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Attorneys for Plaintiff United States of America
(Attorneys for State of California - next page)

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

| | |
|---|---|
| UNITED STATES OF AMERICA and STATE OF CALIFORNIA, on Behalf of the STATE OF CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL,<br><br>Plaintiffs,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants.<br><br>AND CONSOLIDATED ACTIONS | Case Nos. C 84-6273 CW<br>C 84-6324 CW<br>C 85 4776 CW<br>C 96-2103 CW<br><br>NOTICE OF ENTRY OF FIVE CONSENT DECREES |

NOTICE OF ENTRY

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ORIGINAL
FILED
JUL 19 1996
RICHARD W. WIEKING
CLERK, U.S. DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
OAKLAND

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

| | |
|---|---|
| UNITED STATES OF AMERICA,<br><br>Plaintiff,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants.<br><br>AND RELATED ACTIONS | NO. C 84-6273 CW (Consolidated)<br><br>CONSENT DECREE<br>[MONTROSE GROUP RD/RA] |

ENTERED IN CIVIL DOCKET JUL 19 1996

113. Each Settling Defendant hereby agrees not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States has notified the Settling Defendants in writing that it no longer supports entry of the Consent Decree; provided, however, that this Consent Decree shall become voidable at the option of any Party if it is not approved by the Court by August 1, 1996.

114. Each Settling Defendant shall identify, on the attached signature page, the name, address and telephone number of an agent who is authorized to accept service of process by mail on behalf of that Party with respect to all matters arising under or relating to this Consent Decree. Settling Defendants hereby agree to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons.

SO ORDERED THIS 19th DAY OF July, 1996.

CLAUDIA WILKEN

United States District Judge
CLAUDIA WILKEN

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Assistant Attorney General
Environment & Natural Resources Division
United States Department of Justice

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NORTHERN DISTRICT OF CALIFORNIA
OAKLAND

UNITED STATES DISTRICT COURT

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| UNITED STATES OF AMERICA,<br><br>Plaintiff,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants.<br><br>AND RELATED ACTIONS | NO. C 84-6273 CW (Consolidated)<br><br>CONSENT DECREE<br>[LEVIN GROUP RD/RA] |

JUL 19 1996

ENTERED IN CIVIL DOCKET 19

Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons.

SO ORDERED THIS 19th DAY OF July, 1996.

CLAUDIA WILKEN

United States District Judge
CLAUDIA WILKEN

LOIS J. SCHIFFER
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JUL 19 1996

RICHARD W. WIEKING
CLERK, U.S. DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
OAKLAND

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

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| UNITED STATES OF AMERICA,<br><br>Plaintiff,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants.<br><br>AND RELATED ACTIONS | NO. C 84-6273 CW (Consolidated)<br><br>CONSENT DECREE<br>[Parr Group] |

JUL 19 1996

ENTERED IN CIVIL DOCKET _____ 19 _____

their intent to so move. Termination of this Decree shall not affect the provisions herein for contribution protection, document retention, the covenants not to sue and reservations of rights, which shall remain in effect as an agreement among the Parties.

40. The following Appendices are attached to and incorporated into this Consent Decree:

"Appendix A is a complete list of the Montrose Group.

"Appendix B" is the map of the land portion of the Site.

"Appendix C" is the map of the marine portion of the Site.

"Appendix D" is the ROD.

COUNTERPARTS

41. This Decree may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument.

ORDER

THE FOREGOING Consent Decree is hereby APPROVED. There being no just reason for delay, this Court expressly directs, pursuant to Rule 54(b), Federal Rules of Civil Procedure, ENTRY OF FINAL JUDGMENT in accordance with the terms of this Consent Decree this 19th DAY of July, 1996, each party to bear its own costs and attorney's fees, except as specifically provided herein.

CLAUDIA WILKEN

United States District Judge
CLAUDIA WILKEN

LOIS J. SCHIFFER
Assistant Attorney General
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JUL 19 1996
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OAKLAND

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

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| UNITED STATES OF AMERICA,<br><br>Plaintiff,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants.<br><br>AND RELATED ACTIONS | NO. C 84-6273 CW (Consolidated)<br><br>CONSENT DECREE<br>[Miscellaneous Defendants Group] |

JUL 19 1996
ENTERED IN CIVIL DOCKET _____ 19__

provisions herein for contribution protection, document retention, the covenants not to sue and reservations of rights, which shall remain in effect as an agreement among the Parties.

45. The following appendices are attached to and incorporated into this Consent Decree:

"Appendix A" is the complete list of the Miscellaneous Group Settling Defendants.

"Appendix B" is the complete list of the Montrose Group.

"Appendix C" is the map of the land portion of the Site.

"Appendix D" is the map of the marine portion of the Site.

"Appendix E" is the ROD.

COUNTERPARTS

46. This Decree may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument.

ORDER

THE FOREGOING Consent Decree is hereby APPROVED. There being no just reason for delay, this Court expressly directs, pursuant to Rule 54(b), Federal Rules of Civil Procedure, ENTRY OF FINAL JUDGMENT in accordance with the terms of this Consent Decree this 19th DAY of July, 1996, each party to bear its own costs and attorney's fees, except as specifically provided herein.

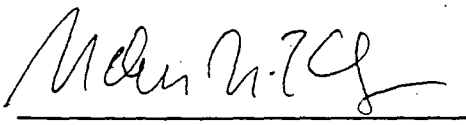
CLAUDIA WILKEN

United States District Judge
CLAUDIA WILKEN

PLEASE TAKE NOTICE that, on July 19, 1996, the Court entered all five of the consent decrees lodged with the Court by the State of California, on behalf of the Department of Toxic Substances Control, and the United States of America. Attached are copies from the federal decrees of the cover pages and the pages on which the Court's order appears. (Attorneys for the State of California, on behalf of the Department of Toxic Substances Control, will separately send to the parties copies of such pages from the state consent decree.)

Dated: July 23, 1996

Respectfully Submitted,



HELEN H. KANG
Environmental Enforcement Section
Environmental & Natural Resources Division
United States Department of Justice

CERTIFICATE OF SERVICE BY MAIL

I, Sharon Cipparrone, hereby certify and declare:

1. I am over the age of 18 years and am not a party to this case.

2. My business address is 301 Howard Street, Suite 870, San Francisco, California 94105.

3. I am familiar with my employer's mail collection and processing practices; know that said mail is collected and deposited with the United States Postal Service on the same day it is deposited in interoffice mail; and know that postage thereon is fully prepaid.

4. Following said practice, on July 23, 1996, I served a true copy of the document(s) entitled:

NOTICE OF ENTRY OF FIVE CONSENT DECREES

by placing it in an addressed sealed envelope with postage fully prepaid, and depositing it in regularly maintained interoffice mail to all counsel of record.

I declare under the penalty of perjury that the foregoing is true and correct.

Executed on July 23, 1996 at San Francisco, California.

Sharon Cipparrone

SHARON CIPPARRONE

CD 01

Consent Decree

Montrose Group RD/RA

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Assistant Attorney General
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United States Department of Justice

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Attorneys for Plaintiff United States of America

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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

| | |
|---|---|
| UNITED STATES OF AMERICA,<br><br>Plaintiff,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants.<br><br>AND RELATED ACTIONS | NO.<br><br>CONSENT DECREE<br>[MONTROSE GROUP RD/RA] |

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This Consent Decree ("Decree") is made and entered into by and among the United States of America (the "United States"), on behalf of the Environmental Protection Agency, National Oceanic and Atmospheric Administration, the Department of the Interior and the Settling Federal Agencies; and the Settling Defendants.

## I. BACKGROUND

A. The United States, on behalf of the Administrator of the Environmental Protection Agency ("EPA"), the Secretary of Commerce and the Secretary of the Interior, has filed a civil action for recovery of response costs and natural resource damages, and for injunctive and declaratory relief, pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606, 9607, with respect to releases of hazardous substances from a former pesticide formulating and packaging facility now known as the United Heckathorn NPL Site in the City of Richmond, County of Contra Costa, State of California.

B. Several related actions are pending in this Court arising out of the release or threat of release of hazardous substances from the Site, namely Levin Metals Corporation v. Parr-Richmond Terminal Co. and related actions ("Private Party Litigation"), Case Nos. C 84 6273; C 84 6324; and C 85 4776. The Honorable Claudia Wilken ordered the parties in the Private Party Litigation, and invited EPA, to engage in mediation to attempt to achieve a global settlement. From October 1994 through January 1995, EPA and the private litigants participated in alternative dispute resolution mediated by Judge Coleman Fannin (Ret.) and

Lester Levy. This mediation process involved sustained, vigorous and substantial negotiation among the parties. As a result of the mediation and subsequent negotiations, the United States has reached four interdependent settlement agreements with regard to the Site (the "Four Decrees"), including this Decree.

C. Settlement funds generated from the Four Decrees will fund the Marine Remedial Action and, to the extent funds remain after completion of such work, will reimburse the United States' Past, Interim and Future Response Costs. Certain sums are also being paid to the federal natural resource trustees to compromise disputed claims regarding alleged injuries to natural resources at the Site.

D. In accordance with the National Contingency Plan ("NCP") and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of California (the "State") of negotiations with potentially responsible parties regarding the implementation of the remedial design and remedial action for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and be a party to this Consent Decree.

E. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the federal natural resource trustees, the Department of the Interior and National Oceanic and Atmospheric Administration, (jointly, the "Trustees"), of negotiations with potentially responsible parties regarding the release of hazardous substances that may have resulted in injury to the natural resources under federal trusteeship.

F. The defendants that have entered into this Consent Decree ("Settling Defendants") do not admit any liability to the Plaintiff arising out of the transactions or occurrences alleged in the complaint, do not admit that the release or threatened release of hazardous substances at or from the Site constitutes an imminent or substantial endangerment to the public health or welfare or the environment, and do not admit that any injury to natural resources has occurred as a result of such releases at the Site. The United States on behalf of the Settling Federal Agencies does not admit any liability arising out of the transactions or occurrences alleged in any third party complaint asserted by the parties to the Private Party Litigation, including Settling Defendants.

G. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on March 14, 1990, 55 Fed. Reg. 9,688.

H. In response to a release or a substantial threat of a release of hazardous substances at or from the Site, EPA commenced a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. § 300.430. EPA completed a Remedial Investigation ("RI") Report in February 1994, and EPA completed a Feasibility Study ("FS") Report on July 5, 1994.

I. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action on July 15, 1994, in a major local

newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

J. The decision by EPA on the remedial action to be implemented at the Site is embodied in a final Record of Decision ("ROD"), executed on October 26, 1994, on which the State has given its concurrence. The ROD includes a responsiveness summary to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA.

K. Based on the information presently available to it, EPA believes that the Work will be properly and promptly conducted by the Settling Defendants if conducted in accordance with the requirements of this Consent Decree and its appendices.

L. Solely for the purposes of Section 113(j) of CERCLA, the Remedial Action selected by the ROD and the Work to be performed by the Settling Defendants shall constitute a response action taken or ordered by the President.

M. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and implementation of this Consent Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby Ordered, Adjudged, and Decreed:

## II. JURISDICTION

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9606, 9607, and 9613(b), and personal jurisdiction over the Settling Defendants. The Parties will not challenge the terms of this Decree, the venue in this District or this Court's jurisdiction to enter and enforce this Decree.

## III. PARTIES BOUND

2. This Consent Decree applies to and is binding upon the United States and upon Settling Defendants and their successors and assigns. Any change in ownership or corporate status of a Settling Defendant including, but not limited to, any transfer of assets or real or personal property, shall in no way alter such Settling Defendant's responsibilities under this Consent Decree.

3. Settling Defendants shall provide a copy of this Consent Decree to each contractor hired to perform the Work (as defined below) required by this Consent Decree and to each person representing any Settling Defendant with respect to the Site or the Work and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. Settling Defendants or their contractors shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Settling Defendants shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work contemplated herein in accordance

with this Consent Decree. With regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with the Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

## IV. CONDITION PRECEDENT

4. This Decree will be effective to bind the Parties only upon entry by this Court of all Four Decrees, which terms were negotiated as described in Paragraph B (Introduction) above and which are contemplated for simultaneous lodging with and entry by the Court.

## V. DEFINITIONS

5. Unless otherwise expressly provided herein, terms used in this Consent Decree which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

"Consent Decree" shall mean this Decree and all appendices attached hereto (listed in Section XXX). In the event of conflict between this Decree and any appendix, this Decree shall control.

"Damage Assessment Costs" shall mean NOAA's and DOI's costs

incurred in connection with activities and studies performed to determine injury to or loss of natural resources, including lost interim uses, resulting from releases of hazardous substances from the United Heckathorn NPL Site.

"Day" shall mean a calendar day unless expressly stated to be a working day. "Working day" shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

"DOI" shall mean the United States Department of the Interior and any successor departments, agencies or instrumentalities of the United States.

"EPA" shall mean the United States Environmental Protection Agency and any successor departments, agencies or instrumentalities of the United States.

"Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States, excluding the Settling Federal Agencies, incurs after August 15, 1996 in connection with the Site, including, but not limited to, performing marine monitoring for at least five (5) years to determine the effectiveness of the remedy selected in the ROD, reviewing or developing plans, reports and other items pursuant to the Four Decrees, verifying or overseeing the Work or the Levin Group Work, or otherwise implementing, overseeing, or enforcing the Four Decrees, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs,

the costs incurred pursuant to Sections VIII and IX (including, but not limited to, attorney's fees and any monies paid to secure access and/or to secure institutional controls, including the amount of just compensation), plus Interest on all such costs.

"Interest" shall mean interest accruing at the rate specified for interest on investments of the Hazardous Substance Superfund established under Subchapter A of Chapter 98 of Title 26 of the U.S. Code, compounded on October 1 of each year, in accordance with 42 U.S.C. § 9607(a).

"Interim Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs paid by the United States in connection with the Site that are not Past or Future Response Costs, plus Interest on all such costs.

"Levin Group" shall mean Levin Enterprises, Inc. and Levin Richmond Terminal, Inc.

"Marine Remedial Action" shall mean those activities to be undertaken by the Settling Defendants to implement the attached SOW and the final Remedial Design/Remedial Action Work Plan (Appendix C) and other plans approved by EPA.

"Marine Response Costs" shall mean all expenses, fees and costs that must be paid by Settling Defendants that are recoverable under Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613. Examples of "Marine Response Costs" include but are not limited to:

- a payment to EPA for Interim Response Costs, as provided in Paragraph 37;

- costs to identify and select consultants/contractors to implement the Work required by this Consent Decree;

- costs of consultants/contractors to implement the Work required by this Consent Decree;

- costs of consultants/contractors to meet with EPA and or State agencies as required to, inter alia, finalize documents, discuss the Marine Remedial Action, project status and schedule;

- costs of consultants/contractors for development and finalization of documents, work plans, and reports required by this Consent Decree;

- any costs of an escrow agent to administer the United Heckathorn Site Escrow;

- fees and taxes that Settling Defendants must pay to remove Waste Material from the Site and dispose of it in a licensed landfill elsewhere.

Marine Response Costs shall not include:

- any legal fees incurred by the Settling Defendants;

- any costs of the Settling Defendants to communicate between themselves or costs of the Settling Defendants incurred for internal organizational purposes;

- any civil penalties assessed against the Settling Defendants.

"Miscellaneous Defendants Group" shall mean that group of defendants which has made certain agreements for payment to the United States, in a related Consent Decree to be lodged simultaneously with this Decree in this matter. The Miscellaneous Defendants Group is specifically identified in Appendix F hereto.

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

"Natural Resource Damages" shall mean damages, including

Damage Assessment Costs and lost use value, recoverable under Section 107 of CERCLA, 42 U.S.C. § 9607, for injury to, destruction of, or loss of any and all Natural Resources at the United Heckathorn Site.

"Natural Resources" shall have the meaning provided in Section 101(16) of CERCLA, 42 U.S.C. § 9601(16).

"NOAA" shall mean the National Oceanic and Atmospheric Administration, an agency of the United States Department of Commerce, and any successor departments, agencies or instrumentalities of the United States.

"Notice of Completion of Work" shall mean that notice the Settling Defendants shall give in accordance with Paragraph 50.a, when Settling Defendants conclude that the Work has been fully performed.

"Other Parties" as used in Paragraph 41 shall mean the Levin, Parr and Miscellaneous Defendants Groups.

"Paragraph" shall mean a portion of this Consent Decree identified by an arabic numeral or an upper case letter.

"Parr Group" shall mean that group of defendants which has made certain agreements for payment to the United States, in a related Consent Decree to be lodged simultaneously with this Decree in this matter. The Parr Group is specifically identified in Appendix F hereto.

"Parties" shall mean the United States and the Settling Defendants.

"Past Response Costs" shall mean the costs the United States paid in connection with the Site through April 30, 1994, in the

amount of $2,693,428.22, as reflected in the August 30, 1994 cost summary provided to Settling Defendants, plus all Interest on such costs that has accrued pursuant to 42 U.S.C. § 9607(a) through April 30, 1994.

"Performance Standards" shall mean the dredging of young bay mud from the Lauritzen Channel and the Parr Canal in accordance with the terms of this Decree, the Statement of Work and the approved final remedial design (including, but not limited to, the RD/RA Work Plan and the Dredging Plan attached thereto), as verified by the Supervising Contractor and accepted by EPA.

"Plaintiff" shall mean the United States.

"RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

"Record of Decision" or "ROD" shall mean the EPA Record of Decision relating to the Site signed on October 26, 1994 by the Regional Administrator, EPA Region IX, or her delegate, and all attachments thereto. The ROD is attached as Appendix A.

"Remedial Design" shall mean those activities to be undertaken by the Settling Defendants to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design/Remedial Action Work Plan.

"Remedial Design/Remedial Action Work Plan" or "RD/RA" Work Plan shall mean the document attached as Appendix C, which is approved by EPA, and any amendments thereto, developed pursuant to Paragraph 11 that provides for design and implementation of the dredging remedy set forth in the ROD and for achievement of

the Performance Standards.

"Section" shall mean a portion of this Consent Decree identified by a roman numeral.

"Settling Defendants" shall mean Montrose Chemical Corporation of California, Inc., Rhone Poulenc, Inc., Stauffer Management Company and Chris-Craft Industries, Inc.

"Settling Federal Agencies" shall mean the General Services Administration and the Agency for International Development, and any successor departments, agencies or instrumentalities of the United States.

"Site" or the "United Heckathorn NPL Site" shall mean: the northern half of the Levin Richmond Terminal property bounded by the Lauritzen Channel, Cutting Boulevard, and South Fourth Street in Richmond, California, depicted as a cross-hatched area in the map attached as Appendix D hereto; and the Lauritzen Channel, the Santa Fe Channel, the Parr Canal and the Richmond Inner Harbor Channel, all as depicted in Appendix E hereto.

"State" shall mean the State of California.

"Statement of Work" or "SOW" shall mean the statement of work for implementation of the Remedial Design and Remedial Action at the Site, as set forth in Appendix B to this Consent Decree and any modifications made in accordance with this Consent Decree.

"Supervising Contractor" shall mean the principal contractor retained by the Settling Defendants to supervise and direct the implementation of the Work under this Consent Decree.

"United States" shall mean the United States of America, including its agencies, departments and instrumentalities.

"Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33), 42 U.S.C. § 9601(33); (3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and (4) any "hazardous waste" under 22 Cal. Code of Regulations Section 66600 et seq..

"Work" shall mean all activities Settling Defendants are required to perform under this Consent Decree, except those required by Section XXVI (Retention of Records).

## VI. GENERAL PROVISIONS

### 6. Objectives of the Parties

The objectives of the Parties in entering into this Consent Decree are to protect public health or welfare or the environment at the Site by the design and implementation of EPA-selected response actions at the Site by the Settling Defendants; to reimburse response costs of the Plaintiff; to pay Natural Resource Damages to federal natural resource Trustees and to resolve cost recovery claims, contribution claims, counterclaims or claims in recoupment against the United States. Settling Defendants enter into this Consent Decree to compromise disputed claims.

### 7. Commitments by Settling Defendants

a. Settling Defendants shall finance and perform the Work consistent with the ROD and in accordance with this Consent Decree, the SOW, and the RD/RA Work Plan, and all other plans, standards, specifications, and schedules set forth herein or developed by Settling Defendants and approved by EPA pursuant to

this Consent Decree. Settling Defendants shall also reimburse the United States, excluding the Settling Federal Agencies, for response costs as provided in this Consent Decree.

b. The obligations of Settling Defendants to finance and perform the Work and to pay amounts owed the United States under this Consent Decree are joint and several. In the event of the insolvency or other failure of any one or more Settling Defendants to implement the requirements of this Consent Decree, the remaining Settling Defendants shall complete all such requirements.

8. Compliance With Applicable Law

All activities undertaken by Settling Defendants to implement the SOW pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Settling Defendants must also comply with all applicable or relevant and appropriate requirements of all Federal and state environmental laws as set forth in the ROD and the SOW. The activities conducted pursuant to this Consent Decree, if approved by EPA, shall be considered to be consistent with the NCP.

9. Permits

a. As provided in Section 121(e) of CERCLA and Section 300.400(e) of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site (i.e., within the areal extent of contamination or in very close proximity to the contamination and necessary for implementation of the Work). Where any portion of the Work that is not on-site requires a

federal or state permit or approval, Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. The Settling Defendants may seek relief under the provisions of Section XVIII (Force Majeure) of this Consent Decree for any delay in the performance of the Work resulting from a failure to obtain, or a delay in obtaining, any permit required for the Work.

c. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

## VII. PERFORMANCE OF THE WORK BY SETTLING DEFENDANTS

### 10. Selection of Supervising Contractor.

a. All aspects of the Work to be performed by Settling Defendants pursuant to Sections VII (Performance of the Work by Settling Defendants), VIII (Remedy Review), and XVI (Emergency Response) of this Consent Decree shall be under the direction and supervision of the Supervising Contractor, the selection of which shall be subject to disapproval by EPA. Settling Defendants have notified EPA in writing that Chemical Waste Management, Inc. is the Supervising Contractor, and EPA has approved of Settling Defendants' proposal. If at any time thereafter, Settling Defendants propose to change a Supervising Contractor, Settling Defendants shall give such notice to EPA and must obtain an authorization to proceed from EPA before the new Supervising Contractor performs, directs, or supervises any Work under this Consent Decree.

b. In the event EPA has notified Settling Defendants that it disapproves a proposed Supervising Contractor, Settling Defendants shall submit to EPA a list of contractors, including the qualifications of each contractor, that would be acceptable to them within 10 days of receipt of EPA's disapproval of the contractor previously proposed. Within 10 days thereof, EPA will provide written notice of the names of any contractors that it disapproves and an authorization to proceed with respect to any of the other contractors. Settling Defendants may select any contractor from that list that is not disapproved and shall notify EPA of the name of the contractor selected within 5 days of EPA's authorization to proceed.

c. If EPA fails to provide written notice of its authorization to proceed or disapproval as provided in this Paragraph and this failure prevents the Settling Defendants from meeting one or more deadlines in a plan approved by the EPA pursuant to this Consent Decree, Settling Defendants may seek relief under the provisions of Section XVIII (Force Majeure) hereof.

11. Remedial Design/Remedial Action Work Plan.

a. The RD/RA Work Plan (Appendix C) is incorporated into and is enforceable under this Consent Decree. Within fourteen (14) days after entry of the Four Decrees, Settling Defendants shall submit to EPA a Health and Safety Plan for field activities required by the RD/RA Work Plan which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

b. The RD/RA Work Plan includes plans and schedules for implementation of all remedial design and remedial action tasks identified in the SOW, including, but not limited to, plans and schedules for the completion of: (1) a preliminary design submittal; (2) a pre-final/final design submittal; (3) a Construction Quality Assurance Project Plan; (4) the schedule for completion of the Remedial Action; (5) methodology for implementation of the Construction Quality Assurance Project Plan; (6) methods for satisfying all regulatory requirements; (7) methodology for implementation of the Contingency Plan; and (8) procedures and plans for the decontamination of equipment and the disposal of contaminated materials. The RD/RA Work Plan also includes a schedule for implementation of all Marine Remedial Action tasks identified in the final design submittal and identifies the initial formulation of the Settling Defendants' Marine Remedial Action Project Team (including, but not limited to, the Supervising Contractor).

c. Upon submittal of the Health and Safety Plan for all field activities to EPA, Settling Defendants shall implement the RD/RA Work Plan. The Settling Defendants shall submit to EPA all plans, submittals and other deliverables required under the approved RD/RA Work Plan in accordance with the approved schedule for review and approval pursuant to Section XI (EPA Approval of Plans and Other Submissions).

12. The Settling Defendants shall continue to implement the Marine Remedial Action until the Performance Standards are achieved and for so long thereafter as is otherwise required

under this Consent Decree.

13. Modification of the SOW or Related Work Plans.

a. If EPA determines that modification to the work specified in the SOW and/or in work plans developed pursuant to the SOW is necessary to carry out and maintain the effectiveness of the remedy set forth in the ROD, EPA may require that such modification be incorporated in the SOW and/or such work plans. A modification may only be required pursuant to this Paragraph to the extent that it is consistent with the scope of the remedy selected in the ROD.

b. For the purposes of this Paragraph 13 and Paragraph 50 of this Decree only, the "scope of the remedy selected in the ROD" is: dredging of young bay mud from the Lauritzen Channel and Parr Canal, with offsite disposal of dredged material and placement of clean fill after dredging.

c. If Settling Defendants object to any modification determined by EPA to be necessary pursuant to this Paragraph, they may seek dispute resolution pursuant to Section XIX (Dispute Resolution), Paragraph 63 (Record Review). The SOW and/or related work plans shall be modified in accordance with final resolution of the dispute.

d. Settling Defendants shall implement any work required by any modifications incorporated in the SOW and/or in work plans developed pursuant to the SOW in accordance with this Paragraph.

e. Nothing in this Paragraph shall be construed to limit EPA's authority to order or require performance of further

response actions as otherwise provided in this Consent Decree.

14. Settling Defendants acknowledge and agree that nothing in this Consent Decree, the SOW, or the Remedial Design or Remedial Action Work Plans constitutes a warranty or representation of any kind by Plaintiff that compliance with the work requirements set forth in the SOW and the Work Plans will achieve the Performance Standards.

15. Settling Defendants shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator of such shipment of Waste Material. However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

a. The Settling Defendants shall include in the written notification the following information, where available: (1) the name and location of the facility to which the Waste Material is to be shipped; (2) the type and quantity of the Waste Material to be shipped; (3) the expected schedule for the shipment of the Waste Material; and (4) the method of transportation. The Settling Defendants shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

b. The identity of the receiving facility and state will be determined by the Settling Defendants following entering into a contract for Marine Remedial Action implementation. The Settling Defendants shall provide the information required by Paragraph 15.a as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

## VIII. REMEDY REVIEW

16. EPA Selection of Further Response Actions. If EPA determines, at any time, that the Remedial Action is not protective of human health and the environment, EPA may select further response actions for the Site in accordance with the requirements of CERCLA and the NCP.

17. Opportunity To Comment. Settling Defendants and, if required by Sections 113(k)(2) or 117 of CERCLA, the public, will be provided with an opportunity to comment on any further response actions proposed by EPA as a result of the review conducted pursuant to Section 121(c) of CERCLA and to submit written comments for the record during the comment period.

## IX. ACCESS

18. To the extent that access to offsite property is required for the implementation of the Work, Settling Defendants shall use best efforts to secure from persons who own or control the property access for Settling Defendants, as well as for the United States and its representatives, including, but not limited to, their contractors, as necessary to effectuate this Consent Decree. For purposes of this Paragraph "best efforts" includes the payment of reasonable sums of money in consideration of

access. If any access required to complete the Work is not obtained by May 31, 1996, Settling Defendants shall promptly notify the United States in writing, and shall include in that notification a summary of the steps Settling Defendants have taken to attempt to obtain access. The United States may, as it deems appropriate, assist Settling Defendants in obtaining access. Any costs the United States incurs in obtaining access, including attorney's fees, shall be considered oversight costs.

19. Notwithstanding any provision of this Consent Decree, the United States retains all of its access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable statute or regulations.

## X. REPORTING REQUIREMENTS

20. In addition to any other requirement of this Consent Decree, Settling Defendants shall submit to EPA two (2) copies of written weekly progress reports that: (a) describe the actions which have been taken toward achieving compliance with this Consent Decree during the previous week (b) include a summary of all results of tests and all other data received or generated by Settling Defendants or their contractors or agents in the previous week; (c) identify all work plans, plans and other deliverables required by this Consent Decree completed and submitted during the previous week; (d) describe all actions, including, but not limited to, implementation of work plans, which are scheduled for the next four weeks and provide other information relating to the progress of work, including, but not limited to, critical path diagrams, Gantt charts and Pert charts;

(e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays; and (f) include any modifications to the work plans or other schedules that Settling Defendants have proposed to EPA or that have been approved by EPA. Settling Defendants shall submit these progress reports to EPA beginning 10 days after entry of the four Consent Decrees and continuing until the Notice of Completion is provided by the Settling Defendants pursuant to Paragraph 50(a). If requested by EPA, Settling Defendants shall also provide briefings for EPA discussing the progress of the Work.

21. The Settling Defendants shall notify EPA of any change in the schedule described in the monthly progress report for the performance of any activity, including, but not limited to, implementation of work plans, no later than seven days prior to the performance of the activity.

22. Upon the occurrence of any event during performance of the Work that Settling Defendants are required to report pursuant to Section 103 of CERCLA or Section 304 of the Emergency Planning and Community Right-to-know Act ("EPCRA"), Settling Defendants shall within 24 hours of the onset of such event orally notify the EPA Project Coordinator or the Alternate EPA Project Coordinator (in the event of the unavailability of the EPA Project Coordinator), or, in the event that neither the EPA Project Coordinator or Alternate EPA Project Coordinator is

available, the Emergency Response Section, Region IX, United States Environmental Protection Agency. These reporting requirements are in addition to the reporting required by CERCLA Section 103 or EPCRA Section 304.

23. Within 20 days of the onset of such an event, Settling Defendants shall furnish to Plaintiff a written report, signed by the Settling Defendants' Project Coordinator, setting forth the events which occurred and the measures taken, and to be taken, in response thereto. Within 30 days of the conclusion of such an event, Settling Defendants shall submit a report setting forth all actions taken in response thereto.

24. Settling Defendants shall submit two (2) copies of all plans, reports, and data required by the SOW, the RD/RA Work Plan, or any other approved plans to EPA in accordance with the schedules set forth in such plans.

25. All reports and other documents submitted by Settling Defendants to EPA (other than the weekly progress reports referred to above) which purport to document Settling Defendants' compliance with the terms of this Consent Decree shall be signed by an authorized representative of the Settling Defendants.

## XI. EPA APPROVAL OF PLANS AND OTHER SUBMISSIONS

26. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Consent Decree, EPA shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that

the Settling Defendants modify the submission; or (e) any combination of the above. However, EPA shall not modify a submission without first providing Settling Defendants at least one notice of deficiency and an opportunity to cure within seven (7) days, except where to do so would cause serious disruption to the Work or where previous submissions have been disapproved due to material defects and the deficiencies in the submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

27. In the event of approval, approval upon conditions, or modification by EPA, pursuant to Paragraph 26(a), (b), or (c), Settling Defendants shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA subject only to their right to invoke the Dispute Resolution procedures set forth in Section XIX (Dispute Resolution) with respect to the modifications or conditions made by EPA. In the event that EPA modifies the submission to cure the deficiencies pursuant to Paragraph 26(c) and the submission has a material defect, EPA retains its right to seek stipulated penalties, as provided in Section XX (Stipulated Penalties).

28. a. Upon receipt of a notice of disapproval pursuant to Paragraph 26(d), Settling Defendants shall, within seven (7) days or such other time as specifically provided herein, correct the deficiencies and resubmit the plan, report, or other item for approval. Any stipulated penalties applicable to the submission, as provided in Section XX, shall accrue during the 7-day period or otherwise specified period but shall not be payable unless the

resubmission is disapproved or modified due to a material defect as provided in Paragraphs 29 and 30.

b. Notwithstanding the receipt of a notice of disapproval pursuant to Paragraph 26(d), Settling Defendants shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not relieve Settling Defendants of any liability for stipulated penalties under Section XX (Stipulated Penalties).

29. In the event that a resubmitted plan, report or other item, or portion thereof, is disapproved by EPA, EPA may again require the Settling Defendants to correct the deficiencies, in accordance with the preceding Paragraphs. EPA also retains the right to modify or develop the plan, report or other item. Settling Defendants shall implement any such plan, report, or item as modified or developed by EPA, subject only to their right to invoke the procedures set forth in Section XIX (Dispute Resolution).

30. If upon resubmission, a plan, report, or item is disapproved or modified by EPA due to a material defect, Settling Defendants shall be deemed to have failed to submit such plan, report, or item timely and adequately unless the Settling Defendants invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution) and EPA's action is overturned pursuant to that Section. The provisions of Section XIX (Dispute Resolution) and Section XX (Stipulated Penalties) shall govern the implementation of the Work and accrual and payment of any

stipulated penalties during Dispute Resolution. If EPA's disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XX.

31. All plans, reports, and other items required to be submitted to EPA under this Consent Decree shall, upon approval or modification by EPA, be enforceable under this Consent Decree. In the event EPA approves or modifies a portion of a plan, report, or other item required to be submitted to EPA under this Consent Decree, the approved or modified portion shall be enforceable under this Consent Decree.

## XII. PROJECT COORDINATORS

32. The designated Project Coordinators and Alternate Project Coordinators are as follows:

For EPA:

Project Coordinator:

Andrew Lincoff
EPA Region IX
75 Hawthorne Street
San Francisco, CA 94105
(415) 744-2245

For Settling Defendants:

Project Coordinator:

Kerri Mullins
Waste Management Industrial Services
715 Comstock St.
Santa Clara, CA 95054
(408) 980-0343

If a Project Coordinator or Alternate Project Coordinator initially designated is changed, the identity of the successor

will be given to the other Parties at least 5 working days before the changes occur, unless impracticable, but in no event later than the actual day the change is made. The Settling Defendants' Project Coordinator shall be subject to disapproval by EPA and shall have the technical expertise sufficient to adequately oversee all aspects of the Work. The Settling Defendants' Project Coordinator shall not be an attorney for any of the Settling Defendants in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

33. EPA may designate other representatives, including, but not limited to, EPA employees, and federal contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. EPA's Project Coordinator and Alternate Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager ("RPM") and an On-Scene Coordinator ("OSC") by the National Contingency Plan, 40 C.F.R. Part 300. In addition, EPA's Project Coordinator or Alternate Project Coordinator shall have authority, consistent with the National Contingency Plan, to halt any Work required by this Consent Decree and to take any necessary response action when s/he determines that conditions at the Site constitute an emergency situation or may present an immediate threat to public health or welfare or the environment due to release or threatened release of Waste Material.

## XIII. ASSURANCE OF ABILITY TO COMPLETE WORK

34. By June 14, 1996, Settling Defendants shall establish and maintain financial security in the amount of $1 million in one or more of the following forms:

(a) A surety bond guaranteeing performance of the Work;

(b) One or more irrevocable letters of credit;

(c) A trust fund;

(d) A guarantee to perform the Work by one or more parent corporations or subsidiaries, or by one or more unrelated corporations that have a substantial business relationship with at least one of the Settling Defendants; or

(e) A demonstration that one or more of the Settling Defendants satisfy the requirements of 40 C.F.R. § 264.143(f).

35. If the Settling Defendants seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 34(d) of this Consent Decree, Settling Defendants shall demonstrate that the guarantor satisfies the requirements of 40 C.F.R. § 264.143(f). If Settling Defendants seek to demonstrate their ability to complete the Work by means of the financial test or the corporate guarantee pursuant to Paragraph 34(d) or (e), they shall resubmit sworn statements conveying the information required by 40 C.F.R. § 264.143(f) annually, on the anniversary of the effective date of this Consent Decree, until a Certification of Completion is issued. In the event that EPA determines at any time that the form of financial assurances provided pursuant to this Section is inadequate, Settling Defendants shall, within 30 days of receipt of notice of EPA's determination, obtain and present to EPA for

approval one of the other forms of financial assurance listed in Paragraph 34 of this Consent Decree. Settling Defendants' inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Consent Decree.

36. Settling Defendants may change the form of financial assurance provided under this Section at any time, upon notice to and approval by EPA, provided that the new form of assurance meets the requirements of this Section. In the event of a dispute, Settling Defendants may change the form of the financial assurance only in accordance with the final administrative or judicial decision resolving the dispute.

## XIV. REIMBURSEMENT OF RESPONSE COSTS AND ESTABLISHMENT OF, AND USE OF MONIES IN, THE UNITED HECKATHORN SITE ESCROW

37. Within 10 days after entry of the last of the Four Decrees, Settling Defendants will cause to be paid, as set out in the Escrow Agreement, to the EPA Hazardous Substance Superfund Account $75,000, in reimbursement of EPA's Interim Response Costs, by FedWire Electronic Funds Transfer to the U.S. Department of Justice account in accordance with current electronic funds transfer procedures, referencing U.S.A.O. file number 9600022, EPA Region 9 and Site/Spill ID #09R3, and DOJ case number 90-11-3-598. Payment shall be made in accordance with instructions provided to the Settling Defendants by the Financial Litigation Unit of the United States Attorney's Office for the Northern District of California, following lodging of this Decree. Settling Defendants shall send notice that such

payment has been made to the United States as specified in Section XXVII (Notices and Submissions) and to David Wood, Chief, Cost Accounting, EPA Region 9, 75 Hawthorne Street, San Francisco, CA 94105.

38. On or before May 21, 1996, Montrose Chemical Corporation of California shall sign and execute the Escrow Agreement in the same form as set forth in Appendix G, establishing the United Heckathorn Site Escrow (the "Escrow"), and shall provide a copy of the same to EPA within seven (7) business days thereafter. The Escrow shall include three accounts designated the "United Heckathorn Escrow Account," the "Montrose Escrow Account," and the "Shell Escrow Account." The Settling Defendants shall deposit $2,400,000 into the United Heckathorn Escrow Account within 17 days of the execution of the Escrow Agreement. The funds in the Escrow shall only be used only to pay for the Marine Response Costs, except as otherwise provided in Paragraph 47 (Termination of the Escrow) of this Consent Decree.

39. Settling Defendants shall be solely responsible for any costs incurred in drafting documentation for the United Heckathorn Site Escrow and negotiating fees with the Escrow Agent.

40. On or before June 13, 1996, Montrose Chemical Corporation of California, acting for Settling Defendants, shall provide to the United States copies of a fully executed Escrow Agreement, the correspondence that establishes and funds the Escrow, and a bank statement showing the initial balance of the Escrow Account. Thereafter, if requested to do so by the United States, Settling

Defendants shall provide all other documentation concerning the Escrow Account.

41. Within 10 days after entry of this Decree, pursuant to other consent decrees negotiated in this action, certain of the Other Parties will have deposited a total of $6,100,000 into the United Heckathorn Escrow Account. If the full amount of $6,100,000 is not deposited in the United Heckathorn Escrow Account within 10 days after entry of this Decree, this Consent Decree is voidable at the option of any Settling Defendant.

42. Settling Defendants' failure to establish and deposit $2,400,000 into the United Heckathorn Escrow Account of the United Heckathorn Site Escrow by June 7, 1996 shall constitute a material default, for which this Decree may be voidable by the United States.

43. Cost Estimates. Within three (3) days of learning from the Supervising Contractor or from any other source that the Marine Response Costs are expected to exceed each of the following amounts, the Montrose Group shall provide to EPA and Shell Oil Company a complete cost estimate and any explanations thereof, certified by the Supervising Contractor:

8.1 million
8.6 million
9.4 million

The certification shall be signed by the Supervising Contractor's authorized employee and shall be in the following form:

> "To my knowledge and belief, the attached cost estimates are for Marine Response Costs, as defined in the Montrose Group Consent Decree, and is for work that must be performed to carry out the terms of that Decree and the RD/RA Work Plan for the Marine Response Action."

44. Within 10 days after EPA's receipt of the Supervising Contractor's cost estimate certifying that Marine Response Costs are expected to exceed $8.1 million, EPA shall, pursuant to the terms of the Miscellaneous Defendants Group Consent Decree to be lodged in this action, obtain $500,000.00 from Shell Oil Company for deposit into the Shell Escrow Account. If Shell fails to deposit $500,000 into the Shell Escrow Account in this 10 day period, the Escrow Agent for the United Heckathorn Site Escrow may draw upon the $500,000 letter of credit established by Shell pursuant to Paragraph 13 of the Miscellaneous Defendants Group Consent Decree.

45. After entry of this Decree, the Escrow Agent may disburse the following amounts in the following order to pay for Marine Response Costs in accordance with the Escrow Agreement and this Consent Decree:

a. The first $7,900,000 in Marine Response Costs shall be paid from the United Heckathorn Escrow Account, with the first $75,000 being paid to the EPA Hazardous Substance Superfund Account pursuant to Paragraph 37.

b. The next $200,000 in Marine Response Costs shall be paid from the Montrose Escrow Account.

c. The next $500,000 in Marine Response Costs shall be paid from the Shell Escrow Account.

d. The next $800,000 in Marine Response Costs shall be paid from the Montrose Escrow Account.

e. The next $1,200,000 in Marine Response Costs shall be paid in equal amounts, dollar for dollar, from the United

Heckathorn Escrow Account and the Montrose Escrow Account.

46. In the event the Marine Response Costs exceed $10.6 million, Settling Defendants shall be responsible for any and all additional funding required to complete the Work. This Paragraph does not constitute any waiver by any Settling Defendant of its rights to seek contribution from any other party responsible for the Site.

47. Termination of the Escrow. The United Heckathorn Site Escrow shall be terminated within 100 days of the issuance of a Certification of Completion. However, if there is a dispute concerning the Marine Response Costs pursuant to Paragraph 49(e) 100 days following the issuance of a Certificate of Completion, the United Heckathorn Site Escrow shall be terminated within 10 days of the conclusion of the dispute resolution process as set out in Section XIX (Dispute Resolution). Any funds remaining in the Escrow shall be disbursed as follows:

a. Any amounts remaining in the United Heckathorn Escrow Account, and any interest earned on amounts held or previously held in the United Heckathorn Escrow Account, to the EPA Hazardous Substance Superfund in reimbursement of Past, Interim and Future Response Costs, by FedWire Electronic Funds Transfer to the U.S. Department of Justice account in accordance with current electronic funds transfer procedures, referencing U.S.A.O. file number 9600022, EPA Region 9 and Site/Spill ID #09R3, and DOJ Case Number 90-11-3-598. The transfer shall be made in accordance with instructions provided to the Settling Defendants by the Financial Litigation Unit of the United States

Attorney's Office for the Northern District of California, following termination of the Escrow.

b. All sums remaining in the Shell Account, and any interest earned on amounts held or previously held on sums in the Shell Escrow Account, to Shell Oil Company at: Randy Heldt, Esq., Shell Oil Company, One Shell Plaza, P.O. Box 2463, Houston, TX 77252.

c. All remaining funds in the Montrose Escrow Account, including any interest earned on sums held or previously held in the Montrose Escrow Account shall be transferred to Montrose Chemical Corporation of California, as provided in the Escrow Agreement.

48. Notwithstanding any provision of the Escrow Agreement or nonperformance by any party thereto, the Settling Defendants shall be responsible for complying with this Consent Decree.

49. Reconciliation of Costs and Resolution of Disputes.

a. Submittal of Documentation. Within 10 days after Notice of Completion is given, Settling Defendants shall submit the following documentation or information ("Marine Response Costs Documentation") to EPA:

(i) a certification by an authorized employee of a Settling Defendant stating:

"To my knowledge and belief after consulting with the Supervising Contractor, all of the costs referenced in the attached invoices and statements are Marine Response Costs, as defined in the United Heckathorn Consent Decree. The costs have been paid in full from the United Heckathorn Site Escrow";

and

(ii) a complete and itemized description of the nature, location, purpose and scope of all work performed and all of the costs incurred, along with such documentation as may be necessary, to enable EPA to determine that the costs are response costs under the Consent Decree. Contractor invoices or construction progress payment certificates with sufficient detail may be used to satisfy this requirement.

b. Disbursement of funds from the Escrow to the Supervising Contractor shall not be construed to mean that the costs paid were in fact or law Marine Response Costs. In the interest of completing the Marine Remedial Action as expeditiously as possible, any resolution of disputes regarding this issue shall be postponed until after the Notice of Completion of Marine Remedial Action has been given, as further set forth in Paragraph 49 of this Decree.

c. The United States shall notify Settling Defendants if it has an objection to any amount disbursed from the Escrow, except that the objections shall be limited to the following grounds: (1) the Marine Response Costs Documentation includes a claim or demand for costs that are not response costs as defined by the term "Marine Response Costs" in this Decree; (2) the Marine Response Costs Documentation is insufficient for the determination of whether the costs claimed therein are response costs as defined by the term "Marine Response Costs"; (3) there is inadequate proof of payment of the Marine Response Costs; (4) the certification required by subparagraph a of this Paragraph is false, incorrect, incomplete or absent; or (5) there are

accounting errors not previously discovered and corrected in disbursing money from the United Heckathorn Site Escrow.

d. Such objection must be made within sixty (60) days after the Marine Response Costs Documentation has been provided to the United States. If, however, the United States provides written notice requesting a ten-day extension within the sixty-day period, such extension shall be deemed to have been given. In that case, any objection shall be made within seventy (70) days after the Marine Response Costs Documentation has been provided. The United States' failure to notify Settling Defendants within the period specified herein shall mean that any and all objections regarding payment of the Marine Remedial Action costs shall be deemed waived.

e. The United States and the Settling Defendants shall resolve any disputes concerning the Marine Response Costs pursuant to Section XIX (Dispute Resolution).

## XV. CERTIFICATION OF COMPLETION

50. Completion of the Work

a. Notice of Completion. When Settling Defendants conclude that the Marine Remedial Action has been fully performed in accordance with the SOW and this Consent Decree, Settling Defendants shall notify EPA.

b. No later than 20 days after Settling Defendants conclude that all phases of the Work have been fully performed, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If, after the pre-certification inspection, the

Settling Defendants still believe that the Work has been fully performed, Settling Defendants shall submit a written report by the Supervising Contractor stating that the Work has been completed in full satisfaction of the requirements of this Consent Decree. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

> "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after review of the written report, EPA, determines that any portion of the Work has not been completed in accordance with this Consent Decree, EPA will notify Settling Defendants in writing, within thirty (30) days of receiving the written report, of the activities that must be undertaken by Settling Defendants pursuant to this Consent Decree to complete the Work. EPA may only require Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy selected in the ROD," as that term is defined in Paragraph 13.b. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (EPA Approval of Plans and Other Submissions). Settling Defendants shall perform all activities

described in the notice in accordance with the specifications and schedules established therein, subject to their right to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution).

c. If EPA concludes, based on the initial or any subsequent request for Certification of Completion by Settling Defendants that the Work has been performed in accordance with this Consent Decree, EPA will so notify the Settling Defendants in writing within thirty days of receiving the written report.

## XVI. EMERGENCY RESPONSE

51. In the event of any action or occurrence during the performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Settling Defendants shall, subject to Paragraph 52, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify the EPA's Project Coordinator, or, if the Project Coordinator is unavailable, EPA's Alternate Project Coordinator. If neither of these persons is available, the Settling Defendants shall notify the EPA Emergency Response Unit, Region IX. Settling Defendants shall take such actions in consultation with EPA's Project Coordinator or other available authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plans, the Contingency Plans, and any other applicable plans or documents developed pursuant to the SOW. In the event that Settling Defendants fail to take

appropriate action as required by this Section, and EPA takes such action instead, Settling Defendants shall reimburse EPA all costs of the action not inconsistent with the NCP.

52. Nothing in the preceding Paragraph, Paragraph 13 or in this Consent Decree shall be deemed to limit any authority of the United States (a) to take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, or (b) to direct or order such action, or seek an order from the Court, to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, subject to Section XXII (Covenants Not to Sue by Plaintiff). Nothing in this Paragraph shall be deemed to narrow, abridge or diminish the statutory exemption for liability provided to response action contractors contained in 42 U.S.C. §§ 9619 (a) (1) and 9607 (d).

## XVII. INDEMNIFICATION AND INSURANCE

53. a. The United States does not assume any liability by entering into this agreement or by virtue of any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Settling Defendants shall indemnify, save and hold harmless the United States and its officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Settling Defendants, their

officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Further, the Settling Defendants agree to pay the United States all costs it incurs including, but not limited to, attorneys fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States based on negligent or other wrongful acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree. The United States shall not be held out as a party to any contract entered into by or on behalf of Settling Defendants in carrying out activities pursuant to this Consent Decree. Neither the Settling Defendants nor any such contractor shall be considered an agent of the United States.

b. The United States shall give Settling Defendants notice of any claim for which the United States plans to seek indemnification pursuant to Paragraph 53.a., and shall consult with Settling Defendants prior to settling such claim.

54. Settling Defendants waive all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States arising from or on account of any contract, agreement, or arrangement between any

one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Settling Defendants shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

55. No later than 15 days before commencing any Work, Settling Defendants shall secure or require their contractors or sub-contractors to secure, and shall maintain or require their contractors or sub-contractors to maintain until the first anniversary of EPA's Certification of Completion of the Marine Remedial Action pursuant to Paragraph 50.b. of Section XV (Certification of Completion) commercial general liability insurance with limits of $3 million dollars, combined single limit, and automobile liability insurance with limits of $1 million dollars, combined single limit, naming the United States as an additional insured. In addition, for the duration of this Consent Decree, Settling Defendants shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Settling Defendants in furtherance of this Consent Decree. Prior to commencement of the Work under this

Consent Decree, Settling Defendants shall provide to EPA certificates of such insurance and a copy of each insurance policy. If Settling Defendants demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Settling Defendants need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor.

## XVIII. FORCE MAJEURE

56. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of the Settling Defendants, of any entity controlled by Settling Defendants, or of Settling Defendants' contractors or sub-contractors, that delays or prevents the performance of any obligation under this Consent Decree despite Settling Defendants' best efforts to fulfill the obligation. The requirement that the Settling Defendants exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (1) as it is occurring and (2) following the potential force majeure event, such that the delay is minimized to the greatest extent possible. "Force Majeure" does not include financial inability to complete the Work or a failure to attain the Performance Standards.

57. If any event occurs or has occurred that may delay the

performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, the Settling Defendants shall notify orally EPA's Project Coordinator or, in his or her absence, EPA's Alternate Project Coordinator or, in the event both of EPA's designated representatives are unavailable, the Director of the Hazardous Waste Management Division, EPA Region IX, within three (3) days of when Settling Defendants first knew that the event might cause a delay. Within ten (10) days thereafter, Settling Defendants shall provide in writing to EPA an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; the Settling Defendants' rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of the Settling Defendants, such event may cause or contribute to an endangerment to public health, welfare or the environment. The Settling Defendants shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude Settling Defendants from asserting any claim of force majeure for that event for the period of time of such failure to comply, and for any additional delay caused by such failure. Settling Defendants shall be deemed to know of any circumstance of which Settling Defendants, any entity controlled by Settling

Defendants, or Settling Defendants' contractors knew or should have known.

58. If EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify the Settling Defendants in writing of its decision. If EPA agrees that the delay is attributable to a force majeure event, EPA will notify the Settling Defendants in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

59. If the Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution), they shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, Settling Defendants shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Settling Defendants

complied with the requirements of Paragraphs 56 and 57, above. If Settling Defendants carry this burden, the delay at issue shall be deemed not to be a violation by Settling Defendants of the affected obligation of this Consent Decree identified to EPA and the Court.

## XIX. DISPUTE RESOLUTION

60. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of the Settling Defendants that have not been disputed in accordance with this Section.

61. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 20 days from the time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be considered to have arisen when one party sends the other parties a written Notice of Dispute.

62. a. In the event that the parties cannot resolve a dispute by informal negotiations, including mediation, under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within seven (7) days after the conclusion of the informal negotiation period, Settling Defendants invoke the formal dispute resolution procedures of

this Section by serving on the United States a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by the Settling Defendants. The Statement of Position shall specify the Settling Defendants' position as to whether formal dispute resolution should proceed under Paragraph 63 or Paragraph 64.

b. Within seven (7) days after receipt of Settling Defendants' Statement of Position, EPA will serve on Settling Defendants its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph 63 or 64. Within five (5) days after receipt of EPA's Statement of Position, Settling Defendants may submit a Reply.

c. If there is disagreement between EPA and the Settling Defendants as to whether dispute resolution should proceed under Paragraph 63 or 64, the parties to the dispute shall follow the procedures set forth in the paragraph determined by EPA to be applicable. However, if the Settling Defendants ultimately appeal to the Court to resolve the dispute, the Court shall determine which paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 63 and 64.

63. Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action and all other disputes that are accorded review on the administrative record

under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action includes, without limitation: (1) the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this Consent Decree; and (2) the adequacy of the performance of response actions taken pursuant to this Consent Decree. Nothing in this Consent Decree shall be construed to allow any dispute by Settling Defendants regarding the validity of the ROD's provisions.

a. An administrative record of the dispute shall be maintained by EPA and shall contain all statements of position, including supporting documentation, submitted pursuant to this Section. Where appropriate, EPA may allow submission of supplemental statements of position by the parties to the dispute.

b. The Director of the Waste Management Division, EPA Region IX, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph 63.a. This decision shall be binding upon the Settling Defendants, subject only to the right to seek judicial review pursuant to Paragraph 63.c. and d.

c. Any administrative decision made by EPA pursuant to Paragraph 63.b. shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by the Settling Defendants with the Court and served on all Parties within 10 days of receipt of EPA's decision. The motion shall

include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States may file a response to Settling Defendants' motion.

d. In proceedings on any dispute governed by this Paragraph, Settling Defendants shall have the burden of demonstrating that the decision of the Waste Management Division Director is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Paragraph 63.a.

64. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any response action nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. Following receipt of Settling Defendants' Statement of Position submitted pursuant to Paragraph 62, the Director of the Waste Management Division, EPA Region IX, will issue a final decision resolving the dispute. The Waste Management Division Director's decision shall be binding on the Settling Defendants unless, within 10 days of receipt of the decision, the Settling Defendants file with the Court and serve on the parties a motion for judicial review of the decision setting forth the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the

Consent Decree. The United States may file a response to Settling Defendants' motion.

b. Notwithstanding Paragraph M of Section I (Background) of this Consent Decree, judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

65. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone or affect in any way any obligation of the Settling Defendants under this Consent Decree, not directly in dispute, unless EPA or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 74. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that the Settling Defendants do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XX (Stipulated Penalties).

## XX. STIPULATED PENALTIES

66. Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraphs 67 and 68 to the United States for failure to comply with the requirements of this Consent Decree specified below, unless excused under Section XVIII (Force Majeure). "Compliance" by Settling Defendants shall include completion of the activities under this Consent Decree or any work plan or other plan approved under this Consent Decree

identified below in accordance with all applicable requirements of law, this Consent Decree, the SOW, and any plans or other documents approved by EPA pursuant to this Consent Decree and within the specified time schedules established by and approved under this Consent Decree.

67. a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Subparagraph b:

| Penalty Per Violation Per Day | Period of Noncompliance |
|---|---|
| $2,000 | 1-4 weeks |
| $5,000 | 5 weeks and beyond |

b. Settling Defendants' failure to establish, fund or terminate the United Heckathorn Site Escrow as specified in Paragraphs 38 and 47;

Settling Defendants' failure to complete the Work as set out in this Decree and the SOW;

Settling Defendants' failure to correct deficiencies and resubmit plans as specified in Paragraph 28; and

Settling Defendants' failure to obtain insurance, or ensure that their contractors or sub-contractors obtain insurance, as specified in Paragraph 55.

68. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports or other written documents pursuant to Paragraphs 20, 22, 23, 43 and 49, and for failure to pay response costs pursuant to Paragraph 37:

Penalty Per Violation

| Per Day | Period of Noncompliance |
|---|---|
| $1,000 | 1-4 weeks |
| $3,000 | 5-7 weeks |
| $5,000 | 8 weeks and beyond |

69. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 86 of Section XXII (Covenants Not to Sue by Plaintiff), Settling Defendants shall be liable for a stipulated penalty in the amount of $50,000.00.

70. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (1) with respect to a deficient submission under Section XI (EPA Approval of Plans and Other Submissions), during the period, if any, beginning on the day after EPA's receipt of such submission until the date that EPA notifies Settling Defendants of any deficiency; (2) with respect to a decision by the Director of the Waste Management Division, EPA Region IX, under Paragraph 63.b. or 64.a. of Section XIX (Dispute Resolution), during the period, if any, beginning on the 21st day after the date that Settling Defendants' reply to EPA's Statement of Position is received until the date that the Director issues a final decision regarding such dispute; or (3) with respect to judicial review by this Court of any dispute under Section XIX (Dispute Resolution), during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding

such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

71. Following EPA's determination that Settling Defendants have failed to comply with a requirement of this Consent Decree, EPA may give Settling Defendants written notification of the same and describe the noncompliance. EPA may send the Settling Defendants a written demand for the payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified the Settling Defendants of a violation.

72. All penalties accruing under this Section shall be due and payable to the United States within 30 days of the Settling Defendants' receipt from EPA of a demand for payment of the penalties, unless Settling Defendants invoke the Dispute Resolution procedures under Section XIX (Dispute Resolution). All payments to the United States under this Section shall be paid by certified or cashier's check(s) made payable to "EPA Hazardous Substances Superfund;" shall be mailed to U.S. EPA, Region IX, Attention: Superfund Accounting, P.O. Box 360863M, Pittsburgh, PA 15251; shall indicate that the payment is for stipulated penalties; and shall reference EPA Region 9 and Site/Spill ID #09R3, the DOJ case number 90-11-3-598, and the name and address of the party making payment. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to the United States as provided in Section XXVII (Notices and Submissions).

73. The payment of penalties shall not alter in any way Settling Defendants' obligation to complete the performance of the Work required under this Consent Decree.

74. Penalties shall continue to accrue as provided in Paragraph 70 during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to this Court, accrued penalties determined to be owing shall be paid to EPA within 15 days of the agreement or the receipt of EPA's decision or order;

b. If the dispute is appealed to this Court and the United States prevails in whole or in part, Settling Defendants shall pay all accrued penalties determined by the Court to be owed to EPA within 60 days of receipt of the Court's decision or order, except as provided in Subparagraph c below;

c. If the District Court's decision is appealed by any Party, Settling Defendants shall pay all accrued penalties determined by the District Court to be owing to the United States into an interest-bearing escrow account within 60 days of receipt of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every 60 days. Within 15 days of receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to EPA or to Settling Defendants to the extent that they prevail.

75. a. If Settling Defendants fail to pay stipulated penalties when due, the United States may institute proceedings to collect the penalties, as well as interest. Settling

Defendants shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 72.

b. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States to seek any other remedies or sanctions available by virtue of Settling Defendants' violation of this Decree or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(l) of CERCLA. Provided, however, that the United States shall not seek civil penalties pursuant to Section 122(l) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of the Consent Decree.

76. Notwithstanding any other provision of this Section, the United States may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Consent Decree.

## XXI. PAYMENT OF NATURAL RESOURCE DAMAGES

77. Within 10 days after entry of this Decree, Settling Defendants shall pay $133,333.34 to the United States. The allocation to Settling Defendants of $133,333.34, out of the United States' total Natural Resource Damages recovery of $400,000 from defendants which are parties to the Four Decrees, was determined solely by potentially responsible parties, including Settling Defendants. Payment shall be made by check, made payable to the Secretary of the Interior and delivered to Chief, Division of Finance, United States Fish and Wildlife

Service, 4401 North Fairfax Drive, Room 380, Arlington, VA, 22203 (phone (703) 358-1742). The check shall reflect that it is a payment to the "Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198" and reference the "Levin Richmond/United Heckathorn Site." DOI will assign these funds a special project number to allow the funds to be maintained as a segregated account within the DOI Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198 ("Trustees Account"). DOI shall, in accordance with law, manage and invest funds in the Trustees Account and segregate in the Account any return on investments or interest accrued for use by the natural resource Trustees. DOI shall not make any charge against the Account for any investment or management services provided. DOI shall hold all funds in the Account, including return on investments or accrued interest, subject to the provisions of this Decree and any agreement DOI and NOAA may reach regarding the use of the funds.

78. If Settling Defendants do not timely pay the amount specified in Paragraph 77, this Consent Decree shall be considered an enforceable judgment, under Federal Rules of Civil Procedure 69 and other applicable statutory authority, for purposes of post-judgment collection of the amount due the Trustees, without further order of this Court. Interest shall be assessed at the annual rate established pursuant to 31 U.S.C. § 3717 on the overdue amount from the due date set forth in Paragraph 77 through the date of payment. In addition, in the event the United States takes action to enforce the judgment,

Settling Defendants shall reimburse the United States for costs and reasonable attorney's fees incurred in enforcing Settling Defendants' obligation.

## XXII. COVENANTS NOT TO SUE BY PLAINTIFF

79. In consideration of the payments to be made by the Settling Defendants under the terms of this Decree and except as specifically provided in Paragraphs 80-85 of this Section, the United States hereby covenants not to sue or take administrative action against any of the Settling Defendants, and the Settling Defendants' past and present officers, directors and employees acting in such respective capacities for the Settling Defendants, pursuant to Sections 106, 107(a) and (f), and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and (f), 9613(f), relating to hazardous substances present at the Site. Except with respect to future liability, these covenants not to sue shall take effect upon the receipt by the United States of the payments required by Paragraph 77 of Section XXI (Payment of Natural Resource Damages) and the establishment of the Escrow as set forth in Paragraph 38 of Section XIV (Establishment of, and Use of Monies in, the United Heckathorn Site Escrow). With respect to future liability, these covenants not to sue shall take effect upon Certification of Completion of the Marine Remedial Action by EPA pursuant to Paragraph 50.b of Section XV (Certification of Completion). These covenants not to sue are conditioned upon the satisfactory performance by Settling Defendants of their obligations under this Consent Decree. These covenants not to sue extend only to the Settling Defendants, and the Settling

Defendants' past and present officers, directors and employees acting in such respective capacities for the Settling Defendants, and do not extend to any other person.

80. United States' Pre-certification Reservations. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order, seeking to compel Settling Defendants (1) to perform further response actions relating to the Site, or (2) to reimburse the United States for additional costs of response if, prior to Certification of Completion of the Marine Remedial Action:

(i) conditions at the Site, previously unknown to EPA, are discovered, or

(ii) information, previously unknown to EPA, is received, in whole or in part,

and these previously unknown conditions or information together with any other relevant information indicates that the remedial action(s) selected in the ROD are not protective of human health or the environment.

81. United States' Post-certification Reservations. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order, seeking to compel Settling Defendants (1) to perform further response actions relating to the Site, or (2) to reimburse the United

States for additional costs of response if, subsequent to Certification of Completion of the Marine Remedial Action:

(i) conditions at the Site, previously unknown to EPA, are discovered, <u>or</u>

(ii) information, previously unknown to EPA, is received, in whole or in part,

<u>and</u> these previously unknown conditions or this information together with other relevant information indicate that the remedial action(s) selected in the ROD are not protective of human health or the environment.

82. For purposes of Paragraph 80, the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date the ROD was signed and set forth in the Record of Decision for the Site and the administrative record supporting the Record of Decision. For purposes of Paragraph 81, the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date of Certification of Completion of the Marine Remedial Action and set forth in the ROD, the administrative record supporting the ROD, the post-ROD administrative record, or in any information received by EPA pursuant to the requirements of this Consent Decree prior to Certification of Completion of the Marine Remedial Action.

83. <u>Reservation by the Natural Resource Trustees for Unknown Conditions and New Information</u>. Notwithstanding any other provision of this Decree, the United States, on behalf of its natural resource Trustees, reserves, and this Decree is without

prejudice to, the right to bring an action against any Settling Defendant in this action or in a new action to seek recovery of Natural Resource Damages, based on (i) conditions with respect to the Site unknown to the Trustees as of the date this Decree is lodged with the court, that result in or contribute to injury to, destruction of or loss of natural resources; or (ii) information received by the Trustees after the date the Decree is lodged with the court which indicates that there is injury to, destruction of, or loss of natural resources of a type unknown, or a magnitude greater than was known, to the Trustees.

84. Notwithstanding any other provision of this Decree, the United States reserves, and this Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants to perform response actions relating to the Site or to reimburse the United States for response costs incurred after the effective date of this Decree, if EPA determines, through an amendment to the ROD, that the Marine Remedial Action is not protective of human health and the environment and EPA selects further response actions at the Site.

85. General Reservation of Rights. The covenants not to sue set forth above do not pertain to any matters other than those expressly specified in Paragraph 79. Notwithstanding any other provision of this Decree, the United States reserves, and this Consent Decree is without prejudice to, all rights against Settling Defendants with respect to all other matters, including

but not limited to, the following:

(1) claims based on a failure by Settling Defendants to meet a requirement of this Consent Decree;

(2) liability arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the Site, including liability for damages for injury to, destruction of, or loss of natural resources occurring outside of the Site, and for the costs of any natural resource damage assessments regarding the same;

(3) liability for future disposal of Waste Material at the Site, other than as provided in the ROD, the Work, or otherwise ordered by EPA;

(4) criminal liability; and

(5) liability for violations by Settling Defendants of federal or state law which occur during or after implementation of the Marine Remedial Action.

86. Work Takeover In the event EPA determines that Settling Defendants have ceased implementation of any portion of the Work, are seriously or repeatedly deficient or late in their performance of the Work, or are implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may assume the performance of all or any portions of the Work as EPA determines necessary. Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution), Paragraph 63, to dispute EPA's determination that takeover of the Work is warranted under this

Paragraph. Settling Defendants shall reimburse the United States all costs of Work takeover not inconsistent with the NCP.

87. Notwithstanding any other provision of this Consent Decree, the United States retains all authority and reserves all rights to take any and all response actions authorized by law.

## XXIII. COVENANTS BY SETTLING DEFENDANTS

88. Covenant Not to Sue. Subject to the reservations in Paragraph 89 and below, Settling Defendants hereby covenant not to sue and agree not to assert any claims or causes of action against the United States with respect to the Site or this Consent Decree, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 107, 111, 112, 113 or any other provision of law;

b. any claims against the United States under CERCLA Sections 107 or 113 related to the Site; or

c. any claims arising out of response activities at the Site, including claims based on EPA's selection of response actions, oversight of response activities or approval of plans for such activities.

The Settling Defendants reserve the right to assert any counterclaims against the United States arising out of any action filed by the United States pursuant to Paragraphs 80, 81, 83, 84, or 85(3).

89. The Settling Defendants reserve, and this Consent Decree is without prejudice to, claims against the United States,

subject to the provisions of Chapter 171 of Title 28 of the United States Code, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States while acting within the scope of his office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, any such claim shall not include a claim for any damages caused, in whole or in part, by the act or omission of any person, including any contractor, who is not a federal employee as that term is defined in 28 U.S.C. § 2671; nor shall any such claim include a claim based on EPA's selection of response actions, or the oversight or approval of the Settling Defendants' plans or activities. The foregoing applies only to claims which are brought pursuant to any statute other than CERCLA and for which the waiver of sovereign immunity is found in a statute other than CERCLA.

90. Nothing in this Consent Decree shall be deemed to constitute preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

91. The Montrose Group agrees that in this action or in a new action or proceeding seeking to recover the United States' response costs, or to compel the Montrose Group to undertake a response action, or to recover Natural Resource Damages incurred for releases of hazardous substances at or from the Site, the United States may, at its option, use any depositions taken in

the Private Party Litigation for any purpose as though the court had found that the conditions set forth in Fed. R. Civ. P. 32(a)(3) are satisfied and as though the deponent were then present and testifying.

XXIV. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

92. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this decree may have under applicable law. Each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto.

93. The Parties agree, and by entering this Consent Decree this Court finds, that the Settling Defendants and Settling Federal Agencies are entitled, as of the effective date of this Consent Decree, to protection from contribution actions or claims as provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2) for matters addressed in this Consent Decree. "Matters addressed in this Decree" shall mean Natural Resource Damages and all response costs incurred or to be incurred by the United States or any other person or entity at the Site, but do not include natural resource damages and response costs incurred or to be incurred in connection with the presence, release or threatened

release of a hazardous substance outside the Site.

94. The Settling Defendants agree that with respect to any suit or claim for contribution brought by them for matters related to this Consent Decree they will notify the United States in writing no later than 60 days prior to the initiation of such suit or claim.

95. The Settling Defendants also agree that with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree they will notify in writing the United States within 10 days of service of the complaint on them. In addition, Settling Defendants shall notify the United States within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

96. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Defendants as against the United States only shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XXII (Covenants Not to Sue by Plaintiff).

## XXV. ACCESS TO INFORMATION

97. Settling Defendants shall provide to EPA, upon request, copies of all documents and information within their possession or control or that of their contractors or agents, generated after the effective date of this Consent Decree, relating to activities at the Site or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Settling Defendants shall also make available to EPA, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

98. a. Settling Defendants may assert business confidentiality claims covering part or all of the documents or information submitted to Plaintiff under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to EPA, or if EPA has notified Settling Defendants that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA, the public may be given access to such documents or information without further notice to Settling Defendants.

b. The Settling Defendants may assert that certain documents,

records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege in lieu of providing documents, they shall provide the Plaintiff with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the contents of the document, record, or information: and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

99. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

## XXVI. RETENTION OF RECORDS

100. Until seven years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 50.b of Section XV (Certification of Completion of the Work), each Settling Defendant shall preserve and retain all records and documents now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or liability of any person for response actions conducted and to

be conducted at the Site, regardless of any corporate retention policy to the contrary. Until seven years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 50.b of Section XV (Certification of Completion), Settling Defendants shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the Work.

101. At the conclusion of this document retention period, Settling Defendants shall notify the United States at least 90 days prior to the destruction of any such records or documents, and, upon request by the United States Settling Defendants shall deliver any such records or documents to EPA. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege, they shall provide the Plaintiffs with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

102. Each Settling Defendant hereby certifies individually that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any original records, documents or other information (or where originals did not exist, the last copy of such records, documents or other information) relating to its potential liability regarding the Site since notification of potential liability by the United States or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA requests for information pursuant to Section 104(e) and 122(e) of CERCLA, 42 U.S.C. 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. 6927.

## XXVII. NOTICES AND SUBMISSIONS

103. Whenever, under the terms of this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one Party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the United States, EPA, the State, and the Settling Defendants, respectively.

As to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
Re: DJ # 90-11-3-598

Chief, Environmental Defense Section
U.S. Department of Justice
Environment and Natural Resources Division
Environmental Defense Section
P.O. Box 23986
Washington, D.C. 20026-20531
Re: DJ # 90-11-3-1291

As to EPA:

Regional Counsel
Office of Regional Counsel
United States EPA
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Director, Waste Management Division
United States EPA
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Andrew Lincoff
EPA Project Coordinator
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

As to the Settling Defendants:

Frank C. Bachman, President
Montrose Chemical Corporation of California
55 Corporate Drive
Trumbull, CT 06611

Richard W. Raushenbush, Esq.
Latham & Watkins
505 Montgomery St., Ste. 1900
San Francisco, CA 94611-2562

David L. Mulliken, Esq.
Latham & Watkins
701 B Street, Suite 2100
San Diego, CA 92101

As to Shell Oil Company:

Randall Heldt, Esq.
Shell Oil Company
One Shell Plaza 4888
900 Louisiana Avenue
Houston, TX 77252-2463

## XXVIII. EFFECTIVE DATE

104. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

## XXIX. RETENTION OF JURISDICTION

105. This Court retains jurisdiction over both the subject matter of this Consent Decree and the Settling Defendants for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XIX (Dispute Resolution)

hereof.

## XXX. APPENDICES

106. The following appendices are attached to and incorporated into this Consent Decree:

"Appendix A" is the ROD.

"Appendix B" is the SOW.

"Appendix C" is the approved RD/RA Work Plan.

"Appendix D" is the map of the land portion of the Site.

"Appendix E" is the map of the marine portion of the Site.

"Appendix F" is the complete list of the Parr Group and the Miscellaneous Defendants Group.

"Appendix G" is the form of Escrow Agreement.

## XXXI. MODIFICATION

107. Schedules specified in this Consent Decree for completion of the Work may be modified by agreement of EPA and the Settling Defendants. All such modifications shall be made in writing.

108. Except as provided in Paragraph 13 ("Modification of the SOW or related Work Plans"), no material modifications shall be made to the SOW without written notification to and written approval of the United States, Settling Defendants, and the Court. Prior to providing its approval to any modification, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification. Modifications to the SOW that do not materially alter that document may be made by written agreement between EPA, after providing the State with a reasonable opportunity to review and

comment on the proposed modification, and the Settling Defendants.

109. Nothing in this Decree shall be deemed to alter the Court's power to enforce, supervise or approve modifications to this Consent Decree.

## XXXII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

110. This Consent Decree shall be lodged with the Court for a period of not less than thirty (30) days for public notice and comment in accordance with Section 122(d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), and 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding the Consent Decree disclose facts or considerations which indicate that the Consent Decree is inappropriate, improper, or inadequate. Settling Defendants consent to the entry of this Consent Decree without further notice.

111. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

## XXXIII. SIGNATORIES/SERVICE

112. Each undersigned representative of a Settling Defendant to this Consent Decree and the Assistant Attorney General for Environment and Natural Resources of the Department of Justice certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Party to this document.

113. Each Settling Defendant hereby agrees not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States has notified the Settling Defendants in writing that it no longer supports entry of the Consent Decree; provided, however, that this Consent Decree shall become voidable at the option of any Party if it is not approved by the Court by August 1, 1996.

114. Each Settling Defendant shall identify, on the attached signature page, the name, address and telephone number of an agent who is authorized to accept service of process by mail on behalf of that Party with respect to all matters arising under or relating to this Consent Decree. Settling Defendants hereby agree to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons.

SO ORDERED THIS _____ DAY OF _____, 1996.

_____
United States District Judge
CLAUDIA WILKEN

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: June 4, 1996

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice
Washington, D.C. 20530

Date: _____

S. RANDALL HUMM
Environmental Defense Section
Environment & Natural Resources Division
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 514-3097

Date: _____

HELEN H. KANG
Environmental Enforcement Section
Environment and Natural Resources Division

Date: _____

MICHAEL J. YAMAGUCHI
United States Attorney
Northern District of California
PATRICK RAMIREZ S. BUPARA
Assistant United States Attorney

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: _____

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice
Washington, D.C. 20530

Date: June 3, 1996

S. Randall Humm/hhk

S. RANDALL HUMM
Environmental Defense Section
Environment & Natural Resources Division
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 514-3097

Date: June 3, 1996

Helen H. Kang

HELEN H. KANG
Environmental Enforcement Section
Environment and Natural Resources Division

Date: 5-29-96

MICHAEL J. YAMAGUCHI
United States Attorney
Northern District of California
PATRICK RAMIREZ S. BUPARA
Assistant United States Attorney

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

Date: 6-6-96

KEITH TAKATA
Director
Hazardous Waste Management Division
Region 9
U.S. Environmental Protection Agency

Date: June 6, 1996

JOHN J. LYONS
Regional Counsel
Region 9
U.S. Environmental Protection Agency

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANTS

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

Date: 5/9/96

FRANK C. BACHMAN
PRESIDENT

CHRIS-CRAFT INDUSTRIES, INC.

Date: _____

By: _____
Its: _____

RHONE-POULENC, INC.

Date: _____

By: _____
Its: _____

STAUFFER MANAGEMENT COMPANY

Date: _____

By: _____
Its: _____

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANTS

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

Date: _____

_____
FRANK C. BACHMAN
PRESIDENT

CHRIS-CRAFT INDUSTRIES, INC.

Date: May 9, 1996

Brian C Kelly
By: Brian C. Kelly
Its: General Counsel and Secretary

RHONE-POULENC, INC.

Date: _____

_____
By: _____
Its: _____

STAUFFER MANAGEMENT COMPANY

Date: _____

_____
By: _____
Its: _____

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANTS

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

Date: _____

_____
FRANK C. BACHMAN
PRESIDENT

CHRIS-CRAFT INDUSTRIES, INC.

