated soils will be consistent with the decision rules presented in the feasibility study (Section 3.5.3).

e. The removal of contaminated soils will be minimized consistent with protection of the human health or the environment.

f. Transportation to disposal facilities will be accomplished using appropriately controlled truck or rail facilities.

g. Contamination in most areas is in the upper 6-12 in. of the soil; however, deeper contamination has been located in scattered areas.

h. Excavation can be conducted in 6 in. lifts, with some difficulty.

The conceptual excavation plan is summarized below:

a. Beginning at points of known contamination, i.e., current sampling locations where contaminant concentrations are equal to or greater than the decision rule criteria, a grid of sampling locations will be established. A grid composed of sampling points located 20 ft. on centers and radiating from the points of known high contaminant concentrations will be established.

b. A sampling point in each grid will be sampled to a depth of 3 ft. Distinct subsamples will be collected for each 6 in. horizon. Based on a 20 ft. grid, each sampling point/sampling horizon would represent approximately 10 cu. yds. of soil.

c. The 0-6 in. horizon will be analyzed for the contaminants of concern.

d. Grid squares in which contaminant concentrations are equal to or greater than the decision rule criteria will be excavated to a depth of 6 in.

e. In excavated squares, the next 6 in. horizon will be analyzed. If the results exceed the remedial action decision rules, the next 6 in. horizon will be excavated.

f. Item d. and e., above, will be repeated until the sampling and analyses indicate that the soils in each grid meet the remediation decision rules.

Southern Pacific Transportation Company Comments - 7 (9 April 1986):

7. Wetlands are known to have considerable capacity to assimilate heavy metals. For example, natural wastewater treatment via wetland flooding is considered a viable methodology. This fact has yet to be recognized in the RI/FS.

Response to Southern Pacific Transportation Company Comments - 7 (9 April 1986):

In fact, wetlands have been proposed as a means for treating wastewaters with characteristics similar to domestic wastewater. Classically, concentrations of metals and arsenic in these wastewaters are relatively low. Treatment of such wastewaters in natural or constructed wetlands is not analogous to the conditions found on the sites under investigation.

Southern Pacific Transportation Company Comments - 8 (9 April 1986):

8. The detailed analysis evaluation criteria should be redefined and a valid data base provided to facilitate a meaningful comparison between alternatives. As many are presently defined, one cannot differentiate between alternatives and, in some cases, cannot really determine whether a criterion is even satisfied. For example, is there documentation to prove that an alternative has been proven effective in similar applications? How can a failure of an alternative result in concentrations greater than the no-action alternative? Are "concentrations" or, rather, "exposures" the correct basis for an evaluation of reliability? Can any alternative be justified if its failure is no better than no action? How can one say one alternative is better than another if they need only be required to perform within their typical range of operating performance? How can costs be compared if inadequate knowledge exists to know how to implement the alternatives (e.g., methods of excavation) much less whether the cost estimates are accurate?

What is a "significant increase in costs?" How can one determine whether an alternative will result in long-term adverse impacts greater than those that would occur with no action if the long-term adverse impacts of no action have not been defined nor substantiated?

Response to Southern Pacific Transportation Company Comments - 8 (9 April 1986):

Because of this and similar comments related to the evaluation factors used in the Final Draft Feasibility Study Report and the (Revised) Final Draft Feasibility Study Report, the (Second Revised) Final Draft Feasibility Study Report was substantially revised, including revisions to the factors on which alternatives are evaluated.

Southern Pacific Transportation Company Comments - 9 (9 April 1986):

9. The list of technologies required to be screened by the NCP includes several not addressed by the revised FS draft. In addition, the NCP requires that recycle/reuse technologies be included as one of the alternatives analyzed in detail.

Response to Southern Pacific Transportation Company Comments - 9 (9 April 1986):

Evaluation of technologies in the (Second Revised) Final Draft Feasibility Study Report is consistent with the requirements of CERCLA, as amended, and implementing regulations and guidelines. It should be noted, that as applied to the sites under investigation, recycle/reuse technologies are not practicable. Recycle/reuse technologies may be suitable on traditional hazardous waste sites in which there is substantial quantities of bulk or drummed wastes. However, application of such technologies to contaminated soils has not developed to the point that it is technically or economically feasible. The (Second Revised) Final Draft Feasibility Study Report evaluated soil washing, which is a concept similar to recycling/reuse.

Southern Pacific Transportation Company Comments - 10 (9 April 1986):

10. In most instances, the revised FS draft does not address the comments previously submitted by Southern Pacific Transportation in September 1985. Rather than reiterate them in this critique, the reader is referred to those comments as previously submitted.

Response to Southern Pacific Transportation Company Comments - 10 (9 April 1986):

Comments received from SPTC concerning the Final Draft Feasibility Study Report and the (Revised) Final Draft Feasibility Study Report were considered in developing the (Second Revised) Final Draft Feasibility Study Report.

Southern Pacific Transportation Company Comments - 11 (9 April 1986):

11. The revised FS Draft (and presumably the revised RI which has yet to be made available) includes only about one half of the area previously designated for remediation. The basis for defining which areas require remediation is not provided nor is the rationale for the changes between the drafts. As noted in our previous comments, the presumed bases for defining areas requiring remediation have yet to be justified. CERCLA and the NCP require remediation to prevent danger to public health, welfare or the environment. Complete removal or elimination of migration is not necessarily required. Cleanup criteria should be based on an appropriate risk assessment and should be set at levels at which discernable future impacts may be minimized.

Response to Southern Pacific Transportation Company Comments - 11 (9 April 1986):

In response to this and other similar comments, the (Second Revised) Final Draft Feasibility Study Report contains a detailed discussion on the evaluation of potential remediation criteria and the development of remediation decision rules. See Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report. As discussed in the (Second Revised) Final Draft Feasibility Study Report, the driving force in determining the appropriate remediation alternatives, including the areal extent of remediation, is the protection of human health or the environment. Application of a balancing test that ensures proper consideration of both the short term impacts associated with any active remediation and the long term impacts associated with leaving the hazardous substances in place has further reduced the area that will be actively remediated. In other areas, environmental protection will be assured through implementation of an extensive monitoring program.

Southern Pacific Transportation Company Comments - 12 (9 April 1986):

12. The NCP clearly provides for the selection of an alternative that may not satisfy all environmental requirements if "all the alternatives that attain . . . appropriate environmental requirements will result in significant adverse environmental impacts if implemented." Given that the available data do not substantiate the need for extensive remediation and that the proposed alternatives (other than no-action or increased monitoring) each entail severe adverse impacts, it is inappropriate for the Navy to select an alternative at this time. Rather, it is recommended that additional studies be completed, that less stringent remedial alternatives be developed and evaluated, that due consideration be given to continued

monitoring if funds are unavailable for the additional studies, and that due consideration be given to a no-action alternative with perhaps "hot spot" remediation since endangerment to public health, welfare or the environment has not and probably cannot be substantiated for the NWS-Concord.

Response to Southern Pacific Transportation Company Comments - 12 (9 April 1986):

As stated above, Section 121(d)(2)(A) of CERCLA states that:

> (2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -
> (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
> (ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of thee release or threatened release.

Section 121(d)(4)(B) of CERCLA provides, in pertinent part; that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that. . .
>
> (B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options.

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons station which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for PASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

Following the identification of proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, or RASS 3, and RASS 4, the Navy identified preferred and second preferred alternative remedial actions for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 5 of its proposed remedial action plan.

Recognizing the importance of the habitat, the Navy has applied the environmental impacts waiver in RASS 1 to significantly reduce the area of active remediation. Only those areas in which the concentrations of hazardous substances are highest and therefore present the highest risk will be actively remediated.

2.10 Allied-Signal Comments - Introduction (17 April 1986):

INTRODUCTION.

This document presents comments on the February 1986 revised final draft report entitled Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Miscellaneous Paper EL-86-3 ("Rev. Draft Feasibility Study"). Comments were solicited by the Navy in connection with their surprise issuance of this revised study. In August 1985 the U.S. Navy issued its first "final" draft Feasibility Study ("draft Feasibility Study"). Both the draft Feasibility Study and the Rev. Draft Feasibility Study purport to assess and identify the most appropriate remedial alternatives for contamination allegedly found on property at the Concord Naval Weapons Station ("NWS"). The type and extent of contamination alleged is identified in investigatory studies performed on behalf of the Navy by the Army Corps of Engineers, Waterways Experiment Station ("WES"). To date, the results of

those investigations are summarized in these documents[1]:

(1) the August 1985 final draft Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California ("draft Remedial Investigation"), (2) the January 1986 Final Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California ("Remedial Investigation"), and (3) the August 1985 Draft Assessment of Damage of Natural Resources at Naval Weapons Station, Concord, California ("draft Damage Assessment"). Because the Rev. Draft Feasibility Study relies on these investigatory studies to support its conclusions, it is necessary to an extent to reference, review and criticize these studies as well.

The comments in this document are presented in three sections. As with our previous comments (dated September 30, 1985), the first section conveys our general observations. The second section critically assesses the appropriateness of the various remediation criteria used in the Rev. Draft Feasibility Study and, relatedly, the remediation conclusions which WES draws from application of the criteria to the field data. The third section addresses WES's evaluation of remediation alternatives.

Allied-Signal Comments - 1.1 (17 April 1986):

1.0 GENERAL COMMENTS

1.1 INADEQUATE RESPONSE TO ALLIED CORPORATION COMMENTS OF SEPTEMBER 30, 1985

In general, the Rev. Draft Feasibility Study and the Remedial Investigation reflect no response to our comments on the prior drafts of those documents. In particular, our request for a reasoned justification for selection of the remediation criteria utilized[2] and our suggested revisions in approach[3] were

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[1] Allied-Signal Inc., like the rest of the public, was kept completely ignorant of the fact that the Navy was preparing a revised final draft upon which it would have another opportunity to comment. This was in spite of regular contact with counsel for the Navy on the subject of possible future draft study publications and comment periods. Such secretive conduct has marked and marred the entire "confirmation study" process and possibly prejudiced all interested parties.

[2] See Allied Corporation Comments, Sept. 1985 at § 1.12.

not addressed.

Moreover, though some additions and alterations were made to the conclusions reached in the Rev. Draft Feasibility Study, our criticism that the conclusions reached are not supported by the field data still applies. The same errors in logic, reliance on unjustified assumptions and misuse of ill-defined terminology persist. The Rev. Draft Feasibility Study does not reflect any serious effort to address these criticisms. No new elements of analysis or explanation for continuing with the same analysis is set forth. Nor are any substantially different remedial alternatives formulated for evaluation.

In summary, our prior criticisms remain valid. We can only repeat them in hopes they will be explicitly addressed in the final Feasibility Study.

Response to Allied-Signal Comments - 1.1 (17 April 1986):

Comments received from Allied concerning the Final Draft Feasibility Study report were considered in developing the (Revised) Final Draft Feasibility Study Report. And comments received from Allied and Allied-Signal concerning the Final Draft Feasibility Study Report and the (Revised) Final Draft Feasibility Study Report were considered in developing the (Second Revised) Final Draft Feasibility Study Report. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report provided a detailed discussion concerning the development of remediation decision rules.

Allied-Signal Comments - 1.2 (17 April 1986):

1.2 INCORPORATION OF AN OBSOLETE DAMAGE ASSESSMENT.

The final draft Damage Assessment issued in September 1985 has not yet been revised. In Section 3 of the Rev. Draft Feasibility Study, it cites the draft Damage Assessment as documenting the "damage" on which the study is based. However, the draft Remedial Investigation, upon which the draft Damage Assessment is based, has been altered and published in final form without a corresponding update of the draft Damage Assessment. Hence, the Rev. Draft Feasibility Study is at least in part based on an obsolete document which does not incorporate the changes WES felt were necessary to make to the final Remedial Investigation.

This leads the reader to wonder why the Damage Assessment was not revised before issuing the Rev. Draft Feasibility Study and places the validity of the conclusions set

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[3] Id. at § 1.9.

forth in the Rev. Draft Feasibility Study in doubt.

Response to Allied-Signal Comments - 1.2 (17 April 1986):

The (Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, did not rely on the Final Draft Report of Assessment of Damage to Natural Resources at Naval Weapons Station, Concord, California.

Allied-Signal Comments - 1.3 (17 April 1986):

1.3 SUBSTITUTION OF MEANINGLESS VALUE TERMS FOR SUBSTANTIVE DATA.

Many conclusions in the Rev. Draft Feasibility Study are justified by reference to changed terminology such as "significant," "potential" and "substantial." Terminology is a poor substitute for actual data when its definitions are unclear. These terms are not defined in the Rev. Draft Feasibility Study. According to the Remedial Investigation glossary, however, "significant" is a statistical term used when data reflect that a condition will occur 95 times out of 100 events. Unfortunately, the definition has no relevance to the use made of the term. For example, in Section 2.2, page 2.23, line 3, the study states that "the WES studies (Lee et al. 1986, Lee et al. 1985) identified areas of significant contamination and recommended that implementation of remedial actions were appropriate for one or more of the contaminated sites" (emphasis added). Reference to the definition in this context sheds no light on what level of contamination is considered "significant" by the Navy and does not justify any conclusions about the "need" for remediation.

For another example, the WES definition of "potential" is "definitely possible, but may not have occurred yet." Although this definition is overbroad to the point of meaninglessness, when used, "potential" carries implications of elevated hazard levels which may not be factually justified. In Section 3.1.1, Air Pathway, wind is said to convey potentially contaminated dust particles to work areas where workers "are potentially exposed daily to the risk of contamination from airborne soil particles." Risk is not defined, nor have measurements of the mobility of such particles been made to give any substance to the actual type or level of risk. The reported wind data and statements on particle theory perhaps justify the use of the term "potential," as defined, but do nothing to inform a rational decision maker of the actual risk level. Again, the study shortcuts to its conclusions, failing to perform the work necessary to make its conclusions meaningful ones.

Similar terminology of equally vague definition is used repeatedly throughout the Rev. Draft Feasibility Study with the

result that the terms take on a life and truth of their own. It would require extensive research through the source references to determine if each of their uses conforms to other accepted definitions. The lack of more precise, data-based definitions for this terminology leaves the reader with the strong impression that it is used for rhetorical effect rather than for effective summary discussion of the field data.

Response to Allied-Signal Comments - 1.3 (17 April 1986):

The term "significant" as used throughout the Final Remedial Investigation Report has a statistical connotation. Duncan's New Multiple Range Test was used to compare contaminant concentrations from reference areas and sites on Navy property. Sites identified by Duncan's test as statistically different are also referred to as significantly different (e.g., the mean contaminant concentration from one site is significantly higher than the mean contaminant concentration from another site). Duncan's test was conducted at the 0.05 error protection level which implies a 95% confidence level. Duncan's test identified sites which had mean contaminant concentrations greater than all reference mean contaminant concentrations. These sites are referred to as contaminated because of their "significant" contaminant concentration. Results from Duncan's test are provided in the Final Remedial Investigation Report. The Navy attempted to make terms consistent in report revisions.

Allied-Signal Comments - 1.4 (17 April 1986):

1.4 INFLEXIBLE APPLICATION OF REMEDIAL ACTION ALTERNATIVES.

The discussion of remedial alternatives in the Rev. Draft Feasibility Study still does not include consideration of the possibility of tailoring remedial actions to discrete areas smaller than the "sites" (i.e.: AA, Kiln, K-2, etc.) that the report describes. Wide experience in application of remedial technologies shows that the most successful and cost efficient remediation schemes subdivide sites requiring remediation into the smallest practical areas so that remediation technologies can be applied selectively in a variety of combinations to achieve the greatest benefit for the least cost and least disruption of the site's beneficial uses.

For example, there might be "hot spots"[4] on site AA,

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[4] WES, in fact, acknowledges the existence of "hot spots" in the draft Remedial Investigation. See, for example, page 13 of that study where sampling was undertaken with the specific intention of identifying such hot spots on the KS, AA and AB areas.

which would require one form of remediation, while the remainder of site AA might be suitably treated by another remedial alternative or the no-action alternative. The Remedial Investigation itself points out the variation that occurs within the AA site in terms of plant densities and metals concentration. Yet no effort has been made to utilize the differences within this area or other areas to focus various remedial technologies where they are most effective. Instead, the Rev. Draft Feasibility Study considers the sites (AA, AB, KS, G-1 etc.) as homogeneous areas, and therefore deserving of a homogeneous remedy. The facts belie this conclusion, yet no reason is given for such an inflexible approach. Further analysis of the data for each site should be undertaken to identify more discrete boundaries of contaminant concentrations. Then, more tailored remedial or no-action alternatives should be considered and applied as may be appropriate.

Moreover, a refined approach to remediation greatly enhances the potential for successful rehabitation of any remediated areas. Clearly, preserving as much habitat as possible by applying the most habitat destructive technologies sparingly provides the maximum opportunity for surviving colonies of both animals and plants to repopulate remediated areas.

Response to Allied-Signal Comments - 1.4 (17 April 1986):

Based on this comment and similar comments received by others, the Navy developed a three-tiered approach for identifying appropriate levels of remediation. First, based on topography, the eight sites were consolidated into four remedial action subsites (RASS's). Using this three-tiered approach, the Navy divided each RASS into three areas: an area to be monitored, an area of passive remediation, and an area of active remediation. The areal extent of each of these subareas was quantified by balancing the potential for harm associated with leaving the contaminants in place with long term benefits of remediation and the short term impacts associated with active remediation. As a result of the above approach, a total of approximately 18.75 acres will be actively remediated.

Other areas in each RASS, totalling 25.11 acres, will be passively remediated. Passive remediation will include intensive monitoring which will be conducted on all environmental media and on all potential pathways. Because of the nature of the environmental concerns, the Navy finds that it is appropriate to sample surface water, groundwater, sediments, soils, and biota. The proposed monitoring program, conducted in two phases, is designed to be time limited. Phase 1, consisting primarily of simple observation and monitoring of the various environmental media is conducted annually for the first five years following remediation. Phase 2, consisting of more complex evaluation of bioaccumulation, is conducted if Phase 1 test results indicate

further monitoring is required. After the initial five years of annual sampling, monitoring is conducted every five years as required by CERCLA.

In addition to the extensive monitoring conducted in areas of known high concentrations of arsenic and heavy metals, less extensive monitoring will be conducted in adjacent areas to evaluate the migration of contaminants.

Navy has prepared a (Second Revised) Final Feasibility Study Report to evaluate alternatives for remediation of contaminated areas on Parcels 572, 573, 574, 575, 576, 579D, and 581 on NWS Concord. The Final Draft Remedial Investigation Report identified soil contamination resulting from discharges from adjacent properties and operations on the parcels prior to acquisition by the Navy. Onsite contamination in the form of surficial deposits of metal contaminants resulting from drainage or overflows of wastewaters to surface drainages or to flat wetland areas from adjacent properties has been identified as the primary potential onsite source. The surficial deposits have been evaluated and found to contain high levels of arsenic, lead, cadmium, copper, and zinc. In addition, offsite contamination on adjacent properties in the form of deposits of metal contaminants has been identified as a potential offsite source of contamination.

During development of the (Second Revised) Final Feasibility Study Report, a range of potential remediation alternatives were evaluated. Among the alternatives considered were several that incorporated the concept of excavation and disposal.

The Navy considers the feasibility study a means of evaluating the conceptual feasibility of potential remedial action alternatives. The conceptual excavation alternatives are based on the current state of knowledge of the levels and extent of contamination on the four RASS's considered in the feasibility study. During the design process, detailed plans will be developed to implement the concepts presented in the (Second Revised) Final Feasibility Study Report. During the remedial action design process, particular attention will be given to those areas in which contaminant concentration levels are known to be high. The detailed excavation plan would be designed to limit the amount of materials to be excavated, consistent with the overall goal of protecting the human health or the environment.

The following assumptions are used in the development of the conceptual excavation plan.

a. All materials that have contaminant concentrations equal to or greater than the State's TTLC/STLC

criteria will be disposed of in a Class I facility.

b. All materials with contaminant concentrations less than the State's TTLC/STLC criteria will be disposed of in a Class III facility.

c. None of the materials found on site are regulated under the Federal Solid Waste Disposal Act, i.e., the contaminant concentrations in soils do not exceed the Extraction Procedure Toxicity Test (EP).

d. Removal of contaminated soils will be consistent with the decision rules presented in the (Second Revised) Final Feasibility Study Report (Section 3.5.3).

e. The removal of contaminated soils will be minimized consistent with protection of the human health or the environment.

f. Transportation to disposal facilities will be accomplished using appropriately controlled truck or rail facilities.

g. Contamination in most areas is in the upper 6-12 in. of the soil; however, deeper contamination has been located in scattered areas.

h. Excavation can be conducted in 6 in. lifts, with some difficulty.

The conceptual excavation plan is summarized below:

a. Beginning at points of known contamination, i.e., current sampling locations where contaminant concentrations are equal to or greater than the decision rule criteria, a grid of sampling locations would be established. A grid composed of sampling points located 20 ft. on centers and radiating from the points of known high contaminant concentrations will be established.

b. A sampling point in each grid would be sampled to a depth of 3 ft. Distinct subsamples would be collected for each 6 in. horizon. Based on a 20 ft. grid, each sampling point/sampling horizon would represent approximately 10 cu. yds. of soil.

c. The 0-6 in. horizon will be analyzed for the contaminants of concern.

d. Grid squares in which contaminant concentrations are equal to or greater than the decision rule criteria will be excavated to a depth of 6 in.

e. In excavated squares, the next 6 in. horizon would be analyzed. If the results exceed the remedial action decision rules, the next 6 in. horizon will be excavated.

f. Items d. and e., above, would be repeated until the sampling and analyses indicate that the soils in each grid meet the remediation decision rules.

The Navy believes that the development and use of the three-tiered approach to evaluation of both the requirement for remediation and the selection of remediation alternatives substantially responds to this comment. In addition, implementation of the detailed excavation plan provides the "refined approach" to remediation requested by Allied-Signal.

Allied-Signal Comments - 1.5 (17 April 1986):

1.5 CONTINUING LACK OF RATIONAL CRITERIA CONSISTENTLY APPLIED.

Although changed somewhat from their initial drafts, the Remedial Investigation and Rev. Draft Feasibility Study are still flawed by the absence of an appropriate criteria, which if consistently applied, would allow for rational identification of specific areas needing remediation. Indeed, it still appears as if Section 2 of the final Remedial Investigation was written by someone other than the author of Section 4. The two sections rely on different criteria to reach their conclusions without making any cross references to contrast or harmonize their findings. This fundamental infirmity greatly weakens the credibility and conclusions of both studies.

In the first part of the Remedial Investigation (Section 2), the authors attempt to identify what areas need remediation. They begin by identifying a number of possibly applicable criteria. The criteria include: (1) concentrations greater than background, (2) concentrations statistically greater than surrounding site samples, (3) MASSA numbers, (4) soil samples in which plants and earthworms died, (5) soil samples in which earthworms bioaccumulated tissue metals above certain values for arsenic and copper, (6) FDA values, (7) "critical tissue contents" for reduced plant growth, and (8) total threshold limit concentration (TTLC) levels.

Rather than evaluating the appropriateness of each set of criteria for application to these facts and selecting the most relevant set, Section 2 relies upon a patchwork of the criteria

identified. This is done largely without considering why any one set of criteria may possibly be more appropriate than another. For example, the criteria used are not appropriate to actual conditions on-site and many of the criteria were developed for application to organisms that neither occur on site nor are relevant to organisms that do occur on site. See Sections 2.1 and 2.3.2 of our Sept. 1985 comments. Moreover, though Section 2 purports to define "areas needing remediation" by identifying where field data values are in excess of the selected criteria, the authors fail to qualify the use of the criteria as they properly should to reflect both the limitations on the criteria's relevance and the unique environmental conditions prevailing at any given area. Again, WES engages in intellectual shortcutting by failing to justify its patchwork use of limited relevance criteria and through misleading, unqualified application of that criteria to the field data.

In Section 4, the Remedial Investigation shifts its focus to the toxicological effects of metals on wildlife. It discusses, in a cursory manner and without resolution, how one might attempt to determine levels of contamination which would be of concern to wildlife. Although the purpose of the remedial effort (and the focus of the Feasibility Study) appears to be to minimize risk to wildlife, neither the Remedial Investigation nor the Rev. Draft Feasibility Study attempts to scientifically apply the levels discussed in Section 4 to the circumstances present at NWS Concord. To do so, the authors should have determined what levels of exposure are dangerous to the species present, correlated those levels with the field data, and determined what type of remediation would be appropriate to mitigate any dangers identified. The authors' failure to perform this work renders the conclusions in this section and the related conclusions in the Rev. Draft Feasibility Study largely speculative and without substance or justification.

Response to Allied-Signal Comments - 1.5 (17 April 1986):

More discussion of the rationale for each criteria considered was given in Section 2 of the Final Remedial Investigation Report. The data for soils, plants, clams and earthworms indicated substantial contamination in certain areas above the criteria considered. Criteria values gave a perspective to the collected data and allowed the evaluation of the toxicological significance of the contamination. The discussion in Section 4 of the Final Remedial Investigation Report used the results of Section 2. If contamination exceeded criteria identified in Section 2, then the toxicological significance of the contamination was evaluated. Since there are no established soil criteria for determining remedial actions, a number of criteria were considered. Collectively, the data indicated that remediation was required. Additional field collected data on mammals residing in the contaminated areas

indicated bioaccumulation and a potential for sublethal effects to wildlife and the endangered species. These data supported earlier bioassay data that indicated contamination was migrating into food chains associated with the area and remediation was required. The (Second Revised) Final Draft Feasibility Study evaluated alternatives appropriate for mitigating the threat to wildlife on site.

Allied-Signal Comments - 1.6 (17 April 1986):

1.6 IMPROPER AND UNLAWFUL GOAL OF STUDY.

The Rev. Draft Feasibility Study states its environmental protection goal" at Section 3.3 as follows: "to minimize or eliminate the continued release and potential release of hazardous substances into the environment from the various contaminated sites."

As we stated in our September 30, 1985 comments, this goal is not consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or the National Contingency Plan. Nor is it consistent with the Endangered Species Act. See our prior comments and the discussion below.

Response to Allied-Signal Comments - 1.6 (17 April 1986):

The Navy revised its general environmental goal in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California.

Section 121(a) of CERCLA provides that:

> The President shall select appropriate remedial actions determined to be carried out under Section 104 . . . which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response.

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall

conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:

(A) the long-term uncertainties associated with land disposal;

(B) the goals, objectives, and requirements of the Solid Waste Disposal Act;

(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;

(D) short and long-term potential for adverse health effects from human exposure;

(E) long-term maintenance costs;

(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

The President shall select a remedial action that is protective of human health and the environment, that is cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

(d) Degree of Cleanup - (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) of CERCLA provides that:

> (2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -
> (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
> (ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of thee release or threatened release.

Section 121(d)(4), of CERCLA provides, in pertinent part; that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that. . .

(B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options.

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons station which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance

with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

Section 7(a)(2) of the Endangered Species Act provides that:

> (2) Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an 'agency action') is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A and 2-3A, in Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse and California clapper rail, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A and 2-3A, on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion, which stated that:

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and

confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh without violating Section 7 of the Endangered Species Act.

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.
>
> The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.
>
> The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.
>
> The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:
>
> 1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.
>
> 2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.
>
> 3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.
>
> To be exempt from the prohibitions of Section 9 of the

Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

Allied-Signal Comments - 1.7 (17 April 1986):

1.7 MANIPULATION AND OBFUSCATION OF DATA.

The reports still manipulate and obfuscate the data. (See our prior comments.) The reports are seriously misleading as a result. For example, in Section 4.4.8 of the Remedial Investigation, the authors state "arsenic was detected in concentrations up to 2,500 mg/kg on the AA area . . . other contaminated sites included the AB area . . . the G-1 area . . . the K-2 area, the KS . . . area and the CP area . . . . Although data from NWS Concord do not indicate the various species of As present in the soil [a very significant omission which the report

largely ignores], up to 2,500 mg/kg total As probably would have significant quantities of various species (i.e. trivalent forms) known to be toxic to both wildlife and humans." The authors fail to note that: (1) the peak reading for arsenic was 2,484.84 ppm. There were triplicate readings at that sampling point; the other readings were 2,041.58 and 1,548.20 ppm (the latter nearly 1,000 ppm less than the number used in Section 4); (2) the 2,485 ppm reading was more than twice as high as nearly all other readings; (3) nearly all the readings were below 500 ppm, which is the TTLC for arsenic; and (4) a majority of the arsenic readings were below 50 ppm.

In summary, the toxicology section of the study emphasizes the highest value and attempts to build a sense of crisis based on that value. The range of values found at the site and the toxicological implications of the far lower values of arsenic found at most areas of the site are not discussed. This blatant manipulation of the data well serves the authors in justifying their pre-selected conclusions and in obfuscating the true universe of data which might justify other, far different, conclusions.

Response to Allied-Signal Comments - 1.7 (17 April 1986):

The statement of facts made in the Final Remedial Investigation Report is correct. Soil data support the statements. The replicate samples showed variability, but concentrations up to the highest levels were observed. The area has considerable variability due to the haphazard discharge of hazardous substances and the partial remediation activities attempted on site. Active remediation is proposed only in those areas exceeding the TTLC/STLC criteria, not in areas below these criteria, in RASS 1 and RASS 2.

Allied-Signal Comments - 2.1 (17 April 1986):

2.0 REMEDIATION CRITERIA.

2.1 MISUSE OF THE TERMS "MOBILITY," "MIGRATION," AND "DISTRIBUTION."

In the "contamination assessment section" in the draft and the Rev. Draft Feasibility Studies (Section 3.0), contaminant mobility is discussed in great detail and is considered a major justification for undertaking remedial response. The description of contaminant mobility was one of the primary goals of the draft Remedial Investigation (Section 2.3). However, one of our criticisms of the draft Remedial Investigation was that maps illustrating the metals distribution on the site incorrectly identified this distribution as "mobility." We pointed out that "mobility" and "distribution" were being confused with one another. In response to this criticism, definitions of the two

terms have been added to the glossary of the final Remedial Investigation.

Despite this, the improper use of "mobility" is repeated in the Remedial Investigation. Although the Rev. Draft Feasibility Study does not include mobility among the criteria for remediation, it refers to the Remedial Investigation for technical justification of its conclusions on remediation. Since the Remedial Investigation repeats the mistakes of the earlier draft by referring to maps of soil metal distribution and claiming "[t]he extent of metal migration across the parcels are [sic] clearly indicated" (Section 2.2.1), this mistake is incorporated into the Rev. Draft Feasibility Study.

Another unjustified use of terms is found in the discussion of the potential for erosion and migration of soil particles by water. That discussion, found in Sections 3.1.2.2 through 3.1.2.5 of the Rev. Draft Feasibility Study, is based primarily on models and theory. On a visit to the property, one can see the results of erosion, sediment transport, and deposition from upland to wetland locations within the study area. But nowhere does WES actually demonstrate how the reality of the site's dynamics impact on WES's presentation of "migration" models and theory. The object of the theoretical discussion appears to be to convince the reader that contaminated sediments move off-site into Suisun Bay. However, a major feature of natural wetland formation is neglected. Vegetated wetlands accumulate particulate matter that enters flooded wetlands. By accumulating mineral soil and organic matter, wetlands increase in elevation and are flooded less frequently as elevation increases. Sediment moving downstream from upland areas is more likely to deposit in the wetlands than to flow into the bay. WES's conclusions, which emphasize only potential migration of sediment from the site to Suisun Bay, are unjustified when the full array of relevant facts concerning the area's history and dynamics are considered.

Similarly, the biological pathways for contaminant mobility (Section 3.1.4) are discussed in a factually unsupported context of "possibilities." Bioassay tests can be used to show that plants and animals take up chemicals in their environment. The greater the concentration in the environment, the greater may be the concentration of these chemicals in the organisms. Here, however, bioassay test results that would demonstrate any actual uptake of metals from the site environments by resident organisms, and any resulting damage to them, are not presented. The comments made in our earlier critique of the draft Remedial Investigation thus remain valid with respect to conclusions about contaminated mobility reported in the Rev. Draft Feasibility Study.

Furthermore, WES's ominous warnings regarding the likely

mobility of contamination appear on their face to be unfounded when one considers that (1) the sites have been contaminated for a long period of time, (2) the extent of contamination is highly localized, and (3) there is little, if any, evidence of gradations in concentration as would be expected if the metals were dispersing from their site of origin by surface runoff or during winter storms or extreme high tides, etc.

Response to Allied-Signal Comments - 2.1 (17 April 1986):

The Navy concluded that contaminants had not yet reached Suisun Bay. However, a spatial display of data collected during the remedial investigation indicated a propensity for the contaminants to follow the surface water courses and migrate towards Suisun Bay. Data displays developed for the State of California Regional Water Quality Control Board clearly indicated that the contamination is migrating from the point of original release into the wetland and towards Suisun Bay.

In fact, rather than being "highly localized," the extent of contamination is widespread. As measured in terms of statistically above reference areas, 32.05, 2.77, 5.67, and 0.25 acres on RASS 1, RASS 2, RASS 3, and RASS 4, respectively, are contaminated, where contamination is defined as soil content or bioaccumulation which is statistically greater than that of the reference sites.

Figure 1 illustrates the relationship between contaminant exposure as measured by bioaccumulation and biological effects. At low levels of exposure as measured by statistically significant bioaccumulation, biological effects are expressed at the molecular and subcellular levels. As exposure increases, these effects can be manifested at the tissue level as histopathology. The bioaccumulation observed in the mice and voles is statistically significant and can have molecular and subcellular effects, but may not be sufficient to result in tissue level effects.

Allied-Signal Comments - 2.2 (17 April 1986):

2.2 MISLEADING ENDANGERMENT ASSESSMENT.

The Rev. Draft Feasibility Study purports to summarize the assessment of contamination and endangerment at the NWS Concord site from the data and conclusions set forth in the draft Damage Assessment and the final Remedial Investigation. However, because the remediation criteria utilized in those studies are arguably irrelevant, the damage and endangerment alleged in the Rev. Draft Feasibility Study is without substantiated basis in fact. The presence alone of the elements cited in the study -- lead, cadmium, copper, zinc, arsenic, and selenium -- neither implies toxicity nor damage to the environment or a potential

threat to human, wildlife, or vegetative populations. All of these elements occur naturally in most soils.

To substantiate the allegations of damage or potential threat, it must be demonstrated by data presentation that the elements in question occur in sufficiently high concentrations (as designated by an appropriately selected criteria) to cause harm to populations having access to the site through a site-specific vector or pathway to the target population. The Rev. Draft Feasibility Study claims on page 3.13 that this demonstration is made by Lee et al., i.e., the Remedial Investigation (1986) and draft Damage Assessment. However, no such demonstrations are contained in these documents. See Section 1.5, supra.

Response to Allied-Signal Comments - 2.2 -(17 April 1986):

Presence of high concentrations of metals was not the only criteria considered. In many cases, substantial bioaccumulation was observed in these same sampling locations. These data evaluated collectively were the basis of the toxicological evaluation.

Allied-Signal Comments - 2.3 (17 April 1986):

2.3 MISLEADING USE OF "DAMAGED AREAS" AS A REMEDIATION CRITERION.

The areas recommended for remediation are illustrated in Figure 1.1 of the Rev. Draft Feasibility Study. The caption describes these 53 acres as having sustained ". . . damage to natural resources . . . ." In Section 3.2, the study repeats its claims that the site has suffered "damage" and references as support the Remedial Investigation and the draft Damage Assessment.

These conclusions should be qualified explicitly in light of the meanings WES gives to its language. This is not done and the credibility of the study suffers greatly as a result. For instance, the use of the term "damage" in the Rev. Draft Feasibility Study is very misleading. As described below, with only two exceptions, "damage" does not refer to demonstrable physical damage. Instead, damage has been redefined in a non-conventional sense to mean the presence of metals in excess of a set of "critical" values which are quite disputable.

Thus, although no document states that "damage" is a criteria for remediation, Figure 1.1 of the Rev. Draft Feasibility Study identifies areas needing remediation as those which have been "damaged" as that term is defined by WES. This strongly suggests that WES assumed a major justification for its suggested remedial effort, i.e., that various portions of these sites have sustained demonstrable physical damage. Because WES

does not identify examples of physical damage directly resulting from the presence of metals, the conclusion that some areas have suffered physical damage and need to be remediated is a dubious one.

An examination of the data in the draft and final Remedial Investigations confirms that the "damages" alleged in the draft Damage Assessment are simply instances where certain "critical" concentrations have been exceeded. Thus, nearly the entire list of damages in the latter document have been inferred rather than demonstrated. Only two results from the studies even indicate the presence of actual physical damage, let alone a connection between the damage and the presence of heavy metals. The first is the fact that the AA site supported a lower below-ground faunal biomass than a background site. The second is the observation of chlorosis (appearance of yellow leaves) in some plants near Nichols Creek.

In both these cases, the authors assert that the presence of metals in the soil was the cause of this "damage." They do not, however, provide sufficient scientific evidence to support their claims, nor do they consider several likely alternative explanations for the "damage."

Our criticism in these two cases is detailed in our critique of the earlier drafts of these documents. To briefly reiterate, the report of a lower below-ground faunal biomass in the AA area is more likely the result of the fact that this area was limed rather than the presence of metals in the soil. The Remedial Investigation does not discuss this or any of the other likely alternative explanations raised by our earlier comments. Similarly, the observation of chlorosis in some of the plants near Nichols Creek is more likely the result of nutrient or light deficiency, or even annual life cycle, rather than an excess of zinc. As detailed in our earlier critique, the authors failed to provide sufficient evidence that zinc was the cause of the chlorosis. Nor were the likely alternative explanations considered.

To summarize, WES assumes that at sites where metals are found at levels above their subjectively selected criteria, organisms at those sites have been "damaged" physically. This inferred "damage" is then used as a major justification for the scope of necessary remediation. In fact, no such physical damage has been demonstrated. Thus, the scope of proposed remediation, because it is based on inferred but unsubstantiated physical damage, is unwarranted.

Response to Allied-Signal Comments - 2.3 (17 April 1986):

Based on this and other similar comments, the Navy substantially expanded the number and variety of criteria for the

protection of human health or the environment that were evaluated for application on the sites under investigation. Section 3 of the (Second Revised) Final Draft Feasibility Study Report presents information on 18 potential criteria and provides a detailed discussion of the development of remediation criteria.

Allied-Signal Comments - 2.4 (17 April 1986):

2.4 OMISSION OF CLAM DATA.

Clam data which reflected low or normal metal levels were omitted from consideration in both the Damage Assessment and the Rev. Draft Feasibility Study. No explanation is provided for the non-consideration of this relevant data. Again, informed readers can only assume that the authors' conclusions were foregone and that contradictory evidence was simply cast aside.

It is noteworthy that the results of the in-situ clam experiments resulted in lower metal levels than clams resident to Suisun Bay. In addition, the level of metals in the study clams exceeded neither the action limits for clam toxicity nor human toxicity through the consumption of shellfish. In ecosystems such as a salt marsh, the aquatic food chain is characteristically the most sensitive to disturbances such as contamination. Because clams are sensitive indicators of the state of aquatic systems, the fact that they accumulated relatively low levels of metals indicates that the aquatic portion of this marsh is probably not adversely affected by whatever metals may be present in the surface water and sediments of the site. This is of particular importance at this site because the primary mode of movement for metals is probably by sediment entrainment.

Neither the Damage Assessment nor the Rev. Draft Feasibility Study discussed this important indication of a lack of metal mobility. On the contrary, in spite of this data on clams that implies minimal impact, the Rev. Draft Feasibility Study, on page 3.12, alleges without substantiation that fish are potentially adversely affected. This supports the contention in Section 1.10 of our earlier critique that the Feasibility Study lacks scientific method, is self-selecting in applications of results, and fails to consider alternative hypotheses.

Response to Allied-Signal Comments - 2.4 (17 April 1986):

All clam data were considered in the preparation of the Final Remedial Investigation Report.

Allied-Signal Comments - 2.5 -(17 April 1986):

2.5 METALS IN SOIL.

In general, remediation was recommended when any tested metal in soils exceeded a "critical concentration." However, as discussed previously, these criteria are neither rational nor consistently applied. For example, the criteria used to determine areas requiring arsenic remediation, particularly in the salt marsh, appear to be based on statistical differences between surrounding and background samples and the samples on the marsh sites. These are arbitrary differences and therefore the statistically derived figures are meaningless as criteria. The criteria for lead and cadmium were not substantiated. The criteria for zinc and copper which were established specifically for assessing phytotoxicity in agriculture are questionable because they were derived for different plants grown under different conditions. The latter criticism was discussed at length in the critique of the draft Remedial Investigation.

2.5.1 Arsenic

There appears to be a considerable lack of consistency as to what the "critical concentration" should be for arsenic. This is demonstrated by the following.

Figure 2-59 in the Remedial Investigation lists nearly 90 locations on the site with metal concentrations that exceed the average measured for the designated background areas (6.6 mg/kg). Some confusion exists in the text of the final Remedial Investigation, however. The text reference to Figure 2-59 states that these sites (1) represent a composite of those sites where arsenic levels exceeded the background levels, (2)". . . are statistically greater than the rest of the sample sites . . ." or, (3) referring only to upland sites, exceed MASSA recommendations. However, in Section 2.2.5 of the final Remedial Investigation, the text states that remediation for arsenic in soil was considered when the levels exceeded 544 mg/kg. Thus it is not clear what criteria were used to generate the area depicted in Figure 2-59.

In addition to this lack of consistency there is also a critical lack of identification. Arsenic exists in several valance states, the most common of which are the plus three (III) and plus five (V) states. The final Remedial Investigation states in Section 4.4.9 that the valance (species) of the arsenic found at NWS Concord is unknown.

This lack of identification is particularly troublesome considering the great difference in toxicity of the two species. WES does not appear to consider this significant difference in arriving at their "critical concentration" for arsenic.

2.5.2 Cadmium

The critical concentration for cadmium is not

documented. Areas where soil cadmium levels exceeded 8 mg/kg were considered for remediation (Figure 2-60 and Table 2-7) However, it is not possible to trace the reference that indicates why this is considered a critical concentration because the reference is not identified. The discussion in Section 2.2.5 states that this concentration should be 12.7 mg/kg based on the statistical difference between these sites and the surrounding ones. But even this criterion is meaningless since it reflects neither demonstrated toxicity nor physical damage.

2.5.3 Lead

The critical concentration for lead referred to in the study is not documented. Figure 2-61 and Table 2-4 of the remedial investigation list 500 mg/kg as the critical concentration of lead in soil. However, the reference listed in the table is not included in the reference list at the end of the section.

2.5.4 Selenium

Two soil samples at the coke pile site were listed in Figure 2-62 as requiring remediation due to high selenium levels. The critical concentration level used appears to be the California Department of Health Services ("DHS") TTLC number. However, the samples taken at this site were likely to have contained fragments of coke material. The selenium in this material, while in excess of the TTLC, is nevertheless immobile and therefore does not necessarily constitute an environmental hazard. A more accurate evaluation of this field data should take into account such limitations on mobility. Such consideration would likely reveal that the presence of selenium at this site does not constitute an environmental hazard.

Another relevant question triggered by WES's use of the TTLC criteria for selenium is why WES has not used the analogous TTLC values as remedial criteria for other metals. DHS, after a long and considered development period, issued this set of criteria for all of the metals discussed in the final Remedial Investigation. This set of criteria is consistently applied throughout the State of California as remediation indicators and may be a helpful reference point at these sites.

Given the effort that went into the development of these DHS TTLC criteria, it is inappropriate and ill-advised for WES to invent and wholly rely upon unsubstantiated new criteria for other metals if in fact WES believes that the DHS TTLC criterion has relevance and meaning for selenium.

2.5.5 Zinc

The criterion used for zinc is not appropriate to the

site or to the plants found on the site. Soil from nearly 70 sample locations (Figure 2-63) was found to contain zinc at levels in excess of 250 mg/kg. This concentration was identified as the point at which agriculturally important plants grown under agricultural conditions display phytotoxic effects. However, the applicability of this criterion is questionable because it is derived for very different plants grown under conditions far removed from those in the marsh. For example, native vegetation may adapt more readily to changes in its environment than the perennial row crops used in the supporting studies. The latter criticism was discussed at length in the critique of the draft Remedial Investigation.

2.5.6 Copper

Soil from nearly 70 sample locations (Figure 2-64) was found to contain copper at levels in excess of 125 mg/kg. This concentration was listed as the point at which some plants display deleterious effects. The application of this criteria for copper is questionable here because it was derived for agriculturally important plants grown under agricultural conditions. This latter criticism also was discussed at length in the critique of the original remedial investigation document.

Response to Allied-Signal Comments - 2.5, and 2.5.1 thru 2.5.6 (17 April 1986):

These comments were considered in the development of the (Second Revised) Final Draft Feasibility Study Report. This report clarified the criteria for remediation.

Allied-Signal Comments - 2.6, 2.6.1, 2.6.2 (17 April 1986):

2.6 METALS IN PLANTS.

Plants growing primarily in the KS, K2 and CP/ESI sites allegedly were found to contain cadmium and zinc at potentially phytotoxic levels. The following two sections critically review the details of this finding.

2.6.1 Cadmium

Plant tissue from 14 sample locations were found to contain cadmium exceeding 8 mg/kg; above this level, phytotoxicity is said to have been documented in certain plants. However, the references provided to substantiate this assertion were not included in the reference section.

2.6.2 Zinc

Plant tissue from 19 sample locations were found to contain zinc exceeding 290 mg/kg; above this level,

phytotoxicity has been documented in certain agricultural plants. This is an inappropriate comparison because the physiologies of native and agricultural plants are too dissimilar to compare.

Response to Allied-Signal Comments - 2.6, 2.6.1, 2.6.2 (17 April 1986):

The references cited were:

Beckett, P.H.T., and Davis, R.D. 1977. "Upper Critical Levels of Toxic Elements in Plants," New Phytol., Vol. 79, pp 95-106.

Davis, R.D., and Beckett, P.H.T. 1978. "Upper Critical Levels of Toxic Elements in Plants. II. Critical Levels of Copper in Young Barley, Wheat, Rape, Lettuce, and Ryegrass, and of Nickel and Zinc in Young Barley and Ryegrass," New Phytol., vol. 80, pp 23-32.

Davis, R.D., Beckett, P.H.T., and Wolan, E. 1978. "Critical Levels of Twenty Potentially Toxic Elements in Young Spring Barley," Plant Soil, Vol. 49, pp 395-408.

Recent native plant sampling by Dr. Duane Mikkelsen, who was retained by Chemical & Pigment Company, indicated zinc concentrations in leaves as high as 831.2 ppm on Parcel 574. Plants usually show reduced growth and yield when zinc tissue content increases above 290 ppm. These data confirmed the Navy's conclusion that plants are contaminated and the contamination on site does pose a threat to the environment.

Allied-Signal Comments - 2.7 (17 April 1986):

2.7 METALS IN EARTHWORMS - INAPPROPRIATE CRITERIA APPLIED.

Earthworm tissue metal levels were compared to FDA food levels. The relevance of such a comparison is highly dubious since humans are not likely consumers of the fauna on the site. Thus, potential risks of metals in lower tropic level fauna have been inadequately addressed.

Response to Allied-Signal Comments - 2.7 (17 April 1986):

FDA action levels were considered to give perspective to the earthworm data. If there is concern for FDA action levels in food for human or animal consumption, it is reasonable to consider similar levels in food for wildlife consumption, especially endangered species.

While data collected in the earthworm bioassay indicated that the bioaccumulation of metals in earthworms are not acutely or chronically toxic, the data indicated that metals

are in fact bioavailable and are migrating into soil invertebrates and consequently into food chains. Additional sampling of mice and voles on the contaminated sites clearly demonstrated that metals migrated into the food chain associated with the captured animals.