Date: _____

_____
By: _____
Its: _____

RHONE-POULENC, INC.

Date: May 9, 1996

John M. Fatesta
By: John M. Fatesta
Its: Senior Corporate Counsel and Assistant Secretary
STAUFFER MANAGEMENT COMPANY

Date: _____

_____
By: _____
Its: _____

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANTS

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

Date: _____

_____
FRANK C. BACHMAN
PRESIDENT

CHRIS-CRAFT INDUSTRIES, INC.

Date: _____

_____
By: _____
Its: _____

RHONE-POULENC, INC.

Date: _____

_____
By: _____
Its: _____

STAUFFER MANAGEMENT COMPANY

Date: 5-9-96

Brian A Spilles
By: Brian A Spilles
Its: President

# RECORD OF DECISION

United Heckathorn Superfund Site
Richmond, California

EPA ID# CAD981436363

## PART I - DECLARATION

### Statement of Basis and Purpose

This Record of Decision ("ROD") presents the selected remedial action for the United Heckathorn Superfund Site ("the Site") in Richmond, California. This document was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), 42 U.S.C. §§9601 et seq., and, to the extent practicable, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300, and the laws of the State of California. This decision is based on the Administrative Record for the Site. The administrative record index identifies the documents upon which the selection of the remedial action is based.

### Assessment of the Site

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

### Description of the Remedy

The United Heckathorn Superfund Site in Richmond, California, was used to formulate pesticides from approximately 1947 to 1966. Soils at the Site and sediments in Richmond Harbor were contaminated with various chlorinated pesticides, primarily DDT, as a result of these pesticide formulation activities. At the time of Site listing in 1990, a visible deposit of pesticide residue containing up to 100% DDT was present on the Lauritzen Channel embankment. Several response actions have already been taken to cleanup the most contaminated upland areas of the Site, including the embankment. Under EPA Removal Order 90-22, a group of Potentially Responsible Parties (PRPs) excavated the embankment deposit and transported it offsite to a permitted disposal facility. During subsequent actions through 1993 pursuant to the removal order, all known additional upland soil deposits containing high levels of pesticides were removed, as were piles of contaminated soils generated in earlier actions.

The final remedy addresses remaining hazardous substances, primarily in the marine environment. The major components of the selected remedy include:

- Dredging of all soft bay mud from the Lauritzen Channel and Parr Canal, with offsite disposal of dredged material.
- Placement of clean material after dredging.
- Construction of a cap around the former Heckathorn facility to prevent erosion.
- A deed restriction limiting use of the property at the former Heckathorn facility location to

non-residential uses.

- Marine monitoring to verify the effectiveness of the remedy.

**Statutory Determinations**

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate ("ARARs") to the remedial action, and is cost effective. The selected remedy uses engineering controls and institutional controls to address remaining hazardous substances at the Site. Concentrated wastes at the upland portion of the Site were addressed by previous removal actions.

Because this remedy will result in hazardous substances remaining onsite, a review will be conducted within five years after the commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

John Wise

Felicia Marcus for
Regional Administrator

10.26.94
Date

## PART II - DECISION SUMMARY

United Heckathorn Superfund Site
Richmond, California

1. Site Name, Location, and Description.

The United Heckathorn Site is located in Richmond Harbor, on the east side of San Francisco Bay (Figures 1 and 2) in Contra Costa County, California. The location of the former United Heckathorn facility (Figure 3) is currently being used as a marine shipping terminal operated by the Levin Richmond Terminal Corporation (LRTC). The area of contamination at the Site includes the northern five acres of the terminal and marine sediments in harbor channels including the Lauritzen, which is immediately adjacent to the location of the former Heckathorn facility, the Santa Fe, the Parr Canal, and the Inner Harbor Channel.

The upland area of the Site is currently fenced and occupied. Current and expected future zoning of the upland area of the Site permits only industrial use. Land use restrictions selected as part of the Site remedy will also permit only nonresidential, industrial or commercial uses in the future.

2. Site History and Enforcement Activities.

The upland area of the Site is currently owned by Levin Enterprises, Inc. The Site was used from approximately 1947 to 1966 by several operators, including the R.J. Prentiss Company, Heckathorn and Company, United Heckathorn, United Chemetrics, and Chemwest Incorporated (hereafter collectively referred to as "United Heckathorn") to formulate and package pesticides. No chemicals were manufactured onsite.

Documents from the 1950s and 1960s indicate that approximately 95% of Heckathorn's operations entailed processing the pesticide, DDT. The processing activities included mixing, blending, grinding, and packaging. Various solvents, including xylenes, were used to dissolve DDT and other pesticides into liquid formulations. Powder formulations were also prepared.

United Heckathorn employees apparently routinely washed out equipment containing pesticide residues. The wash water was permitted to either run through drains that discharged to the Lauritzen Channel, or to seep into the ground adjacent to the Site (Levine-Fricke, 1990). Later, settling tanks were used to recover pesticide residues from wash water; however, overflow and leakage from these tanks also occurred. In addition, accidental spills, leaks, and releases also occurred during the processing of liquid and dry pesticide formulations, which were conducted both inside and outside the United Heckathorn buildings.

In 1960, the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) inspected the facility and cited United Heckathorn for the release of DDT-laden wastewater into the Lauritzen Channel. In 1965, California Department of Fish and Game staff identified a discharge of wastewater overflow into the Lauritzen Channel and leakage from the pesticide settling tanks.

Pesticide processing activities at the Site ended in approximately 1966. Between 1966 and 1970, the United Heckathorn facility buildings were demolished and cleared from the Site. In the 1970s, the Site was apparently used primarily for bulk material storage. In 1981, the Levin Metals Corporation purchased the property from the Parr-Richmond Terminal Company and has been

operating the Site since that time as a bulk shipping facility.

In 1980, the United Heckathorn Site was inspected and sampled by CDHS as part of the Abandoned Sites Project. Chlorinated pesticides and metals were detected in soil samples, and the area was designated a state Superfund Site in March 1982. EPA listed the United Heckathorn Site on the CERCLA National Priorities List (NPL) in March 1990, and took over as lead agency in August 1990.

Interim response actions were conducted from 1982 to 1993 in the upland and embankment areas of the United Heckathorn Site. As early as 1982, contaminated soil, asphalt, and concrete from the United Heckathorn Site were excavated by the current landowner and moved to a nearby lot adjacent to the Parr Canal. These materials were subsequently transported to several hazardous waste disposal facilities. In 1983, soils containing high levels of pesticides were removed by the current landowner during routine maintenance and extension of onsite railroad lines. A 6-in. to 8-in. layer of gravel was placed over the surface of the Site, including a 6-in. layer of ballast rock over the Lauritzen Channel embankment and selected areas of high DDT concentrations. In 1986, during excavation for the construction of a train scale, high levels of pesticides were detected and approximately 60 cubic yards ($yd^3$) of soil were removed by the current landowner.

In November 1990, pursuant to EPA Removal Order 90-22, approximately 1500 $yd^3$ of soil and visible pesticide residue containing up to 100% DDT were excavated by several PRPs (Levin, Montrose, Parr, Shell, and Stauffer) from the Lauritzen Channel embankment. This excavation was taken back to the foundation of the former Heckathorn building 1, where a pesticide deposit approximately 3 ft thick was revealed beneath the foundation. Samples of this deposit contained approximately 30% DDT. An additional 1800 $yd^3$ of pesticide residue and contaminated soil were excavated by the same PRPs from this area in April 1991. The excavated material and stockpiles that had been placed onsite in the 1980s were hauled offsite by truck to permitted hazardous waste disposal facilities. A final soil removal action was completed in May 1993 by the same PRPs as well as Prentiss and Sherwin Williams. Assuming that the embankment deposit contained 30% DDT, over 99% of the mass of pesticides has been removed from the upland portion of the Site since 1990.

Marine sediment has not been the subject of prior removal actions or otherwise been remediated. However, as shown on Figure 3, the southeastern area of the Lauritzen Channel was last dredged for berth maintenance in 1985.

3. Highlights of Community Participation.

Six fact sheets have been released describing activities at the Site. In July, 1994 EPA released a proposed plan and the Administrative Record for the Site. Site documents were made available at the agency Superfund Records Center and at the Richmond Public Library, and a public notice was published allowing 30 days for public comment on the Proposed Plan. A public meeting was held on August 2, 1994 to describe the proposed remedy and receive comments. The public comment period was then extended an additional 30 days at the request of PRPs. Three persons made comments at the public meeting, and six written comments on the proposed plan were received during the comment period. Responses to all significant comments received during this period are contained in the attached "Analysis of Public Comments." The decision for this Site is based upon the Administrative Record.

4. Scope and Role of Remedial Actions.

The remedial actions selected in this Record of Decision are expected to be the final response actions performed at the Site. As described in the Site history above, significant interim response measures were performed at the Site in the past. These removal actions addressed the principal threats at the upland portion of the Site.

The selected remedy addresses the contaminants remaining in sediments at the Site, as well as the low levels of contaminants remaining in soils at the Site.

5. Site Characteristics.

The nature and extent of contamination at the United Heckathorn Site has been delineated by the combination of state-ordered Site investigations which occurred prior to NPL listing, and EPA's subsequent Remedial Investigation (Battelle, 1994). As discussed above, large deposits of extremely high levels of pesticides remained in upland soils after United Heckathorn ceased operations in 1966. These have been the subject of extensive excavation and removal actions over the past three years.

A soils database representing current Site conditions was compiled in EPA's Human Health Risk Assessment (ICF Technology, 1994) from the previous Site studies and removal action reports. A conservative estimate of the remaining mean Site soil concentrations of the primary Contaminants of Concern (COCs), DDT (total) and dieldrin, are 64 and 5.7 milligrams per kilogram (mg/kg), respectively. These estimates are conservative because the soils database includes the large number of additional samples which were taken to delineate the hot-spot areas for the removal actions. The actual mean Site concentrations are likely to be lower.

DDT at levels exceeding 1 mg/kg in upland soils extends over the upland portion of the Site as shown in Figure 4. The total mass of these upland soils is approximately 95,000 tons (Levine-Fricke, 1993). Confirmation sampling performed during the excavations of the most contaminated soil areas indicated that the concentrations drop to nondetectable levels in the younger bay mud immediately below the upland soils, demonstrating that the homogeneous silty-clay bay mud underlying the Site is an effective barrier to downward migration of Site chemicals.

Due to the Site's proximity to San Francisco Bay, the shallow groundwater at the Site is naturally saline and is not a source of drinking water under state or federal law.

In 1992, EPA performed a screening assessment of offsite soils (ICF Technology, 1994) in order to determine whether the historic operations of United Heckathorn could have released pesticides into the air in sufficient quantities to cause current levels of concern in nearby off-site residential soils. Sampling locations were chosen along Cutting Boulevard and immediately north of Highway 580, because the meteorological analysis for EPA's 1988 air monitoring program indicated that the strongest prevailing winds at the Site blow due north. The sampling program was therefore deliberately biased to target the area which would have had the highest levels of pesticides, had Heckathorn caused contamination. All off-site soil sampling results were well within acceptable levels for protection of human health.

The results of the RI of marine sediment, however, indicate that the occurrence of pesticides at the Site, particularly the Contaminants of Concern, DDT and dieldrin, is more widespread and at concentrations orders of magnitude higher relative to San Francisco Bay background levels than other detected contaminants. The areal and vertical distribution of marine contamination is summarized below.

Vertical core segments and channel edge grab samples were analyzed for chlorinated pesticides to delineate the areal and vertical extent of marine contamination. Results indicated that significant pesticide contamination was limited to the soft geologically recent "younger bay mud"; samples from the hard underlying "older bay mud" generally contained only traces of pesticides. Figure 5 presents the average total DDT concentration in the younger bay mud in the inner Richmond Harbor. It is significant to note that the concentration contours on this figure must be presented on a log scale in order to depict the gradient of six orders of magnitude between the Lauritzen Channel and Point Potrero. The maximum and median total DDT and maximum dieldrin concentrations throughout the study area are also shown.

Pesticide concentrations were highest in the Lauritzen Channel, and decreased with increasing distance from the former United Heckathorn Site, clearly indicating that Heckathorn was the source of contamination. The highest total DDT concentration of 633,000 micrograms per kilogram (µg/kg) dry wt was measured in a sample from 1 ft to 3 ft below the mudline in the center of the channel. Pesticide concentrations of greater than 100,000 µg/kg were detected in sediment from the northern and western portions of the channel. The median total DDT concentration was approximately 47,000 µg/kg at the head of the Lauritzen Channel, which has not been dredged in a number of years. The median concentration of total DDT decreased to about 14,000 µg/kg in the western, undredged portion of the channel, and to 1500 µg/kg in the dredged portion of the channel near the Levin terminal. Dieldrin concentrations were lower (maximum concentration of 16,000 µg/kg), but exhibited the same spatial trend in relative concentration.

Total DDT concentrations in sediment decreased by at least two orders of magnitude from the Lauritzen Channel to the Santa Fe Channel. The median concentration of total DDT in the younger bay mud was 110 µg/kg in the upper Santa Fe Channel and 210 µg/kg in the federally maintained portion of the channel. DDT and dieldrin concentrations were higher in the federally maintained portion of the Santa Fe Channel, which includes the area downstream of the Lauritzen Channel. Total DDT and dieldrin concentrations decreased by another order of magnitude from the Santa Fe Channel to the Inner Harbor Channel. The median total DDT concentration was 60 µg/kg in the upper Inner Harbor Channel, and 10 µg/kg in the lower Inner Harbor Channel. The maximum total DDT concentration near Point Potrero was 19 µg/kg, which is approximately equal to the median DDT concentration for the periphery of San Francisco Bay, excluding the Lauritzen Channel (Long et al., 1988).

Pesticide concentrations in Parr Canal sediment were lower than those measured in the Lauritzen Channel but greater than those measured in Santa Fe or Inner Harbor Channels. The maximum and median total DDT concentrations measured in Parr Canal sediment were 4080 µg/kg and 840 µg/kg, respectively. The maximum dieldrin concentration was 170 µg/kg. The Parr Canal is significantly narrower than it was in the 1940's, due to filling which (based on aerial photographs) occurred sometime between 1958 and 1968. Some of the material used to fill the canal may have been dredged from the harbor, possibly explaining the elevated levels of pesticides in Parr Canal sediments.

Grab samples collected from channel edges throughout the study area showed the same spatial trend in pesticide concentrations as the core samples. The total DDT concentrations in channel edge samples were consistent with the median concentration measured in core samples from that area.

Contaminant concentrations in the younger bay mud were generally not well stratified. In the shallow portions of the Lauritzen Channel, contaminant concentrations increased, and then decreased with increasing depth. The most highly contaminated sediment was generally found from 1 ft to 5 ft below the mudline. In the Santa Fe Channel, the most contaminated sediment was

found down-channel of the mouth of the Lauritzen Channel in the surface sediment, and just up-channel of the mouth in deeper sediment. Contaminant concentrations were generally higher in deeper sediment in the Inner Harbor Channel. Analysis of the volumes of contaminated sediments and the average concentrations in harbor channels indicates that 98% of the mass of DDT in harbor sediments is confined to the Lauritzen Channel.

Selected core samples collected during the marine RI were analyzed for polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), metals, and butyltins. In general, sediment from the upper Lauritzen Channel and Parr Canal had higher concentrations of PAHs, PCBs, and metals than sediment from the Santa Fe and Inner Harbor Channels. This is probably because the larger channels have been routinely dredged for navigation, whereas the northern Lauritzen and Parr have not. Only the pesticides, DDT and dieldrin, are consistently found in sediments and biota at levels orders of magnitude higher than the regional background levels.

6. Applicable or Relevant and Appropriate Requirements (ARARs)

Federal and state environmental laws which have been determined to be ARARs for the remedy are summarized below. Chemical-specific ARARs are discussed first, followed by other requirements.

Surface Waters: ARARs for surface water include EPA's ambient water quality criteria for DDT and dieldrin. These are the primary basis for the Site remediation goals.

EPA Ambient Water Quality Criteria. Section 304 of the Clean Water Act required EPA to publish criteria for water quality that accurately reflect the latest scientific knowledge on the kind and extent of all identifiable effects on health and welfare, including effects on plankton, fish, shellfish, wildlife, and plant life, which may be expected from the presence of pollutants in any body of water, based on the substances' whole-water concentration. The ambient water quality criteria for DDT and dieldrin were published in October 1980. The human health values have been updated since the original criteria publications in 1980 to reflect revised carcinogenic potency values from EPA's Integrated Risk Information System (IRIS) database (see Final Rule, 40 CFR Part 131, 57 FR 60848, December 22, 1992).

The derivation of EPA's ambient water quality criteria is discussed at length in the ecological assessment (EPA, 1994). Criteria for the protection of saltwater aquatic life are, for most pollutants, based upon toxic effects data for water-column organisms. However, for DDT and its metabolites, which bioaccumulate to high levels and may cause toxicity to organisms at higher trophic levels, it was determined that more restrictive criteria were necessary to protect fish-eating birds. The chronic marine aquatic life criterion is 1 ng/L ($10^{-9}$ g/l, EPA 1980, EPA 440/5-80-038]). The water quality criterion for the protection of human health from the consumption from the bioaccumulation of DDT in fish is 0.59 ng/l, based on achieving a 1 X $10^{-6}$ lifetime excess cancer risk level.

The chronic marine aquatic life criterion for dieldrin of 1.9 ng/l is also residue-based, and was set at the level which would result in the achievement of the Food and Drug Administration's (FDA) action level in fish oil after bioaccumulation (EPA 1980, EPA 440/5-80-019]). This criterion is protective of sensitive aquatic organisms. The water quality criterion for the protection of human health from the consumption from the bioaccumulation of dieldrin in fish is 0.14 ng/l, based on achieving a 1 X $10^{-6}$ lifetime excess cancer risk level. The EPA aquatic life and human health water quality criteria for DDT and dieldrin are listed in Table 1.

TABLE 1. EPA Ambient Water Quality Criteria

| Chemicals | Saltwater Aquatic Life (ng/L) 24-hour average | Human Health (ng/L) |
|---|---|---|
| DDT[a] | 1.0 | 0.59 |
| Dieldrin | 1.9 | 0.14 |
| (a) The sum of the 4,4'- and 2,4'- isomers of DDT, DDD (TDE), and DDE. | | |

Section 121(d)(2)(A)(ii) of CERCLA requires that remedial actions meet federal Water Quality Criteria established under Section 304 or 303 of the Clean Water Act where such WQC are determined by EPA to be relevant and appropriate to remedial actions at the Site. See 42 U.S.C. § 9621(d)(2)(A)(ii) and 40 C.F.R. § 300.430(e)(2)(i)(G). In evaluating whether specific WQC are relevant and appropriate to remedial actions at Superfund Site, CERCLA requires EPA to consider four criteria: 1. the uses of the receiving water body; 2) the media affected; 3) the purposes of the criteria and 4) current information. See 42 U.S.C. § 9621(d)(B)(i). See also U.S. EPA, CERCLA Compliance with Other Laws Manual - CERCLA Compliance with the CWA and SDWA (OSWER Pub. 9234.2-06/FS, Feb. 1990).

EPA guidance concerning determinations that WQC are relevant and appropriate to remedial action at a Superfund Site provides that:

> A water quality criteria component for aquatic life may be relevant and appropriate when there are environmental factors that are being considered at a Site, such as protection of aquatic organisms. With respect to the use of water quality criteria for the protection of human health, levels are provided for exposure both from drinking the water and from consuming aquatic organisms (primarily fish) and from fish consumption alone. Whether a water quality criterion is appropriate depends on the likely routes of exposure.

U.S. EPA, CERCLA Compliance With Other Laws Manual: Interim Final at 1-15 (EPA 540-G-89-006, Aug. 1989).

Both the marine chronic and human health WQC for DDT and dieldrin are relevant and appropriate to remedial actions at this Site since both aquatic and wildlife and humans may be exposed to these contaminants either directly or through consumption of contaminated organisms. As discussed in the Ecological Risk Assessment, aquatic organisms are present in all channels at the Site, which are a part of San Francisco Bay. Fish eating-birds feed in all channels in the harbor. In fact, the particular bird upon which the marine chronic water quality criterion for DDT was based is the California brown pelican, an endangered species, which has been observed feeding in the most contaminated channels at the Site. As discussed in the Human Health Risk Assessment, fishermen catch and consume fish from the Inner Richmond Harbor channels. In 1986, the State of California Department of Health Services ordered the posting of the Lauritzen Channel to warn fishermen of the fish and shellfish contamination. On April 7, 1994, the Cal-EPA Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor.

The beneficial uses designated by the State of California for central San Francisco Bay waters, which are discussed below, include fishing, wildlife habitat, preservation of rare and endangered species, fish migration, fish spawning, shellfish harvesting, and estuarine habitat.

EPA's Ambient Water Quality Criteria were specifically developed to protect beneficial uses such as these.

Porter-Cologne Water Quality Act, San Francisco Bay Regional Basin Plan, and Fish and Game Code. The release of hazardous substances to surface waters is controlled under the Porter-Cologne Water Quality Control Act and implementing regulations, and the state Fish and Game Code §5650.

Beneficial uses of surface waters were designated in the Water Quality Control Plan for the San Francisco Basin (the Basin Plan) adopted by the Regional Water Quality Control Board (SFBRWQCB, 1986). The Basin Plan designates the following beneficial uses of Central San Francisco Bay, which includes the waters at the Site:

Industrial Service Supply
Industrial Process Supply
Navigation
Water Contact Recreation
Non-contact Water Recreation
Commercial and Sport Fishing
Wildlife Habitat
Preservation of Rare and Endangered Species
Fish Migration
Fish Spawning
Shellfish Harvesting
Estuarine Habitat

The Basin Plan also contains the following narrative objective:

"All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species and/or significant alterations in population or community ecology or receiving water biota. Other relevant biological measures will be considered by the Regional Board in evaluating compliance with this objective. Additionally, effects on human health due to bioconcentration will be considered."

Resolution 68-16: Statement of Policy with Respect to Maintaining High Quality of Waters in California. The State Water Resources Control Board adopted Resolution 68-16 on October 28, 1968. The Basin Plan, discussed above, states: "Whenever the existing quality of water is better than the quality of water established herein as objectives, such existing water quality shall be maintained unless otherwise provided by State Water Resources Control Boars Resolution 68-16." The SFBRWQCB has identified Resolution 68-16 as a potential ARAR for the United Heckathorn Site. While EPA does not agree that Resolution 68-16 is an ARAR, EPA and the State agree that achieving the water quality criteria identified above would meet the requirements of 68-16 regardless of whether or not it is an ARAR.

Soils and Sediments

No chemical-specific ARARs were identified as remedial goals for soils or sediments at the Site. Based on the results of the ecological assessment, mean sediment levels were calculated to prevent violations of the ARARs for surface waters, and to meet the National Academy of Sciences

(NAS) action level for DDT in fish to ensure protection of fish-eating birds, including endangered species (see discussion below).

California Code of Regulations, Title 22. The state of California has developed chemical-specific regulatory criteria for the identification of hazardous and extremely hazardous wastes, based on Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) values (California Code of Regulations, Title 22, Sections 66699 and 66723). Any waste containing a substance at a concentration equal to or exceeding a listed TTLC is classified as a hazardous waste by the California Department of Toxic Substances Control (DTSC). Extremely hazardous wastes are also classified by DTSC using TTLCs. STLCs are related to the Waste Extraction Test (WET), also described in Title 22. Any waste which produces an extract in the WET test the concentration of which exceeds an STLC, is classified as a hazardous waste by DTSC. The TTLCs and STLCs for the major COCs at the Site, DDT and dieldrin, are listed in Table 2.

TABLE 2. State of California Hazardous Waste Limits

| Chemicals | TTLC (mg/kg wet wt) | STLC (mg/kg wet wt) |
|---|---|---|
| DDT, DDD, DDE | 1.0 | 0.1 |
| Dieldrin | 8.0 | 0.8 |

All materials known to contain concentrations of substances exceeding the limits which classify extremely hazardous wastes have been removed from the Site. Based on the results of previous investigations and the marine RI, approximately 95,000 tons of soils in the upland area of the Site and approximately 65,000 $yd^3$ of sediments in the Lauritzen Channel and Parr Canal exceed the California TTLC for DDT. No sediments outside these channels exceed the levels listed in Table 2. Although the TTLCs and STLCs do not represent cleanup levels, soils and sediments with chemical concentrations higher than the TTLCs or STLCs would be classified as hazardous under California law if they were dredged or excavated at the Site.

EPA has developed chemical-specific criteria for the identification of hazardous waste under the Resource Conservation and Recovery Act (RCRA). For the COCs at this Site, the criteria are not concentration-based, but are instead based on the source of the constituents (40 CFR 261.33). Product spills, for example, are RCRA-regulated, but generally releases of chemicals contained in process waste streams are not (40 CFR 261.33(d)(comment)). Based on a review of historical documents, the presence of COCs in marine sediments and remaining soils appears to be due to releases contained in waste streams from United Heckathorn's processes. Therefore, EPA has determined that the contaminated soils and marine sediments are not hazardous wastes regulated under RCRA.

Groundwater. There are no chemical-specific ARARs for the concentration of COCs in Site groundwater. Previous investigations found that salinity levels exceed federal (40 CFR 144.3) and state (SWRCB Resolution No. 88-63) limits for underground sources of drinking water. Consequently, the shallow groundwater at the Site is not considered a potential source of drinking water as defined under state and federal law.

The water quality criteria for surface waters discussed above do not apply to groundwater, although they might provide a basis for developing remediation goals in groundwater if there was a

complete pathway by which contaminants in groundwater caused violations of the criteria in surface water. However, as discussed in the previous chapter, an analysis of groundwater transport to the bay was made in 1986 as part of the initial state-ordered Site investigation. Although extremely high levels of pesticides were present in soils at that time, there were only sporadic detections of low levels of pesticides in groundwater samples, and modeling indicated that this potential pathway would not cause violations of state surface water quality objectives. Based on this analysis, groundwater monitoring was not required in subsequent state-ordered Site investigations. Subsequently, all highly contaminated soils containing approximately 99% of the mass of pesticides were removed from Site soils, further reducing any potential threat.

Air. There are no chemical-specific ARARs, such as National Ambient Air Quality Standards (NAAQS) or National Emission Standards for Hazardous Air Pollutants (NESHAPS), for the concentrations of Site COCs in the air. Air monitoring was performed at the Site prior to the removal of extremely high levels of exposed pesticides from Site soils. Even under those conditions, the concentrations in onsite and offsite air were well below levels of concern.

Fish and Shellfish. There are no chemical-specific ARARs for the concentration of COCs in fish and shellfish. The NAS saltwater action levels are TBCs, which provide an additional level of protection to fish-eating birds beyond the level that is the basis of the surface water ARARs for aquatic life. The FDA action levels for the marketability of fish and shellfish are also TBCs for protecting human health, but they are much less stringent than the levels that would be achieved by meeting the surface water ARARs discussed above.

The NAS and National Academy of Engineering published recommendations in 1972 for pollutant residues in compoSites of 25 or more whole fish of any species within the same size range as those consumed by any bird or mammal in the marine environment (EPA-R3-73-033, March 1973). The document cites studies demonstrating DDE induced shell thinning in mallards, American kestrels, Japanese quail and ring doves, and an inverse relationship between shell thickness and concentrations of DDE in eggs of wild populations of herring gulls, double-crested cormorants, great blue herons, white pelicans, brown pelicans, and peregrine falcons. The document concludes that a wet weight tissue range of 0.1 mg/kg to 0.5 mg/kg (100 $\mu$g/kg to 500 $\mu$g/kg) is "evidently higher than one which would permit successful reproduction of several fish-eating and raptorial birds." The criterion for DDT is 50 $\mu$g/kg, which is one-third the level which was the basis for the EPA water quality criteria discussed above.

Since the US Fish and Wildlife Service raised concerns that the EPA criteria for DDT might not be stringent enough for the protection of fish-eating birds, and an endangered species (the brown pelican) has been observed feeding at the Site, the NAS action level was retained as a TBC to help determine the protectiveness of remediation (see 55 FR 8745).

Other Requirements

Endangered Species Act. The Endangered Species Act of 1973, 16 USC §1531 et seq., requires the conservation of species of fish, wildlife and plants that are threatened with extinction. Compliance with the act at Superfund Sites requires the identification of any threatened or endangered species or of its critical habitat that would be affected by a proposed remedial action.

The U.S. Fish and Wildlife Service (FWS), which is the federal trustee for the protection of migratory birds, provided a list of endangered species that are known to nest in central or northern San Francisco Bay, or are likely to feed regularly in the immediate vicinity of Richmond Harbor (Table 3). Among these, the California brown pelican has been observed by EPA personnel feeding in all channels in Richmond Harbor, including the most contaminated waterways.

The FWS raised the concern that the tissue residue basis (0.15 mg/kg DDT in prey) of the surface water ARARs resulted in reproductive levels in pelicans that were still 10% to 30% below the levels needed to maintain a stable population, described in the 1976 study used to set the criteria. It should be emphasized, however, that the reproductive effects occurred when contamination was widespread in the birds' range, and that the contamination in Richmond Harbor is restricted to a small area. Nevertheless, the selected remedy is expected to also achieve the NAS saltwater action level for DDT in fish (0.05 mg/kg), which was identified as a TBC for determining the protectiveness of remediation.

TABLE 3. Endangered Species

| Common Name | Nests In SF or San Pablo Bays | Feeds In/Around Richmond Harbor | Prey |
|---|---|---|---|
| Brown Pelican | | Y | Fish[a] |
| Bald Eagle | | | Omni.[b] |
| Peregrine Falcon | Y | Y | Bird[c] |
| Clapper Rail | Y | | Invert.[d] |
| Least Tern | Y | Y | Fish |

(a) Fish: consumes primarily fish.
(b) Bird: consumes primarily birds.
(c) Omni.: diet usually omnivorous/scavenger.
(d) Invert.: consumes primarily small- to medium-sized invertebrates.

California Endangered Species Act. The goal of the California Endangered Species Act (California Fish and Game Code §2050) is to conserve, protect, restore and enhance any endangered or threatened species and its habitat. Among the birds likely to nest or feed in the area, most of those that are listed as endangered or threatened by the state are also listed federally. The one exception is the California black rail, a state threatened species.

CDFG submitted the names of two potentially-affected plant species, both of which are listed as rare and have distributions in the north Bay and delta. They are Mason's lilaeopsis, a minute, turf-forming perennial plant in the carrot family, and soft bird's-beak, a sparingly-branched, semi-parasitic herbaceous annual plant in the figwort family. The known distribution of Mason's lilaeopsis, which is found on saturated clay soils regularly inundated by waves and tidal action, appears to be limited to the bay delta. Soft bird's-beak occurs in the coastal salt marshes and brackish marshes of northern San Francisco and Suisun Bays.

The surface water ARARs discussed previously are five orders of magnitude more stringent than the levels necessary to protect aquatic plants. None of the potential remedies would involve destruction of rare plants or their habitat.

Coastal Zone Management Act (CZMA). Section 307(c)(1) of the CZMA requires that federal agencies conducting or supporting activities directly affecting the coastal zone conduct or support those activities in a manner that is consistent with approved state coastal zone management programs. All remedial alternatives analyzed would affect the coastal zone. Under CERCLA Section 121(e), 42 U.S.C. § 9621(e), onsite activities are not subject to administrative review or permitting

processes, but they must be consistent with the substantive requirements of the coastal zone management plan. The approved coastal zone management program for San Francisco Bay includes the McAteer-Petris Act and the San Francisco Bay Plan, and is administered by Bay Conservation and Development Commission (BCDC).

The McAteer-Petris Act and the Bay Plan were developed primarily to halt uncontrolled development and filling of the bay. Their broad goals include reducing bay fill and disposal of dredged materials in the bay, and maintaining water quality and the ecological integrity of the bay. Generally, filling of the bay is allowable only when public benefits exceed public detriment from the loss of water areas, the filling is for a water-oriented use, and there is no alternative upland location available.

Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbor Act, 42 U.S.C § 1344, regulates dredging and filling in waters of the United States. Several of the remedial alternatives analyzed include dredging contaminated sediments. Some of the potential disposal options include filling in waters of the United States. The United States Army Corps of Engineers (USACE) usually issues permits to conduct the above activities; however, since the actions analyzed would all occur onsite, permits would not be required pursuant to Section 121(e) of CERCLA, although the substantive requirements of the laws would still have to be met.

The determination of the acceptability of fill in waters of the United States is made under the Clean Water Act Section 404(b)(1) guidelines, which were promulgated in 40 CFR Part 230. The discharge of dredged or fill material is prohibited if there is a practicable alternative to the proposed discharge that would have less impact on the ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

California Hazardous Waste Control Law. California's hazardous waste facility closure requirements, 22 California Code of Regulations, Chapters 14 and 15, "Closure and Post Closure," are not ARARs with respect to the upland portions of the United Heckathorn Site because it is neither a hazardous waste facility nor a landfill. Some of the remedial alternatives analyzed would involve the consolidation and onsite containment of contaminated sediment. In the analysis of alternatives, operational requirements found in Title 22 of the California Code of Regulations are discussed, including limited long-term management, Site and cover maintenance, and institutional controls, including land use restrictions.

7. Summary of Site Risks and Remediation Levels.

Risk assessments were conducted by EPA to evaluate the threat to human health and the environment posed by contamination from the United Heckathorn Site. Results of these assessments and the final remediation levels established to address Site risks are summarized below.

Human Health Risk Assessment. The Baseline Human Health Risk Assessment for the Site was performed by ICF Technology Inc. for EPA (ICF Technology, 1994). The results indicate that among the various potential exposure pathways for Site contaminants, only the consumption of fish poses risks that are above EPA's acceptable risk range.

COCs at the Site were selected for evaluation in the risk assessment using the Site soil and sediment data collected by HLA (1986), Levine-Fricke (1990, 1991, 1993), and Weston (1993). The COCs selected for onsite soils were DDT (and metabolites), dieldrin, aldrin, endrin, and lead. Of

these, DDT and dieldrin are the most prevalent contaminants and are the primary contributors to risk. COCs selected for sediments were DDT and dieldrin.

Six exposure pathways were identified as potential concerns at the Site, as follows:

- ingestion and dermal adsorption of chemicals in onsite surface soils by workers at the Site;
- inhalation of fugitive dust from surface soils by onsite workers;
- ingestion and dermal adsorption of chemicals in onsite surface and subsurface soils by temporary construction workers at the Site;
- inhalation of fugitive dust from soils by temporary construction workers at the Site;
- incidental ingestion and dermal adsorption of chemicals in offsite soils by nearby residents, and;
- ingestion of contaminants in fish and shellfish from the Lauritzen, Santa Fe, and Inner Richmond Harbor Channels by fishermen and their families.

The onsite exposure pathways assume that the Site will continue to be used for commercial or industrial uses in the future. This is in accordance with the Bay Conservation and Development Commission's (BCDC) San Francisco Bay Plan which designates the area for port priority or water-related industry use, and the City of Richmond's M-3 (heavy industry) zoning of the Site and surrounding properties.

The six potential exposure pathways were evaluated according to EPA guidance, which uses conservative estimates of chemical toxicity and exposure, and cumulative risk from the addition of pathways. Chemical concentrations used in the risk assessment included both average and either Reasonable Maximum Estimates (RME) of Site concentrations or maximum measured values. EPA baseline human health risk assessments intentionally present conservative (i.e. health-protective) estimates of Site risks. Actual risks are likely to be lower and may in fact be zero.

The assessments for onsite worker exposure and offsite residential exposure are more conservative than usual because the soils databases in both cases were influenced toward higher values. The onsite soils database was skewed by the high number of samples taken to delineate the hot-spot excavation areas. Offsite soil screening samples were intentionally taken only in the immediate downwind area, which would have had the highest concentration had contamination occurred.

The cumulative risks calculated for the onsite soil exposure scenarios indicate that the removal actions that have occurred to date have reduced upland Site concentrations of chlorinated pesticides to acceptable levels. The highest RME cancer risk calculated for the various onsite upland worker scenarios (ingestion, dermal adsorption and inhalation of fugitive dusts from surface soils by a permanent worker) is $1 \times 10^{-4}$, and the maximum Hazard Index (HI) for noncarcinogenic effects is 1. More probable estimates for the same exposure scenario are $2 \times 10^{-5}$ and $< 1$. Risks for other onsite worker scenarios are lower. Since the onsite soils database is skewed to produce conservative results and EPA's acceptable risk range is $10^{-4}$ to $10^{-6}$, onsite risks associated with chlorinated pesticides are acceptable.

Onsite risks for occupational exposure to lead were evaluated using EPA's 500 mg/kg to 1000 mg/kg acceptable range for residential exposure, and the state of California's draft procedure for the assessment of adult exposure to lead in soil. Mean onsite lead levels are below 500 mg/kg, and the RME lead concentration results in a 95th percentile adult blood lead level below the target concentration of 10 micrograms per deciliter ($\mu$g/dL) using the state's draft procedures. Therefore, onsite lead levels are acceptable.

Offsite residential risks for COCs in nearby soils were evaluated using the maximum values obtained in EPA's soil screening survey and conservative exposure assumptions, including childhood exposure. All results were well within the acceptable risk range for carcinogenic effects and below an HI of 1 for noncarcinogenic effects. (i.e., the maximum values measured were below a Hazard Index of 1 for noncarcinogenic effects, and below a lifetime excess cancer risk level of $10^{-4}$ for carcinogenic effects).

Risks to fishermen and their families who consume fish caught in the inner Richmond Harbor were evaluated using information from two sources: fish tissue data generated as part of EPA's ecological assessment of the Site, and community interviews with individuals who fish or are familiar with fishing practices in Richmond Harbor. The community interviews confirmed that fishing occurs regularly in Richmond Harbor, particularly at a Site in the Inner Harbor Channel near the Parr Canal that has unrestricted access. Although it could not be determined from the limited interviews performed whether fishing at subsistence rates occurs in the harbor, it is clear that the fishermen are from poor, minority communities, and that the fish are caught for consumption. Fishing in the Lauritzen Channel is restricted because it is surrounded by fenced industrial facilities, and fishing from boats is discouraged by warning signs in English, Spanish, Vietnamese and Laotian, posted under a 1986 order of the CDHS. Baseline risk assessments, however, assume that institutional controls, such as fences and posting, will be ineffective or not maintained. In fact, a person was photographed fishing from an industrial facility on the Lauritzen Channel during the EPA field sampling for the ecological assessment.

The results of the risk calculations indicate that the risks from long-term consumption of either whole fish or fillets of fish caught in the Lauritzen Channel are unacceptable. Using the exposure scenario which is the basis of EPA's water quality criteria for fish consumption, the lifetime excess cancer risk associated with Site COCs is above $10^{-3}$ for consumption of whole fish, and above $10^{-4}$ for fillets. In the Santa Fe and Richmond Inner Harbor Channels, lifetime excess cancer risks are within the acceptable range using the same exposure scenario. If consumption were to occur at subsistence rates, the associated risks would be approximately 10 fold higher. The proposed remedy is expected to achieve protective levels for contaminants of concern under either exposure scenario.

On April 7, 1994, the California Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor. The State's advisory was based on levels of contaminants found in fish purchased from resident fishermen at the Parr Canal area. These fish were larger than those in EPA's studies and had slightly higher contaminant levels. The primary risk associated with the consumption of fish caught outside the Lauritzen Channel is due to contamination with polychlorinated biphenyls (PCBs), although the State would have issued the advisory based upon DDT and dieldrin contamination alone. The source of PCBs is unknown. PCBs are not related to the United Heckathorn Site, and may be present in fish throughout the bay. PCB levels in Richmond Harbor sediments are not elevated relative to typical levels in the bay.

Ecological Assessment. The Ecological Risk Assessment for the United Heckathorn Site was performed by EPA (EPA, 1994). The operations of United Heckathorn from 1947 to 1966 resulted in the release of DDT and other pesticides to and from the shoreline of the Lauritzen Channel and to San Francisco Bay. Today, in the waters of Richmond Harbor near the former plant, high levels of DDT and dieldrin remain in marine sediments. DDT and dieldrin bioaccumulate in marine organisms to the highest levels found in the state of California.

The goals of EPA's ecological assessment were to assess the threats posed to the environment by the contaminants released from United Heckathorn and to determine cleanup levels

protective of the beneficial uses of San Francisco Bay.

The waters of Richmond Harbor are part of San Francisco Bay, the West Coast's largest estuary. The estuary sustains a complex ecosystem containing thousands of species of fish, invertebrates, birds, mammals, insects, amphibians, plants and other life, as well as nearly half the waterfowl and shorebirds migrating along the Pacific flyway. Fish-eating birds, including cormorants, grebes, loons, kingfishers, and California brown pelicans (an endangered species) feed in the most contaminated channels at the Site.

The initial components of EPA's ecological assessment included a review of previous studies in the area. Highlights of this review included the findings that sediment concentrations of DDT are elevated to acutely toxic levels in the Lauritzen Channel and decline by over four orders of magnitude to near background levels in the vicinity of Point Potrero. DDT and dieldrin concentrations are extremely elevated in transplanted mussels and resident invertebrates in the Lauritzen Channel and decline by two orders of magnitude in the Inner Richmond Harbor Channel. Fish caught in the Lauritzen Channel in 1986 contained extremely high levels of DDT, which were comparable to the levels measured in 1960. Finally, a study of migratory waterfowl in San Francisco Bay found that only those which wintered in Richmond Harbor significantly accumulated metabolites of DDT. Although other chemicals are present in Richmond Harbor, they are not consistently found at levels notably above background or above levels that are likely to cause toxicity, in marked contrast to DDT and dieldrin, which are many orders of magnitude above background and were selected as the COCs for the study.

The next preliminary phase of the study was a review of the available standards, criteria, and scientific literature regarding ecological impacts of the COCs to determine as far as possible the contaminant levels in various media that could adversely impact sensitive organisms. This review indicated the ecological receptors likely to be the most sensitive and helped guide the selection of field and laboratory studies. EPA's ambient water quality criteria for DDT and dieldrin were identified as applicable to the Site. The marine chronic criteria for DDT (1 nanogram per liter, ng/L) is based upon preventing bioaccumulation in fish to levels harmful to sensitive marine birds.

The major phase of the study involved field and laboratory measurements of contaminant concentrations in various media and the performance of standard benthic tests for determining impacts from contaminated sediments. Most of the field samples were taken in October 1991. Additional fish and shellfish samples were taken in April 1992. The studies included bulk sediment toxicity testing, benthic community analyses, bioaccumulation testing, and chemical analyses in sediments, surface waters, and tissues of benthic organisms and fish and shellfish collected in trawls. An additional goal of these studies was the determination of the relationship between sediment contaminant concentrations and the concentrations in other media so that a sediment cleanup concentration could be determined which would result in the attainment of water quality criteria and protective contaminant levels in fish and shellfish tissues.

The results of the studies are summarized below. The total DDT levels measured in surface water from the Lauritzen, Santa Fe and lower Richmond Inner Harbor Channels were 50 ng/L, 9 ng/L, and 1 ng/L, respectively. The dieldrin concentrations were 18 ng/L, 2 ng/L, and nondetectable, respectively. These results indicate that the water quality criteria are violated in the Lauritzen and Santa Fe Channels, but are achieved (within the uncertainly of the analysis) or not detectable in the lower Inner Harbor Channel. Analysis of water-to-sediment ratios indicates that the Lauritzen is a source of contamination to the other channels.

Sediment concentrations of total DDT declined from over 50 mg/kg in the Lauritzen Channel to 12 $\mu$g/kg near Point Potrero. Dieldrin concentrations declined from 570 $\mu$g/kg in the Lauritzen to

nondetectable levels in the Inner Harbor Channel. These results are consistent with those of previous researchers, and with the more extensive RI of marine sediments (White et. al 1994).

In 28-day bioaccumulation tests using *Macoma nasuta,* tissue levels of DDT over 50 mg/kg (dry wt) and 1.5 mg/kg dieldrin were obtained using Lauritzen Channel sediments. Tissue levels declined to 80 µg/kg DDT and undetectable levels of dieldrin using sediments from the vicinity of Point Potrero. These results are consistent with those of previous researchers. Further studies revealed that the tissue concentrations obtained at 28 days were approximately half those obtained after a 90-day exposure. Tissue residues of DDT and dieldrin measured in field-collected benthic infauna were as high as 46 mg/kg and 2.5 mg/kg (dry wt), respectively, in the Lauritzen Channel. Concentrations dropped by about two orders of magnitude in the Inner Harbor Channel.

Tissue residues of DDT and dieldrin measured in mussels *(Mytilus sp.)* were 2.6 mg/kg and 97 µg/kg (wet wt) in the Lauritzen Channel, and declined to 40 µg/kg and 5 µg/kg in the lower Richmond Inner Harbor Channel. These results are consistent with those of the State Mussel Watch program. Tissue levels in the lower Inner Harbor Channel are higher than would be predicted from the underlying sediment concentration, again indicating that there is water-column transport of pesticides from the Lauritzen to less contaminated areas.

Tissue residues of DDT measured in whole fish (shiner perch) were over 10 mg/kg in the Lauritzen Channel, roughly 1 mg/kg in the Santa Fe Channel, and roughly 0.1 mg/kg in the Richmond Inner Harbor Channel. Dieldrin levels were roughly 0.6 mg/kg, 0.04 mg/kg, and 0.002 mg/kg in the respective channels. The contaminant concentrations in fish from the Lauritzen Channel are in the same range as those measured in the 1960s, and exceed the levels that may cause adverse impacts to sensitive predatory birds by orders of magnitude. A sensitive bird, which had no other source of DDT in its diet and which consumed more than 0.5% to 1.5% of its diet from the Lauritzen Channel, could be adversely affected. These concentrations may also cause direct toxic impacts such as reduced fry survival in fish. The results for the Santa Fe Channel are an order of magnitude lower, but still exceed levels that may cause adverse impacts to sensitive fish-eating birds. A sensitive bird that consumed more than 5% to 15% of its diet from the Santa Fe Channel might be adversely affected.

Sediment toxicity tests using the amphipod, *Eohaustorius estuarius,* indicated significant acute toxicity in sediments from the Lauritzen Channel. Sediments from the Santa Fe Channel displayed lower but significant toxicity relative to the amphipod's native Yaquina Bay, Oregon, sediment, but were not significantly different from those in the Inner Harbor Channel or other San Francisco Bay locations. DDT was determined to be the primary cause of toxicity in the Lauritzen Channel.

Additional toxicity tests conducted during the RI using the amphipod *Rhepoxynius abronius* confirmed the acute toxicity of Lauritzen Channel sediments. In four of five Lauritzen Channel compoSite samples, there was no survival of test organisms, an extremely rare occurrence indicating severe toxicity. Amphipod survival in samples beginning at the southern end of the Lauritzen Channel and proceeding out the harbor was not significantly different than survival in the San Francisco Bay fine-grained sediment control, indicating that the toxicity is confined to the Lauritzen.

An analysis of benthic infauna indicated that amphipod abundance (with the exception of the pollutant-tolerant *Grandidierella japonica*) was inversely related to DDT concentration. The minimum benthic ecological effects concentration was determined to be 100 µg DDT/g organic carbon (equivalent to 1.9 mg/kg, dry wt, at 1.9% organic carbon).

Overall, the results indicate that the gross contaminant levels in the Lauritzen Channel threaten a variety of ecological receptors at various trophic levels, including benthic and water-column organisms and fish-eating birds. Effects are likely to be much less severe in the Santa Fe Channel, although the contaminant levels in fish are significantly higher than the levels that may threaten sensitive fish-eating birds. In the Richmond Inner Harbor Channel, the DDT levels in fish (100 μg/kg) are between the level that is the basis of EPA's chronic marine water quality criteria intended to protect marine birds (150 μg/kg), and the National Academy of Sciences (NAS) recommendation (50 μg/kg) for protecting marine birds. It is clear from the results above that the most sensitive ecological receptors to sediment organochlorines in Richmond Harbor are likely to be fish-eating marine birds.

The only contaminated medium for which applicable regulatory criteria were identified is surface water. Nonregulatory or surrogate criteria were also identified for fish and shellfish tissues and sediments. Fortunately, surface water concentrations were found to be quite consistent during different tidal cycles and seasons in each of the three channels sampled. In addition, the concentrations measured in the water column and the concentrations measured in whole fish were found to agree remarkably with the concentrations predicted by the applicable EPA marine chronic water quality criteria. This demonstrates that total DDT present in surface waters is bioavailable, and that it accumulates as predicted by the applicable marine chronic criteria.

The analysis of surface water pesticide concentrations in the three channels indicates that the concentrations in the Santa Fe and Richmond Inner Harbor Channels are likely elevated by approximately one order of magnitude over the concentrations that would result from the respective local sediment concentrations, due to the flux of contaminated water from the Lauritzen Channel. This indicates that remediation of the Lauritzen would have beneficial effects throughout the Inner Harbor.

Site Remediation Goals. The final goal of the ecological assessment was to provide sufficient information to develop Site remediation goals for contaminated marine sediments containing the COCs, DDT and dieldrin, which would be protective of the environment and human health. The DDT and dieldrin water quality criteria are near or below the levels which can be quantified by the best laboratories. Protective levels in sediments are much more readily measureable, particularly for DDT. Although DDT and dieldrin co-occur, the DDT concentration is generally 10 to 100 times higher, and DDT was detected in sediment samples over a wider area. Sediment remediation goals, which are expected to attain protective levels for both contaminants, have therefore been established based on DDT concentration.

As indicated above, it was determined that the minimum ecological effects concentration for benthic organisms was 100 μg DDT/g of organic carbon, which is equivalent to 1,900 μg/kg (dry wt) at 1.9% organic carbon. Sediment concentrations exceeding this value might cause local chronic adverse impacts to benthic organisms. EPA has reviewed data for other DDT-contaminated Sites, and found a similar threshold for benthic effects. Sediments in the Lauritzen Channel and Parr Canal exceed this level. The maximum concentrations outside these channels are below this level.

The EPA marine chronic water quality criteria of 1 ng/L DDT is likely to be achieved if the average channel sediment concentration is below 1,000 μg/kg DDT (dry wt); and the human health criteria of 0.6 ng/L is likely to be achieved if the average sediment concentration is below 590 μg/kg DDT.

TABLE 4. Remediation Levels

| Final Remediation Levels | | | | Cancer Risk Level |
|---|---|---|---|---|
| Medium | Chemical | Level | Basis | |
| Surface Water | DDT<br>Dieldrin | 0.59 ng/l<br>0.14 ng/l | EPA AWQC | $1 \times 10^{-6}$<br>$1 \times 10^{-6}$ |
| Sediment | DDT | Avg: 590 µg/kg | Ecological Assessment | $1 \times 10^{-6}$ |

The average sediment concentrations in the Lauritzen Channel and Parr Canal exceed the 590 µg/kg DDT level, while the average concentrations in the Santa Fe and Inner Harbor Channels are below the level. Therefore the remediation of sediments will be limited to the Lauritzen Channel and Parr Canal. Although the concentrations of pesticides in upland soils are acceptable for human exposure, they exceed the protective levels for sediments in the adjacent channels, indicating that erosion of upland soils and stormwater runoff to the marine environment should be prevented.

The NAS action level for the concentration of DDT in fish to protect fish-eating birds is not an ARAR but was identified as a TBC to assist in determining the protectiveness of remediation. The NAS action level is likely to be achieved if the average channel DDT sediment concentration is below 420 µg/kg. Since the average concentrations of DDT in the Santa Fe and Inner Harbor Channels are below this level, cleanup of sediments in the Lauritzen Channel and Parr Canal is expected to result in achievement of the NAS action level.

8. Description of Alternatives.

The environmental media requiring remediation are soft marine sediments (young bay muds) in the Lauritzen Channel and Parr Canal. Contamination is confined to softer younger bay mud, and has not migrated into the underlying older bay mud. The volume of contaminated sediment in the Lauritzen Channel and Parr Canal is approximately 65,000 $yd^3$. Remediation of this sediment is expected to result in achievement of the remedial action goals. In addition, erosion of upland soils containing DDT at concentrations exceeding the final remediation level for sediments must be prevented. No action will be taken in other areas in Richmond Harbor, such as the Santa Fe Channel and Inner Harbor Channel, because sediment levels are below the remediation levels established above.

The action alternatives presented below all include dredging of contaminated sediments and paving of upland soils on the northern half of the Levin Richmond Terminal. The principal difference among these alternatives is in the location chosen for disposal of dredged sediments. In addition, the "no action" alternative has been retained as a baseline for comparison with the other alternatives, as required by the National Contingency Plan, 40 C.F.R. § 300.430(e)(6). The four alternatives are summarized below:

Alternative 1: no action

Alternative 2: confined disposal of marine sediment in the Port of Richmond's Point Potrero graving docks, and capping of upland areas

Alternative 3: confined disposal of marine sediment in the Lauritzen Channel, and capping of upland areas

Alternative 4: offsite disposal of marine sediment by rail, and capping of upland areas.

With the exception of "no action," all of the alternatives have been developed to meet the remedial action goals. In addition to the components listed above, each action alternative includes environmental monitoring to evaluate the effectiveness of the remedy, and institutional measures to limit future Site uses to those considered in the human health risk assessment.

Common Elements

Elements which are common to two or more alternatives, including dredging, monitoring, paving of upland areas, and institutional controls, are discussed below.

Dredging. Alternatives 2 through 4 would involve dredging of the younger bay mud from the Lauritzen Channel and Parr Canal. The total volume of these sediments is estimated to be 65,000 $yd^3$, although if Alternative 2 were selected, some of the most contaminated sediments would remain in place in the Lauritzen Channel within a Confined Disposal Facility (CDF). In areas to be dredged, all soft sediments down to the hard older bay mud contact would be removed.

Silt curtains would be erected across the mouths of the channels prior to dredging to prevent transport of sediment disturbed by the dredging process out of the excavation area. In addition, control measures would be implemented to prevent or minimize the runoff or return of sediment back to the excavation areas. The surface water ARARs for the concentrations of COCs are not currently achieved, and would not be expected to be achieved in the Lauritzen Channel and Parr Canal during the dredging phase of remediation at the Site. The surface water ARARs are remedial action goals which are expected to be achieved after the dredging is completed.

Two sunken barges, one small tank, and other debris (see Figure 3) would have to be removed from the Lauritzen Channel prior to dredging under Alternatives 2 through 4. In one of the configurations of Alternative 3, a CDF would be constructed in the northern end of the channel, allowing one barge and the small tank to remain in place. Samples of sediment taken by EPA divers from inside the barge and tank indicated that they are not sources of contamination.

Monitoring. In order to determine the effectiveness of the remedial action, a post-remedial monitoring program would be required. Monitoring would be expected to occur annually for at least five years or until it was demonstrated that the remediation goals had been achieved, and could continue at longer intervals (e.g., once every five years) for an additional period of time. The monitoring program would also be implemented as part of the "no action" alternative.

The post-remedial monitoring program would include surface water and biological monitoring components. Periodic collection and analysis of surface water samples would determine compliance with EPA ambient water quality criteria, which are ARARs. Bioaccumulation could be monitored through the periodic deployment and subsequent collection and analysis of mussels, as is done in the State Mussel Watch program. Mussels provide the most consistent, readily obtainable biological data. These data can be compared to the historic State Mussel Watch bioaccumulation

database for Richmond Harbor to confirm reductions in tissue residues. Sampling locations to confirm the effectiveness of the remedy would be in the Lauritzen, Santa Fe and Richmond Inner Harbor Channels. Additional sampling might be required based on the remedy selected. For example, if confined disposal at the Port of Richmond's graving docks were selected, an additional monitoring station would be established outside the facility.

Capping of Upland Area. The results of the human health risk assessment indicate that the removal actions performed at the Site between 1990 and 1993 reduced contaminant concentrations in upland soils to levels that are acceptable for current and expected future commercial or industrial uses. Nevertheless, roughly 95,000 tons of soils over a large area of the Site exceed the much lower remedial action goal for marine sediments. Therefore, a remediation goal of erosion prevention was established for upland soils. The northern half of the Levin Richmond Terminal, which is where the United Heckathorn facility was located and where concentrations exceed 1 mg/kg DDT, is currently unpaved. Each of the action alternatives includes paving this area with asphalt. The area of the upland asphalt cap is shown in Figure 6. The cost of capping this area was estimated in the FS performed by Levine-Fricke (1991). The estimate of $400,000 includes a 20% contingency. This cost is included in the estimates generated for each remedial alternative except "no action."

Institutional Controls. The human health risk assessment concluded that the concentrations of COCs in upland soils at the Levin Richmond Terminal had been reduced to acceptable levels for current and expected future industrial uses. This is consistent with the San Francisco Bay Plan under which the area is zoned for port priority or water-related industrial use. In order to provide an additional measure of assurance that the Site could not be converted to other use, such as residential, without further study and possibly further remediation, a deed restriction on the property will be included as part of Alternatives 2 through 4.

The Lauritzen Channel is currently posted with signs warning fishermen that fish and shellfish may be contaminated with DDT and other pesticides. These signs will remain in place until post-remedial monitoring confirms that concentrations of the COCs have been reduced to acceptable levels.

Alternative 1: No Action with Monitoring. The NCP requires the analysis of no action as an alternative (40 CFR 300.430(e)(6)). Under no action, no further remediation would be conducted at the Site, although the monitoring program would still be performed to evaluate the effects of the remaining contamination. The existing institutional controls would remain in place.

The no action alternative does not meet either of the two threshold criteria described below (overall protection of human health and the environment, and compliance with ARARs). Because the threshold criteria are not met, this alternative is not eligible for selection.

Alternative 2: Dredging with Containment at the Point Potrero Graving Docks. The major components of this alternative are dredging approximately 65,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and disposing of the sediment in a CDF constructed at the Port of Richmond's graving docks.

The graving docks are located at Point Potrero, at the southern end of the Richmond Inner Harbor Channel, approximately one mile from the location of the former United Heckathorn facility (see Figure 2). A sediment containment facility constructed at the graving docks could be determined to be "onsite" under the definition of the NCP, which includes all locations within the areal extent of contamination and all suitable areas in very close proximity necessary for implementation of the response action (40 CFR 300.5).

Graving docks are concrete box structures used to drydock ships. The Point Potrero graving docks were built during World War II and, due to their relatively small size, are obsolete for modern vessels. The Port of Richmond suggested that the graving docks be analyzed as a potential disposal Site for contaminated sediments because they have the capacity to effectively contain very large volumes. Depending on the configuration and number of basins used, the facility could contain between 89,000 $yd^3$ and 500,000 $yd^3$ of sediment. The facility would not be simply a disposal Site, but would be constructed so that it would be suitable for use as a marine shipping terminal. Use of the graving docks would not be offered by the Port of Richmond for disposal alone. The Port has analyzed a number of alternative configurations which would accommodate varying volumes of dredged material and provide the Port an additional berth or pier of at least 600 ft. The Port's cost estimates for each of the various configurations include the costs of preparing the basins to receive dredged material, and the costs of enhancing the facility for Port use.

The configuration chosen for analysis would entail filling Basin 1 with approximately 65,000 $yd^3$ of sediment dredged from the Lauritzen Channel and Parr Canal, and 24,000 $yd^3$ of additional material to produce a total of 89,000 $yd^3$. This is the lowest cost configuration which would provide sufficient volume to contain sediments dredged from the Lauritzen Channel and Parr Canal. Prior to receiving sediment, Basin 1 would be inspected and repaired if necessary, and then sealed with a concrete bulkhead. Wick drains would be installed for dewatering. The pier between Basins 2 and 3 would be removed, and Basin 3 would be lengthened from 500 ft to 750 ft, creating a new berth for large ships.

Dredged sediment would be barged to the drydock and depoSited by mechanical means in order to minimize entrainment of water. It is estimated that consolidation of the sediment within the basin would take a minimum of four years. If hydraulic dredging were used, consolidation would probably take longer. The average concentration of DDT in the sediment would be 30 mg/kg wet wt. Based on the results of the treatability testing performed during the marine RI, it is expected that treatment by filtration and carbon adsorption would be required before effluent produced by dewatering could be discharged from the basin to the bay. Although a Waste Discharge Permit would not be required under CERCLA, substantive requirements would have to be achieved, including toxicity limits and compliance with numeric water quality criteria. A possible alternative would be to discharge effluent to a sanitary sewer under permit from the local agency. Discharges to the sewer system would be "offsite" and require permitting.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, removal of the sunken barges and other debris from the Lauritzen Channel, asphalt paving of the northern half of the Levin Richmond Terminal, and institutional controls. The estimated cost of this alternative included roughly $700,000 to prepare Basin 1 and close it after filling, and roughly $1.8 million to remove the pier between Basins 2 and 3, and lengthen Basin 3 to produce a 750-ft berth. Annual overhead and maintenance costs include evaluation and repair of the graving docks, operation and maintenance of an effluent treatment system for dewatering sediment, and post-remediation monitoring. The total estimated cost for this alternative is $5.6 million. This estimate does not include the costs, which could be substantial, of obtaining an agreement among various parties regarding the use of the facility and future liability. In addition, state and federal agencies have indicated that they might seek mitigation to compensate for the fill associated with this alternative. The costs of mitigation would also significantly increase the total cost of this alternative.

This alternative would be expected to meet the remedial action goals defined in Table 4 and provide effective long-term protection of human health and the environment. It is unclear, however, whether it would comply with ARARs related to bay fill unless an upland alternative were unavailable. Dredging would cause short-term impacts within the excavation areas. Because the

dredged sediment would be classified as hazardous waste pursuant to State of California regulations, this alternative would require agreements between a number of government and private parties regarding long-term liability and operations and maintenance, limiting its implementability.

Alternative 3: Dredging with Containment at Lauritzen Canal. The major components of this alternative would be dredging between 44,000 $yd^3$ and 52,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and depositing it in a CDF constructed within the Lauritzen Channel. Two variations of CDFs were analyzed for this alternative based on alternatives developed by Levine-Fricke (1991). The first consists of a steel sheetpile wall approximately 1300 ft long constructed along the eastern shoreline of the channel. The sheetpile wall would be tied to anchors placed in the soil at the Levin Richmond Terminal. This configuration does not interfere with either the storm drain at the northern end of the channel, or with properties across the channel from Levin.

The second variation of a CDF in the Lauritzen would consist of a rock dam across the northern end of the Lauritzen Channel. Advantages of this configuration are that it would minimize the dredging of the most contaminated sediments in the channel; the barge, tank, and debris in the northern end of the channel could remain in place; it would require less maintenance than a steel sheetpile wall; and it would be less costly to construct.

Dredged sediment could be depoSited in the CDF by mechanical means, or by hydraulic dredging. Consolidation of the sediment within the basin would take several years. The average concentration of DDT in the sediment would be 30 mg/kg wet wt. Based on the results of the treatability testing performed during the marine RI, it is expected that treatment by filtration and carbon adsorption would be required before effluent produced by dewatering could be discharged from the basin to the bay. Although under CERCLA a Waste Discharge Permit need not be obtained, substantive requirements would have to be achieved, including toxicity limits and compliance with numeric water quality criteria. A possible alternative would be to discharge effluent to a sanitary sewer under permit from the local agency. Discharges to the sewer system in this case would be "offsite" and require permitting.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, asphalt paving of the northern half of the Levin Richmond Terminal, removal of at least one sunken barge from the Lauritzen Channel, and institutional controls. Annual overhead and maintenance costs include evaluation and repair of the CDF, operation and maintenance of an effluent treatment system for dewatering sediment; and post-remediation monitoring. The cost of dredging the sediment for this alternative would be slightly lower than the costs described for the previous alternative since some of the sediment would remain in place and transportation would not be required. The estimated cost range is $13 million for the sheet-pile wall variation and $4.3 million for the rock dam. In addition, state and federal agencies and the Port of Richmond have indicated that they might seek mitigation to compensate for the fill associated with this alternative. The cost of mitigation would also significantly increase the total cost of this alternative.

This alternative would be expected to meet the remedial action goals defined in Table 4 and provide effective long-term protection of human health and the environment. It is unclear, however, whether it would comply with ARARs related to bay fill unless an upland alternative were unavailable. This alternative would require the least amount of dredging, which would minimize short-term impacts within the excavation areas. The rock dam variation of this alternative would have an impact on adjacent property owners, which could hinder implementability. In addition, because the dredged sediment would be classified as hazardous waste pursuant to State of California regulations, this alternative would require agreements between a number of government and private parties regarding long term liability and operations and maintenance, limiting the

implementability of this alternative.

Alternative 4: Dredging with Offsite Disposal. The major components of this alternative are dredging approximately 65,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and transportation of the sediment by rail to a permitted offsite disposal facility. Transport by rail offers several significant advantages. The Levin Richmond Terminal is a rail facility with lines running the length of the shoreline of the Lauritzen Channel. Since dredging can produce very large volumes of sediment very quickly, the limiting factor in removing sediment from the Site would be the time required to load it for transport. Watertight rail cars would be used to prevent releases during transportation. A rail car can carry 100 tons, and a single train can transport approximately 8000 tons. It is estimated that the entire project could be accomplished in about two months.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, asphalt paving of the northern half of the Levin Richmond Terminal, removal of barges and debris from the Lauritzen Channel, and institutional controls. The estimated cost for this alternative is $7.3 million. Since the sediments would be transported offsite to a permitted disposal facility, long-term operations and maintenance costs are only those associated with the monitoring program and maintenance of the asphalt paving at the Site. The estimated disposal cost for this alternative includes transportation by rail and was provided by the East Carbon Development Corporation, a facility in eastern Utah which is permitted to receive non-RCRA wastes.

This alternative would be expected to meet the remedial action goals defined in Table 4, provide effective long-term protection of human health and the environment, and comply with all ARARs. Dredging would cause short-term impacts within the excavation areas. Disposal of sediments at an offsite facility would require no bay fill, and would minimize long-term maintenance costs and liabilities. Offsite disposal by rail appears to be implementable at a reasonable cost.

9. Summary of Comparative Analysis of Alternatives.

The alternatives were analyzed using the nine criteria of the NCP (see 40 CFR 300.430(f)(5)(i)). The comparative analysis with respect to each criteria is summarized below. Overall, it was determined that Alternative 4, Dredging with Off-Site Disposal provides the best balance among the alternatives with respect to the evaluation criteria.

Overall Protection of Human Health and the Environment: All of the alternatives except "no action" are expected to provide adequate protection of human health and the environment. The risks associated with the COCs are due to their current location in or near the aquatic environment. Alternatives 2 and 3 would achieve protection by isolating the contaminants from the aquatic environment in onsite confined disposal facilities which would require perpetual maintenance to ensure that contaminants were not re-released to the marine environment. Alternative 4 would achieve protection by transporting contaminants offsite.

Compliance with ARARs: The "no action" alternative would not result in compliance with ARARs. Alternative 2, confinement in the Port of Richmond's graving docks, relies on the dual purpose of the remedy to create a port facility in order to achieve consistency with the CZMA and compliance with the Clean Water Act. Alternative 3, confinement in the Lauritzen Channel, would probably not be consistent with the CZMA or the Clean Water Act unless it was determined that there was no practicable alternative. Alternative 4, offsite disposal, complies with all ARARs, and appears to be practicable.

Long-term Effectiveness and Permanence: Alternatives 2 through 4 are all expected to provide adequate long-term effectiveness and permanence. Concrete vaults and shoreline CDFs have been

used successfully at other Sites to contain contaminated sediments, although they require perpetual maintenance. Alternative 4, offsite disposal, provides the highest degree of permanence because the contaminated sediments would be stored far from the aquatic environment. Although the contaminated sediment presents an unacceptable threat to human health and the environment because of its current location which allows exposure to marine organisms and biomagnification in the food chain, the expected average concentration after dredging of approximately 30 mg/kg is well within the acceptable range for direct human exposure, and would not present a direct threat when contained in a disposal facility.

Reduction of Toxicity, Mobility, or Volume through Treatment: None of the alternatives employs treatment. Alternatives 2 through 4 meet the expectation of the NCP for containment of high volumes of waste which have relatively low contaminant concentrations. Based on the process screening conducted in the FS, treatment of the COCs in Site sediments would not be practicable. Site upland soils which contained extremely high levels of contaminants were addressed in previous removal actions.

Short-term Effectiveness: None of the alternatives would be expected to cause short-term risks to the community. The risks to workers are expected to be primarily those associated with construction, transportation, dredging, and solids handling. All of the dredging alternatives would cause short-term impacts within the excavation areas, and would remove the existing benthic communities from the bottoms of the Lauritzen Channel and Parr Canal. However, it is expected that the channel bottoms would be recolonized by more diverse populations. Alternative 4, offsite disposal, would achieve protection in the shortest amount of time.

Implementability: Alternative 4 is the most readily implementable. It would require the least amount of onsite construction and preparation, and should have no administrative impediments. Alternative 2, consolidation at the Port of Richmond's graving docks, would require a complex agreement between the City of Richmond and other parties regarding ownership, operations, and liability. Alternative 3, consolidation in a CDF in the Lauritzen Channel, would likely encounter state opposition, and could require agreements among adjacent property owners regarding loss of shoreline and access, as well as agreements with PRPs and several government agencies, including the City of Richmond, DTSC and EPA.

Cost: The estimated costs for all of the alternatives are comparable. The cost for Alternative 4, offsite disposal, while not the lowest, is the most certain. The estimated costs for Alternative 2, confinement at the Port of Richmond's graving docks, and Alternative 3, confinement at the Lauritzen Channel, would be more likely to change given the need for agreements among parties regarding ownership, maintenance and liability for facilities containing wastes exceeding state hazardous levels. The costs for construction, dewatering, effluent disposal, and hazardous waste storage are also less certain than the offsite transportation and disposal costs. In addition, the cost estimates for alternatives 2 and 3 did not include possibly significant costs for mitigation of bay fill, which had been proposed by state and local agencies.

State Acceptance: The Department of Toxic Substances Control of Cal-EPA, which is the lead state agency for oversight at this Superfund Site, agrees with the selected remedy. In addition, the San Francisco Bay Regional Water Quality Control Board and the San Francisco Bay Conservation and Development Commission also agree with the selected remedy.

Community Acceptance: Based on the comments received during the Proposed Plan comment period, it is evident that the selected remedy is acceptable to the community. No comments were received from the community opposing the selected remedy or supporting other alternatives.

10. Selected Remedy.

The selected alternative is dredging with off-site disposal. Components of the selected remedy include:

- Dredging of all soft bay mud from the Lauritzen Channel and Parr Canal, with off-site disposal by rail of dredged material.
- Placement of clean sediment after dredging.
- Capping of areas around the former Heckathorn facility, shown in Figure 6.
- A deed restriction or notice limiting use of the Levin-Richmond terminal to the current industrial classification.
- Marine monitoring to determine the effectiveness of the remedy.

The remedy will involve dredging of the younger bay mud from the Lauritzen Channel and Parr Canal. The total volume of these sediments is estimated to be 65,000 $yd^3$. In areas to be dredged, all soft sediments down to the hard older bay mud contact would be removed. Two sunken barges, one small tank, and other debris (see Figure 3) would be removed from the Lauritzen Channel prior to dredging. In limited areas dredging may be impractical or of limited effectiveness in removing all contaminated sediments because of obstructions such as rip-rap and capping may be required.

Silt curtains will be erected across the mouths of the channels prior to dredging to prevent transport of sediment disturbed by the dredging process out of the excavation area. Dredged material will either be loaded directly onto rail cars or stockpiled on a barge or on land to facilitate loading. Excess water, if any, produced during dredging and initial handling will be returned to the dredging area inside the silt curtains. However, control measures, such as physical separation or filtration, will be implemented to prevent or minimize the runoff or return of sediment back to the excavation areas. The surface water ARARs for the concentrations of COCs are not currently achieved, and would not be expected to be achieved in the Lauritzen Channel and Parr Canal during the remediation. The surface water ARARs are remedial action goals which are expected to be achieved after the remediation is complete.

The dredged material will be transported by rail to a permitted land disposal facility which meets the requirements of the CERCLA offsite policy. The expected average concentration of approximately 30 mg/kg, is well within the acceptable range for direct human exposure, and will not present a long-term threat at a disposal facility. Monitoring of surface water and biota will occur for at least five years or until it is demonstrated that the remediation goals have been achieved, and could continue for a longer period of time. To promote the return of flora and fauna to the dredged areas, a 1/2 foot layer of clean material will be placed after dredging. The material will not significantly alter the existing bathymetry or impede navigation. The estimated cost for the selected remedy is $7 million.

The selected remedy provides overall protection of human health and the environment, complies with ARARs, and provides the best overall balance of alternatives under the nine selection criteria of the NCP.

11. Statutory Determinations

The selected remedy is protective of human health and the environment, complies with ARARs, and is cost effective. The principal threats at the Site were addressed by removal actions. Because this remedy will result in hazardous materials remaining onsite, a review will be conducted five years after the commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

12. Documentation of Significant Changes.

The proposed plan for the Site was released for public comment in July, 1994. The proposed plan identified alternative 4, dredging with offsite disposal as the preferred alternative. EPA reviewed all written and oral comments submitted during the comment period. Upon review of these comments, EPA determined that no significant changes to the remedy, as it was originally identified in the proposed plan, were necessary.

During the proposed plan comment period, the National Oceanic and Atmospheric Administration and the U.S. Fish and Wildlife Service recommended that a layer of clean material be placed in the channels after dredging for restoration. The material would promote the return of habitat and fauna to the dredged areas. The proposed plan included the placement of clean fill in limited areas. The final remedy includes placement of a 1/2 foot layer of clean material after dredging in the Lauritzen Channel and Parr Canal. The cost of placing clean material, which would apply to all alternatives except "no action," was not included in the estimates contained in the FS or proposed plan. The estimated cost is $200,000, which increases the total estimated cost from $6.8 million in the proposed plan to $7 million for the final remedy.

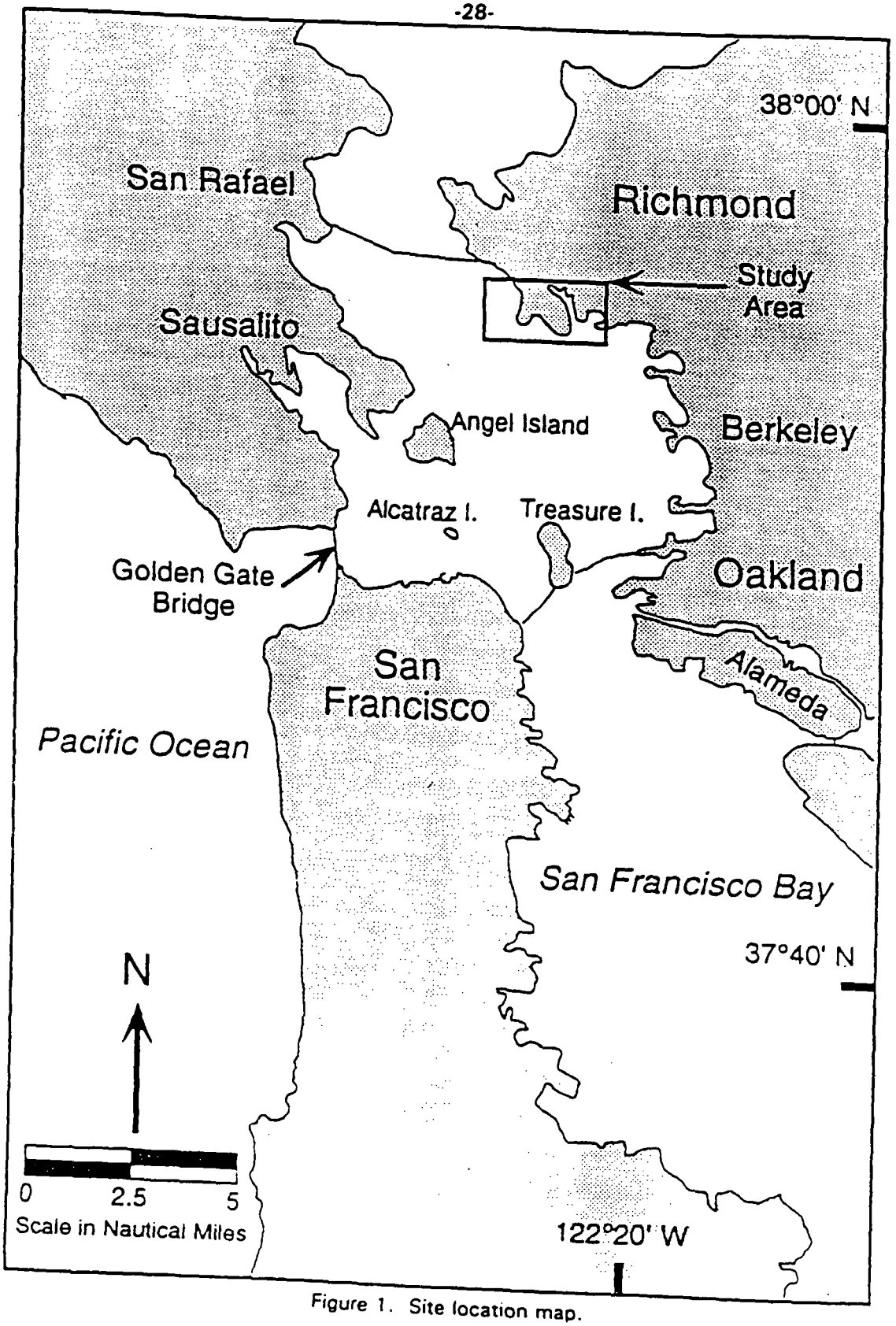



Figure 1. Site location map.

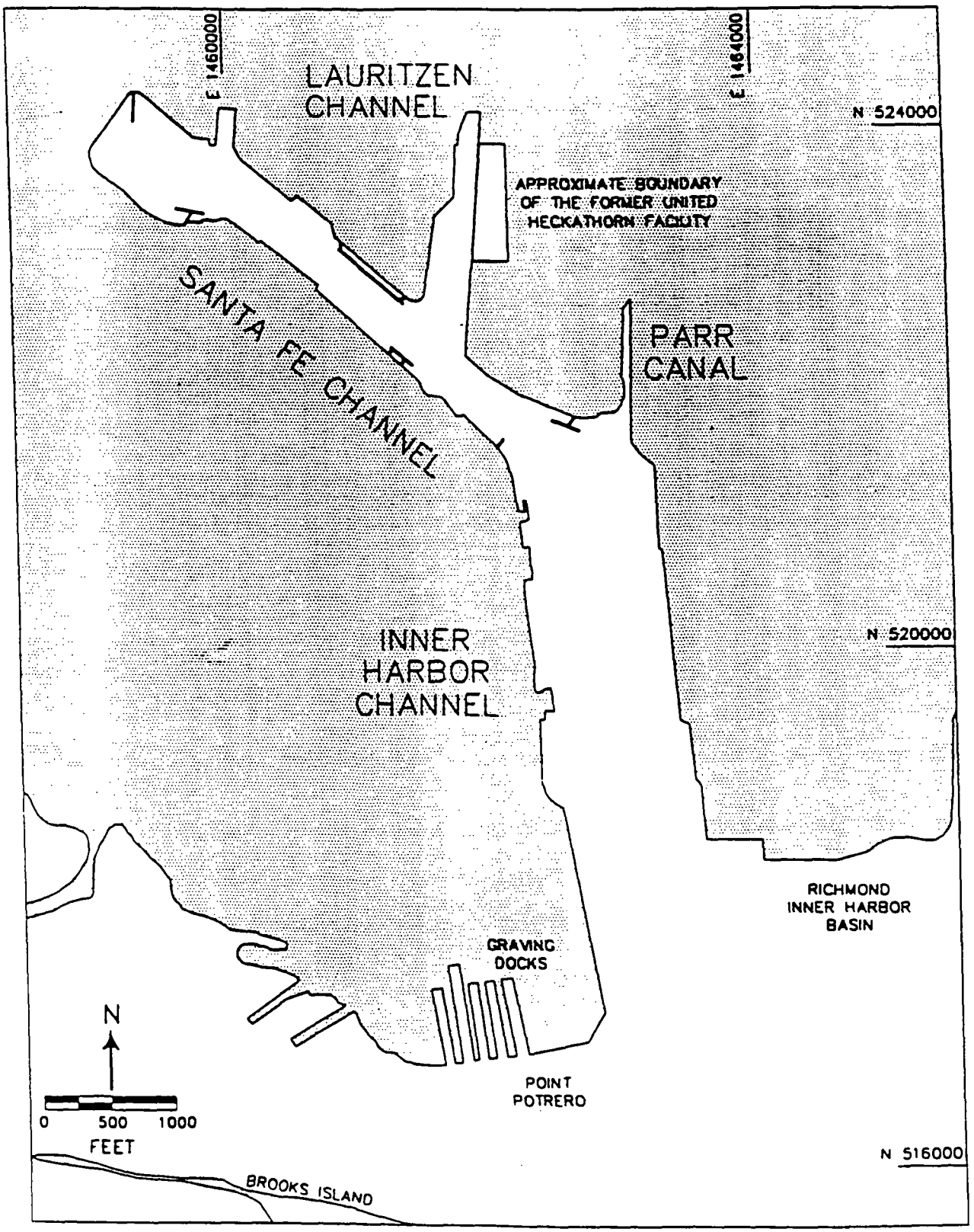



Figure 2. Map of Richmond Harbor.

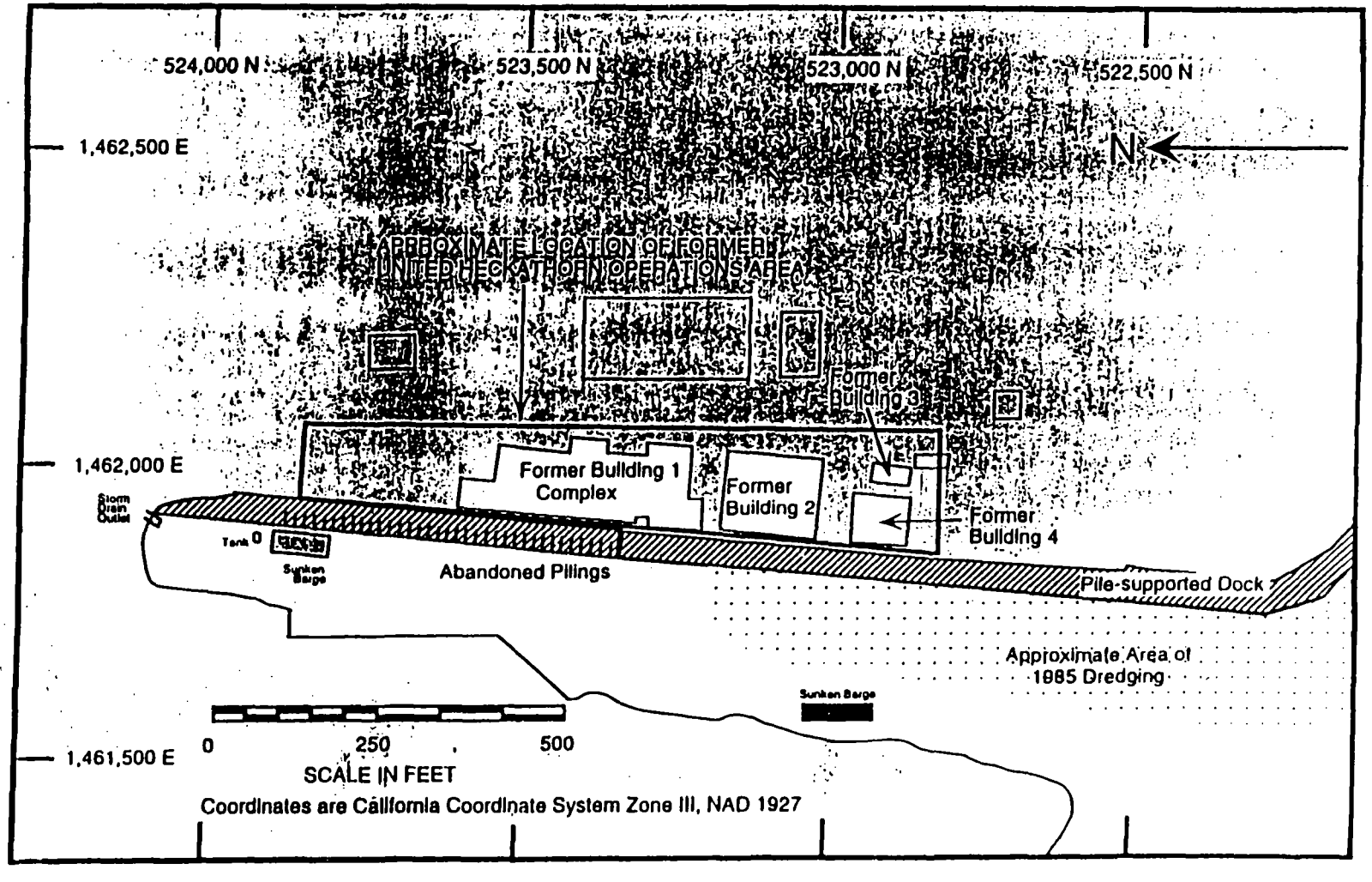
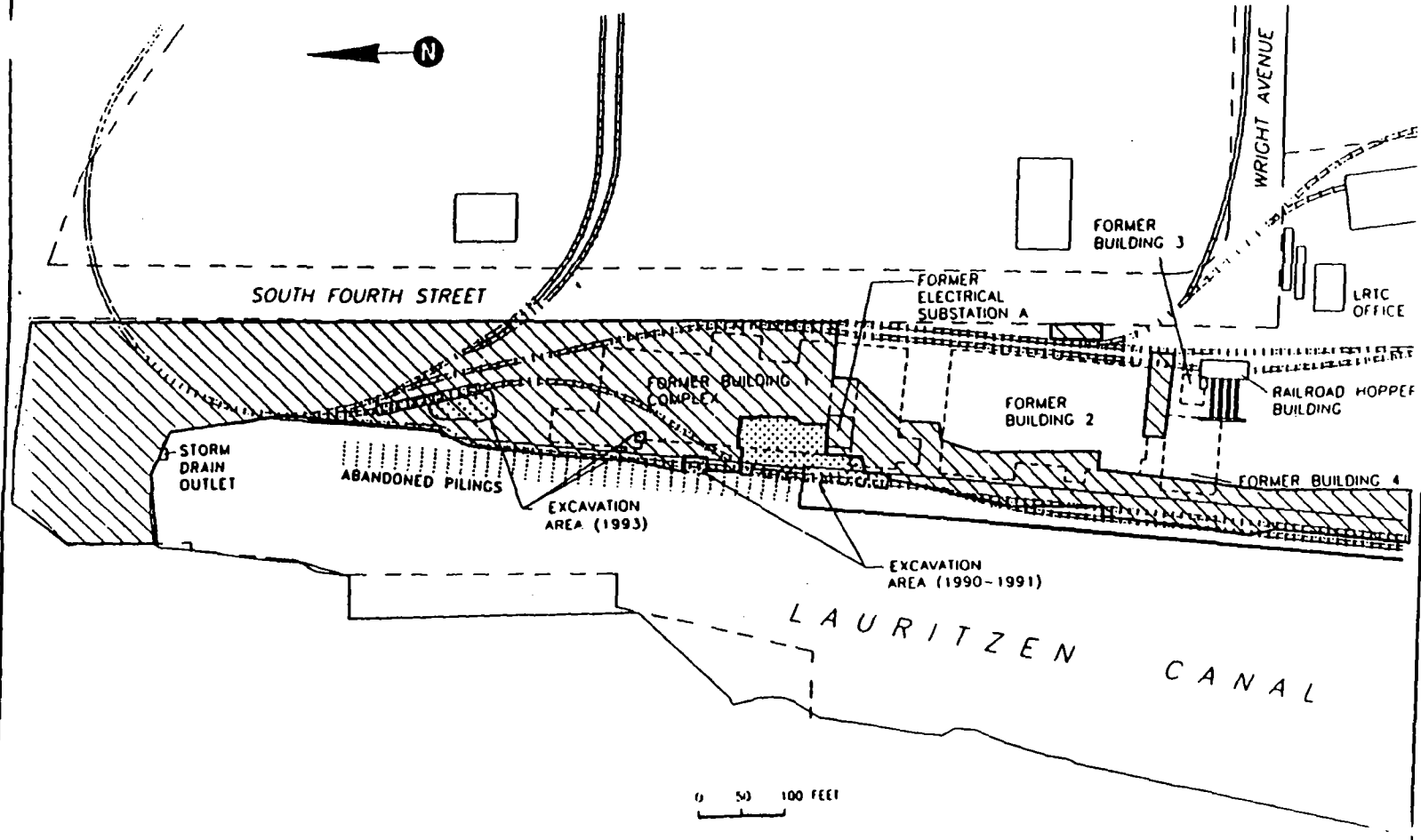



Figure 3. Map of the Lauritzen Channel.




From 12/22/93 letter from Levine-Fricke to EPA.

Figure 4. Upland soils with pesticide concentrations exceeding 1 ppm.

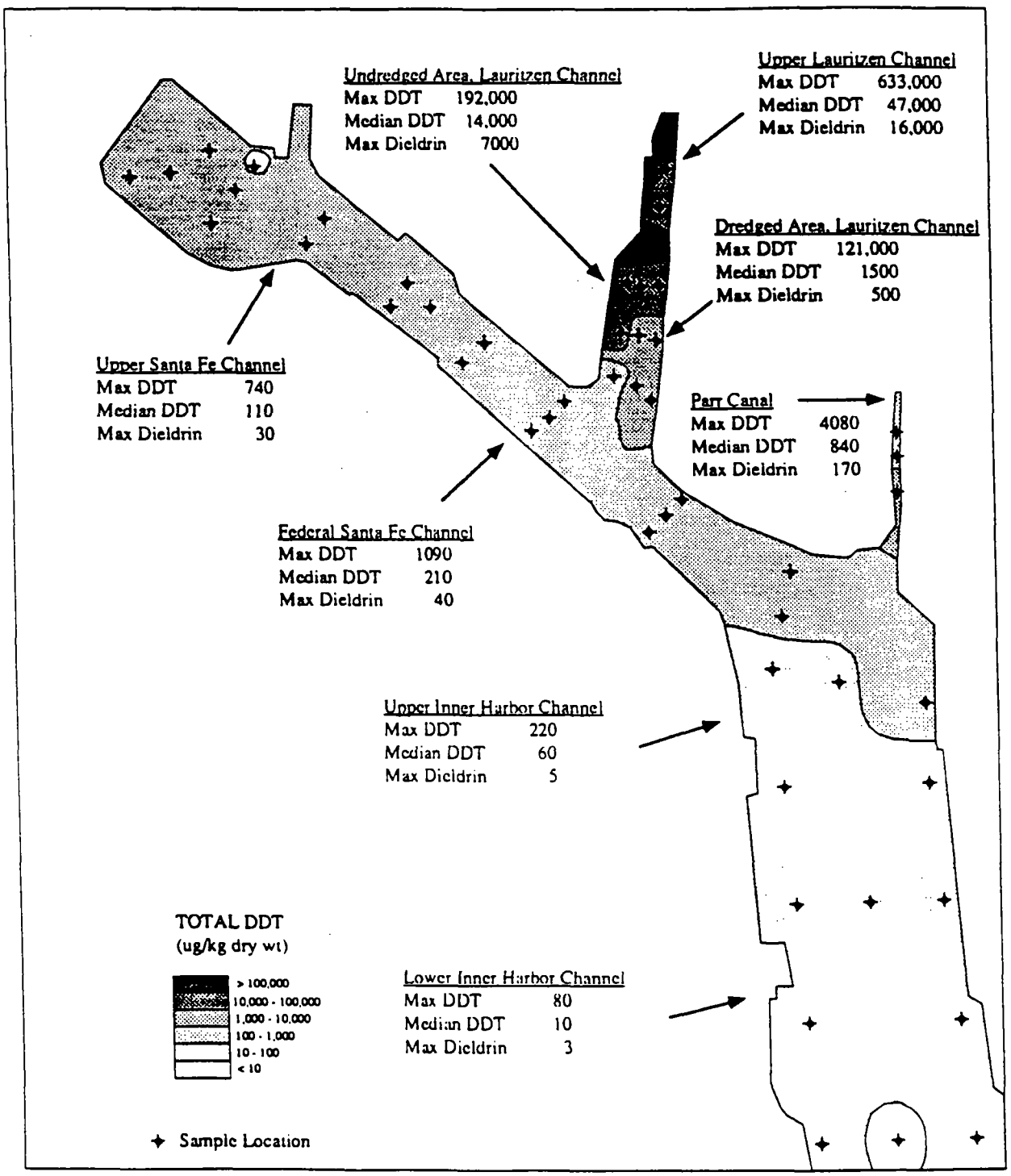
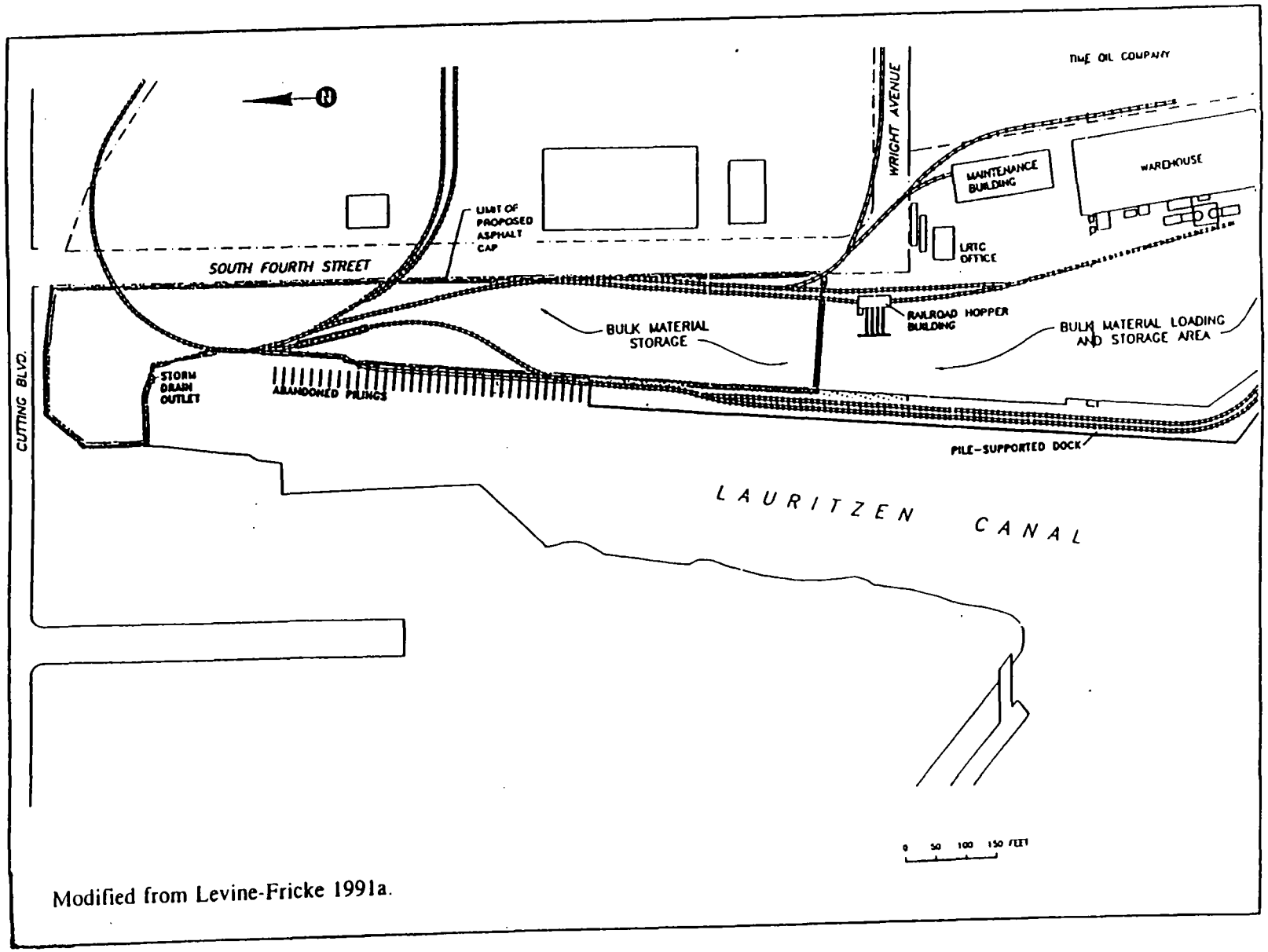



Figure 5. Average total DDT in younger bay mud, Richmond Harbor.




Modified from Levine-Fricke 1991a.

Figure 6. Limit of asphalt cap for upland soils.

**RESPONSE TO COMMENTS**

United Heckathorn Superfund Site
Richmond, California

October 14, 1994

EPA released the Proposed Plan for the United Heckathorn Superfund Site for public comment on July 15, 1994. The comment period included a 30-day extension which was requested by Potentially Responsible Parties (PRPs). Consequently, the public comment period closed on September 14, 1994.

Three persons made comments at the Public Hearing on August 2, 1994, one of which was also submitted in writing. Six additional written comments on the Proposed Plan were submitted during the comment period. The oral and written comments are addressed below in the order in which they were made. Two additional comments, one on the final human health risk assessment and one on the Feasibility Study, were also received during the comment period. These are discussed after the comments on the Proposed Plan.

EPA reviewed all written comments submitted during the public comment period and all oral comments made at the Public Hearing. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary. However, a minor change has been made in response to comments from the United States Fish and Wildlife Service and the National Oceanic and Atmospheric Administration. The Proposed Plan included a provision for minor amounts of clean material to be placed in limited areas after dredging. The comments specified that six inches of clean material be placed in dredged areas to promote restoration. The ROD specifies the six-inch layer, and includes a total estimated cost for placement of $200,000, raising the final remedy cost from the proposed $6.8 million to $7 million.

*1. The Bay Conservation and Development Commission stated that EPA's preferred alternative for remediation "appears to be the most consistent with the Commission's laws and policies [and] best achieves compliance with federal and state environmental laws while ensuring the protection of San Francisco Bay's diverse natural resources, and the health and safety of the surrounding human community." (letter, 7/21/94)*

*2. The Save San Francisco Bay Association expressed its support for EPA's Proposed Plan, stating that it "is the best way to deal with United Heckathorn's legacy of chemical contamination in the Richmond Harbor. Other proposed alternatives are unacceptable because of the need for bay fill and maintenance." (letter, 7/29/94)*

*3. The Director of the Port of Richmond spoke at the public hearing and also submitted his comments in writing (8/2/94). Although the Port supports the selected remedy, it is concerned that lower levels of contaminants elsewhere in the harbor may impact disposal options for material dredged for navigation purposes. The Port stated that it would hold EPA responsible for the costs of disposal of any sediments not addressed by the remedy.*

**Response:** EPA appreciates the Port and the City of Richmond's constructive participation throughout the remedy selection process. Based on the results of the Remedial Investigation and Human Health and Ecological Risk Assessments, EPA concluded that cleanup of those channels

with mean sediment DDT concentrations above 590 ppb is necessary to protect human health and the environment. Channels and private berths outside the cleanup area may still contain sediments with DDT levels below a mean of 590 ppb or with measurable levels of other site-related and/or non site-related contaminants which might affect dredge spoils disposal options. However, based on the results of EPA's RI, HHRA and ERA, contaminant levels in sediment in the Santa Fe Channel and the Inner Richmond Harbor Channel do not pose a significant risk to human health and the environment that would trigger remediation under Superfund. Consequently, EPA in the Record of Decision for the Site has determined that no remedial action is necessary with regard to sediments in the Santa Fe Channel and Inner Richmond Harbor Channel. Under the authority established in CERCLA, particularly in Section 104(a) and Section 121, 42 U.S.C. § 9604(a) and § 9621, EPA is authorized to select remedial actions to protect human health and the environment. EPA is not authorized under CERCLA to make remedial decisions solely to redress economic or property damage that may result or may have resulted from the presence of low levels of hazardous substances or other contaminants. Should the Port incur additional dredge spoil disposal costs because of low level contamination present in the dredged sediment, the City is free to pursue any available legal remedies against parties responsible for the contamination.

*4. Mr. Richard Oba, vice president of United Anglers of California spoke at the public meeting and expressed support for EPA's proposed alternative, stating, "we would like to see the job finished."*

*5. Ms. V. Peters spoke at the public meeting and expressed concern that EPA does not have a community public alert system already in place, stating, "should there be a railway accident, I think you really should have a plan that you can present to the community."*

Response: At the time of the public meeting for a Superfund Proposed Plan, EPA has not yet selected the remedy. In this case, of four alternatives considered, three did not involve offsite transportation and disposal of waste. EPA must solicit and consider comments on all alternatives prior to making a final selection.

EPA efforts to inform and involve the community will continue throughout the period of remedial design and remedial action. A health and safety plan will be prepared and made available to the public prior to initiating any action at the site. This plan will address transportation safety and contain procedures to ensure that the dredged sediment is safely contained during transport and that if a spill occurs specific procedures will be implemented to immediately clean up the spill and minimize any risk that the community could come in contact with the spilled sediment. Transportation of the dredged sediment will be conducted by licensed transporters with oversight by EPA acting in cooperation with local and state authorities.

*6. Mr. Nicholas Pinette, a resident of Richmond, stated that the preferred offsite disposal alternative makes good sense, but questioned where the dredged material would be transported to for disposal and how it would be stored. (letter, 8/7/94)*

Response: EPA has not selected a particular landfill as part of this Record of Decision. The dredged material will be transported to a landfill which is permitted to receive the waste and meets the CERCLA offsite policy which requires EPA to determine that the facility is operating in compliance with all federal and state permits prior to shipment. The choice of landfill will be made by the parties who ultimately perform the remedy, subject to the determination of compliance by EPA. The contaminated sediment currently presents a threat because of its location in the marine environment, which allows direct exposure to sensitive aquatic organisms and bioaccumulation in the food chain. Once it is removed and placed in a landfill it should pose no unacceptable risks to the environment or to human health including that of workers at the disposal site.

*7. The Point Richmond Neighborhood Council supported EPA's proposal for offsite disposal stating: "To move this sediment... to any other location within the City of Richmond would be an injustice to the people of the City of Richmond." (letter, 8/10/94)*

*8. The Montrose Chemical Corporation of California, a DDT manufacturer and Potentially Responsible Party (PRP) at the United Heckathorn Site, submitted extensive comments arguing that the proper remedy for the site is no-action. (letter, 9/13/94)*

*I. Without risk, no action is necessary.*

**Response:** The contamination at United Heckathorn presents unacceptable threats to human health and the environment. These threats are summarized in Section 7 of the ROD. It should also be noted that two previous PRP-lead site investigations (Harding Lawson, 1986, and Levine-Fricke, 1991) recommended dredging the Lauritzen Channel and concluded that "no action" would not be protective of the environment.

*II. EPA's Human Health Risk Assessment (HHRA) fails to demonstrate that DDT or dieldrin in sediments in the Lauritzen Channel or Parr Canal pose any significant threat to human health for the following reasons:*

*A. The only significant health risk calculated by EPA was for consumption of fish from the Lauritzen Channel. However, EPA has not established that fishing occurs in the Lauritzen Channel, but only in the Santa Fe Channel near the Parr Canal. The Lauritzen Channel is posted to discourage fishing. All available evidence suggests that significant exposure to fish from the Lauritzen Channel does not occur.*

Response: EPA risk assessment guidance assumes that institutional controls will not be maintained, or will be ineffective in the long term in eliminating threats to human health. In addition, EPA believes that institutional controls, such as fences and warning signs, cannot be relied upon at this site to prevent fishing in the Lauritzen Channel and Parr Canal. Fish and shellfish in the Lauritzen Channel contain concentrations of DDT and dieldrin which exceed acceptable levels for human consumption. In 1986, CDHS ordered Levin to post warnings around its property, including the eastern shoreline of the Lauritzen to warn boaters about the DDT contamination in fish and shellfish. In 1991, after EPA personnel observed a person fishing from a facility on the shoreline opposite the former Heckathorn location, EPA immediately advised that facility's manager in writing about the State's 1986 health warning. Recently, the State issued a fishing advisory throughout Richmond Harbor. Signs were posted at the popular harbor fishing location near the Parr Canal where there is unrestricted shoreline access. Despite the signs, State personnel report still finding people catching fish for consumption.

*B. EPA overestimated the risk from fish consumption by assuming consumption rates of 132 mg/day (sic) for subsistence fishermen and 54 mg/day (sic) for recreational fishermen.*

Response: EPA's current risk assessment guidance recommends assuming consumption rates of 54 grams per day (g/day) for recreational fishermen, and 132 g/day for subsistence fishermen. Potential risks were calculated by EPA (see HHRA, Table 5-11) using standard exposure assumptions which included both the 132 g/day subsistence rate, and a much lower rate of 6.5 g/day, which was the rate assumed in the development of EPA's Water Quality Criteria for the protection of human health (1980). These criteria are ARARs at the site. The two consumption scenarios are likely to bracket current and potential future exposures. Calculated risks for consumption of fish from the Lauritzen Channel were unacceptable using either exposure assumption. Risks for consumption of fish from the Santa Fe Channel were within EPA's

acceptable risk range using the low consumption rate, but unacceptable using the subsistence rate. Therefore, EPA concluded that consumption of fish from the Santa Fe Channel may be acceptable. EPA expects that remediation of sediments from the Lauritzen Channel will reduce the concentrations of pesticides in Santa Fe Channel fish as well.

Using the responses from EPA's limited fishing survey, Montrose's consultant, Terra, Inc. (August 17, 1994) calculated a consumption rate of 27 g/day for local fishermen. As stated in the HHRA, EPA's survey was intended only to provide general information on local fishing practices. Even with a much larger survey it would be difficult to accurately quantify current, much less future, consumption rates. For these reasons EPA has included the assumptions discussed above in its risk calculations to ensure that a reasonable maximum exposure scenario is evaluated in order to ensure that EPA actions are fully protective of human health.

*C. The risks calculated for fish consumption are also overestimated because they do not account for the effects of cooking. There is no evidence that fishermen eat raw fish. Cooking reduces the concentrations of DDT in fish by 39% to 74%. In addition, absent evidence that whole fish are eaten routinely, EPA should have based its risk calculation on fillets rather than whole fish. EPA guidance states that most humans consume only fillets.*

**Response:** EPA calculated risks for consumption of both whole and filleted fish from the Lauritzen and Richmond Inner Harbor Channels. Risks for fish from the Lauritzen were unacceptable regardless of whether the fish were whole or fillets. A group of recent Laotian immigrants interviewed by EPA stated that they consume raw fish caught in Richmond Harbor. Small fish, such as shiner surf perch, are mashed whole. When fish are filleted, the carcass is also used in the preparation of soup. In order to be protective of diverse ethnic groups known to fish in Richmond Harbor, it is prudent to assume that fish may be eaten raw and that entire fish may be consumed.

The State of California has written fact sheets for fishermen to encourage practices, such as cooking and draining away fat, which will reduce contaminant concentrations. However, even the reductions in concentrations reported by Montrose would be insufficient to make fish from the Lauritzen suitable for consumption (see previous response to this comment, ICF, May 11, 1994).

*D. EPA compared fish tissue concentrations with the State of California's Water Quality Objectives which were recently held invalid.*

**Response:** The State of California's Water Quality Objectives for DDT and dieldrin were adopted on April 11, 1991. They were based upon, and are equal to EPA's Ambient Water Quality Criteria, published in 1980. The final HHRA (May, 1994) cited both EPA's criteria, and the equivalent State objectives. EPA's criteria were identified in the July, 1994 Proposed Plan and selected in the ROD as ARARs. It should be noted that although the 1991 State objectives were recently invalidated on procedural grounds, the San Francisco Bay Basin Plan (1986), designated fish and shellfish harvesting and commercial and recreational fishing as beneficial uses of all waters of San Francisco Bay, which supports EPA's determination in the Record of Decision (Section 6) that the federal Ambient Water Quality Criteria are relevant and appropriate ARARs at this site.

*E. EPA's HHRA failed to cite epidemiology studies for DDT.*

**Response:** EPA has previously responded to this comment. See final HHRA response to comments, May 11, 1994, pp.8 and 9. In addition, there is currently a great deal of research being performed on DDT and related chemicals regarding their estrogenic effects, links with breast cancer and feminization of males. Appendix 1 of this Response to Comments is a timely news article describing some of this research.

*III. EPA's Ecological Risk Assessment of marine sediments (ERA) fails to demonstrate that DDT or dieldrin in sediments in the Lauritzen Channel or Parr Canal pose any significant threat to the environment health for the following reasons:*

*A. In identifying chemicals of concern, EPA improperly excluded from consideration chemical and physical stressors such as PAHs, PCBs, shipping disturbance and industrial activity.*

**Response:** Physical stressors, such as shipping disturbance, were discussed and considered in the ERA, but they are neither site-related, nor are such stressors chemicals and so cannot be identified as "chemicals of concern." Non site-related chemicals, including PAHs and PCBs were also discussed and considered in the ERA. Although PAHs and PCBs are present in Richmond Harbor, they are not consistently elevated above effects thresholds or background concentrations for San Francisco Bay. By contrast, DDT concentrations in sediments in the Lauritzen Channel are on average 10,000 times higher than the San Francisco Bay background level. These facts are graphically illustrated in Figures 8, 9 and 10 of NOAA's March, 1992 evaluation of chemical contaminants in San Francisco Bay, (Technical Memorandum NOS ORCA 64) which are attached as Appendix 2 of this Response to Comments. In viewing Figure 8, it should be noted that if the vertical bar representing the concentration of DDT in the Lauritzen was drawn to the same scale as the bars representing the concentrations of DDT found elsewhere in San Francisco Bay, it would be 2,715 feet, or over a half-mile, high.

*B. EPA has not shown that fish-eating birds are exposed to significant, if any amounts of DDT in the Richmond Inner Harbor. EPA did not analyze any birds or provide dose-response data for individual species. Birds are not feeding in Richmond Harbor. If fish-eating birds are not exposed, the elementary conclusion is that they are not at risk. Andrew Lincoff, Remedial Project Manager stated in a letter dated July 31, 1992 that brown pelicans only feed occasionally in Richmond Harbor.*

**Response:** The US Fish and Wildlife Service (USFWS), which is the federal trustee for avian resources, provided EPA with a list of over 70 species of "birds known to nest in central or northern San Francisco Bay or likely to regularly feed in the immediate vicinity of Richmond Harbor." (EPA, 1994, Table 4-1). While engaged in site investigations, removal actions and other activities at the site, EPA personnel and contractors observed that numerous fish-eating birds including cormorants, western grebes, kingfishers, loons, and California brown pelicans, an endangered species, commonly feed throughout the Richmond Inner Harbor, including the Lauritzen Channel.

The Project Manager's 1992 statement that brown pelicans may only occasionally feed in the harbor was made based on the assertion in a previous PRP Remedial Investigation Report (Levine-Fricke, 1990) that no endangered species had been seen in the vicinity of the site. However, since EPA began working at the site, endangered brown pelicans have been seen commonly in the Inner Richmond Harbor. In response to repeated unsupported claims by Montrose and its consultants that birds would not be found in an industrialized harbor, EPA, with minimal effort (EPA memoranda 12/8/93 and 12/16/93), was able to observe and photograph numerous species of birds in the harbor, including an additional species of shorebird which had not been listed by USFWS. These photographs also include a group of endangered brown pelicans which were feeding at the confluence of the Lauritzen and Santa Fe Channels, and document a brown pelican in the act of plunge-diving for fish at the same location.

It is not subject to any reasonable doubt that DDT in Richmond Harbor accumulates in the food chain and that predatory birds are being exposed. In a 1985 study (Ohlendorf, 1991) the concentration of DDE (a metabolite of DDT) in surf scoters, a migratory shellfish-eating bird which winters in San Francisco Bay, was measured in 39 birds shot in January and compared with the

concentrations in 40 shot in March. The body burdens of birds wintering in Richmond Harbor increased by over four-fold in three months, clearly demonstrating that even birds which feed for only part of the year in and near the harbor can have significant bioaccumulation. No significant increases in concentration occurred in birds which wintered elsewhere in San Francisco Bay.

It is outside the scope of the EPA ecological risk assessment process to conduct new studies to determine dose response information for birds species present at the site. Furthermore, studies of higher organisms, especially birds, are not necessary because criteria are available for their protection (EPA's Ambient Water Quality Criteria and California's Water Quality Objectives) which are based upon achieving much more easily measurable contaminant concentrations in fish and the water column. The primary field sampling for EPA's United Heckathorn ecological assessment took only six days. As discussed in the assessment (Chapter 5), "studies of more mobile species, particularly migratory birds, would require much more effort and would be subject to inherently higher uncertainty regarding pollutant sources and effects than the study of sessile and relatively non-mobile organisms chosen here."

EPA assessed the risks posed by DDT to fish-eating birds using two published criteria for the protection of birds which are based upon contaminant concentrations in fish. EPA's marine chronic Ambient Water Quality Criteria for DDT (1980), which is an ARAR, is based upon a fish tissue residue of 150 ppb. This concentration is a Lowest Observed Adverse Effect Level at which reproduction in California brown pelicans was reduced to a level below that necessary to sustain a stable population. The more protective National Academy of Sciences (NAS) action level for the protection of fish-eating birds is 50 ppb (published by EPA in 1973). The concentration of DDT in fish caught in the Lauritzen Channel is over two orders-of-magnitude (100 times) higher than the NAS level. In the ERA, (Figure 9-19) EPA estimated that if a bird consumed prey from the Lauritzen for more than about one day per year, its annual average diet would exceed the NAS action level. At more than three days per year, it would exceed the level at which reproduction is reduced in pelicans. These calculations may well underestimate risk for a number of reasons, including the fact that they assume that the bird is exposed to no other source of DDT. California brown pelicans, for example, migrate during non-breeding months from nesting areas in southern California (US Department of the Interior, Final Report: California Seabird Ecology Study, MMS 87-0055) where they may be exposed to DDT contaminated prey while feeding in the southern California bight: an area still heavily contaminated from the historic discharges of PRP Montrose's former Torrance, California DDT manufacturing plant.

EPA did not report dose-response data for all species of birds likely to feed in Richmond Harbor because such data does not exist. Dose-response data is available for only a few species of wild birds, including American kestrels, mallard ducks, and a bird which does feed in the most contaminated channels in Richmond Harbor - the California brown pelican. Available effects data is routinely used in developing criteria for the protection of other aquatic organisms and wildlife. Recently, for example, the same effects data discussed above for California brown pelicans were used as the basis of the proposed Wildlife Criteria for DDT to protect fish-eating birds in the Great Lakes (58 FR 20802, April 16, 1993).

*C. The ERA fails to demonstrate that sediment-contained DDT or dieldrin pose any significant risk to benthic invertebrates. The diversity indices for the benthic community structure and number of mollusks actually increase with concentrations of DDT. The poorest community structure was observed at locations with the lowest concentrations of DDT. The predominant effect on benthic community structure is shipping disturbance which the ERA fails to consider as a stressor.*

**Response:** There is ample evidence that DDT contamination in the Lauritzen Channel poses a significant risk to benthic invertebrates. Invertebrate toxicity tests conducted during the ERA indicated that Lauritzen Channel sediments are among the most toxic ever tested by the EPA personnel who developed the standard methods for sediment toxicity tests which are used worldwide. The extraordinarily high levels of DDT were determined in the ERA to be the primary cause of toxicity in the Lauritzen. Additional invertebrate toxicity tests conducted during the RI (Battelle, 1994) found no survival of test organisms throughout most of the Lauritzen Channel.

Although disturbances relating to shipping (including dredging to maintain required depths for navigation and propeller wash from ships) can remove or displace benthic organisms, it does not follow that chemical contamination of the benthos is acceptable. The Richmond Harbor federal channel is dredged annually to maintain a 35 ft navigation depth. The federal channel runs from Point Potrero up the Richmond Inner Harbor and lower Santa Fe Channels, but does not enter the Lauritzen Channel. There is one shipping berth at the mouth of the Lauritzen, which PRP Levin has been unable to dredge since 1985 because of the DDT contamination. Large ships cannot enter the shallower northern Lauritzen Channel which is not maintenance dredged. Absent the very high levels of DDT in the Lauritzen one would expect, based on shipping and dredging history, to find healthy benthic communities there and poorer communities in the navigation channels.

The diversity, number and biomass of mollusks are in fact lower in the shipping channels and increase in the northern Lauritzen, as would be expected from the dredging and shipping history, and the fact that mollusks are known to be insensitive to DDT. The number of amphipods, on the other hand, is opposite of what would be expected from dredging and shipping disturbances, and declines in the Lauritzen Channel because of the DDT (EPA, 1994). Amphipods are crustaceans, which are known to be sensitive to DDT. In the development of the federal water quality criteria for DDT (EPA, 1980), a crustacean was found to be the most sensitive marine aquatic organism. The sensitivity of crustaceans to DDT may be explained by their phylogentic affinity with insects (both are in the phylum Arthropoda, and DDT's purpose was to eradicate insects). An overall measure of benthic community structure is the Infaunal Index, which is a composite measure of the abundance of pollutant-sensitive and pollutant-tolerant taxa. The Infaunal Index declines significantly as DDT concentrations increase in Richmond Harbor.

Finally, it should be emphasized that even though some taxa, such as mollusks, can survive in areas like the Lauritzen which are heavily contaminated with DDT this does not mean that there is no biological effect resulting from their exposure. The California State Mussel Watch found that by far the highest levels of DDT bioaccumulation in the State occur in the Lauritzen. Bioaccumulated contaminants can move up the food chain and affect animals at higher trophic levels. The levels of DDT in benthic invertebrates, like those in fish, are far above the dietary levels which may cause reproductive impacts to birds.

*D. The ERA fails to provide the required uncertainty analysis.*

**Response:** Uncertainties relating to a myriad of factors are discussed throughout the ERA, consistent with EPA guidance. Those study results and conclusions about which there is the least uncertainty are listed in the executive summary.

*E. The ERA offers no evidence that fish are being affected by DDT or dieldrin.*

**Response:** EPA's 1980 Ambient Water Quality Criteria document for DDT reported that levels of 3 to 6.25 ppm DDT caused reduced survival in the fry of fish tested. The average concentration of fish caught in the Lauritzen is above these levels. Therefore one of the conclusions of the ERA was that the concentrations of DDT in the Lauritzen "may also cause direct chronic effects such as

reduced fry survival in fish." Montrose's complaint stems from the fact that the fish caught in the Lauritzen (mostly shiner surf perch) are not the same species as those which have been used in research. In order to determine the level of DDT which causes reduced fry survival in shiner perch, it would be necessary to start a research project, which, as Montrose also points out, is not the purpose of ecological assessments. The ERA reported numerous species of fish potentially affected by the contamination in Richmond Harbor. Since one cannot assume that the few species which have been tested are likely to be the most sensitive to the toxic effects of DDT, it would be prudent to divide the values for tested species by a factor of 10 or more to account for the uncertainty in extrapolating toxicity data from test species to those fish found in Richmond Harbor . Using this approach, one would conclude that fish in the Santa Fe Channel as well as the Lauritzen may suffer chronic impacts from current levels of DDT contamination.

*F. National Academy of Sciences (NAS) action levels should not be used to demonstrate risk in an ecological assessment because they're not ARARs and do not even qualify as to-be-considered material because NAS is not a state or federal agency. NAS action levels only assume that effects will occur, EPA has not demonstrated that actual effects have occurred. EPA failed to follow NAS sampling recommendations and should have sampled fish from a variety of locations throughout known foraging ranges.*

Response: The National Academy of Sciences action levels were published by EPA as 1972 Water Quality Criteria. The criteria for DDT states:

> "It is recommended that DDT concentrations in any sample consisting of a homogenate of 25 or more fish of any species that is consumed by fish eating birds and mammals, within the same size range as the fish consumed by any bird or mammal, be no greater than 50 µg/kg of the wet weight."

EPA analyzed a total of 23 shiner surf perch from the Lauritzen Channel in the ERA and in support of the HHRA. The average concentration was 9,200 µg/kg (wet weight), which is over 180 times the NAS action level. Assuming that the two additional fish needed for a sample of 25 contained no DDT, the average would still be 170 times the action level. Looked at another way, even if sufficient time and resources were spent to determine the foraging ranges of the various species of fish-eating birds which feed in Richmond Harbor and to sample fish throughout those ranges, the concentration of DDT in the Lauritzen Channel is so high that a single fish would cause a homogenate of 25 or even 170 fish of equal size to exceed the action level, even if the all of the fish in the rest of the foraging range contained no DDT at all.

In regard to the assertion that the NAS action level only *assumes* that damage will occur from DDT exposure, Montrose, a DDT manufacturer, should recall that DDT was responsible for great reductions in populations of predatory birds over vast areas and the almost complete extirpation of some species. The California brown pelican is endangered because of exposure to DDT (EPA, 1994).

In regard to EPA's not sampling birds or documenting actual damage in this study, it should also be remembered (in addition to the responses to this issue in previous comments) that the purpose of risk assessments is to evaluate risk, not to document or quantify damage. There is ample evidence that the high levels of DDT in Richmond Harbor threaten a variety of ecological receptors at various trophic levels including benthic and water column organisms and fish-eating birds. The benthic community structure analyses in fact are evidence of damage. EPA guidance recommends that when criteria exist, ecological assessments should include monitoring to determine the extent to which those criteria are exceeded by the environmental concentrations at the site. EPA has done this with the NAS action levels.

*III. In the absence of risk, ARARs are irrelevant. EPA's Water Quality Criteria are not ARARs because they are not promulgated. CERCLA §121(d)(2) states that EPA criteria may be relevant and appropriate considering "the designated or potential use of the surface or groundwater, the environmental media affected, the purposes for which such criteria were developed, and the latest information available." Since the criteria for DDT was set to protect fish-eating birds, and birds are not feeding in the Richmond Inner Harbor the "potential use" of the surface water and the "environmental media affected" do not warrant application of the criteria.*

**Response:** Risks to human health and the environment have been discussed at length above. Section 121(d)(2)(A)(ii) of CERCLA requires that remedial actions meet federal Water Quality Criteria established under Section 304 or 303 of the Clean Water Act where such WQC are determined by EPA to be relevant and appropriate to remedial actions at the site. See 42 U.S.C. § 9621(d)(2)(A)(ii) and 40 C.F.R. § 300.430(e)(2)(i)(G). In evaluating whether specific WQC are relevant and appropriate to remedial actions at Superfund site, CERCLA requires EPA to consider four criteria: 1. the uses of the receiving water body; 2) the media affected; 3) the purposes of the criteria and 4) current information. See 42 U.S.C. § 9621(d)(B)(i). See also U.S. EPA, CERCLA Compliance with Other Laws Manual - CERCLA Compliance with the CWA and SDWA (OSWER Pub. 9234.2-06/FS, Feb. 1990).

EPA guidance concerning determinations that WQC are relevant and appropriate to remedial action at a Superfund site provides that:

> A water quality criteria component for aquatic life may be relevant and appropriate when there are environmental factors that are being considered at a site, such as protection of aquatic organisms. With respect to the use of water quality criteria for the protection of human health, levels are provided for exposure both from drinking the water and from consuming aquatic organisms (primarily fish) and from fish consumption alone. Whether a water quality criterion is appropriate depends on the likely routes of exposure.

U.S. EPA, CERCLA Compliance With Other Laws Manual: Interim Final at 1-15 (EPA 540-G-89-006, Aug. 1989).

Both the marine chronic and human health WQC for DDT and dieldrin are relevant and appropriate to remedial actions at this site since both aquatic and wildlife and humans may be exposed to these contaminants either directly or through consumption of contaminated organisms. As discussed in the Ecological Risk Assessment, aquatic organisms are present in all channels at the site, which are a part of San Francisco Bay. Fish eating-birds feed in all channels in the harbor. In fact, the particular bird upon which the marine chronic water quality criterion for DDT was based is the California brown pelican, an endangered species, which has been observed feeding in the most contaminated channels at the site. As discussed in the Human Health Risk Assessment, fishermen catch and consume fish from the Inner Richmond Harbor channels. In 1986, the State of California Department of Health Services ordered the posting of the Lauritzen Channel to warn fishermen of the fish and shellfish contamination. On April 7, 1994, the Cal-EPA Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor.

The beneficial uses designated by the State of California for central San Francisco Bay waters, which are listed in Section 6 of the Record of Decision, include fishing, wildlife habitat, preservation of rare and endangered species, fish migration, fish spawning, shellfish harvesting, and estuarine habitat. EPA's Ambient Water Quality Criteria were specifically developed to protect such beneficial uses.

*IV. Background risks to human health and the environment from other stressors exceed the purported risks associated with DDT and dieldrin. The human health risk associated with PCBs found in fish exceed the risks of DDT and dieldrin. Other environmental stressors, including PAHs, PCBs and shipping disturbance are relevant to evaluating the long-term effectiveness of the chosen remedy. If the remedy will not reduce existing risk then it should be rejected in favor of no action.*

**Response:** Both natural and anthropogenic background risks are common at Superfund sites and EPA guidance (EPA/540/1-89/002) states that they may be eliminated from risk assessments. The guidance also allows, however, that they may be considered separately in order to provide information to those potentially exposed. This was done for PCBs in the United Heckathorn risk assessment. As a result of EPA's sampling and risk analysis, the California Department of Health Services conducted a further study of fishing in Richmond Harbor and recently issued an advisory for the entire harbor based on both the Heckathorn contaminants and PCBs.

Recent research suggests PCBs may be present in the water throughout San Francisco Bay. EPA's fish sampling found that PCB mixture Aroclor 1254 is present in fish in Richmond Harbor. There is no cancer potency data available for Aroclor 1254. Therefore risks associated with PCBs were calculated using the potency factor for Aroclor 1260 which likely has higher potency. The human health risks associated with PCBs in fish from Richmond Harbor may be overstated for this reason alone. In addition, absent the distinction between Aroclors 1254 and 1260, Montrose's consultant Terra, Inc. stated that it had independently derived a potency factor for PCBs which indicated that human health risks from PCBs were overstated by "1-2 orders of magnitude." Nevertheless, the human health risk assessment still found that the risks calculated for the sum of site-related chemicals of concern (DDT and dieldrin) in the Lauritzen Channel were 2 to 3 times the risk for PCBs (ICF, 1994, Table 5-11). It should also be noted that fish in the Lauritzen exceed the Food and Drug Administration Action Levels for DDT and dieldrin, but not for PCBs. In the Santa Fe Channel, the calculations indicate that PCBs become a greater human health risk than site contaminants, but again the risk from PCBs may be overestimated.

The selected remedy will remove contaminated sediments from the Lauritzen Channel and Parr Canal and reduce human health risks from DDT and dieldrin exposure throughout Richmond Harbor. The sediments to be remediated also contain non site-related chemicals, including PCBs, although the levels of these contaminants relative to bay background concentrations is minute compared to the relative levels of DDT (see Appendix 2). Nevertheless, since the remedy will result in the removal of PCBs from portions of Richmond Harbor, there may be a reduction in human health risk associated with PCBs as well.

Other environmental stressors have been discussed in previous responses. DDT is the primary cause of toxicity in the Lauritzen Channel, and existing threats to benthos, water column organisms, and fish-eating birds are expected to be eliminated by the selected remedy.

*V. Selection of the No-Action alternative is consistent with CERCLA, the NCP, and EPA guidance.*

**Response:** EPA disagrees. As discussed in the Record of Decision, the no-action alternative fails to meet the NCP's threshold criteria for remedy selection. In addition, as mentioned previously, it should be noted that two previous PRP-lead site investigations (Harding Lawson, 1986, and Levine-Fricke, 1991) also recommended dredging the Lauritzen Channel and concluded that "no action" would not be protective of the environment.

*9. The National Oceanic and Atmospheric Administration (NOAA), which is the federal trustee for marine resources, submitted comments (September 14, 1994) supporting EPA's proposed plan. NOAA also recommended: 1) not dredging during the Pacific herring spawning season (December 1 to March 1); 2) the evaluation of dredging techniques to minimize resuspension and avoid spillage during transportation; 3) various types of remedial and post-remedial monitoring, and; 4) the placement of approximately six inches of clean material over dredged areas to help restore the area immediately after implementation of the remedy. (letter, 9/14/94)*

**Response:** EPA appreciates the information provided by NOAA and will ensure that the remedy is not implemented between December 1 and March 1. The detailed selection of dredging and monitoring techniques will be made during the remedial design phase and EPA looks forward to NOAA's participation in that process.

Several commenters before and during the comment period recommended the placement of clean material as part of the remedy. Morrison-Knudsen, consultant to Montrose, recommended the placement of clean material in areas, such as those with rip-rap, in which dredging would be impractical or of limited effectiveness. USFWS (see comment 10, below) recommended placement of clean material after remediation to bury any remaining contaminants and help restore habitat.

The Proposed Plan stated: "Minor capping, which would not significantly alter the existing depths of water, might also be used if determined to be necessary during the remedial design or remedial action phases," although a cost for this activity was not estimated. EPA has contacted Manson Construction, which provided estimates of dredging costs used in the Feasibility Study. Assuming that the total area of the Lauritzen Channel and Parr Canal is 50,000 square yards, a six-inch layer would require approximately 8000 cubic yards of clean material. Manson indicated that the cost of placement is relatively high, and estimated $25 per yard total. A six-inch layer of clean material would therefore cost approximately $200,000. This cost has been added to the estimate for the final remedy, bringing the total estimate to $7 million. There may also be an opportunity to save costs and obtain appropriately sized clean dredged material from the Richmond Harbor deepening project.

**Other Comments**

*10. The US Fish and Wildlife Service submitted comments, dated August 15, 1994, on the FS. USFWS supported EPA's preferred alternative, and made the following recommendations: 1) removal of the upper layer of old bay mud to ensure that median DDT levels are below a deleterious effects range; 2) placement of a clean layer of fill after dredging (discussed in comment 9, above), and; 3) hazing to prevent seabirds from entering the dredging area during remediation. (letter, 8/15/94)*

**Response:** The placement of clean fill after dredging has been discussed above. Additional recommendations regarding activities during remediation will be considered in the remedial design phase, in which USFWS is encouraged to participate. The proposed remedy including dredging of all soft sediments down to the Old Bay Mud contact. In practice, this will result in the removal of the top layer of old bay mud. Sampling conducted during the RI indicates that the medial concentration of contaminants in the upper layer of old bay mud is well below the range which may be deleterious to benthic organisms.

*11. Montrose also submitted comments dated August 17, 1994 from its contractor, Terra Inc., on the final human health risk assessment. With the exception of the following comment, Terra's comments were either repeated in Montrose's comments on the proposed plan, discussed above, or were responded to in earlier responses to comments on the draft human health risk assessment. Exposure point concentrations were improperly estimated for upland soils resulting in the overestimation of risk. Due to its overstatement of risk, the final risk assessment cannot be reliably used to develop remedial alternatives or to determine whether there is any necessity to remediate surface soils.*

**Response:** This comment ignores both the conclusions of the risk assessment and EPA's proposed remediation. The EPA human health risk assessment clearly states that conservative estimates were used, and that risks due to exposure to contaminates in upland soils are within EPA's acceptable risk range even using these conservative estimates. EPA has proposed no further remediation to reduce the concentrations of contaminants in site soils. Therefore, the entire discussion of whether the risk estimates for soils are overly conservative is moot.

Two tables in the final risk assessment (Tables 3-2 and 3-3) did in fact contain typographical errors. Corrected tables enclosed with a memo from ICF are provided as Appendix 3 of this Response to Comments. Because none of the risk calculations contained in the assessment were derived from the erroneous values, the errors had no effect on the final conclusions.

United Heckathorn Response to Comments

Appendix 1

San Francisco Chronicle, October 4, 1994
p. A9

# Clue in Pesticide Link to Breast Cancer

## Exposure to some poisons raises level of 'bad' estrogen

*Associated Press*

New York

Researchers trying to explain the disturbing link between pesticides and breast cancer have discovered that pesticides appear to raise levels of a harmful form of estrogen.

The finding comes as a surprise to the director of the research, who undertook the study expecting to show that pesticides had no effect on estrogen.

"I was wrong," said H. Leon Bradlow, a biochemist with the Strang Cancer Prevention Center at Cornell University Medical School. The study showed that after exposure to pesticides, "your risk ratio is greater than what it was before," Bradlow said yesterday.

Several earlier studies have linked pesticides to an increased risk of breast cancer, although one study failed to find a link. The new study shows how pesticides may be exerting a harmful effect, Bradlow said.

Penelope Fenner-Crisp, a pharmacologist and pesticide specialist with the Environmental Protection Agency, said the EPA is taking the link between pesticides and hormones very seriously. "We should think about how we might go about encouraging exposure reduction," she said.

The study, which will be published soon in Environmental Health Perspectives, a journal of the National Institute of Environmental Health Sciences, builds on Bradlow's previous research showing that there is a "good estrogen" that protects against breast cancer and a "bad estrogen" that is associated with increased risk of the disease.

The researchers exposed human breast cells in the test tube to DDT and other chlorine-containing pesticides. They found that the pesticides' effect on bad estrogen was three to four times as great as that of a known human carcinogen that was used as a comparison.

In a separate study, Bradlow and his colleagues found that women who eat "cruciferous" vegetables — broccoli, cauliflower, brussels sprouts and cabbage — appear to counteract the harmful effects of pesticides. An anti-cancer substance found in these vegetables called indole-3-carbinol was found to increase the ratio of good estrogen to bad estrogen.

Bradlow said a woman who eats such vegetables regularly could significantly reduce her risk of breast cancer, although he cannot yet say precisely how much lower the risk would be.

United Heckathorn Response to Comments

Appendix 2

NOAA Technical Memorandum NOS ORCA 64
Figures 8, 9 and 10

NOAA Technical Memorandum NOS ORCA 64

# AN EVALUATION OF THE EXTENT AND MAGNITUDE OF BIOLOGICAL EFFECTS ASSOCIATED WITH CHEMICAL CONTAMINANTS IN SAN FRANCISCO BAY, CALIFORNIA

Seattle, Washington
March 1992

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

National Ocean Service

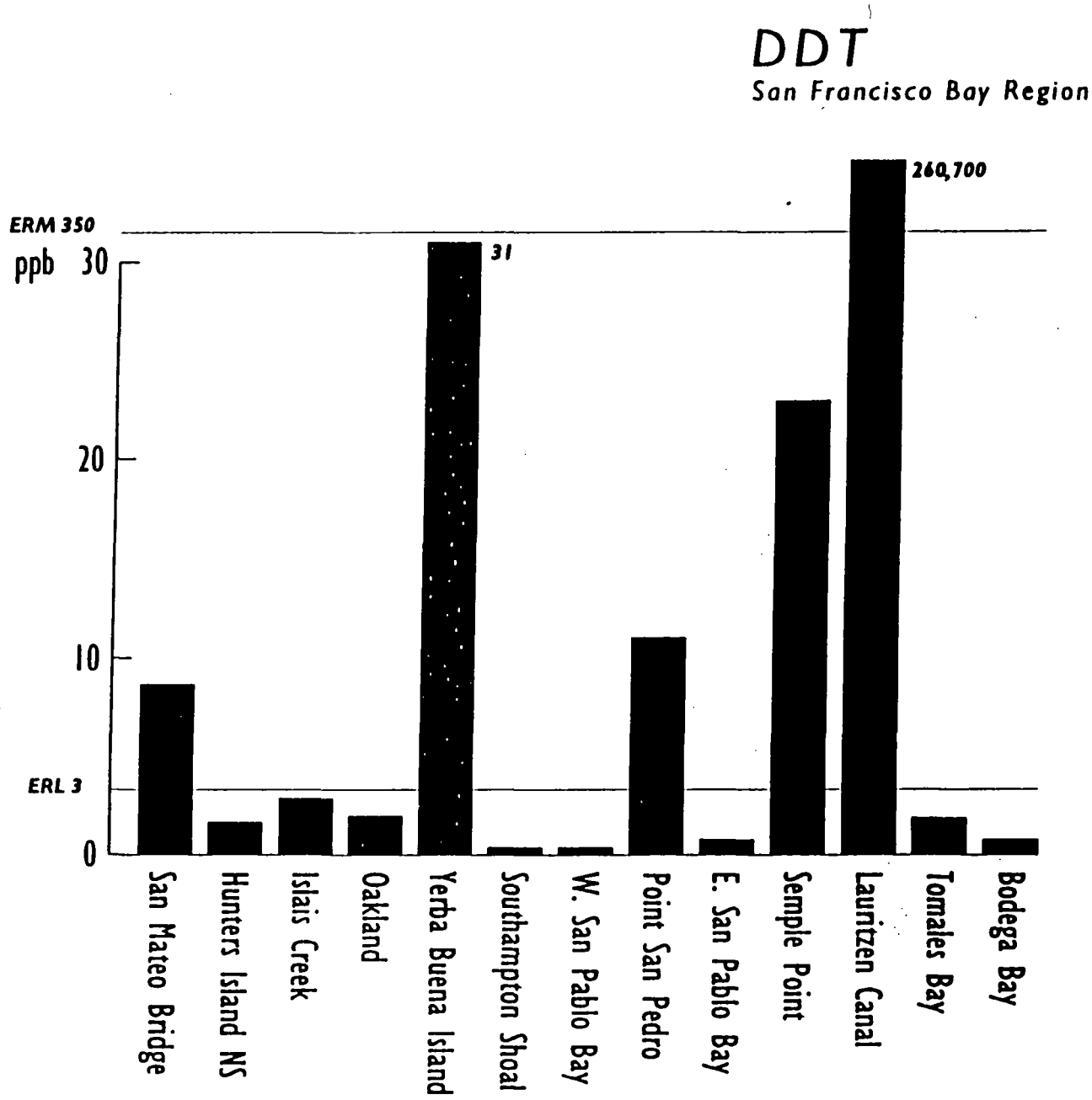



**Figure 8. Mean tDDT concentrations at specific sampling sites in San Francisco Bay (from Long *et al.*, 1988) and ERL and ERM values for tDDT (from Long and Morgan, 1990).**

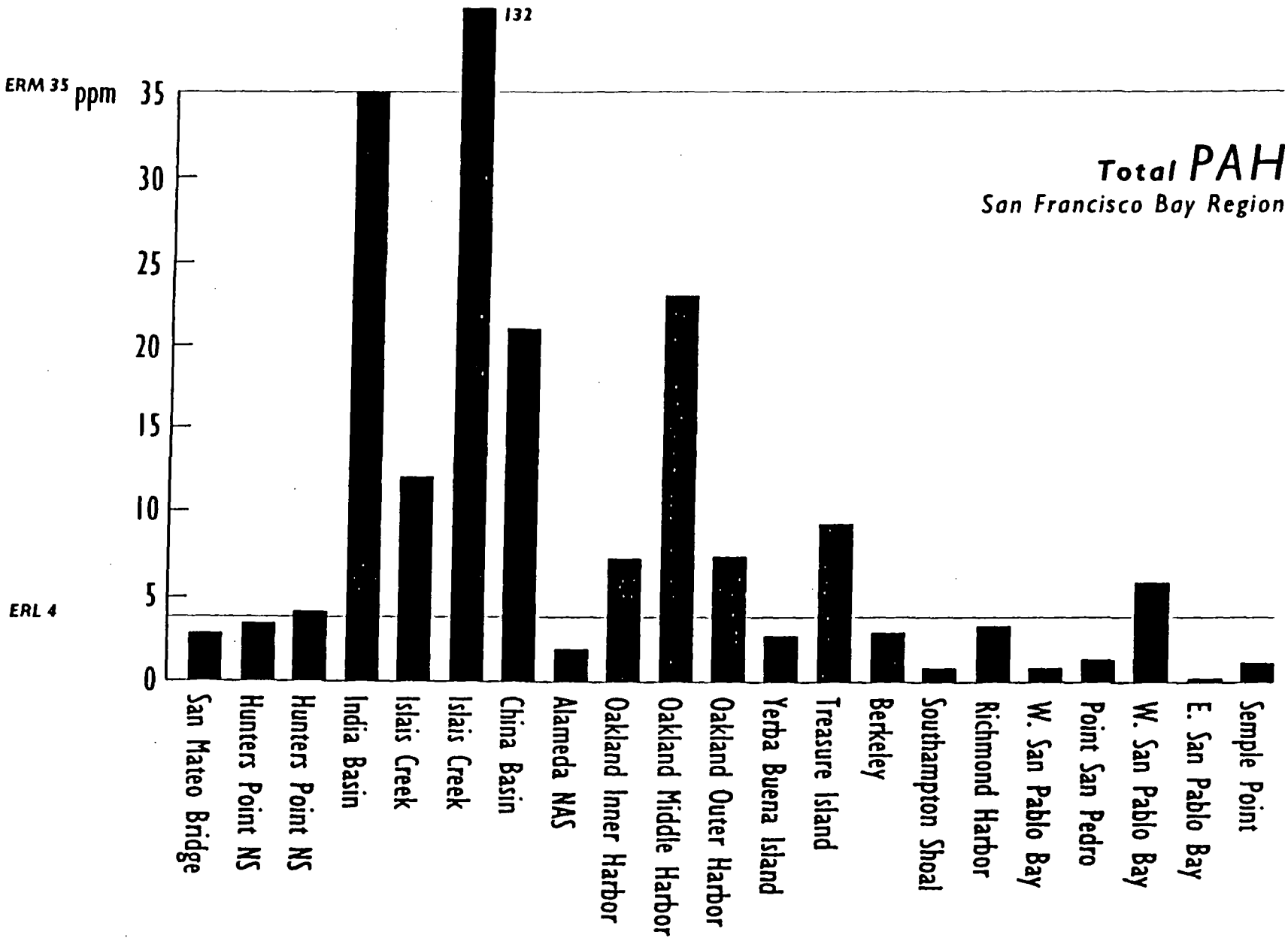



**Figure 9. Mean tPAH concentrations (sum of 18 compounds) at specific sampling sites in San Francisco Bay (from Long *et al.*, 1988) and ERL and ERM values for tPAH (from Long and Morgan, 1990).**

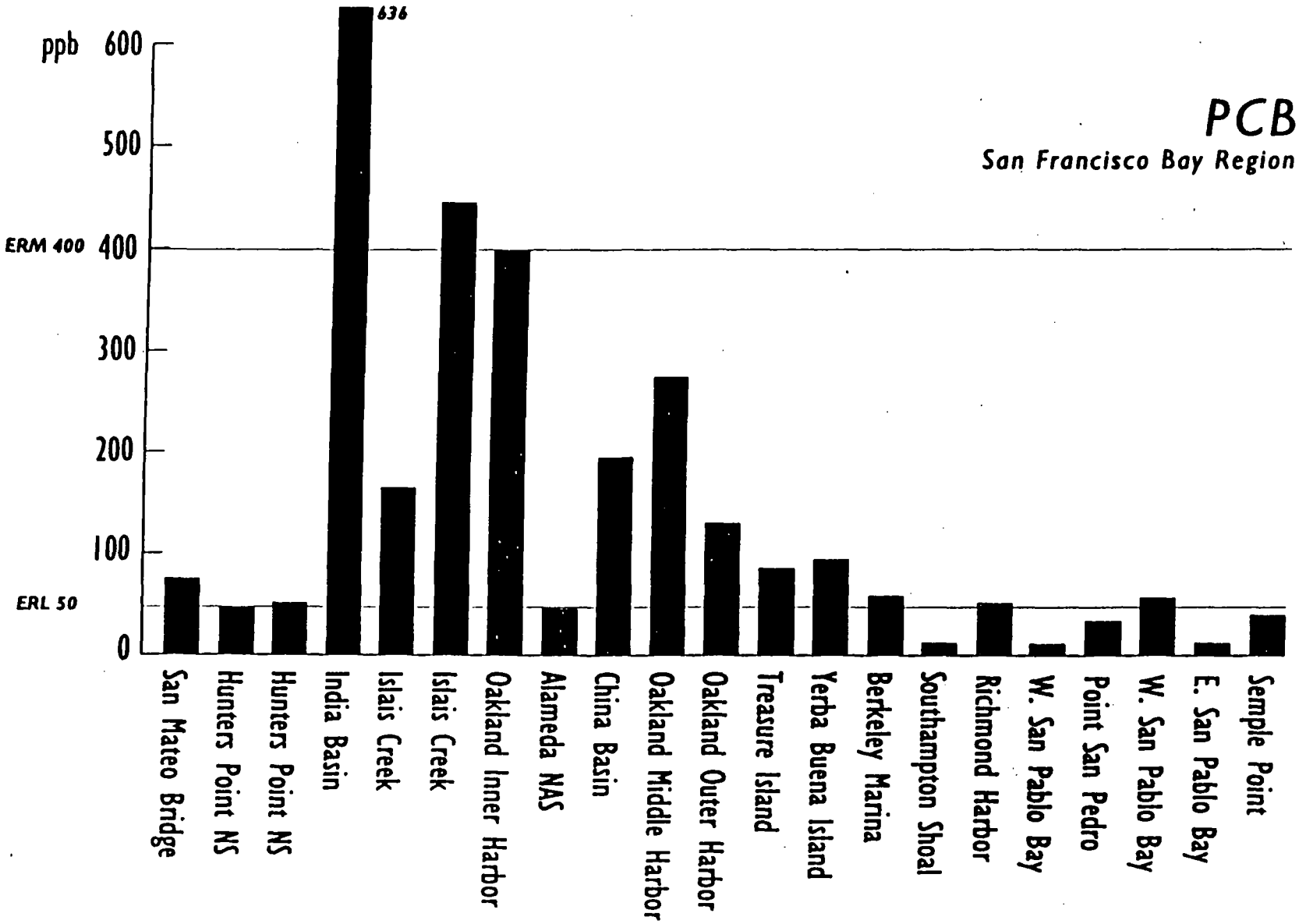



**Figure 10. Mean tPCB concentrations at specific sampling sites in San Francisco Bay (from Long et al., 1988) and ERL and ERM values for tPCB (from Long and Morgan, 1990).**

United Heckathorn Response to Comments

Appendix 3

ICF Kaiser Engineers Memorandum
September 7, 1994

1800 Harrison Street
Oakland, California
94612-2321

510/419-6000

# ICF TECHNOLOGY INCORPORATED

**MEMORANDUM**
**September 7, 1994**

**TO:** **Andy Lincoff**

**FROM: D. Wayne Berman** DWB

**RE: Corrections to the final, "Human Health Risk Assessment for the United Heckathorn Superfund Site, Richmond, California."**

In response to the August 17, 1994 comments from Terra Inc. concerning the values reported in Tables 3-2 and 3-3 of the risk assessment report, it appears that a few minor typographical errors were in fact committed. Corrected tables are attached.

First, regarding the column in Table 3-2 in which 95% UCLs are supposed to have been reported, an incorrect direction command in the underlying spreadsheet to the table resulted in the RME exposure point concentrations being repeated in this column rather than the UCLs.

Note that, in no case are the correct UCLs equal to the corresponding maximum detected values, which are reported in the next column of the table. In some cases the correct UCLs are greater than the maximum detected values but this is not unusual for small or highly variable data sets, particularly when the data are adequately described by a lognormal distribution. Because none of the subsequent calculations performed to complete the risk assessment are based on the UCLs reported in this column, no material changes in the risk assessment resulted from this typographical error.

Regarding the column in Table 3-3 in which RME exposure point concentrations in soil were supposed to have been reproduced, a similar direction error in the underlying spreadsheet caused the 95% UCLs to be reported in this column rather than the RME values. Correcting this column of this table changes a small number of other values in this table; however the changes are minor and none of them affect the overall conclusions drawn from this table. Because none of the other calculations in the rest of the risk assessment are derived from the values reported in the corrected column of Table 3-3, no material changes in the risk assessment resulted from this typographical error.

Please call me if you have any further questions concerning these corrections.

TABLE 3-2
ESTIMATED EXPOSURE POINT CONCENTRATIONS IN SOIL[1]

| COC | Simplified Maximum Likelihood Estimate of the Arithmetic Mean[2] (mg/kg) | Coefficient of Variation (mg/kg) | 95% UCL[3] (mg/kg) | Maximum Detected Value (mg/kg) | RME Exposure Point Concentration[4] (mg/kg) |
|---|---|---|---|---|---|
| Surface Soil (less than equal to 1 foot) | | | | | |
| Aldrin | 9.0E-02 | 15.46 | 6.6E-01 | 4.1E+00 | 6.6E-01 |
| 4,4'-DDD | 1.1E+01 | 13.90 | 3.5E+01 | 5.3E+01 | 3.5E+01 |
| 4,4'-DDE | 1.4E+01 | 21.49 | 5.6E+01 | 7.8E+01 | 5.6E+01 |
| 2,4'-DDT | 4.8E+01 | 32.23 | 4.4E+02 | 1.2E+02 | 1.2E+02 |
| 4,4'-DDT | 1.6E+02 | 34.29 | 7.9E+02 | 7.0E+02 | 7.0E+02 |
| DDT (total)[5] | 1.8E+02 | 25.79 | 7.7E+02 | 7.4E+02 | 7.4E+02 |
| Dieldrin | 2.3E+00 | 60.50 | 1.7E+02 | 1.7E+01 | 1.7E+01 |
| Endrin | 4.6E-02 | 8.44 | 4.8E-01 | 1.2E-01 | 1.2E-01 |
| Lead | 5.5E+02 | 3.14 | 1.3E+03 | 4.0E+03 | 1.3E+03 |
| Subsurface Soil (greater than 1 foot) | | | | | |
| Aldrin | 6.2E-01 | 128.69 | 1.9E+00 | 2.1E+01 | 1.9E+00 |
| 4,4'-DDD | 5.6E+00 | 46.84 | 1.3E+01 | 2.2E+02 | 1.3E+01 |
| 4,4'-DDE | 5.7E+00 | 106.18 | 1.5E+01 | 3.0E+01 | 1.5E+01 |
| 2,4'-DDT | 7.4E+00 | 53.67 | 1.9E+01 | 5.3E+01 | 1.9E+01 |
| 4,4'-DDT | 1.6E+01 | 41.83 | 3.6E+01 | 2.8E+02 | 3.6E+01 |
| DDT (total) | 2.6E+01 | 36.80 | 5.7E+01 | 3.1E+02 | 5.7E+01 |
| Dieldrin | 6.3E+00 | 278.36 | 2.3E+01 | 2.4E+01 | 2.3E+01 |
| Endrin | 4.7E+00 | 282.40 | 1.7E+01 | 6.6E+02 | 1.7E+01 |
| Lead | 2.9E+02 | 2.98 | 9.0E+02 | 2.8E+03 | 9.0E+02 |
| Soils at All Depths | | | | | |
| Aldrin | 4.6E-01 | 92.57 | 1.2E+00 | 2.1E+01 | 1.2E+00 |
| 4,4'-DDD | 8.7E+00 | 47.61 | 1.8E+01 | 2.2E+02 | 1.8E+01 |
| 4,4'-DDE | 1.2E+01 | 127.04 | 2.9E+01 | 7.8E+01 | 2.9E+01 |
| 2,4'-DDT | 1.5E+01 | 72.20 | 3.7E+01 | 1.2E+02 | 3.7E+01 |
| 4,4'-DDT | 4.7E+01 | 69.45 | 1.0E+02 | 7.0E+02 | 1.0E+02 |
| DDT (total) | 6.4E+01 | 52.91 | 1.3E+02 | 7.4E+02 | 1.3E+02 |
| Dieldrin | 5.7E+00 | 236.55 | 1.9E+01 | 2.4E+01 | 1.9E+01 |
| Endrin | 3.1E+00 | 208.73 | 1.0E+01 | 6.6E+02 | 1.0E+01 |
| Lead | 4.4E+02 | 3.14 | 8.2E+02 | 4.0E+03 | 8.2E+02 |

[1] The values presented in this table include the changes to the database necessitated by the new data reported in Levine-Fricke (1993) and Weston (1993). Units are in mg/kg (ppm) unless otherwise stated.

[2] This is a maximum likelihood estimate of the arithmetic mean of the data assuming the data are lognormally distributed. This is assumed to be the best estimate available for the value of the concentration. Even these values, however, are expected to be somewhat conservative.

[3] The 95% UCL is based on Land (1975) as discussed in Gilbert (1987).

[4] RME exposure point concentration determination is the lesser of the maximum detected value and the 95% UCL. This is expected to represent the reasonable maximum estimate of soil concentrations.

[5] The representative concentration for total DDT were derived by summing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT measured in each individual sample and then deriving separate summary statistics for this parameter. Therefore, the sum of the summary statistics representing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT do not strictly add to the summary statistic presented for total DDT.