Allied-Signal Comments - 2.8 (17 April 1986):

2.8 SPECULATION ON DAMAGE TO WILDLIFE REFUTED.

Harvey and Stanley Associates conducted a trapping study in 1985 to determine the number of rodents present at the NWS Concord site. The traps were placed at the kiln site (KS), Allied A (AA) and a background (BK) marsh to the west of the study area. The results of this study indicated that the AA site supported 143 percent more rodents than the BK, while the KS site supported 347 percent more rodents. With respect to the salt marsh harvest mouse, the KS site yielded 17 while the AA and BK sites yielded 4 and 1, respectively (page 14, MSE000298). Not only do these results conflict with the predictions made in both Remedial Investigations that the KS and AA sites were poor mouse habitats (Section 3.5.2), but they also tend to contradict the assertions in the Remedial Investigations and the Damage Assessment that physical damage to such species may be inferred from slightly elevated metal levels in soil and plants.

Response to Allied-Signal Comments - 2.8 (17 April 1986):

Allied's application of statistics to the trapping results is inappropriate. The trapping was conducted over a limited time and space for a species whose distribution and numbers are spotty. The purpose of the trapping was to verify the presence of the salt marsh harvest mouse. A possible comparative figure is trap success, shown in Table 4 of the Final Report of Feasibility Study of Contamination Remediation, Volume II, Biological Assessment. That shows the results from RASS 1 (0.7) on the low end of the scale compared to the average of 4.9, probably because of the relatively short and open pickleweed stand, the small amount of transition zone vegetation, i.e., lack of good cover, and possibly other factors related to the contamination on site.

Results from RASS 2 were higher than expected, perhaps because of adequate escape cover in the form of transition vegetation. Other possibilities include the lack of comparative data from sites with transition zones, which is becoming a rare cover type, and the fact that there is dense vegetation and some stands of pickleweed. The lack of animals at the Reference Area is probably related to the lack of escape cover from tides, and the low quantity of pickleweed.

Neither the model nor the expert would have predicted

the higher numbers of animals from RASS 2. The low amount of data on an endangered species is usually limiting when it comes to building a habitat model. However, the appearance of degraded habitat in RASS 1 does correspond with a smaller number of individuals trapped than would be expected in most pickleweed stands.

Analyses of metal concentrations in specimens of the house mouse and California vole, trapped from the same locations as the salt marsh harvest mouse, showed statistically elevated levels from the "slightly elevated metal levels in soil and plants" (as stated by the commentors). Because the three species share the same habitat and some of the same foods, it can be seen that the harvest mouse is exposed to the same contamination that caused elevated levels in the other rodents.

Allied-Signal Comments - 2.9 (17 April 1986):

2.9 FAILURE TO DISTINGUISH BETWEEN UPLAND AND MARSH HABITAT IN EVALUATING LIKELIHOOD OF EXPOSURE.

The authors persist in ignoring the critical fact that the majority of allegedly contaminated soil is upland habitat, i.e., habitat that is not used by the salt marsh harvest mouse or the black rail. The toxicological evaluation, and therefore the conclusions which rest upon the evaluation, are fatally flawed by the failure to acknowledge this limitation on probable exposure. A good example of this failure is on page 453 of the final Remedial Investigation where the California least tern is identified as being a high risk candidate for lead toxicity due to ingestion of lead-contaminated earthworms and other soil invertebrates. In fact, however, least terns have quite narrowly defined diets; they focus almost entirely on fish and crustacea in open water near shore. The authors clearly have not carefully considered the greatly reduced probability of exposure due to the location of the alleged contamination.

Response to Allied-Signal Comments - 2.9 (17 April 1986):

As can be seen in Figures 29, 42, and 53 of the (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation, Volume III: Figures, and Table 2.6 of the (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation, Volume I, the majority of the contaminated area is wetland, not upland.

Analysis subsequent to the document being reviewed at this point shows that the least tern will not be affected by the contamination on site because it does not feed or nest there. However, elevated levels of lead in the earthworm as a bioassay or surrogate for other soil-dwelling organisms does raise concern for uptake in other species that do feed on site.

Allied-Signal Comments - 2.10 (17 April 1986):

2.10 REGULATORY MANDATE.

The section entitled "Statutes, Regulations and Authorities" (Section 2.4) seems to imply, by its rather lengthy recitation of allegedly applicable laws and regulations, that the Navy is driven to react to the alleged site contamination by the requirements of some or all of the acts and regulations listed. We were unable to locate, however, any reference in either the Remedial Investigation or in the Rev. Draft Feasibility Study to a particular section of any of these acts or regulations. That is, no laws or regulations are cited that would require the Navy to respond to the specific levels of contamination which the Navy (or WES) has selected as the threshold for remedial action. In fact, the criteria selected and applied by the Navy (or WES) to determine these levels are the result of a subjective selection process to which the recited laws and regulations were apparently considered irrelevant.

Response to Allied-Signal Comments - 2.10 (17 April 1986):

Item 2 of the Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California identifies the proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4.

Allied-Signal Comments - 3.1.1 (17 April 1986):

3.0 REMEDIAL ACTION ALTERNATIVES.

3.1 FLAWED DEVELOPMENT OF REMEDIAL ACTION ALTERNATIVES

3.1.1 BASIS FOR RANGE OF ALTERNATIVES CONSIDERED IS BOTH INCORRECT AND INCOMPLETE

CERCLA requires that a range of remedial alternatives be developed. (See "Guidance on Feasibility Studies under CERCLA," EPA/540/G-85/003, June 1985.) The Rev. Draft Feasibility Study develops remedial action alternatives on the assumption that some form of remediation is required by the mere presence of heavy metals at a site. This inflexible attitude toward requiring implementation of remedial measures in a sensitive wildlife habitat conflicts with the requirements of CERCLA and EPA policy regarding the formulation of alternatives.

Response to Allied-Signal Comments - 3.1.1 (17 April 1986):

The (Revised) Final Draft Feasibility Study Report

evaluated an array of technologies for possible application on the sites under investigation. These technologies were combined into a range of alternatives appropriate to sites on which the environment is threatened by the presence of soils containing high levels of arsenic and heavy metals. Among the alternatives considered were a no action alternative and an environmental monitoring alternative. In fact, inclusion of these alternatives demonstrate that the Navy did not have an "inflexible attitude" concerning the implementation of intrusive remediation technologies in a sensitive environment. However, based on this and other similar comments and the Navy's desire to ensure that an appropriate remediation alternative is selected for implementation on all sites under investigation, the Navy substantially enhanced the development and evaluation of alternatives in the (Second Revised) Final Draft Feasibility Study Report.

The (Second Revised) Final Draft Feasibility Study Report evaluated 24 technologies and 12 to 14 alternatives for possible application on the sites under investigation. Alternatives using appropriate technologies were evaluated on a site specific basis. The no action alternative and the environmental monitoring alternative were also included in the evaluation process. Furthermore, the Navy developed a three tiered remediation concept that ensured that intrusive forms of remediation were only used when absolutely necessary.

Allied-Signal Comments - 3.1.2 (17 April 1986):

3.1.2 KNOWN SITE PROBLEMS IGNORED.

For example, apparent site problems ("hot spots") were not considered as a possible basis for developing more narrowly defined remedial action alternatives. This consideration is required by CERCLA. Instead, remedial action alternatives were developed from a list of 25 technologies (Rev. Draft Feasibility Study, page 6.1) with very little attention devoted to relating the technologies to the problems, if any, to be solved.

The Rev. Draft Feasibility Study indicated that the 25 technologies were potential techniques to remedy "hazardous waste sites." The selection of technologies from this list dictates that these technologies, designed for application to genuine disposal sites, will be inadequate to address the more subtle and unique situations encountered at NWS Concord. As a consequence, though the array of technologies considered may be impressive in number, they are in fact largely inappropriate to addressing the problems that might be posed at NWS Concord.

Moreover, screening the 11 candidate remedial action technologies consisted of a narrative description of each technology and a very brief consideration of its possible

application to the NWS Concord site. No clear definition or assignment of relative priorities to any specific site problems to be solved were given. The definition of the problem consisted of a rather vague description of the contaminants found at the site and speculation about the theoretical pathways for them to migrate off site.

> "[T]he contaminants of concern at NWS Concord are heavy metals, primarily arsenic, lead, cadmium, zinc, and selenium. The primary pathway of off site contaminant migration is transport via surface water runoff and erosion processes with subsequent deposition along natural water courses and low lying areas." Rev. Draft Feasibility Study, p. 6.1.

Thus, the problem, as depicted simplistically in the Rev. Draft Feasibility Study, is heavy metal soil contamination of a general nature on the NWS Concord site with the potential for migration. Absent reference to any potential "hot spots," it is not surprising that the technologies were not evaluated more carefully in terms of their possible site-specific application.

Response to Allied-Signal Comments - 3.1.2 (17 April 1986):

The (Revised) Final Draft Feasibility Study Report, read in conjunction with the Final Remedial Investigation Report, clearly defines the areas of concern and the technologies that may be appropriate to protect the human health or the environment. Allied-Signal quoted the (Revised) Final Draft Feasibility Study Report out of context. The full statement contained at page 6.1 of the (Revised) Final Draft Feasibility Study Report is as follows. "The U. S. EPA (1982,1985) identified 25 major technologies with potential application as remedial actions at hazardous waste sites. The applicability of individual remedial technologies to a particular site is determined by the nature of the contaminant problems and the important migration pathways at the specific site." Taken in full context, it is obvious that the (Revised) Final Draft Feasibility Study uses the existing database of technologies to develop a site specific evaluation of the applicability of the technology. Furthermore, although the references published by the EPA discuss technologies for application at "hazardous waste sites," the types of problems at hazardous waste disposal sites are substantially the same as found on hazardous waste disposal sites, i.e., contamination of soils, migration of contaminants into surface waters, etc.

However, in response to this and similar comments, the (Second Revised) Final Draft Feasibility Study Report was substantially revised to more clearly define those areas that

will be remediated and the respective technologies that will be used for remediation.

Allied-Signal Comments - 3.2 (17 April 1986):

3.2 SCREENING OF REMEDIAL ACTION ALTERNATIVES IS INCORRECT AND INCOMPLETE.

The screening process employed in the Rev. Draft Study does not result in the selection of "clearly superior alternatives" as claimed on page 7.1. A number of alternatives have not been evaluated and those that are evaluated are incorrectly evaluated.

In fact, the selection of a remediation alternative follows an unacceptable pattern. It consists of four principal steps:

1. To assume that the existence of some level of heavy metals creates a genuine need to mitigate;

2. To propose sweeping, non-site specific alternatives;

3. To discard those alternatives with quantifiable disadvantages; and

4. To postpone serious analysis of remaining alternatives despite their clearly negative environmental and cost implications and questionable reliability.

In other words, any alternative with a subtle flaw which WES cannot evaluate at this time is retained as an alternative and any alternative with a quantifiable flaw, though it may be relatively slight, is discarded.

The results are predictably biased in a technical sense and represent an analysis which is a sham of objectivity.

Response to Allied-Signal Comments - 3.2 (17 April 1986):

The Navy disputes that the alternative evaluation process used in the (Revised) Final Draft Feasibility Study Report is flawed. However, based on this and similar comments, the Navy recognized the need to further refine and define requirements for remediation on each site. In addition, amendments to CERCLA and changes to implementing guidance required substantial additions to the feasibility study. The (Second Revised) Final Feasibility Study Report complies with the requirements of CERCLA, as amended, and implementing regulations and guidance.

Allied-Signal Comments - 3.3 (17 April 198[illegible]

3.3 WILDLIFE HABITAT PRESERVATION GOAL IS UNDERVALUED.

The environmental protection goal which drives the Rev. Draft Feasibility Study assigns insufficient priority to the goal of preserving wildlife habitat.

Loss of habitat is described as one of many secondary environmental impacts:

> "Secondary environmental concerns include such things as loss of habitat, noise, and airborne releases from implementation of remedial action alternatives." (Emphasis added) Rev. Draft Feasibility Study p. 5.3.

All of these "secondary" environmental concerns combined still only constitute one of seven topics to be considered in evaluating alternative remedial actions. See Rev. Draft Feasibility Study, p. 5.1. Characterizing the habitat preservation goal as a secondary concern is not consistent with the physical realities of the site. The site contains areas that may be suitable as habitat for two endangered species.

Though authorized human occupation of the site is very low, this area is continuously inhabited by wildlife. The greatest beneficial use of this site is its continued preservation and use as wildlife habitat. There is very little reason, outside of site monitoring, for human entry into the contaminated area. Thus, habitat preservation should be a primary goal of remedial action.

All the proposed remedial action alternatives involve the use of excavation and disposal technology as a necessary part of contaminant removal or isolation. Quite properly, the Study cautions that excavation technology can be "environmentally disruptive in sensitive areas such as wetlands." Rev. Draft Feasibility Study p. 6.6. Unfortunately, this understated caveat is lost or ignored in some of the alternative evaluations. This would not be the case if habitat preservation were a primary remedial action goal for the NWS Concord site. This goal would also be in accord with the philosophy of the California Regional Water Quality Control Board (RWQCB) beneficial use mandate.

Given this set of priorities, entirely different remedial action alternatives would likely be selected. As discussed earlier in this document and in our earlier critique, site-specific studies conducted by the Corps of Engineers show that the low levels of site contamination have had no adverse effect on the resident wildlife. Destroying the existing wildlife habitat to remove low levels of contaminants that have

not damaged or posed a threat to the wildlife is not consistent with what we contend is the primary beneficial use of this site. Contaminant removal or isolation requiring destruction of habitat should be restricted to those areas where physical damage to the resident wildlife has been demonstrated.

Response to Allied-Signal Comments - 3.3 (17 April 1986):

Section 121(a) of CERCLA provides that:

> The President shall select appropriate remedial actions determined to be carried out under Section 104 . . . which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response.

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:
>
> (A) the long-term uncertainties associated with land disposal;
>
> (B) the goals, objectives, and requirements of the Solid Waste Disposal Act;
>
> (C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;
>
> (D) short and long-term potential for adverse health effects from human exposure;
>
> (E) long-term maintenance costs;
>
> (F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

The President shall select a remedial action that is protective of human health and the environment, that is cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

(d) Degree of Cleanup - (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) of CERCLA provides that:

(2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if -
(i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
(ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is

> relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of thee release or threatened release.

Section 121(d)(4)(B) of CERCLA provides, in pertinent part; that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that. . .
>
> (B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options.

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize

disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons station which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

Section 7(a)(2) of the Endangered Species Act provides that:

> (2) Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an 'agency action') is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical,

> unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A and 2-3A, in Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A and 2-3A, on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion, which stated that;

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh without violating Section 7 of the Endangered Species Act.

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.
>
> The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of

the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.

The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are

found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

Clearly, the Navy understands the potential for environmental disruption that may result from implementation of positive remedial action alternatives. Because of this concern, the Navy developed a three-tiered approach for identifying appropriate levels of remediation. First, based on topography, the eight sites were consolidated into four remedial action subsites (RASS's). Using this three tiered approach, the Navy divided each RASS into three areas: an area to be monitored, an area of passive remediation, and an area of active remediation. The areal extent of each of these subareas was quantified by balancing the potential for harm associated with leaving the contaminants in place with long term benefits of remediation and the short term impacts associated with active remediation. As a result of the above approach, a total of approximately 18.75 acres will be actively remediated.

Other areas in each RASS, totalling approximately 25.11 acres, will be passively remediated. Passive remediation will be include intensive monitoring which will be conducted on all environmental media and on all potential pathways. Because of the nature of the environmental concerns, the Navy finds that it is appropriate to sample surface water, groundwater, sediments, soils, and biota. The proposed monitoring program, conducted in two phases, is designed to be time limited. Phase 1, consisting primarily of simple observation and monitoring of the various environmental media is conducted annually for the first five years following remediation. Phase 2, consisting of more complex evaluation of bioaccumulation, is conducted if Phase 1 tests results indicate further monitoring is required. After the initial five years of annual sampling, monitoring is conducted every five years as required by CERCLA.

In addition to the extensive monitoring conducted in areas of known high concentrations of arsenic and heavy metals, less extensive monitoring will be conducted in adjacent areas to evaluate the migration of contaminants.

The implication that habitat is of secondary concern is not correct. In the context of page 5.3 of the (Revised) Final Draft Feasibility Study Report, secondary referred to that following the meeting of the environmental goal. The framework of Environmental Considerations has been revised. See page 7.99 for this discussion in the (Second Revised) Final Draft Feasibility Study Report. Habitat considerations were brought into the decision-making process because of the value of the wetland to endangered and other species. On the other hand, studies have documented the potential harm to those species. As a result, some contamination will be actively remediated and some will be left in place rather than disrupt a larger acreage.

Allied-Signal Comments - 3.4 (17 April 1986):

3.4 LOW RELIABILITY OF HABITAT RESTORATION ATTEMPTS.

The Rev. Draft Feasibility Study states on page 7.37 that the reliability of site restoration alternatives will be high. However, it also acknowledges on page 7.30 that wetland restoration is a relatively new science. WES's bold assertion about the reliability of these alternatives is not, therefore, based on the best indicator of reliability, that is, historical success.

The Rev. Draft Feasibility Study also fails to recognize the distinction between wetland restoration and habitat restoration. Experts in this field may agree that a site like the NWS Concord marsh may be destroyed through excavation, refilled, revegetated and repopulated to fit the general definition of a wetland. However, the same experts are quick to point out that many different types of wetlands exist and that attempts to direct the repopulation of plants and animals to select which species will eventually populate the area at equilibrium are not presently feasible.

While this might be a secondary concern at many sites, here it is a primary and overriding interest because the habitat is suitable for two endangered species alleged to be present at or near this site, at least one of which occupies an extremely narrow ecological niche. Since the reliability of rebuilding the NWS Concord marsh as habitat for the salt marsh harvest mouse is, contrary to WES' misleading claims, quite poor, a more candid and serious critical evaluation of the reliability of this alternative is appropriate.

Response to Allied-Signal Comments - 3.4 (17 April 1986):

Because of the variability inherent in ecosystems, especially a brackish marsh, it is not necessary to exactly recreate the vegetation composition of the existing wetland. In fact, one measure of improvement will be establishment of a

larger transition zone adjacent to RASS 1. Another will be a larger coverage of pickleweed in RASS 2. Restoration of the functions of a wetland, including repopulation by the salt marsh harvest mouse, is indeed less certain. Even with this uncertainty, as the Fish and Wildlife Service stated in its Biological Opinion, the environment after remediation and restoration "should support harvest mouse habitat values that exceed the degraded conditions which currently appear to limit the health and fitness of harvest mouse populations onsite."

Allied-Signal Comments - 3.5 (17 April 1986):

3.5 LOW RELIABILITY OF RECOLONIZATION ATTEMPTS.

In evaluating restoration alternatives, the Rev. Draft Feasibility Study assumes that repopulation of animals on the site will occur if plants are restored to pre-disturbance conditions (page 7.32). The assumption of restoration of similar plant species is plausible. However, recreating the same distribution between species is uncertain given the need to overseed in wetland restoration projects.

The assumption of animal repopulation is also plausible, but only for animals occupying a broad ecological niche. As stated above, the salt marsh harvest mouse occupies a narrow ecological niche. The ability to repopulate an endangered species of this type, given the inability in such projects to narrowly control the outcome of natural plant succession, is tenuous at best.

Again the lack of sophistication revealed in the Rev. Draft Feasibility Study by its failure to explicitly consider these negative implications brings the objectivity of all of its remedial alternative evaluations and rankings into question.

Response to Allied-Signal Comments - 3.5 (17 April 1986):

Restoration of the functions of a wetland, including repopulation by the salt marsh harvest mouse, is indeed less certain. Even with this uncertainly, as the Fish and Wildlife Service stated in its Biological Opinion, the environment after remediation and restoration "should support harvest mouse habitat values that exceed the degraded conditions which currently appear to limit the health and fitness of harvest mouse populations on site."

Allied-Signal Comments - 3.6 (17 April 1986):

3.6 INCOMPLETE EVALUATION OF GRADING AND REVEGETATION TECHNOLOGY.

The grading and revegetation technology, which is an

element of several of the alternatives considered, was improperly evaluated. Grading and revegetation was proposed as an acceptable method of controlling off-site transport of soil due to water erosion. On page 6.4 of the Rev. Draft Feasibility study it is stated:

> "Remedial alternatives that incorporate leaving the waste materials on site should include a grading and revegetation scheme."

The fact that grading and revegetation involves, as a necessary component, total destruction of the sensitive wildlife habitat is not considered. Again, this reflects the inappropriate reduction of the wildlife habitat preservation goal to a secondary environmental concern.

Response to Allied-Signal Comments - 3.6 (17 April 1986):

Allied-Signal confuses the evaluation of technologies with the evaluation of alternatives. Furthermore, Allied-Signal, in attempting to develop some rationale to justify the no action alternatives, attempts to associate all statements related to positive control of contaminants to "total destruction" of the environment. Taken in context, this statement simply means that if a source isolation technology, capping, is selected then it should include a grading and revegetation element to ensure surface water erosion forces on the cap are minimized. The statement does not mean that grading and revegetation are appropriate for use as part of the no action or environmental monitoring alternatives.

Allied-Signal Comments - 3.7 (17 April 1986):

3.7 INSUFFICIENT TIME AVAILABLE FOR COMMENT.

Insufficient time was permitted for adequate review of all the sub-alternatives presented in the Rev. Draft Feasibility Study. However, at least one sub-alternative from each of the five major alternative classes was reviewed in sufficient detail to allow a conceptual review of the others by inference. Given our criticisms of the sub-alternatives that were evaluated, we believe that the assumptions, applicability and costs of all of the sub-alternatives are suspect and therefore deserving of a more detailed review.

Response to Allied-Signal Comments - 3.7 (17 April 1986):

On 7 March 1986, the Navy issued a public notice soliciting comments and information necessary to evaluate the seven remedial action alternatives analyzed in the revised final draft feasibility study report. The Navy announced that it would accept comments and other information until 10 April 1985.

Section 113(k)(2)(B) and (C) of CERCLA provides that:

> (B) Remedial action. -- The President shall provide for the participation of interested persons, including potentially responsible parties, in the development of the administrative record on which the President will base the selection of remedial actions and on which judicial review of remedial actions will be based. The procedures developed under this subparagraph shall include, at a minimum, each of the following:
>
> (i) Notice to potentially affected persons and the public, which shall be accompanied by a brief analysis of the plan and alternative plans that were considered.
>
> (ii) A reasonable opportunity to comment and provide information regarding the plan.
>
> (iii) An opportunity for a public meeting in the affected area, in accordance with section 117(a)(2) (relating to public participation).
>
> (iv) A response to each of the significant comments, criticisms, and new data submitted in written or oral presentations.
>
> (v) A statement of the basis and purpose of the selected action.
>
> For purposes of this subparagraph, the administrative record shall include all items developed and received under this subparagraph and all items described in the second sentence of section 117(d). The President shall promulgate regulations in accordance with Chapter 5 of title 5 of the United states Code to carry out the requirements of this subparagraph.
>
> (C) Interim record. -- Until such regulations under subparagraphs (A) and (B) are promulgated, the administrative record shall consist of all items developed and received pursuant to current procedures for selection of the response action, including procedures for the participation of interested parties and the public. The development of an administrative record and the selection of response action under this Act shall not include an adjudicatory hearing.

In addition, Section 117(a) and (b) of CERCLA now provide that:

> (a) PROPOSED PLAN. -- Before adoption of any plan for remedial action to be undertaken by the President, by a State, or by any other person, under section 104, 106, 120, or 122, the President or State, as appropriate, shall take both the following actions:
>
> (1) Publish a notice and brief analysis of the proposed plan and make such plan available to the public.

(2) Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the facility at issue regarding the proposed plan and regarding any proposed findings under section 121 (c)(4) (relating to cleanup standards). The President or the State shall keep a transcript of the meeting and make such transcript available to the public. The notice and analysis published under paragraph (1) shall include sufficient information as may be necessary to provide a reasonable explanation of the proposed plan and alternative proposals considered.

(b) FINAL PLAN. -- Notice of the final remedial action plan adopted shall be published and the plan shall be made available to the public before commencement of any remedial action. Such final plan shall be accompanied by a discussion of any significant changes (and the reasons for such changes) in the proposed plan and a response to each of the significant comments, criticisms, and new data submitted in written or oral presentations under subsection (a).

Section 113(k)(2)(B)(ii) of CERCLA now requires that the Navy give a reasonable opportunity to comment and provide information regarding the plan.

Section 117(a) of CERCLA now requires that the Navy give a reasonable opportunity for submission of comments.

The Navy produced all relevant documents, except documents identified as privileged, to the defendants in the cases styled as United States v. Allied Chemical Corp., et al., Civil No. C-83-5898 FMS (N.D. Calif.) and United States v. Chemical & Pigment Co., et al, Civil No. C-83-5896 FMS (N.D. Calif.).

Allied-Signal Comments - 3.8 (17 April 1986):

3.8 IMPROPER DELETION OF NO-ACTION ALTERNATIVE.

This alternative was deleted on the basis of an improper evaluation. Its removal from further consideration was justified on the grounds that "contaminants would continue to migrate from the various contaminated sites through the pathways described in Section 3" (see page 7.2 of the Rev. Draft Feasibility Study).

Two erroneous assumptions are apparent in this reasoning. The first is that the mere presence of the metals at any level constitutes a problem. Second, movement of metals has been assumed a priori and not demonstrated empirically.

We previously have pointed out the major flaw in the first assumption, namely that the metals must occur in high enough concentrations to cause actual and demonstrable physical damage to the populations resident on the site before the massive destruction of the habitat proposed by WES can be seriously considered.

The second assumption is unsupported by reference to field data. Section 3, referenced in support of this assumption, consists of a theoretical discussion of potential contaminant migration pathways. It is, however, entirely speculative and provides no site-specific migration rate data to support any assumptions about contaminant migration rates or at what rate damage to inhabitant populations might occur. Some means of estimating the alleged contaminant migration rate should have been developed to providing a reference point for the general proposition that migration actually occurred.

Other remedial action alternatives, particularly those emphasizing excavation, are given high marks because they will reduce the assumed contaminant migration rate to some safer or more desirable level. This, of course, is a similarly unsupported conclusion. Thus, the full range of alternatives considered are improperly evaluated because WES's unsupported assumptions about metal migration improperly skew the analysis away from non-excavation alternatives.

It is our contention that for some, if not all subsites, the no-action alternative may very well be the most appropriate alternative. In general, absent contamination of documented significance, remediation should not be required.

Response to Allied-Signal Comments - 3.8 (17 April 1986):

Not only were contaminants present in high concentrations, but they were bioaccumulated in biota and clearly shown to be migrating into surface water at specific locations on the parcels. These data clearly show potential harm to wildlife associated with the contaminated sites.

Allied-Signal Comments - 3.9 (17 April 1986):

3.9 IMPROPER DELETION OF INCREASED ENVIRONMENTAL MONITORING ALTERNATIVE.

Alternative 2 consists of continuing soil and monitoring and analysis for unacceptable levels of contaminants. The WES review and elimination from consideration of this alternative is based on two unwarranted assumptions. First, it is again assumed that unacceptable levels of contaminants exist and will continue to migrate from the site though neither contaminant migration nor the rate of the alleged migration has

been demonstrated empirically. Second, it is assumed on page 7.4 of the Rev. Draft Feasibility Study that:

> "The threat of contamination of plants and wildlife including endangered species will continue and will increase because of the projected increase in the areal extent of contamination."

As with the first assumption, however, no site studies have been performed which demonstrate that the areal extent of contamination will increase. Accordingly, since the assumptions upon which WES based its conclusions about this remedial alternative are unsupported, so is the WES conclusion that the monitoring program is "clearly inadequate" to address "substantial" concerns. Rev. Draft Feasibility Study, p. 7.5.

Ironically, the environmental monitoring which would be performed pursuant to Alternative 2 may provide just the data which would confirm or rebut the WES conclusions about contaminant migration and impacts on wildlife. Other beneficial aspects of this alternative, such as the high reliability of the data provided and its very marginal negative impact on habitat preservation, are noted but not given sufficient weight by WES.

Response to Allied-Signal Comments - 3.9 (17 April 1986):

The Navy evaluated the ability of the remedial action alternatives to attain the RCRA ARAR's. The Navy finds that the No Action and Environmental Monitoring alternatives would leave high levels of arsenic and heavy metals uncontrolled.

Allied-Signal Comments - 3.10 (17 April 1986):

> 3.10 IMPROPER EVALUATION OF EXCAVATION AND DISPOSAL ALTERNATIVE.

This alternative was improperly evaluated. There is a note at the bottom of page 6.6 of the Rev. Draft Feasibility Study indicating that chemical stabilization and disposal on the existing site could be conducted in conjunction with excavation technology. The chemical stability of the waste/soil matrix was fairly well established elsewhere in both the Remedial Investigation and the Rev. Draft Feasibility Study. The cation exchange capacity of peat-type soils holding these metals is well known. Thus, this note is misleading since it is not the chemical instability of the metals in the soil but rather their physical mobility which WES claims poses a risk to the environment.

Response to Allied-Signal Comments - 3.10 (17 April 1986):

Both chemical and physical stability of the contaminants are important considerations in preventing the spread of contaminants. As demonstrated by the results obtained from running the STLC protocol on soil samples from a number of locations, contaminants are readily leached from the soils in high concentrations. Therefore, it is prudent to include consideration of chemical stabilization technologies in the development of remedial action alternatives.

Allied-Signal Comments - 3.11 (17 April 1986):

3.11 UNNECESSARY AND INADEQUATE EVALUATION OF SOURCE ISOLATION ALTERNATIVE.

Alternative 4b is an alternative which need not really considered. It includes an impermeable clay cover, a drainage layer, a synthetic membrane with bedding, and a layer of top soil. Many of these features, including the impermeable clay layer, the drainage layer and the 20 mil synthetic membrane liner, would only be required if we were dealing with site which has leachate potential. This is not the case. The effects and the pathways to be mitigated, if any such mitigation is required at all, are for surface erosion by wind or water. The impermeable layers, the drainage layer, and synthetic membrane accomplish nothing in this regard. In fact, these are materials the report earlier indicated would not be recommended because they would not provide suitable plant habitat. We are at a loss to understand why this alternative would even be considered. Groundwater contamination has not been suggested and is not an issue. This alternative addresses a non-problem.

Also, two relevant non-habitat disrupting technologies were not given proper consideration in evaluating source isolation alternatives. Fourteen potential remediation technologies were screened for relevance to Concord NWS in Chapter 6. In Chapter 7, the five technologies selected as being relevant and the no-action alternative are obliquely brought into an evaluation of five functional remedial alternatives. Flood-proofing and surface water diversion were two of the five technologies thought to have relevance to the perceived problems and apparently were to be considered as components of the "source isolation alternative." As stated on page 7.18 of the Rev. Draft Feasibility Study:

> "Two source isolation alternatives were considered for application at NWS Concord. these include:
>
> A. A surface treatment incorporating construction of a topsoil cover and site revegetation.
>
> B. A surface treatment incorporating construction of

a multi-layered cover roughly meeting RCRA requirements and site revegetation."

The potential benefits that flood-proofing and surface water diversion technologies could add to these alternatives, however, were not explicitly discussed except that "minor concerns over erosion from tidal influences . . . can be addressed during concept development and preliminary design phase." Rev. Draft Feasibility Study p. 7.25. Both offer significant habitat preservation advantages over the other active source isolation technologies evaluated in Chapter 7. In particular, if contaminant migration results primarily by way of sediment transport, both flood-proofing and surface diversion provide a method of minimizing sediment transport while causing little or no short or long-term habitat disruption. WES's failure to explicitly discuss the positive impacts these passive technologies could add to the source isolation alternatives flies in the face of their prior on the potential efficacy of these technologies during the preliminary screening process of Chapter 6[5].

Finally, on page 6.3 of the Rev. Draft Feasibility Study, WES indicates that soils used for capping activities should be relatively impermeable. However, that requirement is not applicable to this site because the specified pathways concern wind erosion and mechanical movement by surface waterways. As a consequence, the "fine grained materials" which are generally required for such capping activities would not be the materials of choice for capping a site such as this. It would be preferable to cover the site with coarse-grained materials which tend to retain and trap water and resist movement by wind.

Response to Allied-Signal Comments - 3.11 (17 April 1986):

With respect to the evaluation of the RCRA cap alternative, contaminant migration through the ground water pathway on the sites under investigation is unlikely. However, no direct data exists to confirm this hypothesis. The Navy is now conducting an investigation to evaluate groundwater conditions on the sites under investigation. Since the potential for migration through the groundwater was not disproven by direct observation, it was appropriate to include this alternative in

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[5] See e.g. p. 6.4 of the Rev. Draft Feasibility Study -- "Contaminant migration resulting from surface water runoff is identified as a major concern at the NWS Concord site. Since water diversion and collection technologies directly address the problem, these technologies will be evaluated for incorporation into remedial action alternatives during the initial screening process."

the evaluation process.

In addition to the above, regulatory agencies have requested information related to the differences in cost between a soil cap and a full RCRA cap. Again, the Navy believes that inclusion of such information in the feasibility study is reasonable and appropriate.

With regard to the flood proofing and surface water diversion alternatives, it was concluded that these technologies, although providing some remediation of the potential for migration of contaminants through the surface water pathway, did not address one of the primary pathways, which is direct contact of biota with the contaminated soils on the site and the biological uptake of contaminants. If capping alternatives are implemented, flood proofing and surface water diversion would be appropriate elements of the alternative. Drainage improvements in the nature of surface water diversion should be implemented on RASS 3. Specifically, the culvert under the SPTC railroad that connects RASS 3 with RASS 2 should be removed or sealed.

Allied-Signal Comments - 3.12 (17 April 1986):

3.12 INADEQUATE EVALUATION OF SITE RESTORATION ALTERNATIVE.

This WES-approved alternative includes elements of Remedial Alternatives 3 and 4 combined with revegetation and replacement of fauna. A major objection to this alternative is that the proposed salt marsh restoration is an unknown, unproven process. As such, it does not meet with the reliability criteria stated on page 5.2 of the Rev. Draft Feasibility Study: "The method must have been proven effective in similar applications."

Significantly, in evaluating the alternative, the difficulties associated with relocating animals and plants from surrounding areas are not addressed. If such a project is implemented, complete restoration may take 10 to 20 years due to the complex ecology of the salt marsh. The dominant plant in the salt marsh, the pickleweed, grows only under exacting soil and water salinity conditions. Each step in a revegetation process--from germinating and maintaining it under greenhouse conditions to transplanting and establishing it at a site--is very difficult to accomplish and is characterized by a low success rate. It may take many years, if ever, before the pickleweed and the other salt marsh plants can provide viable food and cover for the salt marsh harvest mouse, which itself does not do well in captivity. Thus, the WES evaluation of this alternative is incomplete and overly optimistic.

Response to Allied-Signal Comments - 3.12 (17 April 1986):

The marsh restoration process is not unknown and unproven. Successes in such projects date to the mid-1970's.

The probability of success on RASS 1 and RASS 2 is enhanced by several factors, including the fact that the desired outcome is a pickleweed marsh. This species does not generally require planting as it invades on its own with appropriate conditions of elevation and salinity. It is not a stenoecious species, contrary to Allied-Signal's implication.

The Navy is confident that the restoration portion of the proposed remedial action can be accomplished. The Navy also recognizes the risks and uncertainty; because of that, the Navy will show great care in proceeding. A detailed restoration plan will be developed during the design phase of the remedial action. The monitoring plan is very important in providing the framework for regular examination of the wetland during the restoration process, and making any necessary adjustments.

Allied-Signal Comments - 3.13 (17 April 1986):

3.13 LONG TERM ADVERSE IMPACTS OF PROPOSED REMEDIAL ACTION ALTERNATIVES.

Detailed review of the proposed alternatives suggests that implementing any of them would cause massive short-term damage to the wildlife habitat by removing food stocks of vegetative and soft-bodied root zone animals. Implementing any of the alternatives analyzed in detail by WES would also displace populations whose habitat should be preserved. The proposed remediation alternatives will also cause long-term adverse impacts by disrupting the ecological balance of area of concern for several generations for certain of the populations involved.

The Rev. Draft Feasibility Study does not provide detailed consideration of these serious negative impacts of the proposed alternatives. Rather, it pays lip service to a desire to provide "long-term preservation of habitat." Clearly, to properly evaluate the impact of any alternative on long-term habitat preservation, the evaluation of that remedial action alternative must include a phase-by-phase time schedule that includes estimates of the time it will take for remediated areas to return to a habitable environment, either actively by reclamation or passively by natural processes. WES does not provide such information and thus the reader can only guess how long "short term" negative impacts will persist. This, of course, directly impacts on the value of the "long term preservation of habitat" which is relied upon to justify the mass excavation alternatives.

Response to Allied-Signal Comments - 3.13 (17 April 1986):

The comments were considered in the development of the Final Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume II: Biological Assessment.

Short-term is defined as five years. Between the time the proposed excavation would begin and habitat restoration would be completed, 13 to 15 acres of habitat in RASS 1 and RASS 2 would not be fully functional. This period of time is estimated to be two to five years, based on time estimates for site coverage by pickleweed. If pickleweed is not colonizing at the rate expected, supplemental plantings will be made. The transition zone vegetation will also be well established within five years. Habitat values likely would improve and surpass former conditions within ten years of completion of the remedial action.

Allied-Signal Comments - 3.14 (17 April 1986):

3.14 OFF-SITE DISPOSAL ASSUMPTIONS ARE UNREALISTIC.

Alternatives requiring excavation and off-site disposal (alternatives 3a and 3b) may be infeasible. Investigations of this option at other projects have shown it infeasible because of a shortage of Class I and II disposal capacity, cost, conveyance impacts, and priorities of using available Class I site capacity. The use of available Class I or Class II site capacity for the types of contaminated soil on NWS Concord may be unreasonable when compared to the gravity of hazardous materials disposal needs existing at other locations.

Response to Allied-Signal Comments - 3.14 (17 April 1986):

Two Class I landfills have indicated willingness to accept the materials that would be removed from the sites under investigation.

Allied-Signal Comments - 3.15 (17 April 1986):

3.15 COST ANALYSES.

The cost analysis section begins at page 8.13. To the extent that the construction cost is predicated on the assumption of a 40 hour week and a 12 month construction year, such costs will be understated. The wetland restoration program, as it involves excavation, movement of heavy equipment, and planting vegetation, requires accommodations for weather, soil stability, planting season, etc.

In Section 10 of the Rev. Draft Feasibility Study, a

brief outline is presented of additional information required prior to engineering design (presumably of the chosen mitigation alternative). From the description of some of this required additional information (e.g.: the location of suitable back fill material, the location of suitable land fill sites, the location of suitable borrow areas, and the location of suitable wetland offsets), it is hard to see how the cost of any of these alternatives could have been accurately estimated or their feasibility determined. The availability and proximity of these materials and services are critical cost considerations. Without such determinations, cost estimates are subject to wide variation.

Response to Allied-Signal Comments - 3.15 (17 April 1986):

The cost analysis was designed to provide a comparative evaluation of the cost of a range of potential remedial action alternatives. Cost estimates presented in the (Revised) Final Feasibility Study Report were accurate to the required level for a feasibility study. During informal conversations, consultants for Allied-Signal indicated general agreement with the costs presented in the feasibility study. As a result, the Navy is somewhat perplexed by this comment. The (Second Revised) Final Feasibility Study Report refined the cost of potential remedial action alternatives.

Allied-Signal Comments - 4.0 (17 April 1986):

4.0 CONCLUSIONS.

Three primary conclusions result from review of the Rev. Draft Feasibility Study.

First, WES has not substantially altered its studies as a result of our comments submitted in September 1985. The only significant change to the Rev. Draft Feasibility Study was to abandon use of the MASSA standards in the marsh area. One change in the Remedial Investigation from its earlier draft in response to our comments relates to the definitions on page XX for certain terms, such as "significant," "substantial," and "potential." The Remedial Investigation text was changed to avoid apparent inconsistencies between the given definitions for the terms "significant" and "substantial." The continuing failure to define these terms in a relevant, data-based manner, however, reveals that the reliance on these terms to justify the conclusions reached in the final Remedial Investigation is in fact an exercise in rhetoric designed to justify pre-conceived notions. This rhetoric and the unsupported conclusions drawn from it also have been incorporated in the Rev. Draft Feasibility Study with the result that inappropriate remedial actions are proposed for vastly overbroad areas.

Our second and related conclusion is that the interpretation of the data generated in the Remedial Investigation is unsubstantiated and/or erroneous. This errant interpretation breaks the critical link that must be established between the raw field data and the conclusions about, and proposals for, remediation. For example, WES continues to contend that the mere presence of metals in soil, Plants, or worms constitutes "damage." Damage to WES, how is that inferred by comparing data to criteria that were established for different purposes, and is not derived from the observation of any actual physical damage.

It continues to be our contention that the primary objective of the study and any proposed remedial action should be to preserve wildlife habitat. Yet the impact of WES's proposed alternatives will be to destroy the very habitat that could support endangered and other species. We believe nothing short of demonstrable, widespread physical damage to populations on site is sufficient to justify any of the remediation alternatives presented as 3a, 3b, 3c, 3d, 4a, 4b, or 5a, 5b. Such damage has not been demonstrated. The only two instances of physical damage cited by WES could have resulted from numerous conditions, most of which are not related to elevated metal concentrations and most of which WES failed to consider or eliminate from consideration[6].

Based on the actual data reported, the most that can be accurately said is that some contaminants are present, some potential for damage may exist, and that in some locations the uses of land by flora and fauna as habitat may be impacted by the existing concentrations of contaminants. Evidence of contaminants moving off-site or having widespread negative impacts on the food chain is lacking. Although the acreage proposed for remedial action was reduced from about 109 to 54 acres, supporting technical data that would allow selection of the most cost-effective remedial action alternative for each acre is missing. In short, many of WES' most critical conclusions about the field data regarding the nature and extent cf contamination at the site, and the conclusions set forth in the remedial alternative evaluation which follows, suffer from improper interpretation of the relevant data and/or an absence of necessary data.

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[6] Moreover, though numerous individuals of a non-endangered species of mouse were captured and pickled for future experimentation, the Navy has inexplicably not authorized any biopsies to look for physical damage resulting from heavy metal exposure. Perhaps this is because they already found many more mice, of both endangered and non-endangered species, than they predicted in areas where the alleged populations should be lowest.

Our third conclusion is that preservation of critical habitat for endangered and other species is given unduly short shrift in the assignment of priorities. As a result, relevant remediation technologies which maximize habitat preservation and which could have been developed into specific alternatives for consideration, are de-emphasized or not considered at all. Even with the acceptance of WES's basic premise--that the mere presence of metals creates a threat--several of the different passive technologies, such as flood control and surface water diversion, could be implemented that would require much less, if any, disruption of habitat and would justify less than total excavation and disposal. Moreover, the no-action alternative or the continued monitoring alternative are appropriate for much of the acreage identified by WES as needing remediation. WES could reach this conclusion itself if it reordered its priorities and paid more attention to its field data to establish a sense of perspective with respect to the contamination that is really on the property.

In conclusion, it is unfortunate that our prior comments were neither taken to heart nor addressed in large part in the final Remedial Investigation. Many of the most aggregious problems persevere, without explicit justification. As the Rev. Draft Feasibility Study incorporates these problems, it too is flawed and remains so. We trust that our call for a responsible reply to our comments will be heeded in the publication of future reports, either by alteration of the documents or by a well-reasoned rebuttal. The absence of either in the present reports speaks poorly for their credibility.

We reserve the right to make further comments on these studies as a part of the public comment process, in connection with the pending litigation and otherwise.

Response to Allied-Signal Comments - 4.0 (17 April 1986):

Allied-Signal should find the definition and use of terms improved in the (Second Revised) Final Draft Feasibility Study Report over the two previous documents. In addition, major refinements have been made in several areas, e.g., decision criteria, specificity of recommended remedial actions, and incorporation of concerns for the wetlands and endangered species. Interpretation of data has been improved and additional data obtained to clarify the location, migration, and uptake of the contaminants.

The Navy disagrees that the primary objective is preservation of wildlife habitat. In following the requirements of CERCLA, attaining the overall environmental protection goal must be the first priority. Habitat preservation or reclamation is an integral part of that goal.

In answer to footnote 6, 36 individual mice and voles were analyzed for histopathology and metal tissue content. Those results were provided to defendants. The comment about the delay in conducting these analyses does not deserve response.

Allied-Signal should find that in the proposed remedial action plan, the short term habitat destruction has been greatly reduced in extent. Habitat restoration is an integral part of the proposed remedial action. Habitat considerations were balanced with several other criteria and factors to determine a compromise remedy that meets the environmental protection goal. The selected remedy does meet the goal; the No Action and Environmental Monitoring alternatives do not meet the goal.

2.11 State of California Department of Health Services Comments (4 April 1986):

This letter will summarize the positions taken by the California Department of Health Services at our March 18 meeting with representatives of the Navy and of other California state agencies, regarding contamination at the Naval Weapons Station, Concord.

Our preferred combination of options for remedial action at the site is as follows:

AA and KS areas: Soil in areas where metals exceed TTLCs should be excavated and disposed of in on-site disposal facilities created for the purpose. The wetlands damaged in the process should be restored by backfilling with clean fill to the original elevation and replanting with native plant species. EP toxicity testing should be performed before excavation in order to differentiate RCRA materials from non-RCRA California hazardous materials; separate disposal facilities for the two types of soil may simplify the permitting process by allowing for a much smaller RCRA site. The possibility of treating the soil from the KS area to reduce metals mobility before disposal should be explored more thoroughly; this may also greatly reduce the amount of soil which must go to a RCRA facility.

K2, G1, and ES areas: Soil in areas where metals exceed TTLCs should be excavated and disposed of as above, including EP toxicity testing and exploration of the possibility of stabilization before disposal. No backfilling or restoration should be performed; these areas would become lower-elevation freshwater wetlands (for the most part, in essence, a stream) through natural recovery.

CP area: Soil in areas where metals exceed TTLCs should be isolated with a topsoil cap. As an alternative, this area could be used as a disposal site for soil from the other

contaminated areas, and would then be capped appropriately. If other considerations allow it, this option would save considerable expense.

AB area: No soil samples in this area exceeded TTLCs, and we do not believe any remedial action should be taken here.

Please note that using the TTLCs as the cleanup criteria will result in smaller areas for remedial action than those described in the Feasibility Study, but somewhat larger areas than those described on Richard Lee's hand-marked slide showing areas exceeding TTLCs. This is because his slide used the sampling points as boundary points, while the actual cleanup areas should include an area surrounding each sampling point which exceeded a TTLC.

Response to State of California Department of Health Services Comments (4 April 1986):

Substantial revisions were made to the (Revised) Final Draft Feasibility Study Report. Included in these revisions was redefinition of the areas under investigation into four remedial action subsites (RASS's). Former sites AA and AB are now included in RASS 1. Former site KS is now included in RASS 2. With the exception of onsite disposal, the DOHS recommendations concerning RASS's 1 and 2 were implemented. TTLC/STLC criteria were identified as appropriate criteria for determining the extent of active remediation. However, because of concerns related to environmental impacts, the Navy reduced the area of active remediation. Some soils exceeding the TTLC/STLC criteria will be left in place. An extensive environmental monitoring program will be implemented to provide the requisite level of environmental protection.

Alternatives that incorporated disposal of excavated soils on NWS Concord were evaluated. No sites suitable for construction of a Class I monofill were found on NWS Concord. Alternatives incorporating disposal of excavated soils in existing offsite Class I landfills are preferred. The Navy is conducting laboratory studies on treating the soil to reduce contaminant mobility.

Sites formerly designated as K2, G1, and ES are now included in RASS 3. In general, with the exception of onsite disposal, DOHS recommendations for RASS 3 are included in the preferred alternatives.

The site formerly designated as CP is now included in RASS 4. Based on reliability concerns and the desire to minimize operation and maintenance requirements, the preferred alternative for RASS 4 is excavation and disposal in an existing Class I landfill.

3.0 COMMENTS SUBMITTED IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS

3.1 COMMENTS SUBMITTED BY CITIZENS FOR A BETTER ENVIRONMENT IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Citizens for a Better Environment Comments (20 August 1985):

Citizens for a Better Environment (CBE) has received a public notice dated 8 August 1985 concerning the "Superfund" site listed above.