TABLE 3-9
ESTIMATED EMISSION RATES AND AIRBORNE EXPOSURE POINT CONCENTRATIONS
(ASSUMING VARIOUS EMISSION MECHANISMS)

| COCs | CS RME Exposure Point Concentration In Soil[1] (mg/kg) | $Q_{10}$ Estimated Chemical-specific $PM_{10}$ Emission Rates: Wind Erosion (mg/sec) | Vehicular Traffic (mg/sec) | Excavation and Dumping (mg/sec) | $CA_{10}$ Estimated RME Exposure Point Concentration In Air[2]: Wind Erosion ($mg/m^3$) | Vehicular Traffic ($mg/m^3$) | Excavation and Dumping ($mg/m^3$) |
|---|---|---|---|---|---|---|---|
| Surface Soil (≤ 1 foot) | | | | | | | |
| Aldrin | 6.6E-01 | 2.1E-06 | 1.5E-04 | 7.5E-05 | 3.8E-12 | 2.7E-08 | 1.4E-08 |
| 4,4'-DDD | 3.5E+01 | 1.1E-06 | 8.1E-03 | 4.0E-03 | 2.1E-10 | 1.5E-06 | 7.3E-07 |
| 4,4'-DDE | 5.6E+01 | 1.8E-06 | 1.3E-02 | 6.4E-03 | 3.3E-10 | 2.3E-06 | 1.2E-06 |
| 2,4'-DDT[3] | 1.2E+02 | 3.8E-06 | 2.7E-02 | 1.4E-02 | 6.9E-10 | 4.9E-06 | 2.4E-06 |
| 4,4'-DDT | 7.0E+02 | 2.3E-05 | 1.6E-01 | 8.0E-02 | 4.1E-09 | 2.9E-05 | 1.4E-05 |
| DDT (total)[3,4,5] | 7.4E+02 | 2.4E-05 | 1.7E-01 | 8.4E-02 | 4.3E-09 | 3.1E-05 | 1.5E-05 |
| Dieldrin | 1.7E+01 | 5.3E-07 | 3.8E-03 | 1.9E-03 | 9.6E-11 | 6.8E-07 | 3.4E-07 |
| Endrin | 1.2E-01 | 3.9E-09 | 2.7E-05 | 1.4E-05 | 7.0E-13 | 5.0E-09 | 2.5E-09 |
| Lead | 1.3E+03 | 4.2E-05 | 3.0E-01 | 1.5E-01 | 7.6E-09 | 5.4E-05 | 2.7E-05 |
| Subsurface Soil (>1 foot) | | | | | | | |
| Aldrin | 1.9E+00 | 6.1E-08 | 4.3E-04 | 2.2E-04 | 1.1E-11 | 7.9E-08 | 3.9E-08 |
| 4,4'-DDD | 1.3E+01 | 4.1E-07 | 2.9E-03 | 1.4E-03 | 7.4E-11 | 5.3E-07 | 2.6E-07 |
| 4,4'-DDE | 1.5E+01 | 4.9E-07 | 3.5E-03 | 1.7E-03 | 8.9E-11 | 6.3E-07 | 3.1E-07 |
| 2,4'-DDT[3] | 1.9E+01 | 6.2E-07 | 4.4E-03 | 2.2E-03 | 1.1E-10 | 7.9E-07 | 3.9E-07 |
| 4,4'-DDT | 3.6E+01 | 1.2E-06 | 8.2E-03 | 4.1E-03 | 2.1E-10 | 1.5E-06 | 7.4E-07 |
| DDT (total)[3,4,5] | 5.7E+01 | 1.9E-06 | 1.3E-02 | 6.5E-03 | 3.4E-10 | 2.4E-06 | 1.2E-06 |
| Dieldrin | 2.3E+01 | 7.5E-07 | 5.4E-03 | 2.7E-03 | 1.4E-10 | 9.7E-07 | 4.8E-07 |
| Endrin | 1.7E+01 | 5.6E-07 | 4.0E-03 | 2.0E-03 | 1.0E-10 | 7.1E-07 | 3.6E-07 |
| Lead | 9.0E+02 | 2.9E-05 | 2.1E-01 | 1.0E-01 | 5.3E-09 | 3.7E-05 | 1.9E-05 |
| Soil at All Depths | | | | | | | |
| Aldrin | 1.2E+00 | 3.8E-08 | 2.7E-04 | 1.4E-04 | 7.0E-12 | 4.9E-08 | 2.5E-08 |
| 4,4'-DDD | 1.8E+01 | 5.7E-07 | 4.1E-03 | 2.0E-03 | 1.0E-10 | 7.4E-07 | 3.7E-07 |
| 4,4'-DDE | 2.9E+01 | 9.5E-07 | 6.7E-03 | 3.3E-03 | 1.7E-10 | 1.2E-06 | 6.0E-07 |
| 2,4'-DDT[3] | 3.7E+01 | 1.2E-06 | 8.5E-03 | 4.2E-03 | 2.2E-10 | 1.5E-06 | 7.7E-07 |
| 4,4'-DDT | 1.0E+02 | 3.4E-06 | 2.4E-02 | 1.2E-02 | 6.1E-10 | 4.3E-06 | 2.1E-06 |
| DDT (total)[3,4,5] | 1.3E+02 | 4.3E-06 | 3.1E-02 | 1.5E-02 | 7.8E-10 | 5.5E-06 | 2.7E-06 |
| Dieldrin | 1.9E+01 | 6.0E-07 | 4.3E-03 | 2.1E-03 | 1.1E-10 | 7.8E-07 | 3.9E-07 |
| Endrin | 1.0E+01 | 3.2E-07 | 2.3E-03 | 1.1E-03 | 5.8E-11 | 4.1E-07 | 2.1E-07 |
| Lead | 8.2E+02 | 2.7E-05 | 1.9E-01 | 9.3E-02 | 4.8E-09 | 3.4E-05 | 1.7E-05 |

Methodology for estimating exposure point concentration in air is presented in Appendix C.

[1] RME Exposure Point Concentration determination: the lesser of the 95% UCL and the Maximum Detected Value. See Table 3-2.

[2] Exposure Point Concentration in Air ($mg/m^3$) = Chemical-specific $PM_{10}$ Emission (mg/sec) x 1/HxWxU ($sec/m^3$)

[3] 2,4'-DDT was analyzed for in 85% of the samples so that sufficient data is available to include this isomer in our risk analysis. However, because approximately 15% of the samples analyzed for 4,4-'DDT were not also analyzed for the 2,4'-DDT isomer, the 2,4'-DDT isomer could not be properly incorporated into the parameter representing total DDT. Thus, 2,4'-DDT is carried through the risk assessment as a separate analyte. In any case, as demonstrated on these tables, the error contributed to risk if the 2,4'-DDT isomer is ignored is less than 30%, which is small compared to other sources of error in risk assessment.

[4] The representative concentrations for total DDT were derived by summing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT measured in each individual sample and then deriving separate summary statistics for this parameter. Therefore, the sum of the summary statistics representing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT (presented in this table) do not strictly add to the summary statistic presented for total DDT.

[5] 2,4'-DDD and 2,4'-DDE were not included in this analysis because fewer than 30% of the samples were analyzed for these isomers. It is expected, however, that the error to risk estimates contributed by these omissions are small. See footnote 3.

# Statement of Work for Marine Remedial Design and Remedial Action at the United Heckathorn Superfund Site Richmond, California

## 1. Purpose.

The purpose of Remedial Design and Remedial Action at the United Heckathorn Site (the "Site") is to implement the remedy selected in the Record of Decision dated October 29, 1994. The overall goals of the remedy are to reduce pesticide contamination in the marine environment at the Site to levels not posing a threat to human health and the environment. After removal of the contaminated sediments and transportation offsite for disposal, a layer of clean material will be placed to promote restoration.

## 2. Site Background.

The United Heckathorn Superfund Site in Richmond, California, was used to formulate pesticides from approximately 1947 to 1966. Soils at the Site and sediments in Richmond Harbor were contaminated with various chlorinated pesticides, primarily DDT and dieldrin, as a result of these pesticide formulation activities. At the time of Site listing in 1990, a visible deposit of pesticide residue was present on the Lauritzen Channel embankment. Several response actions have already been taken to cleanup the most contaminated upland areas of the Site, including the Lauritzen embankment. Under EPA Removal Order 90-22, a group of Potentially Responsible Parties ("PRPs") excavated the embankment deposit and transported it offsite to a permitted disposal facility. During subsequent actions through 1993 pursuant to the Removal Order, all known additional upland soil deposits containing high levels of pesticides were removed, as were piles of contaminated soils generated in earlier actions.

The results of the Remedial Investigation of marine sediment indicate that the occurrence of pesticides at the Site, particularly DDT and dieldrin, is more widespread and at concentrations orders of magnitude higher relative to San Francisco Bay background levels than other detected contaminants. Vertical core segments and channel edge grab samples were analyzed for chlorinated pesticides to delineate the areal and vertical extent of marine contamination. Results indicated that significant pesticide contamination was limited to the soft geologically recent "younger bay mud"; samples from the hard underlying "older bay mud" generally contained only traces of pesticides.

Pesticide concentrations were highest in the Lauritzen Channel, and decreased with increasing distance from the former United Heckathorn Site. The highest total DDT concentration of

633 milligrams per kilogram (mg/kg) dry wt was measured in a sample from 1 ft to 3 ft below the mudline in the center of the channel. Pesticide concentrations of greater than 100 mg/kg were detected in sediment from the northern and western portions of the channel. The median total DDT concentration was approximately 47 mg/kg at the head of the Lauritzen Channel, which has not been dredged in a number of years. The median concentration of total DDT decreased to about 14 mg/kg in the western, undredged portion of the channel, and to 1.5 mg/kg in the dredged portion of the channel near the Levin terminal. Dieldrin concentrations were lower (maximum concentration of 16 mg/kg), but exhibited the same spatial trend in relative concentration.

Pesticide concentrations in Parr Canal sediment were lower than those measured in the Lauritzen Channel but greater than those measured in Santa Fe or Inner Harbor Channels. The maximum and median total DDT concentrations measured in Parr Canal sediment were 4 mg/kg and 0.8 mg/kg, respectively. The maximum dieldrin concentration was 0.17 mg/kg. The Parr Canal is significantly narrower than it was in the 1940's, due to filling which (based on aerial photographs) occurred sometime between 1958 and 1968. Some of the material used to fill the canal may have been dredged from the harbor, possibly explaining the elevated levels of pesticides in Parr Canal sediments.

Grab samples collected from channel edges throughout the study area showed the same spatial trend in pesticide concentrations as the core samples. The total DDT concentrations in channel edge samples were consistent with the median concentration measured in core samples from that area.

Contaminant concentrations in the younger bay mud were generally not well stratified. In the shallow portions of the Lauritzen Channel, contaminant concentrations increased, and then decreased with increasing depth. The most highly contaminated sediment was generally found from 1 ft to 5 ft below the mudline. Analysis of the volumes of contaminated sediments and the average concentrations in harbor channels indicates that 98% of the mass of DDT in harbor sediments is confined to the Lauritzen Channel.

**3. General Description of Remedy.**

The selected remedial action for the marine portion of the site is dredging and/or excavation of the Lauritzen Channel and Parr Canal with off-site disposal of the dredged sediment. Components of the selected remedy listed in the Record of Decision include:

- Dredging of soft bay mud from the Lauritzen Channel and Parr Canal, with off-site disposal by rail of dredged material.

- Placement of clean material after dredging.

This Statement of Work does not address:

- Capping of areas around the former Heckathorn facility.
- A deed restriction or notice limiting use of the Levin-Richmond terminal to the current industrial classification.
- Long-term marine monitoring to determine the effectiveness of the remedy.

This portion of the remedy will involve dredging and excavating of younger bay mud ("YBM") from the Lauritzen Channel and Parr Canal. The total volume of these sediments is estimated to be approximately 90,000 $yd^3$. Two sunken barges, one small tank, and other debris must be removed from the Lauritzen Channel prior to dredging. In limited areas dredging will be impractical or of limited effectiveness in removing all YBM because of slopes on embankments and obstructions such as rip-rap, and capping may be required.

Silt curtains will be erected across the mouths of the channels prior to dredging to prevent transport of sediment disturbed by the dredging process out of the excavation area. Dredged material will either be loaded directly onto rail cars or stockpiled on a barge or on land to facilitate loading. Excess water, if any, produced during dredging and initial handling will be returned to the dredging area inside the silt curtains. However, control measures, such as physical separation or filtration, will be implemented to prevent or minimize the runoff or return of sediment back to the excavation areas. The EPA surface Water Quality Criteria for the concentration of DDT are not currently achieved, and would not be expected to be achieved in the Lauritzen Channel and Parr Canal during the remediation. The surface Water Quality Criteria are remedial action goals which are expected to be achieved after the remediation is complete.

The dredged and excavated material will be transported by rail to a permitted land disposal facility which meets the requirements of the CERCLA offsite policy, 42 U.S.C. §9621(d)(3). The expected average concentration of approximately 30 mg/kg, is well within the acceptable range for direct human exposure, and will not present a long-term threat to human health or the environment at a disposal facility. To promote the return of flora and fauna to the dredged areas, a layer of clean material will be placed after dredging, as specified in the Work Plan.

The specific remedy components are described in detail in

the February 2, 1996 Work Plan for Remedial Design/Remedial Action at the United Heckathorn Superfund Site, submitted to EPA by Laidlaw Environmental Services of California, Inc. on behalf of Montrose Chemical Corporation of California (the "RD/RA Work Plan").

**4. Project Documents.**

The Remedial Design and Remedial Action at the United Heckathorn Site is expected to be much simpler than at many sites where additional monitoring, treatability studies, and treatment plant design, construction, and long-term operation are required. The remedial action will essentially involve only short-term dredging or excavating and off-site disposal. For this reason, project planning documents which might normally be separated have been and/or may be combined, except as noted below.

A. RD/RA Workplan.

The Settling Work Defendants have prepared and submitted an RD/RA Work Plan which has been conditionally approved by EPA, subject to review by other agencies. The RD/RA Work Plan includes a comprehensive description of the activities to be performed. A comprehensive schedule for completion of each major activity and submittal is also included. The detailed Work Plan is equivalent to a preliminary design document. During the Work Plan development, the Settling Work Defendants conducted extensive field verification of site conditions, including taking over 340 probes of YBM and OBM depths in the Lauritzen Channel and 75 such probed in the Parr Canal. Included in the Work Plan as Appendices A and B are dredge and excavation plans for sediment removal in the Lauritzen Channel and Parr Canals. The Work Plan was developed in conjunction with a Field Sampling and Analysis Plan (FSAP) included as Appendix C of the Work Plan. Subsequent to the approval of the Work Plan there will be a design phase during which further specifics of the FSAP will be developed, such as contract laboratory selection and laboratory analytical Quality Assurance and Quality Control procedures.

B. Health and Safety Plan.

The Settling Work Defendants have prepared a project-specific Health and Safety Plan (HASP) which has been reviewed by EPA. EPA's review of a project HASP does not constitute approval.

C. Contingency Plan.

The Settling Work Defendants shall also prepare a Contingency Plan and coordinate with local emergency responders to ensure proper implementation. The plan shall address

potential accidental releases during the remediation, such as breeches or failure of the silt curtain(s) and other sediment containment facilities, spills during loading or staging of rail cars, and other accidents such as derailments. The plan shall also address emergencies occurring between the Site and the disposal facility. Specifically, the plan will contain the steps to be taken to minimize and cleanup a release should one occur, when operations will be halted, and when emergency responders will be notified. The plan will also identify the individual responsible for the implementation of the Plan.

D. Transportation and Disposal Plan.

The Settling Work Defendants shall develop a transportation and disposal plan which addresses staging and assembling of trains, manifesting and any other regulatory requirements relating to transportation, and the selection of the offsite disposal facility.

E. Pre-final/Final Design.

The detailed RD/RA Work Plan is equivalent to a preliminary design document. Pre-final Design shall function as the draft version of the Final Design. The Pre-final Design shall address comments generated from the Work Plan review by other agencies. The pre-final design shall also include large scale excavation maps and the design of the dewatering pads and water filtration system. After EPA review and comment on the Pre-final Design, the Final Design shall be submitted. All Final Design documents shall be approved by a Professional Engineer registered in California. EPA approval of the Final Design is required before initiating the RA, unless specifically authorized by EPA. The pre-final design shall include a complete set of construction drawings and specifications.

F. Closeout Report.

After implementation of the Remedial Action, the Settling Work Defendants shall conduct the necessary inspections to verify completed work and prepare a Remedial Action Report.

**5. Schedule**

The Settling Work Defendants shall submit deliverables and implement Remedial Action according to the following schedule.

A. Draft Contingency Plan

30 days after signing of the Consent Decree.

B. Final Contingency Plan

14 days after receiving comments from EPA.

C. Pre-final Design

14 days after receiving agency comments on the RD/RA Work Plan.

D. Final Design

14 days after receiving comment on the Pre-final Design from EPA.

E. Begin Remedy Implementation

7 days after Final Design approval, or as soon as dredging equipment is available, but no later than 30 days after Final design approval.

F. Closeout Report

30 days after completion of Remedial Action.

# WORK PLAN

## Remedial Design/Remedial Action on the United Heckathorn Superfund Site Richmond, California

Submitted to:

U.S. Environmental Protection Agency
Region IX
San Francisco, California

Submitted by:

Chemical Waste Management, Inc.

On Behalf of:
Montrose Chemical Corporation of California

May 6, 1996

# WORK PLAN
**for**
**Remedial Design/Remedial Action on the**
**United Heckathorn Superfund Site**
**Richmond, California**

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# WORK PLAN
**for**
**Remedial Design/Remedial Action on the**
**United Heckathorn Superfund Site**
**Richmond, California**

## 1.0 Problem Statement

This Work Plan for Remedial Design and Remedial Action (the "Work Plan") defines a program to remediate contaminated marine sediments in the Lauritzen Channel and Parr Canal of the United Heckathorn Superfund Site (the "Site") in Richmond, California.

This Work Plan describes the procedures which will be used to carry out the remedial action for marine sediments selected in the Record of Decision ("ROD") issued by the U.S. Environmental Protection Agency on October 26,1994. The remedial actions included in this Work Plan are expected to be the final response actions for marine sediments performed at the Site. As described in the Site history below, significant interim response measures were performed at the Site in the past. These removal actions addressed the principal threats at the upland portion of the Site. This Work Plan addresses contaminants remaining in marine sediments at the Site.

## 2.0 Site Description

The United Heckathorn Site is located in Richmond Harbor, on the east side of San Francisco Bay (Figures 1 and 2) in Contra Costa County, California. The location of the former United Heckathorn facility (Figure 3) is currently being used as a portion of a marine shipping terminal operated by the Levin Richmond Terminal Corporation (LRTC). The area of contamination at the Site includes the northern five acres of the terminal and marine sediments in harbor channels including the Lauritzen Channel, which is immediately adjacent to the location of the former Heckathorn facility, the Santa Fe Channel, the Parr Canal, and the Richmond Inner Harbor Channel.

The upland area of the Site is currently fenced and occupied. Current and expected future zoning of the upland area of the Site permits only industrial use. Land use restrictions selected as part of the Site remedy will also permit only nonresidential, industrial or commercial uses in the future.

## 3.0 Site History

The upland area of the Site is currently owned by Levin Enterprises, Inc. The Site was used from approximately 1947 to 1966 by several operators, including the R.J. Prentiss Company, Heckathorn and Company, United Heckathorn, United Chemetrics, and Chemwest

**Figure 1. Site Location Map**

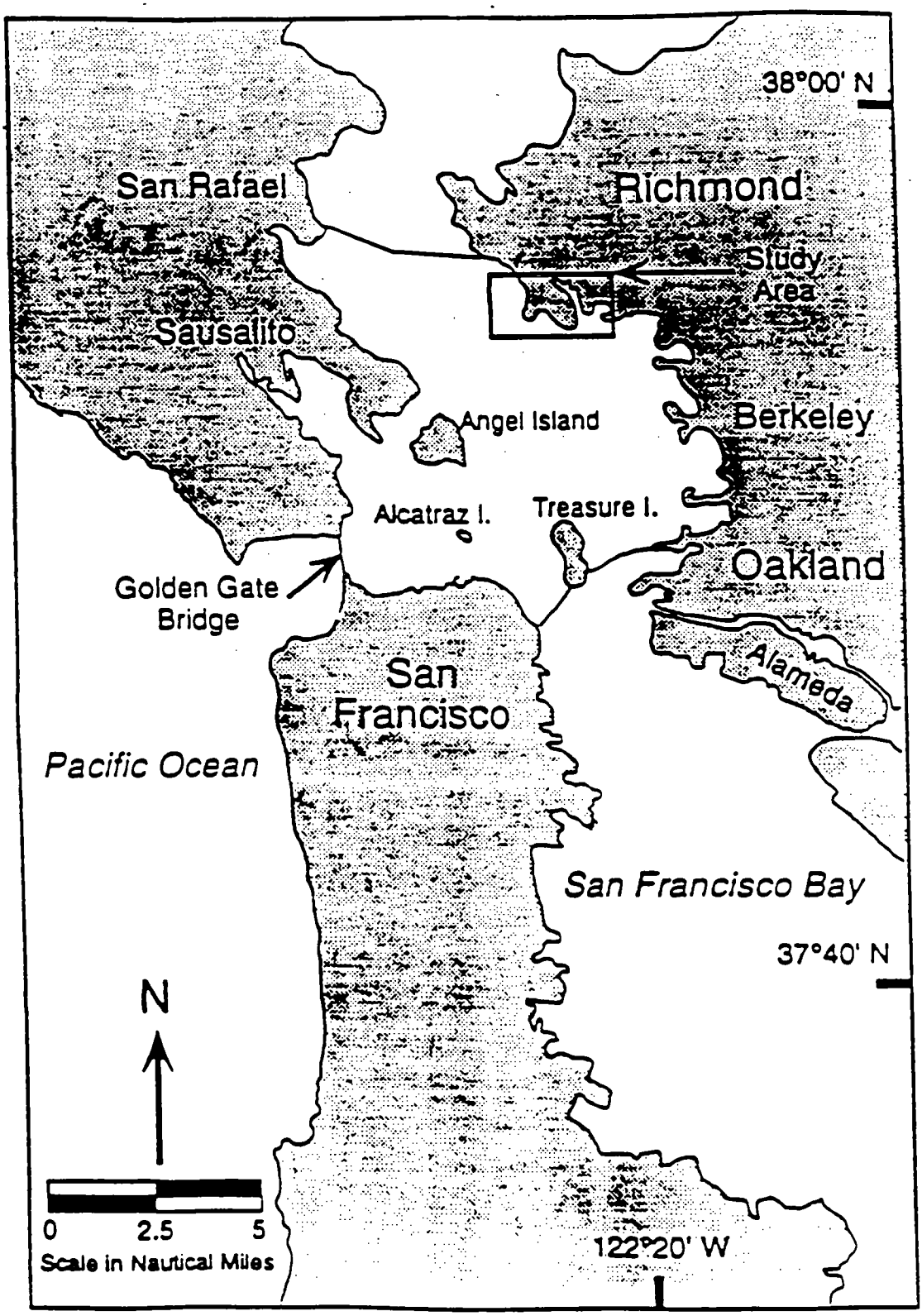


**Figure 2. Map of Richmond Harbor**

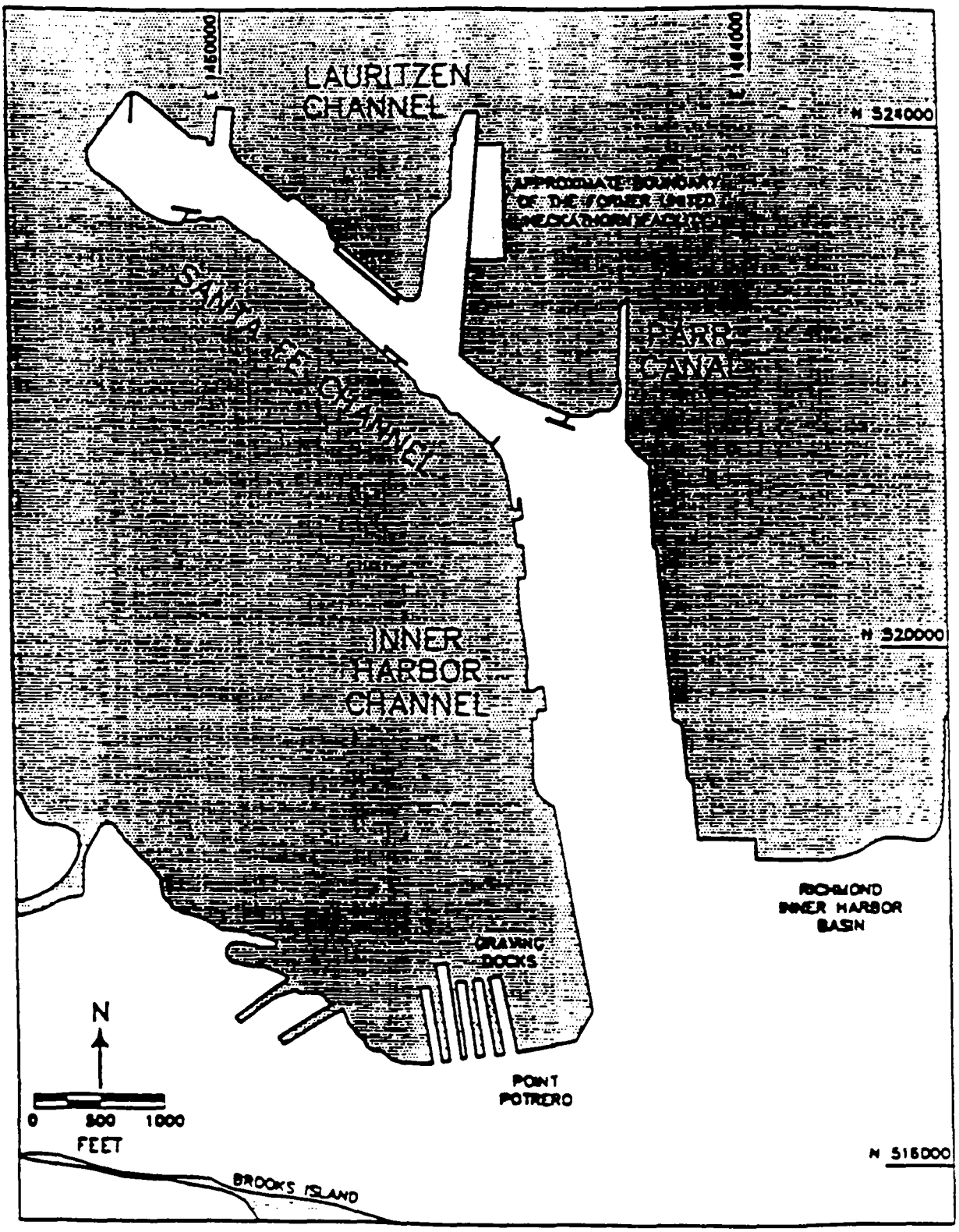
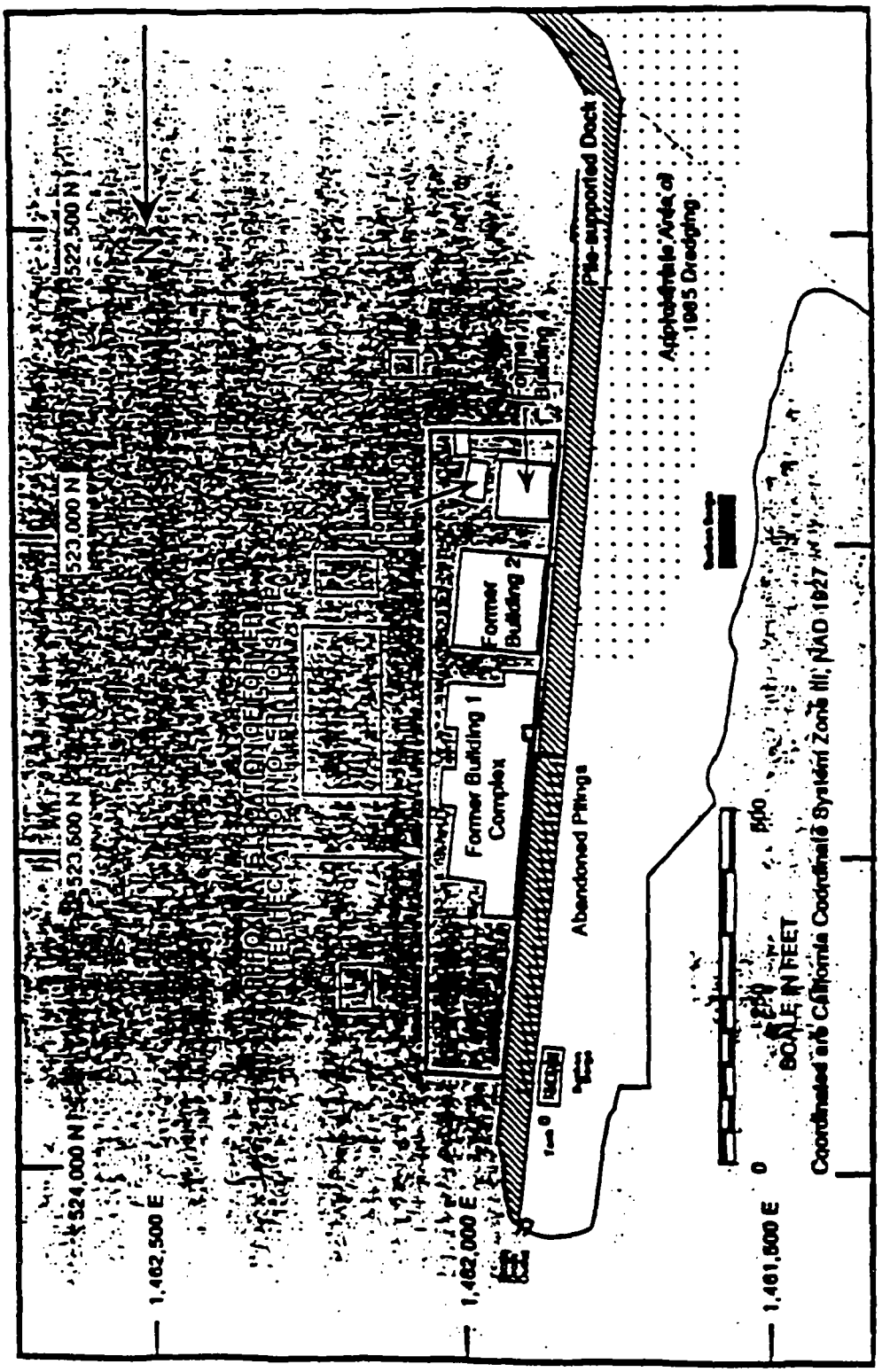


Figure 3. Site of Former United Heckathorn Plant



Incorporated (hereafter collectively referred to as "United Heckathorn") to formulate and package pesticides. No chemicals were manufactured on site. During that time period, the Site was owned, in succession, by the United States of America, Parr Richmond Industrial Corporation, Parr Industrial Corporation and Parr Richmond Terminal Corporation.

During a certain time period, United Heckathorn employees apparently routinely washed out equipment containing pesticide residues. The wash water was permitted to either run through drains that discharged to the Lauritzen Channel, or to seep into the ground adjacent to the Site (Levine-Fricke, 1990). Later, settling tanks were used to recover pesticide residues from wash water; however, overflow and leakage from these tanks may have occurred. In addition, accidental spills, leaks, and releases also may have occurred during the processing of liquid and dry pesticide formulations, which were conducted both inside and outside the United Heckathorn buildings.

In 1960, the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) inspected the facility and cited United Heckathorn for the release of pesticide-laden wastewater into the Lauritzen Channel. In 1965, California Department of Fish and Game staff reported a discharge of wastewater overflow into the Lauritzen Channel and leakage from the pesticide settling tanks.

Pesticide-processing activities at the Site ended by 1966. Between 1966 and 1970, the United Heckathorn facility buildings were demolished and cleared from the Site. In the 1970s, the Site was apparently used primarily for bulk material storage. In 1981, the Levin Metals Corporation purchased the property from the Parr-Richmond Terminal Company and has been operating the Site since that time as a bulk shipping facility.

In 1980, the United Heckathorn Site was inspected and sampled by CDHS as part of the Abandoned Sites Project. Pesticides and metals were detected in soil samples, and the area was designated a state Superfund Site in March 1982. U.S. EPA listed the United Heckathorn Site on the CERCLA National Priorities List (NPL) in March 1990, and took over as lead agency in August 1990.

Interim response actions were conducted from 1982 to 1993 in the upland and embankment areas of the United Heckathorn Site. As early as 1982, contaminated soil, asphalt, and concrete from the United Heckathorn Site were excavated by the current landowner, stockpiled and subsequently transported to several hazardous waste disposal facilities. In 1983, soils containing high levels of pesticides were removed by the current landowner during routine maintenance and extension of on-site railroad lines.

A 6-inch to 8-inch layer of gravel was placed over the surface of the Site, including a 6-inch layer of ballast rock over the Lauritzen Channel embankment and selected areas of high DDT concentrations. In 1986, during excavation for the construction of a train scale, high levels of pesticides were detected and approximately 60 cubic yards ($yd^3$) of soil were removed by the current landowner.

In November 1990, pursuant to U.S. EPA Removal Order 90-22, approximately 1500 $yd^3$ of soil and visible pesticide residue, which the U.S. EPA concluded contained up to 100% DDT, were excavated by several PRPs (Levin, Montrose, Parr, and Stauffer) from the Lauritzen Channel embankment. This excavation was taken back to the foundation of the former Heckathorn building, where a pesticide deposit approximately 3-feet thick was revealed beneath the foundation. Samples of this deposit contained approximately 30% DDT. An additional 1800 $yd^3$ of pesticide residue and contaminated soil were excavated by the same PRPs and Shell from this area in April 1991. The excavated material and stockpiles that had been placed on site in the 1980s were hauled off site by truck to permitted waste disposal facilities. A final soil removal action was completed in May 1993 by the same PRPs as well as Wilmington Securities, Prentiss and Sherwin Williams. The U.S. EPA estimates that over 99% of the mass of pesticides has been removed from the upland portion of the Site since 1990.

Marine sediment has not been the subject of prior removal actions or otherwise been remediated. However, as shown on Figure 3, the southeastern area of the Lauritzen Channel was last dredged for berth maintenance in 1985.

## 4.0 Marine Sediment Contamination Characteristics

The nature and extent of contamination at the United Heckathorn Site has been delineated by the combination of state-ordered Site investigations, which occurred prior to NPL listing, and U.S. EPA's subsequent Remedial Investigation (Battelle, 1994). As discussed above, large deposits of high levels of pesticides remained in upland soils after United Heckathorn ceased operations in 1966. These have been the subject of extensive excavation and removal actions over the past three years. This Work Plan addresses only contamination in marine sediments.

The results of the RI of marine sediment indicate that the occurrence of pesticides at the Site, particularly the contaminants of US. EPA concern, DDT and dieldrin, is more widespread and at concentrations orders of magnitude higher relative to San Francisco Bay background levels than other detected contaminants. The aerial and vertical distribution of marine contamination is summarized below.

Vertical core segments and channel edge grab samples were analyzed for chlorinated pesticides to delineate the aerial and vertical extent of marine contamination. Results indicated that significant pesticide contamination was limited to the soft geologically recent "younger bay mud"; samples from the hard underlying "older bay mud" generally contained only traces of pesticides. Figure 5 presents U.S. EPA's calculations of the average total DDT concentration in the younger bay mud in the inner Richmond Harbor. It is significant to note that the concentration contours on this figure must be presented on a log scale in order to depict the gradient of six orders of magnitude between the Lauritzen Channel and Point Potrero. The maximum and median total DDT and maximum dieldrin concentrations throughout the study area are also shown.

Pesticide concentrations were highest in the Lauritzen Channel, and decreased with increasing distance from the former United Heckathorn Site, clearly indicating that Heckathorn was the source of contamination. The highest total DDT concentration of 633,000 micrograms per kilogram ($\mu$g/kg) dry weight was measured in a sample from 1 foot to 3 feet below the mudline in the center of the channel. Pesticide concentrations of greater than 100,000 $\mu$g/kg were detected in sediment from the northern and western portions of the channel. The median total DDT concentration was approximately 47,000 $\mu$g/kg at the head of the Lauritzen Channel, which has not been dredged in a number of years. The median concentration of total DDT decreased to about 14,000 $\mu$g/kg in the western, undredged portion of the channel, and to 1,500 $\mu$g/kg in the dredged portion of the channel near the Levin terminal. Dieldrin concentrations were lower (maximum concentration of 16,000 $\mu$g/kg), but exhibited the same spatial trend in relative concentration.

Total DDT concentrations in sediment decreased by at least two orders of magnitude from the Lauritzen Channel to the Santa Fe Channel. The median concentration of total DDT in the younger bay mud was 110 $\mu$g/kg in the upper Santa Fe Channel and 210 $\mu$g/kg in the federally-maintained portion of the channel. DDT and dieldrin concentrations were higher in the federally maintained portion of the Santa Fe Channel, which includes the area downstream of the Lauritzen Channel. Total DDT and dieldrin concentrations decreased by another order of magnitude from the Santa Fe Channel to the Richmond Inner Harbor Channel. The median total DDT concentration was 60 $\mu$g/kg in the upper Inner Harbor Channel, and 10 $\mu$g/kg in the lower Inner Harbor Channel. The maximum total DDT concentration near Point Potrero was 19 $\mu$g/kg, which is approximately equal to the median DDT concentration for the periphery of San Francisco Bay, excluding the Lauritzen Channel (Long, et.al. 1988).

Pesticide concentrations in Parr Canal sediment were lower than those measured in the Lauritzen Channel but greater than those measured in Santa Fe or Richmond Inner Harbor Channels. The maximum and median total DDT concentrations measured in Parr Canal sediment were 4,080 $\mu$g/kg and 840 $\mu$g/kg, respectively. The maximum dieldrin concentration was 170 $\mu$g/kg. The Parr Canal is significantly narrower than it was in the 1940s, due to filling, which (based on aerial photographs) occurred sometime between 1958 and 1968. Some of the material used to fill the canal were dredged from the Lauritzen Channel harbor, possibly explaining the elevated levels of pesticides in Parr Canal sediments.

Grab samples collected from channel edges throughout the study area showed the same spatial trend in pesticide concentrations as the core samples. The total DDT concentrations in channel edge samples were consistent with the median concentration measured in core samples from that area.

Contaminant concentrations in the younger bay mud were generally not well stratified. In the shallow portion of the Lauritzen Channel, contaminant concentrations increased, and then decreased with increasing depth. The most highly contaminated sediment was generally found from 1 foot to 5 feet below the mudline. In the Santa Fe Channel, the

most contaminated sediment was found downchannel of the mouth of the Lauritzen Channel in the surface sediment, and just up-channel of the mouth in deeper sediment. Contaminant concentrations were generally higher in deeper sediment in the Inner Harbor Channel. Analysis of the volumes of contaminated sediments and the average concentrations in harbor channels indicates that 98% of the mass of DDT in harbor sediments is confined to the Lauritzen Channel.

Selected core samples collected during the marine RI were analyzed for polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), metals, and butyltins. In general, sediment from the upper Lauritzen Channel and Parr Canal had higher concentrations of PAHs, PCBs, and metals than sediment from the Santa Fe and Inner Harbor Channels. This is probably because the larger channels have been routinely dredged for navigation, whereas the northern Lauritzen and Parr have not. Only the pesticides, DDT and dieldrin, are consistently found in sediments and biota at levels orders magnitude higher than the regional background levels.

## 5.0 Overview of Remedial Design

The remedial action described in this Work Plan responds to the selected alternative from the ROD. That alternative consists of the dredging and off-site disposal of marine sediments by rail. The tasks detailed below are designed to:

- Remove contaminated marine sediments by dredging and/or excavating the bottoms of the Lauritzen Channel and the Parr Canal
- Load contaminated marine sediments into rail cars
- Transport the sediments in rail cars to California (CA), Colorado (CO) or Arizona (AZ) via the Southern Pacific Transportation Company (SP) or Burlington Northern Santa Fe Railroad (BNSF)
- Environmentally dispose of the sediments at one or more of the following:
  - Chemical Waste Management, Inc.'s (CWM) Kettleman Hills Facility (KHF) in California
  - Waste Management, Inc.'s (WMI) Midway Landfill (Midway) in Colorado
  - WMI's Butterfield Station Facility (BSF) in Arizona

In areas of the channels which are impractical to dredge or excavate, such as embankments, areas adjacent to or beneath structures, and rip-rapped areas, the remedial action outlined below calls for the placement of an additional amount of clean material, either sand and/or rock. The Construction Quality Assurance Project Plan outlined below provides for review of the remedial action described in this Work Plan and approval that it has been successfully completed.

These remedial activities will involve the following areas:

(a) the Santa Fe Channel;
(b) the mouth of the Lauritzen Channel and Parr Canal;
(c) the areal extent of the Lauritzen Channel and the Parr Canal, including bottoms, sides, and embankments;
(d) the dewatering cells and area adjacent thereto;
(e) the rail car staging areas;
(f) SP's 23rd Street railyard; and/or BNSF's Gerrard Boulevard railyard; and

generally any area within or directly adjacent to the Levin-Richmond Terminal property bounded by the Lauritzen Channel, Cutting Boulevard and South Fourth Street in Richmond, California.

## 6.0 Description of Remedial Action - Lauritzen Channel

### 6.1 Summary

A marine derrick will lift sunken barges, a used storage tank, caissons, cables and other large debris from the water. Once raised, the objects will be rinsed of any sediments and placed on shore for appropriate recycling or disposal. A silt curtain will be placed across the mouth of the Channel prior to raising the sunken vessel as well as for the duration of the dredging operations, or may be repositioned to allow ship access to Berth B once EPA approves completion of dredging in the outer portion of the Channel.

Younger bay mud from the Lauritzen Channel will be dredged in accordance with the Dredge Plan and placed into marine scows. Loaded barges will be pulled by a tow boat to the Levin-Richmond Terminal ("LRT") dock where a crane or pump will remove the dredge spoils from the barge and place them onto a paved dewatering cell. The dewatering cell will be engineered and constructed by the Supervising Contractor such that water will drain from the dredge spoils toward a point where it will be processed prior to being conveyed back into the Lauritzen Channel. If needed to further reduce moisture, an absorbent or drying agent will be added to the dredge spoils prior to loading them into rail cars destined for the CWM or WMI landfills in CA, CO, or AZ.

The banks of the Channel will be sloped according to the Dredge Plan and clean rock will be placed to ensure bank stability. At the end of the dredging of each group of grids, the bottom will be "dragged" to assure an even contour for placement of clean material. The bottom dragging will be implemented from the mouth of the channel northward toward the head of the channel, to assure that no clean areas are contaminated from the dragging procedure. In areas where dredging is impractical due to obstructions, an 18" layer of clean material will be placed. In all other dredged areas, six inches (6") of clean materials will be placed. However, underneath docks where slopes are too steep to hold sand and where sand would likely slip back down slopes, no material will be applied.

## 6.2 Preparation of Site

Prior to the start of rail car loading activities, a paved dewatering cell will be engineered and constructed on LRT property adjacent to the Channel. As discussed further in the Health & Safety Plan, the dewatering cell will be bordered by rail track for loading. An Exclusion Zone will be established on the paved dewatering cell and will be cordoned off utilizing cones and/or yellow barrier tape. The Exclusion Zone, as shown on Figure 4, is essentially the dewatering cell onto which the dredge spoils will be placed and from which the material will be loaded into rail cars. Only personnel working on the dredging project who have 40-hour hazardous waste operations and emergency response training [Sec. 29 CFR 1910.120(e)(3)] will be permitted inside the Exclusion Zone. The 40-hour training requirement will not apply to workers on the dredge, tug boat, or scows, nor to switch engine crews positioning rail cars on tracks throughout the LRT. Switch engines will be allowed unrestricted access on rail tracks through the Exclusion Zone. Their crews will remain inside the engine cabs while within the Exclusion Zone. Since rail cars will be loaded and decontaminated prior to leaving the Exclusion Zone for weighing, the area around the rail scales will not be part of the Exclusion Zone.

Normal business activities at the LRT will be permitted if outside of the Exclusion Zone. Any personnel allowed into the Exclusion Zone will decontaminate their clothing prior to exiting the Zone. The Exclusion Zone will include:

- Paved Dewatering Cell
- Drying Area
- Rail Car Loading Point
- Rail Car Decontamination Area

Within the Exclusion Zone, visqueen will be placed in any areas where dredged materials may fall onto unpaved areas due to incidental loading activities. Placement of visqueen will be along pathways that the loading bucket may swing and adjacent to the rail car loading area.

In the area just down the track from the Rail Car Loading Point, a Rail Car Decontamination Area will be situated. Visqueen will be laid on unpaved surfaces adjacent to the track. In this Area, rail cars will be cleaned by brush of any materials which may be on the outside of the car or on the wheels. The visqueen and any contaminants will be loaded into rail cars at the end of the project or as necessary.

As dredging proceeds, the Supervising Contractor will monitor the dredge, dredge scows, and the Exclusion Zone for the presence of birds attracted to the operations. In the event that birds are attracted, hazing methods will be employed to discourage interest in the operations. These methods may include firing blanks, air horns, sirens or other commonly employed hazing techniques.

## 6.3 Removal of Barges and Debris

Previous soundings and surveys of the bottom of the Lauritzen Channel have shown large pieces of debris, including two barges, on the bottom of the Channel. Prior to commencement of dredging, the Supervising Contractor or subcontractor will raise the barges and other large debris from the Channel. The barges will be raised from the Channel, rinsed of sediments using bay water and placed on shore at the head of the Channel on land owned by LRTC. The area on shore where the material will be placed is shown in Figure 4. Once on shore, the barges will be promptly cut up and the metallic portions will be recycled as scrap metal. Any non-recyclable materials will be sent to an appropriate landfill for disposal. Any other large debris encountered during the process of dredging the Channel will be salvaged in a similar manner as described above.

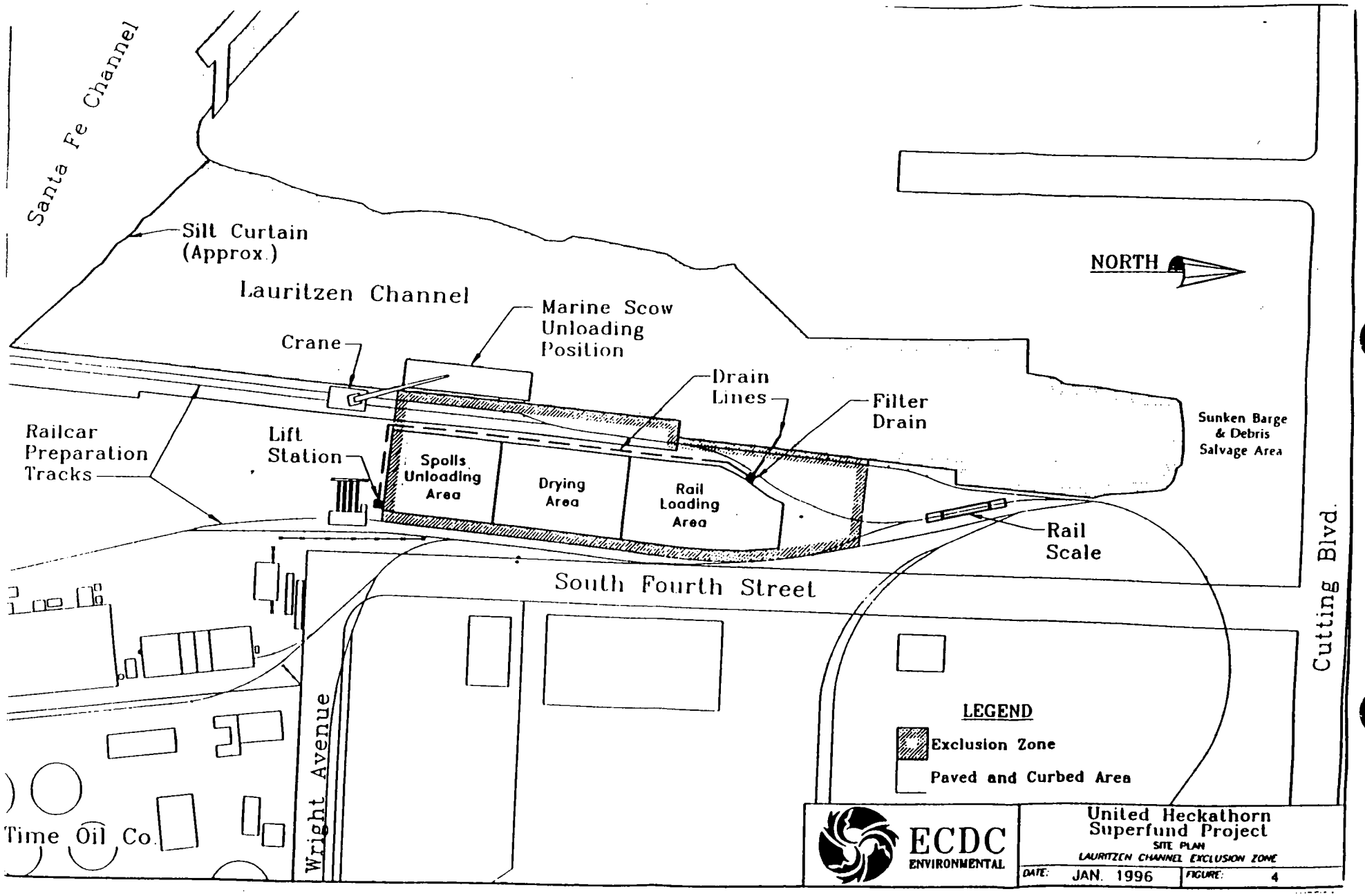
## 6.4 Installation of Silt Curtain

Prior to dredging in the Lauritzen Channel, a silt curtain will be installed across the mouth of the Channel. This curtain will extend from the water line down to the bottom of the Channel. It will be designed and placed to contain within the Lauritzen Channel sediments entrained in the water column during dredging activities. The curtain will remain in place until removal of contaminated sediments in the Channel is completed and the water turbidity has subsided to an acceptable level. There may be the need to move the silt curtain once the outer half of the Lauritzen Channel has been dredged to allow ships docking at the LRT to access Berth B in the outer portion of the Lauritzen. Should the U.S. EPA approve the completion of dredging in the outer portion of the Lauritzen Channel, and should LRTC demonstrate a need for silt curtain repositioning, the Supervising Contractor will implement procedures to allow turbidity to subside to acceptable levels before any repositioning takes place.

The silt curtain will be affixed on both ends of the shore at the mouth by the Supervising Contractor or subcontractor and will be held in place by ropes to the shorelines, chains, and anchors to the bottom. It will have a floating boom on the top and will extend to the bottom. The design will be such that it will capture sediment generated from dredging activities, yet not be affected by tidal surges or wakes from passing ships. More detail on the design of the silt curtain can be found in the Dredge Plan - Appendix A.

The curtain will be monitored and maintained by the dredging crew during the dredging activities to prevent migration of particulate or turbidity from within the Channel to adjacent waterbodies. The curtain will be checked periodically (at least three times per day) to assure that no tears or breaches have developed. Any tears or holes discovered in the silt curtain will immediately be repaired before any further work is undertaken.

Prior to final installation of the silt curtain, the Supervising Contractor or subcontractor will mobilize their dredge, 2 dump scows (1,800 to 4,000 cubic yard capacity) and a tugboat for the duration of the dredging portion of the project.


Santa Fe Channel
Silt Curtain
(Approx.)
Lauritzen Channel
Marine Scow
Unloading
Position
Crane
Drain
Lines
Filter
Drain
NORTH
Sunken Barge
& Debris
Salvage Area
Railcar
Preparation
Tracks
Lift
Station
Spoils
Unloading
Area
Drying
Area
Rail
Loading
Area
Rail
Scale
South Fourth Street
Cutting Blvd.
Wright Avenue
Time Oil Co.
LEGEND
Exclusion Zone
Paved and Curbed Area
ECDC
ENVIRONMENTAL
United Heckathorn
Superfund Project
SITE PLAN
LAURITZEN CHANNEL EXCLUSION ZONE
DATE: JAN. 1996
FIGURE: 4

## 6.5 Dredging Procedures

All dredging work in the Channel will be guided by the Dredge Plan (Appendix A). The Dredge Plan resulted from a detailed survey performed in the Lauritzen Channel during the period August-October, 1995. That survey by PLS Surveys, Inc. in conjunction with Vortex Diving, collected over three hundred and forty data points at coordinates throughout the Lauritzen Channel and over seventy data points in the Parr Canal to determine the depths to both YBM and OBM. The resulting volumes of YBM which will be removed from the Channel were higher than previous surveys had shown. Copies of the PLS survey maps are included in Appendix A.

To the maximum extent possible, the dredge will utilize a patented cable-arm or similar bucket to provide a level "cut" and to minimize turbidity. In areas where there are known obstructions or large objects, such as pilings or debris, a different bucket will be used. All dredging will be conducted on a grid-by grid pattern starting at the mouth of channel and working back and forth across the channel in a northward direction ultimately ending at the head of the Channel. By working from the outer to the inner part of the Channel, the contaminated areas will always be kept in front of the dredge crew, thus minimizing contamination of clean areas. This procedure also may allow the reopening of LRT's Berth B before completion of the entire project.

The goal of dredging is to remove the YBM from the Channel to the greatest extent practicable. The dredge operator will lower the bucket in a particular grid area to the depth delineated on the Dredge Plan. The target depth for dredging is 6" below the YBM/OBM intersect. The operator will attempt to maximize the amount of sediments in each bucketful, thereby minimizing the amount of water backflow into the channel from the bucket. The operator will use two methods to assure that the dredging in a particular grid is successfully completed: (1) measuring devices including electronic tide gauge, markings on the dredge line; and spot checks with lead-line soundings which assure that the depths on the Dredge Plan have been achieved for that particular grid; and (2) periodic hydrographic surveys to further verify dredging activities in a grid. The above information shall be recorded in a daily log and submitted to EPA as part of the Weekly Report described in Section 9.2 below.

In any area where the cable-arm or similar bucket can not penetrate six inches (6") into the OBM, the EPA Project Manager and Supervising Contractor will make a determination in the field as to whether a core sample of the bottom sediments will be drawn, except that no samples will be drawn in areas where dredging is impractical, such as areas which have been sloped or adjacent to piers and beneath docks. In cases where a core sample is drawn, it will be drawn utilizing LEXAN tubing and a collection device to allow visual observation of the extracted sediment core from the surface of sediments to the point of resistance in OBM. Samples will be taken from either the deck of the dredge rig or a skiff positioned along the swing arm radius of the dredge. Samples will be evaluated by the EPA Project Manager and the Supervising Contractor in the field on a case-by-case basis and an immediate determination will be made as to whether further dredging of a location is needed. A cable-arm bucket will be used for the majority of dredging in the Lauritzen Channel.

## 6.6 Sloping Embankments Along the Channel

The delineations of the sloped embankments that will not be dredged have been made in the Dredge Plan (Appendix A). Based upon these delineations, work will be pursued on a "toedown" basis. The cable-arm or clamshell bucket on the dredge will be used to take approximate cuts from the banks based upon the arc of the swing of the bucket and depth. As each slope is completed, the next will be cut along the bank in accordance with the Cross-Section sloping maps of the Dredge Plan.

The banks will be sloped at a 3 horizontal to 1 vertical angle. Dredging along the shoreline will be to within 10 feet, plus or minus 2 feet, of the toe of the slope. Dredging will not take place directly adjacent to pilings or under structures. After the sloping is completed, clean rocks to provide bank stabilization and clean sand, totaling on average 18" thick, will be placed as outlined in Section 6.12 below. Please see the Dredge Plan (Appendix A) for further details of the dredging procedures.

## 6.7 Handling & Loading of Sediments Into Scows

The overall Work Plan will be to begin at the mouth of the Channel and work northward, swinging the dredge bucket generally toward the head of the channel over areas which have not yet been dredged. Performing the work in this manner will allow the best opportunity to clean up any sediments which may fall from the dredge bucket during dredging activities. In addition, clearing sediments from the mouth to the head may allow for the reopening of LRT's Berth B prior to completion of the entire Lauritzen Channel dredging project.

During loading activities, the dredge operator will attempt to maximize the amount of sediments in each bucket so as to minimize water. Dredging will be conducted such that as each bucket is raised from the Channel, free water is allowed to drain back into the Lauritzen Channel. So long as all work is performed inside of the silt curtain, and acceptable turbidity levels are achieved prior to removal or repositioning of the silt curtain, there will be no restrictions on the drainage of water from the dredge bucket or barge/scow back into the Channel.

In general, the dredge operator will load each scow to at least ninety percent of its capacity before radioing the tugboat to pull the full scow to the LRT dock and to return with an empty scow.

## 6.8 Handling & Removing Sediments From Scows

Once scows are filled, they will be shuttled by the tugboat to the dock alongside the LRT crane. A crane utilizing an optimally-sized bucket or a pump mechanism will unload materials from the scow and place them onto the paved dewatering cell for dewatering and subsequent loading into rail cars.

Prior to the commencement of scow unloading activities, layers of visqueen will be placed on any unpaved surfaces underneath the swing of the loading crane bucket and on any unpaved surfaces adjacent to rail cars.

### 6.9 Rail Car Preparation & Staging

Upon delivery from the Southern Pacific (SP) or BNSF mainline, rail cars for the project will be staged at the respective railyards. A switch engine will pick up empty cars from the railyard (in car segments of optimum length) and stage them on a nearby spur track (herein, "preparation track") in the LRT Terminal. In this work area, the bottoms of rail cars will be lined with plastic rail car liners.

Once the cars are lined, a switch engine will position them on the loading track in a timely manner so as to minimize standby time. Thereupon, the switch engine will return to the appropriate railyard and pick up another segment of cars for delivery to the preparation track. Upon delivery of these cars to the preparation track, the switch engine will connect to the cars on the loading track for weighing. After weighing the loaded cars and prior to pulling the loaded cars to the railyard, the engine will switch over the prepared cars from the preparation track to the loading track. This process will be repeated until there are no more empty rail cars in the railyard.

On each day of delivery of rail cars from SP or BNSF, the Supervising Contractor will have at the Exclusion Zone an amount of non-hazardous drying agent (e.g., lime, fly ash, etc.) needed for at least that day's loading activities. This drying agent will be delivered in trucks or rail cars and placed into an Exclusion Zone holding area or in portable silos directly adjacent to the rail car loading area.

### 6.10 Draining, Drying and Loading Sediments Into Rail Cars

The paved dewatering cell onto which dredge spoils will be placed by the crane or pump will be designed and constructed such that a maximum amount of water will drain from the sediments almost as soon as they are placed in the drying equipment on the dewatering cell. Drained water will be channeled to a collection area where the water will be processed to remove solids prior to draining back into the Channel. Drain water will be filtered or polished as a contingency back-up system. The flow rate and suspended solids content of the drainage water will be monitored, as described in the Field Sampling and Analysis Plan, Appendix C.

Once the sediments have been drained of free liquid, they may be mixed with an absorbent or drying agent to further remove moisture. The drying agent, stored in silos, will be mixed with the sediments in such a way as to optimize the drying process while at the same time minimize any fugitive emissions of dust. The mixing process may be performed by loaders, a pug mill, an auger system, a combination of these devices, or some other mixing technology which the Supervising Contractor deems appropriate for the activity.

As the sediments are dried, they will be moved toward the rail car loading area at one end of the paved dewatering cell. At the loading area, front end bucket loaders will load the sediments into rail cars staged on the adjacent loading track. As they are loaded, rail cars will be pushed along the track by a switch engine. Applicable Federal, state, and local safety regulations will be adhered to in the movement of rail cars. After being loaded, and prior to pulling out for weighing at the scalehouse, rail cars will be cleaned and decontaminated within the Exclusion Zone . Any spilled materials will be collected on sheets of visqueen and placed into rail cars for disposal.

After rail cars are loaded, they will be sent across the LRT certified rail scales for weighing and adjustment of payloads as necessary. After weighing, properly loaded rail cars may be covered, if deemed necessary by the Supervising Contractor, with either a plastic visqueen liner placed over the load or a surfactant sprayed on to seal the top material and keep any material from blowing. Any plastic cover would be secured with a series of sandbags. The rail scales and covering area will be outside of the Exclusion Zone.

After release from the scale house, the cars will be shunted to a nearby LRT track to await enough loaded cars (approximately 20) so that they can be transported by the switch engine to the railyard where the loaded cars will be assembled for delivery. Upon completion of loading of all the rail cars in a train, or when there are no more materials to load (whichever comes first), the train will be pulled out of the railyard by SP or BNSF destined for Kettleman Hills Facility, California, Butterfield Station Facility, Arizona, or Midway, Colorado landfill. Rail cars will be periodically inspected to assure their integrity.

### 6.11 Removal of Silt Curtain

After completion of the removal of contaminated sediments and once the turbidity in the waters has subsided, the silt curtain will be removed by the Supervising Contractor or subcontractor and placed in the dewatering cell for disposal by the Supervising Contractor. A turbidity meter will be used to assure that levels of turbidity in the Lauritzen Channel do not exceed ambient levels of turbidity in the adjacent Santa Fe Channel at the time the silt curtain is removed.

There is the possibility that, in order to allow ships access to LRT's Berth B once the outer half of the Lauritzen Channel has been dredged and deemed complete in accordance with procedures established in Section 9 below, the silt curtain may be repositioned approximately toward the head of the Lauritzen Channel. This will be done only upon the U.S. EPA's written Certification of Completion of the previously dredged portion of the channel, and only upon a showing by LRT that there is an imminent need for use of Berth B. In such case, the turbidity will be allowed to subside prior to repositioning of the silt curtain.

## 6.12 Placement of Clean Material

After removal of the silt curtain. clean sand will be imported by barge. and a 6" layer placed by the Supervising Contractor or subcontractor throughout the dredged areas of the Channel. The general method used to place the sand will be to either hydraulically pump the sand or remove it from the barge utilizing a derrick with a clamshell bucket smaller than that used for dredging. The sand will be lifted from the barge and dropped into the water such that it will result in a relatively even layer of sand on the bottom of the Channel.

The source of the clean material will be sand materials dredged from another part of San Francisco Bay. It is hoped that the use of sand imported from another part of the Bay will be helpful to promoting natural growth in the Lauritzen Channel. Prior to placement of the sand, the Supervising Contractor will either: (1) provide U.S. EPA with acceptable previously performed test results on the materials; or (2) draw a representative sample of the material and test in accordance with standard U.S. EPA testing procedures to ensure no contaminated materials are imported into the Channel.

In areas where the embankments were sloped. the Supervising Contractor or its subcontractor will place clean rock with clean sand on top. The rock and sand will be placed utilizing either a pneumatic pumping unit or the clamshell from the barge on which the clean materials are imported.

Atop inaccessible areas that were impractical to dredge, an average of 18" of clean sand will be pumped pneumatically. However. underneath docks where slopes are too steep to hold sand and where sand would likely slip back down slopes. no material will be applied. The clean sand will be placed in such a manner that as uniform a layer as practical will be placed.

## 6.13 Decontamination of Work Area

After completion of the project. the Work Area will be decontaminated utilizing the following methodologies:

Dredge Bucket:

The dredge bucket will be washed using a firehose and bay water while over a designated scow. Any loose materials will be rinsed off of the bucket and will be contained in the scow. The method of collecting sediments from the bucket and from within the scow is outlined in the next paragraph below.

Scows:

The scows will have filter cloth placed over a centralized capture point to which all water and sediments will either be pumped or drained. The scows will then be rinsed with bay water using a firehose, such that all sediments will drain toward the capture point. The water will be allowed to drain back into the Lauritzen Channel through the filter cloth or will

be pumped to the drying area for processing. Any remaining sediments will be taken out of the scow and placed into a rail car destined for the appropriate landfill.

Loading Crane or Pump:

While positioned over the paved dewatering cell. the loading crane bucket or pump will be rinsed using a firehose and bay water. The rinse water will drain from the dewatering pad through the filter water processing system and into the Channel. Sediments from the cleaning operation will be loaded into a rail car.

Exclusion Zone:

Visqueen placed on the ground to contain any spillage will be collected and placed directly into rail cars destined for disposal at the landfill(s). Any remaining accessible residual sediments or spills will be placed into a rail car destined for the landfill(s). Inaccessible sediments will be washed back into the Lauritzen Channel prior to placement of the Clean Materials. The paved dewatering cell will be washed down with a fire hose. All water will be processed. then drained back into the Lauritzen Channel. Sediments remaining on the dewatering cell from the processing will be loaded into rail cars and sent to the landfill for disposal. The dewatering pad will be restored to its condition prior to the project. and any modifications which were made by the Supervising Contractor will either be left or dismantled, at the option of LRTC.

## 7.0 Description of Remedial Action - Parr Canal

The Site will be prepared largely by clearing debris from the shores and by preparing truck loading areas from which the sediments can be shuttled to the Lauritzen drying pad.

A barge currently partially submerged toward the head of the canal will be removed from the Canal. cleaned of sediments and placed on shore where it will be cut up and recycled.

A silt curtain will be erected across the mouth of the Parr Canal prior to excavation activities to inhibit sediments from migrating into the Santa Fe Channel.

Young bay mud from the Parr Canal will be removed from the Canal bottom in accordance with the Excavation Plan (Appendix B). and placed directly into trucks for shuttling to the Lauritzen drying cell. The methods of removing young bay mud from the Parr Canal will be excavation from both shores. The delineation of excavation activities are found in the Excavation Plan for the Canal.

After completion of the excavation. the bottom will be leveled and an average of 18" of clean sand will be placed on the bottom of the Parr Canal to provide a means of promoting growth and restoring the ecosystem.

## 7.1 Preparation of Site - Construction of Truck Loading Areas

Prior to the start of excavation/dredging, any debris on both sides of the Parr Canal, including creosoted wood, metal barriers, and other miscellaneous debris will be cleared by LRT.

An exclusion zone will be set up along each of the two banks of the Parr Canal (Figure 5). Each of the two exclusion zones, which will serve as truck loading areas, will be approximately 15-20 feet wide and will run the length of the Canal. The zones will be lined with heavy duty visqueen which will catch falling sediments or water. Excavators will work from both sides of the Canal, proceeding in a northerly direction from the mouth toward the head. Excavators will load sediments directly from the Canal into water-tight, high-sided, end-dump trucks waiting in the exclusion zone. Each loaded truck will pass through a decontamination checkpoint prior to shuttling down Wright Avenue to the Lauritzen dewatering cell, where the sediments will be unloaded into the drying system and then loaded into rail cars.

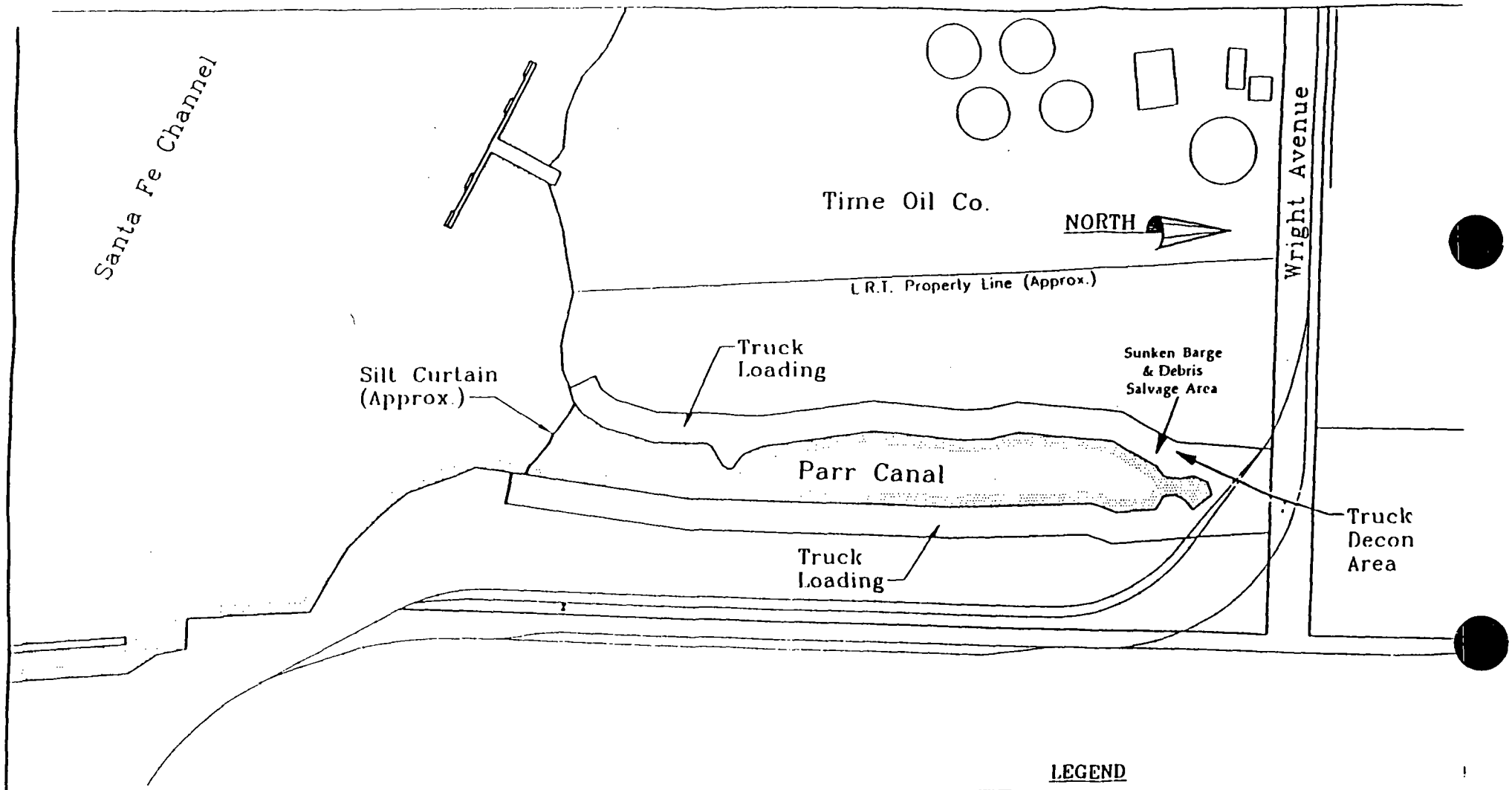
As excavating proceeds, the Supervising Contractor will monitor the Exclusion Zone for the presence of birds attracted to the operations. In the event that birds are attracted, hazing methods will be employed to discourage interest in the operations. These methods may include firing blanks, air hose, sirens or other commonly employed hazing techniques.

## 7.2 Removal of Barge & Debris

Once construction of the dewatering cell is complete, the partially submerged barge will be raised from the water, washed clean of any sediments while over the Canal using bay water, and placed onshore near the head of the Canal (see Figure 5). It will then be promptly cut up using torches and, as appropriate, sent for recycling as scrap metal. Any non-recyclable materials will be sent to an appropriate landfill for disposal.

## 7.3 Installation of Silt Curtain

Prior to removal of young bay mud from the Parr Canal, a silt curtain will be installed across the mouth of the Canal. The curtain will be designed and placed to contain within the Parr Canal any sediments generated during excavation activities. This curtain will remain in place until excavation of YBM sediments is completed and the water turbidity has subsided to an acceptable level. A turbidity meter will be used to assure that levels of turbidity in the Parr Canal do not exceed ambient levels of turbidity in the adjacent Santa Fe Channel at the time the silt curtain is removed and repositioned across the mouth of the Lauritzen Channel.




ECDC ENVIRONMENTAL

United Heckathorn Superfund Project

SITE PLAN - ALTERNATIVE 1

PARR CANAL EXCLUSION ZONE

DATE: JAN. 1996 | FIGURE: 5

The silt curtain will be affixed on both ends of the shore by the Supervising Contractor or subcontractor personnel and will be held in place by ropes to the shorelines, chains, and anchors for the bottom. It will have a floating boom on the top and anchors chained to the bottom. The design will be such that it will capture sediment generated from excavation activities yet not be affected by tidal surges or wakes from passing ships. Any silt or sediment which hits the curtain will be redirected towards the bottom of the Canal.

The curtain will be checked periodically (at least three times per day) by the Supervising Contractor or subcontractor to assure that no tears or breaches have developed during the excavation activities, so that there is no migration of particulate or turbidity from within the Canal or adjacent waterbodies. Any tears or holes discovered in the silt curtain will immediately be repaired before any other work is undertaken.

## 7.4 Excavation of Parr Canal Young Bay Mud

Long reach excavators (approximately 70' reach) will be utilized to remove YBM sediments from the Canal. At this time, it is anticipated that an excavator on both sides of the Canal will be required to reach all areas of the Canal. The excavators will begin on the south side of the Canal and work their way in tandem, north toward the head of the Canal. In general, excavation will be done in such a fashion as to maximize the amount of sediments in the bucket, thus minimizing the amount of water removed. Excavation along the shore line will be to the toe of the slope.

Excavation will continue in accordance with the depths on the Excavation Plan, or until riprap or other non-removable barriers make further excavation impractical. In general, as much young bay mud will be removed as practical.

Excavation operations will be conducted to minimize the possibility of cross-contamination. Where possible, the arms of the buckets will primarily swing to the north during removal activities. Thus, any materials spilled in water will be captured as the excavation proceeds in the northerly direction. As sediments are removed, a layer of visqueen will be placed underneath where the bucket is anticipated to swing. Any spillage which occurs on the canal slopes will be rinsed back into the canal using bay water. Any sediments spilled on rip-rap will be washed back into the Canal using bay water.

The material will be loaded into watertight dump trucks for shuttling to the Lauritzen dewatering area. Trucks will be cleaned of any residual sediments prior to leaving the truck loading area to mitigate contamination of clean areas.

Obstructions such as rip-rap in the bottom of the Parr Canal may inhibit the ability of the equipment to remove sediments. Therefore, good faith efforts will be used to remove the maximum amount practicable of young bay mud. After the excavation has been completed.

and prior to the verification survey, the bottom of the Canal will be "dragged" to ensure a level contour for placement of clean material.

### 7.5 Stockpiling of Sediments

As outlined above, sediments removed from the Parr Canal will be placed directly into trucks for transport to the Lauritzen dewatering pond.

### 7.6 Rail Car Preparation and Staging

Upon delivery from SP or BNSF, rail cars for the project will be staged at the respective railyard(s). A switch engine will pick-up empty cars from the railyards and stage them on tracks at the Lauritzen Channel.

Rail cars will be lined with plastic rail car liners. Depending on the drying process, prior to loading of sediments into rail cars, a front-end loader may place a layer of a drying agent into the bottoms of the rail cars to act as an absorbent for residual water emanating from the sediments.

### 7.7 Draining, Drying, and Loading Sediments Into Rail Cars

The paved dewatering cell (at Lauritzen) onto which sediments will be placed will be designed and constructed such that a maximum amount of water will drain from the sediments as soon as they are placed on the dewatering cell. Drained water will be channeled to a collection area where the water will be processed to remove solids prior to draining back into the channel. The flow rate and suspended solids content of the drainage water will be monitored, as described in the Field Sampling and Analysis Plan, Appendix C. The outfall of the drain pipe will be situated toward the head of the channel.

Once the sediments have initially drained of free liquid, they will be mixed with an absorbent or drying agent to further remove moisture. The drying agent, stored in silos, will be mixed with the sediments in such a way as to optimize the drying process while at the same time minimize any fugitive emissions of dust. The mixing process may be performed by loaders, a pug mill, an auger system, a combination of these devices, or some other mixing technology which the Supervising Contractor deems appropriate for the activity.

As the sediments are dried, they will be moved toward the rail car loading area of the paved dewatering cell. At the loading area, front-end bucket loaders will load the sediments into rail cars staged on the adjacent loading track. After being loaded, and prior to pulling out for weighing at the scalehouse, rail cars will be cleaned and decontaminated within the Exclusion Zone. Any spilled materials will be collected on sheets of visqueen and placed into rail cars for disposal.

On each day of delivery of rail cars from SP and/or BNSF, the Supervising Contractor will have at the Exclusion Zone an amount of non-hazardous drying agent needed for at least

that day's loading activities. This drying agent will be delivered in trucks or rail cars and placed into the Exclusion Zone holding area or in portable silos directly adjacent to the rail car loading area.