We respectfully request full copies of the final draft Remedial Investigation and Feasibility Study reports for our review in order to develop comment.

Thank you in advance for your help in making these available for our review before the 3 September 1983 deadline for comment.

Response to Citizens for a Better Environment Comments (20 August 1985):

The Navy responded to CBE on 28 August 1985.

3.2 COMMENTS SUBMITTED BY CANONIE ENGINEERS IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 8 AUGUST 1985 AND THE NAVY'S RESPONSES TO THOSE COMMENTS

Canonie Engineers Comments (23 August 1985):

Canonie Environmental Services has been retained by the Atchison, Topeka & Santa Fe Railway Company and Santa Fe Industries, Inc. to comment upon --

- The August 1985 Final Draft report of the Remedial Investigation of Contaminant Mobility at the Naval Weapons Station, Concord, California: and
- The August 1985 Final Draft Report of the Feasibility Study of Contamination at the Naval Weapons Station, Concord, California.

Photocopies of these reports were delivered to Santa Fe's San Francisco counsel during the afternoon of August 12, 1985.

Canonie Environmental Services' preliminary review demonstrates that we are substantially hampered in submitting further comments and information helpful to the Navy in

evaluating the reports because we have not been given --

(a) duplicate prints of the photographs referred to in the reports,

(b) legible copies of the figures referred to in the reports,

(c) maps which clearly show the precise boundaries of parcels 571 through 576,

(d) maps which clearly show the precise boundaries of areas "KS", "G1" and "K-2",

(e) maps which clearly show the exact locations of each soil sample in relation to the precise boundaries of parcels 571 through 576 and in relation to the boundaries of areas "KS", "G1" and "K-2",

(f) details of the cross-sections used in the HEC-2 analysis of Nichols creek, referenced to the parcel boundaries, and

(g) copies of the Brown & Caldwell and Environmental Resource Group's reports of laboratory analyses of soil samples taken from locations on parcels 571 through 576.

We will reimburse the Navy for all expenses incurred in preparing these duplicate photographic prints, copying these maps and copying this laboratory data for immediate transmission to us by air courier. To expedite reimbursement, pleas telephone our office to report the total amount due. We will deliver our check payable to your order within two business days.

To permit our review of this critical information, we also ask that you extend the September 3, 1985 deadline for public comment. In particular, we request that the new, extended deadline be at least 20 days after delivery of the prints, maps and other requested data to our office.

Response to Canonie Engineers Comments (23 August 1985):

The Navy responded to Canonie Engineers comments on 28 August 1985.

3.3 COMMENTS SUBMITTED BY DAVID KEITH TODD CONSULTING ENGINEERS, INC. IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 8 AUGUST 1985 AND THE NAVY'S RESPONSES TO THOSE COMMENTS

David Keith Todd Consulting Engineers, Inc., Comments (27 August

1985):

I have reviewed the two recent final draft reports by C.R. Lee, et al., on the remedial investigation and the feasibility study of contamination at Naval Weapons Station, Concord, California. My comments, limited to the hydrogeolgic aspects of the reports, are presented below.

Remedial Investigation Report

The report poses problems of identifying study areas and sampling sites. On page 1 and on subsequent pages there is discussion of parcels 571 to 581, yet there is no map locating these areas. On pages 7 and 12 the locations of the lettered areas are not shown. On page 29 and subsequent pages the bar graphs provide no means for identifying which samples are represented. The maps on pages 118 to 123 do not specify what chemical limits were selected as being "excessive". On page 166 and subsequent pages reference is made to nine cross-sections of Nichols Creek, yet nowhere are these sections shown. The tables on pages 189 to 208 do not identify sample locations, sample dates, sampling agency, as well as various number and letter codes.

Feasibility Study Report

The parcel areas described on page 1.3 and on subsequent pages are not identified or located on a map.

Response to David Keith Todd Consulting Engineers, Inc., Comments (27 August 1985):

These comments were addressed by preparation of the figures in the (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures; detailed plates included in the (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at the Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives; and drawings submitted to the State of California Regional Water Quality Control Board.

3.4 COMMENTS SUBMITTED BY CITIZENS FOR A BETTER ENVIRONMENT IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 8 AUGUST 1985 AND THE NAVY'S RESPONSES TO THOSE COMMENTS

Citizens for a Better Environment Comments (3 September 1985):

Unfortunately the Navy has not yet responded to our request for the above-mentioned RI/FS reports although the deadline for our evaluation and response passes today (September 3). This failure in public information transmittal appears to have prevented CBE from participating in the review process for

the Navy's Concord toxic waste clean up despite the public access guarantee of federal law.

A copy of CBE's request for the RI/FS reports, dated the 20th of August 1985, is enclosed. On behalf of CBE I would request the Naval Facilities Engineering Command to inform us of the options available for correcting this problem and allowing us to exercise our right to be involved in this Bay area toxics clean up. In view of the time frame noted above your prompt response would be appreciated. Also, we still await the reports and would appreciate receiving copies as soon as possible.

Response to Citizens for a Better Environment Comments (3 September 1985):

CBE confirmed receipt of documents transmitted by Navy on 28 August 1985.

3.5 COMMENTS SUBMITTED BY CANONIE ENGINEERS (ON BEHALF OF ATSF AND SANTA FE INDUSTRIES, INC.) IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Canonie Engineers Comments (3 September 1985):

Canonie Environmental Services has been retained by the Atchison, Topeka & Santa Fe Railway Company and Santa Fe Industries, Inc. to comment upon -

* The August 1985 Final Draft Report of the Remedial Investigation of Contaminant Mobility at the Naval Weapons Station, Concord, California; and

* The August 1985 Final Draft Report of the Feasibility Study of Contamination at the Naval Weapons Station, Concord, California.

Photocopies of these reports were delivered to Santa Fe's San Francisco counsel during the afternoon of August 12, 1985.

Canonie Environmental Services' preliminary review demonstrates that we are substantially hampered in submitting further comments and information helpful to the Navy in evaluating the reports because we have not been given -

- (a) duplicate prints of the photographs referred to in the reports,

- (b) legible copies of the figures referred to in the reports,

- (c) maps which clearly show the precise boundaries of parcels 571 through 576,

(d) maps which clearly show the precise boundaries of areas "KS", "G1" and "K-2",

(e) maps which clearly show the exact locations of each soil sample in relation to the precise boundaries of parcels 571 through 576 and in relation to the boundaries of areas "KS", "G1" and "K-2",

- (f) details of the cross-sections used in the HEC-2 analysis of Nichols Creek, referenced to the parcel boundaries, and

(g) copies of the Brown & Caldwell and Environmental Resource Group's reports of laboratory analyses of soil samples taken from locations on parcels 571 through 576.

We will reimburse the Navy for all expenses incurred in preparing these duplicate photographic prints, copying these maps and copying this laboratory data for immediate transmission to us by air courier. To expedite reimbursement, please telephone our office to report the total amount due. We will deliver our check payable to your order within two business days.

To permit our review of this critical information, we also ask that you extend the September 3, 1985 deadline for public comment. In particular, we request that the new, extended deadline be at least 20 days after delivery of the prints, maps and other requested data to our office.

Response to Canonie Engineers Comments (3 September 1985):

The Navy responded to Canonie on 28 August 1985. As a result of this comment, more detail was developed for the figures presented in the Draft Final Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures (April 1988). Details of the cross section used in the HEC-2 analysis were described in the (Second Revised) Draft Final Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives (September 1988). Brown & Caldwell data are presented as Contractor Samples in Section 2.4 Appendixes page 210 of the Final Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California (January 1986). The Environmental Resource Group's data are presented in Anderson Geotechnical Consultants, 1984. Confirmatory Study of Hazardous Substances at Naval Weapons Station, Concord, California, Draft Report.

3.6 COMMENTS SUBMITTED BY STATE OF CALIFORNIA DEPARTMENT OF FISH

AND GAME IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

State of California Department of Fish and Game Comments (19 September 1985):

Department of Fish and Game personnel have reviewed the Final Draft Report of the Remedial Investigation of contaminant Mobility and Naval Weapons Station, Concord, California and Final Draft Report of the Feasibility Study of Contamination at Naval Weapons Station, Concord, California and find them to be extremely comprehensive.

It is our understanding from review of the remedial investigation of contaminant mobility that arsenic, lead, cadmium, selenium, zinc, and copper are the principal hazardous materials deposited on Lands recently acquired by the Navy. The report further addresses the mobility of these heavy metals through various biological methodologies (i.e., insitu clam bioassay, laboratory earthworm exposure and vegetation growth studies) results of which confirm the potential, if not actual, adverse effects to local fish and wildlife species.

Of major significance and concern are conclusions of the comprehensive risk assessment which details an unacceptable high probability of kidney disease (p. 445-6) and reproductive failure (p. 447) in the federal and state listed endangered salt marsh harvest mouse (Reithrodontomysraviventris) and a lower body weight trend as well as possible reproductive problems (p. 449) in the federal candidate threatened or endangered California black rail (Laterallusjamaicensisconturniculus). Other threatened as well as non-threatened species would likewise be at risk. The feasibility study reviews appropriate technology and cost analyses of means to abate the environmental effects of the improper hazardous waste disposal on acquired properties. The alternatives considered ranged from posting and monitoring (no project) [$217,000]) to complete soil and vegetation removal with site restoration ($55,890,000). On site encapsulation with resultant loss of wetland habitat ($13,379,000) to be mitigated by preservation of a like amount of comparable wetland elsewhere appears at first glance to be more economically acceptable. However, acquiring existing wetlands to compensate for the loss of wetland habitat, especially that supporting threatened or endangered species is unacceptable. We advocate the position that new wetland habitat must be created from non-wetland areas (uplands for example >) when loss of existing wetlands is unavoidable. In this case, the cost for creation of 109.87 acres of new wetland should be included in the cost of this alternative. Naval Weapons Station and we recommend the Navy also investigate the possibility of creating new wetlands from upland areas and using the fill removed for contaminated site encapsulation.

While we acknowledge the costs for full remediation of this problem are high, we believe the conclusions in the Corps' reports thoroughly justify those remedial actions which not only remove further threats to fish and wildlife but which also result in no loss of our critically scarce wetland habitat.

Thank you for the opportunity to comment. If you have any technical questions please contact Mike Rugg, Associate Water Quality Biologist, telephone (707) 944-2011.

Response to State of California Department of Fish and Game Comments (19 September 1985):

The (Second Revised) Final Draft Feasibility Study Report does not consider the capping (onsite encapsulation) alternative as being technically or institutionally feasible. Analysis of the existing conditions, related to contamination of the wetlands, and development of a 3-tiered remediation approach have reduced the total amount of impacted wetlands to 14.39 acres. In the case of the brackish water wetlands on RASS's 1 and 2 (10.50 acres), onsite restoration will be conducted following removal of soils exceeding the TTLC/STLC criteria. Fresh water wetlands on RASS 3 (3.65 acres) and RASS 4 (0.24 acres) will not be revegetated and allowed to recover naturally.

3.7 COMMENTS SUBMITTED BY STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

State of California Department of Health Services Comments (24 September 1985):

This letter contains comments on the chemical contamination of parts of the Concord Naval Weapons Station (CNWS). The parcels of land in question were acquired by the Navy from several prior owners during 1969-1971, for use as a buffer zone around NWSC facilities. In 1981 the State of California notified NWSC that portions of those parcels were contaminated with hazardous substances. Contaminated areas include both uplands and wetlands, totaling about 95 acres, which provide habitat for eight rare or endangered species. Contamination includes lead, cadmium, arsenic, selenium, nickel, zinc, and copper, as well as soil pH levels as low as 4.5 in some areas. The table below shows the highest sampled concentrations of each contaminant, compared to each's respective Total Threshold Limit Concentration (TTLC), Soluble Threshold Limit Concentration (STLC), and maximum allowable concentration in sewage sludge applied to agricultural land (MASSA) (all figures in parts per million):

	Sampled	TTLC	STLC	MASSA

lead	7000+	1000	5	511
cadmium	80+	100	1	2.7
arsenic	2500+	500	5	
selenium	140	100	1	
zinc	80000	5000	250	304
copper	3000+	2500	25	144
nickel	90	2000	20	82

Plants in the contaminated areas show visible signs of metal toxicity, and in some places no plants grow at all. Plants and soil invertebrates contain levels of metals correlating to the levels in the soils in which they are found. Limited groundwater sampling shows that EPA drinking water standards are exceeded in some areas at least for cadmium, zinc, and arsenic. Based on the above, the Department finds that remedial measures are necessary at the site.

Out of the remedial measures initially considered, the feasibility study narrowed the options to seven, with the following estimated present value costs:

1. no action except posting	$ 217,000
2. increased environmental monitoring only	1,673,000
3. excavation, disposal in an existing RCRA-approved off-site facility, and revegetation	55,408,000
4. installation of a topsoil cap and revegetation	13,399,000
5. installation of a multi-layer RCRA cap and revegetation	36,213,000
6. option #3 plus wetlands restoration	56,480,000
7. option #4 plus purchase of similar off-site lands, otherwise subject to development, to be held out of development	55,890,000

The option of excavation and disposal in a RCRA-approved facility created specifically for this situation, either on-or off-site, was rejected because of the expected difficulty in obtaining RCRA approval for a new facility. This option should be further explored.

We suggest that additional testing of soil samples be performed in accordance with CFR 40, Part 261, Appendix II (Extraction Procedure, or "EP," toxicity test). If the extractable levels of each contaminant do not exceed their respective allowable concentrations in the EP toxicity test, it may be possible to dispose of the contaminated soil in an on-site facility without necessitating RCRA approval. This could probably be accomplished much more cheaply than offsite disposal, and could allow continued beneficial use of the disposal area, as well as restoration of the damaged wetland areas.

Even should the materials fail the EP toxicity test, it may be worthwhile to explore the possibility of obtaining RCRA

authorization for an on-site facility. This would still probably be cheaper than off-site disposal. It would also avert the need to take up thousands of cubic yards of RCRA-approved disposal space, which is already in short supply.

We hereby request that an addendum to the feasibility study be prepared and submitted by January 1, 1986, addressing the above issues. If you should have any questions, please contact Will Hevelin of my staff.

Response to State of California Department of Health Service Comments (24 September 1985):

As requested by this comment, the Navy conducted a detailed investigation of the potential for construction and operation of a monofill located on Naval Weapons Station Concord. In the (Second Revised) Final Draft Feasibility Study Report the Navy evaluated a range of alternatives. Among these were several alternatives that included the possibility of disposal in a monofill constructed on Naval Weapons Station Concord. A detailed evaluation of available sites on Naval Weapons Station Concord revealed that none met the siting requirements for a Class I landfill. See the report entitled "Suitability of Sites for Hazardous Waste disposal, Concord Naval Weapons Station, Concord, California." EP testing revealed that, in general, the contaminated soils are not regulated as a hazardous waste under RCRA. However, most of the soils would be classified as a Class I waste using the State of California TTLC/STLC criteria. It is believed that construction of a Class I monofill located off of Naval Weapons Station Concord would encounter significant public concern and permitting difficulties from the State, leading to significant delays in implementation of a remedy that included excavation. Although the construction of a monofill may appear to provide savings in transportation cost, these would be more than offset by the costs associated with operation and maintenance of the monofill. It is further believed that transport of the materials to an established Class I facility would provide a more secure environment for the materials.

3.8 COMMENTS SUBMITTED BY WOODWARD CLYDE CONSULTANTS (ON BEHALF OF ESI CHEMICALS, INC. IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Woodward Clyde Consultants Comments (on behalf of ESI Chemicals, Inc. (24 September 1985):

ESI Chemicals, Inc., has retained Woodward-Clyde Consultants to prepare comments on the following documents: Remedial Investigation of Contaminant Mobility at NWS Concord, California; Assessment of Damage to Natural Resources at NWS

Concord, California; and Feasibility Study of Contamination at NWS Concord, California. The report which follows contains our comments on each of these documents and general comments on all of them. These comments are filed pursuant to Public Notices issued on August 8 and August 26, 1985 by the Naval Facilities Engineering Command, Western Division.

Woodward Clyde Comments - 1.0 (24 September 1985):

1.0 COMMENTS ON REMEDIAL INVESTIGATION OF CONTAMINANT MOBILITY AT NWS CONCORD, CALIFORNIA.

Woodward Clyde Comments - 1.1 (24 September 1985):

1.1 Contamination Data

Section 2.1.1.2 contains a description of methods and materials used to collect soil and plant samples. More needs to be said about collection of replicate samples. The authors should include the dimensions of the area harvested of plant material and how the plant material was divided among the three replicates. The authors should also describe the juxtaposition of the nine soil samples, e.g., were they all taken from a common hole? or nine distinct holes in a 3x3 pattern? etc. And the authors should explain how the replicate numbers were assigned and the relationship between the replicate numbers for soil samples, bioassays and plant samples.

Claims of exceedance of MASSA or TTLC limits in Section 2.1.2.1.2 "Results and Discussion" should be backed by statistical analysis of replicated samples. Repeatability among replicated samples was generally poor. For example at locations CP 28F1 and CP 29E1 the reported selenium concentrations for three replicates each were 73.8, 7.3, 2.0 and 138.4, 5.8, 9.0, respectively (units: mg/Kg). It appears unlikely most claims of exceeding the limits can be sustained. A check of the results for zinc show that of the nineteen locations where replicate samples were taken and the average of the three replicates exceeded the MASSA limit only four exceeded the MASSA limit at a significance level of 2.5%. None exceeded the TTLC limits, at the same significance level. The sample variance, as a percent of the mean, for the nineteen sets of replicates ranged from 11% to 101% with an average of 43%. If either the MASSA limit or TTLC limit is used as the standard for declaring soils excessively contaminated, the authors need to show how reliably the data show exceedance. (Also in Section 2.1.2.1.2: The titles for subsections 2.1.2.1.2.1 and 2.1.2.1.2.2 should be switched).

The authors use a number of contamination limits, borrowed from other applications, for declaring excessive contamination. The use of these limits needs to be justified. In particular, the use of MASSA limits for soil contamination needs

to be justified. These limits are for agricultural lands, but the lands in question would be used for agriculture only under extremely unusual circumstances. Contamination limits for agriculture are based on yield reductions or human health effects. Human health limits are usually very conservative-generally the no effects level divided by a safety factor of 10 or 100. If there will be no direct human consumption of plant material from the site, why should such a conservative limit be used?

Throughout Chapter 2 and its appendices, the authors need to improve the presentation of data. The graphs for contamination data should be replaced with something with the following characteristics: a) easy to read; b) indicates sample locations; c) shows variance in replicated samples, i.e, shows the mean with a single point and variance with "error bars" one standard deviation above and below the average; and d) clearly indicates whether a datum point is from a single sample, an average of three replicates or the highest of three replicates. The maps should be of a larger scale with better legends, more detail, and sampling locations clearly shown and labeled. The tables in the appendices need to be decoded and made easier to read (larger type). The authors owe the readers data presentations which are easy to read, follow and understand.

Response to Woodward Clyde Comments 1.1 (24 September 1985):

The three samples were randomly collected from each sampling site and were considered to represent the variability existing in a 4-sq-ft sampling site. The plant material harvested in the field came from 3 separate locations within the 4-sq-ft sampling site. All plant material in a 1-sq-ft area became a replicate. Hence, the plant material from each of the three discrete 1-sq-ft locations are referred to as replicates R1, R2, and R3. R1 is simply the first random location. Within each 1-sq-ft location, 1 sample of soil was collected each for chemical analysis and for plant and earthworm bioassays. For example, soil for the chemical analysis, plant, and earthworm bioassays for 1 replicate came from the same sample location. Likewise, the soil for R2 and R3 came from different locations, 2 and 3, within the 4-sq-ft sampling site. The clam biomonitoring procedure consisted of three clam cages being placed at each location in the field. The cages were randomly assigned as replicates, R1, R2, and R3. The relationship of R1 among soil, plant, and earthworm samples is that these samples were collected from the first location at a sampling site. The clam sample R1 was the first cage deployed at the sampling site. An example of the labelling for site AA 124 and replicate R1 is presented in Table 2.

Table 2

Sample Id	Sample Type	Exhibition
AASCW1241R1	soil used in chemical analysis	obs 1 page 200*
AACLW1241R1	clam tissue from the clam biomonitoring	obs 1 page 223
AAPVW1241R1	plant material collected at this location	obs 1 page 229
AAPCW1241R1	plant material from the plant bioassay	obs 1 page 234
AAEACW1241R1	worm tissue from the earthworm bioassay	obs 1 page 245

* These observations are presented in Final Draft Remedial Investigation Report.

The Navy disagrees that exceedance of MASSA or TTLC criteria should be backed by statistical analysis of replicated samples. All sampling sites did not have replicates. Consequently, any sample replicated or not exceeding a criteria, was included in the area exceeding the criteria. Moreover, as indicated below, the Navy believes that the observed variability is a true reflection of the heterogenous distribution of metals in these samples.

Past historical use of the parcels under investigation clearly shows agricultural grazing was practiced. The MASSA criterion not only applies to land producing crops for human consumption, but also to land used for animal feed or grazing. If this land use were to be considered in the future, consideration of the MASSA criterion would be appropriate. Because of the present contamination on these parcels, they can not be used for grazing until the contamination is removed.

The variability between some replicates is greater than one might initially expect. However, we are not dealing with a homogeneous area. Instead, we are evaluating an area that has received a number of different sources of contamination. Several of the areas have had attempted cleanup and/or removal operations which resulted in the disturbance of large amounts of material. Samples CP 28F1 and CP 29E1 are from RASS 4 which has undergone a removal operation. Therefore, the amount of variability found may be due to the original discharges of contaminants or by subsequent activities which have occurred on site. The variability in selenium concentrations is just a true indication of the variable nature of this environment.

Bioassays are commonly used to determine the biological impact of contamination. Since chemical analysis of total concentration of contaminants has not always been related to biological impacts, exposure of a plant or animal has been accepted by the scientific community to be more reliable in determining the potential for biological impacts from contaminated soil and sediments.

The authors have made every attempt to make figures, tables, and graphs as legible as possible. However, our success rate is less than 100%. Efforts to improve data presentation, etc. evolved into the (Second Revised) Final Draft Feasibility Study Report.

Woodward Clyde Comments - 1.2 (24 September 1985):

1.2 DATA CORRELATIONS

In Section 2.2 the authors present a number of correlations between contaminant data. For each correlation the authors give a correlation factor (r). The authors should instead give the square of the correlation factor (r^2) because this value represents the variation of the value of the y-axis variable attributable to variation in the x axis variable. Thus, for example, for the correlation with r = 0.38 - the poorest of the group, only 14% of the variation in the y-axis variable can be attributed to variation in the x-axis variable - essentially no correlation. Correlations with $r \leq 0.71$ ($r^2 = 50\%$) should be discarded as being too uncertain to conclude a correlation actually exists.

The strongest correlation in section 2.2 is "Earthworm Tissue Selenium vs. Soil Selenium." The correlation factor is 0.86 ($r^2 = 74\%$). Inspection, however, reveals the high value is an artifact. 99% of the data are in the lower left hand corner of the plot; clustered around the point (0,4). Only two points, lying in the upper righthand corner, are outside the cluster. Because the preponderance of the data are in one cluster, the correlation factor is quite insensitive to the location of the two outlying points. If the two outlying points are ignored, linear regression or inspection yield a line with a slightly negative slope, i.e., the data very strongly show no correlation. Similar artifact correlation factors can be observed in a majority of the correlations. The authors should delete the correlations as the data do not support their conclusions.

If the authors keep the correlations in the report, improvements are needed. In figure 2-83, the graduation along the x-axis should be reduced by a factor of 10. In those figures where the data are plotted on logarithm scales, base 10 logarithms should be used and the scale should be labeled for concentrations not the values of the logarithms.

Response to Woodward Clyde Comments - 1.2 (24 September 1985):

When one considers the relationship between r (i.e. correlation coefficient) and r-square (i.e. coefficient of determination), either is correct. It seems trivial to promote r-square over r. The preference of the Navy's consultants is for r rather than r-square. The consultants looked at correlation

coefficients as a technique to assess the potential for contaminant uptake without conducting additional bioassays, thus saving additional expense. The idea of when a correlation coefficient becomes important is certainly debatable. A correlation coefficient of 0.7 is probably always different from zero. This would imply that a linear relationship between the two variables exists. As is the case here, one can assess the potential for contaminant uptake. The Navy agrees that a correlation coefficient of 0.7 or less yields a weak coefficient of determination. Therefore, one should use caution in producing regression equations from data such as this, because there would be uncertainty about the actual predictions provided. In the case at hand, there would be uncertainty about the actual amount of contaminant uptake. However, the potential for contaminant uptake may be substantial while one may not have a precise means of quantifying chemical speciation of the contaminant and thus the actual exposure. Therefore, one should not discount the potential for contaminant uptake by discarding the regression analyses.

An examination of the selenium soil analysis reveals the fact that no site outside of RASS 4 has a high concentration of selenium. Out of the 162 sites on RASSs 1, 2, and 3, only 3 sites have a sample with a selenium concentration greater than 10 ppm (see the Final Remedial Investigation Report at p 200-202, and p 206). Two of those three are less than 12 and the other one is 27.25 ppm. Five of the 16 sites in RASS 4 have selenium concentration greater than 10 ppm. There are three sites from RASS 4 which have selenium concentrations above 70 ppm. These sites are CPSCPCW28F1R1, CPSCPCW29E1R1, and CPSCPCW29F1. The earthworm tissue analysis is quite similar to the soil analysis. Out of 162 sites on RASSs 1, 2, and 3, only 4 have a selenium concentration greater than 10 ppm (see the Final Remedial Investigation Report at pp 245-248). There are two sites from RASS 4 which have selenium concentrations above 88 ppm. These sites are CPEACW28F1R1 and CPEACW29E1R1. Unfortunately, the earthworms from site CPSCPCW29F1 died before the bioassay was completed. These data are clustered because high concentrations of selenium exist only in a few sites from RASS 4. The results presented here are not artifacts of the data. It is important to note, however, that all sites with high selenium concentrations yielded high selenium concentrations in earthworm tissues or mortality. These data strongly suggest that the earthworm bioassay is highly reliable (e.g. when concentrations in the soil are low concentrations in the earthworm are low; when concentrations in the soil are high concentrations in the earthworm are high).

The horizontal axis is incorrectly printed in the Final Remedial Investigation Study Report. The correct axis is printed in the Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, Subtitle

Appendix 2.5 - 1986-87 Data. The correct axis is: 0 1000 2000 3000 4000 5000 6000 7000 8000.

Woodward Clyde Comments - 1.3 (24 September 1985):

1.3 NATURAL RESOURCES

One of the principle concerns resulting from the contamination is the health of fish and wildlife at the site, including several endangered species. To this end the authors have conducted habitat suitability assessments to show two of the endangered species probably live at the site. The assessments show at least some of the site is suitable for the two species. Because the number of individuals of each species the site could support is an issue, the authors should include isopleth maps of habitat suitability for the two species. Isopleths of soil contamination should be overlain on these maps. The authors should also include isopleth maps of quantitative measures of vegetation health and overlay these with soil contamination isopleths.

Woodward Clyde Comments - 2.0 (24 September 1985):

2.0 COMMENTS ON ASSESSMENT OF DAMAGE TO NATURAL RESOURCES AT NWS CONCORD, CALIFORNIA

Woodward Clyde Comments - 2.1 (24 September 1985):

2.1 PHYSICAL DAMAGE

In Chapter 2 the authors tabulate the amount of damaged acreage for seven different criteria and for the aggregate damage. These tabulations should be accompanied by isopleth maps showing quantitative damage levels for the various criteria. The maps should be of a larger scale and be more readable than the maps presently used. The maps should show all sampling locations including location identification numbers and damage levels.

Also in chapter 2 the authors speculate about air quality impairment because of elevated soil lead levels. Instead of speculating, the authors should either show impairment of air quality or delete all reference to it. The authors should choose a criterion for impairment, e.g., significant exceedance (alpha = 0.05) of 20% of the permissible Exposure Limit (OSHA) for lead, then take multiple air samples (NIOSH method) at the NWS boundary down wind of locations with excessive soil lead.

Response to Woodward Clyde Comments - 2.1 (24 September 1985):

This comment was appreciated and has been addressed in part in the Final Report of the Feasibility Study of Contamination Remediation, Volume III: Figures, Figures 19, 26,

28, and 33.

Woodward Clyde Comments - 2.2 (24 September 1985):

2.2 MONETARY DAMAGE

In section 3.5 the authors calculate the value of non-market-based damages to endangered species habitats. Implicit in this calculation are the following assumptions: a) all 109 acres would be prime Salt Marsh Harvest Mouse (SMHM) habitat were it not contaminated; and b) The entire 109 acres is uninhabitable by the SMHM due to contamination. Both of these assumptions are incorrect. Only a small portion - the habitat suitability assessment indicates marginal suitability in limited areas-of the 109 acres would otherwise be SMHM habitat. Of that only a few acres are so contaminated or so denuded as to be completely uninhabitable. The value of damages to SMHM habitats is, therefore, approximately $20,000.

Woodward Clyde Comments - 3.0 (24 September 1985):

3.0 COMMENTS ON FEASIBILITY STUDY OF CONTAMINATION AT NWS CONCORD, CALIFORNIA

In Section 3.3 the authors make a statement about the general goal of a remediation program of NWS Concord. A statement of specific goals should then follow. These goals are: a) protection of endangered species; b) protection of wildlife generally: c) protection of human health; d) protection of vegetation: and e) protection of aesthetic values. The authors should then quantitatively evaluate each alternative relative to each specific goal. First, though, the authors should clearly state that human activity can not destroy heavy metals, only move them, hide them, or change their concentration. That is, remediation is limited to dispersing the heavy metals so that concentrations pose insignificant risks, or hiding the heavy metals-either on or offsite-so they are less objectionable.

Quantitative evaluation of each alternative means estimating the net loss or gain, relative to the no action alternative, for each specific goal. For endangered species, the authors must compare the effects of natural dispersal with the effects of earth moving, contaminated soil transportation and other invasive human activities. For human health, the authors must compare the number of lives shortened by the no action alternative with the number shortened by accidents and exposures due to activities in the other alternatives. For vegetation the authors must compare how well and how quickly each alternative restores the status quo ante. For aesthetic values, the authors must compare whatever present losses there are with losses or gains due to each alternative. For all comparisons, the authors must document how each estimate was made. Only with quantitative information, can

the best alternative be selected.

Response to Woodward Clyde Comments - 3.0 (24 September 1985):

The Navy prepared a (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, to comply with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended; the National Oil and Hazardous Substances Contingency Plan; and guidance issued by the Environmental Protection Agency. General and specific goals were established and a quantitative evaluation of each alternative was presented in the (Second Revised) Final Draft Feasibility Study Report.

Woodward Clyde Comments - 4.0 (24 September 1985):

4.0 GENERAL COMMENTS.

Woodward Clyde Comments - 4.1 (24 September 1985):

4.1 ILLUSTRATIONS.

Illustrations, especially maps, need improvement. Illustrations are included in reports to enhance the readers understanding. They should be prepared with that goal in mind. Maps should be of a legible scale, clear, well labeled and provided with a good legend.

Response to Woodward Clyde Comments - 4.1 (24 September 1985):

The Navy prepared a (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives, which included detailed plates, and a Final Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures.

Woodward Clyde Comments - 4.2 (24 September 1985):

4.2 TABLES

Tables need improvement, also. Tables should be clear, legible, and understandable. Footnotes should be used liberally to explain abbreviations, or words and phrases with special meanings. Short tables should be included with the text. Long tables should be placed in appendices. In all cases, tables should be prepared with the goal of reader understanding.

Response to Woodward Clyde Comments - 4.2 (24 September 1985):

The Navy prepared a (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at Naval

Weapons Station, Concord, California, which included tables and graphs which are as legible as possible.

Woodward Clyde Comments - 4.3 (24 September 1985):

4.3 EDITING

The reports should be extensively edited to remove duplications, contradictions, and typographical errors.

Response to Woodward Clyde Comments - 4.3 (24 September 1985):

The Navy prepared a (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, which was extensively edited.

3.9 COMMENTS SUBMITTED BY SOUTHERN PACIFIC TRANSPORTATION COMPANY IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Southern Pacific Transportation Company Comments - General (25 September 1985):

Reference is made to your Public Notices with which you furnished for public comment the final draft RI/FS and Assessment of Damage to Natural Resources to the Naval Weapons Station, Concord, California. Enclosed herewith are Southern Pacific Transportation Company's comments.

Because of the complex technical issues presented in these documents, Southern Pacific's engineers and consultants have not found the comment period to be adequate time to study and to respond fully to some of the highly technical points raised in the documents.

For this reason, Southern Pacific reserves the right to submit additional comments after the expiration of the formal comment period but prior to the United States Navy's promulgating a formal decision as to the cleanup plan to be implemented.

Southern Pacific Transportation Company Comments - Introduction (25 September 1985):

This report presents a critique of the Remedial Investigation/Feasibility Study (RI/FS) and Assessment of Damage to Natural Resources for the Naval Weapons Station - Concord (NWSC) prepared by ERM-West and ERM-Southwest, Inc. on behalf of Southern Pacific Transportation Company. This critique is submitted in response to the Department of the Navy Public Notice and solicitation of comments dated 8 August 1985. Due to the limited comment period and nonavailability of some support

documents, the primary conclusions are summarized below and will be discussed further in following comments. Southern Pacific reserves the right to make subsequent comments.

Southern Pacific Transportation Company Comments - 1 and 2 (25 September 1985):

1. The heavy metal contamination alleged in the RI/FS and the areas identified with such contamination may not pose a significant risk to public health and the environment. No basis is provided in the RI/FS to support the statement in the FS in Section 3.3 that "the contamination . . . is a present or potential threat to human, wildlife, and vegetation populations using the sites or areas adjacent to the contamination."

2. The hypothetical migration of contaminants via the potential migration pathways identified in the RI and the FS (Section 3.1) has not been evaluated. No calculations nor the necessary testing and studies for such calculations have been completed to substantiate the present or potential for contaminant migration. Accordingly, the alleged threat to offsite areas is not supported by the RI/FS.

Response to Southern Pacific Transportation Company Comments - 1 and 2 (25 September 1985):

Sufficient data have been collected to indicate that there is substantial adverse toxicological impact on wildlife associated with the contaminated sites. See Section 4.4 of the Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California.

The mouse and vole tissue analyses clearly show substantial bioaccumulation of toxic metals. The clam biomonitoring data clearly indicate toxic metals are migrating into surface waters and can accumulate in aquatic animals. While it does not appear that hazardous substances have been released into Suisun Bay to date, there is still a potential for release as long as the hazardous substances are allowed to remain in an environment that is subject to flood and tidal activity.

Southern Pacific Transportation Company Comments - 3 (25 September 1985):

3. The alleged "threat posed to human health through ingestion or inhalation of contaminated dust particles" or through "volatilization, chemical vapors or co-evaporation" alleged in the FS (Section 3.1) is unsubstantiated. No effort has been made to quantify potential exposure and thereby assess the risk of such exposure. Such a risk assessment is required by the National Contingency Plan. Without one, no remedial action can be justified.

Response to Southern Pacific Transportation Company Comments - 3 (25 September 1985):

No data have been collected for air quality on site. Observations have been made of dust generation from barren areas as the wind blows across these areas and especially when someone walks over the areas. Remediation to address other pathways of contaminant migration will also eliminate potential exposure to dust when barren areas are restored.

Southern Pacific Transportation Company Comments - 4 (25 September 1985):

4. The stated environmental goals of the proposed remediation "are to abate the release and potential release of hazardous substances into the environment from the various contaminated sites in a manner that does not result in significant long-term adverse impacts to critical wildlife habitat." (emphasis added). With the exception of Alternative 1 (No Action) and Alternative 2 (Increased Environmental Monitoring), the proposed alternatives will result in the irreparable long-term adverse impact on wetland areas. The ability to restore wetland areas as proposed in Alternative 6 is not substantiated. It is doubtful that restoration to present productivity levels is achievable even within the typical 30-year period of time typically allotted for post remediation monitoring.

Response to Southern Pacific Transportation Company Comments - 4 (25 September 1985):

The Navy evaluated both the long term benefits of remediation and the short term impacts of remediation. Balancing was conducted in a manner consistent with the requirements of CERCLA, as amended, and implementing regulations and guidelines. As a result of this balancing effort, the area proposed for active remediation in the Final Draft Report of the Feasibility Study of Contamination of the Naval Weapons Station, Concord, California, and the (Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at the Naval Weapons Station, Concord, California, was substantially reduced in the (Second Revised) Final Draft Report of Contamination Remediation at the Naval Weapons Station, Concord, California. The adverse impact on wetland areas to be remediated will be short-term, not irreparably long-term, because of the ability to restore the wetlands.

Southern Pacific Transportation Company Comments - 5 (25 September 1985):

5. The "Detailed" Development of Alternatives (FS, Section 8.0) is not detailed and is wholly inadequate for

decision-making purposes. In particular, the basis for defining the areas requiring remediation is not provided. Similarly, the level of detail typically required for substantiating the basis for FS remediation cost estimates (FS, Section 9.0) is not provided. Consequently, no selection can be made based on the required evaluation of the relative accuracy of the costs and cost effectiveness of the alternatives.

Response to Southern Pacific Transportation Company Comments - 5 (25 September 1985):

Both the Final Draft Report of the Feasibility Study of Contamination at the Naval Weapons Station, Concord, California, and the (Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at the Naval Weapons Station, Concord, California, provided sufficient information for a comparative evaluation of alternatives. However, in response to the request for more site specificity and more details on alternatives, as well as amendments to CERCLA, the Feasibility Study has been substantially revised. The (Second Revised) Final Draft Feasibility Study Report complies with CERCLA as amended, and implementing regulations and guidance. The descriptions of alternatives, evaluation criteria, and cost estimates are considerably expanded in the (Second Revised) Final Draft Feasibility Study Report. The revised document provides sufficient detail to enable comparative evaluations of a range of alternatives.

Southern Pacific Transportation Company Comments - 6 (25 September 1985):

6. The RCRA Alternatives (3 and 6) and the Offsite Mitigation Alternative (7) are clearly characterized by exorbitant costs. In addition, the RCRA Alternatives, in particular, are subject to significant price escalation due to the diminishing capacity of commercial disposal facilities and the trend for additional disposal taxes. It is doubtful that the given costs, for example, take into account the added costs that will result from implementation of the provisions of the Hazardous and Solid Waste Act of 1984 (HSWA). Current EPA procedures require an evaluation of the risks and protection provided by each alternative. As documented by EPA's recent reevaluation of remedial alternatives for the Crystal Chemical Superfund Site, the RCRA Alternatives do not pose substantiable added protection over a capping in place alternative (Alternative 4). Selection of any of these exorbitantly, expensive alternatives is not consistent with the National Contingency Plan. Furthermore, RCRA regulations are not mandated in Superfund remedial actions.

Response to Southern Pacific Transportation Company Comments - 6 (25 September 1985):

The (Second Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California was prepared in accordance with the requirements of CERCLA, the NCP, and implementing regulations and guidance. As a result of a detailed balancing of short term impacts and long term benefits of remediation, the costs for remediation of the sites under investigation have been substantially reduced, while maintaining protection of the human health and the environment. The (Second Revised) Final Draft Feasibility Study Report identifies RCRA as an ARAR. Cost estimates developed in the Final Draft Report of the Feasibility Study of Contamination at Naval Weapons Station, Concord, California included provisions for meeting the requirements of RCRA (Hazardous and Solid Waste Act). However, because of considerable changes in the requirements for alternative evaluation, the (Second Revised) Final Draft Feasibility Study Report includes substantially more detail on the costs of alternatives. In addition, communication with vendors of disposal services indicated that there were no substantial problems associated with landfill capacity. Two vendors expressed a willingness to accept the waste materials. Capping in place may, under some circumstances, be an appropriate remedy. However, for a variety of technical reasons, capping in place is not believed to be an appropriate remedy for sites evaluated in this investigation.

Southern Pacific Transportation Company Comments - 7 (25 September 1985):

7. The evaluation of alternatives reflects only a cursory, subjective assessment and is of insufficient detail to satisfy the National Contingency Plan.

Response to Southern Pacific Transportation Company Comments - 7 (25 September 1985):

The evaluation of alternatives, in the (Second Revised) Final Draft Feasibility Study Report, has been substantially augmented and meets the requirements of CERCLA, the NCP, and implementing guidance.

Southern Pacific Transportation Company Comments - 8 (25 September 1985):

8. The evaluation of alternatives (FS, Section 9.0) did not include an analysis of the construction and transportation risks posed by these alternatives. Construction activities pose substantial risk for the release of contaminated particulate dust. Available dust control techniques are only partially and intermittently effective to control such releases. The risk of exposure due to construction activities and release of dust orders of magnitude more contaminated than current

emissions warrants quantification in order to evaluate adequately the relative risks and protection of each alternative. Similarly, the probability of a traffic accident and death during transportation of the over 13,000 20-ton truck loads of excavated contaminated material is almost certain. The associated risks of such accidents can be significantly greater than the risks posed by no action.

Response to Southern Pacific Transportation Company Comments - 8 (25 September 1985):

The evaluation of alternatives, in the (Second Revised) Final Draft Feasibility Study Report, has been substantially augmented and meets the requirements of CERCLA, the NCP, and implementing guidance. The possibility of dust generation and traffic accidents during remediation is discussed in the (Second Revised) Final Draft Feasibility Study Report. Dust will probably not present a significant problem because most of the active remediation technologies are applied in a moist environment. However, there are sufficient dust palatives and dust prevention measures that can be implemented to ensure that dust does not present a public health problem. The (Second Revised) Final Draft Feasibility Study Report discusses the possibility for increased traffic and the possibility for traffic accidents. An alternative transportation mode, i.e., rail transport, is included as a possible means of transporting contaminated materials to appropriate disposal sites. Use of this mode of transportation offers increased safety and potential cost savings.

In addition to the above, revisions to the remediation decision rules have significantly reduced the volume of materials that will require disposal. Assuming implementation of an excavation alternative on all sites, approximately 45,446 cu. yds. of soils would require transportation to a disposal facility (note that this includes a 40 percent bulking factor). Assuming an 18 cu. yd. capacity truck, this is approximately 2,524 truck loads. If rail is chosen as the mode of transport, this is about 710 rail car loads.

Southern Pacific Transportation Company Comments - 9 (25 September 1985):

9. The classification of the proposed excavated contaminated soils as hazardous wastes is not substantiated. No EPA Extraction Procedure (EP)-Toxicity data is provided. It is likely that a significant portion of the soils identified for excavation are nonhazardous.

Response to Southern Pacific Transportation Company Comments - 9 (25 September 1985):

Substantial numbers of EP and TTLC/STLC data have been developed for the sites under investigation. In general, the materials of concern have been found not to exceed the EP criteria and are not believed to be regulated under RCRA. However, a substantial quantity of materials exceeds the TTLC/STLC criteria and are believed to be a California Class I waste. Alternatives developed for the (Second Revised) Final Draft Feasibility Study Report have a materials classification element that will be used to minimize the amount of materials requiring Class I disposal.

Southern Pacific Transportation Company Comments - 10 (25 September 1985):

10. The reference sites used to obtain control background data are not necessarily analogous to each of the soil types and environments found at the other sites. It is questionable that heavy metal concentrations alleged to be elevated in portions of the site are representative of the corresponding soils and environments.

Response to Southern Pacific Transportation Company Comments - 10 (25 September 1985):

The reference sites selected do relate to the soil types on Navy property. Reference sites south of Port Chicago Highway (BK133) are similar to soils in RASS 3 and RASS 4. Reference sites (BK116) northwest of RASS 1 and RASS 2 are similar to soils in RASS 1. RASS 2 soils resemble both Reference site soils (BK133 and BK116). There is no doubt that the contaminant concentrations found on RASS 1, RASS 2, RASS 3 and RASS 4 are significantly elevated relative to appropriate reference soils.

Southern Pacific Transportation Company Comments - 11 and 12 (25 September 1985):

11. The clam and plant uptake studies documented in the RI (Section 2.0) do not necessarily show a strong correlation. For example, the clam arsenic uptake (as measured in tissue metal concentration) is similar for both the allegedly contaminated AA site and uncontaminated reference sites BK. In some cases (e.g., selenium at AA and cadmium at AA and BK), higher uptakes are noted for sites with relatively low metal concentrations. It is evident that the factors controlling clam and plant uptake were not adequately understood or controlled in the studies.

12. The alleged potential for contaminant migration is not supported by the clam and plant uptake studies. The conclusion of the clam uptake study was that the observed uptake "caused no physiological stress in the clams" and that "the

metals in the surface water NWS Concord will have minimal environmental impact." A similar conclusion is inferred from the Typha plant uptake studies. Except perhaps for arsenic, similar conclusions were reached in the flooded plant studies. The upland plant studies indicated no statistical differences in uptake of metals from site soils as opposed to reference areas. The earthworm studies are questionable given the lack of understanding and control of the factors affecting growth and survival. In summary, the studies do not demonstrate that the "contaminated" sites are presently impacting or potentially may impact human health, welfare or the environment. The basis for remedial action is unsubstantiated.

Response to Southern Pacific Transportation Company Comments - 11 and 12 (25 September 1985):

We agree that certain contaminants such as arsenic did not show statistical differences in clams for the locations evaluated. The mechanisms controlling bioaccumulation were not addressed in these studies. However, lead, cadmium, and zinc did show substantial bioaccumulation above reference areas at certain locations associated with high soil concentrations of these metals. These data do support the potential for contamination migration and bioaccumulation.

Southern Pacific Transportation Company Comments - 12, 13, 14, 15, 16, 17, 18, 19, and 20 (25 September 1985):

12. In the introduction, mention is made of a description by Lee in the RI of the NWS environment "in terms of pathways of contaminants into ecosystem components." This description is one about hypothetical pathways which may not apply to the NWS area.

13. Allowable agricultural soil metal levels are used in Section 2.1.1 to define "damage" areas with excess metal levels. It is inappropriate to base remedial decisions on this discussion since the analysis is based on nonpublished references that have yet to be peer-reviewed. It is further inappropriate to use agricultural-based criteria for marshy areas such as AA, AB and KS where agricultural use is not likely and where wetland soils are known to have "an enormous capacity to adsorb and retain metals." As noted in the critique of the RI/FS, the potential for damage due to the reported metal concentrations was not substantiated by the plant uptake, clam and earthworm studies. Other areas are clearly used for industrial purposes and have no potential use for agricultural purposes. Therefore, potential damage based on agricultural criteria are inappropriate.

14. Throughout the text, estimates of affected acreage are provided. There are no sampling location maps with metal

level data provided nor discussion of the basis by which potentially affected areas were defined.

15. The applicability of the reported 500 mg/kg lead criterion level for ingestion of soil or dust has not been substantiated. Appropriate comparison of lead dust emission concentrations versus air limits is necessary to substantiate the alleged risk.

16. Total threshold limit concentrations may be used by the State of California to identify potentially hazardous soil but such total metal levels may not represent areas which pose a substantial risk given current land use. A better basis to evaluate potential hazardous levels is soluble metal concentrations.

17. The selection of a pH of 5.0 as a criterion is not supported. Others may select a pH of 4.5 as a more appropriate cutoff.

18. The alleged zinc-induced iron deficiency is based on field observations of stressed growth which may or may not be related to zinc soil levels. It is stated that the field observations "can be related to the soil content of metals" but no controlled study has been performed to substantiate the alleged cause of the field observations. The use of an agricultural-based criterion for zinc soil levels is not appropriate.

19. The zinc and cadmium plant tissue content data were not used consistently. In Section 4.4, the plant tissue content is said to have serious implications for other biological components but the serious damage to those components is not quantified nor substantiated.

20. Data from earthworm studies and soil core macroinvertebrate samplings are used in the attempt to document damage to soil invertebrates in Section 2.5. However, little documentation is provided to document the analogous nature of the reference sites and area AA on the appropriateness of the earthworm species.

To the contrary, the earthworm study data suggested that the earthworm tissue metal contents were not as high as reported in the literature and furthermore, earthworm growth was limited in both the reference and contaminated soils by natural factors unrelated to metal contaminant level. Therefore, any use of the earthworm data to denote damages is wholly inappropriate. In addition, the claim that a statistically significant difference (P-0.05) between the macroinvertebrate population diversity and density of the AA and reference areas is not substantiated in the reference study. Indeed, the reference

study indicates that the sample size was too small for valid statistical comparisons. The estimated total loss of soil animals is based on inappropriate manipulation of study data.

Southern Pacific Transportation Company Comments - 21, 22, 23, and 24 (25 September 1985):

21. In Section 2.6, the results of the clam bioassays are purported to indicate movement of metals into surface water. To the contrary, the clam bioassays indicated that clam tissue metal levels did not exceed metal levels reported in other studies for the bay and "that metals in the surface water NWS Concord (sic), will have minimal environmental impact." No FDA limits have been set for earthworms contrary to the allegation in the report. The FDA limits are based on other edible species.

22. In Section 2.8, it is alleged that there exists "an established human exposure concentration of 500 mg/kg" in the EPA 1977 Air Quality Criteria for Lead document. This document sets an ambient air quality criteria and the connection between it and the given soil concentration limit is not substantiated in the "damage" report. No calculations have been provided to substantiate that any employees or passersby will be exposed to levels in excess of the air quality criteria. While it may be true that wildlife exposure to lead-contaminated dust may have some impact, even the potential for such an impact is not substantiated and in no way "represents a definite risk for wildlife at NWS Concord."

23. Similarly, the alleged food quantity and quality damages is unsupported. The "toxicological studies" in the RI were plagued by a lack of control and understanding of the factors affecting uptake and growth and no valid discussion of these studies "indicates conclusively that wildlife are being exposed to contaminated food sources that threaten their health and well-being."

24. The Economic Evaluation of Natural Resource Damages is plagued by the Navy's own admission by a lack of data. Indeed, none of the studies have actually quantified damages but rather have been used to allege the unsubstantiated potential for damages. While various methods of estimating damages are discussed, the only legitimate estimate is the total restoration cost if the assumption that society is willing to pay this cost is accurate. The various other estimates cannot be added since they reflect estimates for the same alleged potential damages. In addition, the true estimates should include the deduction for the damage cost of the restoration. In the final analysis, the proposed full restoration will probably result in significantly greater short-term detrimental impacts than very limited remedial measures for hot spot areas.

Response to Southern Pacific Transportation Company Comments - 21, 22, 23, and 24 (25 September 1985):

The clam biomonitoring data indicate that metals are migrating in surface water at certain locations on Navy parcels. The use of molluscs to indicate pollution of surface water is employed throughout the world in the Mussel Watch. Bioaccumulation of contaminants by molluscs is used to make decisions about the need to clean up pollution of surface water. This approach is widely accepted by the scientific community. The clam biomonitoring data at NWS Concord indicate migration of metals into surface water and a substantial potential for harm to aquatic organisms. The migration of metals into surface waters has been limited to certain parcels on Navy property and fortunately does not appear to have moved out into Suisun Bay. While the Bay waters may not have been adversely impacted, surface waters on Navy property have been, and are continuing to be, substantially impacted. The clam biomonitoring data indicate migration of contaminants into food chains and potential harm to wildlife associated with the sites.

FDA action levels were considered to give perspective to the earthworm data. If there is concern for FDA action levels in food for human or animal consumption, it is reasonable to consider similar levels in food for wildlife consumption, especially endangered species.

While data collected in the earthworm bioassay indicated that the bioaccumulation of metals in earthworms are not acutely or chronically toxic, the data do clearly indicate that metals are, in fact, bioavailable and are migrating into soil invertebrates and consequently into food chains. Additional sampling of mice on the contaminated sites clearly demonstrated that metals did in fact migrate into the food chain associated with the captured mice. See Final Report of Feasibility Study of Contamination Remediation, Volume II: Biological Assessment.

3.10 COMMENTS SUBMITTED BY GETTY OIL COMPANY IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Getty Oil Company Comments (25 September 1985):

Pursuant to Public Notice dated August 8, 1985 and subsequent extension of the deadline for submission of such comments to September 26, 1985, Getty Oil Company submits the following comments on the Final Draft Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California ("Remedial Investigation") and Final Draft Report of the Feasibility Study of Contamination at Naval Weapons Station, Concord, California (Feasibility Study).

Getty Oil Company Comments - Data Format and Presentation (25 September 1985):

Data Format and Presentation

The manner in which the data are presented in the Remedial Investigation is very difficult to understand. The results of the chemical analyses are presented as bar charts, but the identification of the sample number associated with each bar is missing. Cross checking the results then becomes an uncertain process. For example, on Figure 2-7 (total soil concentration of zinc) there are eleven values shown for the G-1 site, but in Appendix Table 2-B1 there are only seven values reported for the same site.

Response to Getty Oil Comments - Data Format and Presentation (25 September 1985):

An attempt to present the data more clearly evolved in the Final Remedial Investigation Report. However, the chemical analysis of results are presented in Figure 2-7, Table 2-B1, and Table 2-B6 (see p 200-203, p 206 of the Final Remedial Investigation Report. Figure 2-7 was an attempt to provide the reader with a pictorial view of the frequency and relative concentrations of zinc on the various parcels of land under investigation. The location value from Table 2-B1 and Table 2-B6 correspond to the hash marks on the horizontal axis of Figure 2-7. The reader can identify sites in Figure 2-7 and then find the corresponding site in Table 2-B1 or Table 2-B6 or vice versa. Only seven of the eleven G-1 sites shown in Figure 2-7 are found in Table 2-B1. The four additional sites are found in Table 2-B6.

Getty Oil Company Comments - QA/QC Procedures - Spatial Representation of the Samples (25 September 1985):

QA/QC Procedures

The Quality Assurance/Quality Control procedures followed by Brown and Caldwell for February 1985 and Anderson Geotechnical in the previous reports -- are not clearly presented. It is therefore difficult to evaluate their analytical results.

Spatial Representation of the Samples

The maps presented in the Remedial Investigation are not adequate. For example, they do not indicate the boundaries of the sites and, while the sample locations are vaguely indicated, the identification of which sample came from each location is missing. Such a map should have been a part of the report. Evidently, a grid pattern was developed for the entire

area but nowhere in the report is there a discussion of this grid pattern. There is also no indication of whether sample collection was randomized on or within the grid or was guided by some other mechanism. Without knowledge of the grid pattern, it is not possible to relate analysis results to sample location.

Response to Getty Oil Comments - QA/QC Procedures - Spatial Representation of the Samples (25 September 1985):

The QA/QC procedures of Brown and Caldwell for February 1985 were essentially similar to the WES procedures. NBS sediment standard data are presented on page 211 of the Final Remedial Investigation Report. QA/QC procedures for the Draft Confirmation Study have not been reported.

Efforts to improve data presentation, etc., evolved into the (Second Revised) Final Draft Feasibility Study Report. In addition, data were presented in the Final Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume III: Figures, and in drawings submitted to the State of California Regional Water Quality Control Board. The sampling plan was formulated based on previous soil and water data, historical information, and the potential pathways for contaminant mobility. Three samples were collected at some locations and one sample was collected at the other locations. The triplicate samples were used in statistical comparisons. This sampling plan reduced the cost of the investigation by allowing a selected number of sample locations to be tested extensively while other sample locations received one-third the cost and effort.

Getty Oil Company Comments - Sample Descriptions - Interpretation of Results - Criteria for Identifying Hazardous Soils (25 September 1985):

Sample Descriptions

Descriptions of the soil samples are not available. Physical description of the soil samples -- color, grain size, texture, etc. -- are useful for interpretation of the sample origin and whether or not it has been disturbed. The mode of origin of the sediment -- marsh, stream, or alluvial deposit -- coupled with the spatial distribution of the samples is very useful in determining whether the contamination occurred in place or whether contaminated material was transported to that location.

Interpretation of Results

There are several instances where, because of the deficiencies noted above, there is a lack of clarity in the interpretation of the results. In Section 2.2.1, page 124 of the

Remedial Investigation, the statement is made that "the extent of metal migration across the parcels are (sic) clearly indicated." Given the manner of the data presentation, it is difficult to support this statement at all, much less have it 'clearly indicated.' such example of this is in the bar charts indicating the concentration of metals at the site. Figure 2-7 indicates eight values over 1,000 ppm for zinc on the G-1 site. The data in Table 2-B1 show that six of these values are from only two locations (three replicates from each sample site). The other two values cannot be located in the Table. Therefore, while Figure 2-7 indicates eight locations of high zinc concentrations on the G-1 site, only two locations are supported from the data given in Table 2-B1 and the conclusion may be misleading.

The Remedial Investigation Report also lacks unequivocal identification of the source of the contamination. There is a lengthy discussion of the hydrology of the area with the conclusion that the contaminants could migrate downstream during flood events. There is no discussion of whether or not this has already occurred or whether the contamination present on the lower sites including G-1 could be there as a result of sedimentary deposition. In fact, that is the conclusion reached in the Anderson Geotechnical report. The Anderson Geotechnical report states that the contamination present on the G-1 site is related to the stream and that contamination is not present elsewhere on the site.

The interpretation of the clam biomonitoring results tends to support this conclusion. In Section 2.2.3, page 124 of the Remedial Investigation report, the presence of Pb in clams planted on the G-1 site is interpreted as being evidence for contamination moving from the soil on that site. However, the report also states that the clams were planted in moving water and, therefore, it seems that the source of the lead could be anywhere upstream.

Criteria for Identifying Hazardous Soils

The criterion used for identifying hazardous levels of contamination in the soils is apparently the maximum allowable concentration for sewage sludge applications. How this value relates to soil contamination as hazardous waste from industrial sites is not discussed. Also not clear are the captions of the figures showing contaminant distribution. The captions read "Distribution of excessive soil zinc," for example. There is no discussion of what constitutes 'excessive.'

Response to Getty Oil Comments - Sample Descriptions - Interpretation of Results - Criteria for Identifying Hazardous Soils (25 September 1985):

Descriptions of the soil samples are not available.

The soil sampling was not conducted to determine the origin of the soil, but rather to determine the nature and extent of contamination.

Figure 2-7 clearly shows 8 locations with zinc concentrations above 1000 ppm. Six of these locations are shown in Table 2-B1. The two additional locations are shown in Table 2-B6.

This comment, as relates to the Final Draft Report of the Feasibility Study of Contamination at the Naval Weapons Station, Concord, California, is factually incorrect. The MASSA criterion was only one of the criteria evaluated. In addition to MASSA, such criteria as the California TTLC/STLC test were also evaluated. Two criteria relate to the classification of a material as a hazardous waste: the US Environmental Protection Agency EP and the State of California TTLC/STLC. Sampling and analysis of soil throughout the areas covered by the feasibility study indicate that, in general, the materials do not exceed the EP criteria and therefore are not believed to be regulated under RCRA. However, significant numbers of samples were found to exceed the TTLC/STLC criteria and are therefore believed to be classified as California Class I wastes.

In response to the amendment of CERCLA and several comments similar to the above, additional criteria were evaluated in the (Second Revised) Final Draft Feasibility Study Report. In the (Second Revised) Final Draft Feasibility Study Report, approximately eighteen potential criteria were evaluated as potentially sufficient to protect the human health or the environment. Decision rules developed for each RASS are presented in Section 3.5.3 of the (Second Revised) Final Draft Feasibility Study Report.

Getty Oil Company Comments - Conclusion (25 September 1985):

The foregoing comments are by no means exhaustive, but are intended to identify some of the more prominent deficiencies in the subject reports. These deficiencies suggest that there are serious problems with the way in which the Remedial Investigation was conducted and raise questions as to the validity of the conclusions reached therein.

3.11 COMMENTS SUBMITTED BY DAVID KEITH TODD CONSULTING ENGINEERS, INC. (ON BEHALF OF CHEMICAL AND PIGMENT COMPANY) IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

David Keith Todd Consulting Engineers, Inc. (on behalf of Chemical & Pigment Company) Comments (25 September 1985):

I have reviewed the recent reports by C. R. Lee, et

al., on the remedial investigation and damage assessment at Naval Weapons Station, Concord, California. My comments are presented below.

Remedial Investigation Report

On page 48 and 49, there are inconsistencies between the action levels on the one hand, and the "normal" values on the other, especially with regards to cadmium. Also, "normal" needs to be defined.

Assessment of Damage to Natural Resources

On page 6, a table of TTLC values should be presented. Also, background values of metals should be presented for reference. Arsenic is absent from Table 1, page 4 yet arsenic is one of the major contaminants. Arsenic is also missing from Table 2, page 7. On figure 5, page 9, arsenic is presented but yet no standard has previously been stated. On Figure 6, page 10, a legend is needed to clarify meanings of points. Two columns of values on Table 3, page 23 do not have the units stated.

On Figure 20, page 24, one must assume that "excessive" means "10 % yield reduction" (Table 3, page 23), since the threshold value for Figure 21 is 290 mg/kg. However, on Figure 21, page 25, "excessive" for cadmium is taken as the "Critical Content" value of 8 mg/kg and not the "10 % yield reduction" value of 15 mg/kg; which is correct? On page 26, it is stated that both ES and G-1 areas have "seriously damaged" plant food quality based on elevated cadmium contents in plant tissue; however, only one plant sample in each area out of at least 20 samples showed cadmium levels above the critical content (see figures 2-18, 2-26, 2-35, 2-42, Remedial Investigation Report).

On page 35, the table shows 0.67 acres of area AA with damaged air quality, yet this area is not represented by a dot on Figure 28 as the other areas are. Also on Figure 28, page 36, how can areas be represented by points? On page 37 through 38, neither the methodology nor the criterion by which food reduction is evaluated, is presented. In general, how were areas determined, as shown on page 12 and elsewhere? Values imply accuracy to one-hundredth of an acre.

On page 46, there is extensive discussion of the Navy's responsibility to preserve the wetlands in the subject areas, yet the impact of such land use (and resulting restrictions) on market value is not considered in section 3.3, Loss of Market Value of Land.

Response to David Keith Todd Consulting Engineers, Inc. (on behalf of Chemical & Pigment Company) Comments (25 September

1985):

These values are not inconsistent. These are two different sources of information. Chaney describes the typical concentration of metals found in agricultural crops across the country. The FDA published guidelines on the intake of metals allowed. Exceedence of that intake would result in action by FDA to remove the foodstuff from the market. Normal means found under typical conditions of environmental contamination below action levels.

3.12 COMMENTS SUBMITTED BY CANONIE ENGINEERS (ON BEHALF OF SANTA FE INDUSTRIES, INC., AND ATCHISON, TOPEKA, AND SANTA FE RAILWAY COMPANY) IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - A1, 2, 3, 4 (26 September 1985):

A. Introduction and Qualifications

1. My name is Phillip Antommaria, Executive Vice President of Canonie Engineers Incorporated. I hold degrees in Microbiology, Environmental Engineering and Law and have been active in the preparation of remedial investigations, feasibility studies, site remedial designs and construction for hazardous material sites for the last twenty years.

2. Canonie Engineers is an engineering corporation that was established to design, construct, and operate remedial measures for hazardous waste sites. Canonie has extensive experience in this field and has been responsible for many of the major clean ups at both private industry and federal Superfund sites within the United States. I personally have been directly responsible for technical issues involving investigation, design, and construction of many of these major works.

3. I have been retained by Santa Fe Industries, Inc. and the Atchison, Topeka and Santa Fe Railway Company to review and comment on the various reports prepared for the U.S. Naval Weapons Station in Concord, California. These documents include:

(i) "Navy Assessment and Control of Installation Pollutants: Initial Assessment Study of Naval Weapons Station, Concord, California", dated August 23, 1982 prepared by Ecology and Environment incorporated in draft and final form;

(ii) "Draft Confirmation Study Report, NWS Concord," prepared by Anderson Geotechnical Consultants Incorporated and Brown and Caldwell Consulting Engineers and dated September 1984;

(iii) "Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California," by Charles R. Lee, et al., the Environmental Laboratory, Department of the Army, Waterways Experiment Station, dated August 1985;

(iv) "Feasibility Study of Contamination of Naval Weapons Station, Concord, California", by M. John Cullinane, Jr., et al., of the Environmental Laboratory of the Department of the Army, Waterways Experiment Station, dated August 1985;

(v) the public notice of preparation of the final draft report, remedial investigation, and feasibility study dated August 8, 1985; and

(vi) "Assessment of Damage to Natural Resources at Naval Weapons Station, Concord, California," by Charles R. Lee, et al., Environmental Laboratory of the Department of the Army, Waterways Experiment Station, dated August 1985.

I have also reviewed site maps showing sampling locations. The maps were supplied upon my request.

4. Unfortunately, much of the supporting data that was used in the preparation of the reports cited above was not made available to me in timely fashion so that a detailed review and evaluation of the data by me has been restricted. In addition, the quality of many of the reproductions was such that detailed evaluation of the data could not be made. The comments and conclusions contained herein are based on the information available.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - A1, 2, 3, 4 (26 September 1985):

On 23 August 1985, Canonie requested that the Navy provide Canonie with certain documents and that the Navy provide Canonie with twenty days to submit comments in response to the Final Draft Report of the Remedial Investigation of Contaminant Mobility at the Naval Weapons Station, Concord, California (August 1985) and the Final Draft Report of the Feasibility Study of Contamination at the Naval Weapons Station, Concord, California (August 1985), which the Navy issued by public notice on 8 August 1985. On 28 August 1985, the Navy advised Canonie that:

> Some of the documents which you requested have already been produced to the document depository established at McCutchen, Doyle, Brown and Enersen for the cases styled as United States v. Allied Chemical Corp., et al, Civil No. C-83-5898 FNS (N.D. Calif.) and United States v. Chemical & Pigment Co., et al, Civil

No. C-83-5896 FNS (N.D. Calif.). Additional documents which you requested will be produced to the document depository by 3 September 1985. A third group of documents will be made available for inspection at the office of Charles M. O'Connor, Assistant United States Attorney, 450 Golden Gate Avenue, Room 16201, San Francisco, California, from 9:30 a.m. to 5:00 p.m. on 3 September 1985.

The Navy, thus, gave Canonie the time it requested to submit comments after the Navy provided Canonie with the documents it requested.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - B1, 2, and 3 (26 September 1985):

B. Summary and Conclusions

Based on my review of the limited available data, I conclude the following:

1. The data do not establish that the studied site presents sufficient environmental or potential human health risks to warrant the type or extensive scope of the studies performed by the Navy. Under federal criteria, the NCP Mitre Site ranking model is used to determine whether federal Superfund monies should be spent to study a particular site. It is my opinion that the ranking criteria to be used clearly show the type of study performed by the Navy to be inappropriate. If the proper screening and ranking were performed, using available data, the NCP Mitre criteria would not justify the expenditure of federal funds for remedial action at the portion of the NWS Concord under study.

2. Based on the studies performed, the site appears to pose no significant environmental or human health risk since the data do not indicate any significant adverse effects on surface water, groundwater quality, ambient air concentrations, wildlife including endangered species, aquatic ecosystems, and historical land uses.

3. Based on the data available, I conclude that the "No Action Alternative" should be selected. However, to confirm this conclusion, I recommend a time-limited monitoring program of surface water for chemical parameters (i.e. heavy metals).

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - B1 and B2 (26 September 1985):

Since its enactment in December 1980, Section 104 of CERCLA

has provided that:

> Whenever (A) any hazardous substance is released or there is a substantial threat of such a release into the environment, or (B) there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare, the President is authorized to act, consistent with the national contingency plan, to remove or arrange for the removal of, and provide for remedial action relating to such hazardous substance, pollutant, or contaminant at any time (including its removal from any contaminated natural resource), or take any other response measure consistent with the national contingency plan which the President deems necessary to protect the public health or welfare or the environment.

Prior to 1987, the Navy responded to the release, and the threatened release of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, through its Navy Assessment and Control of Installation Pollutants (NACIP) Program. In the course of its Confirmation Study under the NACIP Program, the Navy confirmed that hazardous substances, including arsenic, cadmium, copper, lead, selenium, and zinc, were released, or threatened to be released, on these parcels.

The toxicological evaluation in Section 4.4 of the Final Remedial Investigation Report was revised to better describe the potential environmental and human health risk as a result of the contamination on the parcels.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - B3 (26 September 1985):

This is merely a conclusionary statement on the part of Canonie. No information is provided to justify such a conclusion. The (Second Revised) Final Draft Feasibility Study Report includes monitoring as a part of the preferred alternatives. In preparing this report, the Navy evaluated a range of alternatives ranging from no action to extensive remediation using excavation and soil washing technologies. Based on evaluation in accordance with CERCLA, the NCP, and implementing guidelines, the no action alternative and the environmental monitoring alternatives were given lower rankings than the more positive remediation alternatives.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company)

Comments - B4 (26 September 1985):

4. I conclude that the critical habitat restoration program proposed should not be adopted. The program proposed is not a proven technology and, in fact, may cause irreversible damage to the critical habitat for the endangered species of concern and kill endangered species as the work is undertaken.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - B4 (26 September 1985):

While wetland restoration is not a proven technology, the Navy believes this option will succeed. Examples of both unsuccessful and successful sites in the San Francisco area are available and they provide valuable lessons and meaningful suggestions for assuring success. These recommendations will be followed in developing a detailed restoration and monitoring plan.

Major factors in unsuccessful projects have included a lack of specific objectives and a monitoring plan. the detailed restoration plan will include both items. There is often no long-term commitment to a project, but that commitment exists here, expressed plans for long-term monitoring and the intent and ability to make adjustments as needed.

The likelihood of successful establishment of the primary target plant species at Naval Weapons Station Concord, which is pickleweed, is evidenced at the Faber Tract, Salt Pond 3, and Muzzi Marsh. Harvey and Josselyn (1986, p. 568, Environmental Management, vol. 10, no. 5) state that "given appropriate substrate and tidal inundation, pickleweed will naturally recolonize a site in San Francisco Bay." Other plant species, such as cordgrass, are more difficult to establish, but are not appropriate at this site.

It is true that individuals of an endangered species (the salt marsh harvest mouse) will be killed during the proposed remedial activity. The Fish and Wildlife Service issued a no-jeopardy opinion concerning the proposed remedial action on 23 August 1988, indicating that the Fish and Wildlife Service does not believe that the endangered species will be destroyed. Both the Fish and Wildlife Service and the Navy believe that the probability of successful restoration is a valid assumption.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - B5 (26 September 1985):

5. Based on the available data, the criteria used in the studies to determine potential hazards are not appropriate

standards for this site based on the site's historical land use.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - B5 (26 September 1985):

In the Final Draft Feasibility Study Report, the (Revised) Final Draft Feasibility Study Report, and the (Second Revised) Final Draft Feasibility Study Report a variety of potential criteria were evaluated. These criteria were selected based on their potential for providing protection of human health and the environment. Potential criteria were evaluated in accordance with requirements of CERCLA, the NCP, and implementing guidance. Based on this evaluation, remediation decision rules were presented in Section 3.5.4 of the (Second Revised) Final Feasibility Study Report. Although historical land use may be considered, it is not the controlling factor in the determination of appropriate contaminant levels requiring remediation. This is particularly true for sites such as those located on Naval Weapons Station Concord, on which the protection of the environment is the primary driving force behind the determination of remediation standards.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - C1 (26 September 1985):

C. Basis for Summary Conclusions

The basis for the conclusions set forth above are:

1. Need for Detailed Superfund Evaluation and Study.

I first reviewed the criteria set forth in the NCP for ranking the environmental hazards posed by "Uncontrolled Hazardous Waste Sites." Those standards are set forth in 40 C.F.R. Part 300, Appendix A. Table I of this appendix contains a comprehensive list of factors which are to be used in ranking sites. A summary of the application of these factors to this site follows.

The first required consideration is of the potential for migration of materials from the site to groundwater, surface water, and air. Application of these criteria to the site indicates that the site should receive a low hazard ranking. I base this conclusion on the following:

a. The reports themselves conclude that migration of heavy metals to groundwater is not a factor at the studied site.

b. Surface water samples which were taken do not show concentrations of heavy metals above drinking water standards. Such data generally are sufficient to demonstrate a lack of impact on surface waters in evaluating potential Superfund sites.

Despite the above, the Navy nevertheless performed heavy metal uptake tests using the exotic Asiatic clam (Corbicula fluminea). Based on these studies, the study concludes that: "these data suggest that the uptake of metals by C. fluminea in the present study should cause no physiological stress on the clams and that metals in the surface water NWS Concord, will have minimal environmental impact." These data and the study's conclusion thus further indicate that migration of heavy metals to surface water is not a problem at the site.

c. Regarding possible migration by the air route, the existing site condition minimizes this concern. First, the majority of the site area is vegetated; therefore, it is unlikely that heavy metals will migrate by the suspension of soil particles in air. Second, even if some limited suspension occurred, it is unlikely that such migration would have any significant impact on human health since the nearest population center is approximately two miles away.

In summary, based on these considerations and the data set forth in the reports, the migration of heavy metals from the NWS Concord site via groundwater, surface water or air will not impact human populations or aquatic and terrestrial ecosystems off site.

The NCP criteria next require rating based on the potential for fire and explosion. Neither risk factor is present at this site.

Data from the site indicate that the heavy metals are immobilized in place (i.e. bound to the soil) and are not migrating, and, therefore, have little likelihood to move off-site in detectable concentrations. Stated differently, the metals are bound to the soil and pose little risk of either igniting or exploding. More fundamental, the metals detected at the site are not ignitable, do not react with one another and are not incompatible. Again, these factors indicate that there is virtually a non-existence risk from fire and explosion.

Next, I evaluated the hazards potentially posed by direct contact with the site. I conclude that there appears to be little risk to humans or animals from direct contact. First,

there is no indication of an observed incidence of contact. These metals are not readily absorbed through the skin. Second, there is little potential for exposure since the metals are immobilized in site soils and further, are held in place by site vegetation which prevents them from becoming airborne. Therefore, the only theoretical risk to humans posed by these materials would be through ingestion. This risk is also minimal since the lands are not used for the production of edible agricultural products. Moreover, the metals are immobilized in the soils. Finally, the area is relatively remote and generally inaccessible.

Another relevant factor of the NCP criteria is distance to critical habitat. The standard for evaluation here is the likelihood of the material becoming solubilized in surface water and reaching the wetlands. As previously discussed, water analyses and clam bioassays have shown that this has not occurred at the site and that the critical habitat is not affected by the water route.

A related criteria to be considered, is the distance to a critical habitat of an endangered species. This factor is a rough measure of the probability of harm to members of an endangered species by direct contact with hazardous substances. Since the materials identified at this site are heavy metals which are not readily absorbed through the skin, the probability for damage to endangered species by direct contact is minimal, even with prolonged exposure. Therefore, under this factor the site does appear to warrant a high hazardous rank.

An additional factor which must be considered under the NCP ranking criteria is distance to agricultural plots which are defined as lands which have been in agricultural production within the last five years. The available data indicate there are no agricultural lands within one mile or prime agricultural lands within two miles of the site. Accordingly, no hazardous ranking value should be assigned for this criteria, nor should allowable metal concentrations in crops be used as part of the evaluation.

It also should be noted that photographs presented in the "Assessment of Damage to Natural Resources at Naval Weapons Station, Concord, California", purport to show barren areas and dead plants, but even casual observers in California are thoroughly acquainted with "California Gold" which results when vegetation becomes dehydrated during summer and fall because of limited rainfall. This is a normal occurrence in this egion and no credible evidence is presented to correlate barren areas with heavy metal concentrations.

Based on the data which has been provided, there is no available data to demonstrate that materials from the site are

causing negative impacts to human populations or ecosystems. In light of these facts, I cannot comprehend why the Navy has expended the amount of time, energy, and financial resources necessary to prepare these studies.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - C1 (26 September 1985):

Data collected during the remedial investigation clearly indicate that heavy metals are migrating from the soil into the biota present on the sites.

Contamination has been documented within the wetlands on RASS 1, 2, 3, and 4. See Figures 19, 39, and 48 of the Final Draft Report of the Feasibility Study of Contamination Remediation, Volume III: Figures, for the boundaries of contamination. Figures 29, 42, and 53 depict the wetland boundaries.

Direct contact of endangered species and contamination found on site is a certainty. Exposure to metals can occur through ingestion (food, water, and grooming) and physical contact with the sediments. The salt marsh harvest mouse was trapped and the California black rail was observed in wetlands that are within the zone of contamination. The mouse is a herbivore; a food habits study reported on page 22 and in Appendix B of the Final Report of the Feasibility Study of Contamination Remediation at the Naval Weapons Station, Concord, California, Volume II: Biological Assessment, could not give conclusive results concerning the species of plant eaten, but pickleweed is a highly probable food item. Pickleweed is found in contaminated areas where individual mice have been caught. See Figures 19, 26, and 28 of the Final Report of the Feasibility Study of Contamination Remediation at the Naval Weapons Station, Concord, California: Volume III: Figures. Results of the earthworm bioassays, which act as surrogates of other soil invertebrates eaten by the black rail, showed significant levels of contamination.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - C2a (26 September 1985):

2. Findings Established by the Studies.

In addition to the matters discussed above, I also note the following matters which further support the non-hazardous nature of this site.

a. Potential Effect on Vegetation

Both the field studies conducted on the site and the laboratory studies performed on plant uptake studies indicated "that even though some plant uptake of metals did occur in some of the sites, the extremely large variability in soil content results in no statistical differences from that of the remote reference areas." In other words, the studied area is not significantly different than the comparison area selected by the Navy.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments - C2a (26 September 1985):

These comments are factually incorrect. There were no statistical differences in contaminant concentrations among plants grown under upland conditions. Vast differences existed among plants grown under flooded conditions. Differences also existed among plants collected in the field. Locations which are statistically different from the reference area are listed on page 194 and page 196 of the Final Remedial Investigation Report. Therefore, Canonie's comments are true only in reference to plants grown under upland conditions. These statements are grossly incorrect in reference to plants grown under flooded conditions and plants collected in the field.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments C2b (26 September 1985):

b. Impact on Earthworms

The studies evaluated whether the site has effected earthworms through bioassay techniques. According to the Navy study, these analyses indicated that only a few of the sampling locations out of the many tested were found to be unsuitable for the survival of earthworms. While the data may be of interest, it provides no evidence that metals have actually bioaccumulated to harmful levels in earthworms or adversely impacted animals higher in the food chain. It can hardly be cited as the basis for the extensive remedial measures proposed to be undertaken.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments C2b (26 September 1985):

While it may be true that only a few sites were toxic to earthworms, the earthworm bioassays indicated numerous sites where substantial bioaccumulation was observed far above that observed in the reference areas. These results strongly suggest a high potential for continued bioaccumulation in soil

invertebrates associated with these sites. As discussed in Section 4.4 of the Final Remedial Investigation Report, these data along with other bioaccumulation data suggest a real potential for toxicological impacts to wildlife, especially endangered species, associated with the sites.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments C3 (26 September 1985):

3. Proposed Remedial Action Alternatives.

The Navy has identified five specific source removal, source isolation and site restoration alternatives for the site. These include:

(1) excavation and offsite disposal in a licensed landfill, followed by revegetation and reclamation to preexcavation conditions;

(2) surface treatment with topsoil cover and site revegetation;

(3) surface treatment with multilayered cover (RCRA type) and site vegetation;

(4) restoration of onsite areas; and

(5) remedial action of onsite areas and mitigation by offsite land set asides.

All of these alternatives would require major construction activities to be performed on the site and would require extensive earth moving. Ironically, if these measures were undertaken, the construction and earthmoving activities proposed have a very high potential to cause the death of the endangered species of concern. In addition, there is a very high probability that these activities would destroy the critical habitat necessary for the endangered species of concern. In my professional opinion it is highly unlikely that the critical habitat could be reconstructed or restored after the proposed remedial actions in a timely fashion and in a manner that would insure the continued existence of the endangered species of concern.

The reconstruction and restoration activities proposed are not a proven technology. In my opinion, wetlands restoration is a science in its infancy which has not been developed to the level of assurance promised in the Feasibility Study or required by federal regulation. In my opinion, the proposed reconstruction and restoration alternative would be an extremely risky experiment which might completely destroy the existing

habitat. Moreover, there is little foreseeable benefit to be gained.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments C3 (26 September 1985):

In Items 4 and 5 of the Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California, the Navy identified Alternatives 1-3C, 2-3C, 3-3C, and 4-3C as the preferred remedial action alternatives for RASS 1, 2, 3, and 4, and Alternatives 1-3A, 2-3A, 3-3A, and 4-3A as the second preferred remedial action alternatives for RASS 1, 2, 3, and 4. Prior to issuing the proposed remedial action plan on 16 September 1988, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action plan to determine whether excavation and removal of contaminated soil from RASS 1 and 2, which would be required by the preferred and second preferred alternatives, would threaten the continued existence of the salt marsh harvest mouse and California clapper rail. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion, which stated that:

> It is our Biological Opinion that the proposed remediation of heavy metal contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or the California clapper rail.

The Fish and Wildlife Service, in its Biological Opinion, concluded that after the environment is remediated and restored, it "should support harvest mouse habitat values that exceed the degraded conditions which currently appear to limit the health and fitness of harvest mouse populations onsite." Even with the uncertainty that exists in the area of wetland restoration, the Fish and Wildlife Service, the State of California Department of Fish and Game, and the San Francisco Bay Conservation and Development Commission prefer the proposed remediation to the status quo.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from RASS 1 and 2 and the wetlands on RASS 1 and 2 be restored without violating Section 7 of the Endangered

Species Act.

Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.

The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.

The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

Based on environmental concerns, during preparation of the (Second Revised) Final Draft Feasibility Study Report the Navy evaluated a range of alternatives. Two alternatives given consideration were the no action alternative and the environmental monitoring alternative. Neither of these were determined to provide the requisite protection of human health and the environment. However, because of concern over the short term impacts of remediation alternatives using intrusive technologies, the Navy has decided to reduce the area of active remediation on RASS 1. In lieu of active remediation, the Navy proposes to implement an extensive monitoring program. This monitoring program will be designed to determine the need for more aggressive remediation in those areas where active remediation is not presently being implemented.

Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company)

Comments C4 (26 September 1985):

4. Preferred Alternative.

In reviewing the alternatives set forth for site remediation in the studies, I have concluded they are not justified on the following basis:

1. there is a lack of migration of heavy metals from the site;

2. there is a lack of evidence that the habitat is deteriorating to justify such extreme actions; and

3. there is a high probability of the destruction of endangered species if a habitat reconstruction and restoration program is undertaken.

It is my opinion that the rationale solution for the NWS Concord site is the no action alternative. This is the only remedial action that will guarantee that endangered species will not be crushed or otherwise destroyed during site activities and that the habitat of such species will be protected. It is the only solution which meets the requirements of the Endangered Species Act.

Response to Canonie Engineers (on behalf of Santa Fe Industries, Inc., and Atchison, Topeka, and Santa Fe Railway Company) Comments C4 (26 September 1985):

Data collected during the remedial investigation indicate that contaminants are in fact migrating into the surface water and are being bioaccumulated by the indigenous biota. During preparation of the (Second Revised) Final Draft Feasibility Study Report the Navy has evaluated a range of alternatives, including the no action alternative. Alternative remediation technologies and concepts were evaluated in accordance with CERCLA, as amended, and implementing regulations and guidance. The Navy finds that the no action alternative does not provide the requisite level of protection to human health and the environment. The recommended alternative meets the environmental goal, including provision for not jeopardizing the existence of endangered species.

3.13 COMMENTS SUBMITTED BY ATCHISON, TOPEKA, AND SANTA FE RAILWAY COMPANY IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Atchison, Topeka, and Santa Fe Railway Company Comments - I. Preliminary Statement (26 September 1985):

I. PRELIMINARY STATEMENT.

These comments are submitted on behalf of the Santa Fe Industries, Inc. and the Atchison, Topeka and Santa Fe Railway Company ("Santa Fe") and concern the final draft reports on the Remedial Investigation, Feasibility Study, and Assessment of Damage to Natural Resources at the Concord Naval Weapon Station ("NWS") which the Corps of Engineers Waterways Experiment Station prepared for the United States Navy. These comments supplement the written technical comments of Mr. Phillip E. Antommaria, an engineering consultant retained by Santa Fe, which are appended as Exhibit No. 1. The technical comments included in these comments are based on Mr. Antommaria's analysis.

Santa Fe contends that after nearly four years of studies at the NWS, the Remedial Investigation, Feasibility Study and Natural Resources Damage Assessment reports demonstrate that the Navy is struggling to find evidence of environmental problems on the parcels of land the Navy acquired for a buffer zone at the facility (the "study area"). The data from earlier studies demonstrated that existing conditions in the study area posed no public health or environmental threat. Indeed, an application of National Contingency Plan site-ranking criteria to the site indicates the further studies were unwarranted. But the Navy conducted elaborate studies, including bioassays and greenhouse experiments, in an attempt to find an environmental problem in the study area. The Navy's latest studies further confirm that existing conditions present no threat to public health, welfare, and the environment.

Contrary to the evidence, however, the Navy has proposed remedial actions that would involve a major environmental surgery certain to cripple if not destroy the study area and species that may occur there. The studies indicate the proposed removal, isolation and restoration alternatives would destroy acres of wetlands and grasslands that provide important habitat for rare and endangered species contrary to the requirements of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") and the Endangered Species Act.

Santa Fe further contends that the Fund-balancing provision of CERCLA requires the Navy to conduct a cost/benefit analysis of the remedial action alternatives to determine whether the alternatives are worth pursuing or whether Superfund monies are better spent elsewhere. The Navy's proposed alternatives fail to satisfy that standard since they would provide no additional environmental benefits but would produce serious adverse environmental impacts at the expense of millions of Superfund dollars. Clearly, such funds should be used to remedy other sites with serious public health and environmental problems.

The No Action Alternative combined with a limited

monitoring system would preserve and protect this important ecosystem at a cost many times less than the proposed alternatives. Accordingly, Santa Fe contends the No Action Alternative is the appropriate response action under CERCLA.

Santa Fe also contends that the Navy has performed no comparative analysis of the impact the NWS has on the study area. Although earlier studies identified potential environmental problems on other portions of the NWS, the Navy's reports do not address what impact those areas and NWS activities may have on the study area. In other words, the Navy has not addressed whether it would do any good to take the proposed remedial actions if activities at the NWS will cause greater problems.

Santa Fe further contends that the Navy's Assessment of Damage to Natural Resources is inconsistent with CERCLA since it fails to identify losses or injuries to natural resources resulting from a release of hazardous substances and makes economic evaluations based on irrelevant and erroneous factors.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - I. Preliminary Statements (26 September 1985):

The Navy is responding to the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, through its Installation Restoration Program (IRP). The Department of Defense funds the Navy's response to the release, and the threatened release, of hazardous substances, under the IRP through the Defense Environmental Restoration Account.

Previously, the Navy responded to the release, and the threatened release, of hazardous substances on these parcels through its Navy Assessment and Control of Installation Pollutants (NACIP) Program.

Neither the Navy's response under its IRP nor its response under its NACIP Program have been funded by the Hazardous substance Superfund established under subchapter A of chapter 98 of the Internal Revenue Code of 1986. Thus, the Navy is not required by CERCLA to conduct balancing between the need for protection of public health and welfare and the environment on these parcels on the Naval Weapons Station, Concord, and the availability of amounts from the Fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats.

Section 121(a) and (b) of CERCLA provides that:

> (a) Selection of Remedial Action. -- The President shall select appropriate remedial actions

determined to be necessary to be carried out under section 104 or secured under section 106 which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response. In evaluating the cost effectiveness of proposed alternative remedial actions, the President shall take into account the total short- and long-term costs of such actions, including the costs of operation and maintenance for the entire period during which such activities will be required.

(b) General Rules (1) Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:

(A) the long-term uncertainties associated with land disposal;

(B) the goals, objectives, and requirements of the Solid Waste Disposal Act;

(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;

(D) short and long-term potential for adverse health effects from human exposure;

(E) long-term maintenance costs;

(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

The President shall select a remedial action that is protective of human health and the environment, that is cost effective and that utilizes permanent solutions

and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

(2) The President may select an alternative remedial action meeting the objectives of this subsection whether or not such action has been achieved in practice at any other facility or site that has similar characteristics. In making such a selection, the President may take into account the degree of support for such remedial action by parties interested in such site.

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

(d) Degree of Cleanup, (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) of CERCLA provides that:

(2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or

(ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is

relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.

Section 121(D)(4)(f) of CERCLA provides that:

(4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that

. . .

(F) in the case of a remedial action to be undertaken solely under section 104 using the Fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration, and the availability of amounts from the Fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats. The President shall publish such findings, together with an explanation and appropriate documentation.

In its (Second Revised) Final Draft Feasibility Study Report, the Navy evaluated a range of remedial action alternatives including a no action alternative. Before that, the Navy evaluated alternative remediation technologies and concepts in accordance with CERCLA, the NCP, and implementing guidance. The Navy finds that the no action alternative does not provide adequate protection of human health and the environment.

Atchison, Topeka, and Santa Fe Railway Company Comments - II- (26 September 1985):

II. COMMENTS ON REMEDIAL INVESTIGATION, FEASIBILITY STUDY AND NATURAL RESOURCES DAMAGE ASSESSMENT REPORTS.

The Remedial Investigation, Feasibility Study, and Natural Resources Damage Assessment reports reveal that after years of elaborate studies the Navy is laboring to find evidence of environmental problems in the study area. By misapplying irrelevant standards to the data, the Navy has attempted to justify remedial action alternatives that would destroy acres of important endangered species habitat at a cost of millions of dollars. Through similar erroneous analytical techniques, the Navy has also attempted to identify and perform economic evaluations on numerous alleged damages to natural resources. The three studies fail to support the Navy's proposed remedial actions and assessment of natural resources damages and thus the proposed remedial actions and natural resources damage assessment must be rejected.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - II- (26 September 1985):

The Navy prepared a Final Report of the Remedial Investigation of Contaminant Mobility at the Naval Weapons Station, Concord, California; a (Revised) Final Draft Report of the Feasibility Study of Contamination Remediation at the Naval Weapons Station, Concord, California; and a (Second Revised) Final Draft Feasibility Study Report of Contamination Remediation at the Naval Weapons Station, Concord, California. These reports document contamination and remediation of that contamination.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIa (26 September 1985):

A. THE NAVY HAS DENIED THE PUBLIC AND INVOLVED PARTIES A MEANINGFUL OPPORTUNITY TO COMMENT ON THE THREE STUDIES.

The Navy provided Santa Fe and the other involved parties with a copy of the Remedial Investigation and Feasibility Study on August 12, 1985. The Navy initially provided the public 22 days to comment on the two studies, which contained over 600 pages and took the Navy over 15 months to prepare. As noted in his attached technical comments, Mr. Phillip Antommaria, acting on behalf of Santa Fe, requested the Navy to produce some of the technical information supporting the studies to enable Santa Fe to provide meaningful comments on the reports. The additional information Mr. Antommaria requested included:

(1) legible copies of the figures and photographs referred to in the reports;

(2) maps delineating the precise boundaries of the parcels, the Navy-designated subareas, (K-2, K-3, G-1) and the soil sampling locations in relation to the precise boundaries;

(3) copies of the cross-sections used in the HEC-2 analysis of Nicholas Creek; and

(4) copies of certain analytical data.

Mr. Antommaria also requested the Navy to extend the comment period at least 20 days beyond the date when he received the requested information.

On August 28, 1985, the Navy informed Mr. Antommaria that the agency had extended the comment period an additional 23 days to September 26, 1985. The Navy further informed Mr. Antommaria that some of the information he requested was available at the Navy's document depository at McCutchen, Doyle, Brown & Enersen in San Francisco and that other requested information would be produced to the depository on September 3, 1985. The Navy further stated that a third group of documents would be made available for inspection at the office of the Assistant United States Attorney in San Francisco on September 3, 1985. The Navy did not specify which requested documents could be found at the different locations.

Although counsel for Santa Fe obtained copies of what is believed to be the additional documents the Navy produced in response to Mr. Antommaria's request, neither the Navy or its counsel produced all of the information Mr. Antommaria requested, including the cross-sections used in the HEC-2 analysis and maps clearly showing the precise boundaries of the Navy-designated subareas and the exact locations of each soil sample in relation to the precise boundaries of the parcels and subareas. In addition, many of the maps and documents the Navy did produce contained no reference keys or other information concerning the type, date and precise location of the various samples collected at the site.

On August 26, 1985, the Navy issued its final draft Natural Resources Damage Assessment report. The Navy provided the public 30 days to comment on that report.

The Navy's actions in providing the public with only portions of the technical data supporting the studies and with such limited time periods for providing comments have denied the general public and the parties involved a meaningful opportunity to comment on the three reports. Accordingly, we reserve our right to supplement these comments with additional information as it becomes available either through discovery in the Allied and Chemical Pigment litigation or in response to previous requests

for information.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIa (26 September 1985):

On 8 August 1985, the Navy issued a public notice soliciting comments in response to the Final Draft Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, and the Final Draft Report of the Feasibility Study of Contamination at Naval Weapons Station, Concord, California. With the public notice the Navy distributed copies of the two reports.

On 23 August 1985, Canonie requested that the Navy provide Canonie with certain documents and that the Navy provide Canonie with twenty days to submit comments in response to the Final Draft Report of the Remedial Investigation of Contaminant Mobility at the Naval Weapons Station, Concord, California (August 1985), and the Final Draft Report of the Feasibility Study of Contamination at the Naval Weapons Station, Concord, California (August 1985), which the Navy issued by public notice on 8 August 1985. On 28 August 1985, the Navy advised Canonie that:

> Some of the documents which you requested have already been produced to the document depository established at McCutchen, Doyle, Brown and Enersen for the cases styled as United States v. Allied Chemical Corp., et al, Civil No. C-83-5898 SC (N.D. Calif.) and United States v. Chemical & Pigment Co., et al, Civil No. C-83-5896 JPV (N.D. Calif.). Additional documents which you requested will be produced to the document depository by 3 September 1985. A third group of documents will be made available for inspection at the office of Charles M. O'Connor, Assistant United States Attorney, 450 Golden Gate Avenue, Room 16201, San Francisco, California, from 9:30 a.m. to 5:00 p.m. on 3 September 1985.

The Navy, thus, gave Canonie the time it requested to submit comments after the Navy provided Canonie with the documents it requested.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIb (26 September 1985):

> B. THE NAVY'S ANALYSIS OF REMEDIAL ACTION ALTERNATIVES IS INCONSISTENT WITH CERCLA AND THE NCP.
>
> Section 104 of CERCLA states in relevant part:
>
> Whenever . . . any hazardous substance is released or there is a substantial threat of

> such a release into the environment . . . the President is authorized to act, consistent with the national contingency plan, to remove . . . and provide remedial action relating to such hazardous substance . . . or take any other response measure consistent with the national contingency plan which the President deems necessary to protect the public health or welfare or the environment.

42 U.S.C.§9604(a)(1) (emphasis added). Section 104 makes clear that the President is authorized to take remedial action only when necessary to protect public health, welfare, or the environment. The statute does not authorize cleanup for the sake of cleanup. Rather, any remedial action proposed to be taken must specifically be intended to address real public health and environmental threats.

The National Contingency Plan ("NCP") similarly makes clear that remedial actions are allowed only when necessary to protect public health and the environment. Section 300.68 of the NCP provides that agencies must evaluate many criteria in determining the appropriate extent of remedial action that may be required at sites, including the extent to which substances pose a danger to public health, welfare, or the environment. 40 C.F.R. {300.68(e)(2)(i)(1984). As discussed below, the Navy's studies establish that no remedial action can be justified here because the data indicate existing conditions present no threat to public health or the environment.