Sediments will be loaded into rail cars from the dewatering cell using bucket loaders. Rail cars will be pulled past a loading point by a locomotive. The area from the dewatering cell to the rails will be paved or covered with visqueen to minimize effects of any spillage. Rail cars will be cleaned within this area upon the completion of loading. Any spilled materials will be picked up and placed into the rail cars as the cars are loaded.

When several rail cars are loaded. they will be sent over to LRT's rail scales for weighing and adjustment of payloads as necessary. After weighing, properly loaded rail cars will be covered with either a plastic visqueen liner placed over the load or a surfactant sprayed on to seal the top and prevent material from blowing. Any plastic cover will be secured with a series of sandbags. The rail scales and covering area will be outside of the Exclusion Zone.

After release from the scalehouse, the cars will be taken by a switch engine to the designated railyard where a train of loaded cars will be formed. Upon completion of loading all the rail cars in a train or when there are no more materials to load (whichever comes first), the train will be pulled out by SP or BNSF destined for the CWM or WMI landfills in CA. CO, or AZ.

### 7.8 Decontamination of Site

After final loading of the material into rail cars. visqueen and other contaminated items will be loaded into rail cars for disposal. The Exclusion Zone and adjacent areas will be restored to their condition prior to the project. and any modifications which were made by the Supervising Contractor will either be left or dismantled. at the option of LRTC.

### 7.9 Removal of Silt Curtain

After completion of the removal of YBM sediments and once the turbidity in the waters has subsided. the silt curtain will be removed by the Supervising Contractor or subcontractor and repositioned across the mouth of the Lauritzen Channel. A turbidity meter will be used to determine acceptable levels of turbidity prior to silt curtain removal and repositioning. A turbidity meter will be used to assure that levels of turbidity in the Parr Canal do not exceed ambient levels of turbidity in the adjacent Santa Fe Channel at the time the silt curtain is removed.

### 7.10 Placement of Clean Materials

After removal of the silt curtain. clean sand will be imported by dump trucks. and then spread through the bottom of the Canal by the Supervising Contractor or subcontractor

at an average 18" thickness. Sand will be placed by either the long-reach excavators or pumped hydraulically in order to spread along the bottom as evenly as practical.

Prior to delivery of the sand, the Supervising Contractor will either: (1) provide U.S. EPA with acceptable previously performed test results on the materials; or (2) draw a representative sample of the material and test in accordance with standard U.S. EPA testing procedures to ensure no contaminated materials are imported into the Parr Canal project site.

## 8.0 Transportation and Disposal Plan

### 8.1 Overview

Materials loaded into rail cars will be transported by the Southern Pacific Transportation Company (SP) and/or Burlington Northern Santa Fe Railroad (BNSF) from the Site in Richmond to the CWM and/or WMI landfill facilities in Kettleman City, California; Mobile, Arizona; and/or Fountain, Colorado. At the facility, the cars will be unloaded utilizing rail car crawlers. In the unlikely event of rail interruption, material will be loaded into end dump trucks and sent to CWM's KHF in California. In such a situation, a car top unloader will place the contents into the end dumps for transport.

### 8.2 Type and Configuration of Rail Equipment

The type of rail equipment used will be gondola cars with capacities of 70, 100, or 107 tons each. These cars are configured with solid bottoms. The dimensions of a typical gondola car are presented in Figure 6.

### 8.3 Rail Switching In/Out of Levin-Richmond Terminal

SP and/or BNSF will deliver empty cars from the mainline to the 23rd Street and/or Gerrard Boulevard rail yard, respectively. Trains will typically travel in 55 to 80-car sets. Cars will be switched in 20 car segments into the LRT loading area. In the Exclusion Zone within the confines of the yard, the cars-will be lined and prepared for loading.

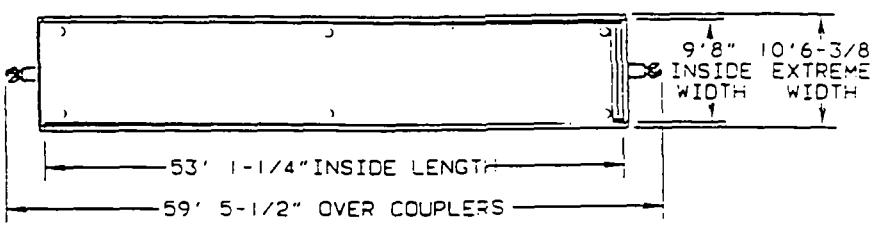
Loaded rail cars will be weighed and decontaminated within the Exclusion Zone as described in sections 6.7 and 7.8 above. Loaded cars will then be staged in the appropriate railyard where they will be periodically monitored as routine security until they depart for the designated landfill . When the entire 55 to 80-car train is fully loaded, a bill of lading will be faxed to SP in Denver and/or BNSF in Topeka. Multiple heavy duty locomotives will be dispatched to Oakland and/or Richmond and will hook up to the loaded cars and pull them directly to the designated landfill. The trains will arrive at the landfill approximately 24 to 96 hours later.

**Figure 6: Typical Gondola Car**

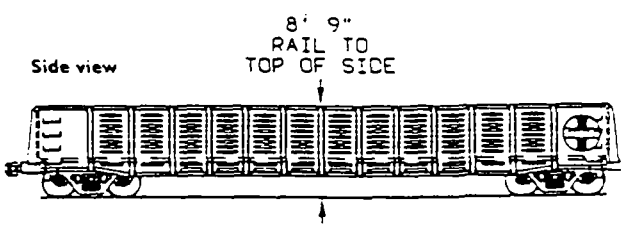
## Waste Products Rail Equipment

Santa Fe has long-term and long-distance solutions for transporting EPA and non-EPA manifest waste and municipal solid waste. Santa Fe has a fleet of dedicated gondola cars meeting ferderal and state EPA safety standards for transporting contaminated soils. These leak-proof cars are designed with six capped drain holes to make it easier for customers to clean the car after use.

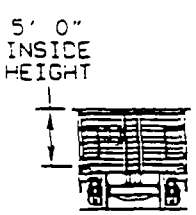
Top view




Side view




End view




### SPECIFICATIONS

| | |
|---|---|
| Tare weight: | 65,000 lbs. |
| Capacity: | 100 tons |
| Cubic Capacity: | 2500 - 2567 cubic feet |
| Nominal Capacity: | 185,000 - 195,000 lbs. |
| Load Limit: | 186,000 - 200,000 lbs. |
| Light Weight: | 63,000 - 76,763 lbs. |
| Decking: | Steel |

## 8.4 Primary Routes to Disposal Facilities

The rail routes to the designated landfills for the loaded cars will be as presented in Figures 7.1, and 7.2. They will travel on SP and/or BNSF the entire way to the designated landfill. Therefore, no switching between railroads is foreseen at this time. The routing to each facility is shown in Figures 7.1, and 7.2.

In the unlikely event that the primary rail access is not available, trucks may be used to temporarily support the project. Trucks would exit the project and utilize the following route, which is depicted in Figure 7.3:

Interstate 580 to Interstate 80
Interstate 80 to Interstate 980
Interstate 980 to Interstate 880
Interstate 880 to Highway 238
Highway 238 to Interstate 580
Interstate 580 to Interstate 5
Interstate 5 to Highway 41
Highway 41 to Kettleman Hills Facility

A copy of Southern Pacific Transportation Company's and BNSF's 1995 Safety Program Manual delineating railway safety and contingency procedures in the event of a derailment or release of material will be available at the onsite Project Office.

## 8.5 Location of Disposal Facilities

The CWM Kettleman Facility is located in the Central Valley of California approximately 250 miles from the project. The landfill is located 4.1 miles west of Interstate 5 on Highway 41. The precise location coordinates are:

Section 3, Township 23 South, Range 18 East, Mount Diablo Basin and Meridian, East half of Section 33, All of Section 34, Township 22 South, Range 18 East, Mount Diablo Basin and Meridian, Kings County, California.

The WMI Butterfield Station Facility is located 40 miles Southwest of Phoenix, Arizona. The precise location coordinates are:

Section 17, Township 4 South, Range 1 East, Gila and Salt River Base Meridian, Maricopa County, Arizona

The Midway Landfill is located approximately one mile West and two miles North of the Pueblo County line. The Midway Landfill consists of 554 acres in Southwestern El Paso County with a landfill footprint of 238 acres.

**Figure 7.1 Primary Rail Route to Midway Landfill Facility**

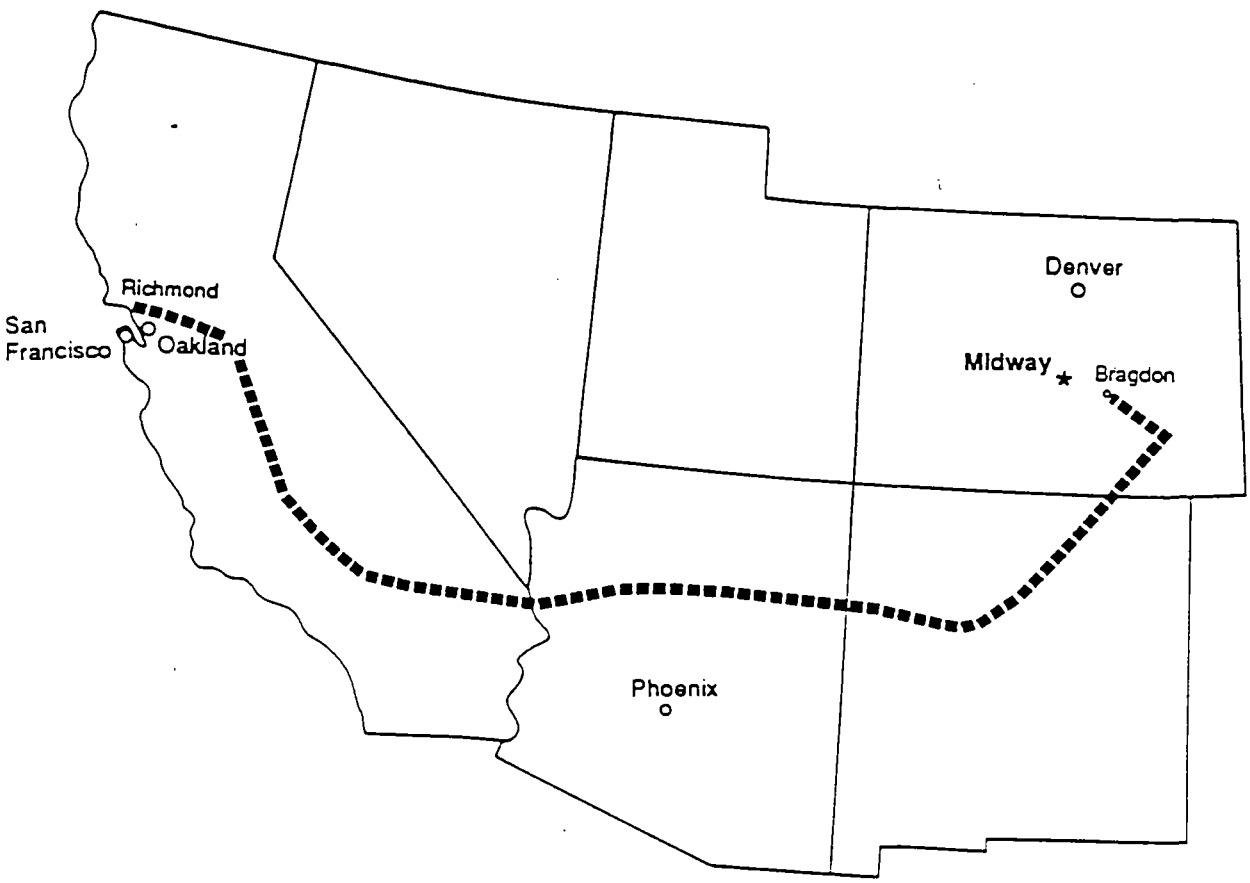


**Figure 7.2 Primary Rail Route to Butterfield Station Facility**

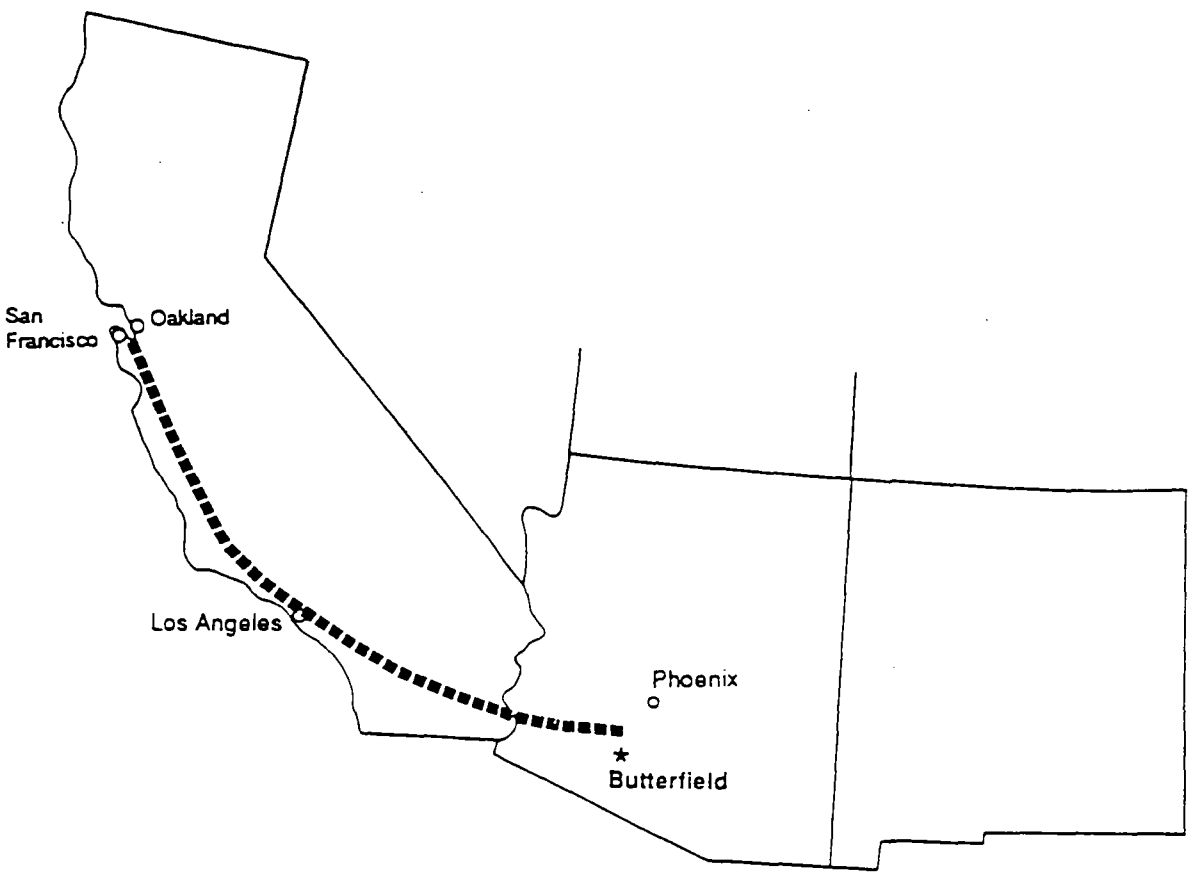


**Figure 7.3 Primary Truck Route to Kettleman Hills Facility**

The precise location coordinates are:

Portions of Sections 20, 22, 27, 28, and 29 in Township 17 South, Range 65 West of the 6th Principal Meridian, El Paso County, Colorado.

## 8.6 Receiving and Operations at Disposal Facility

All rail cars received at the spur are checked and logged in against the bill of lading and the manifests to ensure they are indeed destined for that landfill. Cars arriving from the United Heckathorn Project will be checked against these lists. Any cars arriving at the respective spur without proper paperwork are researched in conjunction with SP and/ or BNSF to determine their point of origin and destination. Any cars in question are side-tracked until the matter is resolved. Should a determination be made that cars have been mistagged, or sent to the wrong location, the cars are released back to SP and/or BNSF for re-routing.

Gondolas arriving at the rail spurs will be unloaded using either "climbing hoes," back hoes, or track excavators. End dump trailers will be used to transport the marine sediments to the landfill.

Midway: Trucks will proceed North out of the Bragdon Spur and access I-25 (Exit 108) and continue North on I-25 for approximately 10 miles. Trucks will use exit 119 to access the Midway Landfill. Trucks will proceed west 0.4 miles to the Midway Landfill entrance.

Butterfield Station: Trucks will proceed East on State Route 238 two miles to 91st Avenue. Proceeding North they then will travel one mile to Butterfield Road and continue West one mile on into the landfill.

Trucks will be weighed using the facilities' certified scales. Waste manifests/bills of lading will be reviewed and processed. Trucks will be directed to the applicable off-loading area(s). Empty vehicles will be rerouted back to the spur for subsequent loads.

## 8.7 Technical Design of Disposal Facility

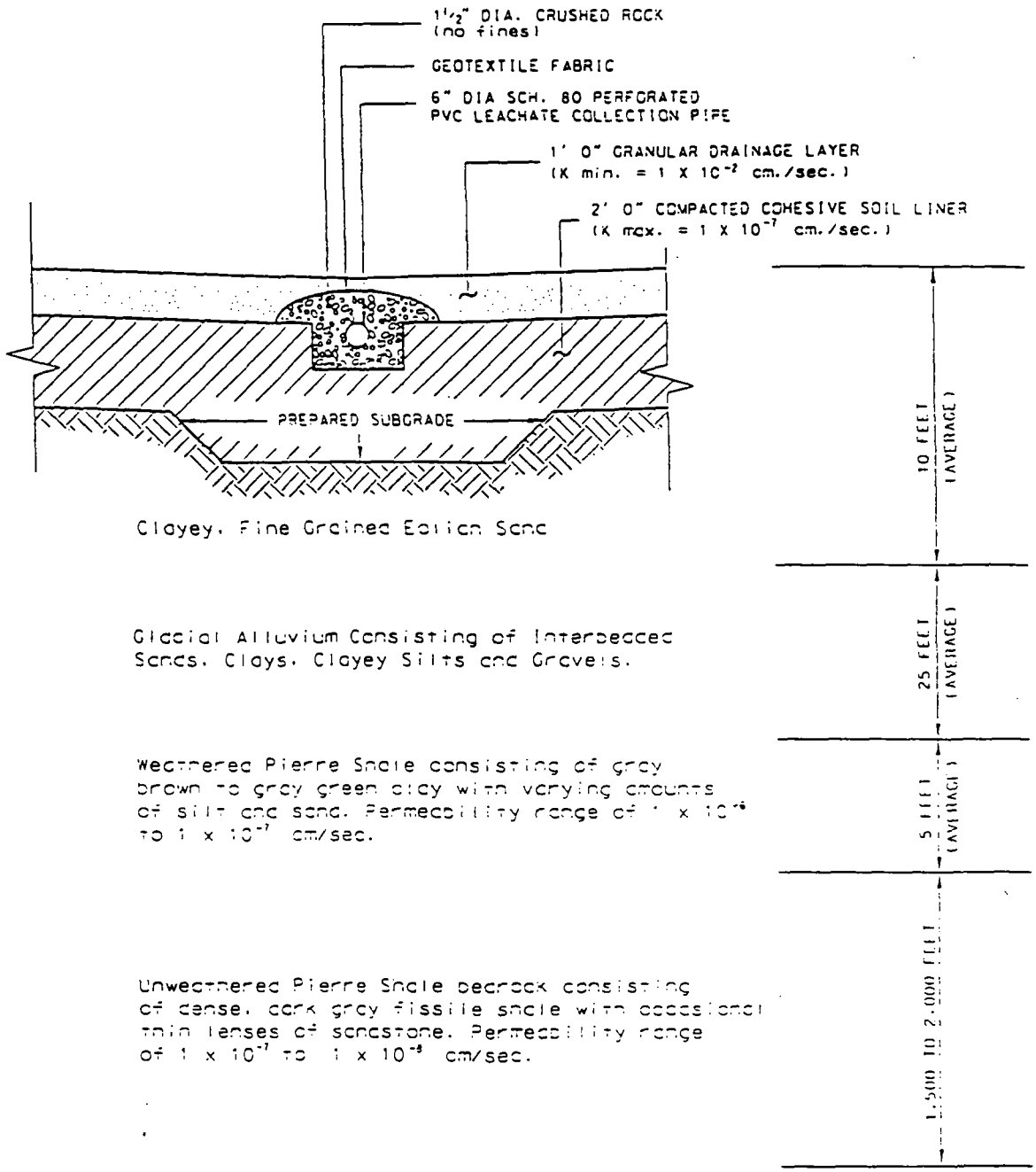
The CWM and WMI landfills-are designed with state-of-the-art lining systems. Schematics of each landfill's liner system is presented in Figures 8.1, 8.2, and 8.3 on the following pages.

## 9.0 Reporting

Chemical Waste Management, Inc., and its affiliate Waste Management Inc. and the dredging and excavation contractor(s) will provide the U.S. EPA Project Manager with a grid-by-grid notification that dredging and excavation have been completed, weekly progress reports, a weekly manifest summary, and a close-out report, including description of final

## Figure 8.1 Technical Design Schematic of Midway Landfill

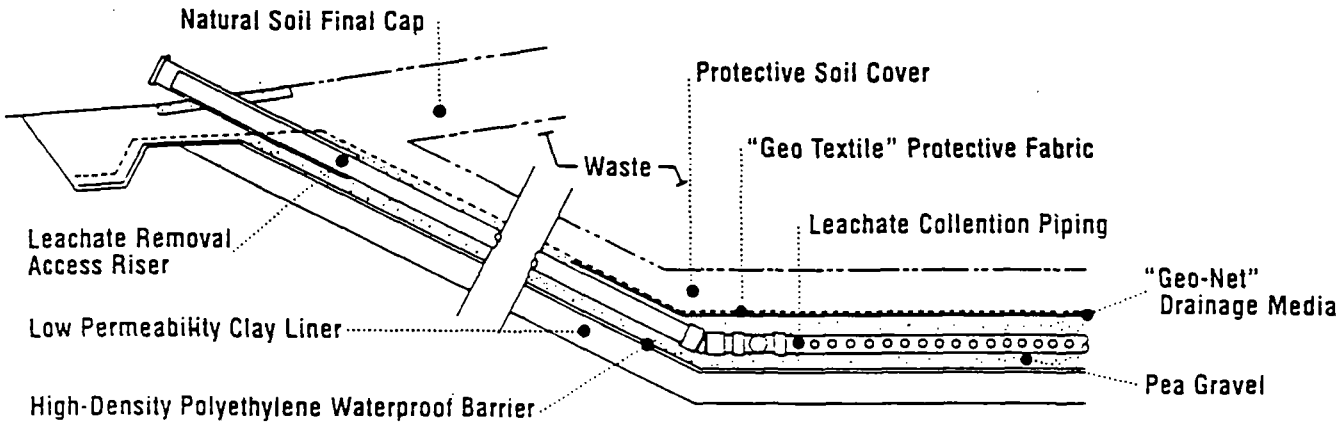
NOT TO SCALE




CELL MONITORING: A groundwater monitoring program to establish background water quality and to conduct ongoing detection monitoring began in 1991. Also each cell features a leachate collection/detection system comprised of a sand drainage layer, collection pipes and a HDPE-lined collection sump.

CELL CLOSURE: When final refuse contours are reached, the cell is capped with a 24 inch low permeability soil layer and a 12 inch erosion layer suitable to support vegetation. The erosion layer will be appropriately fertilized and seeded with native grasses.

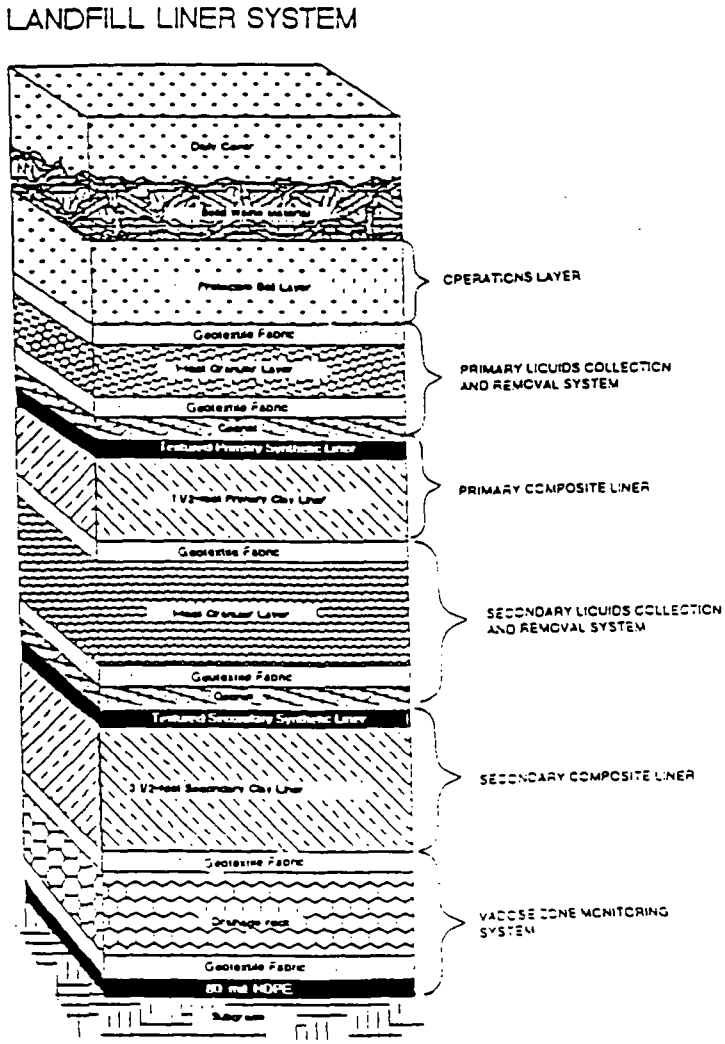
**Figure 8.2 Technical Design Schematic of Butterfield Station Landfill**




Cell Monitoring: A complete background monitoring well system was installed in 1989. In addition, each cell features a composite liner and leachate collection system. Leachate is collected from each cell and transferred through dual containment piping to a triple lined leachate collection unit.

Closure: When final capacity is reached, the cell is capped with a 48" cap of low permeability soil with a 24" vegetative layer constructed in full compliance with the current Subtitle D requirements.

**Figure 8.3 Technical Design Schematic of Kettleman Hills Landfill**




Cell Monitoring: The Kettleman Hills Facility's Site Specific Groundwater Monitoring Plan currently includes 42 monitoring wells and has been in existence since May 1986.

Cell Closure: The Kettleman Hills Facility's Closure Cap configuration from the bottom up consists of: waste; 1 foot of general fill; 1 foot of low permeability layer ($1x10^{-5}$ cm/sec); 40 mil geomembrane, 12 ounce geotextile; 30 inches of vegetative soil; and vegetated with native grasses.

decontamination of the project Site at the completion of the project. Each of these reports is described below.

The entire remedial project will be a implemented and completed within a relatively brief 2-3 month timeframe, and the cost to de-mobilize and then re-mobilize equipment and personnel would be significant. Therefore, the EPA and its oversight contractor will make their best efforts to raise any questions regarding operations, grid completion reports, and weekly reports as soon after they are submitted as possible, so that issues can be resolved between the Supervising Contractor and the EPA Project Manager on an ongoing basis.

## 9.1 Grid Completion Notification

A hydrographic survey will be performed periodically (every 1-3 days) to show the extent and demonstrate the completion of dredging in a series of grids. The grid completion report will include grid numbers completed, along with the hydrographic survey results. These shall also be submitted with each weekly report.

The EPA and/or its oversight contractor shall approve or disapprove each grid completion notification report within three working days of receipt (except for the final grid completion notification which will be in 48 hours), by signing the grid completion approval sheet, which lists all grid numbers. If the EPA or its oversight contractor disapproves the grid completion, the EPA Project Manager and Supervising Contractor shall meet immediately to determine what steps are necessary to obtain approval. The Supervising Contractor will resubmit a grid completion notification report once the agreed upon steps have been taken.

## 9.2 Weekly Progress Reports

On Monday following each week during the Project, the Supervising Contractor, in conjunction with the dredging contractor, will deliver a weekly progress report to the U.S. EPA Project Manager describing activities and milestones achieved during the preceding week. The weekly progress report will give a concise update as to the progress of the project vis a-vis the overall schedule. The report will include:

- Periodic grid completion reports
- Hydrographic surveys of the week's dredging activities.
- Description of any unanticipated changes in conditions.
- Progress for the week compared to the schedule.
- Number, weights and status (i.e., the location) of rail cars shipped during previous week and compared to anticipated schedule.

Any significant changes in conditions which impact the overall project schedule will be reported by the Supervising Contractor to the U.S. EPA Project Manager by fax as soon as reasonably possible.

### 9.3 Manifest Reporting

Copies of all uniform manifests shipped with each rail car during the preceding week will be given to the U.S. EPA project manager along with the weekly report. Any exceptions or issues related to manifests will be addressed and suggested courses of resolution (if necessary) will be made.

### 9.4 Channel Completion Report

Upon completion of each of the Lauritzen Channel and the Parr Canal, the Supervising Contractor shall submit a Channel Completion Report, including the final week's activities in the channel and the post-dredge survey of the bottom contour of the channel. Because time will be of the essence with regard to demobilizing the dredge equipment and taking down the silt curtain, the Channel Completion Report for each channel will be hand-delivered to U.S. EPA and a rapid review and approval will be necessary, as outlined in Section 9 above and Sections 10.4 and 10.5 below.

### 9.5 Close-Out Report

At the end of the project, a Close-Out Report will be drafted and submitted to the U.S. EPA Project Manager. The Close-Out Report will include:

- Summary of operations and milestones achieved
- Final tonnage from the project and number of rail cars shipped
- Description of decontamination activities at the Lauritzen Channel and Parr Canal
- Summary of changes in conditions and how they were addressed
- Copies of and comparison of pre-dredge and post-dredge surveys
- Summary of amounts of clean materials placed in Lauritzen Channel and Parr Canal locations and copy of post-placement surveys
- Confirmation of project completion.

Per the Project Schedule in Section 11 below, EPA will review and approve of project completion within two weeks of receipt of all report submittals from the Supervising Contractor.

## 10.0 Construction Quality Assurance Project Plan

The Construction Quality Assurance Project Plan (CQAPP) for the remediation of contaminated marine sediments from the United Heckathorn Superfund Project Site establishes criteria to assure that the goals of the project are achieved to the maximum extent practical. The CQAPP describes below the measures which will be taken from the beginning to the end of the Project to maximize operational effectiveness, to minimize the possibility of contamination of upland areas or adjacent waterways, and to assure the highest quality and safest project performance toward successful completion of the Site clean-up.

The goal of this project is to remove the contaminated YBM from both the Lauritzen Channel and the Parr Canal to the maximum extent practicable, and to place clean material on the bottom of both waterways so as to promote growth and rejuvenate the ecosystem. The criteria for removal established below provides assurances that the proposed remediation activity will remove those contaminated sediments which can be practically removed and provide for a marine environment which can be readily restored.

### 10.1 Experience of the Supervising Contractor

The most reliable way in which to assure that the operations of a planned project are as effective and efficient as possible is to choose a Supervising Contractor and subcontractors who have demonstrated experience and a proven track record at successfully completing similar projects. The Supervising Contractor for the United Heckathorn Site. Chemical Waste Management. Inc., and its affiliate Waste Management. Inc., represent the largest environmental management company in the world. CWM and WMI disposed of more than 5 million tons of contaminated soils in 1995 and remediated several project sites which individually had over 50,000 tons of soils.

On a project with as many operational components as the United Heckathorn Project, the Supervising Contractor is only as good as the subcontractors that he chooses to perform the particular components of the project. For this Project. the three basic operational components for which CWM, as Supervising Contractor. will select three separate subcontractors are: (1) dredging and other work in the Lauritzen Channel: (2) rail car loading, switching and weighing in the Lauritzen Channel: and (3) excavation and other work in the Parr Canal. CWM. and its affiliate. WMI. will select subcontractors who have the level of experience and expertise in performing the tasks required for the particular projects components outlined above.

### 10.2 Prevention of Contamination

Steps will be taken to prepare the Site and the operational infrastructure to minimize the possibility for contamination of the upland areas and waterways adjacent to the Site by spills of contaminated marine sediments. The following are the major procedures which will be established to prevent contamination to the maximum extent practical:

1. Barges and large debris from the Lauritzen Channel and Parr Canal bottoms will be rinsed prior to placement on shore for recycling or disposal.

2. A silt curtain will be installed at the mouth of both the Lauritzen Channel and Parr Canal prior to dredging or excavation. The silt curtain is expected to assure that dredging activities inside of the silt curtain do not negatively impact ambient turbidity levels in the adjacent Santa Fe Channel.

3. Exclusion Zones will be set up which will demarcate the boundaries within which only hazardous-trained personnel will be permitted to enter and work. These are the areas of closest proximity to the contaminated sediments after dredging or excavation.

4. Dredge and excavator operators will maximize sediments in bucket loads so as to minimize water overflow back into channels.

5. Upland property beneath the path of the unloading crane and excavators will be lined with impervious material (e.g., visqueen) so as to catch falling material.

6. Upland property used for dewatering dredge spoils will be engineered and constructed with paved surfaces and positive drainage to assure maximum dewatering and to prevent contamination of upland soils.

7. Fugitive water from contaminated sediments placed in barges or on shore will be physically captured and processed prior to being returned to the channels.

8. If rainfall is likely, sediments placed on the dewatering pad and dried, which are not being immediately loaded into rail cars, shall be protected from rainfall by covering stockpiles with visqueen. Should precipitation fall anywhere on the dewatering pad, it will flow through the same drainage and collection system as the runoff from the sediments.

9. Both work sites will be thoroughly decontaminated after completion of the work, with all contaminated materials being loaded into rail cars for disposal at the designated landfill.

### 10.3 Criteria for and Verification of Ongoing Work

The criteria which will be used to evaluate whether the ongoing work is achieving the goal of removing the targeted YBM from the Lauritzen Channel are the dredge-to-depth markings on the Cross-Section sloping maps contained in the Dredge Plan. The dredge operator will use the depths and contours on those maps, plus six inches (6") of overdredge, as the indicators of whether the targeted YBM removal depths have been reached, except as

set forth below. These same maps will be compared to post-dredge hydrographic surveys to verify completion of individual grids and the entire channels.

As stated above, all dredging and marine work in the Lauritzen Channel will be guided by the Dredge Plan (Appendix A) and all excavation work in the Parr Canal will be guided by the Excavation Plan (Appendix B). There will be two basic methodologies used to verify that the ongoing work is being performed in accordance with the above plans and that the criteria for removal has been achieved. They are:

(1) Use of data from electronic tide gauge, markings on the digging line, and spot checks with lead-line sounding; and

2) Hydrographic surveys.

From 1-2 lead-line soundings will be taken at different coordinates in each cell and the data will be logged and graphed on a cross-sectional map. After the dredge operator has completed dredging in a cell, and after the cell for the Parr Canal only has been dragged, a hydrographic survey will be taken. The hydrographic survey and the lead-line soundings will be graphed and compared with the Channel Cross-Section Map (Appendix A - Exhibit #3) for that cell to determine if the proper slopes and depths have been attained for that cell or if further dredging is required to achieve the target depths of six inches below the depth identified on the Cross-Section Map. If there are any elevations higher than the map, the coordinates shall be noted and the dredge operator will re-dredge at those coordinates. A follow-up lead-line sounding will be taken at each re-dredged coordinate, and another hydrographic survey will be taken after re-dredging activities have been completed in the cell. If the Cross-Section Map contours are achieved, the cell shall be deemed complete. If there remain higher elevations, the re-dredging and verification process will continue until conformance with the map is achieved.

In cases where the cable-arm or similar dredge bucket can not penetrate the OBM layer and, thus, the target dredge depth of 6" below the OBM intersect of the Channel Cross-Section Map has not been achieved, the EPA Project Manager and Supervising Contractor will make a decision in the field on a case-by-case basis whether a Lexan core sample should be taken in the location to determine the amount of YBM sediments remaining on top of the OBM layer. Should such a sample be taken, the EPA Project Manager and Supervising Contractor will evaluate the sample to determine whether more dredging is necessary at the location of the sample. The dredge operator will be instructed accordingly.

### 10.4 Verification of Completion of Work - Lauritzen Channel

Confirmation of the completion of the dredge work will be on a grid-by-grid basis through scientific measurement of the depths achieved using hydrographic survey techniques, and through determination in the field by the EPA Project Manager for locations where the dredge bucket can not penetrate to six inches below the designated dredge depth. Proper

placement of clean material on the bottom of the Lauritzen Channel shall be verified by taking a hydrographic survey of the channel. For areas of the channel that are targeted to receive an average of six inches (6") of clean material, the hydrographic survey will need to show a minimum of four inches (4") of consolidated clean material to be deemed complete. For areas targeted to receive an average of eighteen inches (18") of clean material, the hydrographic survey will need to show that in each grid the average depth is 18 inches (18"). At no single point in the grid will the depth be less than twelve inches (12") of consolidated clean material. Should any of the hydrographic surveys show less than the minimums required, the Supervising Contractor will apply additional clean material to the area and re-survey to assure that the minimums are achieved.

The Supervising Contractor will inform the U.S. EPA Project Manager in a Channel Completion Report that the work in the Lauritzen Channel has been completed in accordance with this Work Plan. The Lauritzen Channel Completion Report will include the final week's activities in the Lauritzen Channel and the post-dredge hydrographic survey showing the final contour on the bottom of the Channel.

The EPA and/or its oversight contractor shall approve or disapprove the Lauritzen Channel Completion Report within three working days of receipt by signing the last page of the report. If the completion is disapproved, the reason for disapproval shall be provided in writing at that time. If the EPA or its oversight contractor disapproves the Lauritzen Channel Completion Report, the EPA Project Manager and Supervising Contractor shall meet immediately to determine what steps are necessary to obtain approval. The Supervising Contractor will resubmit a Lauritzen Channel Completion Report once the agreed upon steps have been taken. The resubmitted report shall be approved or disapproved by EPA within three working days of receipt.

### 10.5 Verification of Completion of Work - Parr Canal

Proper placement of clean material on the bottom of the Parr Canal shall be verified by taking a hydrographic survey of the channel after placement of the material. For areas targeted to receive an average of eighteen inches (18") of clean material, the hydrographic survey will need to show that in each grid the average depth is 18 inches (18"). At no single point in the grid will the depth be less than twelve inches (12") of consolidated clean material. Should the survey show less than the minimum required for any particular area of the Canal, the Supervising Contractor will apply additional clean material to the particular area and resurvey to assure that the minimum is achieved.

The Supervising Contractor will inform the US. EPA Project Manager in a Parr Canal Completion Report that the work in the Parr Canal has been completed in accordance with this Work Plan. The Parr Canal Completion Report will include the final week's activities in the Canal and the post-dredge hydrographic survey showing the final contour on the bottom of the Canal.

The EPA and/or its oversight contractor shall approve or disapprove the Parr Canal Completion Report within three working days of receipt by signing the last page of the report. If the completion is disapproved, the reason for disapproval shall be provided in writing at that time. If the EPA or its oversight contractor disapproves the Parr Canal Completion Report, the EPA Project Manager and Supervising Contractor shall meet immediately to determine what steps are necessary to obtain approval. The Supervising Contractor will resubmit a Parr Canal Completion Report once the agreed upon steps have been taken. The resubmitted report shall be approved or disapproved by EPA within three working days of receipt.

## 11.0 Project Schedule

The Supervising Contractor is anticipated to begin site preparation work within 30 days of a final order approving the Consent Decrees as orders of the court or by July 29, 1996, whichever date is later.

The tentative project schedule on a daily milestone basis is included as Figure 10. The project schedule is designed to conclude operations prior to adverse winter weather conditions occurring.

The dredging project schedule attached assumes the Supervising Contractor will have the exclusive use of the marine scow dock, the dewatering pad, and adequate rail car loading track to meet the project needs.

## 12.0 Project Organization and Personnel

The general organization of the Project Team is included in the organizational chart on Figure 10. The Supervising Contractor will have the primary responsibility for performing the tasks within this Work Plan. The Project Manager (PM) will be the Supervising Contractor's representative with ultimate responsibility and authority for decision making on behalf of the Supervising Contractor. The PM will be the Supervising Contractor's on-site manager during performance of activities on the Project. The PM may have one or more Assistant PMs for supervising the Project during those periods when the PM is not present, or the PM may designate a representative of a subcontractor to supervise in the absence of a representative of the Supervising Contractor.

The Supervising Contractor will retain a subcontractor for dredging and ancillary work in the Lauritzen Channel, a subcontractor for excavation and ancillary work in the Parr Canal and sediment processing, and a subcontractor for performing specified rail car loading activities in the Lauritzen Channel and rail switching activities at Lauritzen.

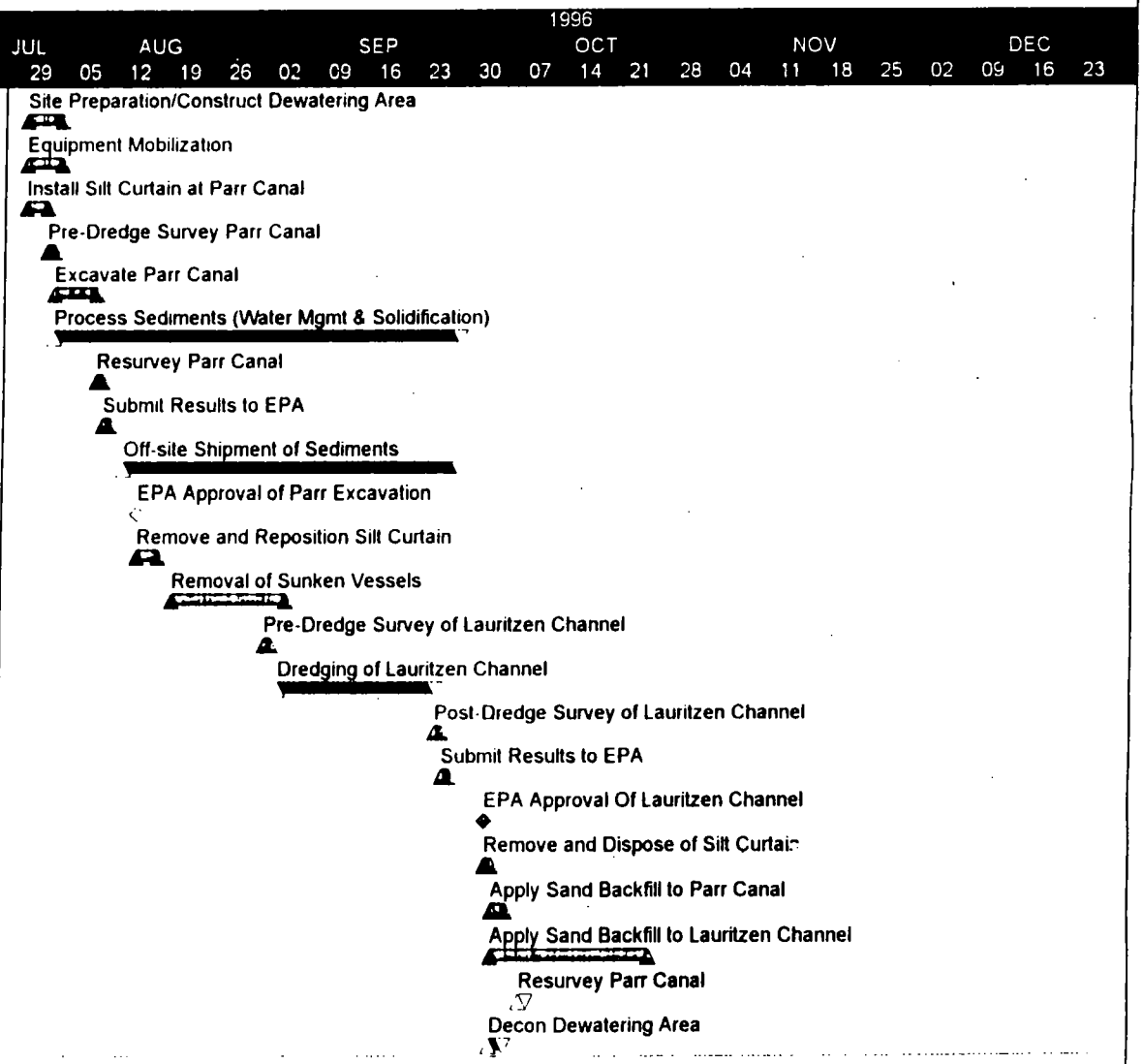
All contact on substantive issues and inquiries from U.S. EPA will be directed through the Supervising Contractor's personnel so as to maintain consistency of response and accountability on the Project.

Report: Heckathorn Site
Layout: classic gantt
Filter: All Activities

# Figure 9
# United Heckathorn Site

Rust Environment & Infrastructure
Report Date: 08MAY96
Page 1A of 2A

| Description | Early Start | Early Finish |
|---|---|---|
| Site Preparation/Construct Dewatering Area | 29JUL96 * | 02AUG96 |
| Equipment Mobilization | 29JUL96 | 02AUG96 |
| Install Silt Curtain at Parr Canal | 29JUL96 | 31JUL96 |
| Pre-Dredge Survey Parr Canal | 01AUG96 | 01AUG96 |
| Excavate Parr Canal | 02AUG96 | 07AUG96 |
| Process Sediments (Water Mgmt & Solidification) | 02AUG96 | 27SEP96 |
| Resurvey Parr Canal | 08AUG96 | 08AUG96 |
| Submit Results to EPA | 09AUG96 | 09AUG96 |
| Off-site Shipment of Sediments | 12AUG96 | 27SEP96 |
| EPA Approval of Parr Excavation | | 13AUG96 |
| Remove and Reposition Silt Curtain | 14AUG96 | 16AUG96 |
| Removal of Sunken Vessels | 19AUG96 | 03SEP96 |
| Pre-Dredge Survey of Lauritzen Channel | 01SEP96 * | 01SEP96 |
| Dredging of Lauritzen Channel | 03SEP96 | 24SEP96 |
| Post-Dredge Survey of Lauritzen Channel | 25SEP96 | 25SEP96 |
| Submit Results to EPA | 26SEP96 | 26SEP96 |
| EPA Approval Of Lauritzen Channel | | 01OCT96 |
| Remove and Dispose of Silt Curtain | 02OCT96 | 02OCT96 |
| Apply Sand Backfill to Parr Canal | 03OCT96 | 04OCT96 |
| Apply Sand Backfill to Lauritzen Channel | 03OCT96 | 24OCT96 |
| Resurvey Parr Canal | 07OCT96 | 07OCT96 |
| Decon Dewatering Area | 03OCT96 | 04OCT96 |




Early start point
Early finish point
Early bar
Progress bar
Critical bar
Summary bar

Progress point
Critical point
Summary point
Start milestone point
Finish milestone point

| | |
|---|---|
| Data date | 26JUL96 |
| Start date | 26JUL96 |
| Finish date | 04DEC96 |
| Must finish date | |
| Target finish date | |

© Primavera Systems, Inc.

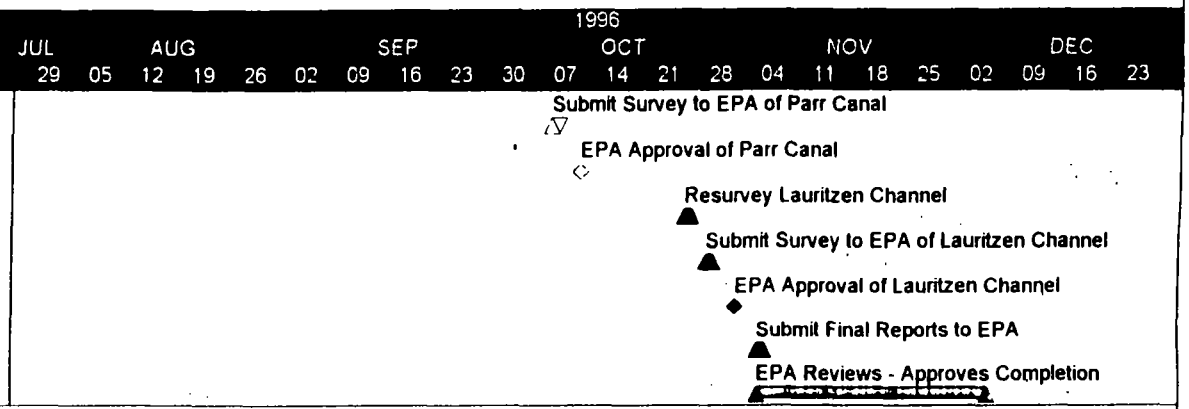
| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

Report: Heckathorn Site
Layout: classic gantt
Filter: All Activities

# Figure 9
# United Heckathorn Site

Rust Environment & Infrastructure
Report Date: 08MAY96


| Description | Early Start | Early Finish |
|---|---|---|
| Submit Survey to EPA of Parr Canal | 07OCT96 | 07OCT96 |
| EPA Approval of Parr Canal | | 10OCT96 |
| Resurvey Lauritzen Channel | 25OCT96 | 25OCT96 |
| Submit Survey to EPA of Lauritzen Channel | 28OCT96 | 28OCT96 |
| EPA Approval of Lauritzen Channel | | 31OCT96 |
| Submit Final Reports to EPA | 04NOV96 | 04NOV96 |
| EPA Reviews - Approves Completion | 04NOV96 | 04DEC96 |




Early start point
Early finish point
Early bar
Progress bar
Critical bar
Summary bar

Progress point
Critical point
Summary point
Start milestone point
Finish milestone point

| | |
|---|---|
| Data date | 26JUL96 |
| Start date | 26JUL96 |
| Finish date | 04DEC96 |
| Must finish date | |
| Target finish date | |

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| Date | Revision | Checked | Approved |
|---|---|---|---|
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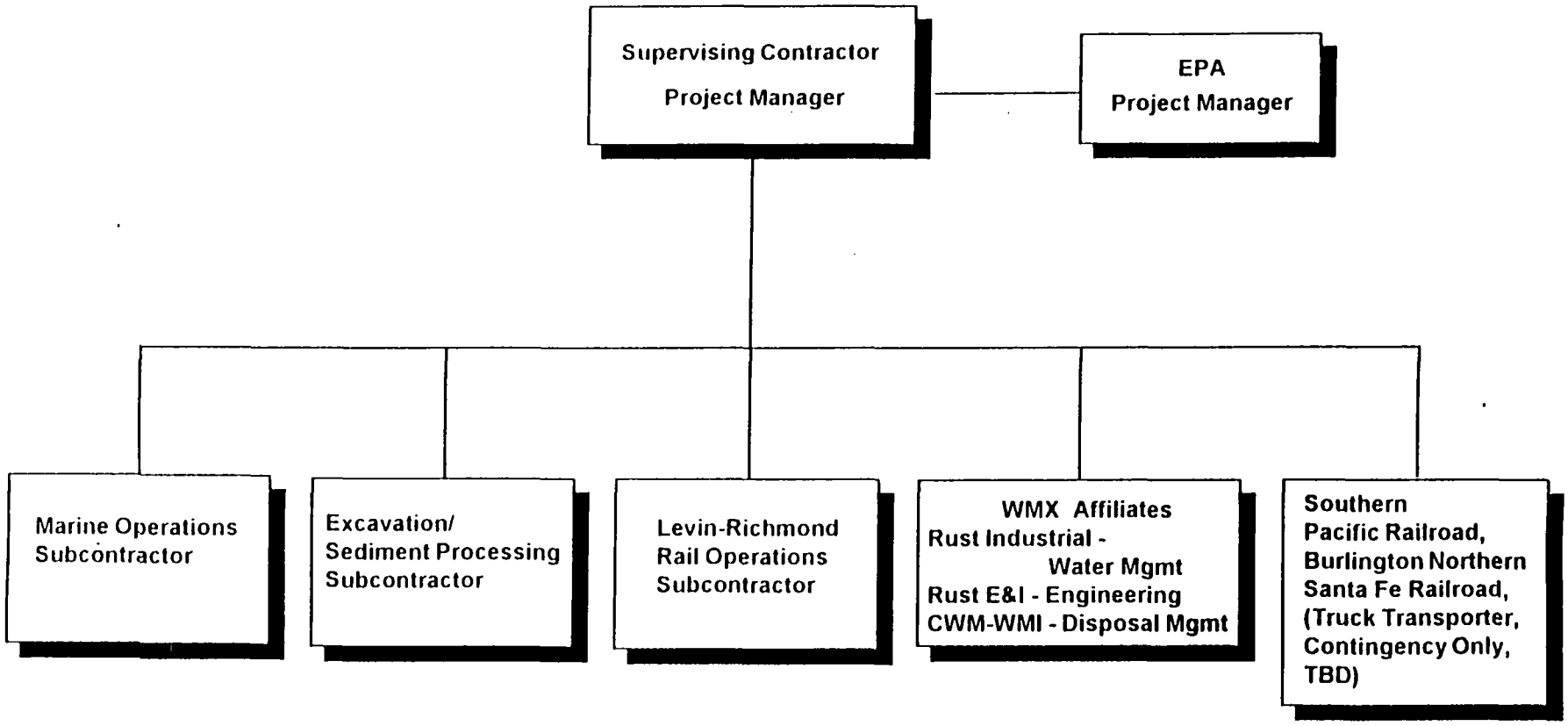
N CAD\POWERPT\WMXORG

Figure 10

## Project Organization Chart



# Appendices

| | |
|---|---|
| Appendix A | Dredge Plan & Maps for Lauritzen Channel |
| Appendix B | Excavation Plan & Maps for Parr Canal |
| Appendix C | Field Sampling & Analysis Plan |

# Appendix A

## Dredge Plan & Maps for Lauritzen Channel

# APPENDIX A

## LAURITZEN CHANNEL DREDGE PLAN
## *UNITED HECKATHORN SUPERFUND SITE*
***Richmond, California***

**Pre-dredge Survey**
After removal of the submerged barges and other large debris, and prior to the start of dredging activities, a pre-dredge hydrographic survey will be conducted. The maps generated from this survey will be compared at the end of dredging activities with the dredge-to-depth target elevations on the Channel Cross-Section Maps (Exhibit #3) and to the post-dredge survey described below to ensure that the Lauritzen Channel has been dredged to the targeted elevations and contours of the Channel Cross-Section Maps.

The pre-dredge survey will be conducted by the dredging contractor, using a fully equipped, automated survey boat. Positioning of the boat will be accomplished using Trimble hydro survey equipment, or equal. Manufacturer's data for the Trimble equipment is included with this Dredge Plan in Exhibit #1. Pre-dredge mapping will be conducted at 50-foot intervals perpendicular to the centerline of the Lauritzen Channel and in parallel with the plotting as depicted on the Dredge Work Site Plan attached as Exhibit #2.

**Channel Cross-Section Maps**
Prior to development of this Work Plan, the bottom of the Lauritzen Channel was extensively surveyed by Vortex Diving to determine the thickness and volume of Young Bay Mud ("YBM") throughout the waterway. Over 340 individual locations on the bottom of the channel were probed to determine the depth to the top of the YBM, depth to the top of the Old Bay Mud ("OBM"), and the resulting thickness and the volume of the YBM. The data and coordinates for each probe location were recorded and mapped by PLS Surveys of Alameda. From this data, Channel Cross-Section Maps were developed by Manson Engineering & Construction Company, in conjunction with PLS Surveys, to serve as the actual guide for dredging operations. These Channel Cross-Section Maps, as shown in Exhibit #3, display the slopes, contours, and depths to the top of OBM. The dredge operator will target dredging to six inches (6") below that OBM level in most locations on the bottom of the Lauritzen Channel. These Channel Cross-Section Maps will be compared to periodic hydrographic surveys of grids which have been dredged to verify completion of those grids. Comparison of the hydrographic surveys to the Channel Cross-Section Maps may show "high spots" which the dredge operator will then re-dredge down to six inches below the elevations, absent a determination by the EPA Project Manager that it is unnecessary because OBM has been reached, on the Channel Cross-Section Maps.

**Silt Curtain**
Upon completion of the pre-dredge survey and upon completion of work in the Parr Canal, the dredge derrick, tugboat and barges will be mobilized within the Lauritzen

Channel, and the silt curtain will be repositioned from the Parr Canal to the mouth of the Lauritzen Channel. A sufficient number of steel piles will be installed first at the mouth of the Lauritzen Channel and then at the centerline of Berth C (if determined appropriate), as shown on the Dredge Work Site Plan, to secure the silt curtain in place. The pile will be removed once the dredging is complete and the curtain is no longer needed.

The silt curtain will be designed to contain within the Lauritzen Channel loose sediments that may be generated during dredging operations. The mesh size of the curtain will be sufficient to retain sediments within the Lauritzen Channel. Please refer to Exhibit #4 of this Dredge Plan for more details and specifications. The silt curtain will be manufactured by Sea Curtain, Inc.or equal and will include the following features:

1. Maximum depth of 40 feet from float to bottom of curtain (contoured to the depth of specific points in the Channel)
2. Flotation log in sewn pocket with log straps at 10 foot centers
3. Galvanized chain curtain weight
4. Woven filter fabric
5. Reinforced yoke assembly at each end
6. Grommet tie-offs at each end for multiple curtain additions as necessary.

Specifications will be given in the pre-final or final design for the silt curtain if it is different than the one shown. The silt curtain will have similar sieve size and permissivity characteristics.

Upon completion of dredging to the centerline of Berth C of Levin Richmond Terminal's (LRT) dock, upon EPA's written approval of completion of work in the outer Lauritzen Channel (Berth B), and once turbidity has subsided to a level acceptable to EPA, Chemical Waste Management, as Supervising Contractor, may instruct its dredging subcontractor to relocate the silt curtain to the centerline of Berth C to allow for LRT's ships to use Berth B. The movement of the silt curtain within the Lauritzen Channel will be dependent upon EPA approval and a demonstration of need by LRT to utilize Berth B within the timeframe of the project.

Previous experience has shown that clamshell dredging operations do not produce a significant amount of turbidity; cable-arm or similar bucket dredging produces even less, and the risk of contaminated sediments migrating outside of the Lauritzen Channel, whether or not a silt curtain is present, is minimal. Nevertheless, visual observations for turbidity plumes outside of the silt curtain will be made at least three times daily during dredging activities and the curtain itself will be monitored once every two hours during dredging for any tears or damage, and will be repaired as necessary.

**Dredge Procedures**

Dredging of the Lauritzen Channel will be guided by the Dredge Work Site Plan (Exhibit #2) and Channel Cross-Section Maps (Exhibit #3). The maps in Exhibit #3 were developed by PLS Surveys of Alameda, through extensive probing of the Channel bottom

by Vortex Diving, which took more than three hundred and forty data points from the bottom of the Lauritzen Channel to determine the extent and thickness of the Young Bay Mud. The Channel has been laid out in 50' by 50' grids with the depth, slope and contour to which each grid will be dredged identified on the Channel Cross-Section Maps.

The dredging will be conducted on a grid-by-grid basis starting at the mouth of the Lauritzen Channel, working across the channel. Dredging will proceed from bank-to-bank across the Channel ultimately ending at the north end. By proceeding in this fashion, the results will be to minimize contamination of previously dredged areas and, if appropriate, permit re-opening of LRT's Berth B before completion of the project.

The ultimate goal of the dredging activities will be to remove contaminated YBM from the Lauritzen Channel to the maximum extent practical. Dredging will follow the contour from bank-to-bank across the Channel to depths specified in the Cross-Section Maps in Exhibit #3. The dredge operator will work within a series of grids until dredging is completed in those grids. Completion of dredging will be confirmed by markings on the dredge line, measuring devices including electronic tide gauges, and spot checks with lead line soundings. In addition, periodic hydrographic surveys will be taken for grids dredged. Completion of dredging in locations where the dredge operator can not penetrate to six inches (6") below the OBM will be confirmed by the EPA Project Manager. A Lexan tube sediment core sample will be drawn and evaluated by the EPA Project manager and Supervising Contractor.

Dredging of the Lauritzen Channel will be performed using Derrick 24 or equal with a 12 (twelve) cubic yard cable-arm or similar bucket, 2 (two) material barges, and a tug boat. A smaller 5 (five) cubic yard clamshell bucket will likely be utilized for dredging around the existing pier piles at the north end of the Lauritzen Channel. Details and specifications for Derrick 24 and the cable arm and clamshell buckets are included in Exhibit #5 of this Plan. The barges will be outfitted with filter cloth which will be designed to allow water to passively drain back into the Channel while retaining sediments within the scow. Should the filter cloth become torn or clogged, it will be cleaned or replaced as necessary. At no time will barges be loaded such that large quantities of unfiltered sediments overflow back into the Channel.

To facilitate efficient and effective dredge operations, a 50' by 50' square grid template has been established for the Lauritzen Channel as shown on the Dredge Work Site Plan - Exhibit #2. Horizontal positioning of the dredge will be accomplished using a line laser. In order to achieve the required dredge depth, the dredge will be equipped with a remote reading tide gauge and the bucket lines will be marked so that the operator knows the depth of the bucket at all times vis-a-vis the Channel Cross-Section Maps in Exhibit #3.

The anticipated dredging sequence will be to start on the southeast corner of the Lauritzen Channel and dredge the outermost row of cells alongside the silt curtain. The operator will then begin dredging the next row of cells from west to east. After completion of two rows of cells (6-10 grids) the operator will order a hydrographic survey on those two

rows of grids to verify completion. The positioning of the barge alongside the dredge over cells which have yet to be dredged will virtually eliminate the possibility of recontamination of previously dredged cells from sediments falling from the bucket, as the only time the loaded bucket will pass over a previously dredged cell is on the far east side of the Lauritzen Channel. During dredging of the far east side of the Lauritzen Channel, the barge will be repositioned on the west side of the dredge so as to cover the previously dredged cell and prevent recontamination. The dredge operator will be responsible for ensuring that the barges are not overfilled and that sediment overflow is avoided at all times.

As each barge is loaded, it will be pushed to LRT's dock by the tugboat for offloading. As a general rule, as one barge is being offloaded along LRT's dock, the other barge will be loaded by Derrick #24 or equal. On average, the anticipated dredge production is 3,500 to 4,000 cubic yards per 24-hour day. Accordingly, dredging of the Lauritzen Channel should be completed in approximately 30 days.

Areas to be side-sloped are identified on the Dredge Work Site Plan (Exhibit #2). In areas where the banks are to be side-sloped, the bucket will be used to take approximate cuts from the banks based upon the arc of the swing of the bucket and depth. As each slope is completed, the next will be cut along the bank. The banks will be sloped at 3 to 1 horizontal to vertical angle. Dredging along the shoreline will be to within 10 feet, plus or minus 2 feet of the toe of the slope. After sloping is completed, clean rock to provide bank stabilization and clean sand, totaling on average 18" thick, will be placed as outlined on the Dredge Work Site Plan.

In areas where dredging is to take place around existing pilings as identified on the Dredge Work Site Plan, the overall objective will be to dredge as much material as possible while not breaking or compromising the stability of the existing piles. With this in mind, the smaller 5-yard clamshell bucket will be utilized. This smaller bucket will allow access to more areas than the larger 12-yard cable-arm bucket. In general, the removal of sediments from the pilings will take place towards the end of the dredging of the Lauritzen Channel. After dredging is completed, an average 18" layer of clean sand will be placed in the area between the pilings as outlined in Section 6.12 and RD/RA Work Plan.

Methods to be used to verify completion of dredging include hand soundings with a lead-line and periodic hydrographic surveys. In addition to the methods described above, a Lexan Tube sediment sampler will be used to verify that sufficient Young Bay Mud has been removed in areas where the cable-arm bucket can not penetrate the OBM layer. For further description of the sampling protocol, see the RD/RA Work Plan at Section 10.3 and the Field Sampling and Analysis Plan in Appendix C. It is anticipated that periodic hydrographic surveying will be undertaken after dredging of two rows of parallel grids has been completed (i.e., 6-10 grids) in the Lauritzen Channel. Prior to periodic confirmation hydrographic surveying, the bottom of that period's work area will be smoothed to contour the bottom as described in the RD/RA Work Plan at Section 6.5.

This smoothing will provide a more accurate picture of the bottom of the Lauritzen Channel for surveying purposes. In addition, it will provide a more stable surface for the placement of clean materials after all dredging activities are completed. Any areas in a grid which do not show as dredged to the desired depths will be re-dredged until the targeted depth is reached as confirmed by lead-line soundings and periodic hydrographic surveys.

As the work proceeds, a grid-by-grid completion report will be developed by the Supervising Contractor and submitted to the EPA Project Manager. This grid-by-grid completion report will contain scientific measurement of the depths achieved for grids by hydrographic surveys. The information will be submitted periodically and will be compiled into the Lauritzen Channel Completion Report along with a post-dredge hydrographic survey of the bottom of the Lauritzen Channel.

In addition to the grid-by-grid completion confirmation procedures outlined above, a laboratory analysis conforming to EPA Method 8080 will be performed on sediment samples drawn from areas of the bottom throughout the Lauritzen Channel after dredging has been completed in those areas. Those procedures are described in more detail in the Field Sampling & Analysis Plan presented in Appendix C.

As dredging proceeds, the Supervising Contractor will monitor the dredges, dredge barges, and the Exclusion Zone for the presence of birds which may have been attracted to the operations. In the event that birds attracted to the operations, the appropriate hazing methods will be employed to discourage their interest in the operations. These methods include firing blanks, air horns, sirens or other commonly employed hazing techniques.

**Post-Dredge Survey**

After completion of the dredging activities and prior to removal or re-setting of the silt curtain at Berth C (if needed), a post-dredge survey will be undertaken to confirm that the Lauritzen Channel has been dredged to the desired depths. This survey will be compared to the Pre-Dredge Survey and the Channel Cross-Section Maps to determine the volume of YBM dredged from the Lauritzen Channel, and as additional confirmation of the grid-by-grid confirmation. The same equipment and procedures as in the Pre-Dredge Survey will be utilized.

A more detailed description of the post-dredge survey and the confirmation reporting for the Lauritzen Channel is provided in Sections 6.5 and 10.3 of the Work Plan and in the Field Sampling & Analysis Plan (Appendix C).

**Decontamination Procedures**

Upon completion of dredging activities, and prior to removal of the silt curtain, the dredge bucket and barges will be decontaminated. Decontamination procedures will include rinsing of the dredge bucket with clean bay water while over a scow.

The barges will be decontaminated by qualified personnel utilizing pumping equipment and/or a small bucket loader (Bobcat) equipped with a small bucket and a sweeper attachment. The Bobcat will be lifted from the shore utilizing the bucket of Derrick # 24, or equal and placed onto each barge. Sediments will be collected and placed into a specific portion of the scow. Any remaining sediments which can not be reached by the loader will be collected utilizing hand tools such as shovels and brooms. The pump or land-based crane will then collect the sediments for placement into the Exclusion Zone for subsequent loading into railcars. The barge will then be washed and the sediments directed towards a specific part of the barge where the water will be pumped and filtered prior to entry to the Channel. Sediments will then be collected by the pump or land-based crane for placement into the Exclusion Zone.

**Placement of Clean Materials**

Placement of clean bay sand and slope stabilization material will begin immediately after determination that the Lauritzen Channel has been dredged to the required depths and the equipment has been decontaminated. For a more complete description of the bay sand and the method and verification of placement, please refer to Sections 6.12 and 10.5 of the RD/RA Work Plan.

# Exhibit #1

## Positioning and Surveying Equipment

Trimble

SURVEYING & MAPPING PRODUCTS

# 4000RS™ & 4000DS™

## *DGPS Reference Surveyor and Differential Surveyor*

*The DGPS solution for real-time sub-meter accuracy without P-code.*

The 4000RS™ and 4000DS use Trimble's latest GPS technology to achieve real-time DGPS sub-meter position accuracy using carrier-smoothed C/A code. Both receivers feature 9-channels of continuous satellite tracking (12 channels optional), a lightweight, rugged, weatherproof housing, and low power consumption for extended field operation time.

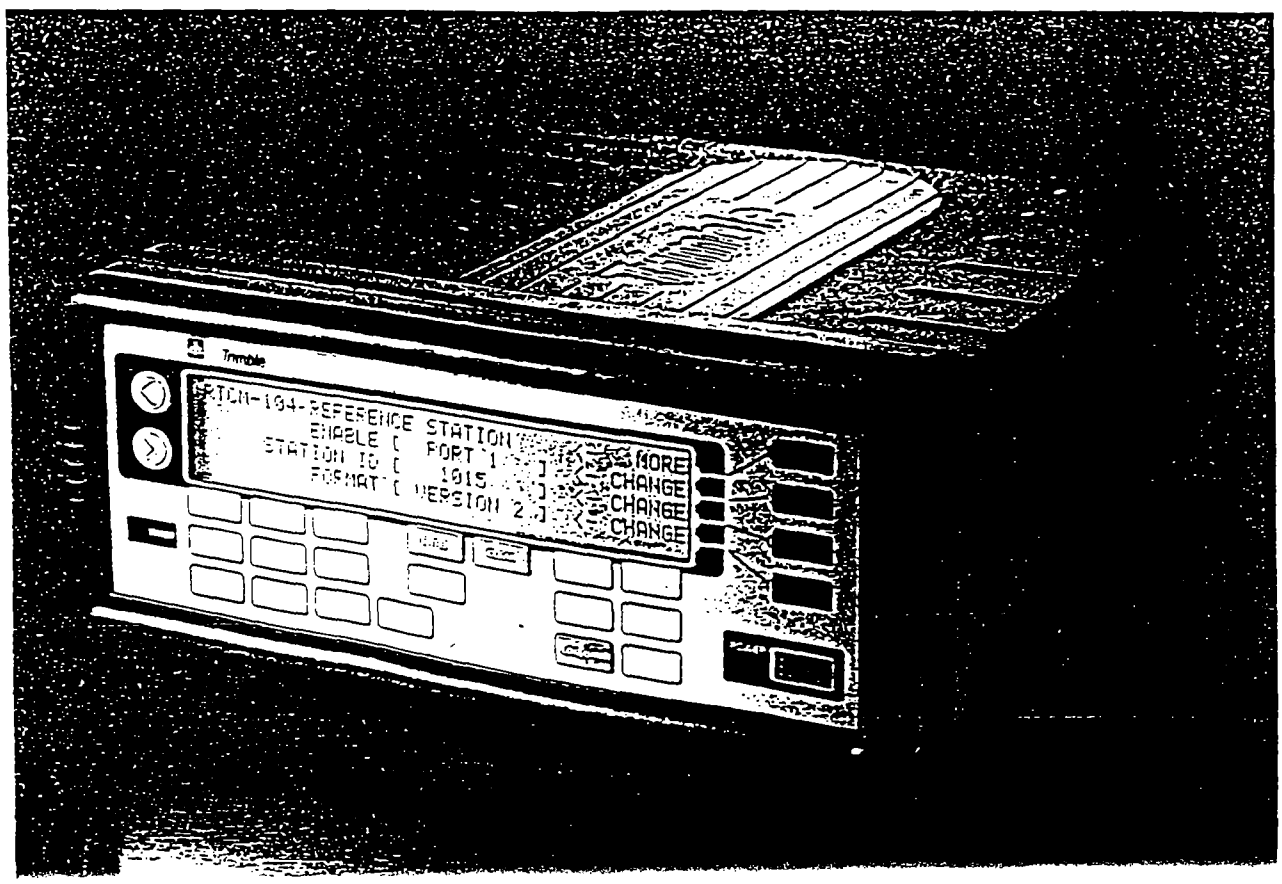
The 4000RS Reference Surveyor is ideal for dynamic surveying, hydrographic and navigation systems as well as vessel tracking. It operates as an autonomous reference station, calculating and transmitting DGPS corrections in the RTCM SC-104 standard format to mobile GPS receivers. Precise DGPS corrections, which comply to the RTCM SC-104 standard, are generated using carrier aided filtering and smoothing techniques applied to an exceptionally low noise C/A code, providing the highest performance available in GPS positioning.

While providing DGPS corrections, the 4000RS can also output binary or ASCII data for recording, archiving or post-mission analysis. In addition, the 4000RS can operate as a mobile receiver with the same features, functionality and options as the 4000DS.

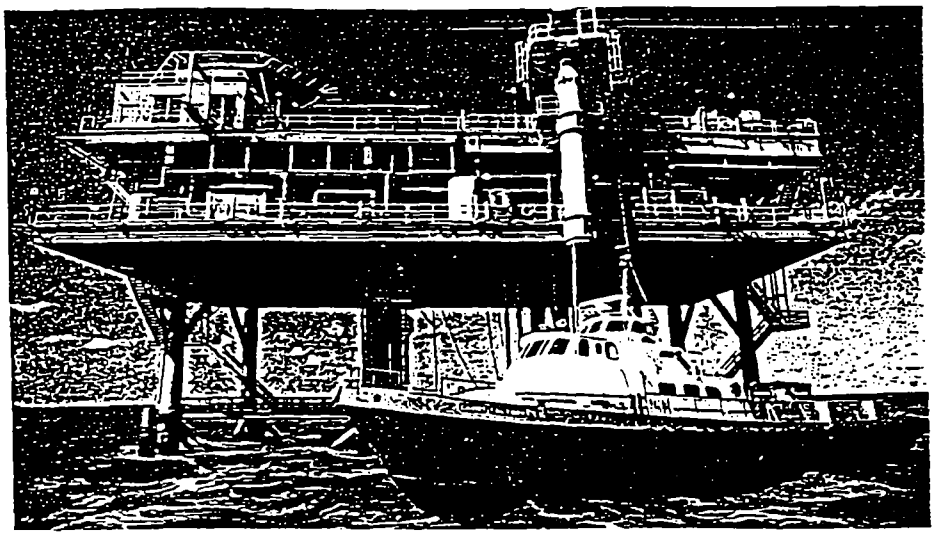
The 4000DS Differential Surveyor is designed to receive and apply DGPS corrections broadcast from the 4000RS or other DGPS reference station using the RTCM SC-104 standard format. This enables the 4000DS to output real-time, sub-meter corrected positions at a 2 Hz rate—even under the most challenging operating conditions.

The 4000DS receiver's standard NMEA-0183 version 2 messages, navigation functions and 1PPS output allow for optimal flexibility for system integration and interfacing with other instruments. Data can be output as either ASCII or binary for recording, archiving and post-mission analysis.

For optimum DGPS positioning, combine the 4000 receivers with any of Trimble's data communications systems and QA/QC software to ensure the integrity of positioning accuracy.