Furthermore, even if remedial actions were required at the site, Section 104 of CERCLA requires the Navy to select the cost-effective remedial action by balancing the costs and public health and environmental benefits of the alternatives with the need to spend Superfund monies at other sites. 42 U.S.C. {9604(c)(4). This "Fund-balancing" provision in effect requires EPA to conduct a cost/benefit analysis of the proposed remedial action alternatives.

More importantly, the NCP is quite clear that only the cost-effective remedial action can be taken at site:

> The appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost effective (i.e., the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare or the

environment).

40 C.F.R. (300.68(j) (1984) (emphasis added). As discussed below, Santa Fe contends the most appropriate remedial action at the site is the No Action Alternative, which would protect important wildlife habitat with no adverse environmental effects.

The Navy's proposed excavation, isolation, and restoration alternatives would destroy acres of endangered species habitat at a cost of millions of dollars. The Navy admits that the wetland restoration alternatives are technologically infeasible and that the surface capping alternative is technologically excessive. Feasibility Study ("FS") at 9.7-9.9. Furthermore, none of the proposed alternatives minimizes potential environmental damage; the proposed alternatives would create environmental damage.

Rather than being based on the required cost/benefit analysis, the Navy's evaluation of the proposed alternatives appears driven by its stated environmental goal. To abate the release and potential release of hazardous substances into the environment in a manner that does not result in significant long term adverse impacts to critical wildlife habitat. Neither CERCLA nor the NCP authorize such action. Indeed, absent a showing of potential harm to endangered species by direct contact the studies that have been conducted violate the NCP, are inappropriate and are irrelevant to the matter. The Navy's evaluation of remedial action alternatives is inconsistent with CERCLA and the NCP.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIb (26 September 1985):

Section 121(a) of CERCLA provides that:

> The President shall select appropriate remedial actions determined to be carried out under Section 104 . . . which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response.

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative

remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:

(A) the long-term uncertainties associated with land disposal;

(B) the goals, objectives, and requirements of the Solid Waste Disposal Act;

(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;

(D) short and long-term potential for adverse health effects from human exposure;

(E) long-term maintenance costs;

(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

The President shall select a remedial action that is protective of human health and the environment, that is cost effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

(d) Degree of Cleanup, (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances

presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) of CERCLA provides that:

> (2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or
>
> (ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.

Section 121(d)(4)(B) of CERCLA provides, in pertinent part; that:

> (4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that

. . .

(B) compliance with such requirement at that facility will result in greater risk to human health and the environment than alternative options.

As stated in the Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, the Navy concluded that:

a. Substantial contamination has occurred as a result of the release of hazardous substances onto Parcels 572, 573, 574, 575, 576, 579D, and 581 at NWS Concord.

b. Hazardous substances such as arsenic, cadmium, lead, selenium, zinc, and copper are present in surface soil on certain portions of these parcels at concentrations that are statistically greater than other sampled sites and are in excess of established acceptable levels.

c. Results of plant and earthworm bioassay tests indicate a high potential for mobility of arsenic, cadmium lead, and selenium into plants and soil-dwelling animals.

d. Field-collected plant samples from Parcel 575(G1) and Parcel 574(K2) indicate native plants are contaminated with cadmium, lead, and zinc.

e. Clam bioassay tests in the field indicate that there is a moderate potential for cadmium, lead, and zinc to move into surface waters at a limited number of sampling locations (Parcels 576 and 575).

f. The hydrological evaluation indicates that the low permeability of the soils on these parcels minimizes the potential for ground-water contamination. However, storm events and high tides have resulted in the movement of hazardous materials in surface waters across the wetland surface and into mosquito-control drainage ditches. Ten-year high tides completely inundate the entire wetland area as well as backing up into Parcel 573 (K2 site). Predicted 25-year storm events would wash contaminated sediment from Nichols Creek on Parcels 579D, 576, and 575 over the stream embankment and through an existing culvert onto Parcel 572 (at the KS site).

g. A comprehensive natural resource evaluation indicated the wetland areas have moderate to high functional values for wildlife habitat, food-chain

support, flood storage, shoreline anchorage, sediment trapping, nutrient retention, and passive recreation and heritage. A lower potential value was determined for fishery habitat, ground-water recharge or discharge, and active recreation. The macroinvertebrate community study indicates contamination from the overflow of the Allied Chemical Corporation Bay Point Works's waste lagoon into Parcel 572 resulted in a significantly lower abundance and number of species in the contaminated wetland site in comparison to a reference site. The habitat evaluation study indicated a moderate to high potential value and that wildlife are attracted to the contaminated site and consequently are exposed to the hazardous substances.

h. The toxicological evaluation indicates that lead, cadmium, selenium, and arsenic are probably contaminating animal food chains and that high potential exists for the contamination of species higher in the food chain, such as carnivorous birds and mammals. This area on Naval Weapons Station Concord provides habitat for rare or endangered species which are being exposed to toxic metals in their feeding habits. The contamination present at Naval Weapons Station Concord is of a persistent nature and will cause chronic problems to inhabitants of the area.

As stated in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

(Second Revised) Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial

action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons station which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A, and 2-3A, in Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse and California clapper rail, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A, and 2-3A, on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion, which stated that:

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the

continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh without violating Section 7 of the Endangered Species Act.

Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.

The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.

The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIc (26 September 1985):

C. THE PROPOSED REMOVAL, ISOLATION, AND RESTORATION ALTERNATIVES WOULD DESTROY IMPORTANT WILDLIFE HABITAT CONTRARY TO CERCLA REQUIREMENTS.

The Navy concluded that 109.87 acres in the study area

required remedial action by combining the total area of each sampling site that showed a metal content above a "critical value in soils, plants and earthworms". Remedial Investigation Study ("RI") at 470, 472. As the discussed below, this conclusion is not supported by the facts and contrary to the limitation of the NCP that remedial action is only authorized under CERCLA where a demonstrated potential harm to the environment or public health exists.

Furthermore, the Navy does not explain in either the Remedial Investigation or Feasibility Study which "critical values" it used in calculating the total acreage designated for remedial action. Accordingly, it is impossible to determine precisely which factor the proposed remedial action is intended to address. More importantly, as more fully discussed below, the application of standards designed for other purposes is inappropriate for determining whether remedial actions may be required under CERCLA. Furthermore, the data indicate that background samples contain concentrations of metals above the Navy's stated standards. In short, the data do not establish that existing conditions present a public health or environmental threat requiring remedial action under CERCLA. The Navy's assumption that 109.47 acres of study area require remedial action thus appears arbitrary and is unsupported by the data.

Nevertheless, the Navy evaluated five categories of potential remedial actions for the site: No action, increased monitoring, source removal, source isolation, and site restoration. FS at 1.3. The Navy identified five specific source removal, source isolation and site restoration alternatives for the site:

(1) Excavation and off-site disposal in a licensed landfill;

(2) Surface treatment with topsoil cover and site revegetation;

(3) Surface treatment with multi-layered cover RCRA caps) and site vegetation;

(4) Restoration of on-site areas;

(5) Remedial action of on-site areas and mitigation by off-site land set asides.

FS at 8.1.

All of these action alternatives would involve major construction activities that would radically rip up existing wetlands and grasslands, causing what the Navy classifies as "moderate to severe" damage in areas where no proven problems exist. The excavation and off-site disposal option (Navy

Alternative "3"), for example, would involve excavation of nearly 200,000 cubic yards of materials. FS at 8.10-8.11. To accomplish this monumental task, the Navy projects that access and haul roads and parking areas would need to be constructed on each of the subareas. FS at 8.12. Trailers, chemical toilets and other materials would also be brought to each subarea. Id. In addition, compaction equipment would be brought on-site to backfill the excavated areas with cleanfill.

The Navy states that the short-term adverse environmental impacts of Alternative 3 would be "moderate to severe" and that it would destroy up to 84 acres of wetlands. FS at 9.8-9.9. The surface treatment alternatives (Navy Alternatives 4 and 5) and on-site remediation alternative (Navy Alternative 7) also would permanently destroy about 84 acres of wetlands. FS at 9.9.

More importantly, under the on-site restoration alternative (Navy Alternative 6), the Navy proposes to implement Alternative 3 (excavation) which would destroy 84 acres of wetlands and then attempt to restore the upland and wetland areas. FS at 8.31, 9.9. The Navy proposes such action although it recognizes that wetland restoration is at best an infant science and thus is not technologically feasible. FS at 8.31.

The Navy's proposed action alternatives would not only cause severe damage to but may destroy the study area in order to save it. CERCLA was intended to address, not create environmental problems. The statute does not authorize the government to take actions that will cause environmental problems, especially in areas where it is unclear any exist. The proposed action alternatives must, therefore, be rejected.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIc (26 September 1985):

In the (Second Revised) Final Draft Feasibility Study Report, the Navy evaluated numerous criteria for the protection of human health and the environment. In addition, the Navy evaluated a range of remedial action alternatives including a no action alternative. Before that, the Navy evaluated alternative remediation technologies and concepts in accordance with CERCLA; the NCP; and implementing guidance. The Navy finds that the no action alternative does not provide adequate protection of human health or the environment.

The Navy balanced the potential for harm associated with leaving the contamination in place with the long term benefits of remediation and the short term impacts associated with active remediation. As a result of the balancing process, the Navy recommended a substantial reduction in the acreage to be actively remediated. The (Second Revised) Final Draft

Feasibility Study Report recommended that active remediation be conducted on approximately 18.75 acres whereas the Final Draft Feasibility Study Report recommended that active remediation be conducted on 109.47 acres. Protection of the environment in the areas not recommended for active remediation in the (Second Revised) Feasibility Study Report will be provided by an environmental monitoring program.

The contention that wetland restoration is an infant science does not mean that restoration is not technologically feasible. It simply means that careful and detailed planning is required to make wetland restoration feasible.

Atchison, Topeka, and Santa Fe Railway Company Comments - IId (26 September 1985):

D. THE PROPOSED REMOVAL, ISOLATION, AND RESTORATION ALTERNATIVES WOULD DESTROY POTENTIAL ENDANGERED SPECIES HABITAT IN VIOLATION OF THE ENDANGERED SPECIES ACT.

As discussed above, the Navy's proposed remedial actions would destroy acres of what the Navy has determined is critical habitat to several species listed on the federal Endangered Species list. Although the Navy proposes to take such actions for the benefit of the species, the data indicate the species may not survive such a drastic "cure."

Section 7 of the Endangered Species Act provides in relevant part:

> Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary . . . to be critical, unless such agency has been granted an exemption for such action. . . . In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

16 U.S.C.§1536(a)(2) actions that are likely to jeopardize the continued existence of an endangered species or result in the destruction or modification of critical habitat but to insure that their actions do not have such consequences. Tennessee Valley Authority v. Hill, 437 U.S. 153, 173 (1978); Roosevelt

Campobello International Park Commission v. EPA, 684 F.2d 1041 (1st Cir. 1982). In making that determination, the agency must evaluate both the direct and indirect effects of its proposed action on the species and its habitat. National Wildlife Federation v. Coleman, 529 F.2d 359, 373 (5th Cir. 1976), cert. den., 429 U.S. 979 (1976).

Section 7 also requires federal agencies to use the best scientific and commercial data available in satisfying the Section 7 standard. 16 U.S.C. {1536(a)(2). This requirement assumes that a decision with potentially adverse consequences for an endangered species will be made after full and careful review of the then available and relevant data. Village of False Pass v. Watt, 565 F.Supp. 1123, 1154 (D. Alaska 1983), aff'd 733 F.2d 605 (9th Cir. 1984).

In addition to the Section 7 requirements, Section 9 of the Act prohibits any person, including federal agencies, from "taking" any endangered species. 16 U.S.C. {{1532(13), 1538(1). The term "taking" is defined to include harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting or attempting to engage in any such conduct. 16 U.S.C. 1532(19). "Harass" is further defined in the regulations as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns. 50 C.F.R. {17.3(c)(1984). Similarly, "harm" is defined to include activity that results in significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns. 50 C.F.R. {17.3(c). Agency activities that cause significant environmental modification or degradation of an endangered species habitat may also constitute an unlawful taking of the species. Palila v. Hawaii Department of Land & Natural Resources, 471 F.Supp. 985, 995 (D. Hawaii 1979), aff'd 639 F.2d 495, 497-498 (9th Cir. 1981).

As the Navy itself recognizes, the proposed alternatives would result in the destruction of many acres of wetlands and grasslands in the study area. The Navy emphasizes the importance of the wetlands and grassland areas as wildlife habitat, particularly for the rare and endangered species that may occur in the area. RI at 313. Indeed, the Navy stated that these areas are critical habitat to eight rare or endangered species. RI at 437.

The Navy further emphasized that the amount of habitat for those species has dwindled over the years and that these wetlands and grassland areas are among the very few remaining to support such species. Id. Moreover, the Navy and the Department of Interior entered into a Memorandum of Understanding that designates many of the marsh areas at the NWS, including what

appears to be portions of the subareas, as a Wetland Preserve. See February 1, 1984 Memorandum of Understanding between the Department of the Navy and U.S. Fish and Wildlife Service.

The Navy's proposed removal, isolation, and restoration alternatives would destroy acres of this important endangered and rare species habitat. Furthermore, constructing roads and parking lots and operating heavy equipment on each of the subareas would not only radically change the existing habitat but would certainly harass, harm and possibly kill any endangered and rare species that may occur in those areas during the proposed activities.

Moreover, as the Navy itself recognizes, restoration of the wetland areas cannot be assured with proven technology. The Navy thus proposes to destroy important endangered and rare species habitat in an effort to enhance the already good quality of that habitat through use of unproven technology. The Navy has proposed such actions without evaluating any of the potential impacts on endangered species and despite the data that indicate such species may not survive such a radical remedy.

The Navy's proposed source removal, source isolation, and site restoration alternatives clearly would violate Sections 7 and 9 of the Endangered Species Act. Accordingly, the Navy's proposed alternatives must be rejected.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IId (26 September 1985):

Section 7(a)(2) of the Endangered Species Act provides that:

> (2) Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an 'agency action') is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A, and 2-3A, in

Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A, 2-3A, on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion, which stated that;

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh without violating Section 7 of the Endangered Species Act.

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.
>
> The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.
>
> The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the

remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this

statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

The use of the term "critical habitat" in the Final Draft Feasibility Study Report was misleading and inadvertent. The Fish and Wildlife Service has not designated any critical habitat for any of the species of concern.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIe (26 September 1985):

E. THE "NO ACTION ALTERNATIVE" WITH A LIMITED MONITORING PROGRAM SHOULD BE SELECTED SINCE IT WILL BEST PROTECT AND PRESERVE THE ENTIRE ECOSYSTEM, INCLUDING THE POTENTIAL ENDANGERED AND RARE SPECIES HABITAT IN THE AREA.

As discussed below, the data indicate that existing conditions at the site present no adverse environmental threats. The Navy's proposed alternatives, however, would have serious adverse impacts on endangered species that may occur in the study area. In view of these factors, the most effective remedial action concerning the study area is the No Action Alternative. The No Action Alternative would preserve and protect the important wildlife habitat in the study area and, as the Navy recognizes, would allow concentrations of metals to be attenuated by natural dilution processes. FS at 7.2-7.3.

As Mr. Antommaria recommends in the attached technical comments, combining the No Action Alternative with a time-limited monitoring program of surface water for metals would enable the Navy to make periodic evaluations of environmental conditions at the site. The Navy's proposed monitoring scheme which includes elaborate tests and activities is unnecessary, however, since the data do not indicate that existing conditions are deteriorating.

Furthermore, the proposed monitoring program is not cost-effective as required under the NCP. It includes surface water and sediment sampling, bioassays, and habitat evaluation. The estimated capital cost of the proposed program is $206,000. FS at 8.8. The biannual operation and maintenance costs alone are estimated at $88,000. FS at 8.9. Certainly, such expenses are not cost-effective in view of the data and must be rejected.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIe (26 September 1985):

Results of analyses conducted on house mice and voles

trapped on RASS 1 and 2 and results of bioassays conducted on earthworms, clams, and plants confirm the presence and biological availability and uptake of the metals contaminating the site. Because the no action alternative recommended by ATSF would leave all contaminated soil in place, the impacts described in the Final Remedial Investigation Report and the effects described in Section 4.4 of the Final Report of the Feasibility Study of Contamination Remediation, Volume II: Biological Assessment, would remain. Release of the hazardous substances would continue. Because heavy metals are not biodegradable, chronic, long-term exposure would continue for future generations of wildlife associated with the site.

During preparation of the (Second Revised) Final Draft Feasibility Study Report the Navy evaluated a range of alternatives, including the no action alternative. Before that, the Navy evaluated alternative technologies and concepts in accordance with CERCLA, the NCP, and implementing guidance. The Navy finds that the no action alternative does not provide the requisite level of protection to human health or the environment. However, based on concerns expressed by a number of commenters, the Navy developed a three tiered remedial action plan. Using this three tiered approach, the Navy divided each RASS into three areas: an area to be monitored, an area of passive remediation, and an area of active remediation. The areal extent of each of these subareas was quantified by balancing the potential for harm associated with leaving the contaminants in place with the long term benefits of remediation and the short term impacts associated with active remediation. As a result of the balancing process approximately 18.75 acres will be actively remediated.

Other areas in each RASS, approximately 25.11 acres, will be passively remediated. Passive remediation will include intensive monitoring which will be conducted on all environmental media and on all potential pathways. Because of the nature of the environmental concerns, the Navy finds that it is appropriate to sample surface water, groundwater, sediments, soils, and biota. The proposed monitoring program, conducted in two phases, is designed to be time limited. Phase 1, consisting primarily of simple observation and monitoring of the various environmental media, will be conducted annually for the first five years following remediation. Phase 2, consisting of more complex evaluation of bioaccumulation, is conducted if Phase 1 results indicate the need for Phase 2 testing. After the initial five years of annual sampling, monitoring will be conducted every five years as required by CERCLA.

In addition to the extensive monitoring conducted in areas of known high concentrations of arsenic and heavy metals, less extensive monitoring will be conducted in adjacent areas to evaluate the migration of contaminants.

The Navy finds that the cost of the preferred alternatives as presented in the (Second Revised) Final Draft Feasibility Study Report is consistent with the release of hazardous substances that has occurred on the sites under investigation.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIF1 (26 September 1985):

F. THE REMEDIAL INVESTIGATION AND NATIONAL RESOURCES DAMAGE ASSESSMENT STUDIES DEMONSTRATE THAT EXISTING CONDITIONS IN THE STUDY AREA PRESENT NO THREAT TO PUBLIC HEALTH, WELFARE, OR ENVIRONMENTAL, INCLUDING THE ENDANGERED AND RARE SPECIES THAT MAY OCCUR IN THE AREA.

1. AGRICULTURAL AND DOHS TTLC VALUES ARE INAPPROPRIATE STANDARDS FOR DETERMINING WHETHER REMEDIAL ACTIONS MAY BE REQUIRED AT THE SITE AND DO NOT DEMONSTRATE THAT EXISTING CONDITIONS PRESENT AN ENVIRONMENTAL THREAT.

The Remedial Investigation and Natural Resources Damage Assessment studies demonstrate that the Navy is struggling to find evidence of environmental problems at the site. Since the agency has not been able to do so based on traditional methods and criteria, it has misapplied other criteria in an attempt to show such effects. The Navy compared the concentrations of metals in soil samples from the parcels to agricultural cropland background values, maximum allowable soil concentration values established for sewage sludge applications to agricultural land ("MASSA"), and California Department of Health Services ("DOHS") total threshold limit concentrations ("TTLC's") for hazardous wastes. The Navy's stated purpose for performing such comparisons was to provide "some perspective to the soil concentration data obtained for each parcel." RI at 21. However, such standards are irrelevant in determining whether remedial actions are needed at the site.

First, the land is not and in all likelihood will never be used for agricultural purposes. The Navy states that the parcels were acquired to create a buffer zone around its facilities. The purpose of a buffer zone is to protect the public and environment from possible explosions at the facility. The closest agriculture land is four miles away.

Second, the MASSA standards appear to be specifically designed to determine whether sewage sludge can be applied to cropland soils that are presumably used for the production of human and animal food. The application of these standards simply does not address whether, based on the use of this land, remedial action is needed.

Third, the DOHS TTLC values are designed to assist in evaluating whether the particular material might be considered hazardous waste under the DOHS hazardous waste management regulations. The application of those standards does not address whether remedial actions are needed at a site. That question must be addressed by evaluating whether the materials present a threat to public health, welfare, and the environment. Comparing the soil sample analytical results to agricultural standards and TTLC values is thus inappropriate under the circumstances and irrelevant in determining whether remedial actions may be required.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIF1 (26 September 1985):

The Navy may use the land for something other than a buffer zone in the future. Because the land was used for agricultural grazing in the past, the MASSA criterion could be appropriate for developing remedial actions. MASSA values apply to land used to grow food crops for animals as well as for humans. However, the (Second Revised) Final Draft Feasibility Study Report did not use MASSA as a criterion in the decision rules for remedial action alternative evaluation.

While it is true that the TTLC and STLC were developed to classify the hazardous nature of a waste material for landfill disposal, the resulting data corresponded will with most of the biological data collected. For example, soil samples that exceeded TTLC/STLC criteria also showed adverse biological impacts such as plants and earthworm death, reduced soil invertebrate abundance, bioaccumulation of one or more contaminants in plants, earthworms, clams, mice, and/or voles. Because of this apparently close relationship, the TTLC/STLC criteria were consistently applied to each RASS.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIF2 (26 September 1985):

2. EVEN IF AGRICULTURE AND DOHS TTLC STANDARDS WERE TO BE USED IN DETERMINING WHETHER REMEDIAL ACTIONS WERE REQUIRED, THE ANALYTICAL RESULTS INDICATE THAT BACKGROUND SAMPLES EXCEEDED THE MASSA STANDARDS AND THAT FEW SOIL SAMPLES FROM THE STUDY AREA EXCEEDED THE TTLC VALUES.

The Navy analyzed soil samples from the parcels for arsenic (As), cadmium (Cd), lead (Pb), selenium (Se), Zinc (Zn), copper (Cu), and nickel (Ni). The analytical results indicated that few of the soil samples exceeded the DOHS TTLC and MASSA standards. Indeed, many of the background soil samples contained concentrations of certain metals in excess of the MASSA standards. In other words, soils from areas other than the study

area also contained concentrations of metals above the standards.

(a) Arsenic

The analytical results indicate that none of the soil samples, except a small number from the AA site, exceeded the DOHS As TTLC value of 500 mg/kg. In addition, the results indicate that many of the samples contained concentrations of As similar to those found at the background sites. As is thus naturally occurring in the area.

(b) Cadmium

The analytical results indicate that none of the soil samples contained Cd in concentrations above the DOHS Cd TTLC value of 100 mg/kg. In addition, although the results show that some samples from certain parcels contained concentrations of Cd above the MASSA Cd value reported as 2.7 mg/kg, two background samples also showed concentrations of Cd above the MASSA standard. Accordingly, the data indicate that Cd also is naturally occurring in soils in the area.

(c) Lead

It appears only six out of numerous samples from the various parcels contained Pb concentrations in excess of the DOHS Pb TTLC cf 1000 mg/kg. *The Remedial Investigation* Study states that seven areas had Pb values that exceeded the MASSA standard. RI, at 24. But the data indicate that only eight samples from five of the designated subareas contained Pb concentrations above the MASSA standard.

The Remedial Investigation Study further states that the seven areas pose a threat to humans exposed to fugitive dust since the Pb content exceeded a 500 mg/kg Pb surface soil standard, which was apparently developed for another Navy project concerning dredged material at Commencement Bay, Washington. RI at 28a, 184. The Navy fails to explain how it derived the referenced standard and why that standard may be relevant to this matter. Nevertheless, even if that standard were applied in this matter, few of the soil samples contained concentrations of Pb above 500 mg/kg. More importantly, the study fails to show whether any fugitive dust is likely to occur or how people would be exposed to such dust if it occurs. Therefore, even the low levels detected do not appear to present any human health threat.

(d) Selenium

As the Navy recognized, nearly all the soil samples contain concentrations of Se below detectable limits. Only two samples, both from the CP subarea, contained Se concentrations above the DOHS Se TTLC of 100 mg/kg. Concentrations of Se were

detected in samples from some of the subareas, but were also found in background samples. The data indicate that Se is naturally occurring in the area.

(e) Zinc

The results indicate that only two samples contained Zn concentrations above the DOHS Zn TTLC of 5,000 mg/kg. In addition, although some of the samples from certain areas contained Zn concentrations above the MASSA standard, at least one background sample also contained Zn above the MASSA standard. Again, the data indicate that Zn is naturally occurring in the area.

(f) Copper

It appears none of the soil samples contained concentrations of Cu above the DOHS Cu TTLC of 2,500 mg/kg. In addition, although some of the samples from certain parcels contained concentrations of Cu above the MASSA standard, at least one background soil sample also appears to have exceeded that standard.

(g) Nickel

The Remedial Investigation Study states that most of the soil samples contained Ni at concentrations less than the MASSA Ni standard except for a few samples from the AA, AB, and K-2 (Parcel 574) subareas. But the data also indicate that four samples from the background areas contained concentrations of Ni above the MASSA standard.

In summary, the data indicate that few samples contained concentrations of metals in excess of the DOHS TTLC values and that some of the samples, including background samples, contained concentrations of metals above the MASSA standards. The data thus indicate that the metals at levels above the MASSA standards are naturally occurring in the area. Accordingly, even if the DOHS TTLC and MASSA standards were to be applied in the matter, the data indicate that few samples exceeded those standards and thus that existing conditions present no environmental threat.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIF2 (26 September 1985):

While it is true that a few background samples appeared to exceed the MASSA criterion for a few metals, bioaccumulation in the background samples was substantially lower than samples in the contaminated areas. While the MASSA criterion was considered in the Final Remedial Investigation Report, it was not used in the decision rules for remediation. Contaminated areas requiring

remediation were those areas where soil contamination and bioaccumulation were statistically higher than reference areas. Because TTLC/STLC criteria related well to bioaccumulation of contaminants, they were used to define areas of remediation in the (Second Revised) Final Draft Feasibility Study Report. It is true that there were some samples exceeding the TTLC criterion; however, a much larger number of samples exceeded the STLC criterion. According to California regulations, these materials, when excavated, would require disposal in a Class I landfill. When soil data, as well as plant and earthworm mortality and bioaccumulation data and reduced soil invertebrate quantities are evaluated collectively, a substantial threat exists to the environment and wildlife associated with the contaminated sites. Remedial actions are required to eliminate this threat.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIF3 (26 September 1985):

3. EXISTING CONDITIONS IN THE STUDY AREA PRESENT NO THREAT TO SURFACE WATERS

After finding very low concentrations of dissolved metals in surface waters at the site through traditional techniques,the Navy conducted an elaborate clam bioassay to determine if conditions in the study area may affect aquatic organisms in such waters. The results indicate that clams in surface waters at the site are *cleaner* than those found in the Bay. The Remedial Investigation study shows no evidence that conditions in the study area are affecting surface waters at the site.

The study states that previous water sampling data indicated very low concentrations of dissolved metals in surface waters in the study area. RI at 15. Despite that data, the Navy conducted a clam bioassay presumably to determine whether metals from the parcels were migrating into surface waters at the site. The Navy concluded from the bioassay results that no practical differences in concentrations of Cu, Ni, Se, and As existed in clam tissues from locations near suspected contaminated areas and tissues from the reference areas. RI at 45. The Navy further speculated that if bivalve molluscs exist in the stream in the K-2 and G-1 areas and to some extent in the tidal water in the AA area, the animals may accumulate concentrations of Pb, Cd, and Zn. RI at 45. The study does not demonstrate, however, that such molluscs actually occur in those areas. Furthermore, the study states that the results are within the expected ranges to be found elsewhere. Id.

The Navy also presented no evidence that the Pb, Cd, and Zn concentrations found in the clams actually came from the soils in those areas rather than from other potential sources, including the Bay itself. Moreover, the Navy reported that

concentrations of Cd, Ca, and Zn in clams collected from Suisun Bay exceed those found in the clams in the bioassay. The Navy concluded that metals in the surface water at NWS Concord will have minimal environmental impact. RI at 45-47. In other words, clams near the site are cleaner than those in the Bay.

The Navy also compares the concentrations of metals found in the test animals to certain action levels for aquatic organisms used for human consumption. RI at 35-45. The Navy provides no explanation of how those standards may be relevant in this matter.

More important, no aquatic organisms from the study area, if any indeed exist, appear likely to be consumed by humans since few people have access to the study area. In addition, the study findings establish that none of the clam tissues taken from any of the test stations exceeded dietary standards. RI at 45. In short, there is no evidence that these clams will be eaten by humans, and even if they were, they meet dietary standards and in fact are more healthy than clams from the Bay. The Remedial Investigation Study clearly demonstrates that existing conditions in the study area pose no threat to surface waters at the site.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIF3 (26 September 1985):

The clam biomonitoring data indicates that metals are migrating in surface water at certain locations on Navy parcels. The use of molluscs to indicate pollution of surface water is employed throughout the world in the Mussel Watch. The clam biomonitoring data at Naval Weapons Station Concord indicate migration of metals into surface water and a substantial potential for harm to aquatic organisms. The migration of metals into surface waters has been limited to certain parcels on Navy property and does not appear to have moved out into Suisun Bay. While Bay waters may not have been adversely impacted, surface waters on Navy property have been and are continuing to be substantially impacted. The clam biomonitoring data indicate that significant biotic uptake is occurring and may result in potential harm to wildlife.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIF4 (26 September 1985):

4. EXISTING CONDITIONS IN THE STUDY AREA PRESENT NO THREAT TO PLANTS

Although recognizing that there is little information on metal concentrations in native plant species and that it is extremely difficult to compare tissue metal contents of different plant species to predict confidently the potential for movement of metals into all plants in the area, the Navy performed

elaborate experiments in an attempt to make such a prediction. RI at 15. The Navy evaluated samples of cattails (Typha augustifolia) collected from the parcels and reference areas and conducted a greenhouse experiment to determine the potential for concentrations of metals to move from soil into plants on the property. The Navy compared the results from those investigations with certain tissue metal standards and FDA "action levels" for metals in animal and human foods and analyzed the statistical differences among mean values for various sampling sites.

The results of the Analysis of Variance ("ANOVA") statistical analysis indicated that:

> even though some plant uptake of metals did occur in some of the sites, the extremely large variability in soil contents results in no statistically differences [sic] from that of the remote reference areas.

RI at 88. In addition, the Remedial Investigation study indicates that few field samples of Tvpha contained concentrations of As, Pb, Cd, and Zn above those found in plants from other sampled areas presumably including background areas. RI at 47-66.

Furthermore, the Navy does explain where it obtained and why it used the specified tissue metal and FDA standards for comparing the plant test results in this matter. See, RI Tables 2-7 and 2-8. The specified standards appear to apply to agriculture crops for animal and human feedstocks. Since the standards were not designed to determine whether remedial actions may be required at a site and since the parcels are not used for agricultural purposes, the specified standards appear irrelevant and should not be used in the matter.

Moreover, even if such standards were to be applied in this case, few samples appear to contain concentrations of metals in excess of such standards. No Typha samples, for example, contained concentrations of Cd or Ni above the stated Cd "critical content" values of 8 and 11 mg/kg, respectively. RI at 48-57. Only one of the numerous samples contained concentrations of Cu in excess of the stated Cu "critical content" value of 20mg/kg. RI at 64. In addition, nearly all the Typha samples contained concentrations of As below that normally found in Typha. RI at 66.

The Remedial Investigation Study indicates the greenhouse plant analysts data showed that plant death occurred at a limited number of sites and that the stated standards were exceeded in a limited number of samples from certain sites. RI at 68-88. But in correlating the field data to the greenhouse

data to determine how well the greenhouse analysis would predict potential metal uptake by native plants at the site, it appears that the Navy obtained a good relationship only for Zn. RI at 130-136. This indicates that the greenhouse plant analysts data for the metals other than Zn are unlikely to provide a good prediction of the potential metal uptake in plants at the site.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIF4 (26 September 1985):

The quotation from page 88 of the Final Remedial Investigation Report refers to the Appendix Table 2-A8, which presents the total uptake of metals by plants, not plant contents. When the size of the plant is considered along with the tissue content of metals, extreme variability was observed in the data and consequently no statistical differences were observed. This was misinterpreted by ATSF, which disregarded the statistical differences observed in plant tissue contents and concluded despite data to the contrary, that contaminants are not migrating from the soil into plants.

Tables 2-7 and 2-8 are guidelines for evaluating contaminated food for human or animal consumption. This guidance gives some perspective of the relative tissue concentrations that are considered unacceptable for human and animal consumption. Consequently, food for any animal could be considered contaminated for consumption when tissue contents exceed these values. No other established values exist for considering environmental pollution problems. The parcels were used for animal grazing activities in the past, so the FDA values could in fact be considered.

Nevertheless, the Final Remedial Investigation Report and the (Second Revised) Final Draft Feasibility Study Report did not use FDA values in the decision rules for developing remedial action alternatives.

It is true that the arsenic content of Typha was observed to be below that normally found by other researchers as ATSF contended, but page 66 of the Final Draft Remedial Investigation Report explains why. ATSF obviously failed to mention the low recovery of arsenic in the acid digestion procedure used. Consequently, the arsenic values were all below their true values.

It is true that plant zinc contents in field collected Typha were related to the greenhouse grown plants. This was fortunate because of the uncontrolled and complex situation in the field compared to the well controlled conditions in the greenhouse. This relationship clearly supports the Navy's findings that contaminants are migrating into plants on site as indicated by the greenhouse plant bioassay. All contaminants

could not be expected to be perfectly correlated between field and laboratory tests.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIF5 - (26 September 1985):

5. EXISTING CONDITIONS IN THE STUDY AREA PRESENT NO THREAT TO SOIL-DWELLING ANIMALS.

Although the Navy found it difficult to obtain enough of the soil invertebrate species, including earthworms, from the parcels and reference areas to make comparisons between sites, the Navy performed an earthworm bioassay to assess the potential for metals in soils to move into soil-dwelling animals. RI at 16. The bioassay results clearly show that existing conditions at the site pose no threat to soil-dwelling animals.

The Navy states that the results indicate soils from 11 sampling sites would not support many soil invertebrates and thus would not be expected to contain large numbers of soil-dwelling animals. RI at 136. The Navy further states that the results of the soil invertebrate test show a statistically significant decrease in the number and diversity of soil invertebrates in the AA area compared to the reference area. Natural Resources Damage Assessment ("NRDA") at 26. A difference in the amount of invertebrates found at the two locations does not demonstrate that conditions at the AA site caused the decrease in invertebrates at that site.

The Navy also applied the action levels established for human consumption of aquatic organisms used in the clam bioassay to the results of the earthworm bioassay. RI at 91. The Navy provides no explanation of why those standards were used or how they are relevant in interpreting the results of the earthworm bioassay.

The study further indicates that the maximum concentrations of Cd, Pb, Se, Zn, Cu, and Ni found in the earthworm bioassay were well within the ranges reported for earthworms in recent literature. RI at 93-115. The study also states that the concentrations of Cd observed in the bioassay would have little currently detectable impact on earthworm populations that may occur in the area. RI at 93-108. In addition, the study reports that in many cases earthworms are very resistant to Pb accumulation. RI at 108. The study further reports that the concentrations of Zn in soils used in the earthworm bioassay do not appear to be high enough to cause either acute or chronic toxicity problems in the earthworms. RI at 112. Similarly, the study indicates that Cu is well regulated in earthworms and is unlikely to be a problem for soil invertebrates in the area. RI at 115. The study concludes that the potential for soils to have a deleterious effect on

soil-dwelling animals at the site appears to be low. Id.

The study states that arsenic levels were above those reported in recently published literature. But the data indicates that the highest concentrations were found in the AA and AB areas where few soil-dwelling invertebrates were found. Thus, even if arsenic in soil-dwelling animals at those areas produces an adverse effect on other animals, it appears few animals would feed in that area where few invertebrates occur. The study clearly indicates that existing conditions at the site pose no threat to soil-dwelling animals at the site or to other animals that might feed on them.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIF5 - (26 September 1985):

A statistical difference in soil invertebrate data between RASS 1 (AA site) and the reference site does clearly demonstrate that the conditions at RASS 1 reduced the abundance of soil invertebrates at that site. (The difference in invertebrate numbers between the plots on RASS 1 and the Reference Area was very large, with nearly 4.5 times more organisms per square yard in the Reference Area. Below ground plant biomass was measured in conjunction with the study, and RASS 1 had significantly less plant root material than the Reference Area. The sample size was 40 which was adequate for analysis.

FDA action levels were considered to give perspective to the earthworm data. If there is concern for FDA action levels in food for human or animal consumption, it is reasonable to consider similar levels in food for wildlife consumption, especially endangered species.

While data collected in the earthworm bioassay indicated that the bioaccumulation of metals in earthworms are not acutely or chronicly toxic, the data do clearly indicate that metals are in fact bioavailable and are migrating into soil invertebrates and consequently into food chains. Additional sampling of mice and voles on the contaminated sites clearly demonstrated that metals did in fact migrate into the foodchain associated with the captured animals. See Final Report of Feasibility Study of Contamination Remediation, Volume II, Biological Assessment.

ATSF failed to realize that when soil invertebrates eventually invade and recolonize the AA and AB sites, they will bioaccumulate high tissue arsenic contents. Consequently, existing conditions most certainly pose a threat for soil invertebrates.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIF6

(26 September 1985):

6. METALS IN THE SOILS IN THE STUDY AREA ARE UNLIKELY TO MIGRATE SIGNIFICANTLY INTO SURFACE AND GROUNDWATERS.

The Remedial Investigation study makes clear that metals are unlikely to migrate into groundwater because of the relatively impermeable layer of stiff sandy silt below the marsh soils. RI at 175. In addition, the study indicates that the permeable peat material in the area has an exceptional capacity for absorbing metals and would restrict migration laterally. Id. The study further states that metals are likely to precipitate as sulfides and carbonates which would further restrict their movement through marsh soil. Id. The study thus clearly demonstrates that chemicals are unlikely to migrate into groundwater or laterally through soil at the site.

The Navy also attempted to predict the potential for metals to migrate based on tidal inundation and storm events. But the studies do not demonstrate that such migration would have any adverse effect on the environment if such migration occurred.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIF6 (26 September 1985):

The Navy agrees that the metals are unlikely to migrate into groundwater. Surface water migration by tidal inundation and storm events from barren areas, where contamination is high, however, is likely.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIF (26 September 1985):

7. EXISTING CONDITIONS IN THE STUDY AREA PRESENT NO THREAT TO THE ENDANGERED AND RARE SPECIES THAT MAY OCCUR IN THAT AREA.

The Remedial Investigation study indicates that numerous animals, including certain rare and endangered species, have been observed in habitat types similar to those in the study area. RI at 295. The study indicates that under existing conditions, the grasslands in the study area are "highly" suitable for species such as meadowlarks and kestrels and moderately suitable for species such as pheasants. RI at 300. The habitat suitability for pheasants was lower than for the other species because of the lack of cultivated cropland in the area. Id.

The study further indicates that the grasslands in the study area were not noticeably different than those in the reference area except for a small bare area near the former kiln area. RI

at 305. That area, however, was determined to be too small to have a significant effect on the quality of the entire site. Id.

The study also stated that three endangered or rare species, the Salt Marsh Harvest mouse, the California Least tern and the California Black rail were observed within the salt marsh portion of the study area. RI at 295-296. Under existing conditions, the habitat quality for the mouse ranged from poor to moderate because of the lack of suitable plant cover and structure and plant diversity conditions which were not demonstrated to be related to the metals at the site. RI at 311-312.

The Study concluded that the habitat quality for California Black rail ranged from poor to good. RA at 313. The ratings varied based on the natural conditions in that area. RI at 312. The report thus indicates that under existing conditions, the study area provides important habitat for many species at the site, including certain endangered and rare species. As Mr. Antommaria indicates in the attached technical comments, the study does not demonstrate that the existing conditions are deteriorating or affecting endangered species in any manner.

In evaluating the potential for the concentrations of metals on the site to affect such species, the Navy concludes based on the plant and animal bioassay data and field evaluations that the metals are mobile and are probably entering the food chain. RI at 440. But as discussed above, neither the field data or bioassay results indicate that metals from the parcels are entering the food chain. Indeed, the data show that metals are naturally occurring in the area and thus that any potential uptake of metals into species may result from natural conditions.

The study also suggests that animals at the site may be exposed to concentrations of Pb, Cd, and As in water at the NWS. RI at 445-460. But as discussed above, the field data showed very low concentrations of metals in surface waters at the site and the clam bioassay established that metals in surface waters at the site have minimal environmental impact.

The study further suggests that species such as the Salt Marsh Harvest mouse and California Black rail would bioaccumulate Pb, Cd, Se, and As by living in the areas containing concentrations of metals. The study presents no evidence, however, to support that conclusion. The Study also presents no evidence establishing that any metals the species may accumulate would come from the study area and not other areas where the metals are naturally occurring. The Study also presents no evidence showing that even if the species consumed such plants and invertebrates, the concentrations of metals they might consume would have an adverse effect on the animals.

The study simply fails to provide any evidence that

demonstrates the existing conditions in the study area pose any threat to the endangered and rare species that may occur at the site. Rather, the study indicates that the existing conditions provide important, quality habitat for such species.

Response to Atchison, Topeka, and Santa Fe Railway Company Comments - IIF (26 September 1985):

A premise of the type of habitat evaluation conducted for the Remedial Investigation is that potential and visible habitat quality is being investigated. The actual quality may be lower or higher than the evaluation shows, because a habitat model cannot incorporate all aspects of a species' needs. The lack of visible effects from a site known to be contaminated is insufficient to declare it a non-problem. The evidence of visible effects, however, such as was seen in the areas that became RASS 1 and RASS 2, is sufficient to trigger additional investigation.

Data collected for the (Second Revised) Final Draft Feasibility Study Report and the Final Draft Report of the Feasibility Study of Contamination, Volume II, Biological Assessment, verified the presence of three animal and one plant species either on the list of endangered species or candidates for listing. Because of the status of these species, improvement of their habitat quality and quantity is considered necessary for their long-term survival. An area that provides poor quality habitat, but that could be improved, is of great potential value.

Additional analysis confirms the low suitability value given to habitat for the salt marsh harvest mouse and black rail. Contributing factors include the death of some plants and earthworms when grown in sediments from the site, bioaccumulation of metals by the earthworms and plants, decreased abundance of invertebrates and underground plant biomass, the extent of bare ground, high concentrations of arsenic, a "moldy odor," and the fact that much of the pickleweed on RASS 1 seems to be stressed and reduced in vigor.

In addition to the indications of low habitat suitability, some of which is believed to be the result of contamination, tissue analysis of mice and voles captured on RASS 1 and RASS 2 showed significantly elevated concentrations of metals when compared to animals from the Reference Area. Although a histopathological examination of the mice and voles did not identify "toxin-related gross findings", 12 of 30 animals from a RASS did exhibit some kind of gross change as opposed to 2 of 19 from the Reference Area. This evidence was not available at the time the Final Draft Remedial Investigation Report was prepared.

The Navy has determined that there is an adverse impact

on biota from the elevated concentrations of metals in the contaminated areas. The organisms are exposed to and accumulating metals in their tissues at levels which are potentially harmful. The quality of their habitat is degraded, which lowers both individual and population fitness. Animals such as the salt marsh harvest mouse, which has a very limited home range, are most assuredly being contaminated from the metals on site.

Atchison, Topeka, and Santa Fe Railway Company Comments - IIG (26 September 1985):

G. THE NAVY'S ASSESSMENT OF DAMAGE TO NATURAL RESOURCES IS INCONSISTENT WITH CERCLA.

CERCLA provides that only those natural resources that the United States government owns, manages, holds in trust, or otherwise controls are subject to a damage assessment and damages may only be assessed for such resources that are actually injured or lost because of a release of hazardous substances. 42 U.S.C. {{ 9601(16), 9601(6), 9607, 9611. In the Natural Resources Damage Assessment study, however, the Navy attempts to show that natural resources in the study area have been damaged by misapplying irrelevant standards to the data and manipulating the data to suggest that environmental impacts have occurred in the study area. The Navy states, for example, that because portions of the study area contain metals in excess of the MASSA standards, they are damaged to the extent that agriculture use of the land should be prohibited indefinitely. NRDA at 4. The Navy has not shown, however, that those areas have been or will ever be used for agricultural purposes, or explained how an exceedance of the MASSA standards demonstrates that a resource has been damaged when the data indicate that background samples also exceeded the MASSA standards. Accordingly, in attempting to identify damages to natural resources, the Navy has failed to demonstrate that natural resources in the study area have actually been injured or lost as a result of a release of hazardous substances in that area contrary to the CERCLA requirements.

The Navy also attempts to make an economic evaluation of the alleged natural resources damages by developing cost estimates for numerous factors such as the purported decline in market value of lands containing concentrations of metals and the costs associated with a restoration plan. The Navy also attempts to provide an economic justification for the preservation of rare and endangered species and an economic cost estimate for the risk of future damage. The Navy's economic evaluations are based on erroneous interpretations and the application of inappropriate criteria to the data. The data indicate, for example, that no restoration of the site is required and that attempts to enhance the quality of the site would adversely impact endangered and

rare species that may occur at the site. Restoration costs are thus irrelevant to any assessment of natural resources damages in the matter since no restoration is required.

Similarly, Navy suggests that the concentrations of metals found on the parcels has reduced the market value of the land. NRDA at 53. The Navy has made no showing that a loss in market value is recoverable under CERCLA nor that the parcels have lost any actual or potential economic value. The Navy's economic evaluations of the alleged damages to natural resources are speculative and inconsistent with CERCLA requirements.

3.14 COMMENTS SUBMITTED BY ALLIED CORPORATION IN RESPONSE TO A PUBLIC NOTICE ISSUED ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Allied Corporation Comments Overview (30 September 1985):

1.0 OVERVIEW.

This document contains a critique of the study entitled "Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California." Following this overview section, each analytical area is discussed in roughly the order presented in the study.

Since the "Assessment of Damages to Natural Resources at Naval Weapons Station, Concord, California" and the "Feasibility Study of Contamination at Naval Weapons Station, Concord, California" draw heavily (albeit improperly) on the Remedial Investigation, these comments are germane to those documents as well. In addition, some of the following comments relate specifically to either the feasibility study, the natural resources damage study, or both.

The following general observations are not exhaustive. That is, they do not attempt to summarize or encompass all that follows in Sections 2.0, 3.0 and 4.0 below.

Allied Corporation Comments 1.1 (30 September 1985):

1.1. TIME AVAILABLE FOR COMMENT.

The Navy has not permitted sufficient time or information for comment. Documents cited in the reports (e.g. the studies referred to in Table 2-2) are not publically available. One was furnished to us, on request, late in the comment period. However, it proved to be irrelevant. Other data, which purports to support these reports, was not made available until some time into the comment period. Still other data (such as that requested by Mr. Phillip Antommaria) was never provided.

More to the point, one and a half months is not sufficient time to review as fully as we would like, three reports which took the Navy not less than fifteen months to produce. (We received the natural resources damage study only four weeks ago.) We reserve the right to make additional comments as our further analysis continues and as more information is learned in the course of the pending litigation.

Response to Allied Corporation Comments 1.1 (30 September 1985):

On 8 August 1985, the Navy issued a public notice soliciting comments and information necessary to evaluate the release, and/or the threat of the release, of hazardous substances and alternative remedial actions for the release, and the threat of release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. Subsequently, the Navy announced that it would accept comments and other information until 26 September 1985.

The period which the Navy allowed to submit comments and other information was sufficient opportunity to submit comments and information in response to the public notice. At the time the Navy issued the public notice, CERCLA did not require the Navy to give interested persons the opportunity to submit comments and information in response to draft remedial investigation and feasibility study reports or in response to a proposed remedial action plan. Of course, CERCLA was amended on 17 October 1986.

Section 113(k)(2)(B) and (C) of CERCLA provides that:

> (B) Remedial action. The President shall provide for the participation of interested persons, including potentially responsible parties, in the development of the administrative record on which the President will base the selection of remedial actions and on which judicial review of remedial actions will be based. The procedures developed under this subparagraph shall include, at a minimum, each of the following:
>
> (i) Notice to potentially affected persons and the public, which shall be accompanied by a brief analysis of the plan and alternative plans that were considered.
>
> (ii) A reasonable opportunity to comment and provide information regarding the plan.
>
> (iii) An opportunity for a public meeting in the affected area, in accordance with section 117(a)(2) (relating to public participation).
>
> (iv) A response to each of the significant comments, criticisms, and new data submitted in written or oral presentations.
>
> (v) A statement of the basis and purpose of the

selected action.
For purposes of this subparagraph, the administrative record shall include all items developed and received under this subparagraph and all items described in the second sentence of section 117(d). The President shall promulgate regulations in accordance with Chapter 5 of title 5 of the United States Code to carry out the requirements of this subparagraph.

(C) Interim record. Until such regulations under subparagraphs (A) and (B) are promulgated, the administrative record shall consist of all items developed and received pursuant to current procedures for selection of the response action, including procedures for the participation of interested parties and the public. The development of an administrative record and the selection of response action under this Act shall not include an adjudicatory hearing.

In addition, Section 117(a) and (b) now provide that:

(a) PROPOSED PLAN. Before adoption of any plan for remedial action to be undertaken by the President, by a State, or by any other person, under section 104, 106, 120, or 122, the President or State, as appropriate, shall take both the following actions:

(1) Publish a notice and brief analysis of the proposed plan and make such plan available to the public.

(2) Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the facility at issue regarding the proposed plan and regarding any proposed findings under section 121 (c)(4) (relating to cleanup standards). The President or the State shall keep a transcript of the meeting and make such transcript available to the public.
The notice and analysis published under paragraph (1) shall include sufficient information as may be necessary to provide a reasonable explanation of the proposed plan and alternative proposals considered.

(b) FINAL PLAN. Notice of the final remedial action plan adopted shall be published and the plan shall be made available to the public before commencement of any remedial action. Such final plan shall be accompanied by a discussion of any significant changes (and the reasons for such changes) in the proposed plan and a response to each of the significant comments, criticisms, and new data submitted in written or oral presentations under subsection (a).

Section 113(k)(2)(B)(ii) of CERCLA now requires that the Navy give a reasonable opportunity to comment and provide

information regarding the plan.

Section 117(a) of CERCLA now requires that the Navy give a reasonable opportunity for submission of comments.

The Navy produced all relevant documents, except documents identified as privileged, to the defendants in the cases styled as United States v. Allied Chemical Corp., et al, Civil No. C-83-5898 FMS (N.D. Calif.) and United States v. Chemical & Pigment Co., et al, Civil No. C-83-5896 FMS (N.D. Calif.).

Allied Corporation Comments 1.2 (30 September 1985):

1.2. STATUS OF THESE STUDIES.

There is another fundamental problem with this set of reports. They show signs of having been hastily drafted, despite the fact that the Navy spent more than a year preparing them. They are all inadequate. The feasibility study is so sketchy that serious decision-making could not be based upon it.

One has the sense that WES knows this, and that even as the comment period is running, it is working to improve the quality of these reports. (We know, for example, that additional field work was undertaken in mid-September.) If that is so, then these are not true "final draft reports" and this comment period is not an appropriate time in which to solicit or make comments. Commenters are entitled to draft final reports which include all the material which the authors thought relevant to the enterprise; not just that which they had time to include. The comment period is not a time for the authors to polish their document, intending to supplant the one which commenters are reviewing. We object to the extent that these reports are not true "final draft reports" and reserve the right to comment further on them and on this point.

Response to Allied Corporation Comments 1.2 (30 September 1985):

From 1981-1987, the Navy responded to the release, and the threatened release, of hazardous substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station Concord, through its Navy Assessment and Control of Installation Pollutants (NACIP) Program. Since 1987, the Navy has responded to the release, and the threatened release of hazardous substances on these parcels through its Installation Restoration Program.

On 17 February 1986, the Navy completed a Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California. On 7 March 1986, the Navy completed the (Revised) Final Draft Report of the Feasibility

Study of Contamination Remediation at Naval Weapons Station, Concord, California. On 16 September 1988, the Navy issued:

- Final Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, Subtitle Appendix 2.5 1986/87 Data (June 1988).
- Final Report of Suitability of Sites for Hazardous Waste Disposal, Concord Naval Weapons Station, Concord, California (September 1987).
- (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume I: Remedial Action Alternatives (September 1988).
- Final Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume II: Biological Assessment (July 1988).
- Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, volume III: Figures (April 1988).
- Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California (16 September 1988).

Allied Corporation Comments 1.3 (30 September 1985):

1.3. INADEQUATE ANALYSIS.

As is detailed below, a very significant number of the conclusions in the reports are simply not supported by the data. In many places the analysis is not supported by the evidence; in many places the conclusions are not supported by the analysis. These failings are individually and cumulatively significant and preclude reliance on the studies.

Response to Allied Corporation Comments 1.3 (30 September 1985):

The Final Remedial Investigation Report clarified the analysis presented in the Final Draft Remedial Investigation Report. The Final Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, Subtitle Appendix 2.5 1986/87 Data, presented

additional data.

Allied Corporation Comments 1.4 (30 September 1985):

1.4. IMPROPER USE OF ANALYSIS.

In many instances, the remedial investigation report states a conclusion, with caveats, that a certain state of affairs may exist. But later in the report (or when used in an executive summary, the feasibility study or the natural resources damage report), when that conclusion is summarized (as the basis for further analysis) both the caveats and the tentative nature of the conclusion are ignored. Instead the later analysis restates the conclusion as unrestricted truth, and seeks to build on it. That is not proper analysis.

Response to Allied Corporation Comments 1.4 (30 September 1985):

The Final Remedial Investigation Report clarified the analysis presented in the Final Draft Remedial Investigation Report.

Allied Corporation Comments 1.5 (30 September 1985):

1.5. THE FEASIBILITY STUDY DOES NOT COMPORT WITH EPA GUIDANCE.

The "Guidance on Feasibility Studies Under CERCLA", prepared for the EPA by JRB Associates and others, EPA/540/G 85/003 June 1985) provides guidance for the preparation of feasibility studies. The report prepared by WES simply does not measure up. It contains very little of the information or detail which is required in a feasibility study.
Most of the information which it does purport to supply is sketchy and incomplete. And of course, to the extent it relies on the remedial investigation, it is without foundation.

Response to Allied Corporation Comments 1.5 (30 September 1985):

The Final Draft Feasibility Study Report complied with the requirements of CERCLA and the NCP. In response to amendments to CERCLA and implementing guidance, the Navy prepared a (Second Revised) Final Draft Feasibility Study Report. "Guidance on Feasibility Studies Under CERCLA," EPA/540/G-85/003, was used to prepare the (Second Revised) Final Draft Feasibility Study Report.

Allied Corporation Comments 1.6 (30 September 1985):

1.6. THE "GOAL" IS IMPROPER AND UNLAWFUL.

Moreover, the feasibility study is wholly misdirected. It sets forth as its goal: "to abate the release and potential release of hazardous substances into the environment from the various contaminated sites in a manner that does not result in significant long term adverse impacts to critical wildlife habitat." (Feasibility Study, p. 3.5, p. 4.2) This goal drives all of the analysis which follows in that study.

Yet it is not the correct legal standard. CERCLA provides that:

> "Whenever . . . any hazardous substance is released or there is a substantial threat of release into the environment . . . the President is authorized to act, consistent with the national contingency plan, to take any . . . response measure consistent with the national contingency plan which the President deems necessary to protect the public health or welfare or the environment."

(CERCLA, §104(a)(1)) (See also, the National Contingency Plan, at 40 C.F.R. §300.68.)

The goal set forth in the feasibility study is inconsistent with the standards contained in CERCLA and the NCP. It does not include any requirement that the "release and potential release" constitute a threat to the public health or welfare or the environment. The feasibility study goal says, in effect, "if there is contamination, it must be removed."

The feasibility study's "goal" violates CERCLA and the National Contingency Plan in another significant respect. Section 104(c)(4) requires the lead agency to take cost into account in selecting a remedial alternative. The cost-effectiveness criterion is elaborated in Section 300.68(j) of the NCP:

> The appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e. the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment.).

(See also 40 C.F.R. 300.68(k)).

Here, the goal contains no hint of cost-effectiveness.

Measuring the proposed remedial alternatives against the goal contained in the feasibility study is a clear violation of CERCLA and the NCP.

Indeed, as detailed in this paper, none of the relevant criteria are met: for example, there is no showing of a need to protect the public health, welfare or the environment, there is no showing that the action alternatives considered (including marsh "restoration") will be effective, and there is no discussion at all of cost-effectiveness.

Take a simple example: The studies report that the value of the Salt Marsh Harvest Mouse is estimated to be between $377,400 and $566,100, and that the total societal cost of the loss of habitat at the site "most probably lies between three and four times" that amount. We believe these calculations are seriously flawed, but passing that, call the loss $2,000,000. To "protect" that $2,000,000 the Navy is now considering remedial alternatives that are estimated to cost between $13,379,000 and $56,480,000. There is no sense of proportion in that. Neither CERCLA nor the NCP permit selection on such a basis.

In addition, it seems most probable that the Navy's proposed remedial alternatives would <u>not</u> "protect" these species, even if they needed protection. In the course of "remedying" the perceived problems, the Navy would do grave damage to the marsh. Under the capping alternatives, it would move heavy equipment and very substantial loads of material onto the marsh, compacting or otherwise impairing the staging and transport areas, and permanently destroying approximately 84 acres of wetland.

Under the source removal alternatives, the Navy would undertake measures which, the feasibility report itself acknowledges, will ". . . severely impact the critical wetland habitat . . . ." Without support, it states this would be a short-term impact only (page 7.6).

Under alternative 6, the Navy would destroy unspecified amounts of land (the report does not tell us how much acreage is involved) with the expectation of "restoring" the marsh.

To the extent the studies propose to "restore" the marsh, the authors are engaged in an extremely speculative enterprise, which is almost certain to do more harm than good There is simply no evidence that one can "restore" a marsh to its original condition. Indeed, the authors recognize this when they say "at best, wetland restoration is an infant science." (Feasibility Study, p. 8.31) "At best" is an understatement; "science" is an overstatement. (Compare the authors' statement elsewhere in the same document: "wetland restoration is still more art than science and therefore, the success of such a program cannot be assured." p. 7.12-7.13) There is absolutely no

reason to believe that the marsh restoration sketched in the feasibility study can be done, or can be done at the cost stated.

More likely, any such effort will result in the destruction of the habitat and thus any endangered species relying on the habitat. That is not consistent with either the Endangered Species Act or with CERCLA. The Navy has no legal authority to attempt any such thing.

Marsh "restoration" should not even be included as an alternative. The NCP requires that a remedial activity be one that is "technologically feasible and reliable and . . . effectively mitigates and minimizes damage to . . . the environment." 40 C.F.R. 300.68(j). The marsh restoration plan is hardly that.

Nor does WES provide any assurance that it is. All it says is "implementability questions associated with Alternative 6 include . . . the successful implementation of a wetland restoration program. These concerns will be addressed during the concept design and are not believed to be a significant impediment to implementation . . ." This provides absolutely no basis for believing it can be done. (Compare the statement quoted above: "the success of such program cannot be assured.") Indeed, what WES is saying, at most, is that we will not know until at least the "concept design" phase whether it can be implemented. That is no basis on which a decision-maker should consider or select that alternative. Indeed it would be wholly improper for the decision-maker to do so. The EPA Guidance states: "The technical analysis of remedial alternatives should not be based on the presumed performance of untested methods. . . ."(Section 3.2.2). That criterion is clearly not met here and it would be wrong to base a decision on such a faulty analysis.

Response to Allied Corporation Comments 1.6 (30 September 1985):

During preparation of the (Second Revised) Final Draft Feasibility Study Report, the recommended alternative was changed, which resulted in a reduction of the number of acres of wetlands which will be impacted. Implementation of the proposed remedial action plan, which includes remedial action coupled with wetland restoration, will indeed have a short-term impact. The long-term benefits, however, outweigh the short-term impacts.

While no one can guarantee the success of a wetland restoration, successful projects have been documented in the last few years. The success of wetland restoration has been more recent on the west coast, but elsewhere in the United States, successful projects have been documented since the mid-1970's. This process cannot be called "untested." Wetland restoration is a necessary part of the active remedial action. Mitigation in the form of any off-site activity such as buying wetland to

preserve it is, as Allied undoubtedly knows, difficult at best.

Allied Corporation Comments 1.7 (30 September 1985):

1.7. VIOLATION OF THE ENDANGERED SPECIES ACT.

There is another point which this underscores: Taking WES' findings and proposals as a premise, these action alternatives all involve the taking of endangered species in violation of the Endangered Species Act. 16 U.S.C. 1531 et seq. The Navy cannot select such an alternative. Based on all the data presented in the reports, it appears that all of the remedial actions proposed (other than the "no-action" alternatives) would likely result in far more harm to the environment that the "no-action" alternatives.

Response to Allied Corporation Comments 1.6 and 1.7 (30 September 1985):

The Navy revised its general environmental goal in the (Second Revised) Final Draft Report of Feasibility Study of Contamination Remediation of Naval Weapons Station, Concord, California.

Section 121(a) of CERCLA provides that:

> The President shall select appropriate remedial actions determined to be carried out under Section 104 . . . which are in accordance with this section and, to the extent practicable, the national contingency plan, and which provide for cost-effective response.

Section 121(b)(1) of CERCLA sets forth general rules for cleanup standards:

> Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, the President shall specifically address the long-term

effectiveness of various alternatives. In assessing alternative remedial actions the President shall, at a minimum, take into account:

(A) the long-term uncertainties associated with land disposal;

(B) the goals, objectives, and requirements of the Solid Waste Disposal Act;

(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;

(D) short and long-term potential for adverse health effects from human exposure;

(E) long-term maintenance costs;

(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

The President shall select a remedial action that is protective of human health and the environment, that is cost effective and that utilizes permanent solutions an alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

Section 121(d)(1) of CERCLA sets forth general rules for the degree of cleanup:

(d) Degree of Cleanup, (1) Remedial actions selected under this section or otherwise required or agreed to by the President under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

Section 121(d)(2)(A) of CERCLA provides that:

(2)(A) With respect to any hazardous substance, pollutant, or contaminant that will remain onsite, if (i) any standard, requirement, criteria, or limitation under any Federal environmental law, including, but not limited to, the Toxic Substances Control Act, the Safe

Drinking Water Act, the Clean Air Act, the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, or the Solid Waste Disposal Act; or

(ii) any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than any Federal standard, requirement, criteria, or limitation, including each such State standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator under a statute cited in subparagraph (A), and that has been identified to the President by the State in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant, the remedial action selected under section 104 or secured under section 106 shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation. Such remedial action shall require a level or standard of control which at least attains Maximum Contaminant Level Goals established under the Safe Drinking Water Act and water quality criteria established under section 304 or 303 of the Clean Water Act, where such goals or criteria are relevant and appropriate under the circumstances of thee release or threatened release.

Section 121(d)(4) of CERCLA provides, in pertinent part; that:

(4) The President may select a remedial action meeting the requirements of paragraph (1) that does not attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate standard, requirement, criteria, or limitation as required by paragraph (2) (including subparagraph (B) thereof), if the President finds that --

(B) compliance with such requirement at that - facility will result in greater risk to human health and the environment than alternative options.

As stated in the Final Draft Report of Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, the Navy established a general environmental goal for remedial action which:

> [C]alls for preventing or minimizing the release of hazardous substances causing substantial danger to present or future human health or the environment, using cost effective measures, without adversely impacting important wildlife habitat in the long term.

Final Draft Feasibility Study Report, at 3.38. The Navy also established four primary specific objectives for remedial action: one, prevent biota from contacting contaminated soils that would threaten the biota; two, prevent the resuspension of contaminated sediments and soils in surface water and air and the redistribution of the contaminated sediments and soils which would threaten the area flora and fauna; three, minimize disturbance to the wetlands consistent with long term protection of flora and fauna; and four, prevent migration of contaminants into the groundwater.

Following the establishment of the general environmental goal and the specific objectives for remedial action, the Navy identified potentially applicable or relevant and appropriate requirements and decision rules which specify the criteria for the cleanup required for the portions of Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons station which it concluded are contaminated with hazardous substances. Section 3.3 of the (Second Revised) Final Draft Feasibility Study Report identifies the potentially applicable or relevant and appropriate requirements. Section 3.5 of the (Second Revised) Final Draft Feasibility Study Report identifies the decision rules. Section 7.3.1 of the (Second Revised) Final Draft Feasibility Study Report analyzes the ARAR's for RASS 1; Section 7.3.2 of the report analyzes the ARAR's for RASS 2; Section 7.3.3 of the report analyzes the ARAR's for RASS 3; and Section 7.3.4 of the report analyzes the ARAR's for RASS 4.

The Navy identified proposed applicable or relevant and appropriate requirements for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 2 of its Proposed Remedial Action Plan for the Release, and the Threatened Release, of Hazardous Substances on Parcels 572, 573, 574, 575, 576, 579D, and 581 on the Naval Weapons Station, Concord, California. The Navy identified proposed decision rules for RASS 1, RASS 2, RASS 3, and RASS 4 in Item 3 of its proposed remedial action plan. In Item 3 of its proposed remedial action plan, the Navy indicated that full compliance with the ARAR's for RASS 1 and RASS 2 would result in greater risk to the environment than alternative options and that, because of that environmental risk, the remedial action for RASS 1 and RASS 2 need not attain a level or standard of control at least equivalent to the ARAR's for RASS 1 or RASS 2 (to the extent that compliance with the ARAR's for RASS 1 and RASS 2 will result in greater risk to the environment than alternative options).

Section 7(a)(2) of the Endangered Species Act provides that:

> (2) Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an 'agency action') is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

To determine whether excavation and removal of contaminated soil from the marsh in RASS 1 and RASS 2, which would be required by Alternatives 1-3C, 2-3C, 1-3A, 2-3A, in Item 4 of the proposed remedial action plan, would threaten the continued existence of the salt marsh harvest mouse, the Navy prepared a biological assessment of the impact from the implementation of the proposed remedial action, i.e., Alternatives 1-3C, 2-3C, 1-3A, and 2-3A on RASS 1 and RASS 2. On 5 July 1988, the Navy submitted its biological assessment to the Fish and Wildlife Service and requested that the Fish and Wildlife Service complete consultation concerning the proposed remedial action, as required by Section 7 of the Endangered Species Act. On 23 August 1988, the Fish and Wildlife Service issued a biological opinion, which stated that;

> It is our Biological Opinion that the proposed remediation of heavy metals contamination at Concord Naval Weapons Station is not likely to jeopardize the continued existence of the salt marsh harvest mouse or California clapper rail.

The issuance of the no-jeopardy biological opinion by the Fish and Wildlife Service concluded consultation and confirmed that the Navy can select a remedial action plan which requires that the soil contaminated with hazardous substances be excavated and removed from the marsh without violating Section 7 of the Endangered Species Act.

> Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without special exemption. Under the terms of Section 7(b)(4) and 7(o)(2), taking that is

incidental to and not intended as part of the agency action is not considered taking within the bounds of the Act, provided that such taking is in compliance with this Incidental Take statement.

The lack of suitable clapper rail habitat in the active remediation areas indicates that incidental take of this species is not likely. Because the harvest mouse is not sufficiently vagile to evade disturbance associated with the proposed action, taking of the species incidental to otherwise lawful activities is anticipated. The difficulty of finding any or all animals taken renders infeasible the specification of the extent of incidental take in terms of number of animals. In such situations, we estimate the level of take in terms of habitat loss.

The Service anticipates that about 13-15 acres of harvest mouse habitat would be eliminated for 3-5 years by the proposed active remediation work. Habitat values likely would improve and surpass former conditions 3-10 years after completion of the remediation activities.

The Service believes the following reasonable and prudent measures are necessary or appropriate to minimize the extent of take:

1) Marsh disturbing activities associated with passive remediation and installation of water monitoring wells shall be minimized to the maximum extent possible.

2) Human and mechanical disturbance associated with active remediation shall be confined within the active remediation zone boundary as much as possible.

3) If the anticipated level of incidental take is exceeded, project activities shall cease and formal consultation shall be reinitiated immediately.

To be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1) Passive remediation work and installation of water monitoring wells shall be conducted as infrequently as possible to obtain the necessary monitoring information. Travel between monitoring stations shall be the shortest distance possible without noticeably trampling vegetation or compacting

soil.

2) Active remediation activities shall not extend more than 20 feet beyond the active remediation zone boundaries.

3) If any of the terms and conditions are violated, the causative action shall cease immediately and formal consultation shall be reinitiated within 5 working days of the date of infraction.

The Fish and Wildlife Service shall be notified within 3 working days if any dead or injured harvest mice are found during construction of this project. Contact persons with the Service are Mr. Gail C. Kobetich or Mr. Peter Sorensen (916/978-4866). Any dead or injured animals shall be deposited with the Museum of Vertebrate Zoology, University of California, Berkeley, or the Museum of Birds and Mammals, San Jose State University.

The issuance of the biological opinion with this statement confirmed that the Fish and Wildlife Service would not consider the taking of salt marsh harvest mice which is incidental to and not intended as part of the proposed remedial action as taking in violation of Section 9 of the Endangered Species Act, provided that such taking complies with the conditions included in such statement.

During preparation of the (Second Revised) Final Draft Feasibility Study Report, the Navy has evaluated a range of alternatives, including the no action alternative. Alternative remediation technologies and concepts were evaluated in accordance with CERCLA, the NCP, and implementing guidance. The Navy finds that the no action alternative does not provide the requisite level of protection to human health or the environment. However, based on concerns expressed by a number of commenters, the Navy developed a three tiered remedial action plan. Using this three tiered approach, the Navy divided each RASS into three areas: an area to be monitored, an area of passive remediation, and an area of active remediation. The areal extent of each of these subareas was quantified by balancing the potential for harm associated with leaving the contaminants in place and long term benefits of remediation with the short term impacts associated with active remediation. As a result of the above approach, a total of approximately 18.75 acres will be actively remediated.

Other areas in each RASS, totalling 25.11 acres, will be passively remediated. Passive remediation includes extensive monitoring on all environmental media and on all potential pathways, with the potential for future active remediation if required for the protection of the human health or the

environment. Because of the nature of the environmental concerns, the Navy finds that it is appropriate to sample surface water, groundwater, sediments, soils, and biota. The proposed monitoring program, conducted in two phases, is designed to be time limited. Phase 1, consisting primarily of simple observation and monitoring of the various environmental media, is conducted annually for the first five years following remediation. Phase 2, consisting of more complex evaluation of bioaccumulation, is conducted if Phase 1 test results indicate further monitoring is required. After the initial five years of annual sampling, monitoring is conducted every five years as required by CERCLA.

In addition to those areas of high levels of arsenic and heavy metals, monitoring of adjacent areas will be conducted to determine if these substances are migrating into the surrounding environment.

The Navy finds that the cost of the proposed remedial actions is consistent with the release of hazardous substances that has occurred on the sites under investigation.

The excavation and the restoration in the remedial action plan will have a short-term impact. The long-term benefits, however, will outweigh the short-term impact. Although the success of wetland restoration cannot be guaranteed, successful restoration projects have been documented since the mid-1970's. (Successful wetland restoration has been more recent on the west coast.) Mitigation, in the form of off-site activity such as purchasing wetlands for preservation would be difficult.

Allied Corporation Comments 1.8 (30 September 1985):

1.8. THE FEASIBILITY STUDY FAILS TO DO THE REQUIRED COST SCREENING.

The EPA "Guidance on Feasibility Studies Under CERCLA" requires that:

> Alternatives should be eliminated if they are deemed much more expensive (an order of magnitude or more) and offer similar or smaller environmental and public health benefits but no greater reliability than competing alternatives.

It also requires that a certain range of alternatives be included for purposes of further discussion. (See Section 2.4.) But in our case, further cost-screening would have eliminated improper alternatives, while permitting WES to meet that latter requirement. Such cost screening would have ruled out alternatives that WES included. Certainly there is no justification offered in the feasibility study for leaving them

in.

Response to Allied Corporation Comments 1.8 (30 September 1985):

This quotation is from a guidance document. Indeed, for some site specific cases where alternatives are limited, the decision maker may desire to see all alternatives. The amendments to CERCLA eliminated the "order of magnitude guide." Allied emphasized the cost aspects of the quote and minimized the second part of the quote, which states: "and offer similar or smaller environmental and public health benefits but no greater reliability than comparable alternatives."

The (Second Revised) Final Draft Feasibility Study Report includes a cost screening step. However, it should be noted that amendments to CERCLA eliminate the statement quoted in this comment.

Allied Corporation Comments 1.9 (30 September 1985):

1.9. THE FOCUS OF THE REPORTS.

The reports sweep too broadly insofar as they purport to consider remedial actions. Based on what may be, at most, "hot spots", they generalize that entire "sites" need remediation. There is no effort to provide an analysis from which a cost effective remedy can be chosen.

In this connection, the summary of alternatives displayed in the feasibility study is grossly inadequate. It proposes that a given remedial technology or alternative be applied on an "all or nothing" basis. There is no attempt to discriminate among the purported problems at the site. In the study's view, if "total removal" is good for one area, it must be applied to all areas. If "no action" is not good for all areas, it must not be good for any area. That is not a sensible way to approach this problem.

Response to Allied Corporation Comments 1.9 (30 September 1985):

In response to this comment, during preparation of the (Second Revised) Final Draft Feasibility Study Report, the Navy developed a three tiered remedial action plan. First, the Navy categorized the sites studied into four remedial action subsites (RASS's) based on the nature of contamination, location of the sites, and the topographic and hydrologic characteristics. To address concerns raised by several commenters on the definition of the study area and the location of sampling points, the boundaries of each RASS were defined by topographic features and designed to include all sampling points if reasonable. Using a three tiered approach, the Navy divided each RASS into three areas: an area to be monitored, an area of passive remediation,

and an area of active remediation. The areal extent of each of these subareas was quantified by balancing the potential for harm associated with leaving the contaminants in place, with the long term benefits of remediation and the short term impacts associated with active remediation. As a result of the above approach, a total of approximately 18.75 acres will be actively remediated.

Other areas in each RASS, totalling 25.11 acres, will be passively remediated. Passive remediation includes extensive monitoring on all environmental media and on all potential pathways, with the potential for future active remediation if required for the protection of the human health or the environment. Because of the nature of the environmental concerns, the Navy finds that it is appropriate to sample surface water, groundwater, sediments, soils, and biota. The proposed monitoring program, conducted in two phases, is designed to be time limited. Phase 1, consisting primarily of simple observation and monitoring of the various environmental media, is conducted annually for the first five years following remediation. Phase 2, consisting of more complex evaluation of bioaccumulation, is conducted if Phase 1 test results indicate further monitoring is required. After the initial five years of annual sampling, monitoring is conducted every five years as required by CERCLA.

In addition to those areas of high levels of arsenic and heavy metals, monitoring of adjacent areas will be conducted to determine if these substances are migrating into the surrounding environment.

The Navy finds that the cost of the proposed remedial actions is consistent with the release of hazardous substances that has occurred on the sites under investigation.

Allied Corporation Comments 1.10 (30 September 1985):

1.10. THE REMEDIAL INVESTIGATION REPEATEDLY FAILS TO CONSIDER ALTERNATIVE HYPOTHESES.

One of the many failings of the remedial investigation is its failure to consider alternative hypothesis. Bent on finding environmental damage, the authors repeatedly misinterpret data to achieve that end. This is not a disinterested study.

An example of this is graphically seen on pp. 108-110. On p. 108, it is stated that FDA criteria for lead were not exceeded at areas AA and AB for bioassay worms. It is further noted that the maximum lead level in the bioassay worms is well within the ranges reported for earthworms and more than 10 times lower than reported in recent literature. One possible explanation for all this is that soil lead is not at levels

sufficient to cause high levels in worms or clams. The report, however, does not consider this simple explanation. Rather, it considers only the worst possible explanation, i.e., that the data indicate worms are very resistant to lead accumulation. The study goes on to cite literature that high soil lead levels (in the thousands of mg/kg) cause problems in worms, but fails to note only a very few soil samples exceed 1,000 mg/kg (Figure 2-5) at the Concord NWS. A reasonable finding would be that lead may not be a demonstrably serious problem at the NWS for soil invertebrates. Instead of this finding, the study concludes (p. 110) that there may be significant potential for lead accumulated in soil-dwelling organisms to be transferred into food chains at the sites. This tenuous (at best) finding is then used to justify a toxicological evaluation of lead on endangered species.

A careful reading of facts results in a conclusion that endangered species at NWS are not threatened by lead:

- Lead concentrations in soil (p. 27) exceed maximum allowable soil concentrations in only a few samples from the upland areas. These maximum allowable levels are established for sewage sludge application sites and are designed to protect human health and the health of species feeding on crops raised on the treated soil. (See below.)

- Some of the literature cited in the toxicological evaluations describes physiological changes in worms at lower soil concentrations, but there is no evidence to date that some of these subcellular effects result in ecologically meaningful detriment to worms or worm populations.

- Clam tissue lead content (p. 40) does not exceed FDA criteria, which are also designed to protect human health.

- Field-collected plant tissue content of lead (p. 53) is at or below normal (p. 48) in all but a few samples from upland sites.

- Bioassay plant uptake of lead (p. 61) is noted in only a few samples from upland areas.

- A large body of data exists that notes biomagnification of lead in food chains does not occur. Furthermore, a large body of data exists on the ability of metallothioneins to detoxify lead over a range of environmental levels of lead.

Thus, the data show only a few upland samples have any

potential for lead toxicity. The salt marsh harvest mouse and the black rail are not upland species. Therefore even if one makes the questionable assumption that lead levels designed to protect human health are reasonably applied to wildlife species, then there is further reason to assume lead not only does not endanger the health of wetland species, it also does not endanger the health of endangered species.

The same analysis and conclusions could be drawn for each of the metals. By failing to consider alternative hypotheses, the study reaches incorrect conclusions.

Response to Allied Corporation Comments 1.10 (30 September 1985):

These comments were considered in the development of the Final Remedial Investigation Report. The Navy disagrees with these comments. The data demonstrate substantial migration of certain contaminants into foodchains and a threat to wildlife, including endangered species.

Allied Corporation Comments 1.11 (30 September 1985):

1.11. THE REMEDIAL INVESTIGATION NEGLECTS TO CONSIDER IMPORTANT DATA REGARDING METALLOTHIONEINS.

The reports do not distinguish the important differences between biological uptake, bioconcentration, bioaccumulation, or biomagnification of heavy metals in the food chain. A considerable body of data exists that demonstrates only methyl mercury among metals biomagnify in the food chain, although recently questions have also arisen about selenium. Furthermore, a considerable body of data exists on the ability of animals to detoxify heavy metals by varying production of special proteins, called metallothioneins. The presence of these proteins allows the animal to control the toxic effect of metals over a range of environmental concentrations. The report, however, does not adequately address this type of evidence that could lead to the conclusion that higher trophic levels are not adversely affected at Concord NWS. This may be particularly important when one considers that certain proposed remedial actions could destroy habitat for endangered species more certainly than any potential toxicity from heavy metal contamination.

Response to Allied Corporation Comments 1.11 (30 September 1985):

These comments were considered in the development of the Final Remedial Investigation Report. The production of metallothionein in animals does indeed provide a limited capacity to adapt to transient increases in the accumulation of zinc,

copper, and cadmium. This capacity is finite, however (two to four fold increase). This capacity and the use of metallothionein for detoxification may alter its function in normal metal metabolism. Furthermore, metallothionein does not protect organisms from other contaminants at this site including lead, arsenic, or selenium.

Allied Corporation Comments 1.12 (30 September 1985):

1.12. THERE IS NO JUSTIFICATION FOR THE "STANDARDS" CHOSEN.

These reports use several "standards", almost willy-nilly: MASSA, TTLC, background, FDA actions levels, and so on. Yet there is no serious effort to justify their use.

In places the reports seek to mask the problem by the use of the term "excessive", which is defined in the remedial investigation's glossary as "an amount greater than desirable". That definition works to conceal, not reveal, the confusion.

It does no good to label something "excessive" when the standard of what is "desirable" is shifting and confused. Some of the problems raised by this are discussed below. However the problem is a pervasive one, and requires fuller explication in these reports.

Response to Allied Corporation Comments 1.12 (30 September 1985):

The Final Remedial Investigation Report included an improved glossary to assist in the interpretation of test results. Because no standards exist for soil contamination, a number of standards were considered. The (Second Revised) Final Feasibility Study Report discussed, in detail, the standards which were used in the development of remedial action alternatives.

Allied Corporation Comments 1.13 (30 September 1985):

1.13. THERE IS INADEQUATE "SITE" DEFINITION.

In the remedial investigation report, WES narrowed its focus by dividing the site into eight smaller research sites (see Figure 1-2), using the designations which had previously been used by Pacific Environmental Laboratories and Anderson Geotechnical in their assessments of these sites. However, the boundaries presented in the map in this section (and those used throughout this document) do not clearly define the boundaries of these sites. In particular, Sites AA, AB, KS, K-2 and G-1 need to be more definitely located. Later references in the document to AA, AB and KS strongly infer that WES boundaries are very different from boundaries used in earlier reports. Furthermore,

it makes little sense to discuss the possible presence or absence of contaminants on a site which cannot be differentiated from an adjacent site.

Response to Allied Corporation Comments 1.13 (30 September 1985):

In response to this and other similar comments, the Navy substantially improved the definition of the areas under investigation. Improvement in both the display of areas and the description of the areas was improved. Based on the extent and type of contamination and topography, the original eight "research sites" were combined into four remedial action subsites (RASS's). The areal extent of each RASS is defined in Section 2.2 of the (Second Revised) Final Draft Feasibility Study Report and shown on Figures 3 through 7 in the Final Report of the Feasibility Study of Contaminant Remediation, Volume III: Figures. The boundaries of each RASS were modified to include all sampling locations that could be attributed to the particular RASS. Where possible, the boundaries of each RASS were identified in terms of identifiable topographic features.

Allied Corporation Comments 1.14 (30 September 1985):

1.14. THE DEFINITIONS ARE MISLEADING.

The use of certain words, defined in the glossary of the feasibility study, is problematic for the reader. For example, "substantial" is defined in the glossary as "a real, actual amount, not imaginary." But it is used in the report in a way that is often misleading. "Substantial" can also mean "important," "essential," and "considerable." The word is used many times in the report, especially in the toxicological evaluation, with these latter connotations.

As defined in the glossary, "substantial" evidence or risk can also refer to real, non-imaginary evidence or risk of only a very small value or quantity. The definition of the term allows one to state that there is substantial (i.e., real, actual, non-imaginary) risk that a large meteorite will strike the Naval Weapons Station ("NWS") area and alter the topography. This statement is true as rigorously defined, but it is obviously misleading as are many similar statements in the WES report.

"Toxicity" is defined in the glossary as stress that can lead to death, or plant chlorosis, or cause a 50 percent reduction in growth or yield. In the toxicological evaluation (pp. 440-462), however, toxicity is also used to describe physiological effects at subcellular levels that to date have not been demonstrated to result in death, reduced survival, or other ecologically meaningful detriment to organisms or populations.

Response to Allied Corporation Comments 1.14 (30 September 1985):

The use of the word "substantial" in the toxicological evaluation was inconsistent. The inconsistences were corrected.

Toxicity as used in the toxicological evaluation is used to describe physiological effects at subcellular levels that can result in adverse impacts to an organism and can lead to reduced survival and death eventually.

Any definition can be misinterpreted a number of ways. While it may appear to be problematic, this will always be true for certain readers.

Allied Corporation Comments 1.15 (30 September 1985):

1.15. THE DATA PRESENTATION IS POOR.

The presentation of data makes it difficult to compare test results from one bioassay/analysis to another. For example, several spikes are shown for area AA in Figure 2-17, but there is no clear way to compare these spikes to those shown in Figure 2-3. Inability to make these comparisons efficiently is an important weakness of the report because the reader is not allowed to compare levels detected in the various environmental areas at a particular site. There is also no way to relate the data with the maps shown in Figures 2-59, 2-65, 2-69, etc. Given the large number of typographical errors in the report, how can the reader be sure the data presentation is free of important errors? This major question could be greatly alleviated if the reader could compare data sets.

Response to Allied Corporation Comments 1.15 (30 September 1985):

The data which are plotted in Figure 2-17 are also listed in Table 2-D1, p 229-230. The data which are plotted in Figure 2-3 are also listed in Table 2-B1 and Table 2-B6. These tables are found on p 200-202 and p 206, respectively. The variable Location is included in each table. The value of this variable is the same as the hash marks on the horizontal axis of Figure 2-3 and Figure 2-17. Therefore, spikes from a common location in Figure 2-17 and Figure 2-3 came from the same location. The actual concentrations are found in Table 2-B1, Table 2-B6 and Table 2-D1. Figures 2-59, 2-65 and 2-69, etc., were developed to provide a general overview of contaminant distribution across the entire site. Segments of Figures 2-59 and 2-69 have been enlarged to include the sample identity. These segments appear as Figures 5-1, 5-2 , and 5-3 in the Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California. The sample identity enables one to discern the actual metal concentrations from appendixes A thru E. Improved figures are provided in the Final Report of the Feasibility Study of Contamination Remediation, Volume III: Figures. Figure 2-65 is a reprint from the Draft

Confirmation Study Report by Anderson Geotechnical Consultants in 1984. These data are presented in the aforementioned report. Few errors were found in Appendixes A thru E of the Final Remedial Investigation Report. Corrections are presented in the Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, Subtitle Appendix 2.5 1986/87 Data. The Navy is not aware of any errors that exist in the datasets which appear in the Final Remedial Investigation Report.

Allied Corporation Comments 1.16 (30 September 1985):

1.16. THERE IS ERRONEOUS HISTORICAL INFORMATION.

A brief history of the sites is presented on page 6. In this section, Allied Chemical Corporation is stated as having owned and operated ten kilns at the Kiln Site (KS) from 1963 to 1964. None of the information supplied to the Navy by Ecology and Environment or Anderson Geotechnical, however, substantiates this statement. In fact, Allied never operated the kilns on the so-called Kiln Site.

Response to Allied Corporation Comments 1.16 (30 September 1985):

The Navy corrected the information concerning kilns in Section 1.3 of the Final Report of Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California. Section 1.3 of the Final Remedial Investigation Report states in part, that:

> The Kiln Site on Parcel 572. About 1962-1964, ten large industrial kilns known as hershoff [sic] ovens or burners (which had been located on the Allied Chemical Corporation Bay Point Works facility adjacent to Parcel 572) were placed on and/or near Parcel 572 in an area called the Kiln Site. Allied owned and operated Parcel 572 before the United States acquired the property on behalf of the Navy.

Allied Corporation Comments 2.0 (30 September 1985):

2.0 SPECIFIC COMMENTS, PRINCIPALLY DIRECTED TO THE REMEDIAL INVESTIGATION.

Allied Corporation Comments 2.1 (30 September 1985):

2.1. SOIL SAMPLING AND ANALYSIS

The study refers to the sampling and analysis of soil in order to assess the "nature and extent of contamination" as "contaminant mobility" in soil. The use of the word "mobility" here, however, appears to be confused with "distribution."

Mobility typically refers to the movement of some compound both horizontally and vertically through some matrix, such as soil, usually in association with a vehicle such as water. Such measurements were not attempted in these studies. Rather, the horizontal distribution at one point in time was determined. Although the possible translocation of sediment entrained metals was inferred from these data, mobility in soil was not.

Soil sample locations were based on previous samples taken by Anderson Geotechnical in 1984, and were supposed to augment them. As a result, the sampling locations were subjectively chosen over relatively small areas throughout the NWS site (Figure 1-2). The problem with this approach is that without justification for these sample locations, the possibility exists that the sample set as a whole does not constitute an unbiased representation of the site. This is even more likely in view of the fact that no reference is ever made to incorporate the previously mentioned soil results into this study, thus, filling the gaps. Such subjective sampling is contrary to the guidelines set out by the EPA in SW-846.

Review of the data is made difficult by the fact that the sample locations are presented in code and that no means of deciphering this code is provided. For example, one can interpret WES Soil Samples ending in R1, R2 and R3 as being triplicates, Appendix 1, Tables 2-A1, 2-B2 and 2-B6. If this is true, then the triplicate soil data shows 3-20X differences. This is totally unacceptable reproducibility by any standard. It suggests either that the samples were not homogeneously mixed or that there were serious analytical problems.

Moreover, the Brown & Caldwell data do not always appear to agree with those of the Army Corps of Engineers (COE). This is not too surprising in light of the variable nature of COE's results. We do not have sufficient information to be able to determine whether COE results or Brown and Caldwell results are more accurate. (Nor, does it appear, does WES.) We have no quality control information (e.g., replicate samples) for Brown and Caldwell results nor were any of the samples split between the two labs. It is difficult to draw meaningful conclusions from data with such a lack of quality control and, apparently, of quality.

The interpretation of the soil results is of crucial importance in this study because unless the data can be related to appropriate standards, the results have little meaning. The standards primarily relied upon in this report are referred to as "MASSA" numbers. Aside from the fact that we have requested but not yet received copies of the reference which supposedly details the origin and validity of these numbers, there is a question regarding their applicability. These numbers are applicable to metal levels in activated sludge to be applied on a regular basis

to agricultural lands under cultivation for human consumption. The Navy has claimed that (1) most of the land claimed to require remediation is salt marsh, which is not suitable for agricultural, and (2) all of the Navy land in question was purchased for use now and in the foreseeable future as buffer land with restricted access. Thus, the Navy has no intentions of using this land to grow crops of any kind. If this is the case, it does not seem appropriate to apply such standards.

The argument cannot be made that these numbers can be used as guidelines for use in wildlife habitat maintenance because whatever toxicology has gone into the derivation of these numbers has been based on the accumulation of metals by the commercially valuable portions of agricultural plants (not native, uncultivated plants) to be ingested by humans (not various wildlife species).

Moreover, a considerable body of literature exists describing long-term effects of sewage sludge application to croplands. These data are probably unfavorable to the report's conclusions, but they are never brought up. For example, Baxter et al. (1983) in a report to EPA (EPA-600/S2-83-012) noted that only 2-9 percent of cadmium in the diet is taken up by cattle. The well known effect that dietary uptake is not 100 percent efficient in transfer of metals to higher trophic levels is never considered in the WES report. Although cadmium levels increased in liver and kidney tissue of these cattle, the worst case analysis (feeding cattle dried sludge as part of the diet) showed no positive or negative effect on cattle. The WES report does not acknowledge that increased heavy metal burdens may have no ecologically meaningful effect.

Hinesly et al. (1984) examined for EPA (EPA-600/S2-83-113 and EPA-600/S2-84-128) the long-term (15 yr.) effects of using sludge on agricultural and disturbed lands. They found no adverse health or performance effects in pheasants or swine fed crops from sludge-amended soils. At the highest level of cadmium that could be biologically incorporated in corn or soybeans, nothing indicated that enhanced levels of dietary cadmium in these feed crops affected chickens. Although chickens are not black rails, these data are relevant to the toxicological evaluation; these findings were not discussed in the report.

Additionally, the selection of the actual numbers chosen for the MASSA values were apparently based upon a faulty assumption. The amount of metals in a soil which are available to be taken up by those plants which do take them up is dependent upon several physical, colligative properties of the soil in which they are found. One of the most important of these properties is the cation exchange capacity (CEC) of that soil. The greater the CEC of a soil, the greater is its ability to

adsorb metals and thus render them unavailable to plants. The numbers used in this study were evidently arrived at using the assumption that the soils were all of roughly equivalent CEC (which is unlikely considering the range of soils encountered) and that the CEC was of moderate range typical of many agricultural soils. This assumption is almost certainly not valid for the salt marsh soil which constituted the most ubiquitous category of soil (over 70 acres) encountered in this study. Such soil is characterized by large proportions of peat as well as clay (which is confirmed in the report). The increase in CEC accompanying the high organic matter and clay contents of this soil would have resulted in substantially higher limits of metals.

In addition, two metals in this study (arsenic and selenium) do not have established MASSA numbers. In places WES compared the arsenic and selenium data to background levels. But the report does not attempt to justify that practice.

But even if MASSA numbers could be applied here, WES has not done so with any serious intent. In the figures describing soil concentrations (pp. 25-32) relatively few samples exceed the MASSA levels stated in the report, and there is no effort to compare those soil concentrations with MASSA numbers which correspond to the CEC of these soils.

The study also refers to TTLC values, and reports them on Table 2-3. But having reported them, the study does not refer to them again, no doubt because virtually all soil data is below TTLC limits. The study does not explain why the TTLC values are so lightly dismissed.

Soil data also was evaluated in terms of phytotoxicity (plant death). The problem with this criterion is that it is based on agricultural rather than native plants. Very often native plants display significantly different responses to environmental parameters (such as heavy metals) than do cultivated plants. This is especially true if these plants have been repeatedly exposed to these parameters for many generations. In such circumstances, the exposed natives may display a tolerance or an avoidance (e.g., lack of uptake of metals) not displayed by the cultivated plants. Good examples of this are shown by the data for the soil samples which were shown to exceed phytotoxic limits for agricultural plants for zinc, copper and nickel (Figures 2-7 to 2-9) but still supported growth of Typha at, near or above background growth where the background contained relatively low levels of these metals. Thus, the application of agricultural standards is not valid for natural situations, and therefore, the arguments put forward that the levels of metals in the soils are such as to result in reduced plant growth or plant death are without support.

Response to Allied Corporation Comments 2.1 (30 September 1985):

The sampling plan was formulated based on previous soil and water data, historical information, and the potential pathways for contaminant mobility. The sample site designation (e.g. AA, AB, G-1, etc.) is used only to quickly orient the reader as to the general location of the sample. Remediation recommendations and decisions are based on the characteristics found at the individual sampling sites not the area designations. The Navy did not claim an unbiased representation of the area designations(e.g. AA, AB, G-1, etc.). Instead, the Navy made an unbiased representation from individual sampling locations.

The codes used in the sample identity are explained on page 190 of the Final Remedial Investigation Report. It is clearly stated on this page that R1, R2, and R3 are triplicate samples.

The three samples were randomly collected from each sampling site and were considered to represent the variability existing in a 4-sq-ft sampling site. The plant material harvested in the field came from 3 separate locations within the 4-sq-ft sampling site. All plant material in a 1-sq-ft area became a replicate. Hence, the plant material from each of the three discrete 1-sq-ft locations are referred to as replicates R1, R2, and R3. R1 is simply the first random location. Within each 1-sq-ft location, 1 sample of soil was collected each for chemical analysis and for plant and earthworm bioassays. For example, soil for the chemical analysis, plant, and earthworm bioassays for 1 replicate came from the same sample location. Likewise, the soil for R2 and R3 came from different locations, 2 and 3, within the 4-sq-ft sampling site. The clam biomonitoring procedure consisted of three clam cages being placed at each location in the field. The cages were randomly assigned as replicates, R1, R2, and R3. The relationship of R1 among soil, plant, and earthworm samples is that these samples were collected from the first location at a sampling site. The clam sample R1 was the first cage deployed at the sampling site. An example of the labelling for site AA 124 and replicate R1 is presented in Table 2.

Table 2

Sample Id	Sample Type	Exhibition
AASCW1241R1	soil used in chemical analysis	obs 1 page 200*
AACLW1241R1	clam tissue from the clam biomonitoring	obs 1 page 223
AAPVW1241R1	plant material collected at this location	obs 1 page 229
AAPCW1241R1	plant material from the plant bioassay	obs 1 page 234
AAEACW1241R1	worm tissue from the earthworm bioassay	obs 1 page 245

* These observations are presented in the Final Draft Remedial

Investigation Report.