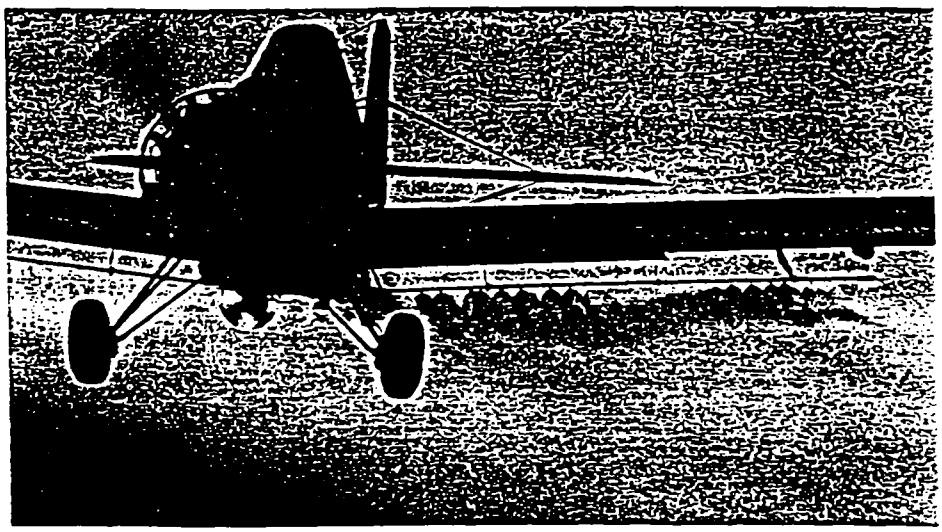


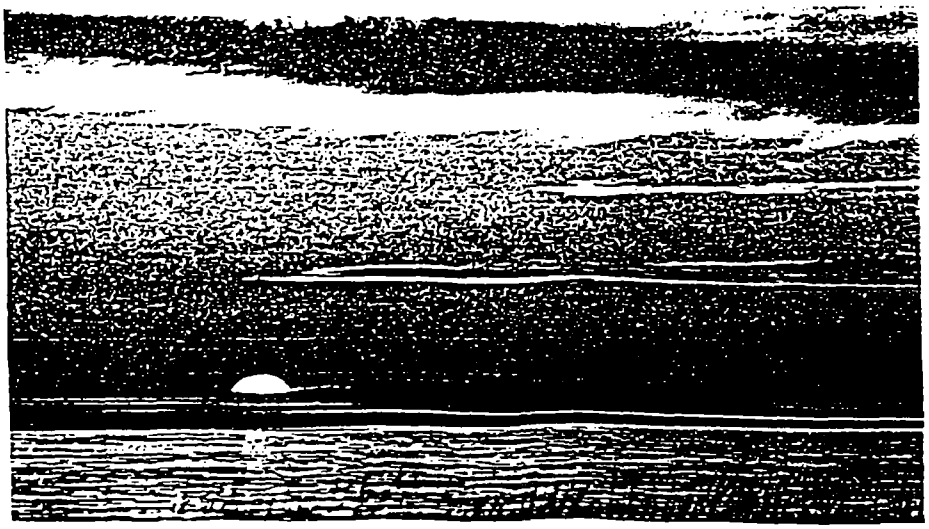
## Applications:
*Precision GPS Positioning on the ground, at sea and in the air.*



**HYDRO/DGPS** Trimble's HYDRO software provides a totally integrated field-to-finish product that combines your DGPS position with other survey sensors such as echosounders, compasses, sidescan sonar, tide gauges and acoustic positioning equipment. HYDRO also provides navigation and has post-processing capabilities to produce high-quality plots. Additional modules include contouring, profiles, volumes and digitizing. HYDROseismic and HYDROrig have specialized features for the exploration industry's requirements for surveying and rig positioning.

**Airborne Applications** Traditionally, aerial application has required multiple pilots as well as numerous human flaggers and associated ground crews. Using TRIMFLIGHT™, a precise DGPS airborne navigation and mapping system, crops can be sprayed effectively and consistently—without flaggers or ground assistance, providing the pilot with graphical proof of where he has sprayed. The system can also be used for a wide variety of other aerial applications, such as geophysical exploration, photogrammetry, GIS data capture and search & rescue.





**Tracking** Trimble's Barge Monitoring System has taken DGPS one step further and uses two-way radio communication to provide DGPS corrections to vessels for navigation as well as reporting the vessel's position and dumping status back to the controlling PC at the reference site. The system is being used for environmental policing to ensure that the barges dump the material in legal dump sites. If a dump occurs outside these sites, the system will warn the controller.

## System Integration Components

*Data Communications Systems*

Trimble offers optimized telemetry systems for use with RS/DS systems. The real-time DGPS data communication systems include short-range "license-free" telemetry for line-of-sight environments such as ports, rivers, and coastal regions. For mid-range applications, there are proven HF, VHF and UHF systems for various conditions and licensing requirements. For long-range (up to 500 km) requirements, Trimble offers MF ground-wave systems. All telemetry components and accessories are tested to ensure system reliability.

*DeltaNav QC™*

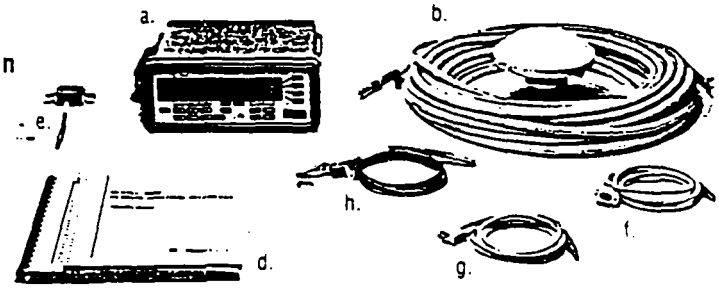
DeltaNav QC is a MS-DOS™-based software package that provides quality control and analysis for DGPS positioning in real-time. The system enables you to view quality control data quickly and easily. You can examine how the survey is progressing by viewing time-series displays of critical parameters such as position and satellite errors, error ellipses and position uncertainties. The software is simple to use with a mouse-driven user interface, but is also flexible so that it can be configured to your requirements. DeltaNav QC also generates reports and has automatic archival of all quality control data for analysis and plotting.

*Universal Reference Station™*

The Universal Reference Station (URS™) is a PC software-based system that works as a dedicated, programmable DGPS reference station for broadcasting corrections to an unlimited number of users. The URS collects data from all satellites in view, including pseudo ranges, carrier phase and ephemeris data, and outputs the data and corrections for transmission to mobile receivers that are being used anywhere in range, whether the field user is on the ground, at sea or airborne. The URS also can also be programmed to collect data for post-processed applications such as resource mapping and photogrammetric applications.

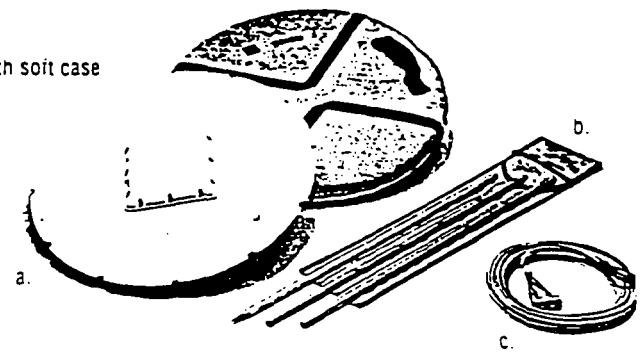
### Standard Configuration

a. Series 4000 GPS receiver
b. Compact dome antenna
c. 30m antenna cable
d. Operating manuals
e. Lemo to dual BNC cable
f. 5 pin Lemo to DB9 cable
g. 7 pin Lemo to DB9 cable
h. Dual power input cable

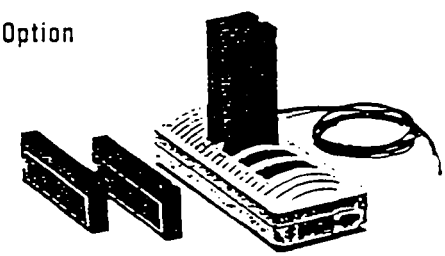



### Geodetic Antenna Option

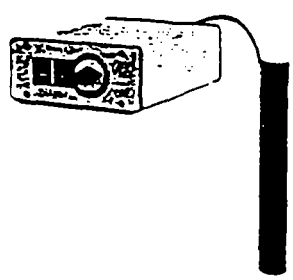
a. Ground plane geodetic antenna with soft case
b. Height rod and softcase
c. 10m antenna cable



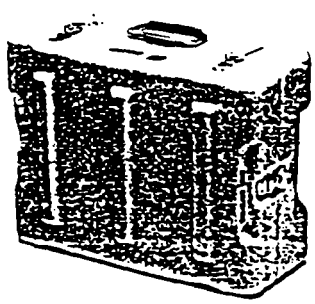

### Office Support Module Option



### TRIMTALK 900 Radio Link Option



### Transport Case Option



*For information about additional options, contact your Trimble sales representative.*

# 4000 RS™ & 4000 DS™

*Differential GPS Reference Surveyor and Differential Surveyor*

## 4000 RS Features

Autonomous operation; Filtered and carrier-smoothed RTCM differential corrections (versions 1.0 and 2.0); 0.5 second measurement rate; Data integrity provision; Data link flow control on RTCM port; Triple DC input; Compact dome antenna; 30m antenna cable; Automatic mode restoration after power-off; Dual I/O port for data recording; Low power; Lightweight; Portable; Environmentally protected; 1 PPS output; NMEA-0183 outputs; RTCM input and output; 1-year warranty.

## 4000 DS Features

Less than 1 meter accuracy; Real-time operation; 0.5 second measurement rate; Data integrity provision; Triple DC input; Compact dome antenna; 30m antenna cable; Automatic mode restoration after power off; Extra I/O port for data recording; Low power; Lightweight; portable; Environmentally protected; 1 PPS output; Navigation firmware; NMEA-0183 outputs; Weighted least squares solution; 1-year warranty.

## Options

- Firmware update service—4 years
- 30m antenna cable extension, with in-line amplifier
- L1 carrier phase
- 12 channels
- Event marker
- QA/QC firmware
- Internal memory for datalogging
- Extended hardware warranty

## Optional Accessories

- Geodetic antenna
- Office support module
- AC power adapter, 50/60 Hz, 120V or 240V
- Receiver transport case
- TRIMTALK 900 radio link

## Physical Characteristics

| | |
|---|---|
| **Size:** | 9.8"W x 11.0"D x 4.0"H (24.8cm x 28.0cm x 10.2cm) |
| **Weight:** | 6 lbs. (2.7kg) receiver<br>0.5 lbs. (0.2kg) compact dome antenna |
| **Power:** | Nominal 10.5 to 35 VDC, 7 watts<br>Optional office support module for AC operation |
| **Operating temp:** | -20°C to +55°C |
| **Storage temp:** | -30°C to +75°C |
| **Humidity:** | 100%, fully sealed, buoyant |

## Technical Specifications

*4000 RS™*

| | |
|---|---|
| **Pseudorange correction accuracy:** | Typically less than 30cm RMS; Low multipath environment |
| **Compatibility:** | Corrections may be applied to all differential-equipped Trimble receivers |

*4000 DS*

| | |
|---|---|
| **Accuracy:** | Typically less than 1m RMS; Assumes at least five satellites and PDOP less than 4 |
| **Compatibility:** | Accepts RTCM SC-104 corrections Version 1.0 or 2.0 |

*4000 RS and 4000 DS*

| | |
|---|---|
| **Tracking:** | 9 channels of L1 C/A |
| **Start-up time:** | Less than 2 minutes from power-on to tracking |
| **Antenna:** | External antenna with 30m RG213 cable |
| **Data link rates:** | 50-38,400 baud |
| **RTCM message output:** | Types 1, 2, 3, 6, 16 |
| **Data recording:** | Corrections and all data available for archiving through RS-232 port up to 38,400 baud |
| **Display:** | Backlit LCD with four lines of forty alpha-numeric characters; Large, easy-to-read characters—2.8mm x 4.9mm; Total viewing area: 32cm²; Adjustable backlight and viewing angle |
| **Keyboard:** | Alpha-numeric, function, and softkey entry |
| **Cables:** | Lemo to DC and Lemo to DB-9 connectors, dual power input, dual BNC |
| **Navigation:** | The navigation firmware enables waypoint-based route planning with deviation-from-track and distance-to-next waypoint available for 100 waypoints |
| **QA/QC:** | Firmware option provides indications of accuracy in real time, including one sigma position error components and unit variance displayed on screen as well as output via RS-232 serial port. Also included in the output data are DOPS, error ellipse parameters, E-N covariance and solution type indicators |
| **NMEA-0183:** | ALM, BWC, GGA, GLL, GSA, GSV, RMB, RMC, VTG, WPL, XTE, ZDA |
| **Ports:** | Dual serial; Triple power inputs; Antenna; and 1PPS output |

GAHAGAN & BRYANT ASSOCIATES, INC.
111 Market Place, Suite 1001, Baltimore, MD 21202
Tel (410) 727-5835 Fax (410) 625-1215
Tampa, FL - Tel (813) 831-4408

*Specifications subject to change without prior notice.*

Trimble

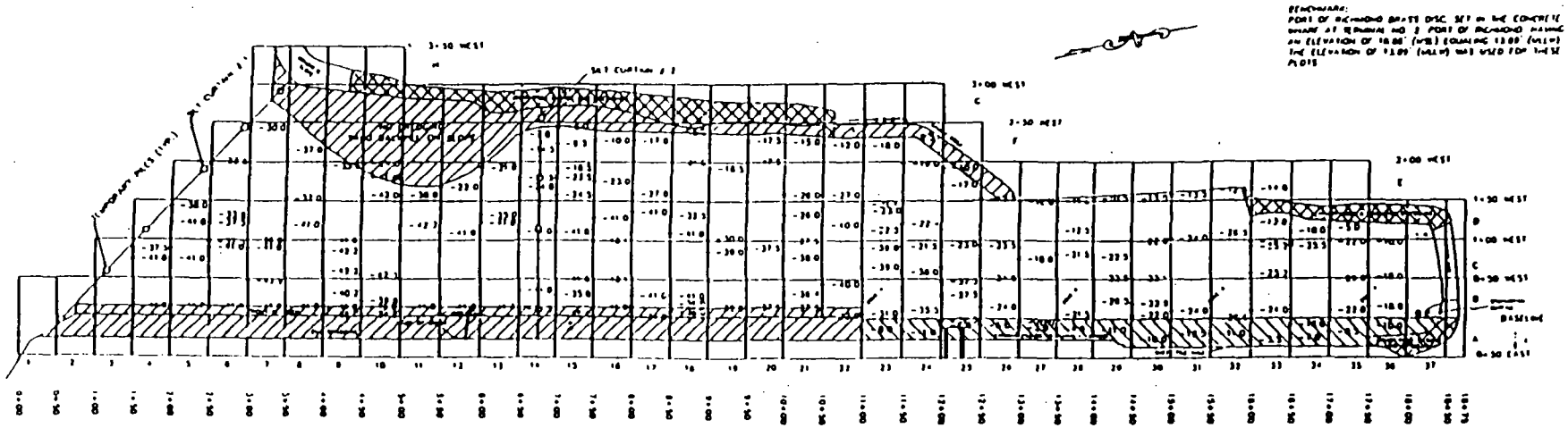
Surveying & Mapping Products
645 North Mary Avenue
Post Office Box 3642
Sunnyvale, CA 94088-3642
1-800-827-8000
(408) 481-8000 outside U.S.

Trimble Navigation Europe, Ltd
Trimble House, Meridian Office Park
Osborn Way, Hook
Hampshire, RG27 9HX England
+44 256-760150

Trimble Navigation Singapore
15 Scotts Road
#03-01 Thong Teck Building
Singapore 0922
+65 738-6549

# Exhibit #2

# Dredge Work Site Plan



PREPARED FOR
MANSON CONSTRUCTION &
ENGINEERING COMPANY

THIS DRAWING HAS BEEN REDUCED
NO SCALE.

DREDGE MAP
LAURITZEN CHANNEL
EXHIBIT #2 TO THE DREDGE PLAN
WHICH IS APPENDIX A TO THE RD/RA WORK PLAN
UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA
SCALE: 1" = 50'
DATE OF SURVEYS 9-6-95 THROUGH 9-12-95
REV 1-2-96
REV 1-31-96

NO DREDGING - SAND BACKFILL ON SLOPES EXCEPT UNDER ROCK

NO DREDGING - BACKFILL WITH ARMOR ROCK & SAND

DREDGING AROUND PILINGS BACKFILL WITH SAND

PROPOSED DREDGE ELEVATION AT MARKED LOCATION

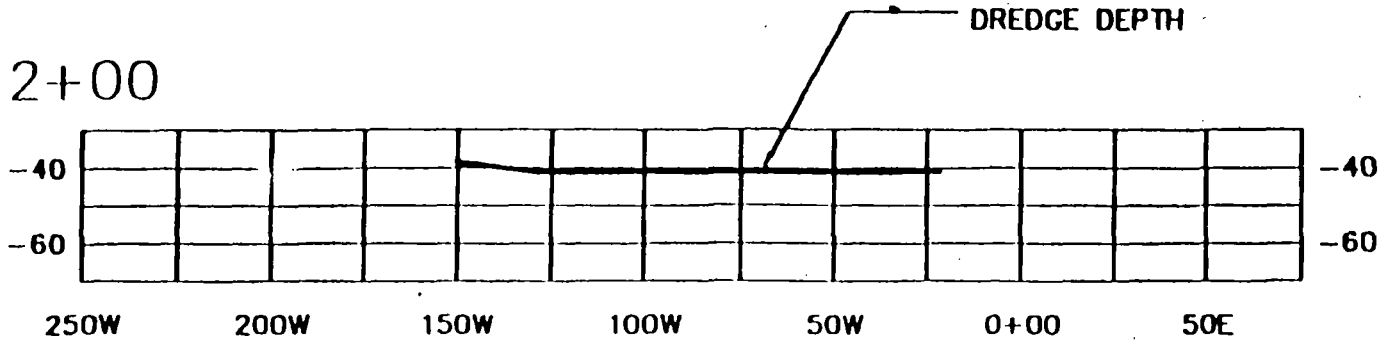
ALL ELEVATIONS MLLW (ft.) AT - OR +.

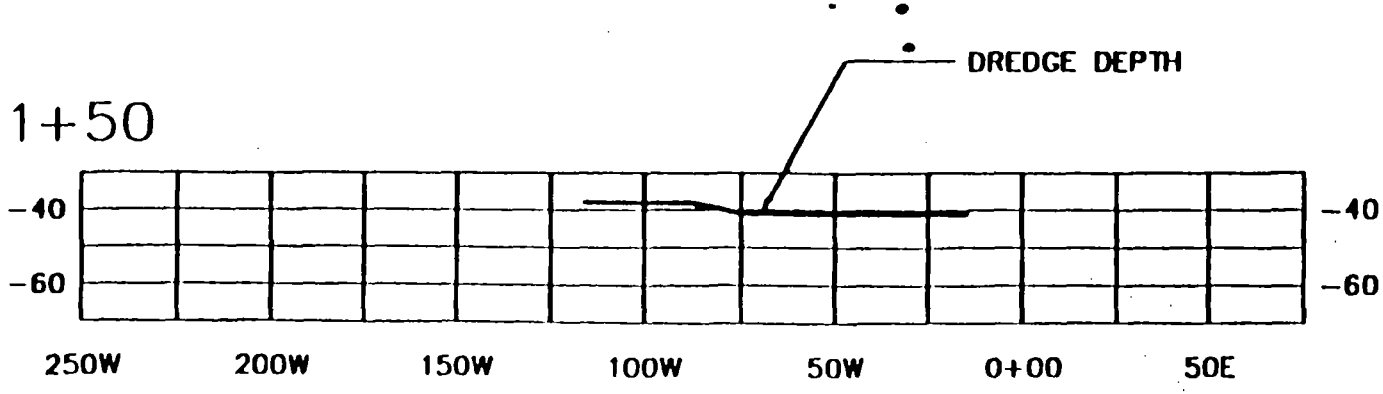
SHORELINE IS APPROXIMATE

PLS SURVEYS, INC.

# Exhibit #3

## Channel Cross Sections



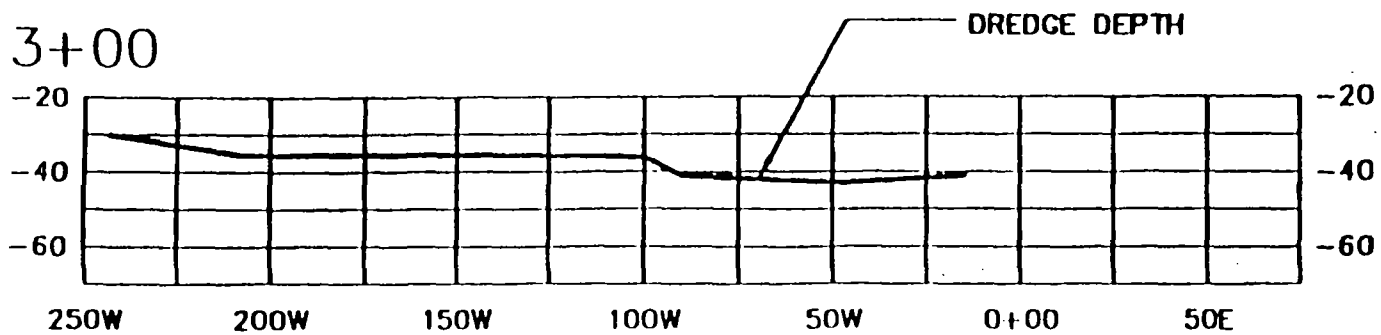



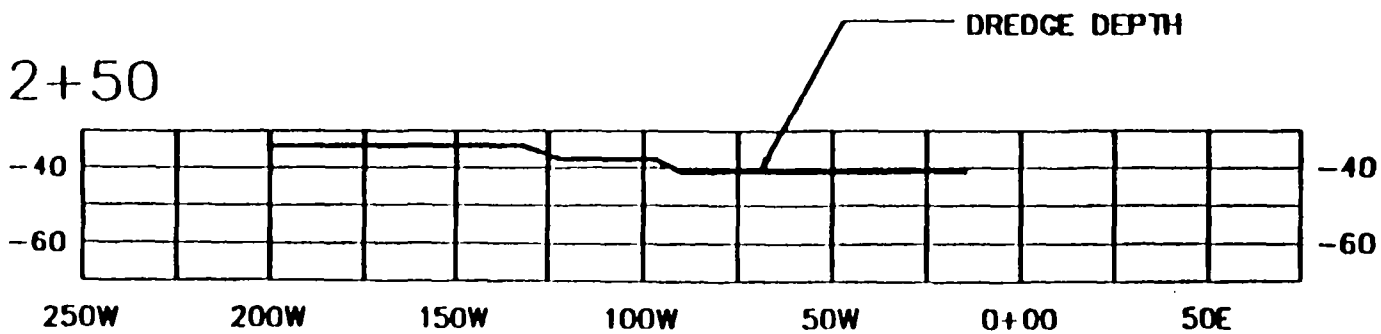

LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

V SCALE: 1"=50'
H SCALE: 1"=50'

**NOTE: NO DATA POINTS WERE PROBED FOR STATIONS 0+50 TO 1+50, WHICH COVER 1.75 GRIDS. THOSE GRIDS WILL BE DREDGED TO -41FEET (PLUS 6" OVERDREDGE).**

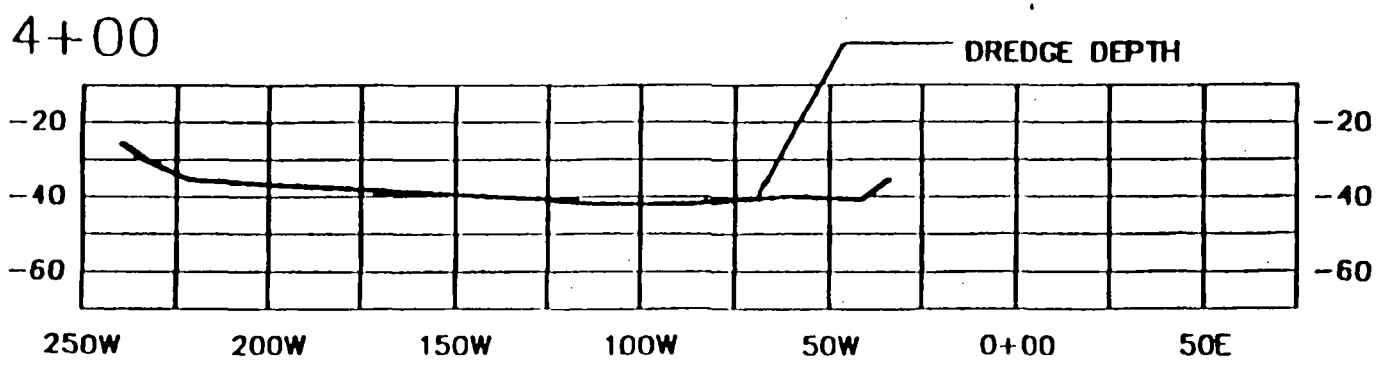


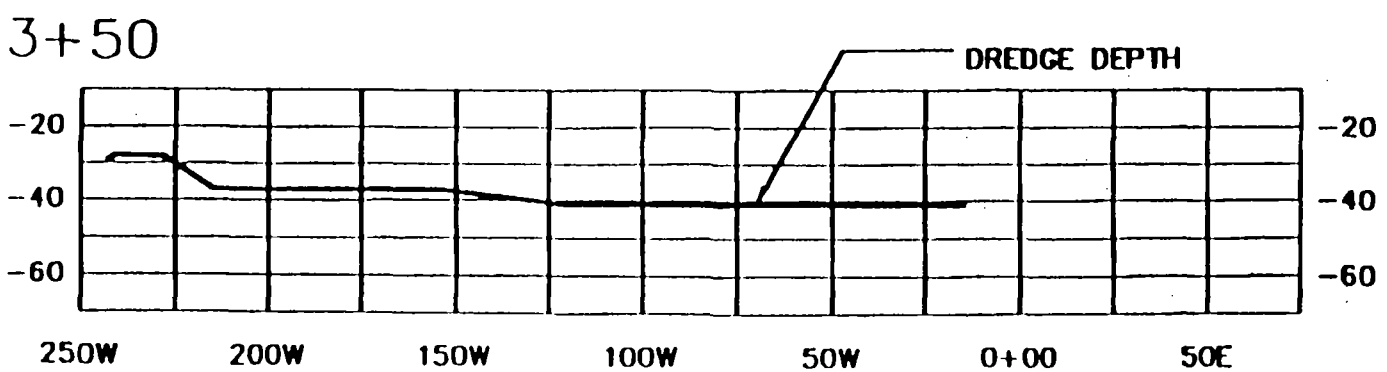




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

V SCALE: 1"=50'
H SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96
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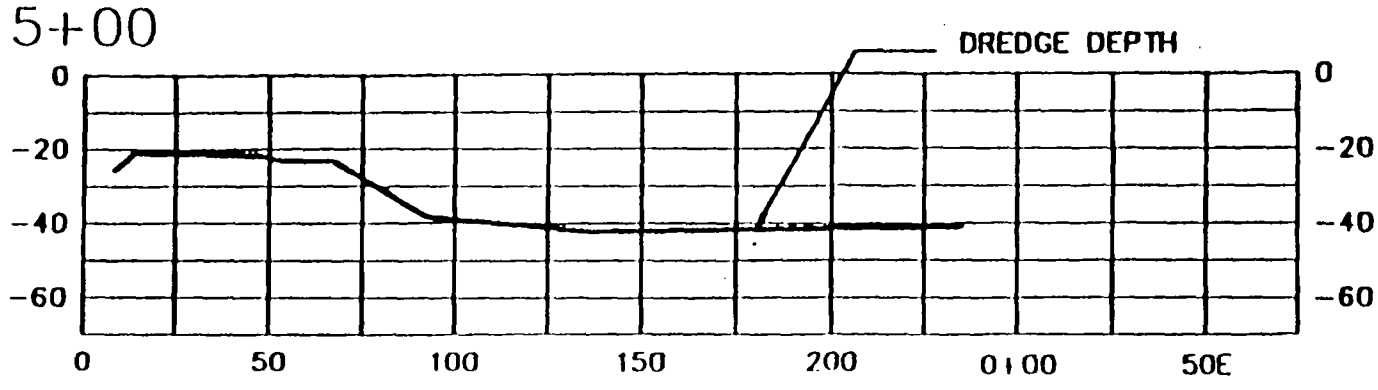
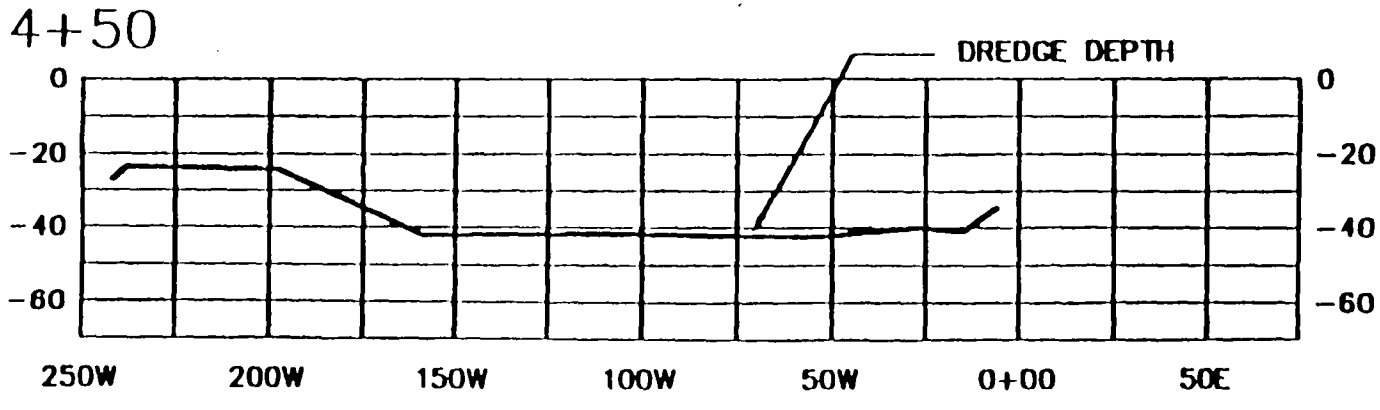
H SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

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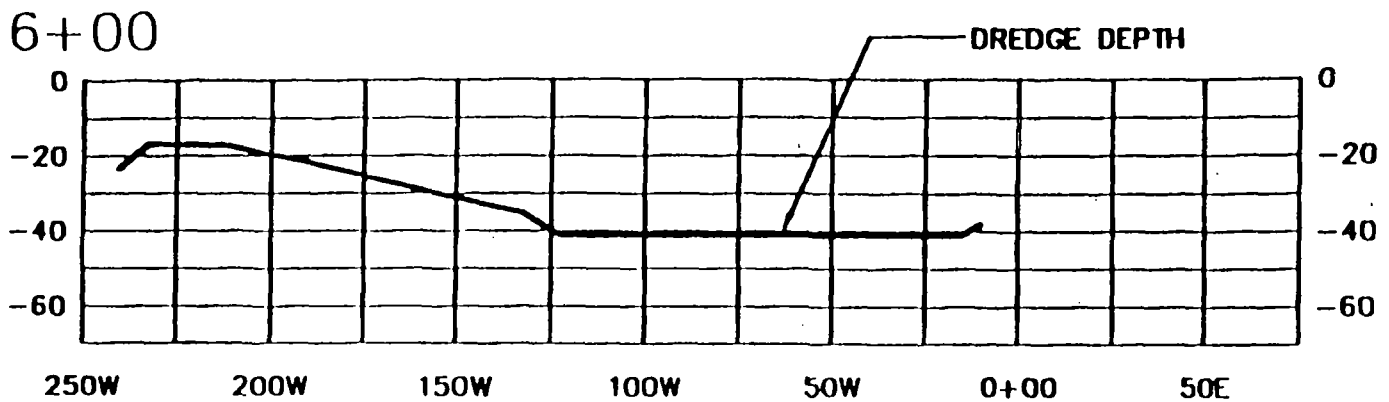
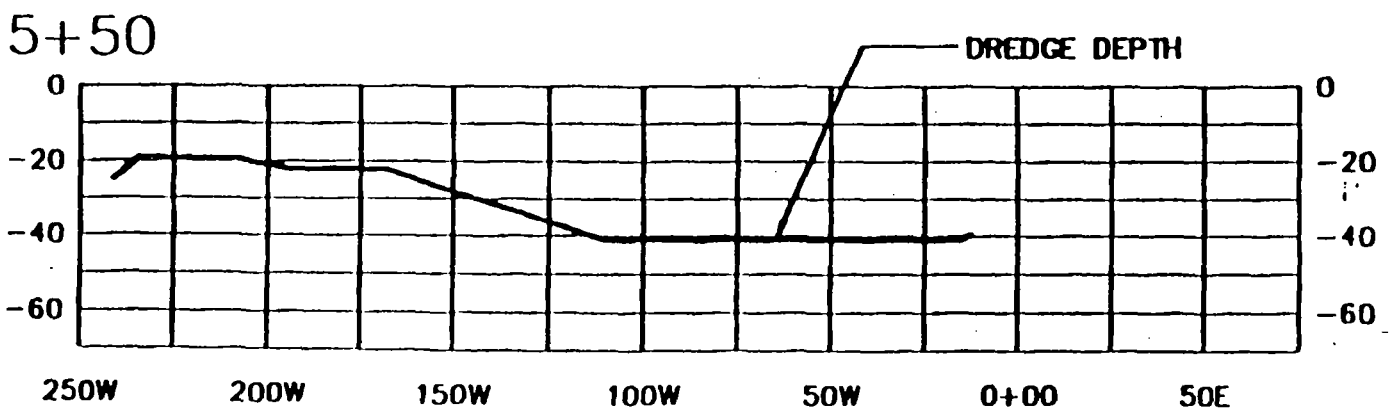
H SCALE: 1"=50'

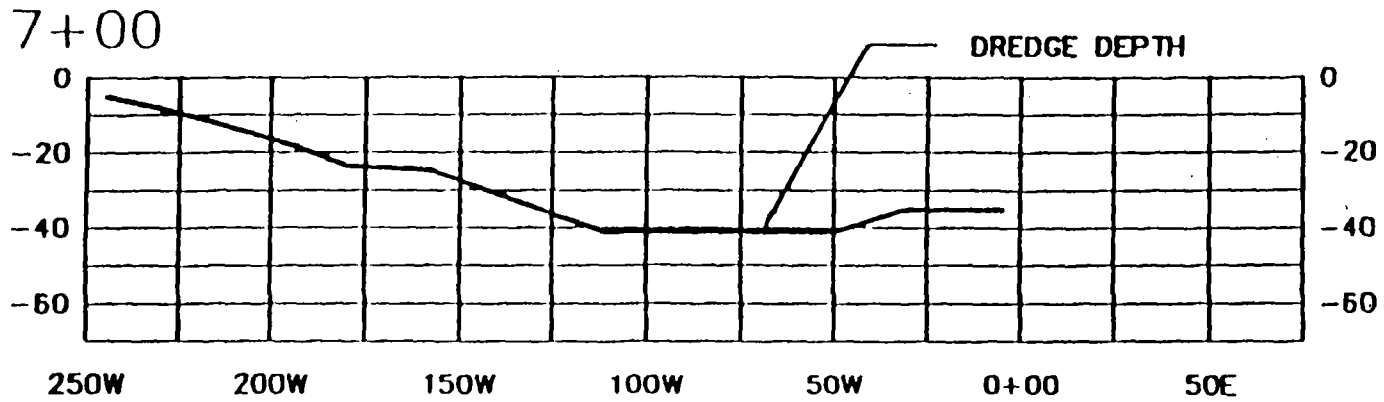


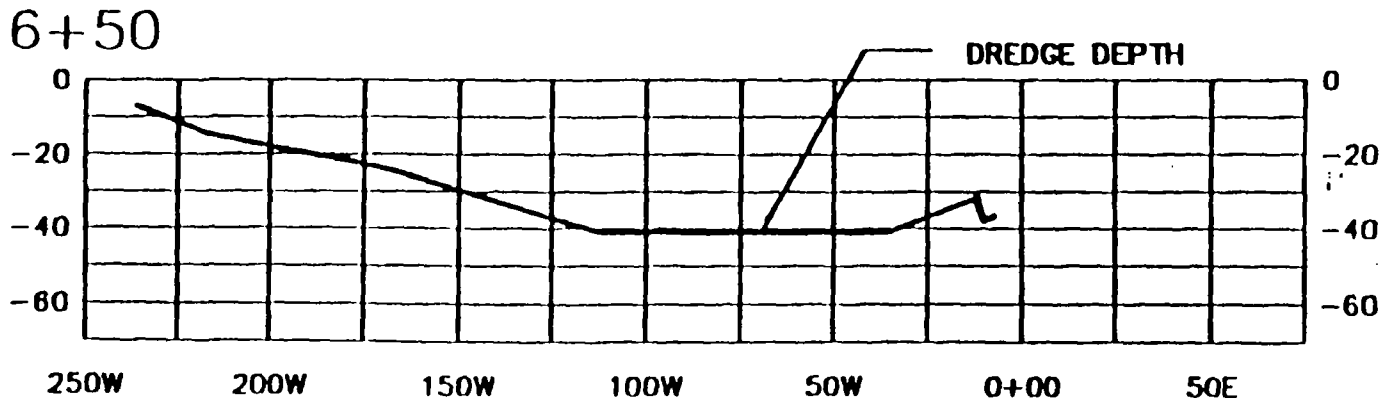




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

V SCALE: 1"=50'
H SCALE: 1"=50'

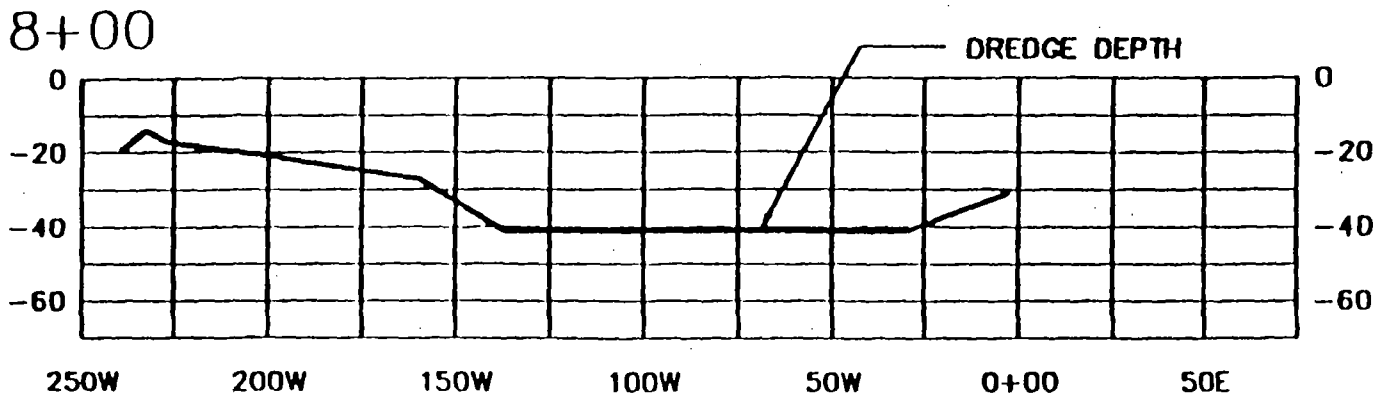


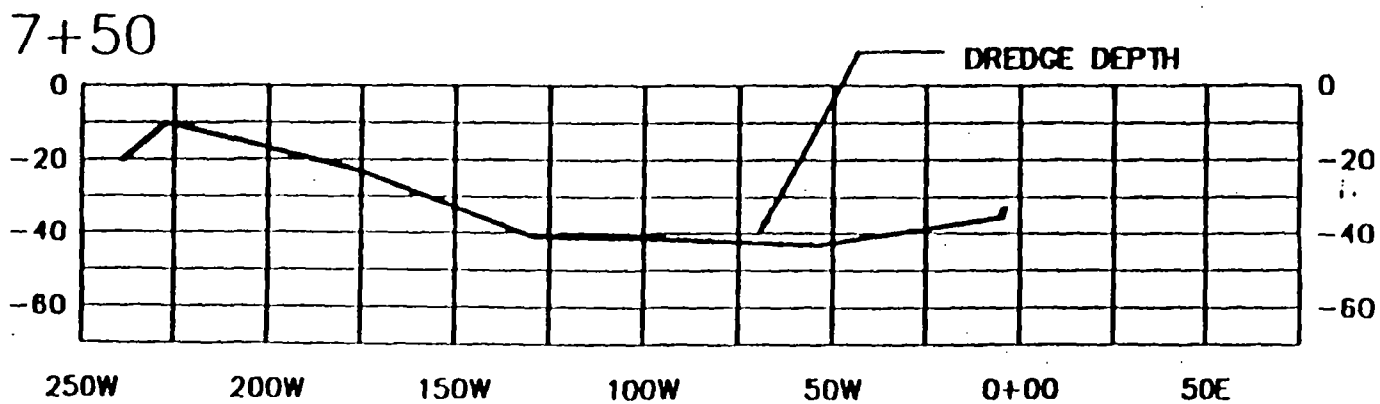




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

V SCALE: 1"=50'
H SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

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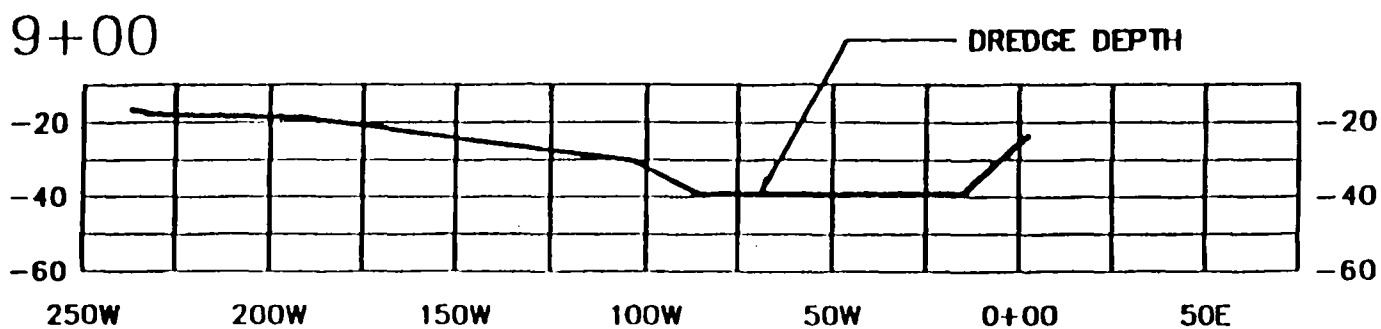
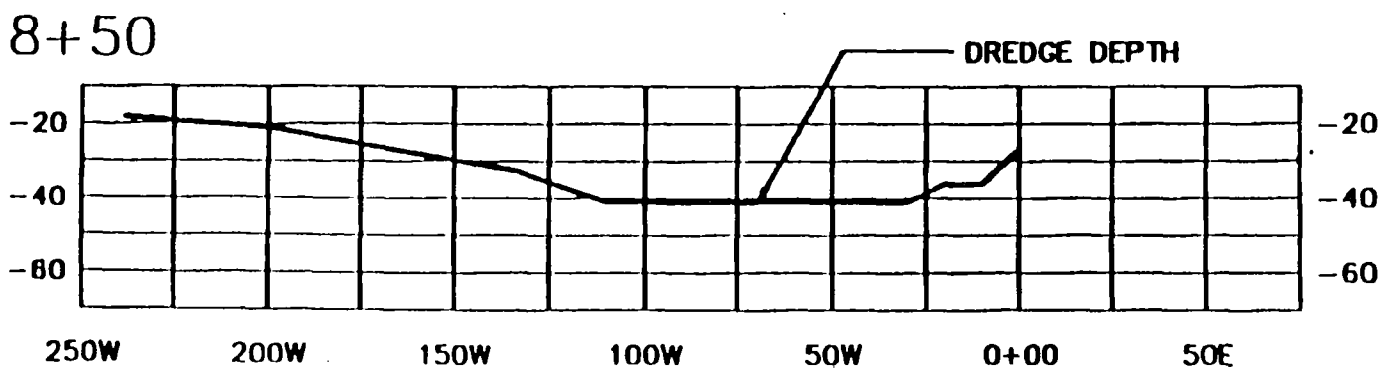
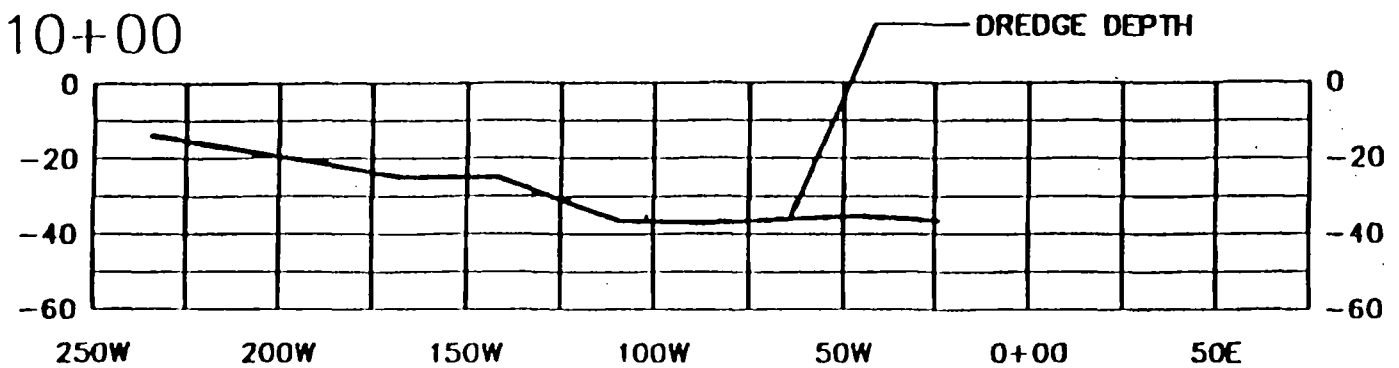
H SCALE: 1"=50'

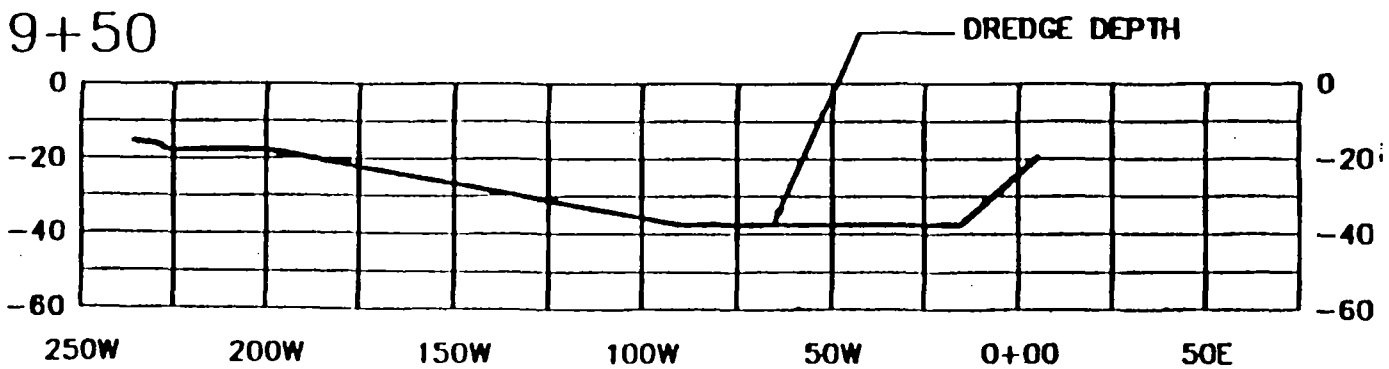



LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96
V SCALE: 1"=50'
H SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

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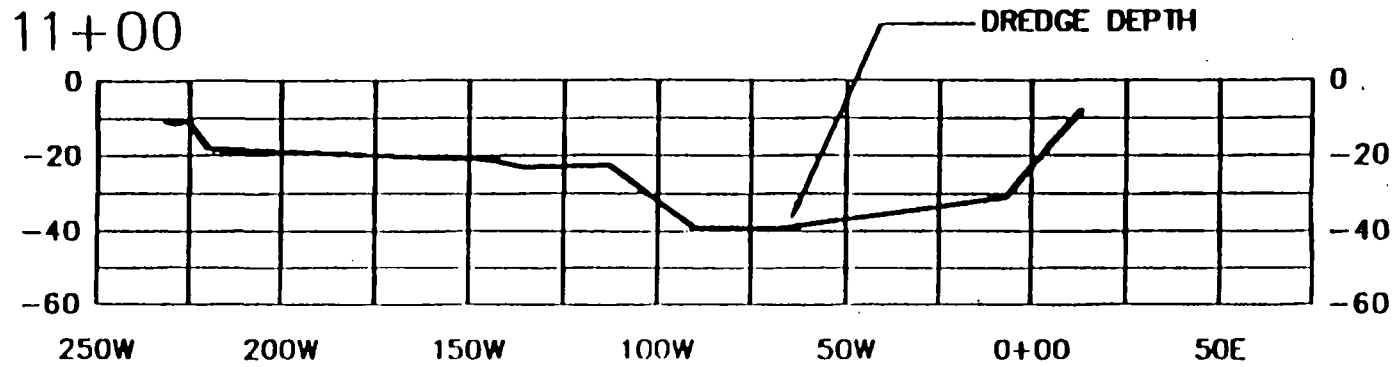
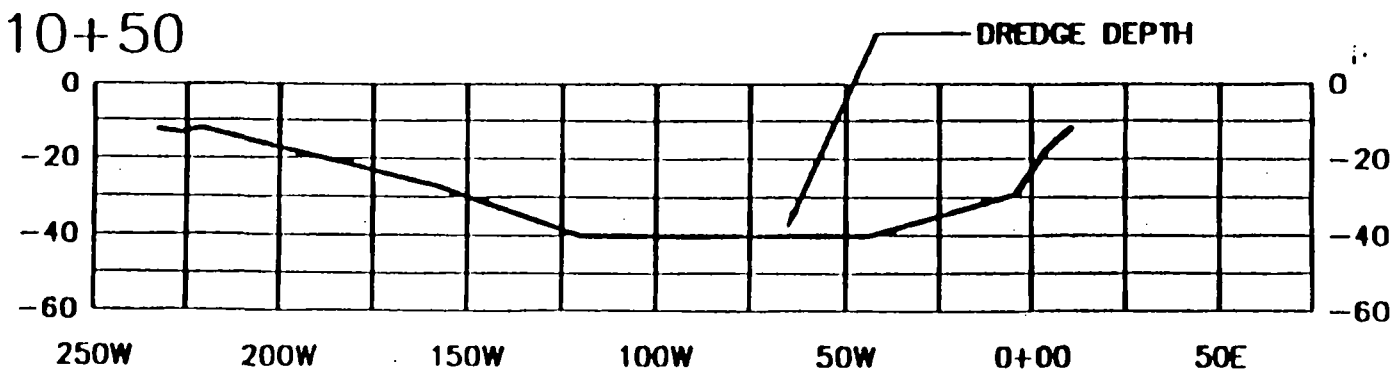
H SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

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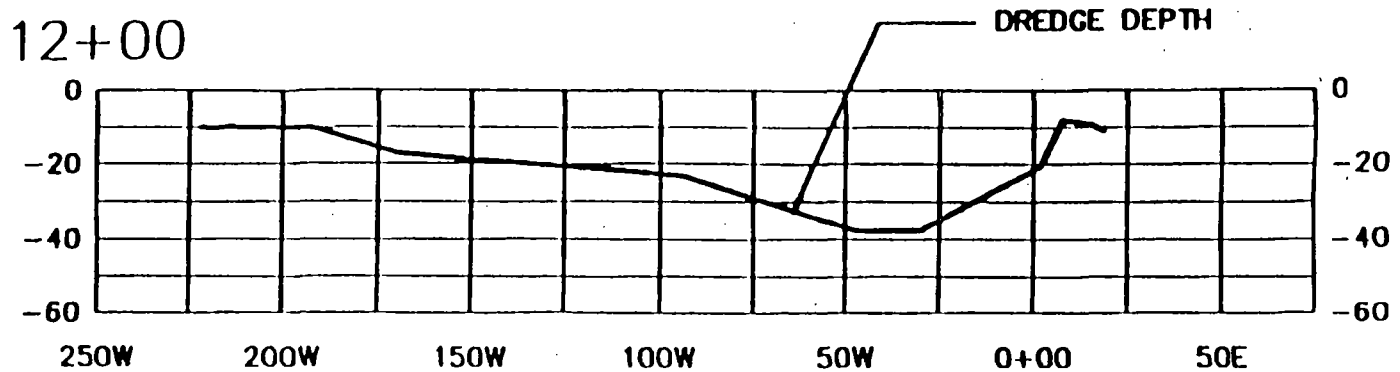
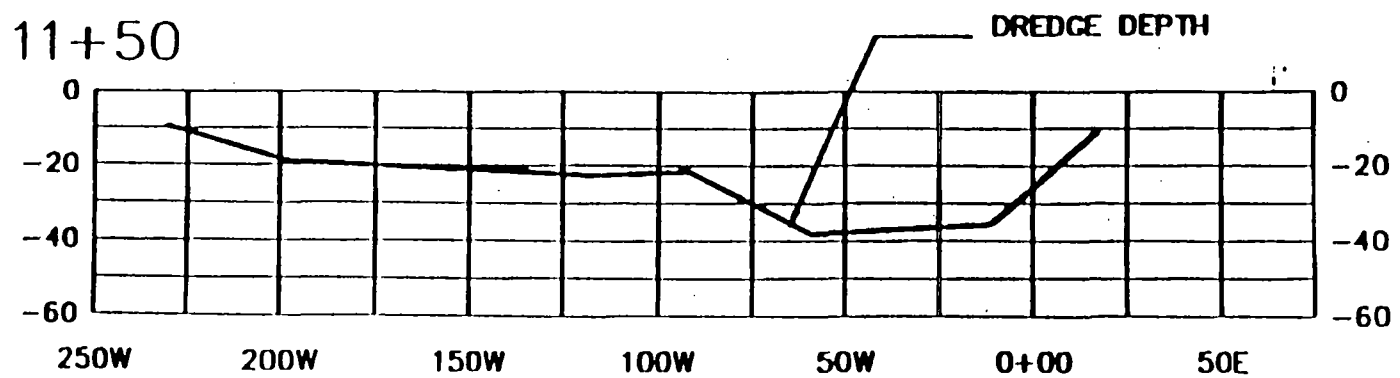
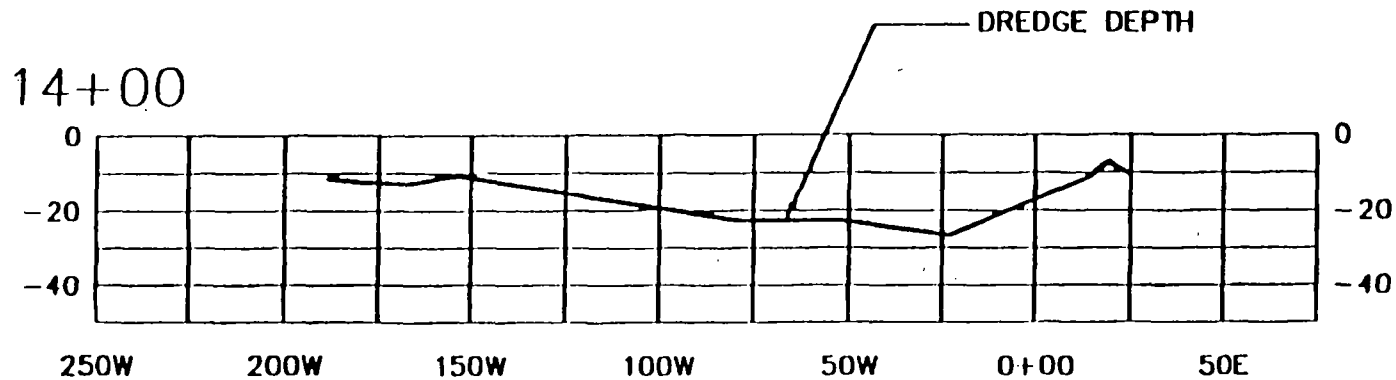
H SCALE: 1"=50'

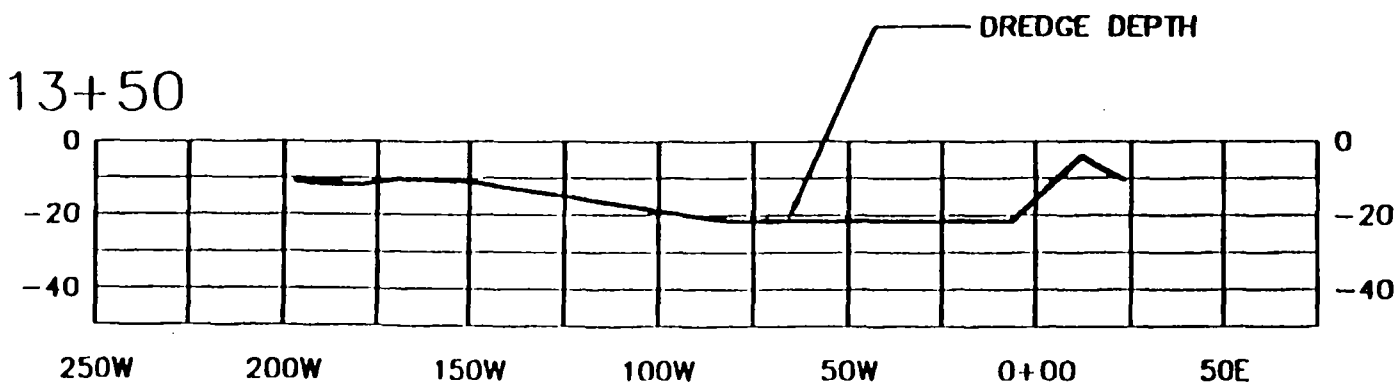



LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96
V SCALE: 1"=50'
H SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

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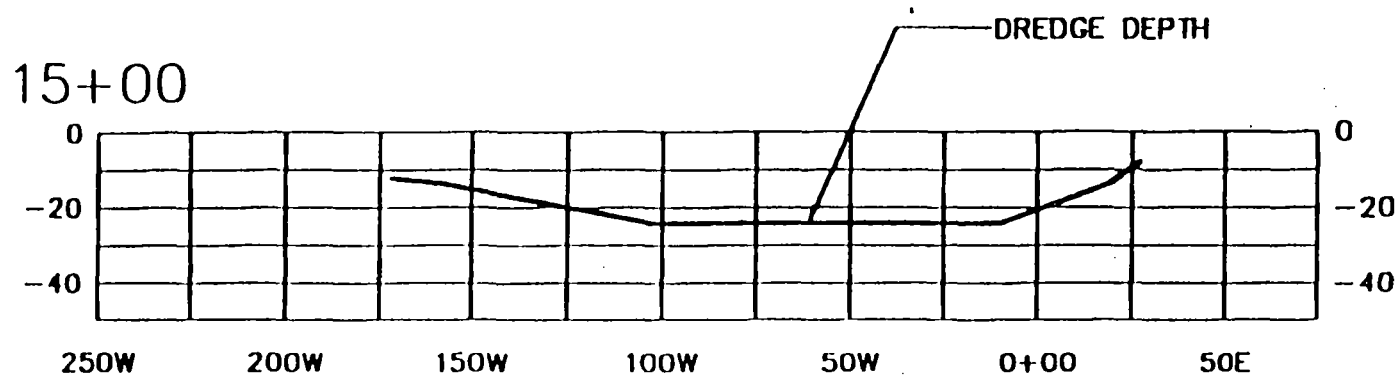
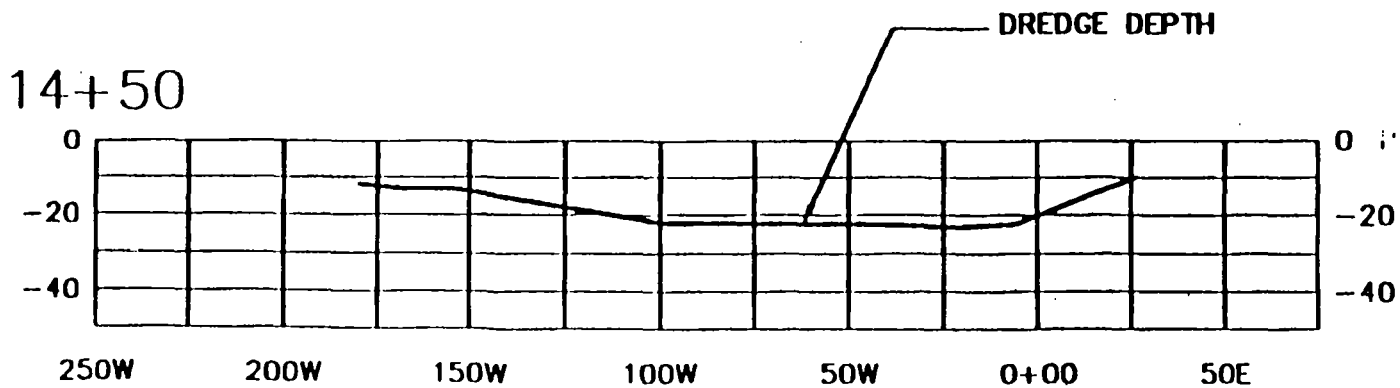
H. SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

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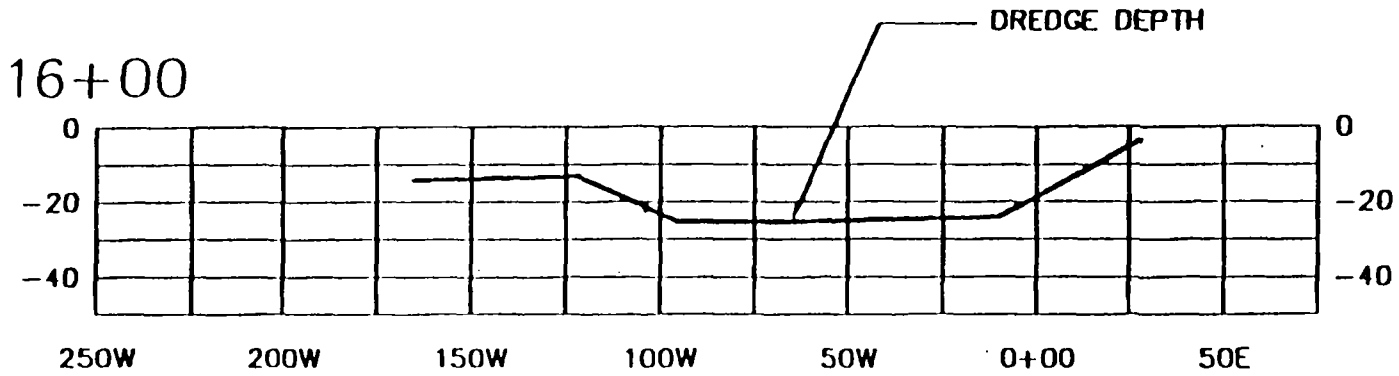
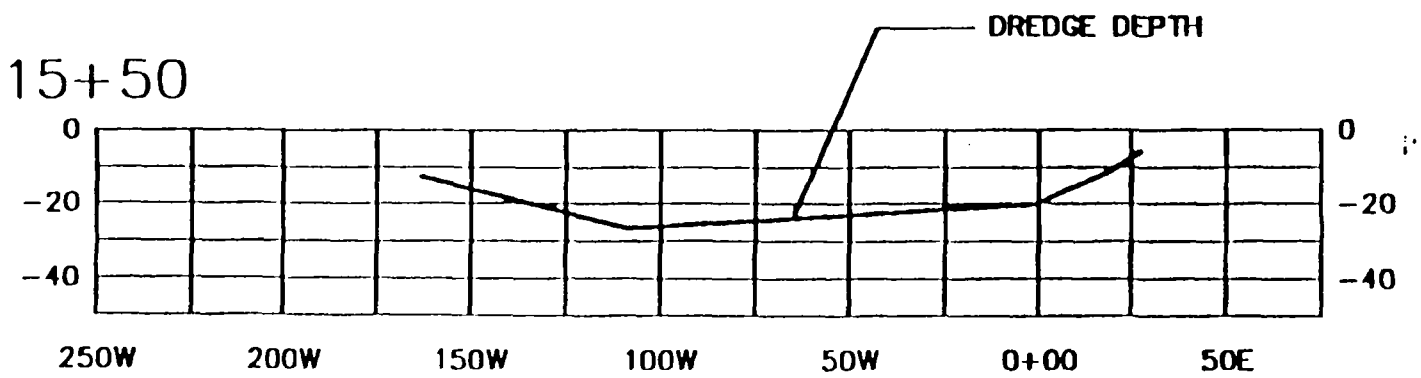
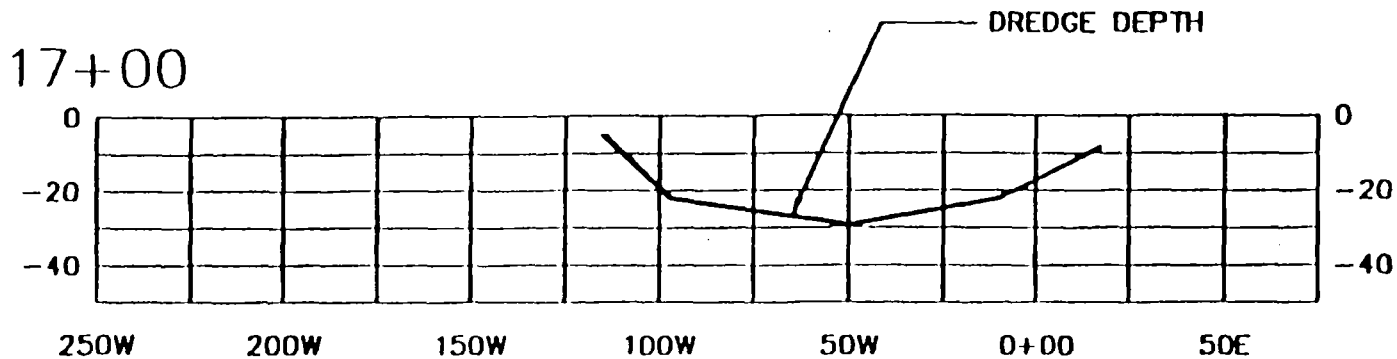


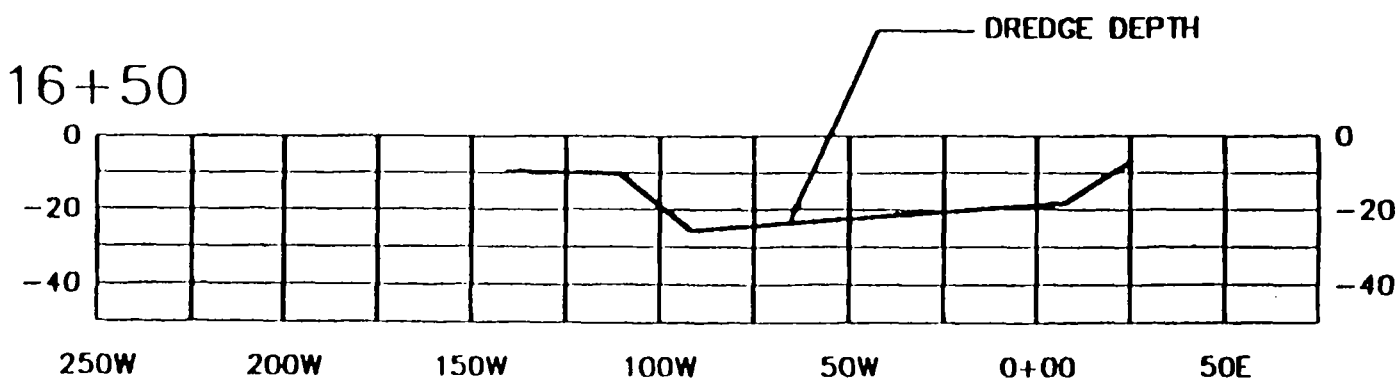




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

V SCALE: 1"=50'
H SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

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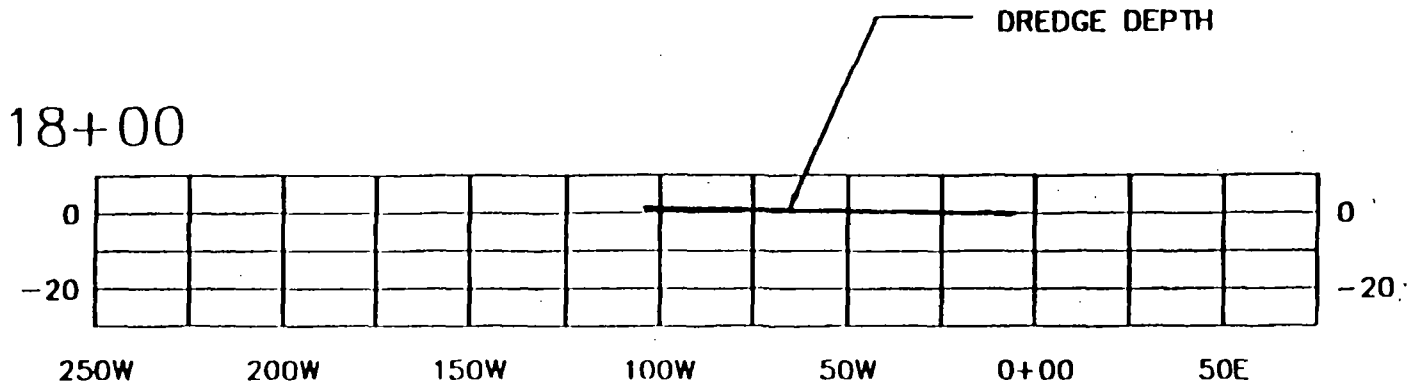
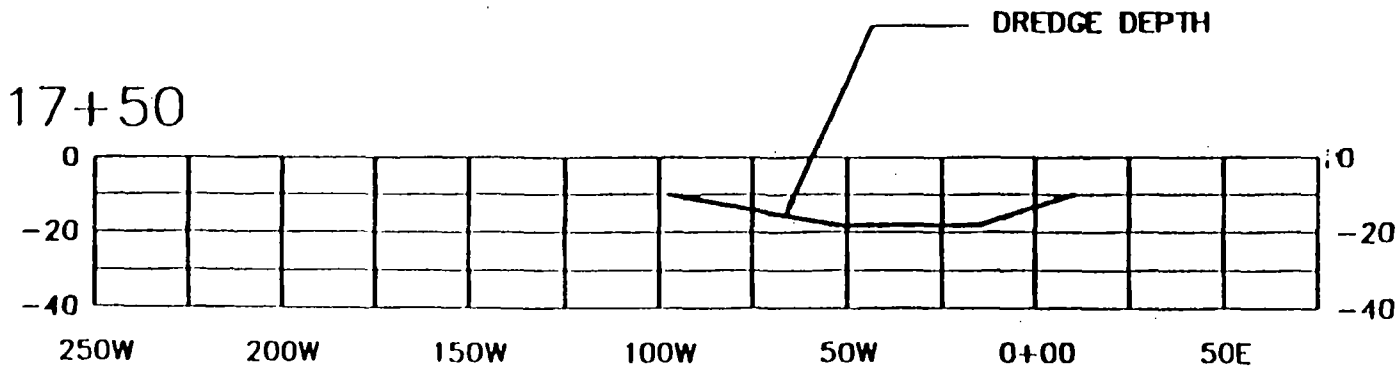
H SCALE: 1"=50'




LAURITZEN CHANNEL
EXHIBIT #3 CHANNEL CROSS-SECTIONS
UNITED HECKATHORN SUPPERFUND SITE
RICHMOND, CALIFORNIA.

01-31-96

V SCALE: 1"=50'
H SCALE: 1"=50'

# Exhibit #4

## Silt Curtain Specification and Details

AMOCO FABRICS AND FIBERS COMPANY

# STYLE-2006

We wish to advise that Amoco CEF Style 2006 meets the following minimum roll averages:

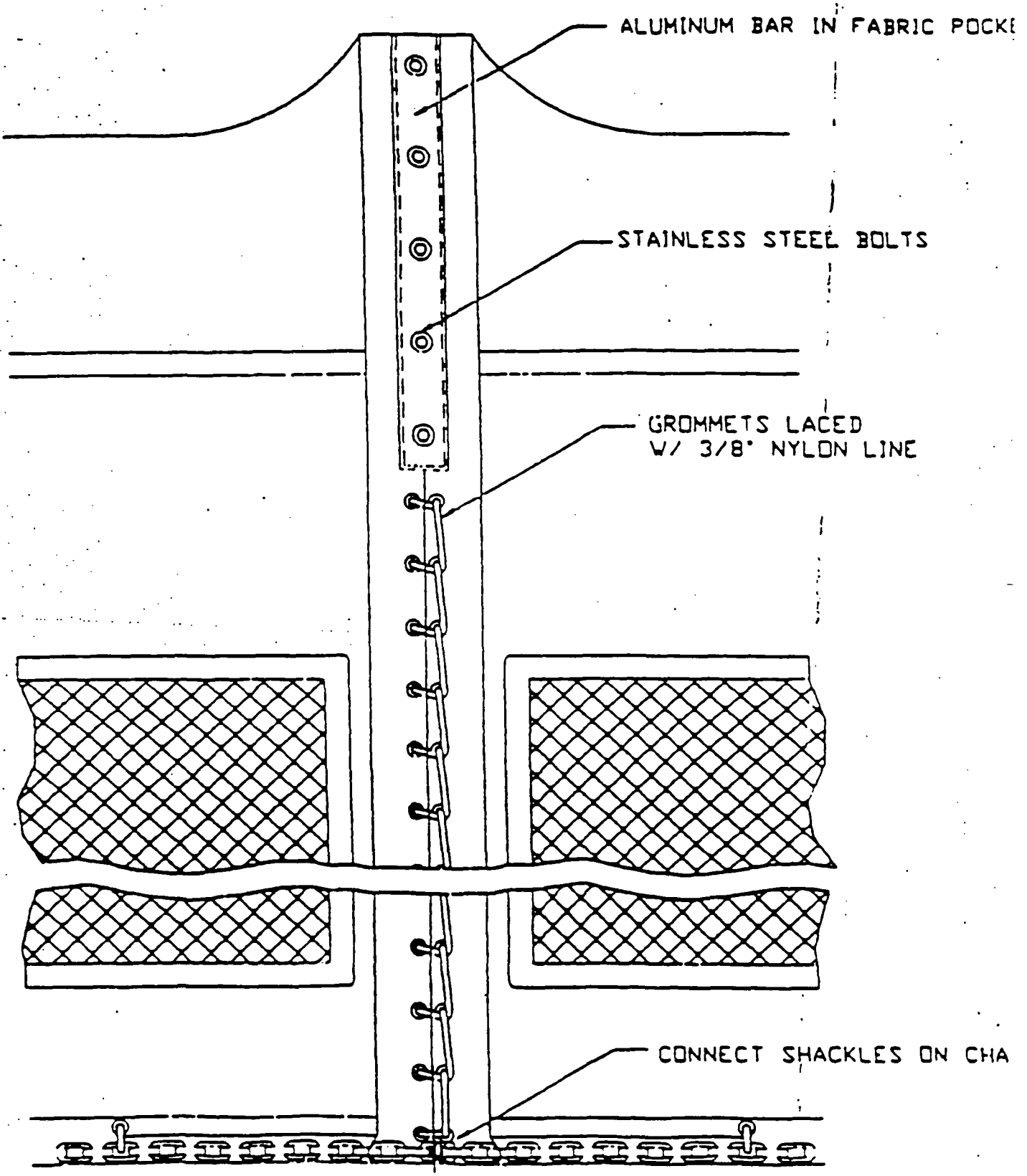
| Property | Test Method | Minimum Roll Average Value | Typical Value |
|---|---|---|---|
| Grab Tensile, lbs | ASTM-D-4632 | 300 | 340 |
| Grab Elongation, % | ASTM-D-4632 | 15 | 23 |
| Mullen Burst, psi | ASTM-D-3786 | 600 | 635 |
| Puncture, lbs | ASTM-D-4833 | 120 | 140 |
| Trapezoidal Tear, lbs | ASTM-D-4533 | 120 | 150 |
| UV Resistance, %SR | ASTM-D-4355 | 70 | 70 |
| AOS, US Sieve # | ASTM-D-4751 | 40 | 70 |
| Permitivity, 1/sec | ASTM-D-4491 | .02 | .025 |
| gal/min/ft$^2$ | | 2 | 2.5 |

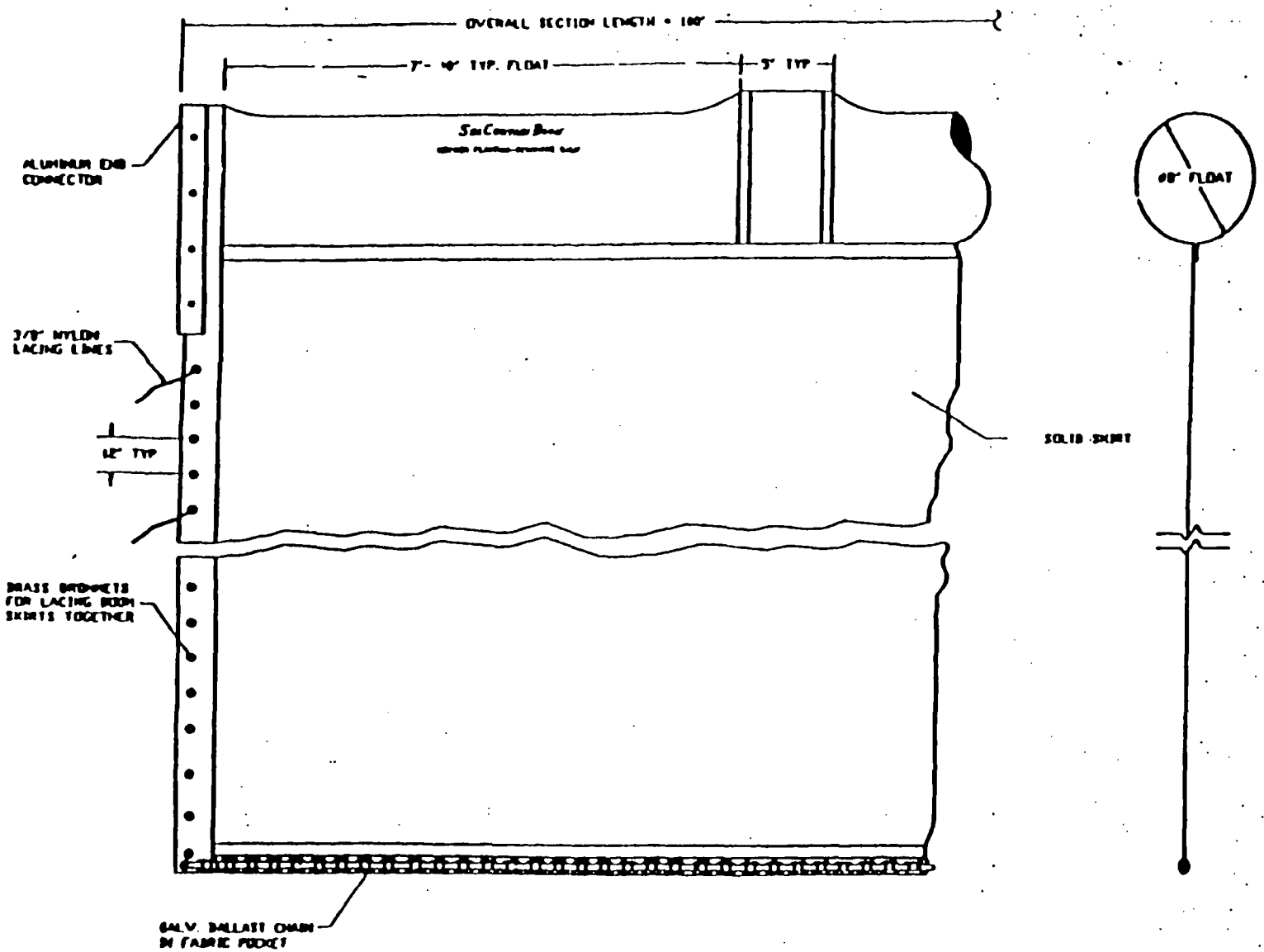
Amoco Fabrics and Fibers Company manufactures Style 2006 in the USA. The values listed are a result of testing conducted in on-site laboratories. A letter certifying the minimum average roll values will be issued from the manufacturing plant by the Quality Control Manager at the time shipment is made. The typical values provided are for comparison purposes, and are representative of current production of this product.

DATE ISSUED: 04/25/94

The information presented herein, while not guaranteed, is to the best of our knowledge true and accurate. Except when agreed to in writing for specific conditions of use, no warranty or guarantee expressed or implied is made regarding the performance of any product, since the manner of use and handling are beyond our control. Nothing contained herein is to be construed as permission or as a recommendation to infringe any patent.

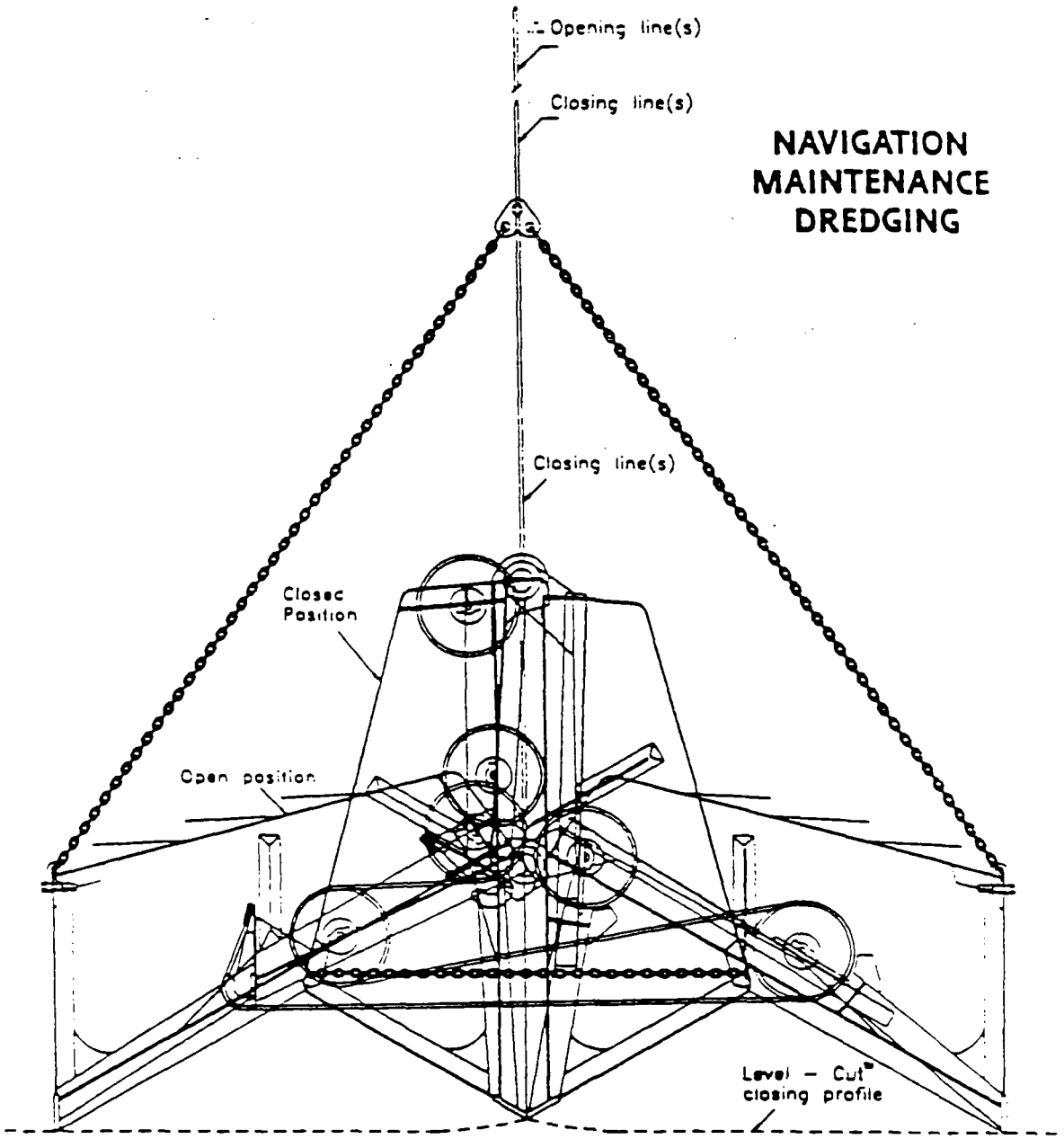
SILT BARRIER END CONNECTION _ DETAIL C






DRAWING NOT TO SCALE

| | |
|---|---|
| Kepner Plastics Fabricators Inc | W.O. # STD |
| SeaCurtain SILT BARRIER | |
| MODEL #BH085400BRF | |




**NAVIGATION MAINTENANCE DREDGING**

**ENVIRONMENTAL DREDGING**

*Removal of contaminated sediments for a healthier ecosystem*

# CABLE ARM™ CLAMSHELL

# TECHNICAL DATA

## DERRICK BARGE NO. 24

Built in 1968 by Clyde Iron Works. This fully revolving crane is pedestal mounted on a steel-constructed barge, 150' long x 54' wide x 13' deep.

| | |
|---|---|
| Heel pins: | 23' above the waterline. |
| Boom length: | 105', 125' or 145' to all falls, as required. |
| Capacity: | Dredging: the digging drums have 42,000 lb. line pull and can handle a 9-cubic-yard, lightweight bucket or a 6-cubic-yard, heavy-duty bucket. |
| Manning level: | One operator, one oiler and one deck engineer are employed on the dredge and one scow hand for the dump scow, if hauling the material. In addition to this manning, there is a barge captain assigned to run the job as required. For dredging, construction and demolition, all hands are Operating Engineers. |
| Power: | Hoist and topping lift, direct drive diesel. Caterpillar D353 Series E, rotation electric. |
| Controls: | Compressed air actuated. |
| Deck machinery: | One Skagit G-140, 4-drum waterfall anchor winch. One Clyde Frame G, 4-drum scow handling and mooring winch. |
| Deck capacity: | 1200 lbs. per square foot. |
| Tag line tower: | A weighted tag line tower is installed for bucket work. |

# Appendix B

# Excavation Plan & Maps for Parr Canal

# APPENDIX B

## PARR CANAL EXCAVATION PLAN
## *UNITED HECKATHORN SUPERFUND SITE*
***Richmond, California***

**Overview**
Remedial work in the Parr Canal will involve excavation of the bottom of the Canal from land. Excavation work will be conducted from the shore utilizing long-reach excavators with 70' arms. The ultimate goal of the excavation activities will be to remove as much Young Bay Mud ("YBM") from the Parr Canal as is practical given the nature of the bottom of the Parr Canal and the amount of broken concrete and rip-rap on the bottom.

Excavated YBM will be placed directly into trucks for shuttling to the Lauritzen dewatering cell. The sediments will be subsequently dewatered and loaded into railcars destined for the designated landfill for environmental disposal. Once excavation activities are complete, the EPA approves the Parr Canal Completion Report pursuant to Section 10 of the RD/RA Work Plan, the equipment is decontaminated and the silt curtain repositioned across the mouth of the Lauritzen Channel. an average 18" layer of clean bay sand will be placed on the bottom of the Parr Canal.

**Pre-excavation Survey**
After removal of the partially sunken barge and other large debris, and prior to the start of excavation activiites, a pre-excavation hydrographic survey will be conducted. The pre-excavation survey will be conducted using a fully equipped. automated survey boat as described in the section titled. "Pre-Dredge Survey" discussed in Appendix A - The Dredge Plan for the Lauritzen Channel. Positioning of the boat will be accomplished using equipment described in Appendix A, Exhibit #1. Pre-excavation mapping will be conducted at 50 foot intervals perpendicular to the centerline of the Parr Canal and in parallel with the plotting as depicted on the Excavation Work Site Plan Map attached as Exhibit #1 hereto.

**Silt Curtain**
Upon completion of the pre-excavation survey, the silt curtain will be set across the mouth of the Parr Canal. Prior to installation. a sufficient number of steel piles will be installed first at the mouth of the Parr Canal to secure the silt curtain in place. The silt curtain will remain in place until the dredging/excavation of the Parr Canal is complete. the EPA has approved the Parr Canal Completion Report pursuant to Paragraph 10.5 of the RD/RA Work Plan, the equipment has been decontaminated, and turbidity has subsided to a level acceptable to the EPA.

The silt curtain will be designed to contain within the Parr Canal loose sediments that may be generated during dredging/excavation operations. For details on the specifications of the silt curtain. please refer to Exhibit #3 of Appendix A - Dredge Plan for the Lauritzen Channel. It is important to note that the curtain will be designed to

follow the contour of the bottom of the mouth of the Parr Canal and will not extend to the same depths as in the Lauritzen Channel.

Visual observations of turbidity plumes outside of the silt curtain will be made at least three times daily during excavation activities and the curtain itself will be monitored once every two hours during dredging for any tears or damage and repaired as necessary.

Once the silt curtain has been removed from the Parr Canal, it will be repositioned across the mouth of the Lauritzen Channel prior to dredging activities in that waterway.

**Excavation Procedures**

Excavation of the Parr Canal will be guided by the Excavation Work Site Plan attached as Exhibit #1 hereto and the Cross-Section Maps in Exhibit #2. Exhibit #1 was developed by PLS Surveys of Alameda from data provided from extensive probing by Golder Associates, which took more than seventy data points from the bottom of the Parr Canal to determine the extent and thickness of the YBM. In Exhibit #1, the Parr Canal has been laid out in 50' by 50' grids. The Cross-Section Maps in Exhibit #2 will be used by the dredge operator to determine the sloping of the bottom of the Canal and the depth and profile to which each of the grids is to be excavated.

The excavation will be conducted on a grid-by-grid basis starting at the mouth of the Parr Canal, working north. Excavation will initiate from both shores utilizing long-reach excavators equipped with 1.5-cubic-yard buckets to remove as much YBM from the Parr Canal as is practical. A description and specifications of these excavators is provided in Exhibit #3, attached hereto. Two excavators will be used during the remediation. One excavator will be stationed along the eastern shore of the Canal. The second excavator will work from the western side of the Parr Canal and will reach into areas the excavator on the east side cannot reach.

Horizontal positioning of the excavators will be accomplished utilizing stakes placed every 50' in correspondence with the Excavation Work Site Plan Map - Exhibit #1. The excavators will proceed from the mouth of the Canal and work north excavating YBM from grids across the Canal. As each set of east/west grids is completed, both machines will move north to the next set of grids until the end of the Parr Canal is reached.

The excavator on the east side of the Parr Canal will remove YBM and place it directly into trucks for shuttling to the Lauritzen dewatering cell. Except for the northernmost grids, the swing of the bucket will be limited to a northerly direction. Thus, should materials spill out of the bucket over the Canal, they will be recaptured as the remediation works it way north. A layer of visqueen will be placed on the shore underneath the swing radius of the bucket and beneath the truck loading area to capture any sediments which might fall off between the shoreline and the truck loading area. Upon completion of the project or as necessary, this visqueen will be loaded into a railcar bound for the designated landfill where the visqueen will be environmentally disposed.

The excavator on the west side of the Canal will reach into areas which the east shore-based excavator cannot reach. YBM will be loaded into water-tight trucks for transport to and placement in the Lauritzen dewatering cell. Care will be taken to load the trucks such that YBM does not collect on the outside of the truck. Each truck will be brushed clean of any YBM on the outside of the truck prior to departure to the dewatering cell. In addition, a layer of visqueen will be placed from the shore where the trucks are to be loaded to collect any YBM which may fall from the bucket during operations. Upon completion of the project or as necessary, this visqueen will be loaded into a railcar for environmental disposal at a CWM or WMI landfill. These steps will serve to avoid cross-contamination of the upland areas.

Excavation activities will be conducted on a good-faith effort basis. The excavators will reach to the bottom of the Canal and pick up any loose sediments from the top of the rip-rap. Excavation along the shoreline will be to within 5 feet, plus or minus 2 feet, of the high tide line. The excavator operator will work within a particular grid until excavation is completed. Excavation within a particular grid will be deemed completed when: 1) the excavator operator visually observes Old Bay Mud in the excavator bucket or; 2) when the nature of the Parr Canal bottom (e.g., rip-rap) is such that the excavator can no longer pick up any appreciable amounts of YBM from the bottom. Once excavation of a set of grids is complete, the excavators will drag the bottom from the mouth towards the head of the Canal utilizing metal beams.

As the work proceeds, a grid-by-grid completion report will be developed by the Supervising Contractor and presented to the EPA Project Manager. This grid-by-grid completion report will be completed by the excavator operators and the Supervising Contractor based on visual observations. The information will be compiled into the Parr Canal Completion Report (RD/RA Work Plan, Section 10.5) along with a post-excavation hydrographic survey of the bottom of the Parr Canal.

On average, the anticipated remedial production will be 4 to 8 grids per day for an 8-hour work day. Accordingly, excavation of the Parr Canal should be completed in approximately 5 to 10 days.

For a description of how excavated materials are to be handled after placement into the dewatering cell, please refer to Sections 7.5 through 7.8 of the RD/RA Work Plan. For a description of the placement of clean materials, please refer to Section 7.10.

**Post-Excavation Survey**

After completion of the excavation activities and prior to decontaminating of the equipment and the dewatering cell, a post-excavation survey will be undertaken to confirm that the Parr Canal has been excavated to the desired depths. This survey will be compared to the Canal Cross-Section Maps to determine the amount of material excavated from the Parr Canal and as additional confirmation of the grid-by-grid confirmation. The same equipment and procedures as in the Pre-excavation Survey will be utilized.

A more detailed description of the post-excavation survey and the Completion Report for the Parr Canal is provided in Section 9 of the Work Plan.

**Decontamination Procedures**

Once the YBM has been loaded into rail cars and upon approval from the EPA that excavation of the Canal is complete, turbidity will be allowed to subside, the equipment will be cleaned and decontaminated and the silt curtain will be removed. The excavators will be decontaminated by qualified personnel utilizing shovels and high pressure hoses while stationed over the truck loading area. Excess water will be filtered and directed back into the Canal. The remaining sediments will be placed into a rail car for environmental disposal at the designated landfill.

**Placement of Clean Material**

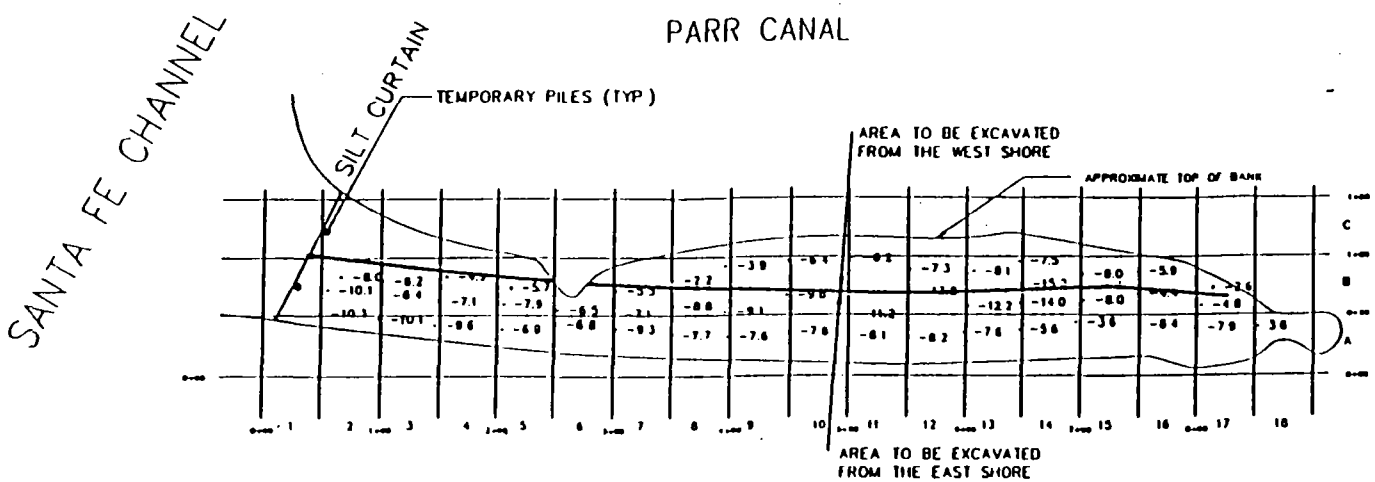
Placement of an average of 18" of clean bay sand will begin immediately after determination that the Parr Channel has been remediated and the silt curtain has been removed. For a more complete description of the bay sand and the method and verification of placement, please refer to Sections 7.10 and 10.5 of the RD/RA Work Plan.

Exhibit #1

Excavation Work Site Plan Map

NO SCALE

# PARR CANAL




NOTE: ELEVATIONS SHOWN ARE THE "EXCAVATE TO" DEPTHS

-7.1 PROPOSED EXCAVATED ELEVATION AT MARKED LOCATION
Excavation depths are sloped across the Canal from one marked location to the next marked location above it. The line of the slope is shown on the Cross Section set forth on Exhibit #2.

PARR CANAL EXCAVATION MAP
EXHIBIT #1 TO THE EXCAVATION PLAN
WHICH IS APPENDIX B TO THE RD/RA WORK PLAN
UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA
SCALE 1" = 50'
January 17, 1996

GRAPHIC SCALE

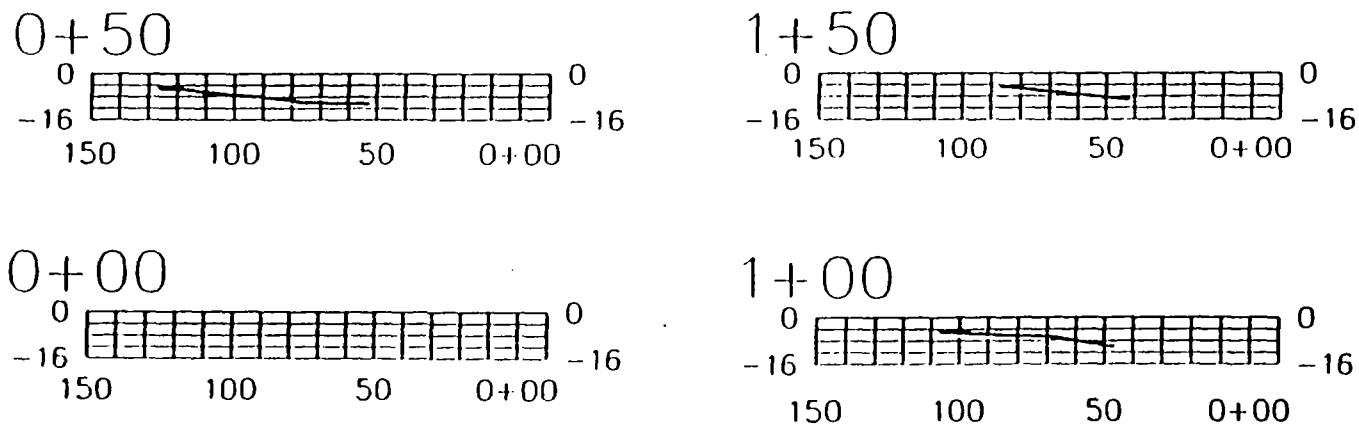
PLS SURVEYS, INC.
1202 LINCOLN AVENUE
ALAMEDA, CA 94501
(510) 522-1700
FAX(510) 522-0207

C:\EDSIPROJ\95053\95069 1-17-96 9:42:44 am

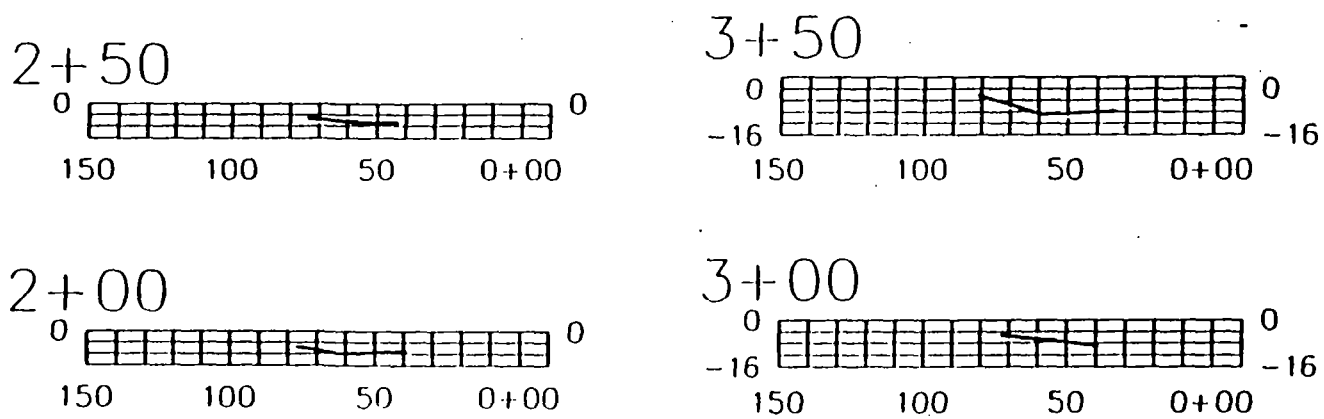
THIS DRAWING HAS BEEN REDUCED.
NO SCALE.

Exhibit #2

# PARR CANAL CROSS SECTIONS




PARR CANAL CROSS SECTIONS
EXHIBIT #2 TO THE EXCAVATION PLAN
WHICH IS APPENDIX B TO THE RD/RA WORK PLAN
UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA
SCALE 1"=50'

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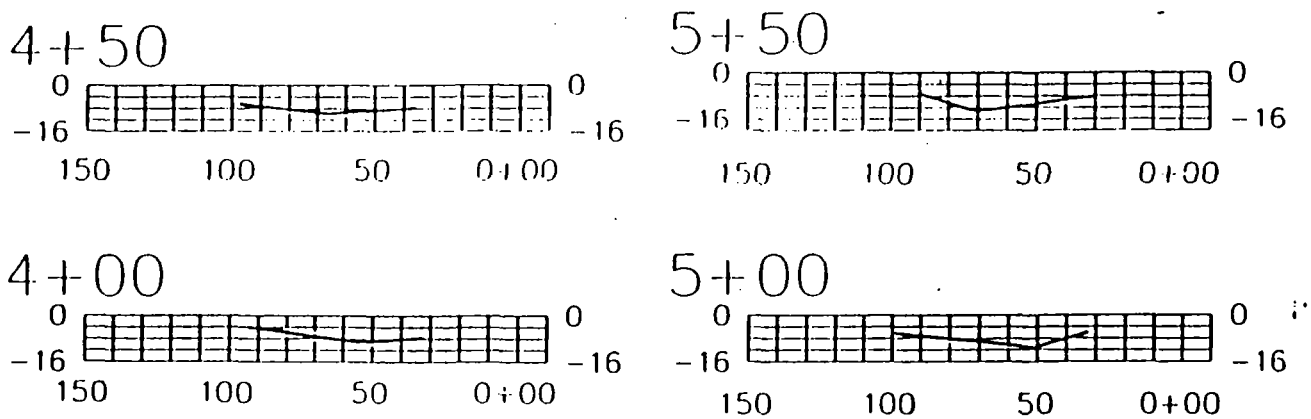


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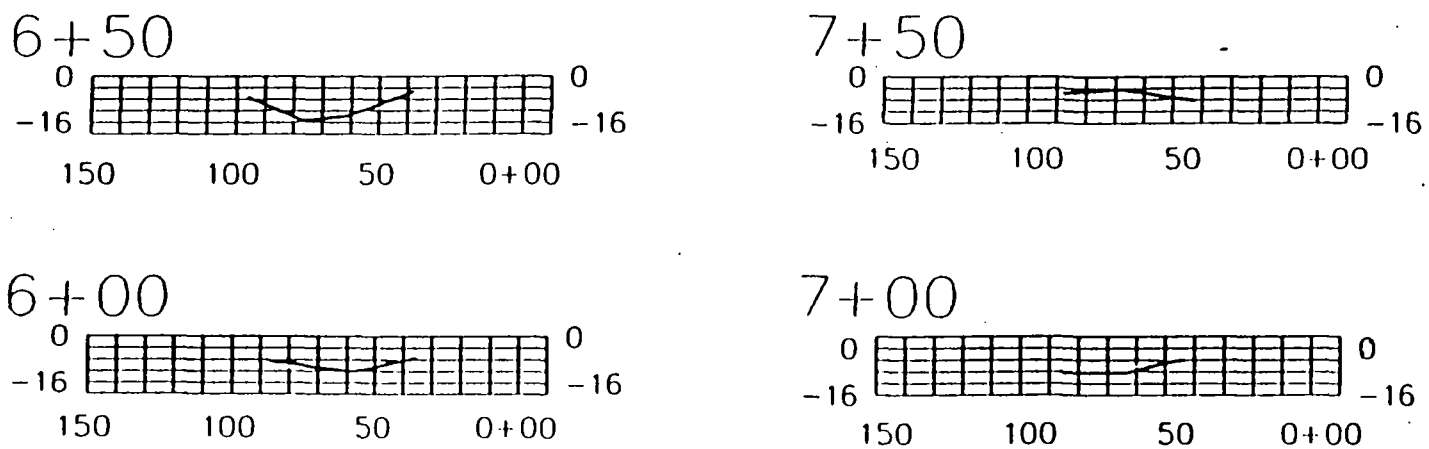


PARR CANAL CROSS SECTIONS
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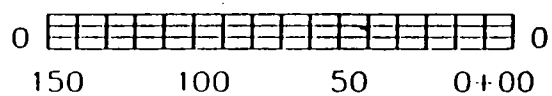
WHICH IS APPENDIX B TO THE RD/RA WORK PLAN
UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA
SCALE 1"=50'

8+50

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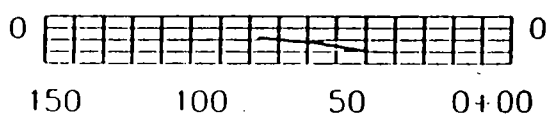


PARR CANAL CROSS SECTIONS
EXHIBIT #2 TO THE EXCAVATION PLAN
WHICH IS APPENDIX B TO THE RD/RA WORK PLAN
UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA
SCALE 1"=50'

Exhibit #3

# Long-Arm Excavator
# Description and Specifications

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*Maybe double your output on slurry or settling ponds! Combine the long reach and payload of draglines with the speed and precision of a backhoe. That's the unique Priestman VC DragHoe concept. The Variable Counterbalance principle gets you out where the action is, at twice the speed. And precisely places the bucket, not stirring up the mix!*

The long outreach VC25/20 on water control or general contracting – 66ft outreach with 3500lb payload!



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40

# SPECIFICATION

## VC20/20

| | | |
|---|---|---|
| MACHINE WEIGHT (34" Plates) | 64,480lbs | 29.25 tonne |
| MAX OUTREACH (Std Boom) | 65'6" | 20.0m |
| DIGGING DEPTH (Std Boom) | 27'3" | 8.3m |
| DIGGING DEPTH (Cranked Boom) ---------CRANKED | 37'9" | 11.5m |
| DISCHARGE HEIGHT (Std Boom) (MAX OUTREACH CRANKED BOOM 71') | 39'4" | 12.0m |
| DISCHARGE HEIGHT (Cranked Boom) | 28'9" | 8.8m |
| SUPERSTRUCTURE WIDTH | 9'7" | 2930mm |
| TRANSIT HEIGHT OF MACHINE | 11'3" | 3430mm |
| TAIL RADIUS | 10'1" | 3080mm |
| CRAWLER LENGTH | 15'3" | 4650mm |
| CRAWLER WIDTH (34" Plates) | 11'11" | 3610mm |
| GROUND BEARING PRESSURE | 5.93lbs/in² | 0.41kg/cm² |
| DIESEL ENGINE | 131bhp | 100kW @ 2100rpm |
| HYDRAULIC PUMP | 39.3 US galls | 2 x 145 litre/min |
| HYDRAULIC PRESSURE (MAX) | 4000 psi | 276 bar |
| PILOT CONTROLS – HYDRAULICS | 500 psi | 34 bar |
| FUEL CAPACITY | 129 US galls | 490 litres |
| HYDRAULIC OIL CAPACITY | 121 US galls | 460 litres |
| TRAVEL SPEED | 1.9 mph | 0.3.0 kph |
| SWING SPEED | . | 5.1 rpm |
| BUCKET LINE SPEED | 158 fpm | 48.0 m/min |
| BUCKET LINE PULL | 16,100lbs | 7.3 tonnes |
| BUCKET SIZE AT MAX OUTREACH:- DITCH CLEANING 72" | 1½ cu yd | |
| SILT | 1.125 cu yd | 930 litre |
| EXCAVATING | 1.00 cu yd | 800 litre |
| WEEDMOWER | 13 foot | 4.0m wide |
| MAX LOAD (Bucket & Contents) AT FULL OUTREACH | 3530lbs | 1.6 tonnes |

* ALSO AVAILABLE: VC-15 w/ 50' REACH & 7/8 cu yard Ditch Cleaning Bucket

SANDERSON PRIESTMAN

# Appendix C

# Field Sampling & Analysis Plan

# APPENDIX C

## FIELD SAMPLING & ANALYSIS WORK PLAN
*UNITED HECKATHORN SUPERFUND SITE*
***Richmond, California***

### Introduction

This Field Sampling & Analysis Work Plan (FSAP) has been developed as part of the Marine Remedial Action/Remedial Design Work Plan ("Work Plan") for the United Heckathorn Superfund Site in Richmond, California. The Work Plan describes in detail how the Lauritzen Channel will be dredged and how the Parr Canal will be excavated to remove contaminated sediments from those waterways. The Work Plan also describes how the sediments will be handled once removed from the waterways, and the way in which they will be transported and environmentally disposed.

Subsequent to the approval of the Work Plan there will be a design phase of the project, during which further specifics of this FSAP will be developed, such as the particular contract laboratory which will be used for the chemical analyses of samples, and the laboratory's detailed quality assurance procedures.

This FSAP addresses the following aspects of the project and the scientific measurements which will be taken in order to verify compliance with the goals of the project:

1. Turbidity of surface water during and after dredging.
2. Settleable solids content in and flow rate of return water from dredge material dewatering activities.
3. Depths to sediments on bottom both before and after dredging.

For each of the above aspects of the project, the Plan below will addresses the following issues:

- Objective of the sampling process
- Sampling equipment to be used
- Locations where samples will be taken
- Number of samples to be taken
- Laboratory to be used, if applicable
- Methods for testing sample
- Holding times for samples extracted from the site

- Preservation of samples - number and time period to be held
- Chain of custody procedures
- Data logging and reporting
- Quality assurance procedures

## 1. Turbidity of Surface Water

Objective: To monitor surface waters in the work area so that dredge activities and resultant turbidity within the silt curtain does not negatively impact the adjacent Santa Fe Channel by causing turbidity to exceed ambient levels in that waterway.

If turbidity as measured inside the Channel is less than the ambient turbidity as measured outside the silt curtain in the Santa Fe Channel, then it is assumed that no turbidity is migrating outside the silt curtain and no action is to be taken.

If measured turbidity inside the silt curtain is greater than that measured directly outside the silt curtain, yet ambient turbidity in other points of the Santa Fe Channel is measured greater than or equal to the point directly outside the silt curtain, it will be presumed that turbidity is resulting from factors in the Santa Fe Channel other than the remediation activities inside the Lauritzen Channel silt curtain.

Should turbidity inside of the silt curtain be greater than outside the curtain, and the turbidity level directly outside the curtain in the Santa Fe Channel is higher than in the other stations in the Santa Fe Channel, then the potential exists that turbidity from the remediation operation is migrating through the silt curtain and impacting turbidity in the Santa Fe Channel.

Contingency Plan:

If turbidity measurements indicate that turbidity from the remediation operation is migrating through to impact the Santa Fe Channel, the following mitigation steps will be taken:

1) Observe activities within the Santa Fe Channel to see if there is an explanation for the higher turbidity reading just outside of the silt curtain (i.e., passing ship, activities along the LRT dock, weather, etc.). Should no obvious activity be noted, then --

2) Immediately re-check the turbidity readings from all stations. Should the possibility of turbidity as generated from the dredging activities persist, then --

3) Immediately inspect the silt curtain for integrity. Should holes tears or compromises, then repair immediately. Should the silt curtain show no holes, tears or compromises, then --

4) Curtail dredging operations until the cause of the increased turbidity is identified or the turbidity levels return to normal just outside the silt curtain in the Santa Fe Channel.

| | |
|---|---|
| Sampling Equipment: | Hand-held or mounted turbidity monitors. These monitors take in water from a particular location and immediately register a turbidity level on a digital readout. |
| Locations of Samples: | The samples will be drawn from one location inside and three locations outside of the silt curtain at the mouths of both the Lauritzen Channel and Parr Canal. The monitor locations will be set within 20 feet of the shore or silt curtain at approximate locations as presented in Exhibit 1. Surface and subsurface samples will be taken at the Lauritzen stations. |
| Number of Samples: | Samples will be taken once every two hours during dredging or excavation. If after the first two complete days of dredging, all turbidity readings have been acceptable, the EPA Project Manager will reduce turbidity sampling to one (1) to two (2) sample events per shift. A sample event consists of one (1) sample drawn from inside the silt curtain and three (3) samples drawn from each location outside the silt curtain. Thus, a total of at least twelve (12) turbidity samples per day will be drawn during dredging activities. |
| Laboratory To Be Used: | As the turbidity monitor produces instant results, no other laboratory analysis will be necessary. |
| Methods For Testing Sample: | As stated above, the turbidity monitor is a self-contained analysis instrument which produces almost instant results. |
| Holding Time For Samples: | After logging of the results from the turbidity meter, the water will be discharged immediately back into the same waterway from which it was drawn. |
| Preservation of Samples: | Not applicable - see above. |

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| Chain of Custody: | Not applicable. |
| Data Logging and Reporting: | The data from the turbidity monitor readout will be recorded by the Supervising Contractor's technician on a form with the following information for each sample taken: the date and time the readout was taken, the code number of the location at which the sample was taken, weather conditions and other potential influences on turbidity readings, including ship traffic, and the technician's name and signature. At the end of each day of dredging activity, the technician will submit this turbidity log to the Supervising Contractor's Project Manager. |
| Quality Assurance Procedures: | Turbidity monitors will be calibrated prior to commencing work on the project and will be periodically checked and re-calibrated on an as-needed basis to assure accuracy. Technicians will be trained in the use of the monitors, including the reading and logging of turbidity data. |

## 2. Suspended Solids In and Flow Rate of Discharge Water

| | |
|---|---|
| Objective: | To monitor the suspended solids in and flow rate of effluent water from the dewatering of contaminated marine sediments so as to record the character of water being returned to behind the silt curtain of the Lauritzen Channel from dewatering cell activities. |
| Sampling Equipment: | Clean, dry, glass sample containers (8 oz.) with Teflon-lined lids shall be used to gather the samples directly from the storage tanks prior to release of effluent. |
| Locations of Samples: | The samples for settleable solids will be gathered at either of the 4" outlets located at end of the tanks. Measurements will be performed on site. |
| Number of Samples: | The number of samples collected for settleable solids shall be consistent with recommended sampling schedules for the anticipated volume of drainage water from the dewatering operation, as issued by the Bay Area Regional Water Quality Control Board staff. Flow rate will be determined by counting the number of tank loads filled during a specific period of time. |
| Laboratory To Be Used: | The bulk of the sampling and analysis shall be performed on-site using gravimetric methods specified in the appropriate |

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|---|---|
| | USEPA Method. This analysis shall be checked bi-weekly by a certified analytical laboratory - Curtis & Thompkins of Berkeley, CA.. Standard deviation shall be calculated on an n=10 and n=x for the duration, where x = the total number of samples analyzed. |
| Methods For Testing Sample: | The method for settleable solids determination shall be by appropriate USEPA Method. Flow rate will be determined by counting the tank loads that have been filled and discharged into the channel within a set time period. |
| Holding Time For Samples: | The holding time before the sample is offered for analysis shall not be more than 12 hours. |
| Preservation of Samples: | Not applicable - see above. |
| Chain of Custody: | See attached Sample Chain of Custody (Exhibit 2). This shall be kept as a record of the Chain of Custody. |
| Data Logging and Reporting: | Data shall be manually recorded in a neat, orderly fashion and presented to the Supervising Contractor in a weekly report. |
| Quality Assurance Procedures: | All lab equipment shall be calibrated at the commencement of the project and maintained throughout the project. All procedures for testing and reporting shall be monitored by the Supervising Contractor to assure adherence to the FSAP. |

3. Depths To Sediments On Bottom Both Before and After Dredging

| | |
|---|---|
| Objective: | To verify that dredging has been completed in accordance with the Work Plan, and that depths have been achieved which extensive pre-dredge surveys and probing showed was the extent of the contaminated Young Bay Mud (YMB). |
| Sampling Equipment: | There will be three types of depth-finding equipment which will be employed for various aspects of the project. They will be: (1) lead-line sounding equipment; (2) hydrographic survey equipment; and possibly (3) Lexan core sample probe equipment. A description of each type of equipment follows.<br><br>(1) Lead Lines: These are hand-held instruments which have a flat weight at one end and a long line with markings in inches on it. After dredging in a particular area, the line is lowered to the bottom and the marking on the line is read and recorded. |

(2) Hydrographic Surveys: For this project the equipment will consist of the Trimble models 400RS and 4000DS DGPS Reference Surveyor and Differential Surveyor, or equal . Specifications and manufacturer's data can be found in this work Plan, (Appendix A - Exhibit #1).

(3) Lexan Core Sample Probe: The Lexan probe is a clear tube designed to obtain a consolidated core sample of the bottom sediments so as to allow for observation. The probe can either be hand or mechanically pushed down into the bottom sediments from either a boat or a dredge rig. Once firmly placed into the bottom sediments, a cut-off mechanism wedges the sediment core inside the tube to be brought to the surface for observation.

Locations of Samples:

*Lead Lines*: These depth confirmation soundings will be taken at random locations (1-2) within each grid, at the discretion of the dredge operator.

*Hydrographic Surveys*: A pre-dredge hydrographic survey will be taken of both the Lauritzen Channel and the Parr Canal. The pre-dredge survey locations will be cross-sections of the entire waterways as shown in the Work Plan on the Dredge Plan - Appendix A and the Excavation Plan - Appendix B. Once dredging begins on the Lauritzen, a hydrographic survey will be taken each time approximately two rows of grids across the channel have been dredged. These periodic hydrographic surveys, conducted during dredging, will be taken to allow comparison, for verification purposes, with the dredge map and channel cross sections of Appendix A, approximately 18 to 30 locations throughout the Lauritzen Channel. Finally, one post-dredge survey of the entire Lauritzen Channel and one of the entire Parr Canal will be taken after dredging of the entire waterways has been completed. An additional hydrographic survey of each of the waterways will be performed after placement of clean material to assure that a minimum amount of material has been placed in accordance with the Work Plan.

*Lexan Core Samples*: In cases where the cable-arm dredge bucket can not penetrate the OBM layer and, thus, the target dredge depth of 6" below the OBM intersect has not been achieved per the Dredge Plan, the EPA Project Manager and Supervising Contractor will make a decision in the field on a case-by-case basis that a Lexan core sample should be taken in the location to determine the amount of YBM sediments

| | |
|---|---|
| | remaining on top of the OBM layer. Should such a sample be taken, the EPA Project Manager and Supervising Contractor will evaluate the sample to determine whether more dredging is required at the location of the sample. |
| Number of Samples: | *Lead Lines*: At least one per grid throughout the Lauritzen Channel.<br><br>*Hydrographic Surveys*: One pre-dredge survey on Lauritzen Channel and one on Parr Canal. Approximately 18 periodic surveys of two grid row sections throughout the Lauritzen. Two post-dredge surveys on Lauritzen Channel and two on Parr Canal, one to confirm that dredging/excavation is complete, one to confirm that placement of clean material has been successful.<br><br>*Lexan Core Samples*: Only where the cable-arm bucket has not achieved the targeted dredge depth as shown on post-dredge hydrographic surveys and the EPA Project Manager and Supervising Contractor determine core sample is needed. |
| Laboratory To Be Used: | Not applicable. |
| Methods For Testing Samples: | All measurements with lead-lines and hydrographic surveys taken in the Lauritzen Channel will be compared to the Channel Cross-Section Maps (Appendix A - Exhibit 3) to determine whether the target depths and contours have been achieved. Lexan core samples will be visually evaluated by the EPA Project Manager and the Supervising Contractor to determine whether additional dredging is required. |
| Holding Time For Samples: | Not applicable. |
| Preservation of Samples: | Lexan core samples will be returned to the Channel in the location from which they were drawn. |
| Chain of Custody: | Not applicable. |
| Data Logging and Reporting | *Lead Lines*: The following information will be recorded in a log for each lead-line sounding taken: the date and time; the grid number; the coordinates of the location; the depth reading of the sounding; tide conditions; and the technician's name and signature. The technician will immediately report the |

results of lead-line sounding to the dredge operator who will use the information to guide the dredge depths. At the end of each day of dredging, the lead-line log will be submitted to the Supervising Contractor's Project Manager.

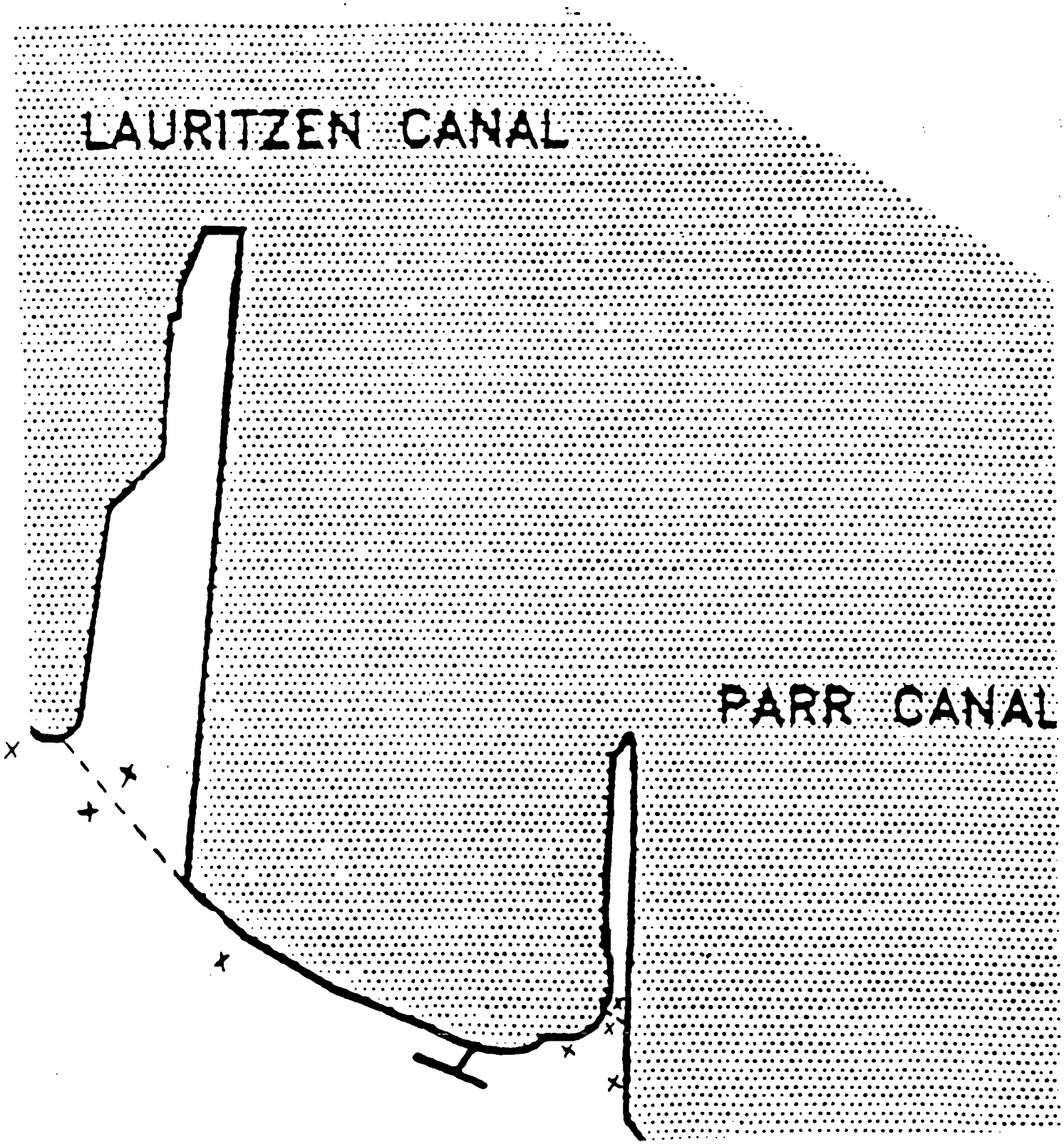
*Hydrographic Surveys*: All data from hydrographic surveys will be recorded on a print-out on the survey boat and also on a computer disk which, using the Innerspace PHSS System software or similar, can be input into an IBM PC-compatible computer. Further details of the hardware, software and reporting formats of the hydrographic surveys system are presented in the Work Plan (Appendix A - Exhibit #1).

*Lexan Core Samples*: The visual evaluation of the Lexan core sample will be recorded by the Supervising Contractor's personnel on a form with the following information for each sample taken: the date and time the sample was taken, the map coordinates of the location at which the sample was taken, the visual observation of the EPA Project Manager and the Supervising Contractor as to the number of inches of consolidated YBM observed in the core sample, and the names of the EPA Project Manager and representative of the Supervising Contractor making the observation. At the end of each day of dredging activity, the technican will submit this core sample log to the Supervising Contractor's Project Manager.

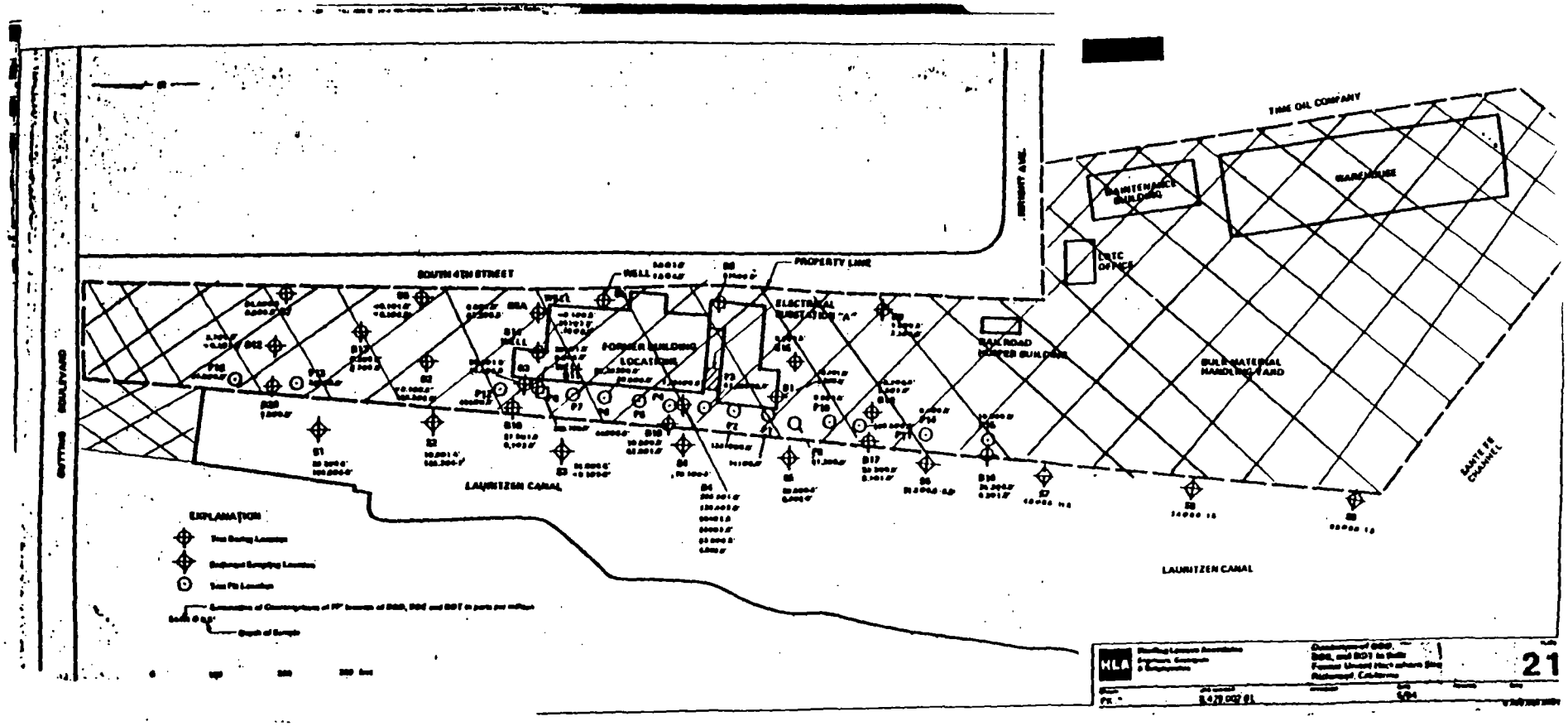
Quality Assurance Procedures:

All survey equipment will be calibrated prior to commencement of work on the project and will be periodically checked and re-calibrated on an as-needed basis to assure accuracy. Lead-line soundings will be performed by trained dredge assistants. Surveys will be performed by certified marine surveyors. Lexan core sampling and evaluation will be performed by trained personnel of the Supervising Contractor or subcontractor.

*Exhibit 1. Approximate Locations of Turbidity Sampling*



Montrose Group Consent Decree
Appendix D



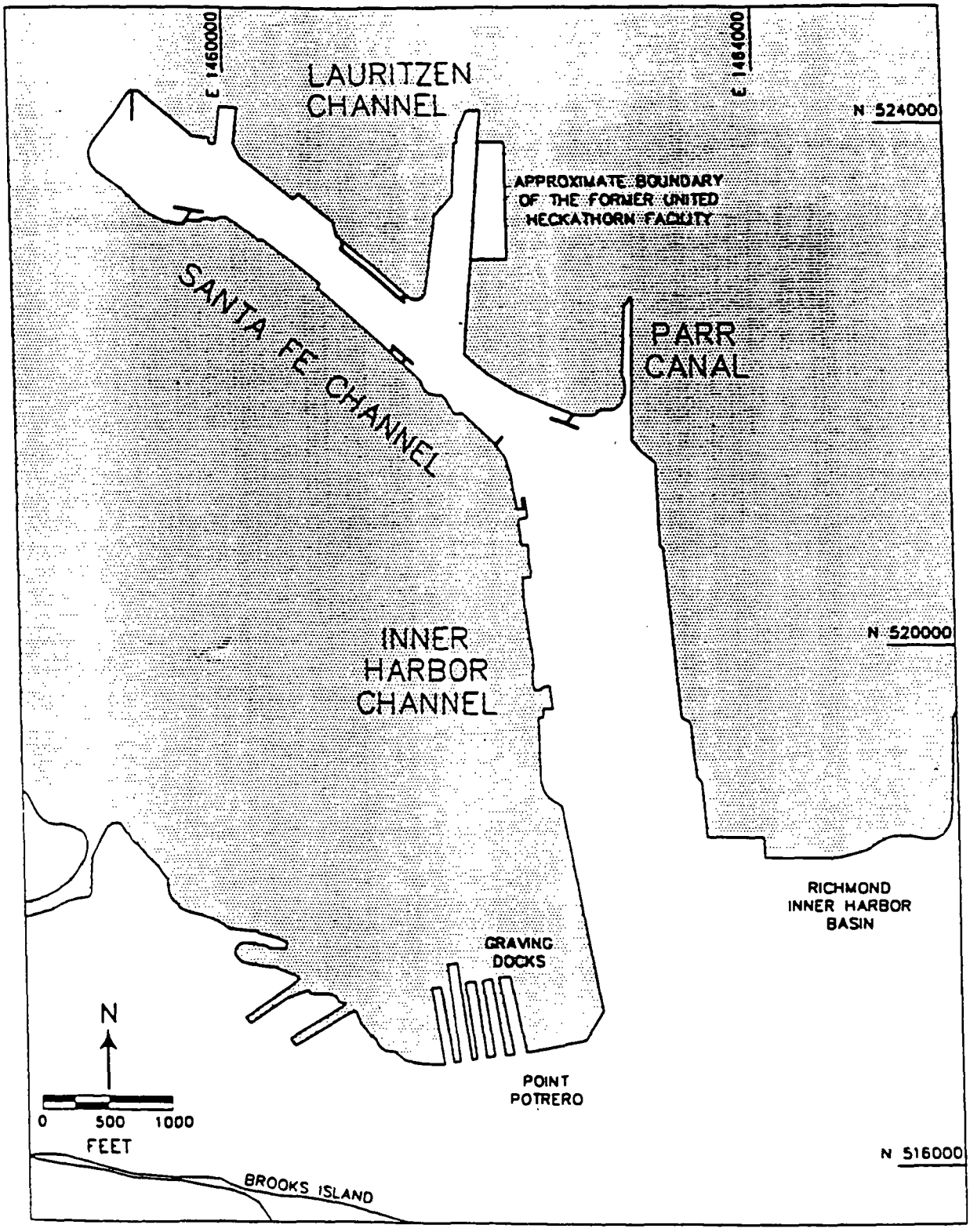



Figure 2. Map of Richmond Harbor.

Montrose Group Consent Decree
Appendix F
List of Parr Group and Miscellaneous Defendants Group

PARR GROUP

Parr-Richmond Terminal Company

Parr Industrial Corporation

John Parr Cox

Miscellaneous Defendants Group

Elf Atochem North America (Pennsylvania Salt Manufacturing Co.)

Olin Corporation (John Powell & Co., Inc.)

Prentiss Incorporated (R.J. Prentiss & Company)

Puregro Company

Shell Oil Company (Shell Oil Company)

The Sherwin-Williams Company

Wilmington Securities, Inc.

MONTROSE GROUP
CONSENT DECREE
APPENDIX G

# ESCROW AGREEMENT

This ESCROW AGREEMENT, dated as of May 21, 1996 (this "Agreement"), is between MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, a Delaware corporation ("Montrose") and BANKERS TRUST COMPANY, a New York corporation ("Escrow Agent").

WITNESSETH:

WHEREAS, the United States Environmental Protection Agency, a governmental agency (the "EPA") and Montrose have entered into a Remedial Design/Remedial Action Consent Decree (the "Montrose Group Consent Decree"), pursuant to which Montrose and EPA have each agreed, pursuant to the terms of this Agreement, to contribute or cause to be contributed certain funds to accounts administered by Escrow Agent, which funds will be used for the purpose of paying Marine Response Costs as that term is defined by the Montrose Group Consent Decree for the United Heckathorn Superfund Site (the "Site") and as set forth in Section 3.11 of the Agreement;

WHEREAS, Montrose desires to deposit such funds into an account held by Escrow Agent and to provide accounts for deposit of funds contributed by Shell Oil Company ("Shell"), and certain other parties to other EPA Consent Decrees, and to set forth the conditions under which Escrow Agent may release such funds;

NOW, THEREFORE, the parties hereto agree as follows:

## SECTION 1 ACCOUNT AND PERMITTED USES

Section 1.1 Account. Escrow Agent shall establish: (a) an account entitled Acct. No. _____ (the "United Heckathorn Escrow Account"), into which Escrow Agent shall deposit all funds received pursuant to Section 2.1; (b) an account to be entitled Acct. No. _____ (the "Montrose Escrow Account"), into which Escrow Agent shall deposit all funds received from Montrose pursuant to Sections 2.2, 2.4 or 2.5; and (c) an account to be entitled Account No. _____ (the "Shell Escrow Account"), into which Escrow Agent shall deposit all funds received from Shell pursuant to Section 2.3. The United Heckathorn Escrow Account, the Montrose Escrow Account and the Shell Escrow Account are from time to time collectively referred to herein as the "Escrow Accounts". Escrow Agent shall have exclusive possession of and sole dominion and control over the Escrow Accounts in accordance with the terms of this Agreement. All funds contributed into the Escrow Accounts shall be used for the Permitted Uses (as defined in Section 1.2) and distributed in accordance with Section 2 and Section 3.

Section 1.2 Permitted Uses. Funds contributed to the Escrow Accounts pursuant to the terms of Section 2 shall be used for the following purposes only (collectively the "Permitted Uses"):

1.2.1 Payment of invoices submitted to Montrose by Chemical Waste Management, Inc. (the "Contractor") to reimburse the Contractor for clean-up work and services provided by the Contractor and any employees, agents or subcontractors of the Contractor in connection with the work specified by the EPA's Record of Decision and the Montrose Group Consent Decree for the Site (a "Contractor Payment"), if such invoices are approved by Montrose for payment and which approved invoices shall be forwarded on to Escrow Agent;

1.2.2 Payment of fees and charges of Escrow Agent (per Exhibit A attached) in connection with this Agreement if approved by Montrose pursuant to Section 3.10;

1.2.3 Payment of taxes and fees assessed against Montrose Chemical Corporation of California as a result of its implementation of the Marine Remedial Action specified in the Montrose Group Consent Decree (a "Tax Payment");

1.2.4 Payment of $75,000 to the EPA Hazardous Substance Superfund Account to reimburse the EPA for Interim Response Costs, which payment is a Marine Response Cost (both as defined in the Montrose Group Consent Decree) (the "EPA Payment");

1.2.5 Payment of other costs which are Marine Response Costs (as defined in the Montrose Group Consent Decree) (an "Other Payment");

1.2.6 Upon receipt of a Notice of Completion (as defined below), payment of all funds remaining in the Escrow Accounts as set forth in Section 3.11.

## SECTION 2 CONTRIBUTION OF FUNDS AND ORDER OF EXPENDITURE

Section 2.1 Initial Escrow Contributions. EPA will cause to be contributed Six Million One Hundred Thousand Dollars ($6,100,000) to the United Heckathorn Escrow Account within ten (10) days of entry of the Montrose Group Consent Decree. In the event that EPA has not caused to be contributed Six Million One Hundred Thousand ($6,100,000) to the United Heckathorn Escrow Account by such date, this Agreement shall terminate upon written notice from Montrose to Escrow Agent. Montrose shall contribute Two Million Four Hundred Thousand Dollars ($2,400,000) into the United Heckathorn Escrow Account no later than May 31, 1996. Escrow Agent shall disburse up to Seven Million Nine Hundred Thousand Dollars ($7,900,000) from the United Heckathorn Escrow Account to pay for the Permitted Uses prior to utilizing funds in any other account. Escrow Agent shall disburse the remaining funds in the United Heckathorn Escrow Account as required pursuant to Sections 2.3 and 2.5 or Section 3.11.

Section 2.2 Montrose Second Contribution. Within ten business days of receipt of a request from Escrow Agent substantially in the form of Exhibit C attached hereto (a "Contribution Request"), to contribute funds to pay a Contractor Payment, a Tax Payment, the EPA Payment or an Other Payment based on the Escrow Agent's receipt from Montrose of a Request for Contractor Payment, Request for Tax Payment, Request for EPA Payment or Request for Other Payment, Montrose shall contribute or cause to be contributed such requested funds, up to a total contribution under this Section 2.2 of Two Hundred Thousand Dollars

($200,000), into the Montrose Escrow Account. In no event shall Montrose be obligated to contribute funds to the Montrose Escrow Account under this Section 2.2 until at least $7,900,000 has been disbursed from the United Heckathorn Escrow Account for Permitted Uses.

Section 2.3 Shell Contribution. If the Contractor certifies that Marine Response Costs will exceed $8.1 million, as set forth in Paragraph 43 of the Montrose Group Consent Decree, then the EPA will cause Shell to contribute Five Hundred Thousand Dollars ($500,000) into the Shell Escrow Account to pay for Permitted Uses within ten days of receiving written notice from Montrose of such contribution. If Shell has not deposited $500,000 into the Shell Escrow Account within thirteen days of the date of such notice of notification, Escrow Agent shall draw upon a $500,000.00 irrevocable letter of credit established by Shell and deposit $500,000.00 in the Shell Escrow Account. Escrow Agent shall not disburse any sums in the Shell Escrow Account until Escrow Agent has disbursed $7,900,000 from the United Heckathorn Escrow Account and $200,000 from the Montrose Escrow Account to pay for Permitted Uses.

Section 2.4 Montrose Third Contribution. Within ten business days of receipt of a Contribution Request from Escrow Agent, Montrose shall contribute or cause to be contributed such requested funds, up to a total contribution under this Section 2.4 of Eight Hundred Thousand Dollars ($800,000), to the Montrose Escrow Account. In no event shall Montrose be obligated to contribute funds under this Section 2.4 to the Montrose Escrow Account until Escrow Agent has disbursed at least $7,900,000 from the United Heckathorn Escrow Account, $200,000 from the Montrose Escrow Account, and $500,000 from the Shell Escrow Account. to pay for Permitted Uses.

Section 2.5 Dollar for Dollar Contribution. Within ten business days of receipt of a Contribution Request from Escrow Agent, Montrose shall contribute or cause to be contributed such requested funds, up to a total contribution under this Section 2.5 of Six Hundred Thousand Dollars ($600,000), to the Montrose Escrow Account. In no event shall Montrose be obligated to contribute funds under this Section 2.5 to the Montrose Escrow Account until the Escrow Agent has disbursed at least $7,900,000 from the United Heckathorn Escrow Account, $1,000,000 from the Montrose Escrow Account, and $500,000 from the Shell Escrow Account to pay for Permitted Uses. Furthermore, for every dollar contributed by Montrose to the Escrow Account and disbursed by the Escrow Agent from the Montrose Escrow Account pursuant to this Section, Escrow Agent shall disburse an equal amount from the United Heckathorn Escrow Account.

## SECTION 3 NOTICES AND DISTRIBUTION OF FUNDS

Section 3.1 Request for Contractor Payment. Within ten business days of receipt of an invoice from the Contractor, Montrose shall deliver to Escrow Agent a copy of the invoice together with a request for payment substantially in the form of Exhibit D (a "Request for Contractor Payment"); provided, however, that if in the reasonable determination of Montrose, such invoice is incorrect or unreasonable, Montrose shall not be required to submit a Request for Contractor Payment and shall immediately begin discussions with the Contractor to resolve the payment dispute; provided further that all Requests for Contractor Payment submitted by Montrose shall only authorize the Escrow Agent to make a Contractor Payment.

Section 3.2 Request for Tax Payment. Within ten business days of a receipt of an invoice from or prior to submission by Montrose of a statement to the California Board of Equalization, the California Department of Toxic Substances Control, or any other agency with authority to assess taxes or fees against Montrose, or to which Montrose is required to submit a statement of taxes or fees owed, in connection with the Marine Remedial Action required by the Montrose Group Consent Decree, Montrose shall deliver to such Escrow Agent a request for payment substantially in the form of Exhibit E ("Request for Tax Payment"); provided, however, that if in the reasonable determination of Montrose, such invoice is incorrect or undocumented, Montrose shall not be required to submit a Request for Tax Payment and shall immediately begin discussions with the appropriate agency to resolve the payment dispute; provided further, that all Requests for Tax Payment submitted by Montrose shall only authorize Escrow Agent to make a Tax Payment.

Section 3.3 Request for EPA Payment. Within three business days after the last of the Four Decrees (as defined in the Montrose Group Consent Decree) have been entered by the United States District Court for the Northern District of California, Montrose shall deliver to Escrow Agent a request for payment substantially in the form of Exhibit F (the "Request for EPA Payment"); provided, however, that the Request for an EPA Payment submitted by Montrose shall only authorize the Escrow Agent to make the EPA Payment.

Section 3.4 Request for Other Payment. Within ten business days of a receipt of an invoice reflecting costs that constitute, in Montrose's opinion, Marine Response Costs under the Montrose Group Consent Decree, Montrose shall deliver to Escrow Agent a copy of the invoice together with a request for payment substantially in the form of Exhibit G (a "Request for Other Payment"); provided, however, that if in the reasonable determination of Montrose, such invoice is incorrect or unreasonable, Montrose shall not be required to submit a Request for Other Payment and shall immediately begin discussions with the Contractor to resolve the payment dispute; provided further that all Requests for Other Payments submitted by Montrose shall only authorize the Escrow Agent to make an Other Payment.

Section 3.5 Contribution Requests. If, upon receipt of a Request for Contractor Payment, a Request for Tax Payment, a Request for Other Payment, or an Escrow Charge approved by Montrose pursuant to Section 3.10, the Escrow Agent determines there are not sufficient funds in the appropriate Escrow Account(s) to make the distribution called for by Sections 3.6, 3.7, 3.8, 3.9 or 3.10, then, pursuant to Sections 2.2, 2.4, or 2.5 as appropriate, Escrow Agent shall deliver, within three business days of receipt of a Request for Contractor Payment, Request for Tax Payment, Request for Other Payment, or approved Escrow Charge, the appropriate Contribution Request, to Montrose.

Section 3.6 Distribution of Funds to Contractor. Upon receipt of a Request for Contractor Payment from Montrose and, if necessary, upon receipt of funds received pursuant to a Contribution Request, Escrow Agent shall, within three business days, distribute the payment amount specified in the Request for Contractor Payment to the Contractor at the address provided therein.

Section 3.7 Distribution of Funds to Taxing Agencies. Upon receipt of a Request for Tax Payment from Montrose and, if necessary, upon receipt of funds received pursuant to a Contribution Request, Escrow Agent shall, within three business days, distribute the payment amount specified in the Request for Tax Payment, by check made payable to the entity identified in the Request for Tax Payment, to Montrose at the address provided herein.

Section 3.8 Distribution of Funds to EPA. Upon receipt of the Request for EPA Payment from Montrose, Escrow Agent shall, within three business days, distribute Seventy Five Thousand Dollars ($75,000.00) to the EPA Hazardous Substance Superfund Account by FedWire Electronic Funds Transfer to the U.S. Department of Justice account in accordance with current electronic funds transfer procedures, referencing U.S.A.O. file number 9600022, EPA Region 9 and Site/Spill ID #09R3, and DOJ Case Number 90-11-3-598. Payment shall be made in accordance with instructions provided to Montrose by the Financial Litigation Unit of the United States Attorney's Office for the Northern District of California, which will be forwarded by Montrose to Escrow Agent along with the Request for EPA Payment.

Section 3.9 Distribution of Funds For Other Payments. Upon receipt of a Request for Other Payment from Montrose and, if necessary, upon receipt of funds received pursuant to a Contribution Request, Escrow Agent shall, within three business days, distribute the payment amount specified in the Request for Other Payment to the entity designated in the Request for Other Payment at the address provided therein.

Section 3.10 Distribution for Escrow Fees. Upon receipt of an invoice from Escrow Agent, setting forth all reasonable fees and expenses (per Exhibit A attached) incurred as a result of Escrow Agent performing its duties hereunder (an "Escrow Charge"), Montrose shall approve such invoice in writing, substantially in the form of Exhibit H (an "Escrow Charge Distribution"); provided, however, that if in the reasonable determination of Montrose, such invoice is incorrect or unreasonable, Montrose shall not be required to approve such invoice and shall immediately begin discussions with the Escrow Agent to resolve the payment dispute. Upon written approval of such invoice, Escrow Agent shall be entitled to debit such amount from the appropriate Escrow Account(s) to cover approved charges and fees set forth on such invoice.

Section 3.11 Distributions Upon Receipt of Notice of Completion. Upon the receipt of a Notice of Completion pursuant to Section 5.2, Escrow Agent shall distribute to the EPA Hazardous Substance Superfund Account, to the extent available, any sums that remain in the United Heckathorn Escrow Account and any interest earned on sums held or previously held in the United Heckathorn Escrow Account, pursuant to the procedures in Section 3.8 above. Any remaining funds in the Montrose Escrow Account, including any interest earned on sums held or previously held in the Montrose Escrow Account, shall be disbursed to Montrose. Any funds remaining in the Shell Escrow Account contributed pursuant to Section 2.3 and any interest earned on sums held or previously held in the Shell Escrow Account, shall be returned to the contributor of such funds upon receipt of a Notice of Completion.

Section 3.12 Non-payment of Fees. In addition to and without limitation of its recourse against Montrose, the Escrow Agent shall have a first priority lien upon and right of setoff

against the assets of the Escrow Accounts for approved fees and expenses not paid in a timely manner.

## SECTION 4 INVESTMENT OF FUNDS; ESCROW AGENT RESPONSIBILITIES

Section 4.1 Investments. Escrow Agent shall invest all funds held in the Escrow Accounts in an AAA-rated, federal tax free, money market fund, including but not limited to the Bankers Trust federal tax-free money market fund. Escrow Agent shall not be liable for any loss suffered in connection with any investment of funds made by it in accordance with this Section.

Section 4.2 Interest. Any interest earned on all funds deposited in the Escrow Accounts shall be distributed as set forth in Section 3.11.

Section 4.3 Statements. The Escrow Agent shall submit to Montrose by the tenth (10th) business day of each month a monthly activity report with respect to the Escrow Accounts for the prior month.

Section 4.4 Responsibilities and Reliance. The Escrow Agent shall not have any duties or responsibilities except those expressly set forth herein and no implied covenants, functions, responsibilities or duties on the part of the Escrow Agent shall be read into this Agreement or otherwise exist against the Escrow Agent. The Escrow Agent shall be fully protected in relying without inquiry upon any direction or instruction of Montrose and in refraining from acting in the absence of such direction or instruction in accordance with this Agreement. The Escrow Agent shall not be required to (i) institute any litigation or collection proceedings hereunder, or (ii) take any action which in its reasonable judgment would involve it in expense or liability unless it has been furnished with adequate indemnity against such expense or liability. Upon the approval of Montrose, the Escrow Agent may consult with counsel, accountants or any other experts and their opinions shall be full authorization and protection in respect of any action taken or omitted by the Escrow Agent consistent with the terms of this Agreement. The Escrow Agent shall have the right at any time to seek instructions concerning the administration of this Agreement from Montrose or any court of competent jurisdiction and shall be fully protected in relying thereon. The Escrow Agent may execute any of its duties hereunder through agents or attorneys-in-fact and shall not be responsible for the negligence or misconduct of any agents or attorneys-in-fact selected by it with reasonable care. The Escrow Agent shall be entitled to rely and shall be protected in acting or refraining from acting upon any certificate, notice or other document (including any cable, telegram, telecopy or telex) believed by it to be genuine and correct and to have been signed by the proper person or persons.

Section 4.5 Taxes. Montrose shall instruct the Escrow Agent on reporting of income earned and expenses incurred by the Escrow Accounts.

## SECTION 5 TERMINATION

Section 5.1 Automatic Termination. In the event that Montrose, Shell and the EPA have contributed or caused to be contributed all of the funds required to be contributed pursuant to the terms of Section 2, and all funds in the Escrow Accounts have been distributed in accordance with Section 3, this Agreement, except for Section 4.5 for any year in which income is earned, Section 4.4 and Section 6, shall automatically terminate and be of no further force and effect.

Section 5.2 Termination Upon Completion. In the event Escrow Agent receives from Montrose a Notice of Completion substantially in the form of Exhibit B attached hereto. Escrow Agent shall disburse the funds remaining in the Escrow Accounts pursuant to Section 3.11 (minus any fees and expenses owed to Escrow Agent pursuant to Section 3.10). Once such funds have been disbursed, this Agreement, except for Section 4.5 for any year in which income is earned, Section 4.4 and Section 6, shall automatically terminate and be of no further force and effect.

Section 5.3 Termination Upon Notification. In the event Escrow Agent receives written notice from Montrose stating that the United States District Court for the Northern District of California has not approved the "Four Decrees" (as defined in the Montrose Group Consent Decree), the Escrow Agent shall return all funds deposited in any Escrow Account to the party that deposited such funds. Once such funds have been returned, this Agreement, except for Section 4.5 for any year in which income is earned, Section 4.4 and Section 6, shall automatically terminate and be of no further force and effect.

## SECTION 6 IMMUNITY AND INDEMNIFICATION

Section 6.1 Limitation on Liability of Escrow Agent. The Escrow Agent acts solely as a Escrow Agent of the Escrow Accounts on behalf of Montrose and has solely an agency and not a fiduciary relationship with Montrose. In respect of any contract, obligation or liability made or incurred by the Escrow Agent in performing its duties hereunder all persons shall look solely to the Escrow Accounts and not the Escrow Agent, nor any of its directors, officers, employees or authorized representatives, personally. The Escrow Agent shall not incur any liability, personal or corporate, of any nature in connection with any act or omission, unless involving its negligence or willful misconduct, in the administration of the Escrow Accounts or otherwise pursuant to this Agreement. The Escrow Agent has no responsibility with respect to management of the Site, the remediation of the Site, the payment of any costs of remedial or removal action, damages, penalties, fines, taxes or other expenses related to the Site, or compliance by Montrose with this Agreement, the Montrose Group Consent Decree or to conduct any duties other than the express duties explicitly set forth in this Agreement with respect to the Escrow Accounts.

Section 6.2 Indemnification of Escrow Agent. Montrose agrees to indemnify and hold the Escrow Agent harmless against any and all losses, claims, costs, damages, liabilities and expenses (including the reasonable fees and expenses of counsel pursuant to the terms of this Agreement) imposed on, incurred by or asserted against the Escrow Agent in any way relating to or arising out of this Agreement or the acceptance of its appointment and performance of its

duties hereunder, except for those losses, claims, costs, damages, liabilities and expenses resulting from the negligence or willful misconduct of the Escrow Agent or actions by the Escrow Agent that are inconsistent with the terms of this Agreement (unless the Escrow Agent has received prior written authorization for such actions).