The Navy did not attempt to achieve a homogeneous mixture. These replicates are independent indicators as to what is actually in the field rather than separate determinations on the same sample. The variability between some replicates is greater than might initially be expected. However, the Navy is not dealing with a homogeneous area. Instead, it is evaluating an area that has a number of different sources of contamination. Several of the areas have had attempted cleanup and/or removal operations which resulted in the disturbance of large amounts of material. Therefore, the amount of variability found may be due to activities which have occurred on site. The variability in concentrations is just a true indication of the variable nature of this environment.

The term "distribution" was used in place of the term "migration", as appropriate, in the Final Remedial Investigation Report and the (Second Revised) Final Feasibility Study Report.

The quality of the data collected by Brown and Caldwell can be evaluated using the analysis of the NBS Standard found on page 211 of the Final Remedial Investigation Report.

Because the property was used for agricultural grazing in the past and may be used for agricultural purposes in the future, the MASSA criterion could be appropriate for evaluating contamination on the property and for developing remedial action alternatives. (MASSA values apply to land used to grow food crops for animals, as well as for humans.) The (Second Revised) Final Draft Feasibility Study Report did not use MASSA as a criterion in the development of decision rules for remedial action. The TTLC/STLC criteria were used to determine the appropriate class landfill to place excavated materials.

Allied Corporation Comments 2.2 (30 September 1985):

2.2. CLAM BIOASSAY AND BIOMONITORING

The use of clams was intended as an indicator for the potential damage to aquatic filter-feeding invertebrates as well as to demonstrate the potential for any contamination in surface water to enter lower biotic trophic levels.

The report states that clams were placed at sites having "moving water on tidal flow" (p. 35)(sic). However, Figure 2-2 shows that 12 out of the 27 sites were on the creek running to the west of the CP/ESI site. It is doubtful that this creek is tidally influenced.

It is important to note that no FDA action level criteria were exceeded at any stations. One can therefore conclude that human health is not threatened by eating these aquatic indicator species (which do not occur naturally, anyway). Arsenic levels in clams at all sites are not different from clams from reference areas. Therefore, it also can be concluded that arsenic is not entering the aquatic food chain at levels that jeopardize higher trophic levels or differ from reference stations.

The results also show that accumulation of lead, nickel and zinc in the clam tissues occurred to a limited extent in a very limited number of sites. However, none of the background clams were free of any of the metals. No difference in metal accumulation between background and study site was observed for arsenic, cadmium, selenium and copper. In fact, the clams at the study sites were all found to contain lesser or equivalent amounts of metals than in the entire bay region. The report concludes from the data (p. 47) that "...metals in the surface water (at) NWS Concord will have minimal environmental impact." However, in the contaminant mobility section beginning on page 117, concern is expressed that lead, cadmium and zinc may "eventually" be released into the environment, in particular, Suisun Bay. Not only does the report overlook its earlier statement of minimal environmental impact, but it disregards the fact that Suisun Bay clams already contain generally higher concentrations of metals than were measured in this study (Table 2-6).

Most of the bioaccumulation which was observed was noted to take place in the upland site of the seasonal stream. Since running water is not present year round (perhaps only half the year) the stream cannot support aquatic filter-feeders (e.g., clams) year round. The significance of what little bioaccumulation was observed is highly questionable since these locations cannot support the potential food sources being considered.

Also, a large body of data exists that demonstrates most aquatic species maintain equilibrium between body burdens of heavy metals and environmental levels. Only methyl mercury appears to be the exception, although some concern is developing with regard to selenium. (The only selenium reported above background levels was at the Coke Pile site; away from the marsh. It is not an environment that supports clams.) Furthermore, organisms are capable of regulating uptake over a range of environmental levels and adjusting tissue levels of metallothioneins (proteins that sequester and detoxify heavy metals). Thus, there is good evidence from the site and from the literature that metal concentrations at NWS are not entering the

aquatic food chain at levels that cause harm to any level in the food web. The levels of metals in clams are likely a product of equilibrium and internal regulation of metal levels, since most are at the same levels as at reference stations.

Response to Allied Corporation Comments 2.2 (30 September 1985):

The typographical error, "moving water on tidal flow," was corrected on page 38 of the Final Remedial Investigation Report, which states "moving water in the stream or on tidal flow."

Allied interprets the data in an oversimplified manner. Clams were used as biomonitors to determine migration into surface waters and not necessarily to represent native clams in Nichols Creek. (Nichols Creek flows from a spring in the hills south of Port Chicago Highway.)

The clam biomonitoring data indicate that metals are migrating in surface water at certain locations on Navy parcels. The use of molluscs to indicate pollution of surface water is employed throughout the world in the Mussel Watch. Bioaccumulation of contaminants by molluscs is used to make decisions about the need to clean up pollution of surface water. This approach is widely accepted by the scientific community. The clam biomonitoring data at Naval Weapons Station, Concord indicate migration of metals into surface waters has been limited to certain parcels on Navy property and fortunately does not appear to have moved out into Suisun Bay. While the Bay waters may not have been adversely impacted, surface waters on Navy property have been and are continuing to be substantially impacted. The clam biomonitoring data indicate that significant biotic uptake is occurring and may result in potential harm to wildlife.

Allied appears to agree that clams did bioaccumulate certain metals to concentrations statistically greater than those found in clams from reference sites. This clearly demonstrates that the migration of metals into surface water at specific locations within the wetlands is greater than that at reference sites. Although Suisun Bay has not been impacted by the migration of metals to date, metals could migrate into Suisun Bay if no remedial action is taken to eliminate the contamination.

Allied Corporation Comments 2.3 (30 September 1985):

2.3. PLANT BIOASSAY.

The study involving plants can be divided into two sections, (1) studies involving native vegetation, and (2) studies involving an indicator or "index" species.

Allied Corporation Comments 2.3.1 (30 September 1985):

2.3.1. TYPHA-(NATIVE VEGETATION).

The object of looking at native vegetation is to obtain a general idea of the extent to which the flora has been impacted, as well as to assess the potential damage to that subset of the flora which serves as the major food source for the herbivores on the site. In this study both a grassland and a salt marsh community are in question. Because of this diversity of plant community types, the selection of a single plant to represent both communities is unrealistic. By selecting Typha augustifolia, the range of communities represented is effectively reduced to the wetter portions of a grassland and the freshwater parts of the salt marsh. An example of the nonrepresentativeness of this plant is the fact that it was not picked up in one of the two plant community transects in the "contaminated" area, and was only a minor component of the remaining transects.

In addition, no hint is given in the report of the representativeness of Typha as a food source to the surrounding ecosystem. In fact, while the above-ground parts of Typha were assayed for metals, it is generally the below-ground parts of the plant which constitute food for its consumers. Thus, the choice of T. augustifolia as the single plant representative for this site as well as the part of the plant assayed are of questionable utility in this study, and the conclusions drawn must be interpreted with these deficiencies in mind.

The results of these analyses were difficult to interpret because of their form of presentation. The graphs were drawn in such a way as to make it impossible to determine if lack of a bar indicated that no Typha was present at the location chosen for sampling, or whether the metal indicated simply was not detected.

Furthermore, there is no information on the extent to which experimental results were applicable. Although replication is alluded to (p. 68), there is no discussion of it in the study.

Figure 2-2 indicates that several Typha foliage zinc contents exceeded the "critical" and "twenty-five percent yield reduction" levels established for agricultural plants. Again, the fallacy of applying agricultural plant "standards" to native vegetation situations is revealed, because the yield (i.e., growth) data (Figure 2-24) indicates that the plants which exceeded these criteria had among the highest yields on the entire study site.

Normal lead in plants is 2-5 mg/kg (p. 48), and lead levels were at or below normal in all but 6 samples (out of about 100) (pp. 53, 61).

In a subsequent summary, (page 274) Typha growing on a marsh site is described as "stunted" in order to support an argument that it was growing under stressful conditions. Generally, stunting is a sign of suboptimal conditions, but is not necessarily an indicator of chemical stress. If this were the case, then the yield data in Figure 2-24 which shows that "stunted" plants also occurred on background sites indicates that the "background" sites were not free of contamination and thus were poorly chosen.

Response to Allied Corporation Comments 2.3.1 (30 September 1985):

Typha was selected for contaminant analyses because it was a dominant species and occurred widely across the parcels and in the reference areas. Typha was a field indicator species much the same as Cyperus esculentus was the greenhouse index plant for comparison purposes. Since the comparison of plant communities in the impacted AA area did not have Typha present, similar plant communities were selected in the reference areas.

The location variable in Table 2-D1 corresponds to the hash marks on the horizontal axis of the graphs. The lack of a bar means that no typha was collected at this location. All Concord studies conducted by WES denote triplicate samples as R1, R2, and R3. Whenever present, Typha was collected and analyzed. It should be noted that p 68 contains Figure 2-31. The text on p 68 makes neither implicit nor explicit reference to the term "replication."

The guidelines from agriculture present a frame of reference which was used because no other data has been established for native plants. An appreciation for the contamination level in plants can be gained from agricultural plant data. Many stunted plants were associated with soils that contained some of the highest metal concentrations, although exceptions to this existed as Allied pointed out. It is not necessary for Cyperus to display a similar ecology and physiology as field plants. Cyperus has been compared to a wide variety of plants and has related well to most plants in indicating potential for plant bioaccumulation of metals.

Allied Corporation Comments 2.3.2 (30 September 1985):

2.3.2. CYPERIS (GREENHOUSE STUDIES).

The objective of the use of indicator species was to compensate for the fact that Typha did not grow everywhere soil samples were chosen. Cyperis esculentus, a nutsedge which does not grow on site, was chosen as the plant indicator species. The choice of the species to be used is critical because it will be

used to represent field conditions. In order to be a valid indicator of the plants in the field, it should display a similar ecology and physiology to the field plants. Such similarities were never documented for this plant. In fact, the only justification given for its use was that it had been used (by the authors) in the past. This is certainly insufficient to justify the appropriateness of this species being used to represent all grassland and marsh species on the study sites.

By way of judging the appropriateness of Cyperis as an index species, we can use the data in this report to compare the uptake of metals by Typha with Cyperis. While above-ground tissue metal content of Typha is still not indicative of the plant metal status at this site - it is the only opportunity this report offers to examine the physiologic link between the Cyperis and the Typha. The report offers only a single comparison out of the fourteen for which data exist. This is a regression of Typha zinc vs. Cyperis zinc grown in the flooded condition (Figure 2-74). The correlation coefficient (r) of 0.73 indicates that there is a lot of data scatter about the least squares fit line, and that the believability of the trend (e.g., the mathematical slope) displayed by the line is bordering on dubious. For example, for a Cyperis zinc content of about 530 mg/Kg, the corresponding Typha zinc content ranged from 80 to 720 mg/Kg. Although regressions for the rest of the metals and Cyperis growth conditions are not presented, a comparison of the bar graphs for these parameters indicates that Cyperis does not accumulate arsenic, cadmium, selenium, and probably lead and nickel as does Typha. Thus, Cyperis does not appear to be an appropriate index species.

However, an actual regression analysis would be necessary to confirm this. These kinds of analyses should have been presented to offer support for the appropriateness of Cyperis as an index species. Such data, however, apparently does not exist. The reader should not have been left guessing as to these relationships.

The discussion concludes that there was plant death on the AA site which was the result of arsenic. Such a conclusion might have been lent credence if the report had indicated what the arsenic levels of the dead plants were, and whether or not such levels could be shown to be toxic to those plants. This information was not provided, and thus the conclusion that arsenic was the toxic agent is not substantiated. In a later discussion section, these sites are apparently referred to in Figure 2-69 and the report states that "there is a high potential that these sampling sites will be toxic to plants growing there". Ncnetheless, aerial photographs of this area show it to be vegetated.

It is interesting to note that Cyperis grew much

better in the flooded compared to the upland growth conditions (Figure 2-33 vs. 2-47). The background plants grew about five times better in the flooded condition. This strongly suggests that the upland growth conditions were stressful in themselves and thus contributed to whatever stress was attributable to the presence of metals. This complicating factor compromises the utility of the bioassay and may even invalidate the results. In addition, the fact that Cyperis does not grow equally well in the two growth conditions of the bioassays suggests that Cyperis is not an appropriate index species for upland plants.

The summary section points to the potentially toxic level of metal content in Typha and Cyperis. Nowhere is it shown, however, that even the agriculturally derived twenty-five percent reduction in growth (let alone phytotoxicity) level actually resulted in such a reduction. This same argument is restated on page 130 in a later discussion. The study also states that bioaccumulation can occur. While metal accumulation was observed to occur for Typha and Cyperis (which is not a valid index species) nowhere was it shown that it might accumulate to deleterious levels.

Response to Allied Corporation Comments 2.3.2 (30 September 1985):

These comments were considered in the development of the Final Remedial Investigation Report. The Final Remedial Investigation Report clarified and presented the results of plant correlation analyses.

Many dead plants were observed in soils containing the highest concentrations of arsenic. Consequently, arsenic could very well be one of the factors, if not the only factor, causing plant mortality. Cyperus has developed as a plant which can grow in both flooded and upland conditions. The same growth would not be expected in the two extremely different environments. Cyperus has been successful in indicating bioavailable metals in both flooded and upland environments (Folsom et al. 1981).

Bioaccumulation of metals by Cyperus and Typha clearly demonstrated migration of metals into foodchains. The toxicological impact of these results was discussed in detail in Section 4.4 of the Final Remedial Investigation Report.

Allied Corporation Comments 2.4 (30 September 1985):

2.4. EARTHWORM BIOASSAY.

Three important issues concern the validity of the earthworm bioassay, and the results must be judged inconclusive at least until these three issues are resolved. Earthworms will ingest soil particles along with organic material and it

is clear that these worms were stressed by insufficient food (p. 117). The reason the bioassay protocol calls for post-test purging of gut contents is to eliminate from measurement the heavy metals adsorbed to soil particles in the gut lumen. Thus, the first issue is whether the guts were in fact voided of content. Did worms reingest gut material during the purge period as a result of their starved condition? The results could be significantly and substantially biased to show high metal uptake if this scenario occurred.

Second, stressed animals undergo physiological changes that include a well-documented loss of ability to control uptake, detoxification, and excretion (depuration) of heavy metals. Thus the test results may have been biased in this fashion. The simple, necessary test controls to answer this question were not conducted.

Finally, the soil conditions (e.g., salinity, redox potential) are not specified for the various samples. It is noted, however, that soils in area AA are "flooded-reduced" (p. 77), which could have a harmful effect on worm survival. Therefore, it cannot be conclusively stated that toxicity was due to metal contamination and not to an unrelated, natural soil condition. Stressful conditions (other than starvation) may have resulted in some of the toxicity or in loss of metal regulation.

Earthworms were used as the terrestrial equivalent of clams for invertebrates which may occupy low trophic levels. In fact, the contamination criteria applied to the clams (Table 2-5 - Levels of Contaminants in Aquatic Organisms for Human Consumption) were also applied to the worms. The applicability of these standards is inappropriate in light of the fact that people, who may in fact ingest clams (albeit not from this site), do not ingest earthworms; and thus the toxicity levels are incorrectly targeted.

In the study, the term "toxicity" is used differently for the worms than for the plants and clams. It is arbitrary to redefine such a term for each organism. The term is not used to signify death, but rather to indicate growth reduction to fifty percent of that of the background sites, which in itself seems an arbitrary definition.

The results section presents yield (dry weight, g) for all earthworm bioassays (Figure 2-51) followed by specific metal levels in Figures 2-52 to 2-57. In Figure 2-51 there are eleven dashed "toxicity" lines while on the remaining figures there are only six. No explanation is provided for that discrepancy.

As noted above, poor earthworm survival may be due to factors other than chemical toxicity, but the necessary information to evaluate this is not provided. Furthermore, the

protocol calls for retesting of soil samples that exhibit poor survival, but no data are offered regarding the results of the retest.

The discussions of results noted that all earthworms contained metals to within the ranges described in the literature and therefore would be expected to have ". . . little currently detectable impact on earthworm populations. . .".

It was noted that (Figure 2-51) even in the relative absence of soil metals, background earthworms grew to about the same extent as did worms in the study site soils. This confirms the earlier observation that metal levels at this site pose little threat to worm well-being.

Accumulation over background was observed for lead, selenium and cadmium at a few sites, while nearly half the worms in the AA and AB sites showed accumulation of arsenic. In view of the lack of any acute effects of the metal levels observed in these bioassays as well as the generally low levels compared to recent literature, the report was left to speculate about potential chronic effects arising from accumulation. This is clearly "grasping at straws" speculation, especially in light of the fact that several of the metals present in some of the soils in rather high concentrations did not appear to be available for worm uptake (e.g., lead, nickel, copper).

The report also notes that earthworms were generally absent in the upland areas perhaps due to poor soil moisture holding capacities and low organic matter content) and therefore the worms ". . . may not be the primary food source . . ." at this site. This is putting it mildly. The fact is, no evidence is presented that would indicate that soil invertebrates - in either the marshlands or grassland - constitute major avenues of food chain metal flux.

Moreover, even if they did, the data shows no significant problem. For example, although the maximum arsenic concentration in the worms was more than three times that in recent literature, the mean values of 3.5-49.2 (p. 95) are within the reported means of 17.5-53.8 (p. 96). Thus, any wildlife foraging throughout the marsh area that may be consuming worms (if any) in contaminated areas would be consuming soil invertebrates that contain arsenic levels comparable to other locations.

The report notes "high" zinc concentrations in worms could be lethal to worm-eaters. How "high" must zinc concentrations be in worms before worm-eating animals are killed? This type of statement is useless and even inflammatory if it is not properly qualified and compared to relevant data.

Response to Allied Corporation Comments 2.4 (30 September 1985):

Figure 2-51 was developed to give an overall indication of earthworm growth and yield, while indicating toxicity and death across all soil samples. Five sites which yielded diminished earthworm tissue growth plus the six sites which yielded total death were plotted in Figure 2-51. The former sites yielded tissue between 0.07 and 0.66 grams of tissue. The locations associated with these sites are 36, 43, 51, 53, and 112, respectively. These locations correspond to the hash marks on the horizontal axis of Figure 2-51 and Figures 2-52 thru 2-57. The retesting showed similar poor growth as the original test, consequently, the original test results were reported.

Earthworms were depurated to clean their guts sufficiently. Earthworms were not allowed to reingest the contents of their guts. Moreover, earthworms exposed to reference sediments served as internal controls for these data.

Earthworms have been used in toxicological studies for years in England. Earthworms respond to metal contamination and are good indicators of bioavailability even when stressed. The earthworm test was conducted at a moisture content suitable for earthworm growth.

FDA action levels were considered to give perspective to the earthworm data. If there is concern for FDA action levels in food for human or animal consumption, it is reasonable to consider similar levels in food for wildlife consumption, especially endangered species.

While the data collected in the earthworm bioassay indicated that the bioaccumulation of metals in earthworms are not acutely or chronically toxic, the data do indicate that metals are in fact bioavailable and are migrating into soil invertebrates and consequently into food chains. Additional sampling of mice and voles on the contaminated sites clearly demonstrated that metals did in fact migrate into the foodchain associated with the captured animals.

Many sites which showed poor earthworm survival also revealed some of the highest metal concentrations. Retesting was performed and similar results were observed.

Earthworms bioaccumulated contaminants to levels above those in reference area soil but the levels were not high enough to cause severe impacts on earthworm populations. However, the data indicate that the contaminants would be bioavailable to soil animals and that migration of contaminants into food chains associated with the sites would occur.

The soil samples were collected during July and August.

At these dry times of the year, earthworms would not be expected to be seen on site. Soil invertebrates can represent major avenues for movement of contaminants into food chains. While it is true that the mean value for arsenic in earthworms was 49.2 ppm, maximum values as high as 150.6 ppm were present on the same page of data.

Allied Corporation Comments 2.5 (30 September 1985):

2.5. CONTAMINANT MOBILITY ACROSS THE SITE.

Although it may be useful to know which sites contain metals significantly elevated above reference areas, it must be recognized that this has little value unless levels exceed those considered dangerous to fish, wildlife, or human health Thus, the data plotted in Figures 2-59 through 2-64 have minor value for decision-making.

The extent of metal migration across the parcels is not clearly indicated. There is no evidence that metals are leaving the site. Consider the following facts: 1) previous water sampling data indicate very low concentrations of dissolved contaminants in surface waters (p. 15); 2) metals levels in clams at all sites were no different from reference areas (p. 45) or were below maximum values reported for clams collected from the Bay (p. 45); and 3) assuming that the location of a spike on the X-axis is constant throughout the
graphs, that elevated levels of metals in biota occur only in those areas where that metal is also elevated in soil. Thus, mobility of contaminants across the parcels is not demonstrated except in the case of sediment entrainment in Nichols Creek.

In a summary section on contaminant mobility (2.2.4.1 Earthworm Toxicity, p. 136) the text notes the eleven previously discussed "toxicity" cases and refers to Figure 2-75 for their locations. This figure contains only nine location dots.

On the same page, the discussion mentions a potential for bioaccumulation of zinc, along with the metals previously described, to have a potential for bioaccumulation. The data does not support the contention that zinc possesses such a potential. The location of these bioaccumulation sites are presented in Figures 2-76 to 2-79. The report says that corrective measures should be considered at these sites to minimize ". . . potential release of these metals into food chains . . .". However, as previously stated, it has not been demonstrated that such a release into food chains is a concern.

It is important to note that the areas of earthworm toxicity are also areas that have below-ground plant biomass and where soil salinity was slightly lower (p. 277). Thus, the toxicity could be due to starvation or physiological stress due

to soil conditions other than metal toxicity. These sources of stress may also have resulted in loss of metal uptake regulation.

The report next discusses the relationship of earthworm tissue metal content and soil metal content by regressing these two parameters for each metal. The resulting least squares linear regression line was used to estimate worm metal levels in soils not involved in bioassays (i.e., those collected by Brown and Caldwell). The relationships obtained (Figures 2-80 to 2-85) were highly dubious for cadmium (all soil concentration levels), lead (all soil levels), selenium (all soil levels) and zinc (soil levels less than 10,000 mg/kg). In these cases, all the relationships except for cadmium were definitely not linear as presented by the report.

In the case of lead, zinc and selenium it appears that no relationship exists. In other words, that earthworm lead and zinc and selenium content was independent of soil concentration; this is likely related to the variable bioavailability discussed for these metals. In the case of cadmium, there was so much variability associated with the data (i.e., fifty percent) that the use of such a regression as a predictive tool is highly limited. The correlation coefficients for arsenic and copper were rather low (0.76 and 0.63 respectively), so that while the general trend indicated by the line may be valid, a high degree of uncertainty must still be attached to predictions arising from its use. Therefore, the resulting conclusions regarding the locations of worms predicted to contain "excessive" (by FDA standards) metal levels (Figures 2-76 - 2-79) are of doubtful validity especially those for lead, cadmium and selenium.

The report then makes a specious argument regarding the bioavailability of metals in plants to earthworms. The reasoning appears to be that the worms pick up metals in the soil by ingesting soil organic matter contaminated by metals contributed by plant detritus. Although a few substantial correlation coefficients (r) were obtained when earthworm metal content was regressed against Typha or Cyperis metal content, there were at least as many poor ones that were also obtained but not reported. For example, r for worm cadmium vs Cyperis cadmium was 0.77, but r was 0.20 for Typha cadmium (WES 23719). The r for worm tissue selenium vs. Cyperis selenium was 0.72, but was 0.08 for Typha tissue (WES 23714). The r for worm lead vs. Typha lead was 0.72 (although WES 23715 lists it as 0.35), but was 0.11 for Cyperis. Therefore, a definite relationship for worm metals vs. plant metals does not really exist, and the bioavailability argument vanishes.

This argument crops up again in the toxicology section on cadmium. In this example, the failure of this argument is made quite plain because the relatively high r value for worm vs. Cyperis (grown under upland condition) is accompanied by an

extremely low r of 0.38 for worm vs. soil. Given the fact that the worm vs. soil data is low, there is no demonstrated reason to conclude that the spurious correlation of worm vs. plant indicate any bioavailability of metals in the worm.

Response to Allied Corporation Comments 2.5 (30 September 1985):

The locations shown in Figure 2-75 are the same sites shown in Figure 2-51. Figure 2-51 shows 8 samples from the areas designated AA and AB. These 8 sites appear as 7 different locations in Figure 2-75 because locations 51 and 53 are two replicates from the same location (e.g., samples identified AAEACW16Y1R1 and AAEACW16Y1R3, respectively).

Figures 2-59 through 2-64 of the Final Draft Remedial Investigation Report gave an overall view of the frequency and general location of contamination observed in the soil. In stating that the mobility of contaminants across the parcels is not demonstrated except in the case of settlement entrainment in Nichols Creek, Allied mentioned part of the data discussed on page 45 but overlooked the lead, cadmium, and zinc bioaccumulation data. Allied, however, appeared to agree that the migration of contaminants by sediment entrainment in Nichols Creek was demonstrated.

The Navy acknowledges the fact that some of the linear regression equations presented in the Final Remedial Investigation Report would offer imprecise estimates of the potential for contaminant uptake. The authors have had much more success predicting contaminant uptake using DTPA extraction procedures (Lee et al. 1983). Substantial bioaccumulation was observed at the sites shown in Figures 2-76 to 2-79. Allied agreed that releases of contaminants into food chains had occurred and are occurring.

The Navy made no attempt to depict all possible relationships. Instead, relationships germane to the evaluation of the Naval Weapons Station were presented in the Final Remedial Investigation Report. Data were provided so that the reader could produce any additional relationships. Each bioassay assesses the potential for contaminant mobility via a separate pathway. Therefore, a perfect relationship between two bioassays may never exist. Likewise, the relationship between two bioassay results may be very strong for one metal and very weak for another metal. One may initially expect a very strong relationship between the earthworm metal contents and the Typha or Cyperus metal contents. Strong relationships exist between the earthworm metal contents and the Typha metal contents. The Typha samples came from sites which were generally flooded. As noted by Allied, these relationships are presented in the Final Remedial Investigation Report.

Some of the relationships between earthworm metal contents and Cyperus metal contents are very weak. The Cyperus bioassays were conducted under flooded and upland conditions (e.g. the Cyperus bioassays were conducted using conditions similar to those which existed in the field). Contaminant uptake of heavy metals under flooded and upland conditions can be quite different (Folsom and Lee 1981). Thus, the relationship between earthworm metal content and Typha could be vastly different from the relationship between earthworm metal content and Cyperus metal content. Each case should be evaluated individually.

As previously noted, much of the data presented in the Final Remedial Investigation Report is clustered. Usually, there exist many sites with very low contaminant concentrations and a few sites with high contaminant concentrations. The few sites with high contaminant concentrations are not artifacts in the data but rather a true indication of conditions that exist in the environment under investigation. Obviously, these sites play a key role in developing the relationships presented in the Final Remedial Investigation Report. The correlation coefficient for earthworm cadmium and Cyperus is 0.77 while the correlation coefficient for earthworm cadmium and Typha is 0.20 (see Figure 2-88). Two sites, KSPCW8R1 and KSPCW8R2 have high Cyperus contaminant concentrations (i.e. 35.64 and 41.66 ppm, respectively). Without these sites the relationship (e.g. r =0.77) would be quite different. The dataset used to develop the relationship between earthworm metal content and Typha metal content did not include sites KSPCW8R1 and KSPCW8R2. Typha did not grow at these sites. Figure 2-89 depicts a similar situation. Two sites, CPPCW28F1R1 and CPPCW29E1R3 have the greatest selenium content. However, no Typha grew at these sites. Figure 2-86 also depicts a similar situation. Two sites, CPPCW28F1R1 and KSPCW10P1 have the greatest lead content. Again, no Typha grew at these sites. There are definite relationships between the earthworm content and plant content. Since the Typha does not exist at sites where the Cyperus uptake was the greatest, the relationship between earthworm metal content and Typha content is different from the relationship between earthworm metal content and Cyperus content. One can only speculate as to why Typha does not grow at sites where the Cyperus concentrations were the greatest. Cyperus showed highest concentrations under upland conditions, Typha does not grow in upland conditions, but rather in flooded wet conditions.

As stated previously, there may be several reasons why one obtains inconsistent results when evaluating different subsets of a dataset. The preceding section gave three illustrations of obtaining one result while evaluating earthworms and Cyperus grown at specific sites and another result while evaluating earthworms and Typha collected at different sites. Any correlation coefficient between earthworms and Cyperus (grown under upland condition) would be calculated using 60 data points.

The correlation coefficient between earthworms and soil was calculated using 172 data points. Extrapolating from one dataset to another would be quite difficult and perhaps most inappropriate.

The correlations between earthworms and plants are by no means spurious. The Navy admits one can evaluate certain subsets of the dataset with bias and contend no relationships exist. However, the Navy evaluated the entire dataset and consistently found strong relationships.

Allied Corporation Comments 2.6 (30 September 1985):

2.6. WETLAND ASSESSMENT.

All the information about ground-water indicates that ground-water is not impacted. Lateral migration of metals in surface water would not be expected due to the presence of peat in the marsh, and little vertical migration would be expected due to stiff, sandy silt.

Tidal scouring was indicated as a source of contamination to the bay. However, any contamination that might be contributed by tidal scouring would be below the background levels of the bay. The study also noted that both wave and wind erosion of soil particles are inhibited by the presence of plants. Thus, loss of such particles to the bay is restricted to the shore area which is essentially at background levels with respect to the metals under discussion.

The assessment of the site using the Federal Highway Administration (FHWA) technique (Page 246-261), which evaluates eleven potential wetland functions, resulted in the marsh receiving high marks in nearly every function category. Essentially, it makes a very good case for preserving the marsh in its present state.

Response to Allied Corporation Comments 2.6 (30 September 1985):

The Navy disagrees with Allied's contention that lateral migration of metals in surface water would not be expected. Allied obviously overlooked the fact that barren areas exist on site with no peat on the surface, just contaminated dust and fine soil particles, and that mosquito abatement ditches cut through the peat and drain suspended soil out of the contaminated area through the tidal creek and toward Suisun Bay.

Allied speculated about tidal scouring without presenting data to support its comment. Allied again overlooked the presence of drainage ditches throughout the wetland that could increase the migration of suspended contaminated soil particles from barren areas into ditches through the tidal creek

and toward Suisun Bay. At present, the contamination has not reached the Bay.

Variables contained in the FHWA assessment in 1984 did not include pollution factors, or some of the more subtle signals of the functioning of a wetland. The method was not able to take advantage of quantitative data on metal concentrations in soil and interpret the data according to the effectiveness of the wetland for fisheries, for example. The method was applied as a screening technique, to give preliminary results.

The FHWA assessment of the wetland, however, indicated that the wetland has important functions and is important in this area of Suisun Bay. Based on a thorough evaluation of the data, the Navy disagrees with Allied's preference to leave the wetland in its present contaminated state.

Allied Corporation Comments 2.7 (30 September 1985):

2.7. CHARACTERIZATION OF PLANT COMMUNITIES.

A characterization of plant community structure was carried out for the marsh. Three transects were laid out; one in a "background" marsh and two near the Allied property (Figure 3-2). Following preliminary determinations defining the six community types on site, the transects were assayed for their community makeup.

Although it is difficult to judge the locations of the transects from the figure given, it appears as if transect II was located to cover the only bare areas on Site AA. There was no explanation given for the rationale involved in choosing transect placement; thus we are left with an apparently biased, nonrepresentative placement.

The results showed that all three transects had very different community makeups. Therefore, unless a cause for any one specific makeup can be demonstrated, no conclusions can be drawn regarding metal impact as a probable cause of the difference between background and study areas. In fact, the report accounted for most of the community makeup differences by citing the presence of mosquito ditches and referring to the effects on surface elevation caused by alleged overflow from Allied's pond. No chemical toxicity, however, was involved.

Response to Response to Allied Corporation Comments 2.7 (30 September 1985):

The plant characterization transects, laid out in the initial stages of the remedial investigation, were established to cover the area between the dike on the Allied Corporation Bay Point Works and the mosquito abatement ditch which runs in a

north-south direction which is closest to the dike, and to intersect as many plant communities as possible. Better figures of the transects were prepared and were included in the Final Draft Report of the Feasibility Study of Contamination Remediation at the Naval Weapons Station, Concord, California, Volume II: Figures. The study was descriptive, comparing the impacted wetland to a reference wetland, and was not designed to determine cause and effect. The conclusions drawn from the study were necessarily preliminary.

Allied Corporation Comments 2.8 (30 September 1985):

2.8. CHARACTERIZATION OF MACROINVERTEBRATE COMMUNITY.

A study was undertaken to assay the density of underground plant biomass and its associated invertebrate fauna ("infauna") in the marsh at or adjacent to the AA site and in a background site. No similar study was undertaken for the grassland.

The results of the study showed that the study area had significantly less below-ground plant biomass than the background area (Table 3-7). The lower biomass would be expected to support a lower number of associated infauna, and the data presented in this report bears this out. The problem comes in the interpretation of the causes for these differences. On page 462, the report states ". . . a substantial number of invertebrates have been killed by the contamination. . . ." Evidence for this conclusion is totally lacking.

Reference area BK 116 was chosen because it was relatively distant from the contaminated area AA and contained vegetation similar to that found in area AA (p. 275). However, these two areas were not compared with respect to many other environmental factors that could contribute significantly to differences in overall infaunal invertebrate abundance, such as tidal exposure, elevation, relative plant cover, and organic content of the soil. Further, since there is no information in this report on the range of natural variation in infaunal abundances within comparable sites in Suisun Bay, it is not possible to conclude that reduced infaunal invertebrate abundances within the contaminated area are due to heavy metal contamination rather than habitat differences. These reduced levels of abundance may be well within the natural range of variation found among salt marshes in the vicinity. Moreover, the study failed to consider the simple proposition that the increased root biomass in the reference area could contribute to greater biomass of oligochaete species (three of the four most abundant species were oligochaetes) by organically enriching the soil that they ingest.

The study also ignores the possibility that the differences in infauna density were the result of the fact that

the study area was disced and limed in December 1977 by order of the State of California. Such a disturbance to the soil (compaction, pH, water regime, salinity regimes, etc.) could be a cause of the lowered below-ground biomass in this area. Additionally, the fact that this area appears to be more extensively drained with ditches than the background area is another likely difference which could account for the observed reduction in density of plants and invertebrates. At the very least, such differences (such as salinity in Table 3-5) make the comparison of these two sites all but meaningless.

The summary also mentions that infauna species diversity was reduced along with density. Species diversity, however, was never analyzed. In fact, each area had eleven different species.

The data provided by this study are not sufficient to conclude that reduced invertebrate abundance, at levels reported from the contaminated area, could seriously reduce the food base of organisms at higher trophic levels. Three of the four most abundant invertebrates were oligochaete species. The fourth was an amphipod species (Table 3-10). It is unlikely that oligochaetes form a significant portion of the diet of either of the endangered species discussed. The salt marsh harvest mouse is herbivorous, and the California black rail feeds on horse mussels, clams, shore crabs and insects (p. 448 and Figure 401). Of these, only insects were reported from either of the two sampled areas, and they were no less abundant within the contaminated area than the reference area (Table 3-10). The amphipod species, which could comprise a portion of the diet of the rail, was less abundant within the contaminated area. However, there is no evidence that this reduced level would represent a resource limitation for this bird.

Response to Allied Corporation Comments 2.8 (30 September 1985):

The comments concerning the quotation from page 462 of the Final Draft Remedial Investigation Report are correct in that the cause and effect relationship was not established, nor was diversity calculated. The macrobenthic study, like the vegetation survey, was designed to be descriptive and was so presented on pages 283-301 of the Final Draft Remedial Investigation Report. The liming may, indeed, have been the cause of lowered values, indicating that the attempted remediation did not work. At any rate, the macrobenthic differences between the two study sites are striking.

Two or three explanations suggested by Allied are not viable. The extent of drainage ditches is not different between the two areas; in fact, the Reference Area was selected because of the similarity of its drainage ditches. The plant coverage in the Reference Area was also as similar as can be found in a

brackish marsh. In addition, although mean interstitial water salinities were higher in the Reference Area, differences were not significant.

Allied missed a major factor. Food items for organisms other than the black rail and harvest mouse are important in a discussion of a food base. The wetland supports a large variety of species.

Allied Corporation Comments 2.9 (30 September 1985):

2.9. WILDLIFE HABITAT EVALUATION.

The site was evaluated with respect to two habitats, grassland and saltmarsh. Each habitat was evaluated separately based on its suitability for various species; three birds for the grassland, and a rodent and one bird for the marsh. A Habitat Suitability Index (HSI) was used to provide a procedure for rating habitat conditions for a particular species in a particular area. Generally, the HSI evaluations for the salt marsh harvest mouse and the black rail are open to criticism, the most obvious point being the inconsistency between habitat variables listed in Table 3-21 and those given in Appendix 3-D (which is supposed to contain the complete HSI models). The inconsistencies noted below make it impossible to determine what HSI models were, in fact, used.

Table 3-21 lists four variables for the salt marsh harvest mouse HSI model, but the model described in Appendix 3-D only uses three variables. Variable 3 (number of plant species) listed in Table 3-21 does not appear in the model presented in Appendix 3-D.

There is even greater disparity between Table 3-21 and Appendix 3-D for the California black rail. Table 3-21 lists 5 HSI model variables for this species. Appendix 3-D, however, uses only three variables in the model; one of these three (average spring/early summer soil moisture) is not even on the list in Table 3-21. Three variables listed in Table 3-21 (percent cover of Distichlis; presence of areas of dense vegetation above highest tide; and total coverage of vegetation) do not appear in the mode presented in Appendix 3-D.

The text discussion of HSI model development for the salt marsh harvest mouse identifies two habitat variables which were not included in the HSI models: proximity to areas of tidal inundation; and proximity to dense cover at an elevation above highest tidal inundation. The latter variable was listed in Table 3-21 for the California black rail, but not for the salt marsh harvest mouse; the HSI models presented in Appendix 3-D did not include either variable for either species.

Response to Allied Corporation Comments 2.9 (30 September 1985):

Table 3.21 in the Final Remedial Investigation Report lists the variables which were measured in the field, based on first draft models. As stated at the top of page 310 of the Final Remedial Investigation Report, "the models were modified . . . final versions are included in Appendix 3-D." Because this was not understood by Allied, only the final model variables were listed in the Final Remedial Investigation Report. During the model modification process, variables can be added, deleted, or modified. Page 348 of the Final Remedial Investigation Report indicated that the model applied used the following factors: proximity to areas of tidal inundation and proximity to dense cover at an elevation above highest tide inundation. The proximity to areas of tidal inundation factor is assumed in applicability of the model to stands dominated by pickleweed. The proximity to dense cover factor is a modifier if absent.

Allied Corporation Comments 2.9.1 (30 September 1985):

2.9.1. GRASSLAND.

The three birds chosen were the kestrel (a carnivore), the meadow lark (an insectivore), and the ring-necked pheasant (a granivore). The habitat for the kestrel and the meadow lark are both rated "high", while that for the pheasant is down-rated to "moderate" because of a lack of a cultivated crop land for winter feed. The down-rating for the pheasant (an introduced species) for reasons having nothing to do with contamination is not viewed as a problem with the habitat. The summary on page 313 concludes that there appears to be nothing wrong with the grassland habitat. However, the summary on page 436 states that the problem with the grassland is that it was in such good shape that it would ". . . attract and expose wildlife species to toxic metal contamination. . . ." This contention is wholly unfounded because nowhere in the study is it demonstrated that there were any metals present in this area that could lead to harmful consequences.

On page 300 the grasslands study area is said to be "adjacent to Allied Chemical." Judging from Figure 3-5 that appears to be a misleading and prejudicial description of its location.

Response to Allied Corporation Comments 2.9.1 (30 September 1985):

An adequate amount of sampling had been conducted prior to the wildlife habitat analysis to document the presence of contamination. Animals can be exposed to contamination through ingestion (food, water, and grooming) and physical contact, e.g., a bird taking a dust bath.

The description of the grassland study area as "adjacent" was a way to distinguish it from the reference areas. "Diagonally from" would have been a better term to use.

Allied Corporation Comments 2.9.2 (30 September 1985):

2.9.2. MARSH.

The marsh habitat was evaluated from the point of view of two species on the Endangered Species list. The Salt Marsh Harvest Mouse, and the California Black Rail. There are several questionable aspects about this evaluation.

Sample plot location was based on the presence of Salicornia in the field. This may be proper for the rail because Table 3-21 indicates that Salicornia-related parameters are the two most important for their evaluation models. However, the presence of Salicornia ranks last in importance for the mouse and therefore the selection of sites is predetermined to find less than optimal sites for the mouse. Biases like this one are reflected in the results. Two of the plots (4 and 5) were said to be elevated and thus contained vegetation dominated by grass (Distichlis). This led to low habitat ratings. One plot (plot 6) was low in Salicornia but high in plant diversity due to proximity to mosquito ditches. Thus, this site rated well with the mouse, but poor with the rail for reasons unrelated to any metal contamination. However, if the sites adjacent to bare areas are ignored (after all, they constitute less than an acre in the total of 75 acres of marsh) we see that the study area scores were not very divergent from those of the reference area.

Response to Allied Corporation Comments 2.9.2 (30 September 1985):

Allied concluded the evaluation was biased because its interpretation of the models was incorrect. The order in which a variable was listed had nothing to do with its importance. Rather, the shape of the graph, the interaction of the variable with other variables, and the use of the variable in the equation must be interpreted. In fact, the equation for the mouse shows that the additive function of a dense stand of pickleweed can make up for a value of zero in the other variables.

Allied Corporation Comments 2.10 (30 September 1985):

2.10. FOOD WEB.

As described above, most plants sampled in the field show natural levels of heavy metals, and FDA criteria for seafood are not exceeded by clams. Thus, the threat to aquatic food chains is overstated. Levels above reference were found

only in clams in the stream and the upland areas, and then only in a few samples for only lead, cadmium, and zinc. Furthermore, levels of cadmium and zinc are below the maximum reported for the bay (p. 45). Arsenic, the one metal of concern in the wetland sites (Figure 2-65) is not above reference in clams (p. 45). Therefore, there is ample evidence that aquatic species in the wetland habitat and in the bay are not threatened by metal concentrations at the NWS.

Response to Allied Corporation Comments 2.10 (30 September 1985):

Allied agreed that certain contaminants migrated into surface water, but suggested that no threat existed to the wetland habitat or to Suisun Bay. The Navy addressed these comments by undertaking additional sampling and analyses to investigate the potential for further migration. Additional data were presented in the Final Report of the Remedial Investigation of Contaminant Mobility at the Naval Weapons Station, Concord, California, Subtitle Appendix 2.5 1986/87 Data, and in the Final Report of the Feasibility Study of Contamination Remediation at Naval Weapons Station, Concord, California, Volume II: Biological Assessment.

Allied Corporation Comments 2.11 (30 September 1985):

2.11. TOXICOLOGY.

The importance of this section lies in the attempt by WES to justify its contention that while the presence of certain metals in plants, worms or clams is not necessarily harmful to these organisms, it may be harmful to animals who eat them on a regular basis. For this contention to be credible, at least the following elements must be demonstrated: (1) WES must establish a significant exposure level by, for example, knowing the ingestion rate of the California Black Rail, and the metal content of the food within the rail's feeding range, which makes it possible to estimate the metal exposure by ingestion for the rail; (2) WES must present toxicological evidence linking the known exposure rate of a particular metal to some physiologic response for the species of concern or a closely related one.

The report presents toxicological discussions for lead, cadmium, selenium, and arsenic. However, in none of these cases are both of the above elements demonstrated.

Response to Allied Corporation Comments 2.11 (30 September 1985):

In the Final Report of the Remedial Investigation of Contaminant Mobility at the Naval Weapons Station, Concord, California, an extensive toxicological evaluation was presented. Based on this evaluation, it was concluded that lead, cadmium,

selenium, and arsenic were present in high enough concentrations to have potential impact on resident wildlife and particularly, the endangered species. furthermore, as indicated in the Final Biological Assessment Report, sampling of resident rodent species confirmed that bioaccumulation of lead and cadmium was significantly elevated. These data demonstrate that there is substantial potential for harm to the Salt Marsh Harvest Mouse due to the accumulation of contaminants at this site.

Allied Corporation Comments 2.11.1 (30 September 1985):

2.11.1. LEAD.

The entire toxicological evaluation presupposes a) that the species of concern feed only on the most heavily contaminated food source and b) that salt marsh harvest mice and the California black rail feed only in lead contaminated areas which are generally upland sites at NWS. Both presuppositions are unreasonable. Furthermore, the evaluation does not consider that lead does not biomagnify in food chains and that organisms can sequester and detoxify heavy metals by synthesizing metallothioneins.

Moreover, the report bases its estimate of Salt Marsh Harvest Mouse exposure to lead on the assumption that it eats only Typha. In fact, the mouse is known to eat a variety of plants over the course of the year and it is not known if Typha is even among them. Nothing is known about the metal content of those other plants.

Nevertheless, the report estimates that if the mouse ate nothing but Typha which was contaminated with the highest amount of lead found on the site, the exposure rate would be about 1.75 ug lead/g body weight. Out of all the examples of lead in the environment discussed, only one study might qualify as a valid comparison. The study showed that lab mice experienced "reproductive impairment" when exposed to 1.5 to 3.0 ug lead/g body weight. However, even these results are not truly germane to the field situation here because the estimated exposure for the harvest mouse was derived using Typha levels for upland sites where the mouse was not found to live. In fact, lead levels for Typha in the AA site (reported as confirmed mouse habitat) were about an order of magnitude lower. Thus, the toxicology presented in the report supports no ill effects to the mouse from lead exposure in its diet.

The same problems exist for the data on the California Black Rail. The report used average earthworm lead concentrations for site K-2 to estimate exposure levels. However, not only does the rail not feed in such upland sites (which contained the highest levels of lead in worms) but the rail eats only Marine invertebrates - such as clams. It just so

happens that worm lead levels (Figure 2-54) are much higher than clam levels (Figure 2-12). Nevertheless, using the upland worm numbers yields an exposure rate of 0.64 ug lead/g body weight. WES recites that Japanese quail exposed to 0.75 ug lead/g demonstrated a drop in egg production. But the consumptive patterns and physiology of the Japanese quail are considerable different from those of the rail. Thus this comparison is, at best, highly questionable. WES cites other studies but they are all irrelevant - such as ingestion of lead shot by turtle doves. Clearly, no evidence is presented to link exposure levels to deleterious effects.

The section on lead concludes by insisting that a potential for lead stress exists for wildlife on this site. However, support for this conclusion is totally absent.

Response to Allied Corporation Comments 2.11.1 (30 September 1985):

Sampling of resident rodent species confirmed that bioaccumulation of lead was significantly elevated. In samples from RASS 1, the concentrations of lead in the livers of both the house mouse and the California vole were significantly higher than in organisms from reference areas. In samples from RASS 2, concentrations of lead were significantly elevated in liver, kidney and femur of house mice. These data demonstrate that there is substantial potential for lead bioaccumulation by resident rodent species. The increased accumulation of lead in the kidney of field mice is of particular concern because of the sensitivity of this organ to lead toxicity. These data suggest that there is substantial potential for harm to the Salt Marsh Harvest Mouse due to the accumulation of lead at these sites.

Allied Corporation Comments 2.11.2 (30 September 1985):

2.11.2. CADMIUM.

This section begins with a general introduction intended to show that cadmium exists in the biological compartments of the NWS ecosystem. It begins by repeating the argument discussed in the plant section that cadmium entering worms is somehow linked to cadmium found in plants. However, as previously discussed, this argument is insupportable. The background section concludes by stating that a ". . . high potential for movement of cadmium from upland soils into plants is underway . . .". Aside from the fact that there is no factual basis established for this statement, it should be remembered that the plants being analyzed are mostly Cyperis which is a dubious index species, especially when grown in upland conditions.

Moreover, no soil samples had cadmium levels (p 26) which exceeded the TTLC level of 100 mg/kg (p. 23). Only six samples of plants had cadmium levels above normal (pp 41, 52, 60), and the maximum value of cadmium in earthworms was within the range reported in recent literature (p. 93). None of the clams had cadmium above FDA levels for seafood, and only a few were above reference area levels (p. 39). There is therefore little evidence for ecologically meaningful harmful effects of cadmium in either terrestrial or aquatic food webs.

Nevertheless, the report uses upland Cyperis cadmium data on which to base an approximate exposure rate of 1.3 ug cadmium/g for the harvest mouse. It so happens that this is the highest cadmium level measured for Cyperis. However, the mouse does not live in such upland conditions, but rather in the marsh where cadmium levels were about two orders of magnitude lower.

The rest of this section fails to supply any toxicological information relevant to our setting. The only information regarding ingestion of cadmium concerns bobwhite quail and ducks and chickens (whose consumptive patterns and physiology are significantly different from the rail) exposed to 20-200 ug/g. (There is no data regarding ingestion by mice.) Moreover, there is no data regarding the ingestion rate of the rail. Thus no toxicological support is presented to substantiate the claim that cadmium is a threat to wildlife at this site.

Almost the only reference to metallothioneins in the entire report is on p. 453, and the reference is misleading. These are proteins commonly found in animals and are known to sequester and detoxify heavy metals. It has been shown that these proteins are formed in response to heavy metal uptake and can regulate heavy metal effects over a relatively wide range of concentrations. This widely understood and well documented phenomenon is virtually ignored in this report.

There is also no evidence for biomagnification of cadmium in air-breathing animals. Studies by the European Fisheries Commission have concluded that cadmium does not biomagnify to upper trophic levels. In any case, FDA limits for seafood have not been exceeded in clam bioassays at any sampling st tion, and elevated cadmium in clam tissues is found primarily in a few samples from upland areas, which is not habitat for the black rail.

Response to Allied Corporation Comments 2.11.2 (30 September 1985):

Sampling of resident rodent species confirmed that bioaccumulation of cadmium was significantly elevated. In samples from RASS 1, the concentrations of cadmium in the livers

and kidneys of the California voles were significantly higher than in organisms from reference areas. In Samples from RASS 2, concentrations of cadmium were significantly elevated in liver and kidney of house mice. These data demonstrate that there is substantial potential for cadmium bioaccumulation by resident rodent species. The increased accumulation of cadmium in the kidney of field mice is of particular concern because of the sensitivity of this organ to cadmium toxicity. These data suggest that there is substantial potential for harm to the Salt Marsh Harvest Mouse due to the accumulation of cadmium at these sites.

Allied Corporation Comments 2.11.3 (30 September 1985):

2.11.3. SELENIUM.

This section begins by attempting to support the argument that bioaccumulation exists at the coke pile (CP) site. It should be remembered that not only were there no earthworms found at this site, but that by its upland nature, it is neither harvest mouse nor rail habitat.

The section then compares large selenium-contaminated sites such as Kesterson to the coke pile site. The tremendous difference in the magnitude of the contamination at Kesterson as opposed to this site, however, makes such comparisons meaningless.

The report further states that extensive foraging on earthworms (which were not found at this site) and on plants with the selenium levels found at this site (by Cyperis which took up nearly ten times the amount taken up by Typha) could be hazardous. A major problem with this scenario is that "extensive foraging" is hardly likely to lead to a significant wildlife contamination problem for a site as small as this The report notes that "animals consuming forage bearing 5-10 ug/g selenium for long periods of time can develop selenosis" and goes on to say that development of "chronic selenium poisoning" would probably occur at the NWS site. The support for these quotes is tenuous at best considering that Typha has selenium values an order of magnitude less than the 5-10 ug/g level, and even Cyperis showed these levels at only two sample locations.

Again, the toxicological support for ill effects due to selenium at this site is absent.

Response to Allied Corporation Comments 2.11.3 (30 September 1985):

Sampling of resident rodent species confirmed that bioaccumulation of selenium was significantly elevated. In samples from RASS 1, the concentrations of selenium in the livers

of the house mice were significantly higher than in organisms from reference areas. In samples from RASS 2, concentrations of selenium were significantly elevated in both the liver and kidney of house mice. These data demonstrate that there is substantial potential for selenium bioaccumulation by resident rodent species. While the toxicological significance of this degree of selenium accumulation in rodents is not well defined, the presence of elevated concentrations of this non-persistent element in mouse tissues suggests continuous chronic exposure is occurring. Potential for chronic exposure to selenium is of particular concern for avian species which forage on this site.

Allied Corporation Comments 2.11.4 (30 September 1985):

2.11.4. ARSENIC.

While the discussion presents examples from the literature of arsenic toxicity as well as carcinogicity (the latter contentions are currently in dispute), the two elements discussed previously which are necessary to validate a toxicological argument for the hazardous effects of arsenic are again conspicuously absent. No estimate of arsenic exposure is given for either mouse or rail and no evidence from clinical studies is presented.

The report mentions the possibility of human exposure as a result of wind dispersal of soil from the AA site. However, even the highest levels encountered in this study were associated with vegetated areas, and vegetation is known to drastically retard the dispersal of underlying soil. The arsenic levels in soil from areas devoid of vegetation at this site were not determined, while the levels in bare areas on other sites were more than an order of magnitude less.

Only 11 samples (all in area AA) exceeded TTLC levels out of approximately 65-70 samples in area AA. The mean values for areas AA and AB are 36.3 and 49.2 mg/kg, compared to 17.5-53.8 in the literature (p. 96).

Only one sample of field collected or bioassayed Typha resulted in arsenic levels above normal (pp. 48 and 51). Mean arsenic concentrations in worms were within reported ranges (pp. 95-96). Although plant and worm bioassays purported to show toxicity at certain locations in area AA, the necessary data were not provided that show that toxicity was due to the presence of arsenic and not some other soil condition.

Arsenic levels in clams were no different from levels in clams from reference areas.

There is substantial doubt, therefore, that arsenic toxicity is a cause for ecological concern in areas AA and AB.

Speculation of hazard to human health is unwarranted, particularly here, where human exposure is not expected.

Response to Allied Corporation Comments 2.11.4 (30 September 1985):

Arsenic concentrations exceed the STLC at the majority of sites in RASS 1. Statistically significant bioaccumulation of arsenic by earthworms, relative to reference areas, was also observed at a number of sites in RASS 1. Furthermore, significant bioaccumulation of arsenic was observed in clams for 13 of the 18 sites in the RASS 1 and RASS 2 areas and the adjacent wetlands and creek. These data suggest substantial potential for arsenic migration and bioaccumulation by soil invertebrates and aquatic organisms.

Allied Corporation Comments 2.12 (30 September 1985):

2.12. CONCLUSIONS AND RECOMMENDATIONS.

The report's conclusions and recommendations are infected by the points noted above, among others. For these reasons, they are largely unsupported. Rather than review them point by point, we note only the following items.

The report states that "substantial" contamination has occurred at the study site. According to the authors' definition of the word "substantial," all this means is that some amount - however small - of contamination has occurred. Thus, this is a hollow conclusion.

The report then says that "certain portions" of the soil on this site have been contaminated to levels in excess of "acceptable" (i.e., MASSA or other) levels. The problem, of course, is that neither MASSA nor other levels have not been shown to be relevant to this study, and thus the area identified as requiring remediation (nearly the entire 110 acres) based on these levels is wholly without justification. Moreover, even if MASSA standards were to be used, they do not result in the conclusions shown, since the areas that exceed true MASSA levels are far more limited than WES concludes.

In addition, the report concludes that native plants (in reality, one plant: Typha) are contaminated with cadmium, lead and zinc, and that a potential exists for the metals to move into terrestrial and marine invertebrates at a limited number of sites. However, the study fails to demonstrate that this potential (which is, at most, limited in scope) can manifest itself as deleterious to either the grassland or marsh habitat. In other words, even given the assumption that the index plant is a valid indicator for these studies (which it is not) and that the clam and earthworm are valid indicators for aquatic and

terrestrial low trophic level food sources (which is not substantiated), the toxicological section still does not link the levels of metal exposures via these pathways to any chronic or acute impact on any aspect of the grassland or marsh ecology.

Therefore, there is no basis for the remediation plan for the area shown in Figure 2-90.

Response to Allied Corporation Comments 2.12 (30 September 1985):

Data collected by the Navy demonstrates substantial accumulation of a number of toxic contaminants, including arsenic and a number of trace metals, on all four RASS's. The concentrations of these contaminants are statistically greater than those found in reference areas and exceed a number of relevant criteria (e.g., TTLC or STLC) at many of the sites sampled within these RASS's. These contaminants are mobile in surface waters and clam bioassays have demonstrated the potential for their bioaccumulation in aquatic species. Laboratory bioassays have demonstrated that these contaminants are also bioavailable to both plants and soil invertebrates. Moreover, at several sites in these RASS's soils containing these contaminants were found to be toxic to both plants and soil invertebrates. Finally, there were indications of phytotoxicity and reduced abundance of plants and soil invertebrates at some of the sites in these RASS's showing high concentrations of these contaminants. Taken together, these data indicate substantial potential for harm to the environment due to the presence of these contaminants in the soils, sediments, and surface waters of the four RASS's.

Allied Corporation Comments 3.0 (30 September 1985):

3.0 SPECIFIC COMMENTS, PRINCIPALLY DIRECTED TO THE NATURAL RESOURCES DAMAGES STUDY.

The natural resources damage study is deeply flawed. It relies almost exclusively on the remedial investigation which is not reliable.

Moreover, it picks and chooses bits of information from the remedial investigation in a peculiar fashion. The following comments respond to that picking and choosing, in the order in which they were considered in that study.

Arguments regarding damage to the soil are based upon the premise that the soils are utilized for the production of crops for human consumption. The metal levels used as criteria for damage are the MASSA numbers developed for activated sludge for agricultural use. The problems with these arguments are that

(1) the Navy has no intention of growing crops for human consumption on the site in question, and thus the value of this land for agricultural purposes is a moot point, and (2) the document states that wildlife would be impacted by contact with vegetation on this site. MASSA numbers have no relevance to uncultivated plants or to wildlife as consumers of those plants. Also, no toxicological evidence is presented in support of such alleged damage to wildlife.

Figure 4 shows locations of soil samples which contain lead levels in excess of 500 mg/Kg. From previous studies we know that any such lead is essentially immobilized in the coke. Since the coke and the soil are intermixed at the surface, it is very likely that the lead in Figure 4 is not in soil, but rather in the coke. The distinction is important because, despite the low pH of these soils, as long as the lead is in the coke it is essentially immobile and does not constitute the potential hazard that similar amounts of lead in the soil would.

In the discussion on soil pH the report states that ". . . most plants are stressed when soil pH drops below 5. . . ." This statement is derived from agricultural research, and therefore does not apply to marshes. In fact, typical marsh soil pH's are around 6, and values close to 5 are probably not stressful to these plants.

This discussion is related to the one which follows which concerns the observation that many plants on the site (we are not told which ones or how many) appeared stunted and chlorotic. These symptoms were ascribed to an excess of soil zinc without any considerations of alternative explanations. In fact, chlorosis has to be one of the more nondiagnostic symptoms in botany because of the multitude of possible causes. For example, both stunting and chlorosis can be caused by deficiencies in one or more of the following: iron, nitrogen, potassium, sulfur, magnesium, and manganese. It is possible that the low pH's mentioned previously may contribute to such deficiencies.

It is interesting to note the use of agriculturally derived metal phytotoxicity (plant death) numbers. Figures 18 and 19 show the distribution of sites which exceeded the phytotoxic levels for zinc and copper (250mg/Kg for zinc, and 125mg/Kg for copper). However, aerial photos reveal that these areas are generally well-vegetated. The point is that agriculturally derived numbers do not apply to natural situations. This becomes important when the report discusses the distribution of plants with reduced growth. Even though the remedial investigation reported no difference in plant heights on a community-by-community basis between background and study area marshes, this report chose to <u>infer</u> reduced growth by the application of agricultural numbers. The reason for choosing

this tack was that plant growth reduction relative to background was not observed in their study due to ". . . low fertility or increased salinity . . ." of the soil. The reduced plant growth was essentially "manufactured" by applying agricultural metal/growth relationships. However, since we know that such relationships are not applicable to natural plant situations, the distributions of "excessive" soil zinc and cadmium (Figures 20 and 21) should be regarded as having no basis in fact.

The statement is made that 8mg/Kg cadmium in plant tissue would have ". . . serious implication for contamination of food sources . . . ." Yet, the cadmium toxicological section gave no support to the idea that ingestion of 40mg cadmium/g plant wet weight (the maximum level observed in the study) would have a deleterious effect on Harvest mice (even though they do not live where this level is found) or the rail. Therefore, the above quote is without support.

In the discussion about soil invertebrates, the report states that both density and diversity of invertebrates were observed. Diversity was never analyzed. The cause of the decreased density is stated to be contamination. However, no evidence was ever presented to substantiate this.

The topic of bioaccumulation in earthworms is discussed. Its importance is associated with the argument that the worms represent an important avenue in the marsh and grassland food chain. However, because there were no earthworms on the site, the bioaccumulation described to occur has potential ecological implication if, and only if, organisms occupying a similar niche are present at these locations.

Figures 23-26 show distribution of "excessive earthworms tissue" cadmium, lead, selenium, and arsenic. These criteria differ from the ones presented in the remedial investigation (page 93-112), the sources of which we have yet to find. The criteria presented in the present report are from Table 2-5 of the Remedial Investigation "Action Levels for Contaminants in Aquatic Organisms for Human Consumption." The ultimate source appears to be the Australian National Health and Medical Research Council Standards for Metals in Food, May 1980. These standards are clearly inappropriate for application to earthworms, which are neither aquatic nor intended for human consumption. Therefore, it is not clear how the earthworms (which do not even exist at this site) "can be considered damaged and essentially a loss from the component of the ecosystem."

The argument of bioaccumulation is advanced again, this time accompanied by a table including all sites for which bioaccumulation was observed. Again, the areas are impacted (although to an indeterminate degree) if, and only if, the niches implied for earthworms and clams can be shown to be occupied at

the locations for which bioaccumulation has been observed.

There is simply no support for the conclusion that the "total loss of soil animals can be estimated to be 371,386,020" (p. 26). Nor is there any support for the notion that this represents a threat to higher organisms either because of loss of food stock or because of potential bioaccumulation.

Surface Water Quality

The fact that contaminated soil can be moved (as sediment) by erosion into the bay does not indicate that it is much more than a weak source of contamination. Much of this sediment does not simply accumulate at the bottom of the bay to act as a slow release source, but rather is dispersed by underwater currents and effectively diluted. It is diluted still further by such erosion being a relatively rare event, i.e., once in 10 years.

All "contamination of groundwater" mentioned is with respect to "solid phase" (i.e., sediment) mobility. It should be remembered that metals so bound are not readily available to plants and are thus a potential impactor on the aquatic community only. The only data we have on such biota are for indigenous clams, which contain considerable concentrations of metals in this whole area anyway.

Air Quality

The report says that air-transported material containing at least 500mg/Kg lead is a hazard and that bare areas of soil containing at least these levels are to be found in five areas listed on the table on page 35 and on Figure 28 (page 36). There is an important discrepancy in the two, because the AA and AB sites are listed in the table but not on the Figure. In fact, it should not be on the table because (1) the bare areas were never sampled on the AA site, (2) the lead concentration was never determined to be over 500mg/Kg on either the AA or AB sites, and (3) there is no justification provided for the 500mg/Kg standard.

The report states that lead levels in these areas constitute a threat to human and wildlife, however, toxicological support for this conclusion is lacking. Indeed, there is nothing in the remedial investigation, or any of the other reports, to support a conclusion that transport by air is a significant pathway to human exposure. No studies to support any such conclusion were undertaken. Nor was the scanty data available analyzed correctly in this regard. Any such conclusions are sheer unsupported speculation.

Food Quantity

This section is essentially a summary of the sections dealing with appearance of vegetation (chlorosis, stunting), plant growth (growth reduction), and soil invertebrates (density). The report mentions ". . . substantial damage to vegetation and soil invertebrates on contaminated areas AA, AB, KS, K-2, and G-1 . . ." Note (1) a reduction in soil invertebrates was noted only in AA, and (2) the reduction in soil invertebrates was not shown to be related to chemical contamination. In consideration of this and recalling the previous discussions on the lack of validity of the plant growth and appearance sections, the selection of impacted areas mentioned in this section (Figure 29: the entire site) are unjustified. (We note that Figure 29 does not square with the table contained at the top of page 38.)

Food Quality

As noted above, the toxicological discussions are insufficient to justify the statement that the vegetation and soil invertebrates over the areas illustrated in Figure 29 are contaminated to the point where their ingestion "threatens the health and well-being of their consumers."

Habitat Quality

The first paragraph is very confusing because it is poorly constructed. It mentions the poor habitat quality of the bare areas, but also note that the lack of vegetation "seems" to be linked to chemical contamination. In fact, no such link (bare areas to chemical contamination) was ever established. It also notes, and rightly so, that these bare areas "are not extensive."

The discussion then turns toward habitat quality for the Salt Marsh Harvest Mouse and the California Black Rail. It states that average plant height (Salicornia?) was less than that in other stands. We have no data for this statement nor do we really know which plants are being compared or where the locations for such a comparison are. It then comments on the poor shape of the Salicornia, but in the next sentence states that these areas received the highest habitability scores of any site on the marsh study area. This is very confusing juxtaposition which does not appear to be supported by the results in Table 4 (page 43).

The report discusses the wetland assessment using the FHWA technique. It concludes that the presence of bare areas "substantially" (which is defined as a real - not imagined amount) lowered the ability of the wetland ecosystem to function

normally. However, the bare areas are a relatively small portion of the whole site and therefore would not reasonably be expected to produce a significant deleterious effect upon the ecosystem as a whole.

The discussion of land use is thoroughly inconsistent. First we are told the Navy acquired these lands to serve as a buffer zone around the explosives operation. (Indeed, that is so. The lands are fenced and presumably monitored or guarded against unauthorized entry.) Next it is said that the Navy is required to preserve this area as wetland Yet the study then considers four types of use that have allegedly been damaged including agricultural use (wetlands are not farms), active recreation (presumably anyone using these lands for recreation is subject to being shot), and industrial development (a clearly incompatible land use).

Elsewhere in the report, the authors say that in valuing this property, one must use the market price of land subject to development. There is no basis for this statement in light of the facts of the matter. Nor is there any basis for the market value figures used to establish a grossly inflated value for this land. (As a rough measure, compare what the Navy said it was worth when the land was condemned with what it's consultants now say the land is worth.)

The discussion of the valuation of endangered species acknowledges that the authors do not have information they deem significant to place a value on these species. Their alternate evaluation is nothing more than speculation. At virtually every point in their syllogism, they admit they lack data required for a proper analysis. Nonetheless, they plow ahead.

The attempt to determine "uncertain future non-consumptive values" is even worse. Among other errors, it would base compensation on beliefs which "might rightly or wrongly be attributed to the consequences of contamination in general or in particular." (p. 63) And although "it is not known what economic value to assign to the non-consumptive uncontaminated value of this site" (p. 64) it nonetheless makes outlandish efforts to do so, comparing this inhabited, industrialized are with wild and scenic rivers.

Allied Corporation Comments 4.0 (30 September 1985):

4.0 CONCLUSIONS

These comments have dwelled, in great detail, on specific shortcomings of these reports. But we must not lose the forest for the trees. The individual comments, many taken alone, but certainly collectively, demonstrate that the conclusions of the remedial investigation are not valid.

Some of the data manipulation contained in the remedial investigation study is wholly unjustified; for example, using the metal content of an upland plant (which is not eaten by the marsh-dwelling mouse) to argue that the mouse is endangered. Other errors, while less egregious, are no more defensible.

Yet the feasibility study and the natural resources damage study rely almost exclusively on the conclusions contained in the remedial investigation. Since those conclusions are wrong, the premise of the other two studies disappears.

In short, the analysis and conclusions of the remedial investigation report must be drastically revised and the feasibility study and natural resource damage study must be redone entirely. When these reports are redone, they should comply with EPA s Guidance on Remedial Investigations Under CERCLA (EPA/540/G-85/002) and Guidance on Feasibility Studies Under CERCLA (EPA/540/G-85/003).

We reserve the right to make further comments on these studies as part of the public comment process, in connection with the pending litigation and otherwise.

Response to Allied Corporation Comments 4.0 (30 September 1985):

The Final Remedial Investigation Report was revised to better describe the toxicological impact of the contamination of the Naval Weapons Station, Concord. The Navy undertook a comprehensive evaluation of the biological impact of the contaminants that have been discharged into the environment by former and adjacent landowners. The situation was complex with a number of interactions that had to be considered. The criteria and factors considered incorporated as many interactions as deemed necessary. Consequently, balancing the important factors for short-term and long-term impacts resulted remedial action alternatives described in the (Second Revised) Final Draft Feasibility Study Report.

3.15 COMMENTS SUBMITTED BY CALIFORNIA DEPARTMENT OF FISH AND GAME IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Comments of California Department of Fish and Game (1 October 1985):

Please allow me to apologize for the errors and omitted phrase in our letter of September 19, 1985 relative to the Remedial Alternatives for Deposited Hazardous Materials. The mistakes were made at our headquarters office and are an embarrassment. I have attached a corrected version for your use. I hope you have suffered no inconvenience.

Comments of California Department of Fish and Game (19 September 1985):

Department of Fish and Game personnel have reviewed the Final Draft Report of the Remedial Investigation of Contaminant Mobility and Naval Weapons Station, Concord California and Final Draft Report of the Feasibility Study of Contamination at Naval Weapons Station, Concord, California and find them to be extremely comprehensive.

It is our understanding from review of he remedial investigation of contaminant mobility that arsenic, lead, cadmium, selenium, zinc, and copper are the principal hazardous materials deposited on lands recently acquired by the Navy. The report further addresses the mobility of these heavy metals through various biological methodologies (i.e., insitu clam bioassay, laboratory earthworm exposure and vegetation growth studies) results of which confirm the potential, if not actual, adverse effects to local fish and wildlife species.

Of major significance and concern are conclusions of the comprehensive risk assessment which details an unacceptable high probability of kidney disease (p. 445-6) and reproductive failure (p 447) in the federal and state listed endangered salt marsh harvest mouse (Reithrodontomys raviventris) and a lower body weight trend as well as possible reproductive problems (p 449) in the federal candidate threatened or endangered California black Rail (Laterallus jamaicensis conturniculus). Other threatened as well as non-threatened species would likewise be at risk. The feasibility study reviews appropriate technology and cost analyses of means to abate the environmental effects of the improper hazardous waste disposal on acquired properties. The alternatives considered ranged from posting and monitoring (no project cost) . . . [217,000]) to complete soil and vegetation removal with site restoration ($55,890,000). On site encapsulation with resultant loss of wetland habitat ($13,379,000) to be mitigated by preservation of a like amount of comparable wetland elsewhere appears at first glance to be more economically acceptable. However, acquiring existing wetlands to compensate for the loss of wetland habitat, especially that supporting threatened or endangered species is unacceptable. We advocate the position that new wetland habitat must be created from non-wetland areas (uplands for example) when loss of existing wetlands is unavoidable. In this case, the cost for creation of 109.87 acres of new wetland should be included in the cost of this alternative. We are familiar with some of the upland areas at the Concord Naval Weapons Station and we recommend the Navy also investigate the possibility of creating new wetlands from upland areas and using the fill removed for contaminated site encapsulation.

While we acknowledge the costs for full remediation of

this problem are high, we believe the conclusions in the Corps' reports thoroughly justify those remedial actions which not only remove further threats to fish and wildlife but which also result in no loss of our critically scarce wetland habitat.

Thank you for the opportunity to comment. If you have any technical questions please contact Mike Rugg, Associate Water Quality biologist, telephone (707)944-2011.

Response to State of California Department of Fish and Game Comments (19 September 1985):

The (Second Revised) Final Draft Feasibility Study Report does not consider the capping (onsite encapsulation) alternative as being technically or institutionally feasible. Analysis of the existing conditions, related to contamination of the wetlands, and development of a 3-tiered remediation approach have reduced the total amount of impacted wetlands to 14.39 acres. In the case of the brackish water wetlands on RASS's 1 and 2 (10.50 acres), onsite restoration will be conducted following removal of soils exceeding the TTLC/STLC criteria. Fresh water wetlands on RASS 3 (3.65 acres) and Rass 4 (0.24 acres) will not be revegetated and allowed to recover naturally.

3.16 COMMENTS SUBMITTED BY DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION IN RESPONSE TO A PUBLIC NOTICE ISSUED BY THE NAVY ON 8 AUGUST 1985, AND THE NAVY'S RESPONSES TO THOSE COMMENTS.

Comments of Department of Commerce, National Oceanic and Atmospheric Administration (2 October 1985):

Thank you for the opportunity to comment on the Remedial Investigation, Feasibility Study, and Assessment of Damage to Natural Resources at Naval Weapons Station (NWS) concord, California. NOAA is interested in the potential effects of this site on coastal and marine resources for which it exercises responsibilities as a trustee on behalf of the public as delegated by the Secretary of Commerce under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

NOAA is concerned that the Navy has not adequately evaluated the extent and severity of off-site contaminant migration resulting from release of hazardous substances at the NWS. This Agency believes, based on information provided in Navy studies, that coastal and marine resources may have been or are being affected by releases of hazardous substances from the NWS into Suisun Bay. Areas of Suisun Bay adjacent to the NWS serve as habitat for species of fish of interest to NOAA. Off-site transport of contamination may have occurred as a result of erosion of sediments caused by surface water runoff, tidal and

wave erosion of wetlands, and airborne dust transport.

Specifically, NOAA has four concerns relating to available studies concerning the NWS:

1) The severity and extent of hazardous substance contamination in Suisun Bay are not evaluated as part of the Remedial INvestigation or Damage Assessment:

2) Alternatives for remedial action in areas of off-site contamination have not been considered in the Feasibility Study:

3) The potential benefits and consequences of remedial alternatives identified in the FEasibility Study do not consider fishery or other impacts in Suisun Bay; and

4) Restoration planning has not been formally initiated.

Finally, we note that, in spite of the grandfather clause, the proposed Department of Interior regulations governing damage assessments under CERCLA are likely to be used as a point of reference for any damage assessment. We recommend that this assessment be conducted, to the greatest extent possible, consistent with those proposed regulations.

NOAA believes that the Navy should undertake sampling of Suisun Bay sediments adjacent to the NWS to determine if off-site migration of hazardous substance has occurred. The Agency wishes to be advised of the results of such sampling and be provided the opportunity to participate in the selection of remedial alternatives.

Please contact me by telephone to discuss questions you may have relating to NOAA concerns at this site. I can be reached at 206-526-6317 or FTS 392-6317.

Response to Department of Commerce, National Oceanic and Atmospheric Administration (2 October 1985):

These comments were considered in the conduct of additional clam biomonitoring following flooding and high tide conditions in the tidal creek draining the contaminated wetland areas. These data are presented in the Final Report of the Remedial Investigation of Contaminant Mobility at Naval Weapons Station, Concord, California, Subtitle Appendix 2.5-1986/87 Data, and clearly show that even under flood and high tide conditions the contamination appears to still be localized within the wetland and has not migrated out into Suisun Bay. The proposed

active remediation will eliminate the potential threat of contaminants migrating from the highest contaminated areas. The proposed passive monitoring and monitoring will insure any contamination left on site will not migrate into Suisun Bay.

Since data indicate no migration of contaminants into Suisun Bay, there is no need for further evaluation of off-site remedial actions in Suisun Bay or the potential benefits and consequences of remedial alternatives to impacts in Suisun Bay.

Restoration planning will be initiated following the selection of a preferred alternative.

Any damage assessment that is conducted will be consistent with the proposed Department of Interior regulations.

The Navy disagrees that sampling of sediments in Suisun Bay be undertaken. Appropriate clam biomonitoring was conducted in the tidal creek draining the wetland and at the point of discharge of drainage water into Suisun Bay. These data indicate no apparent migration of contaminants into Suisun Bay. Therefore the Navy is not justified to extend the investigation beyond the impacted areas. Present sampling has adequately defined the extent of the migration toward the Bay.

4.0 FIGURES

Figure 1. Relationship Between Contaminant Exposure (Bioaccumulation) and Biological Effects.

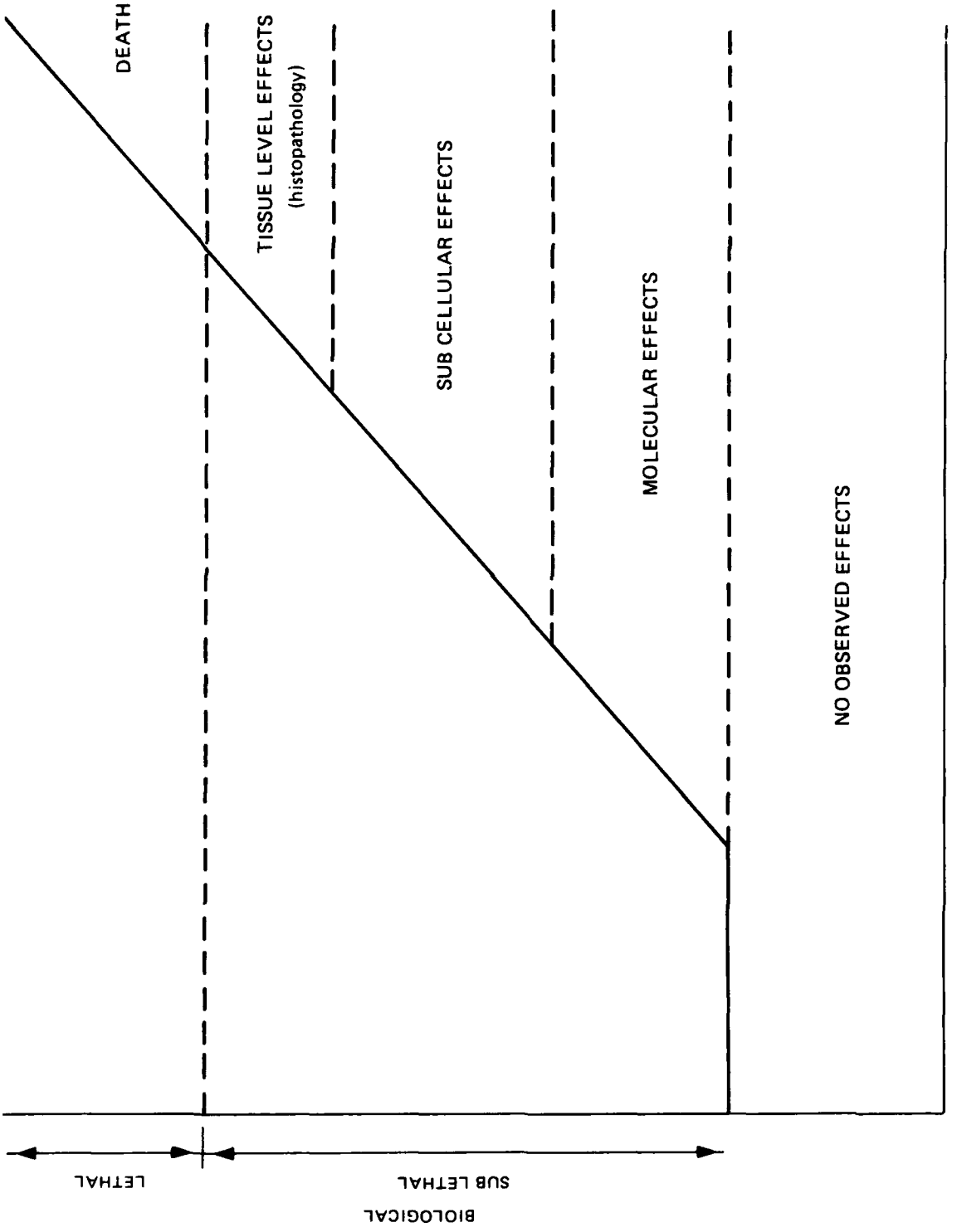


FIGURE 1. RELATIONSHIP BETWEEN CONTAMINANT EXPOSURE (BIOACCUMULATION) AND BIOLOGICAL EFFECTS

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6.0 ERRATA TO THE (SECOND REVISED) FINAL DRAFT REPORT OF FEASIBILITY STUDY OF CONTAMINATION REMEDIATION AT NAVAL WEAPONS STATION, CONCORD, CALIFORNIA, VOLUME I: REMEDIAL ACTION ALTERNATIVES (SEPTEMBER 1988) AND VOLUME III: FIGURES (APRIL 1988).

6.1 VOLUME I: REMEDIAL ACTION ALTERNATIVES (SEPTEMBER 1988)

6.11 Section 9.0 References:

The following literature citations were unintentionally omitted:

Anderson Geotechnical Consultants, 1984. Confirmatory Study of Hazardous Substances at Naval Weapons Station, Concord,

California, Draft Report.

Dutch Ministry of Agriculture and Fisheries, Committee on Mineral Nutrition, The Hague, 1973. "Tracing and Treating Mineral Disorders in Dairy Cattle." Centre for Agricultural Publishing and Documentation, Wageningen.

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Fries, G. F. 1982. "Potential Polychlorinated Biphenyl Residues in Animal Products from Application of Contaminated Sewage Sludge to Land", Journal of Environmental Quality, Vol. 11, pp 14-20.

Lee, C. R., R. K. Peddicord, M. R. Palermo, N. R. Francingues, Jr.1985. "Decisionmaking Framework for Management of Dredged Material: Application to Commencement Bay, Washington." US Army Engineer District, Seattle, Washington 98124.

Logan, T. J., and R. L. Chaney, 1983. "Utilization of Municipal Wastewater and Sludge on Land-Metals", Proceedings of the 1983 Workshop, University of California, Rivesied, CA.

Luoma, S. N., P. V. Cascos, and R. M. Dagovitz. 1984. "Trace Metals in Suisun Bay, California: A Preliminary Report". U.S. Geological Survey, Water-Resources Investigations Report No. 84-4170, Sacramento, CA, July 1984. 35 pp.

Pacific Environmental Laboratories (PEL) 1983 In Anderson Geotechnical Consultants, 1984. Confirmatory Study of Hazardous Substances at Naval Weapons Station, Concord, California, Draft Report.

World Health Organization, 1972. "Evaluation of Certain Food Additives and the Contaminants Mercury, Lead, and Cadmium". Technical Report Series 505.

Van Driel, W., K. W. Smilde, and B. van Luit. 1983. "Comparison of the Heavy-Metal Uptake of Cyperus esculentus and of Agronomic Plants Grown on Contaminated Sediments". Miscellaneous Paper D-83-1. US Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

6.12 Tables E.5, E.6, 3.21 and 3.24:

These tables have minor corrections. Corrected tables are included here for insertion in the report. The corrections are so minor that they do not change the estimates of quantities of excavated material or the cost estimates of each alternative as presented in the report.

6.13 Table 7.20:

This table should be modified to indicate that Sections 7 and 9 of the Endangered Species Act are not applicable requirements for RASS 4. An unintentional oversight resulted in inclusion of these Sections in the table.

6.2 VOLUME III: FIGURES

6.21 Figure 8 - The northern most 14W1 sample should be represented by a diamond. The other 14W1 sample should be represented by a solid square. Similar corrections should be made to all figures depicting the eastern portion of RASS 1.

6.22 Figure 16 - Unlabelled clam biomonitoring site is 10S3. It is labelled in Figure 8.

6.23 Figure 34 - 10P1 sample should be represented by a solid square. This correction should be made to each figure of RASS 3.

6.24 Figure 39 - Samples 3R2 and 16N1 should be included in the area of contamination.

6.25 Figure 41 - Sample 3R2 should be included in the area of active remediation. Sample 16N1 should be included in the area of passive remediation.

Table E.5

Summary of Remediation Area for Selected Potential Criteria

	Area Exceeding Soil Metal Contents of Reference Area	Soil Metal Statistically Higher Than Reference Area	Soil Metal Content Exceeding MASSA	Bioaccumulation of Metals in Plants & Animals	Area of Contamination	Exceeding STLC or TTLC Values	Barren Areas
Rass 1							
572-N	80.03*	19.24	0.19	28.82	31.42	15.40	1.03
571-N	3.90	--	--	--	--	--	--
571-SF	0.45	--	--	0.02	0.02	--	--
571-SP	0.04	--	--	--	--	--	--
CC	--	--	--	--	--	--	--
CC-SF	--	--	--	--	--	--	--
CC-SP	--	--	--	--	--	--	--
Other-N	0.01	--	--	0.01	0.01	--	--
Other-SF	--	--	--	--	--	--	--
Other-SP	--	--	--	--	--	--	--
Stream	0.99	--	--	0.60	0.60	--	--
SUBTOTAL	85.42	19.24	0.19	29.45	32.05	15.40	1.03
Rass 2							
572-N	9.21	1.61	1.80	1.84	1.99	2.33	0.67
572-SF	3.06	0.83	1.78	0.56	0.78	1.39	0.56
572-SP	0.31	--	--	--	--	0.03	--
SUBTOTAL	12.58	2.44	3.58	2.40	2.77	3.75	1.23

(Continued)

* All values in acres.

Table E.5 (Concluded)

	Area Exceeding Soil Metal Contents of Reference Area	Soil Metal Statistically Higher Than Reference Area	Soil Metal Content Exceeding MASSA	Bioaccumulation of Metals in Plants & Animals	Area of Contamination	Exceeding STLC or TTLC Values	Barren Areas
RASS 3							
573-Other-SP	0.04	--	--	--	--	--	--
573-Other-N	0.66	Trace	--	0.02	0.02	--	--
573-Other-SF	--	--	--	--	--	--	--
573-SP	0.36	--	0.50	--	--	--	--
573-N	3.57	2.87	0.17	2.08	2.92	0.34	--
573-SF	--	--	--	--	--	--	--
574-SP	0.48	0.31	0.50	--	0.31	0.09	--
574-N	1.06	1.05	0.88	0.95	1.41	1.28	--
574-SF	--	--	--	--	--	--	--
575-SP	0.14	--	0.13	Trace	--	--	--
575-N	1.12	0.20	1.72	Trace	0.20	0.09	--
575-SF	0.04	0.01	0.17	0.01	0.01	0.05	--
576-SF	0.10	0.08	0.09	0.02	0.10	0.04	--
576-N	0.01	0.01	Trace	0.01	0.01	--	--
576-SN	0.04	0.04	0.03	0.05	0.08	Trace	--
579D-Other-N	0.47	--	--	--	--	--	--
579D-N	0.54	0.01	0.14	0.54	0.54	Trace	--
579D-SN	0.03	Trace	--	0.05	0.05	0.01	--
579D-CP	--	--	--	--	--	--	--
579D-CP-SN	--	Trace	--	0.02	0.02	0.02	--
SUBTOTAL	8.66	4.58	4.33	3.75	5.67	1.92	--
RASS 4							
581-N	4.88	0.19	2.58	0.08	0.25	0.56	--
581-Other-N	0.43	Trace	--	Trace	Trace	--	--
SUBTOTAL	5.31	0.19	2.58	0.08	0.25	0.56	--
TOTAL	111.97	26.45	10.68	35.68	40.74	21.63	2.26

Table E.6

Remediation Area for Selected Decision Criteria

	Passive Remed. Action in Non-Wetland	Passive Remed. Action in Wetland	Total Passive Remediation	Active Remed. Action in Non-Wetland	Active Remed. Action in Wetland	Total Active Remediation
Rass 1						
572-N	0.05*	22.27	22.32	0.16	8.87	9.03
571-N	--	0.06	0.06	--	--	--
571-SF	--	0.02	0.02	--	--	--
571-SP	--	--	--	--	--	--
CC	--	--	--	--	--	--
CC-SF	--	--	--	--	--	--
CC-SP	--	--	--	--	--	--
Other-N	--	0.01	0.01	--	--	--
Other-SF	--	--	--	--	--	--
Other-SP	--	--	--	--	--	--
Stream	--	0.60	0.60	--	--	--
SUBTOTAL	0.05	22.96	23.01	0.16	8.87	9.03
Rass 2						
572-N	--	0.67	0.67	1.11	1.43	2.54
572-SF	--	0.27	0.27	1.40	0.20	1.60
572-SP	--	--	--	0.03	--	0.03
SUBTOTAL	0.00	0.94	0.94	2.54	1.63	4.17

(Continued)

* All areas in acres.

Table E.6 (Concluded)

	Passive Remed. Action in Non-Wetland	Passive Remed. Action in Wetland	Total Passive Remediation	Active Remed. Action in Non-Wetland	Active Remed. Action in Wetland	Total Active Remediation
RASS 3						
573-Other-SP	--	--	--	--	--	--
573-Other-N	--	--	--	--	0.05	0.05
573-Other-SF	--	--	--	--	--	--
573-SP	--	--	--	--	--	--
573-N	--	0.01	0.01	0.02	2.89	2.91
573-SF	--	--	--	--	--	--
574-SP	--	--	--	0.31	--	0.31
574-N	0.05	0.32	0.37	0.50	0.55	1.05
574-SF	--	--	--	--	--	--
575-SP	--	--	--	--	--	--
575-N	--	--	--	0.09	0.11	0.20
575-SF	--	--	--	--	0.01	0.01
576-SF	0.01	--	0.01	0.08	0.01	0.09
576-N	0.02	--	0.02	--	0.01	0.01
576-SN	0.04	--	0.04	0.03	0.01	0.04
579D-Other-N	--	--	--	--	--	--
579D-N	0.54	--	0.54	Trace	Trace	Trace
579D-SN	0.04	--	0.04	--	0.01	0.01
579D-CP	--	--	--	--	--	--
579D-CP-SN	0.02	--	0.02	Trace	--	Trace
SUBTOTAL	0.66	0.33	1.05	1.03	3.65	4.68
RASS 4						
581-N	0.09	0.01	0.10	0.63	0.24	0.87
581-N-Other-N	--	0.01	0.01	--	--	--
SUBTOTAL	0.09	0.05	0.11	0.63	0.24	0.87
TOTAL	0.80	24.25	25.11	4.36	14.39	18.75

Table 3.21

Summary of Remediation Area for Potential Criteria

	Area Exceeding Soil Metal Contents of Reference Area	Soil Metal Statistically Higher Than Reference Area	Soil Metal Content Exceed MASSA	Bioaccumulation of Metals in Plants & Animals	Area of Contamination	Exceeding STLC or TTLC Values	Barren Areas
Rass 1							
572 N	80.03	19.24	0.19	28.82	31.42	15.40	1.03
571 N	3.90	--	--	--	--	--	--
571 SF	0.45	--	--	0.02	0.02	--	--
571 SP	0.04	--	--	--	--	--	--
CC	--	--	--	--	--	--	--
CC SF	--	--	--	--	--	--	--
CC SP	--	--	--	--	--	--	--
Other N	0.01	--	--	0.01	0.01	--	--
Other SF	--	--	--	--	--	--	--
Other SP	--	--	--	--	--	--	--
Stream	0.99	--	--	0.60	0.60	--	--
SUBTOTAL	85.42	19.24	0.19	29.45	32.05	15.40	1.03
Rass 2							
572 N	9.21	1.61	1.80	1.84	1.99	2.33	0.67
572 SF	3.06	0.83	1.78	0.56	0.78	1.39	0.56
572 SP	0.31	--	--	--	--	0.03	--
SUBTOTAL	12.58	2.44	3.58	2.40	2.77	3.75	1.23

(Continued)

Table 3.21 (Concluded)

	Area Exceeding Soil Metal Contents of Reference Area	Soil Metal Statistically Higher Than Reference Area	Soil Metal Content Exceed MASSA	Bioaccumulation of Metals in Plants & Animals	Area of Contamination	Exceeding STLC or TTLC Values	Barren Areas
RASS 3							
573 Other SP	0.04	--	--	--	--	--	--
573 Other N	0.66	Trace	--	0.02	0.02	--	--
573 Other SF	--	--	--	--	--	--	--
573 SP	0.36	--	0.50	--	--	--	--
573 N	3.57	2.87	0.17	2.08	2.92	0.34	--
573 SF	--	--	--	--	--	--	--
574 SP	0.48	0.31	0.50	--	0.31	0.09	--
574 N	1.06	1.05	0.88	0.95	1.41	1.28	--
574 SF	--	--	--	--	--	--	--
575 SP	0.14	--	0.13	Trace	--	--	--
575 N	1.12	0.20	1.72	Trace	0.20	0.09	--
575 SF	0.04	0.01	0.17	0.01	0.01	0.05	--
576 SF	0.10	0.08	0.09	0.02	0.10	0.04	--
576 N	0.01	0.01	Trace	0.01	0.01	--	--
576 SN	0.04	0.04	0.03	0.05	0.08	Trace	--
579D-Other-N	0.47	--	--	--	--	--	--
579D-N	0.54	0.01	0.14	0.54	0.54	Trace	--
579D-SN	0.03	Trace	--	0.05	0.05	0.01	--
579D-CP	--	--	--	--	--	--	--
579D-CP-SN	--	Trace	--	0.02	0.02	0.02	--
SUBTOTAL	8.66	4.58	4.33	3.75	5.67	1.92	--
RASS 4							
581-N	4.88	0.19	2.58	0.08	0.25	0.56	--
581-Other-N	0.43	Trace	--	Trace	Trace	--	--
SUBTOTAL	5.31	0.19	2.58	0.08	0.25	0.56	--
TOTAL	111.97	26.45	10.68	35.68	40.74	21.63	2.26

All values in acres.

Table 3.24

Remediation Area for Selected Decision Criteria

	Passive Remed. Action in Non-Wetland	Passive Remed. Action in Wetland	Total Passive Remediation	Active Remed. Action in Non-Wetland	Active Remed. Action in Wetland	Total Active Remediation
Rass 1						
572 N	0.05	22.27	22.32	0.16	8.87	9.03
571 N	--	0.06	0.06	--	--	--
571 SF	--	0.02	0.02	--	--	--
571 SP	--	--	--	--	--	--
CC	--	--	--	--	--	--
CC SF	--	--	--	--	--	--
CC SP	--	--	--	--	--	--
Other N	--	0.01	0.01	--	--	--
Other SF	--	--	--	--	--	--
Other SP	--	--	--	--	--	--
Stream	--	0.60	0.60	--	--	--
SUBTOTAL	0.05	22.96	23.01	0.16	8.87	9.03
Rass 2						
572 N	--	0.67	0.67	1.11	1.43	2.54
572 SF	--	0.27	0.27	1.40	0.20	1.60
572 SP	--	--	--	0.03	--	0.[illegible]3
SUBTOTAL	0.00	0.94	0.94	2.54	1.63	4.17

(Continued)

Table 3.24 (Concluded)

	Passive Remed. Action in Non-Wetland	Passive Remed. Action in Wetland	Total Passive Remediation	Active Remed. Action in Non-Wetland	Active Remed. Action in Wetland	Total Active Remediation
RASS 3						
573 Other SP	--	--	--	--	--	--
573 Other N	--	--	--	--	0.05	0.05
573 Other SF	--	--	--	--	--	--
573 SP	--	--	--	--	--	--
573 N	--	0.01	0.01	0.02	2.89	2.91
573 SF	--	--	--	--	--	--
574 SP	--	--	--	0.31	--	0.31
574 N	0.05	0.32	0.37	0.50	0.55	1.05
574 SF	--	--	--	--	--	--
575 SP	--	--	--	--	--	--
575 N	--	--	--	0.09	0.11	0.20
575 SF	--	--	--	--	0.01	0.01
576 SF	0.01	--	0.01	0.08	0.01	0.09
576 N	0.02	--	0.02	--	0.01	0.01
576 SN	0.04	--	0.04	0.03	0.01	0.04
579D-Other-N	--	--	--	--	--	--
579D-N	0.54	--	0.54	Trace	Trace	Trace
579D-SN	0.04	--	0.04	--	0.01	0.01
579D-CP	--	--	--	--	--	--
579D-CP-SN	0.02	--	0.02	Trace	--	Trace
SUBTOTAL	0.66	0.33	1.05	1.03	3.65	4.68
RASS 4						
581-N	0.09	0.01	0.10	0.63	0.24	0.87
581-N-Other-N	--	0.01	0.01	--	--	--
SUBTOTAL	0.09	0.05	0.11	0.63	0.24	0.87
TOTAL	0.80	24.25	25.11	4.36	14.39	18.75

All areas in acres.