## SECTION 7 MISCELLANEOUS PROVISIONS

Section 7.1 Notice To Escrow Agent. Escrow Agent shall be entitled to rely on (a) any Requests for Contractor Payments, Requests for Tax Payments, the Request for EPA Payment, Requests for Other Payments, or Escrow Charge Distributions executed by Montrose and submitted to Escrow Agent and (b) a Notice of Completion, executed by Montrose. Any instruction or direction given to Escrow Agent with respect to the transfer, withdrawal, deposit or payment of any funds under this Agreement shall be in writing and shall state with specificity the amount, source and disposition of any such funds. All representatives will provide Escrow Agent with notarized signatures.

Section 7.2 Action by Escrow Agent. Notwithstanding any provisions to the contrary in this Agreement, if any transfer, withdrawal, deposit or payment of any funds by Escrow Agent, or any other action to be taken by Escrow Agent under this Agreement is to be made or taken on a day which is not a business day, such transfer, withdrawal, deposit, payment or other action shall be made or taken on the next succeeding business day.

Section 7.3 Notices. Except as otherwise specified herein, all notices, requests, demands or other communications to or upon the respective parties hereto shall be deemed to have been received (a) in the case of notice by letter, when delivered by hand or three (3) days after the same is deposited in the registered or certified mail, first class postage prepaid, (b) in the case of notice by cable, when delivered to the cable company, charges prepaid, (c) in the case of notice by telex, when sent, answer back received and (d) in the case of notice by telecopier, when sent and confirmed, addressed to them as follows or at such other address as any of the parties hereto may designate by written notice to the other parties hereto:

Montrose: MONTROSE CHEMICAL CORPORATION OF CALIFORNIA
Attn: Frank Bachman, President
55 Corporate Drive
Trumbull, CT 06611
Telephone: (203) 261-4770
Facsimile: (203) 268-4915

Richard W. Raushenbush
Latham & Watkins
505 Montgomery Street
Suite 1900
San Francisco, CA 94111-2562
Telephone: (415) 391-0600
Facsimile: (415) 395-8095

Escrow Agent: Bankers Trust Company
Four Albany Street, 4th Floor
New York, New York 10006
Attn: Shafiq Jadavji - AT
Telephone: (212) 250-6690
Facsimile: (212) 250-6725

EPA: U.S Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, CA 94105
Attn: John Lyons, Regional Counsel
Telephone: (415) 744-1312
Facsimile: (415) 744-1041

United States: Chief, Environmental Enforcement Section
Environment & Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington D.C. 20044
Re: DJ #90-11-3-598
Telephone: (415) 744-6491
Facsimile: (415) 744-6476

Section 7.4 Books and Records. Montrose shall maintain a copy of all invoices submitted by Contractor or Escrow Agent, and a copy of all Requests for Payments and Escrow Charge Distributions submitted by Montrose to Escrow Agent. EPA, upon reasonable advance notice to Montrose, shall have the right to inspect such records.

Section 7.5 Counterparts. This Agreement may be executed in separate counterparts, and each counterpart, when so executed and delivered, shall be an original. Such counterparts shall together constitute one and the same instrument.

Section 7.6 Governing Law. This Agreement is a contract made under the laws of the State of California and shall for all purposes be governed by and construed in accordance with the laws of such state without regard to the conflict of laws rules thereof; however, the duties and responsibilities of the Escrow Agent shall be governed by the laws of the state of New York.

Section 7.7 Waiver; Amendment. This Agreement may be changed, waived, discharged or terminated only by an instrument in writing signed by Escrow Agent and Montrose, and copied to the United States. The United States shall be notified of any proposed changes to the Agreement, for the purpose of ensuring that the proposed changes are not inconsistent with the terms of the Montrose Group Consent Decree.

Section 7.8 Survival. The provisions set forth in Sections 4.4, 6 and 4.5 (for any year in which income is earned) of this Agreement shall survive termination of this Agreement and the Escrow Accounts.

Section 7.9 Interpretation. As used in this Agreement, words in the singular include the plural and words in the plural include the singular, and the masculine and neuter genders shall be deemed to include the masculine, feminine and neuter. The descriptive heading for each Section and Subsection of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement. It is agreed that neither the act of entering into this Agreement nor any contribution to the Escrow Accounts nor any action taken under this Agreement shall be deemed to constitute an admission of any liability or fault on the part of the Escrow Agent or Montrose, with respect to the Site or otherwise, nor does it constitute a commitment or agreement, either expressed or implied, by any or all of them to undertake any further activities with respect to the Site.

Section 7.10 Third Parties. Except as expressly provided in this Agreement, nothing contained in this Agreement shall be construed to create any rights in any person or entity not a party to this Agreement.

Section 7.11 Severalty of Provisions. If any provision of this Agreement or its application to any person or entity or in any circumstance shall be invalid or unenforceable, the application of such provision to persons or entities and in circumstances other than those as to which it is invalid or unenforceable, and the other provisions of this Agreement, shall be not be affected by such invalidity or unenforceability.

Section 7.12 Successor Custodian.

7.12.1 Vacancy Caused by Resignation or Removal. The Escrow Agent may resign at any time by delivering its resignation in writing to Montrose. Montrose may remove the Escrow Agent at any time by delivering notice of such removal in writing to the Escrow Agent. Such resignation or removal will take effect sixty (60) days after delivery of the notice of resignation or removal, or, if earlier, upon the acceptance of appointment in writing by a successor Escrow Agent, whichever is earlier.

7.12.2 Appointment of Successor Escrow Agent. A successor Escrow Agent shall be appointed by Montrose upon the resignation or removal of the Escrow Agent. In the absence of such appointment within sixty (60) days of such resignation or removal, the Escrow Agent may petition a court of competent jurisdiction to make such appointment.

7.12.3 Acceptance of Appointment by Successor Escrow Agent. Acceptance of appointment as a successor Escrow Agent shall be in writing and shall become effective upon receipt by Montrose of notice of such acceptance. Each successor Escrow Agent shall have all of the rights, powers, duties, authority and privileges as if initially named as the Escrow Agent hereunder. Upon the acceptance of appointment of any successor Escrow Agent, the Escrow Agent shall deliver all assets, documentation and other property of the Escrow Agent in its possession, custody or control to such successor Escrow Agent. After selection of a successor, the Escrow Agent shall reasonably cooperate in meeting any reasonable request for information or other assistance made by Montrose to the Escrow Agent with respect thereto and any other subject matter of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Escrow Agreement to be executed by their duly authorized officers, as of the day and year first above written.

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

By:_____
Name: Frank C. Bachman
Title: President

BANKERS TRUST COMPANY

By:_____
Name:_____
Title:_____

EXHIBIT A

Escrow Agent Fees

Acceptance Fees: $500

Includes set-up of trust and escrow accounts including internal document review, creation of ticklers and controls, and design of custom reports.

Legal Review Fee (if necessary): At cost, capped at $750

Annual Administration Fee: $2,000

The annual fee covers the ongoing administration of the trust and escrow accounts, including maintenance of all account records, production of periodic financial statements, creation of tax forms, and collection and disbursement of funds.

Transaction Fees: *(as required)*

| | |
|---|---|
| Per Outgoing Wire Transfer | $25 |
| Per Mutual Fund Purchase/Sale | No Charge |

The fees set forth in this schedule are subject to review of documentation. With sixty (60) days advance written notice to Montrose, the fees are also subject to change should circumstances warrant. Reimbursement for all out-of-pocket expenses, (messenger, overnight mail, contract vendor fees, etc.) disbursements and fees of counsel incurred pursuant to this Agreement (including their disbursements and expenses) incurred in the performance of Escrow Agent's duties will be billed "at cost".

EXHIBIT B

NOTICE OF COMPLETION
(Section 5.2)

The undersigned, a duly authorized officer of Montrose Chemical Corporation of California ("Montrose"), hereby request and certify to Bankers Trust Company (the "Escrow Agent"), in accordance with the Escrow Agreement (the "Escrow Agreement"), dated as of _____ __, 1996, between Montrose and Escrow Agent (all capitalized terms herein having the meanings ascribed thereto in the Escrow Agreement), that:

1. All marine remedial work required to be completed at the Site under the Montrose Group Consent Decree for the Site has been completed to the satisfaction of both EPA and Montrose.

2. All funds currently in the Escrow Accounts be distributed as set forth in Section 3.11 of the Escrow Agreement, and be transferred to the proper party as follows:

[insert transfer instructions]

IN WITNESS WHEREOF, Montrose has executed and delivered this Certificate as of the _____ day of _____, 19__.

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

By:_____
Name:_____
Title:_____

EXHIBIT C

CONTRIBUTION REQUEST
(Section 2.2, 2.4 and 2.5)

The undersigned, a duly authorized officer of Bankers Trust Company ("Escrow Agent"), hereby requests and certifies to Montrose Chemical Corporation of California ("Montrose"), in accordance with the Escrow Agreement (the "Escrow Agreement"), dated as of _____ __, 1996, between Montrose and Escrow Agent (all capitalized terms herein having the meanings ascribed thereto in the Escrow Agreement), that:

1. Montrose is hereby requested to contribute $_____ to the Montrose Escrow Account within ten business days of receipt of this Certificate, pursuant to the requirements of Section [2.2], [2.4], [2.5] of the Escrow Agreement.

FOR CONTRIBUTIONS PURSUANT TO SECTION 2.2 or 2.4 [2. The contribution requested in Paragraph 1 is requested to pay a [Contractor Payment] [Tax Payment] [Other Payment] [Escrow Charge Distribution] pursuant to an invoice dated _____ in the amount of $_____, attached hereto.]

FOR CONTRIBUTIONS PURSUANT TO SECTION 2.5 [2. The contribution requested in Paragraph 1 is equal to 50% of the amount due on the invoice for [payment of services from the Contractor] [tax or fees owed by Montrose] [payment of other costs incurred under the Montrose Group Consent Decree] [payment of escrow charges due Escrow Agent], which invoice is dated _____, in the amount of $_____ and attached hereto.]

3. The contribution referred to herein is to be transferred to the Montrose Escrow Account as follows:

[insert transfer instructions]

IN WITNESS WHEREOF, Escrow Agent has executed and delivered this Certificate as of the _____ day of _____, 19__.

BANKERS TRUST COMPANY

By:_____
Name:_____
Title: _____

EXHIBIT D

REQUEST FOR CONTRACTOR PAYMENT
(Section 3.1)

The undersigned, a duly authorized officer of Montrose Chemical Corporation of California ("Montrose"), hereby certifies to Bankers Trust Company ("Escrow Agent"), in accordance with the Escrow Agreement (the "Escrow Agreement"), dated as of _____ __, 1996, between Montrose and Escrow Agent (all capitalized terms herein having the meanings ascribed thereto in the Escrow Agreement), that:

1. Attached hereto is a true and correct copy of an invoice dated _____ in the amount of $_____, provided by the Contractor to reimburse the Contractor for clean-up work and services provided by Contractor and any employees, agents or subcontractors of the Contractor in connection with the work specified by the EPA's Record of Decision and the Montrose Group Consent Decree for the Site.

2. Escrow Agent is hereby requested to pay the Contractor $_____ out of funds currently available in the Escrow Accounts within three business days of receipt hereof or to provide the appropriate Request for Contribution to Montrose and upon receipt of funds from Montrose, to pay the Contractor $_____ out of funds contributed to the Escrow Accounts.

3. The payment referred to herein is to be paid to Contractor as follows:

[insert transfer instructions]

IN WITNESS WHEREOF, Montrose has executed and delivered this Certificate as of the _____ day of _____, 19__.

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA
By:_____
Name:_____
Title:_____

EXHIBIT E

REQUEST FOR TAX PAYMENT
(Section 3.2)

The undersigned, a duly authorized officer of Montrose Chemical Corporation of California ("Montrose"), hereby certifies to Bankers Trust Company ("Escrow Agent"), in accordance with the Escrow Agreement (the "Escrow Agreement"), dated as of _____ __, 1996, between Montrose and Escrow Agent (all capitalized terms herein having the meanings ascribed thereto in the Escrow Agreement), that:

1. Attached hereto is a true and correct copy of an invoice dated _____ or statement to be filed by Montrose, reflecting an amount of $_____, due to a governmental agency for taxes or fees in connection with the work specified by the EPA's Record of Decision and the Montrose Group Consent Decree for the Site.

2. Escrow Agent is hereby requested to provide to Montrose a check made payable to [name of appropriate agency] in the amount of $_____ out of funds currently available in the Escrow Accounts within three business days of receipt hereof or to provide the appropriate Request for Contribution to Montrose and, upon receipt of funds from Montrose, to provide Montrose with a check payable to [name of appropriate agency] in the amount of $_____ out of funds contributed to the Escrow Accounts.

IN WITNESS WHEREOF, Montrose has executed and delivered this Certificate as of the _____ day of _____, 19__.

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA
By:_____
Name:_____
Title:_____

EXHIBIT F

REQUEST FOR EPA PAYMENT
(Section 3.3)

The undersigned, a duly authorized officer of Montrose Chemical Corporation of California ("Montrose"), hereby certifies to Bankers Trust Company ("Escrow Agent"), in accordance with the Escrow Agreement (the "Escrow Agreement"), dated as of _____ __, 1996, between Montrose and Escrow Agent (all capitalized terms herein having the meanings ascribed thereto in the Escrow Agreement), that:

1. Each of the Four Consent Decrees has been approved and entered by the United States District Court for the Northern District of California

2. Escrow Agent is hereby requested to pay the EPA $75,000.00 out of funds currently available in the Escrow Accounts within three business days of receipt hereof.

3. The payment referred to herein is to be paid to the EPA Hazardous Substance Superfund Account by FedWire Electronic Funds Transfer to the U.S. Department of Justice account in accordance with current electronic funds transfer procedures, referencing U.S.A.O. file number 9600022, EPA Region 9 and Site/Spill ID #09R3, and DOJ Case Number 90-11-3-598 and any additional transfer instruction attached hereto.

IN WITNESS WHEREOF, Montrose has executed and delivered this Certificate as of the _____ day of _____, 19__.

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA
By:_____
Name:_____
Title:_____

EXHIBIT G

REQUEST FOR OTHER PAYMENT
(Section 3.4)

The undersigned, a duly authorized officer of Montrose Chemical Corporation of California ("Montrose"), hereby certifies to Bankers Trust Company ("Escrow Agent"), in accordance with the Escrow Agreement (the "Escrow Agreement"), dated as of _____ __, 1996, between Montrose and Escrow Agent (all capitalized terms herein having the meanings ascribed thereto in the Escrow Agreement), that:

1. Attached hereto is a true and correct copy of an invoice dated _____ in the amount of $_____, provided by [name of service provider], which reflects costs constituting Marine Response Costs under the Montrose Group Consent Decree.

2. Escrow Agent is hereby requested to pay $_____ to _____ out of funds currently available in the Escrow Accounts within three business days of receipt hereof or to provide the appropriate Request for Contribution to Montrose and upon receipt of funds from Montrose to pay $____ to _____ out of funds contributed to the Escrow Accounts.

3. The payment referred to herein is to be paid to _____ as follows:

[Transfer Instructions]

IN WITNESS WHEREOF, Montrose has executed and delivered this Certificate as of the _____ day of _____, 19__.

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA
By:_____
Name:_____
Title:_____

EXHIBIT H

ESCROW CHARGE DISTRIBUTION
(Section 3.10)

The undersigned, a duly authorized officer of Montrose Chemical Corporation of California ("Montrose"), hereby certifies to Bankers Trust Company ("Escrow Agent"), in accordance with the Escrow Agreement (the "Escrow Agreement"), dated as of _____ __, 1996, between Montrose and Escrow Agent (all capitalized terms herein having the meanings ascribed thereto in the Escrow Agreement), that:

1. Montrose has reviewed and approved the invoice dated _____ in the amount of $_____ submitted to Montrose in connection with Escrow Agent's fees, charges and costs.

2. Escrow Agent is hereby authorized to distribute to itself $_____ as payment of the invoice dated _____ or to provide the appropriate Request for Contribution to Montrose and upon receipt of funds from Montrose to distribute to itself $_____ as payment of such invoice.

IN WITNESS WHEREOF, Montrose has executed and delivered this Certificate as of the _____ day of _____, 19__.

MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

By:_____
Name:_____
Title:_____

**CD 02**

**Consent Decree**

**Levin Group RD/RA**

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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

| | |
|---|---|
| UNITED STATES OF AMERICA,<br><br>Plaintiff,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants.<br><br>AND RELATED ACTIONS | NO.<br><br>CONSENT DECREE<br>[LEVIN GROUP RD/RA] |

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This Consent Decree ("Decree") is made and entered into by and among the United States of America (the "United States"), on behalf of the Environmental Protection Agency, National Oceanic and Atmospheric Administration, the Department of the Interior and Settling Federal Agencies, and Settling Defendants.

## I. BACKGROUND

A. The United States, on behalf of the Administrator of the Environmental Protection Agency ("EPA"), the Secretary of Commerce and the Secretary of the Interior, has filed a civil action for recovery of response costs and natural resource damages, and for injunctive and declaratory relief, pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606, 9607, with respect to releases of hazardous substances from a former pesticide formulating and packaging facility now known as the United Heckathorn NPL Site in the City of Richmond, County of Contra Costa, State of California.

B. Before the United States filed suit in this matter, several related actions had been pending in this Court arising out of the release or threat of release of hazardous substances from the Site, namely Levin Metals Corporation v. Parr-Richmond Terminal Co. and related actions, Case Nos. C 84 6273; C 84 6324; and C 85 4776 ("Private Party Litigation"). The Honorable Claudia Wilken ordered the parties in the Private Party Litigation, and invited EPA, to engage in mediation to attempt to settle matters. From October 1994 through January 1995, EPA, the Settling Federal Agencies and the private litigants participated

in alternative dispute resolution ("ADR") mediated by Judge Coleman Fannin (Ret.) and Lester Levy of J.A.M.S. Endispute, a private firm offering ADR services. This mediation process involved sustained, vigorous and substantial negotiation among the parties. As a result of the mediation and subsequent negotiations, the United States has reached four settlement agreements in principle regarding the Site with potentially responsible parties, including with Settling Defendants ("Four Decrees").

C. In accordance with the National Contingency Plan ("NCP") and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of California (the "State") of negotiations with potentially responsible parties regarding the implementation of the remedial design and remedial action for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and be a party to this Consent Decree.

D. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the federal natural resource Trustees, the Department of the Interior and National Oceanic and Atmospheric Administration, of negotiations with potentially responsible parties regarding the release of hazardous substances that may have resulted in injury to the natural resources under federal trusteeship.

E. Settling Defendants do not admit any liability to the Plaintiff arising out of the transactions or occurrences alleged in the complaint, nor do they acknowledge that the release or

threatened release of hazardous substances at or from the Site constitutes an imminent or substantial endangerment to the public health or welfare or the environment. The United States on behalf of the Settling Federal Agencies does not admit any liability arising out of the transactions or occurrences alleged in any claim or counterclaim asserted by the parties to the Private Party Litigation, including Settling Defendants.

F. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on March 14, 1990, 55 Fed. Reg. 9,688.

G. In response to a release or a substantial threat of a release of hazardous substances at or from the Site, EPA commenced a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. § 300.430. EPA completed a Remedial Investigation ("RI") Report in February 1994, and EPA completed a Feasibility Study ("FS") Report on July 5, 1994.

H. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action on July 15, 1994, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

I. The decision by EPA on the remedial action to be implemented at the Site is embodied in a Record of Decision ("ROD"), executed on October 26, 1994, to which the State has given its concurrence. The ROD includes a summary of responses to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA.

J. Based on the information presently available to it, EPA believes that the Work will be properly and promptly conducted by the Settling Defendants if conducted in accordance with the requirements of this Consent Decree and its appendices.

K. Solely for the purposes of Section 113(j) of CERCLA, the remedial action selected by the ROD and the Work to be performed by the Settling Defendants shall constitute a response action taken or ordered by the President.

L. Settling Defendants currently operate a bulk marine cargo terminal at the Site. Settling Defendants expect to continue to operate the Site as a bulk marine cargo terminal even while the response actions called for in the ROD are being implemented at the Site. The Parties acknowledge that continued cooperation between them is necessary to minimize the impact the response actions may have on the operation of the Site as a cargo terminal.

M. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and implementation of this Consent Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the

Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby Ordered, Adjudged, and Decreed:

## II. JURISDICTION

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. § 9606, 9607, and 9613(b), and personal jurisdiction over the Settling Defendants. The Settling Defendants will not challenge the terms of this Decree, the venue in this District or this Court's jurisdiction to enter and enforce this Decree.

## III. PARTIES BOUND

2. This Consent Decree applies to and is binding upon the United States and upon Settling Defendants and their successors and assigns. Any change in ownership or corporate status of a Settling Defendant including, but not limited to, any transfer of assets or real or personal property, shall in no way alter such Settling Defendant's responsibilities under this Consent Decree.

3. Settling Defendants shall provide a copy of this Consent Decree to each contractor hired to perform the Work (as defined below) required by this Consent Decree and to each person representing any Settling Defendant with respect to the Site or the Work and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. Settling Defendants or their contractors shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Settling Defendants shall nonetheless be

responsible for ensuring that their contractors and subcontractors perform the Work contemplated herein in accordance with this Consent Decree. With regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with the Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

## IV. DEFINITIONS

4. Unless otherwise expressly provided herein, terms used in this Consent Decree which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

"Consent Decree" shall mean this Decree and all appendices attached hereto (listed in Section XXX). In the event of conflict between this Decree and any appendix, this Decree shall control.

"Damage Assessment Costs" shall mean NOAA's and DOI's costs incurred in connection with activities and studies performed to determine injury to or loss of natural resources, including lost interim uses, resulting from releases of hazardous substances from the United Heckathorn NPL Site.

"Day" shall mean a calendar day unless expressly stated to be a working day. "Working day" shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

"DOI" shall mean the United States Department of the Interior and any successor departments, agencies or instrumentalities of the United States.

"EPA" shall mean the United States Environmental Protection Agency and any successor departments, agencies or instrumentalities of the United States.

"Interest" shall mean interest at the rate specified for interest on investments of the Hazardous Substance Superfund established under Subchapter A of Chapter 98 of Title 26 of the U.S. Code, compounded on October 1 of each year, in accordance with 42 U.S.C. § 9607(a).

"Levin Richmond Terminal" shall mean that real property described in Appendix C.

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

"Natural Resource Damages" shall mean damages, including Damage Assessment Costs and lost use value, recoverable under Section 107 of CERCLA, 42 U.S.C. § 9607, for injury to, destruction of, or loss of any and all Natural Resources at the

United Heckathorn Site.

"Natural Resources" shall have the meaning provided in Section 101(16) of CERCLA, 42 U.S.C. § 9601(16).

"NOAA" shall mean the National Oceanic and Atmospheric Administration, an agency of the United States Department of Commerce, and any successor departments, agencies or instrumentalities of the United States.

"Operation and Maintenance" or "O&M" shall mean all activities required to maintain the effectiveness of the Remedial Action as required under the Operation and Maintenance Plan approved or developed by EPA pursuant to this Consent Decree and SOW.

"Paragraph" shall mean a portion of this Consent Decree identified by an arabic numeral or an upper case letter.

"Parties" shall mean the United States and the Settling Defendants.

"Performance Standards" shall mean placing a cap on the upland area of the Site identified in Figure 6 of the ROD in accordance with this Decree, the Statement of Work and the final remedial design approved by EPA.

"Plaintiff" shall mean the United States.

"RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

"Record of Decision" or "ROD" shall mean the EPA Record of Decision relating to the Site signed on October 26, 1994 by the Regional Administrator, EPA Region IX, or her delegate, and all attachments thereto. The ROD is attached as Appendix A.

"Remedial Action" shall mean those activities, except for Operation and Maintenance, to be undertaken by the Settling Defendants to implement that portion of the ROD relating to the upland cap, as set forth in the SOW (see Appendix B) and the final Remedial Design and Remedial Action Work Plans and other plans approved by EPA.

"Remedial Action Work Plan" shall mean the document developed pursuant to Paragraph 12 of this Consent Decree and approved by EPA, and any amendments thereto.

"Remedial Design" shall mean those activities to be undertaken by the Settling Defendants to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design Work Plan.

"Remedial Design Work Plan" shall mean the document developed pursuant to Paragraph 11 of this Consent Decree and approved by EPA, and any amendments thereto.

"Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States, excluding the Settling Federal Agencies, has incurred or will incur in connection with the Site, including, but not limited to, the cost of $2,693,428.22 reflected in the August 30, 1994 cost summary and costs incurred in performing marine monitoring for at least five (5) years to determine the effectiveness of the remedy selected in the ROD, reviewing or developing plans, reports and other items pursuant to the Four Consent Decrees, verifying or overseeing the Work or other response actions required by the ROD, or otherwise implementing, overseeing, or enforcing the Four

Consent Decrees, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Sections VII and IX (including, but not limited to, attorney's fees and any monies paid to secure access and/or to secure institutional controls, including the amount of just compensation).

"Section" shall mean a portion of this Consent Decree identified by a roman numeral.

"Settling Defendants" shall mean Levin Enterprises, Inc. and Levin Richmond Terminal, Inc..

"Settling Federal Agencies" shall mean the General Services Administration and the Agency for International Development, and any successor departments, agencies or instrumentalities of the United States.

"Site" or the "United Heckathorn NPL Site" shall mean: the northern half of the Levin Richmond Terminal property bounded by the Lauritzen Channel, Cutting Boulevard, and South Fourth Street in Richmond, California, depicted as a cross-hatched area in the map attached as Appendix F hereto; and the Lauritzen Channel, the Santa Fe Channel, the Parr Canal and the Inner Richmond Harbor Channel, all as depicted in Appendix D hereto.

"State" shall mean the State of California.

"Statement of Work" or "SOW" shall mean the statement of work for implementation of the Remedial Design, Remedial Action, and Operation and Maintenance at the Site, as set forth in Appendix B to this Consent Decree and any modifications made in accordance with this Consent Decree.

"Supervising Contractor" shall mean the principal contractor retained by the Settling Defendants to supervise and direct the implementation of the Work under this Consent Decree.

"United States" shall mean the United States of America, including its agencies, departments and instrumentalities.

"Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); (3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and (4) any "hazardous waste" under 22 Cal. Code of Regulations Section 66600 et seq..

"Work" shall mean all activities Settling Defendants are required to perform under this Consent Decree, except those required by Section XXVI (Retention of Records).

## V. GENERAL PROVISIONS

### 5. Objectives of the Parties

The objectives of the Parties in entering into this Consent Decree are to protect public health or welfare or the environment at the Site by the design and implementation of response actions at the Site by the Settling Defendants; to reimburse response costs of the Plaintiff; to pay Natural Resource Damages to federal Trustees for natural resources; and to resolve cost recovery claims, contribution claims, counterclaims or claims in recoupment among the Parties.

6. Commitments by Settling Defendants

a. Settling Defendants shall finance and perform the Work in accordance with this Consent Decree, the ROD, the SOW, and all work plans and other plans, standards, specifications, and schedules set forth herein or developed by Settling Defendants and approved by EPA pursuant to this Consent Decree. Settling Defendants shall also reimburse the United States, excluding the Settling Federal Agencies, for response costs as provided in this Consent Decree.

b. The obligations of Settling Defendants to finance and perform the Work and to pay amounts owed the United States under this Consent Decree are joint and several. In the event of the insolvency or other failure of any of the Settling Defendants to implement the requirements of this Consent Decree, the remaining Settling Defendants shall complete all such requirements.

7. Compliance With Applicable Law

All activities undertaken by Settling Defendants pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Settling Defendants must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the ROD and the SOW. The activities conducted pursuant to this Consent Decree, if approved by EPA, shall be considered to be consistent with the NCP.

8. Permits

a. As provided in Section 121(e) of CERCLA and Section

300.400(e) of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site (i.e., within the areal extent of contamination or in very close proximity to the contamination and necessary for implementation of the Work). Where any portion of the Work that is not on-site requires a federal or state permit or approval, Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. The Settling Defendants may seek relief under the provisions of Section XVIII (Force Majeure) of this Consent Decree for any delay in the performance of the Work resulting from a failure to obtain, or a delay in obtaining, any permit required for the Work.

c. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

9. Notice of Obligations to Successors-in-Title

a. Within fifteen (15) days after the entry of this Consent Decree, the Settling Defendants shall record a notice of entry of this Consent Decree with the Recorder's Office, Contra Costa County, State of California. Thereafter, each deed, title, or other instrument conveying an interest in the property included in the Site shall contain a notice stating that the property is subject to this Consent Decree and shall reference the recorded location of the Consent Decree and any restrictions applicable to the property under this Consent Decree.

b. The obligations of each Settling Defendant with

respect to the provision of access and the implementation of institutional controls under Section IX (Access and Institutional Controls) shall be binding upon any and all such Settling Defendants and any and all persons who subsequently acquire any such interest or portion thereof (hereinafter "Successors-in-Title"). Within fifteen (15) days after the entry of this Consent Decree, each Settling Defendant shall record at the Recorder's Office a notice of obligation to provide access under Section IX (Access) and related covenants, if any. Each subsequent instrument conveying an interest to any such property included in the Site shall reference the recorded location of such notice and covenants applicable to the property.

c. Any Settling Defendant and any Successor-in-Title shall, at least thirty (30) days prior to the conveyance of any such interest, give written notice of this Consent Decree to the grantee and written notice to EPA of the proposed conveyance, including the name and address of the grantee, and the date on which notice of the Consent Decree was given to the grantee. In the event of any such conveyance, the Settling Defendants' obligations under this Consent Decree, including their obligations to provide or secure access pursuant to Section IX, shall continue to be met by the Settling Defendants. In addition, if the United States approves, the grantee may perform some or all of the Work under this Consent Decree. In no event shall the conveyance of an interest in property that includes, or is a portion of, the Site release or otherwise affect the liability of the Settling Defendants to comply with the Consent

Decree.

## VI. PERFORMANCE OF THE WORK BY SETTLING DEFENDANTS

10. Selection of Supervising Contractor.

a. All aspects of the Work to be performed by Settling Defendants pursuant to Sections VI (Performance of the Work by Settling Defendants), VII (Remedy Review), VIII (Quality Assurance, Sampling and Data Analysis), and XV (Emergency Response) of this Consent Decree shall be under the direction and supervision of the Supervising Contractor, the selection of which shall be subject to disapproval by EPA. Within 10 days after the lodging of this Consent Decree, Settling Defendants shall notify EPA in writing of the name, title, and qualifications of any contractor proposed to be the Supervising Contractor. EPA will issue a notice of disapproval or an authorization to proceed. If at any time thereafter, Settling Defendants propose to change a Supervising Contractor, Settling Defendants shall give such notice to EPA and must obtain an authorization to proceed from EPA before the new Supervising Contractor performs, directs, or supervises any Work under this Consent Decree.

b. If EPA disapproves a proposed Supervising Contractor, EPA will notify Settling Defendants in writing. Settling Defendants shall submit to EPA a list of contractors, including the qualifications of each contractor, that would be acceptable to them within 30 days of receipt of EPA's disapproval of the contractor previously proposed. EPA will provide written notice of the names of any contractors that it disapproves and an authorization to proceed with respect to any of the other

contractors. Settling Defendants may select any contractor from that list that is not disapproved and shall notify EPA of the name of the contractor selected within 21 days of EPA's authorization to proceed.

c. If EPA fails to provide written notice of its authorization to proceed or disapproval as provided in this Paragraph and this failure prevents the Settling Defendants from meeting one or more deadlines in a plan approved by the EPA pursuant to this Consent Decree, Settling Defendants may seek relief under the provisions of Section XVIII (Force Majeure) hereof.

11. Remedial Design.

a. Within 60 days after Settling Defendants' execution of this Decree (i.e., the date when both Settling Defendants' signatures are on the Decree) or 10 days after EPA's issuance of an authorization to proceed pursuant to Paragraph 10, whichever is later, Settling Defendants shall submit to EPA a work plan for the design of the Remedial Action at the Site ("Remedial Design Work Plan" or "RD Work Plan"). The Remedial Design Work Plan shall provide for design of the upland capping remedy set forth in the ROD, in accordance with the SOW and for achievement of the Performance Standards and other requirements set forth in the ROD, this Consent Decree and/or the SOW. Upon its approval by EPA, the Remedial Design Work Plan shall be incorporated into and become enforceable under this Consent Decree. At the same time the RD Work Plan is due, the Settling Defendants shall submit to EPA and the State a Health and Safety Plan for field design

activities which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

b. The Remedial Design Work Plan shall include plans and schedules for implementation of all remedial design and pre-design tasks identified in the SOW. In addition, the Remedial Design Work Plan shall include a schedule for completion of the Remedial Action Work Plan.

c. Upon approval of the Remedial Design Work Plan by EPA and submittal of the Health and Safety Plan for all field activities to EPA and the State, Settling Defendants shall implement the Remedial Design Work Plan. The Settling Defendants shall submit to EPA and the State all plans, submittals and other deliverables required under the approved Remedial Design Work Plan in accordance with the approved schedule for review and approval pursuant to Section XI (EPA Approval of Plans and Other Submissions). Unless otherwise directed by EPA, Settling Defendants shall not commence further Remedial Design activities at the Site prior to approval of the Remedial Design Work Plan.

d. The preliminary design submittal shall include, at a minimum, the following: (1) design criteria; (2) results of additional field sampling and pre-design work; (3) project delivery strategy; (4) preliminary plans, drawings and sketches; (5) required specifications in outline form; and (6) preliminary construction schedule.

e. The intermediate design submittal, if required by EPA or if independently submitted by the Settling Defendants, shall

be a continuation and expansion of the preliminary design. Any value engineering proposals must be identified and evaluated during this review.

f. The pre-final/final design submittal shall include, at a minimum, the following: (1) final plans and specifications; (2) Operation and Maintenance Plan; (3) Construction Quality Assurance Project Plan ("CQAPP"); (4) Field Sampling Plan (directed at measuring progress towards meeting Performance Standards); and (5) Contingency Plan. The CQAPP, which shall detail the approach to quality assurance during construction activities at the Site, shall specify a quality assurance official ("QA Official"), independent of the Supervising Contractor, to conduct a quality assurance program during the construction phase of the project.

12. Remedial Action.

a. Within 60 days after Settling Defendants' execution of this Decree (i.e., the date when both Settling Defendants' signatures are on the Decree) or 10 days after EPA's issuance of an authorization to proceed pursuant to Paragraph 10, whichever is later, Settling Defendants shall submit to EPA and the State, a work plan for the performance of the Remedial Action at the Site ("Remedial Action Work Plan"). The Remedial Action Work Plan shall provide for construction and implementation of the remedy set forth in the ROD and achievement of the Performance Standards, in accordance with this Consent Decree, the ROD, the SOW, and the design plans and specifications developed in accordance with the Remedial Design Work Plan and approved by

EPA. Upon its approval by EPA, the Remedial Action Work Plan shall be incorporated into and become enforceable under this Consent Decree. At the same time as they submit the Remedial Action Work Plan, Settling Defendants shall submit to EPA and the State a Health and Safety Plan for field activities required by the Remedial Action Work Plan which conforms to the applicable Occupational Safety and Health Administration and EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

b. The Remedial Action Work Plan shall include the following: (1) the schedule for completion of the Remedial Action; (2) method for selection of the contractor; (3) schedule for developing and submitting other required Remedial Action plans; (4) methodology for implementation of the Construction Quality Assurance Plan; (5) methods for satisfying permitting requirements; (6) methodology for implementation of the Operation and Maintenance Plan; (7) methodology for implementation of the Contingency Plan; (8) tentative formulation of the Remedial Action team; (9) construction quality control plan (by constructor); and (10) procedures and plans for the decontamination of equipment and the disposal of contaminated materials. The Remedial Action Work Plan also shall include a schedule for implementation of all Remedial Action tasks identified in the final design submittal and shall identify the initial formulation of the Settling Defendants' Remedial Action Project Team (including, but not limited to, the Supervising Contractor).

c. Upon approval of the Remedial Action Work Plan by

EPA, Settling Defendants shall implement the activities required under the Remedial Action Work Plan. The Settling Defendants shall submit to EPA and the State all plans, submittals, or other deliverables required under the approved Remedial Action Work Plan in accordance with the approved schedule for review and approval pursuant to Section XI (EPA Approval of Plans and Other Submissions). Unless otherwise directed by EPA, Settling Defendants shall not commence physical Remedial Action activities at the Site prior to approval of the Remedial Action Work Plan.

13. The Settling Defendants shall continue to implement the Remedial Action and O&M until the Performance Standards are achieved and for so long thereafter as is otherwise required under this Consent Decree.

14. Modification of the SOW or Related Work Plans.

a. If EPA determines that modification to the work specified in the SOW and/or in work plans developed pursuant to the SOW is necessary to carry out and maintain the effectiveness of the remedy set forth in the ROD, EPA may require that such modification be incorporated in the SOW and/or such work plans. A modification may only be required pursuant to this Paragraph to the extent that it is consistent with the scope of the remedy selected in the ROD.

b. For the purpose of Paragraphs 14, 46 and 47 of this Decree only, the "scope of the remedy selected in the ROD" is: capping of areas around the former Heckathorn facility, as shown in Figure 6 of the ROD, together with a deed restriction or notice limiting use of the Levin Richmond Terminal to industrial

or commercial use.

c. If Settling Defendants object to any modification determined by EPA to be necessary pursuant to this Paragraph, they may seek dispute resolution pursuant to Section XIX (Dispute Resolution), Paragraph 61 (record review). The SOW and/or related work plans shall be modified in accordance with final resolution of the dispute.

d. Settling Defendants shall implement any work required by any modifications incorporated in the SOW and/or in work plans developed pursuant to the SOW in accordance with this Paragraph.

e. Nothing in this Paragraph shall be construed to limit EPA's authority to order or require performance of further response actions as otherwise provided in this Consent Decree.

15. Settling Defendants acknowledge and agree that nothing in this Consent Decree, the SOW, or the Remedial Design or Remedial Action Work Plans constitutes a warranty or representation of any kind by Plaintiff that compliance with the work requirements set forth in the SOW and the Work Plans will achieve the Performance Standards.

16. Settling Defendants shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator of such shipment of Waste Material. However, this notification requirement shall not apply to any off-Site shipments when the

total volume of all such shipments will not exceed 10 cubic yards.

a. The Settling Defendants shall include in the written notification the following information, where available: (1) the name and location of the facility to which the Waste Material are to be shipped; (2) the type and quantity of the Waste Material to be shipped; (3) the expected schedule for the shipment of the Waste Material; and (4) the method of transportation. The Settling Defendants shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

b. The identity of the receiving facility and state will be determined by the Settling Defendants following the award of the contract for Remedial Action construction. The Settling Defendants shall provide the information required by Paragraph 16.a as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

## VII. REMEDY REVIEW

17. Periodic Review. Settling Defendants shall conduct any studies and investigations as requested by EPA, in order to permit EPA to conduct reviews of whether the Remedial Action is protective of human health and the environment at least every five years as required by Section 121(c) of CERCLA and any applicable regulations.

18. EPA Selection of Further Response Actions. If EPA

determines, at any time, that the remedial action selected in the ROD is not protective of human health and the environment, EPA may select further response actions for the Site in accordance with the requirements of CERCLA and the NCP.

19. Opportunity To Comment. Settling Defendants and, if required by Sections 113(k)(2) or 117 of CERCLA, the public, will be provided with an opportunity to comment on any further response actions proposed by EPA as a result of the review conducted pursuant to Section 121(c) of CERCLA and to submit written comments for the record during the comment period.

## VIII. QUALITY ASSURANCE, SAMPLING, and DATA ANALYSIS

20. Settling Defendants shall use quality assurance, quality control, and chain of custody procedures for all design, compliance and monitoring samples in accordance with "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operation," (EPA QA/R5; "Preparing Perfect Project Plans," (EPA /600/9-88/087), and subsequent amendments to such guidelines upon notification by EPA to Settling Defendants of such amendment. Amended guidelines shall apply only to procedures conducted after such notification. Prior to the commencement of any monitoring project under this Consent Decree, Settling Defendants shall submit to EPA for approval a Quality Assurance Project Plan ("QAPP") that is consistent with the SOW, the NCP and applicable guidance documents. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QAPP(s) and reviewed and

approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Decree. Settling Defendants shall ensure that EPA personnel and its authorized representatives are allowed access at reasonable times to all laboratories utilized by Settling Defendants in implementing this Consent Decree. In addition, Settling Defendants shall ensure that such laboratories shall analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring. Settling Defendants shall ensure that the laboratories they utilize for the analysis of samples taken pursuant to this Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods which are documented in the "Contract Lab Program Statement of Work for Inorganic Analysis" and the "Contract Lab Program Statement of Work for Organic Analysis," dated February 1988, and any amendments made thereto during the course of the implementation of this Decree. Settling Defendants shall ensure that all laboratories they use for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA-equivalent QA/QC program. Settling Defendants shall ensure that all field methodologies utilized in collecting samples for subsequent analysis pursuant to this Decree will be conducted in accordance with the procedures set forth in the QAPP approved by EPA.

21. Upon request, the Settling Defendants shall allow split or duplicate samples to be taken by EPA or its authorized representatives. Settling Defendants shall notify EPA not less than 28 days in advance of any sample collection activity unless

shorter notice is agreed to by EPA. In addition, EPA shall have the right to take any additional samples that EPA deem necessary. Upon request, EPA shall allow the Settling Defendants to take split or duplicate samples of any samples it takes as part of the Plaintiff's oversight of the Settling Defendants' implementation of the Work.

22. Settling Defendants shall submit to EPA a copy of the results of all sampling and/or tests or other data obtained or generated by or on behalf of Settling Defendants with respect to the Site and/or the implementation of this Consent Decree unless EPA agrees otherwise.

23. Notwithstanding any provision of this Consent Decree, the United States hereby retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA and any other applicable statutes or regulations.

## IX. ACCESS AND INSTITUTIONAL CONTROLS

24. Beginning on February 1, 1996, Settling Defendants agree to provide access at all reasonable times to the Site and, to the extent access to the property is controlled by Settling Defendants, any other property to which access is required for the implementation of the response actions called for in the ROD. Such access shall be provided to the United States and its representatives (including EPA and its contractors); the Supervising Contractor and its employees, agents and subcontractors; and technical representatives of any potentially responsible party performing response actions at the Site

pursuant to an EPA order or agreement. Access shall be for the purposes of conducting any activity related to the implementation of the response actions called for in the ROD, including, but not limited to:

a. Monitoring the Work and other response actions required under the ROD;

b. Verifying any data or information submitted to the United States;

c. Conducting investigations relating to contamination at or near the Site;

d. Obtaining samples;

e. Assessing the need for, planning, or implementing additional response actions at or near the Site;

f. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents, consistent with Section XXVI; and

g. Assessing Settling Defendants' compliance with this Consent Decree or assessing other potentially responsible parties' compliance with an EPA order or agreement.

25. To the extent that access to offsite property is required for the implementation of the Work, Settling Defendants shall use best efforts to secure from persons who own or control the property access for Settling Defendants, as well as for the United States and its representatives, including, but not limited to, their contractors, as necessary to effectuate this Consent Decree. For purposes of this Paragraph "best efforts" includes the payment of reasonable sums of money in consideration of

access. If any access required to complete the Work is not obtained by February 1, 1996, Settling Defendants shall promptly notify the United States in writing, and shall include in that notification a summary of the steps Settling Defendants have taken to attempt to obtain access. The United States may, as it deems appropriate, assist Settling Defendants in obtaining access. Any costs the United States incurs in obtaining access, including attorney's fees, shall be considered Response Costs.

26. Notwithstanding any provision of this Consent Decree, the United States retains all of its access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable statute or regulations.

27. Settling Defendants shall record a deed restriction limiting use of the Levin Richmond Terminal to the current industrial classification, i.e., industrial or commercial use. The restriction shall be recorded in substantially the same form as Appendix G attached hereto.

## X. REPORTING REQUIREMENTS

28. In addition to any other requirement of this Consent Decree, Settling Defendants shall submit to EPA two (2) copies of written monthly progress reports that: (a) describe the actions which have been taken toward achieving compliance with this Consent Decree during the previous month; (b) include a summary of all results of sampling and tests and all other data received or generated by Settling Defendants or their contractors or agents in the previous month; (c) identify all work plans, plans and other deliverables required by this Consent Decree completed

and submitted during the previous month; (d) describe all actions, including, but not limited to, data collection and implementation of work plans, which are scheduled for the next six weeks and provide other information relating to the progress of construction, including, but not limited to, critical path diagrams, Gantt charts and Pert charts; (e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays; (f) include any modifications to the work plans or other schedules that Settling Defendants have proposed to EPA or that have been approved by EPA; and (g) describe all activities undertaken in support of the Community Relations Plan during the previous month and those to be undertaken in the next six weeks. Settling Defendants shall submit these progress reports to EPA by the tenth day of every month following the lodging of this Consent Decree until EPA notifies the Settling Defendants pursuant to Paragraph 47.b of Section XIV (Certification of Completion). If requested by EPA, Settling Defendants shall also provide briefings for EPA discussing the progress of the Work.

29. The Settling Defendants shall notify EPA of any change in the schedule described in the monthly progress report for the performance of any activity, including, but not limited to, data collection and implementation of work plans, no later than seven days prior to the performance of the activity.

30. Upon the occurrence of any event during performance of

the Work that Settling Defendants are required to report pursuant to Section 103 of CERCLA or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), Settling Defendants shall within 24 hours of the onset of such event orally notify the EPA Project Coordinator or the Alternate EPA Project Coordinator (in the event of the unavailability of the EPA Project Coordinator), or, in the event that neither the EPA Project Coordinator or Alternate EPA Project Coordinator is available, the Emergency Response Section, Region IX, United States Environmental Protection Agency. These reporting requirements are in addition to the reporting required by CERCLA Section 103 or EPCRA Section 304.

31. Within 20 days of the onset of such an event, Settling Defendants shall furnish to Plaintiff a written report, signed by the Settling Defendants' Project Coordinator, setting forth the events which occurred and the measures taken, and to be taken, in response thereto. Within 30 days of the conclusion of such an event, Settling Defendants shall submit a report setting forth all actions taken in response thereto.

32. Settling Defendants shall submit two (2) copies of all plans, reports, and data required by the SOW, the Remedial Design Work Plan, the Remedial Action Work Plan, or any other approved plans to EPA in accordance with the schedules set forth in such plans. Settling Defendants shall simultaneously submit two (2) copies of all such plans, reports and data to the State.

33. All reports and other documents submitted by Settling Defendants to EPA (other than the monthly progress reports

referred to above which purport to document Settling Defendants' compliance with the terms of this Consent Decree shall be signed by an authorized representative of the Settling Defendants.

## XI. EPA APPROVAL OF PLANS AND OTHER SUBMISSIONS

34. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Consent Decree, EPA shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that the Settling Defendants modify the submission; or (e) any combination of the above. However, EPA shall not modify a submission without first providing Settling Defendants at least one notice of deficiency and an opportunity to cure within seven (7) days, except where to do so would cause serious disruption to the Work or where previous submissions have been disapproved due to material defects and the deficiencies in the submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

35. In the event of approval, approval upon conditions, or modification by EPA, pursuant to Paragraph 34(a), (b), or (c), Settling Defendants shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA subject only to their right to invoke the Dispute Resolution procedures set forth in Section XIX (Dispute Resolution) with respect to the modifications or conditions made by EPA. In the event that EPA modifies the submission to cure the deficiencies

pursuant to Paragraph 34(c) and the submission has a material defect, EPA retains its right to seek stipulated penalties, as provided in Section XX (Stipulated Penalties).

36. a. Upon receipt of a notice of disapproval pursuant to Paragraph 34(d), Settling Defendants shall, within 14 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the plan, report, or other item for approval. Any stipulated penalties applicable to the submission, as provided in Section XX, shall accrue during the 7-day period or otherwise specified period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in Paragraphs 37 and 38.

b. Notwithstanding the receipt of a notice of disapproval pursuant to Paragraph 34(d), Settling Defendants shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not relieve Settling Defendants of any liability for stipulated penalties under Section XX (Stipulated Penalties).

37. In the event that a resubmitted plan, report or other item, or portion thereof, is disapproved by EPA, EPA may again require the Settling Defendants to correct the deficiencies, in accordance with the preceding Paragraphs. EPA also retains the right to modify or develop the plan, report or other item. Settling Defendants shall implement any such plan, report, or item as modified or developed by EPA, subject only to their right to invoke the procedures set forth in Section XIX (Dispute

Resolution).

38. If upon resubmission, a plan, report, or item is disapproved or modified by EPA due to a material defect, Settling Defendants shall be deemed to have failed to submit such plan, report, or item timely and adequately unless the Settling Defendants invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution) and EPA's action is overturned pursuant to that Section. The provisions of Section XIX (Dispute Resolution) and Section XX (Stipulated Penalties) shall govern the implementation of the Work and accrual and payment of any stipulated penalties during Dispute Resolution. If EPA's disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XX.

39. All plans, reports, and other items required to be submitted to EPA under this Consent Decree shall, upon approval or modification by EPA, be enforceable under this Consent Decree. In the event EPA approves or modifies a portion of a plan, report, or other item required to be submitted to EPA under this Consent Decree, the approved or modified portion shall be enforceable under this Consent Decree.

## XII. PROJECT COORDINATORS

40. The designated Project Coordinators and Alternate Project Coordinators are as follows:

For EPA:

Andrew Lincoff
EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105

For Settling Defendants:

Mike McCoy
Levin Richmond Terminal
402 Wright Ave.
Richmond, CA 94804
(510) 232-4422

If a Project Coordinator or Alternate Project Coordinator initially designated is changed, the identity of the successor will be given to the other Parties at least 5 working days before the changes occur, unless impracticable, but in no event later than the actual day the change is made. The Settling Defendants' Project Coordinator shall be subject to disapproval by EPA and shall have the technical expertise sufficient to adequately oversee all aspects of the Work. The Settling Defendants' Project Coordinator shall not be an attorney for any of the Settling Defendants in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

41. EPA may designate other representatives, including, but not limited to, EPA employees, and federal contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. EPA's Project Coordinator and Alternate Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager ("RPM")

and an On-Scene Coordinator ("OSC") by the National Contingency Plan, 40 C.F.R. Part 300. In addition, EPA's Project Coordinator or Alternate Project Coordinator shall have authority, consistent with the National Contingency Plan, to halt any Work required by this Consent Decree and to take any necessary response action when s/he determines that conditions at the Site constitute an emergency situation or may present an immediate threat to public health or welfare or the environment due to release or threatened release of Waste Material.

## XIII. ASSURANCE OF ABILITY TO COMPLETE WORK

42. Prior to beginning the Work, Settling Defendants shall establish and maintain financial security in the amount of $1 million in one or more of the following forms:

(a) A surety bond guaranteeing performance of the Work;

(b) One or more irrevocable letters of credit equalling the total estimated cost of the Work;

(c) A trust fund;

(d) A guarantee to perform the Work by one or more parent corporations or subsidiaries, or by one or more unrelated corporations that have a substantial business relationship with at least one of the Settling Defendants;

(e) A demonstration that one or more of the Settling Defendants satisfy the requirements of 40 C.F.R. § 264.143(f); or

(f) A demonstration through providing internal and/or public financial information sufficient to satisfy EPA that Settling Defendants have sufficient assets to make other assurances unnecessary. Updates of such financial information

shall be submitted to EPA on a semi-annual basis.

43. If the Settling Defendants seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 42(d) of this Consent Decree, Settling Defendants shall demonstrate that the guarantor satisfies the requirements of 40 C.F.R. § 264.143(f). If Settling Defendants seek to demonstrate their ability to complete the Work by means of the financial test or the corporate guarantee pursuant to Paragraph 42(d) or (e), they shall resubmit sworn statements conveying the information required by 40 C.F.R. § 264.143(f) annually, on the anniversary of the effective date of this Consent Decree. In the event that EPA determines at any time that the financial assurances provided pursuant to this Section are inadequate, Settling Defendants shall, within 30 days of receipt of notice of EPA's determination, obtain and present to EPA for approval one of the other forms of financial assurance listed in Paragraph 42 of this Consent Decree. Settling Defendants' inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Consent Decree.

44. If Settling Defendants can show that the estimated cost to complete the remaining Work has diminished below the amount set forth in Paragraph 42 above after entry of this Consent Decree, Settling Defendants may, on any anniversary date of entry of this Consent Decree, or at any other time agreed to by the Parties, reduce the amount of the financial security provided under this Section to the estimated cost of the remaining work to

be performed. Settling Defendants shall submit a proposal for such reduction to EPA, in accordance with the requirements of this Section, and may reduce the amount of the security upon approval by EPA. In the event of a dispute, Settling Defendants may reduce the amount of the security in accordance with the final administrative or judicial decision resolving the dispute.

45. Settling Defendants may change the form of financial assurance provided under this Section at any time, upon notice to and approval by EPA, provided that the new form of assurance meets the requirements of this Section. In the event of a dispute, Settling Defendants may change the form of the financial assurance only in accordance with the final administrative or judicial decision resolving the dispute.

## XIV. CERTIFICATION OF COMPLETION

46. Completion of the Remedial Action

a. Within 90 days after Settling Defendants conclude that the Remedial Action has been fully performed and the Performance Standards have been attained, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that the Remedial Action has been fully performed and the Performance Standards have been attained, they shall submit a written report requesting certification to EPA for approval, with a copy to the State, pursuant to Section XI (EPA Approval of Plans and Other Submissions) within 30 days of the inspection. In the report, a registered professional engineer and the

Settling Defendants' Project Coordinator shall state that the Remedial Action has been completed in full satisfaction of the requirements of this Consent Decree. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after completion of the pre-certification inspection and receipt and review of the written report, EPA determines that the Remedial Action or any portion thereof has not been completed in accordance with this Consent Decree or that the Performance Standards have not been achieved, EPA will notify Settling Defendants in writing of the activities that must be undertaken by Settling Defendants pursuant to this Consent Decree to complete the Remedial Action and achieve the Performance Standards. EPA may only require Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy selected in the ROD," as that term is defined in Paragraph 14.b. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (EPA Approval of Plans and Other

Submissions). Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established pursuant to this Paragraph, subject to their right to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent report requesting Certification of Completion, that the Remedial Action has been performed in accordance with this Consent Decree and that the Performance Standards have been achieved, EPA will so certify in writing to Settling Defendants. This certification shall constitute the Certification of Completion of the Remedial Action for purposes of this Consent Decree, including, but not limited to, Section XXII (Covenants Not to Sue by Plaintiff). Certification of Completion of the Remedial Action shall not affect Settling Defendants' obligations under this Consent Decree.

47. Completion of the Work

a. Within 90 days after Settling Defendants conclude that all phases of the Work (including O&M), have been fully performed, Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Settling Defendants and EPA. If, after the pre-certification inspection, the Settling Defendants still believe that the Work has been fully performed, Settling Defendants shall submit a written report by a registered professional engineer stating that the Work has been completed in full satisfaction of the requirements of this Consent Decree. The report shall contain the following

statement, signed by a responsible corporate official of a Settling Defendant or the Settling Defendants' Project Coordinator:

> "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If, after review of the written report, EPA determines that any portion of the Work has not been completed in accordance with this Consent Decree, EPA will notify Settling Defendants in writing of the activities that must be undertaken by Settling Defendants pursuant to this Consent Decree to complete the Work. EPA may only require Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy selected in the ROD," as that term is defined in Paragraph 14.b. EPA will set forth in the notice a schedule for performance of such activities consistent with the Consent Decree and the SOW or require the Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (EPA Approval of Plans and Other Submissions). Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established therein, subject to their right to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent request for Certification of Completion by Settling

Defendants, that the Work has been performed in accordance with this Consent Decree, EPA will so notify the Settling Defendants in writing.

## XV. EMERGENCY RESPONSE

48. In the event of any action or occurrence during the performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Settling Defendants shall, subject to Paragraph 49, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify the EPA's Project Coordinator, or, if the Project Coordinator is unavailable, EPA's Alternate Project Coordinator. If neither of these persons is available, the Settling Defendants shall notify the EPA Emergency Response Unit, Region IX. Settling Defendants shall take such actions in consultation with EPA's Project Coordinator or other available authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plans, the Contingency Plans, and any other applicable plans or documents developed pursuant to the SOW. In the event that Settling Defendants fail to take appropriate response action as required by this Section, and EPA takes such action instead, Settling Defendants shall reimburse EPA all costs of the response action not inconsistent with the NCP.

49. Nothing in the preceding Paragraph, Paragraph 14 or in this Consent Decree shall be deemed to limit any authority of the

United States (a) to take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, or (b) to direct or order such action, or seek an order from the Court, to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site, subject to Section XXII (Covenants Not to Sue by Plaintiff).

## XVI. REIMBURSEMENT OF RESPONSE COSTS

50. Within 10 days after entry of this Decree, Settling Defendants shall pay to the EPA Hazardous Substance Superfund $100,000, in reimbursement of Response Costs, by FedWire Electronic Funds Transfer to the U.S. Department of Justice account in accordance with current electronic funds transfer procedures, referencing U.S.A.O. file number 9600022, EPA Region 9 and Site/Spill ID #09R3, and DOJ case number 90-11-3-598. Payment shall be made in accordance with instructions provided to the Settling Defendants by the Financial Litigation Unit of the United States Attorney's Office for the Northern District of California, following lodging of this Decree. Settling Defendants shall send notice that such payment has been made to the United States as specified in Section XXVII (Notice and Submissions) and to David Wood, Chief, Cost Accounting, EPA Region 9, 75 Hawthorne Street, San Francisco, CA 94105.

## XVII. INDEMNIFICATION AND INSURANCE

51. a. The United States does not assume any liability by

entering into this agreement or by virtue of any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Settling Defendants shall indemnify, save and hold harmless the United States and its officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Further, the Settling Defendants agree to pay the United States all costs it incurs including, but not limited to, attorney's fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States based on negligent or other wrongful acts or omissions of Settling Defendants, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree. The United States shall not be held out as a party to any contract entered into by or on behalf of Settling Defendants in carrying out activities pursuant to this Consent Decree. Neither the Settling Defendants nor any such contractor shall be considered an agent of the United States.

b. The United States shall give Settling Defendants notice of any claim for which the United States plans to seek indemnification pursuant to Paragraph 51.a., and shall consult with Settling Defendants prior to settling such claim.

52. Settling Defendants waive all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Settling Defendants shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

53. No later than 15 days before commencing any on-site Work, Settling Defendants shall secure, and shall maintain until the first anniversary of EPA's Certification of Completion of the Remedial Action pursuant to Paragraph 46.b. of Section XIV (Certification of Completion) comprehensive general liability insurance with limits of $5 million dollars, combined single limit, and automobile liability insurance with limits of $1 million dollars, combined single limit, naming the United States as an additional insured. In addition, for the duration of this

Consent Decree, Settling Defendants shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Settling Defendants in furtherance of this Consent Decree. Prior to commencement of the Work under this Consent Decree, Settling Defendants shall provide to EPA certificates of such insurance and a copy of each insurance policy. Settling Defendants shall resubmit such certificates and copies of policies each year on the anniversary of the effective date of this Consent Decree. If Settling Defendants demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Settling Defendants need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor.

## XVIII. FORCE MAJEURE

54. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of the Settling Defendants, of any entity controlled by Settling Defendants, or of Settling Defendants' contractors, that delays or prevents the performance of any obligation under this Consent Decree despite Settling Defendants' best efforts to fulfill the obligation. The requirement that the Settling Defendants exercise "best efforts to fulfill the obligation" includes using

best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (1) as it is occurring and (2) following the potential force majeure event, such that the delay is minimized to the greatest extent possible. "Force Majeure" does not include financial inability to complete the Work or a failure to attain the Performance Standards.

55. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, the Settling Defendants shall notify orally EPA's Project Coordinator or, in his or her absence, EPA's Alternate Project Coordinator or, in the event both of EPA's designated representatives are unavailable, the Director of the Hazardous Waste Management Division, EPA Region IX, within three (3) days of when Settling Defendants first knew that the event might cause a delay. Within ten (10) days thereafter, Settling Defendants shall provide in writing to EPA an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; the Settling Defendants' rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of the Settling Defendants, such event may cause or contribute to an endangerment to public health, welfare or the environment. The Settling Defendants shall

include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude Settling Defendants from asserting any claim of force majeure for that event for the period of time of such failure to comply, and for any additional delay caused by such failure. Settling Defendants shall be deemed to know of any circumstance of which Settling Defendants, any entity controlled by Settling Defendants, or Settling Defendants' contractors knew or should have known.

56. If EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify the Settling Defendants in writing of its decision. If EPA agrees that the delay is attributable to a force majeure event, EPA will notify the Settling Defendants in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

57. If the Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XIX (Dispute

Resolution), they shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, Settling Defendants shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Settling Defendants complied with the requirements of Paragraphs 54 and 55, above. If Settling Defendants carry this burden, the delay at issue shall be deemed not to be a violation by Settling Defendants of the affected obligation of this Consent Decree identified to EPA and the Court.

## XIX. DISPUTE RESOLUTION

58. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of the Settling Defendants that have not been disputed in accordance with this Section.

59. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 20 days from the time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be

considered to have arisen when one party sends the other parties a written Notice of Dispute.

60. a. In the event that the parties cannot resolve a dispute by informal negotiations, including mediation, under Paragraph 59, then the position advanced by EPA shall be considered binding unless, within seven (7) days after the conclusion of the informal negotiation period, Settling Defendants invoke the formal dispute resolution procedures of this Section by serving on the United States a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by the Settling Defendants. The Statement of Position shall specify the Settling Defendants' position as to whether formal dispute resolution should proceed under Paragraph 61 or Paragraph 62.

b. Within seven (7) days after receipt of Settling Defendants' Statement of Position, EPA will serve on Settling Defendants its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph 61 or 62. Within five (5) days after receipt of EPA's Statement of Position, Settling Defendants may submit a Reply.

c. If there is disagreement between EPA and the Settling Defendants as to whether dispute resolution should proceed under Paragraph 61 or 62, the parties to the dispute shall follow the

procedures set forth in the paragraph determined by EPA to be applicable. However, if the Settling Defendants ultimately appeal to the Court to resolve the dispute, the Court shall determine which paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 61 and 62.

61. Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action and all other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action includes, without limitation: (1) the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this Consent Decree; and (2) the adequacy of the performance of response actions taken pursuant to this Consent Decree. Nothing in this Consent Decree shall be construed to allow any dispute by Settling Defendants regarding the validity of the ROD's provisions.

a. An administrative record of the dispute shall be maintained by EPA and shall contain all statements of position, including supporting documentation, submitted pursuant to this Section. Where appropriate, EPA may allow submission of supplemental statements of position by the parties to the dispute.

b. The Director of the Waste Management Division, EPA Region IX, will issue a final administrative decision resolving the dispute based on the administrative record described in

Paragraph 61.a. This decision shall be binding upon the Settling Defendants, subject only to the right to seek judicial review pursuant to Paragraph 61.c. and d.

c. Any administrative decision made by EPA pursuant to Paragraph 61.b. shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by the Settling Defendants with the Court and served on all Parties within 10 days of receipt of EPA's decision. The motion shall include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States may file a response to Settling Defendants' motion.

d. In proceedings on any dispute governed by this Paragraph, Settling Defendants shall have the burden of demonstrating that the decision of the Waste Management Division Director is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Paragraph 61.a.

62. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any response action nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. Following receipt of Settling Defendants' Statement of Position submitted pursuant to Paragraph 65, the Director of the Waste Management Division, EPA Region IX, will issue a final

decision resolving the dispute. The Waste Management Division Director's decision shall be binding on the Settling Defendants unless, within 10 days of receipt of the decision, the Settling Defendants file with the Court and serve on the parties a motion for judicial review of the decision setting forth the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. The United States may file a response to Settling Defendants' motion.

b. Notwithstanding Paragraph K of Section I (Background) of this Consent Decree, judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

63. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone or affect in any way any obligation of the Settling Defendants under this Consent Decree, not directly in dispute, unless EPA or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 72. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that the Settling Defendants do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XX (Stipulated Penalties).

## XX. STIPULATED PENALTIES

64. Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraphs 65 and 66 to the United States for failure to comply with the requirements of this Consent Decree specified below, unless excused under Section XVIII (Force Majeure). "Compliance" by Settling Defendants shall include completion of the activities under this Consent Decree or any work plan or other plan approved under this Consent Decree identified below in accordance with all applicable requirements of law, this Consent Decree, the SOW, and any plans or other documents approved by EPA pursuant to this Consent Decree and within the specified time schedules established by and approved under this Consent Decree.

65. a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Subparagraph b:

| Penalty Per Violation Per Day | Period of Noncompliance |
|---|---|
| $ 1,000 | 1-7 days |
| $ 5,000 | 8-14 days |
| $ 7,500 | 15-21 days |
| $10,000 | 22-28 days |
| $20,000 | 29-35 days |
| $25,000 | 36 days and beyond |

b. Settling Defendants' failure to:

(1) make the payment required in Paragraph 50;

(2) complete the Work as set out in this Decree and the SOW;

(3) correct deficiencies and resubmit plans as specified in Paragraph 36;

(4) obtain insurance as specified in Paragraph 53; or

(5) maintain the upland cap in accordance with the Operations and Maintenance Manual.

66. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports or other written documents pursuant to Paragraphs 28, 30, 31:

| Penalty Per Violation Per Day | Period of Noncompliance |
|---|---|
| $ 100 | 1-7 days |
| $ 500 | 8-14 days |
| $ 750 | 15-21 days |
| $1,000 | 22 days and beyond |

67. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 84 of Section XXII (Covenants Not to Sue by Plaintiff), Settling Defendants shall be liable for a stipulated penalty in the amount of $50,000.00.

68. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (1) with respect to a deficient submission under Section XI (EPA Approval of Plans and Other Submissions), during the period, if any, beginning on the 31st day after EPA's receipt of such submission until the date that EPA notifies Settling Defendants of any deficiency; (2) with respect to a decision by the Director of the Waste Management Division, EPA Region IX, under Paragraph 61.b. or 62.a. of Section XIX (Dispute Resolution), during the period, if any,

beginning on the 21st day after the date that Settling Defendants' reply to EPA's Statement of Position is received until the date that the Director issues a final decision regarding such dispute; or (3) with respect to judicial review by this Court of any dispute under Section XIX (Dispute Resolution), during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

69. Following EPA's determination that Settling Defendants have failed to comply with a requirement of this Consent Decree, EPA may give Settling Defendants written notification of the same and describe the noncompliance. EPA may send the Settling Defendants a written demand for the payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified the Settling Defendants of a violation.

70. All penalties accruing under this Section shall be due and payable to the United States within 30 days of the Settling Defendants' receipt from EPA of a demand for payment of the penalties, unless Settling Defendants invoke the Dispute Resolution procedures under Section XIX (Dispute Resolution). All payments to the United States under this Section shall be paid by certified or cashier's check(s) made payable to "EPA Hazardous Substance Superfund;" shall be mailed to U.S. EPA,

Region IX, Attention: Superfund Accounting, P.O. Box 360863M, Pittsburgh, PA 15251; shall indicate that the payment is for stipulated penalties; and shall reference the EPA Region and Site/Spill ID #09R3, the DOJ Case Number 90-11-3-598, and the name and address of the party making payment. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to the United States as provided in Section XXVII (Notices and Submissions).

71. The payment of penalties shall not alter in any way Settling Defendants' obligation to complete the performance of the Work required under this Consent Decree.

72. Penalties shall continue to accrue as provided in Paragraph 68 during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to this Court, accrued penalties determined to be owing shall be paid to EPA within 15 days of the agreement or the receipt of EPA's decision or order;

b. If the dispute is appealed to this Court and the United States prevails in whole or in part, Settling Defendants shall pay all accrued penalties determined by the Court to be owed to EPA within 60 days of receipt of the Court's decision or order, except as provided in Subparagraph c below;

c. If the District Court's decision is appealed by any Party, Settling Defendants shall pay all accrued penalties determined by the District Court to be owing to the United States into an interest-bearing escrow account within 60 days of receipt

of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every 60 days. Within 15 days of receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to EPA or to Settling Defendants to the extent that they prevail.

73. a. If Settling Defendants fail to pay stipulated penalties when due, the United States may institute proceedings to collect the penalties, as well as interest. Settling Defendants shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 70.

b. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States to seek any other remedies or sanctions available by virtue of Settling Defendants' violation of this Decree or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(l) of CERCLA. Provided, however, that the United States shall not seek civil penalties pursuant to Section 122(l) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of the Consent Decree.

74. Notwithstanding any other provision of this Section, the United States may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Consent Decree.

## XXI. PAYMENT OF NATURAL RESOURCE DAMAGES

75. Within 10 days after entry of this Decree, Settling Defendants shall pay $19,464.72 to the United States. The allocation to Settling Defendants of $19,464.72, out of the United States' total Natural Resource Damages recovery of $400,000 from defendants which are parties to the Four Decrees, was determined solely by potentially responsible parties, including Settling Defendants. Payment shall be made by check, made payable to the Secretary of the Interior and delivered to Chief, Division of Finance Division, United States Fish and Wildlife Service, 4401 North Fairfax Drive, Room 380, Arlington, VA, 22203 (phone (703) 358-1742). The check shall reflect that it is a payment to the "Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198" and reference the "Levin Richmond/United Heckathorn Site." DOI will assign these funds a special project number to allow the funds to be maintained as a segregated account within the DOI Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198 ("Trustees Account"). DOI shall, in accordance with law, manage and invest funds in the Trustees Account and segregate in the Account any return on investments or interest accrued for use by the natural resource Trustees. DOI shall not make any charge against the Account for any investment or management services provided. DOI shall hold all funds in the Account, including return on investments or accrued interest, subject to the provisions of this Decree and any agreement DOI and NOAA may reach regarding the use of the funds.

76. If Settling Defendants do not timely pay the amount specified in Paragraph 75, this Consent Decree shall be considered an enforceable judgment, under Federal Rules of Civil Procedure 69 and other applicable statutory authority, for purposes of post-judgment collection of the amount due the Trustees, without further order of this Court. Interest shall be assessed at the annual rate established pursuant to 31 U.S.C. § 3717 on the overdue amount from the due date set forth in Paragraph 75 through the date of payment. In addition, in the event the United States takes action to enforce the judgment, Settling Defendants shall reimburse the United States for costs and reasonable attorney's fees incurred in enforcing Settling Defendants' obligation.

## XXII. COVENANTS NOT TO SUE BY PLAINTIFF

77. In consideration of the actions that will be performed and the payments that will be made by the Settling Defendants under the terms of this Decree and except as specifically provided in Paragraphs 78-83 of this Section, the United States hereby covenants not to sue or take administrative action against any of the Settling Defendants, and the Settling Defendants' past and present officers, directors and employees acting in such respective capacities for Settling Defendants, pursuant to Sections 106, 107(a) and (f), and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and (f), 9613(f), at the Site. Except with respect to future liability, these covenants not to sue shall take effect upon the receipt by the United States of the payments required by Paragraphs 50 of Section XVI (Reimbursement of Response Costs) and Paragraph 75 of Section XXI (Payment of Natural Resource Damages). With respect to future liability, these covenants not to sue shall take effect upon Certification of Completion of Remedial Action by EPA pursuant to Paragraph 46.b of Section XIV (Certification of Completion). These covenants not to sue are conditioned upon the satisfactory performance by Settling Defendants of their obligations under this Consent Decree. These covenants not to sue extend only to the Settling Defendants, and the Settling Defendants' past and present officers, directors and employees acting in such respective capacities for the Settling Defendants, and do not extend to any other person.

78. United States' Pre-certification reservations. Notwithstanding any other provision of this Consent Decree, the

United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants (1) to perform further response actions relating to the Site, or (2) to reimburse the United States for additional costs of response if, prior to Certification of Completion of the Remedial Action:

(i) conditions at the Site, previously unknown to EPA, are discovered, <u>or</u>

(ii) information, previously unknown to EPA, is received, in whole or in part,

<u>and</u> these previously unknown conditions or information together with any other relevant information indicates that the remedial action(s) selected in the ROD are not protective of human health or the environment.

79. <u>United States' Post-certification reservations.</u> Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants (1) to perform further response actions relating to the Site, or (2) to reimburse the United States for additional costs of response if, subsequent to Certification of Completion of the Remedial Action:

(i) conditions at the Site, previously unknown to EPA, are discovered, <u>or</u>

(ii) information, previously unknown to EPA, is received,

in whole or in part,

and these previously unknown conditions or this information together with other relevant information indicate that the remedial action(s) selected in the ROD are not protective of human health or the environment.

80. For purposes of Paragraph 78, the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date the ROD was signed and set forth in the ROD for the Site and the administrative record supporting the ROD. For purposes of Paragraph 79, the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date of Certification of Completion of the Remedial Action and set forth in the Record of Decision, the administrative record supporting the Record of Decision, the post-ROD administrative record, or in any information received by EPA pursuant to the requirements of this Consent Decree prior to Certification of Completion of the Remedial Action.

81. Reservation by the Natural Resource Trustees for Unknown Conditions and New Information. Notwithstanding any other provision of this Decree, the United States, on behalf of its natural resource Trustees, reserves, and this Decree is without prejudice to, the right to bring an action against any Settling Defendant in this action or in a new action to seek recovery of Natural Resource Damages, based on (i) conditions with respect to the Site unknown to the Trustees as of the date this Decree is lodged with the court, that result in or contribute to injury to,

destruction of or loss of natural resources; or (ii) information received by the Trustees after the date the Decree is lodged with the court which indicates that there is injury to, destruction of, or loss of natural resources of a type unknown, or a magnitude greater than was known, to the Trustees.

82. Notwithstanding any other provision of this Decree, the United States reserves, and this Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order, seeking to compel Settling Defendants to perform further response actions relating to the Site or to reimburse the United States for response costs incurred after the effective date of this Decree, if EPA determines, through an amendment to the ROD, that the remedial actions selected in the ROD are not protective of human health and the environment and EPA selects further response actions at the Site.

83. General Reservation of Rights. The covenants not to sue set forth above do not pertain to any matters other than those expressly specified in Paragraph 77. The United States reserves, and this Consent Decree is without prejudice to, all rights against Settling Defendants with respect to all other matters, including but not limited to, the following:

(1) claims based on a failure by Settling Defendants to meet a requirement of this Consent Decree;

(2) liability arising from the past, present, or future disposal, release, or threat of release of Waste

Materials outside of the Site, including liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

(3) liability for future disposal of Waste Material at the Site, other than as provided in the ROD, the Work, or otherwise ordered by EPA;

(4) criminal liability; and

(5) liability for violations of federal or state law which occur during or after implementation of the Remedial Action.

84. Work Takeover In the event EPA determines that Settling Defendants have ceased implementation of any portion of the Work, are seriously or repeatedly deficient or late in their performance of the Work, or are implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may assume the performance of all or any portions of the Work as EPA determines necessary. Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution), Paragraph 61, to dispute EPA's determination that takeover of the Work is warranted under this Paragraph. Costs incurred by the United States in performing the Work pursuant to this Paragraph shall be considered response costs, and Settling Defendants shall reimburse EPA all costs of the response action not inconsistent with the NCP.

85. Notwithstanding any other provision of this Consent Decree, the United States retains all authority and reserves all

rights to take any and all response actions authorized by law.

## XXIII. COVENANTS BY SETTLING DEFENDANTS

86. Covenant Not to Sue. Subject to the reservations in Paragraph 87 and below, Settling Defendants hereby covenant not to sue and agree not to assert any claims or causes of action against the United States with respect to the Site or this Consent Decree, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 107, 111, 112, 113 or any other provision of law;

b. any claims against the United States, including any department, agency or instrumentality of the United States under CERCLA Sections 107 or 113 related to the Site, or

c. any claims arising out of response activities at the Site, including claims based on EPA's selection of response actions, oversight of response activities or approval of plans for such activities.

The Settling Defendants reserve the right to assert any counterclaims against the United States arising out of any action filed by the United States pursuant to Paragraphs 78, 79, 81, 82 or 83(3).

87. The Settling Defendants reserve, and this Consent Decree is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, for money damages for injury or loss of property or personal injury or death caused by the negligent or

wrongful act or omission of any employee of the United States while acting within the scope of his office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, any such claim shall not include a claim for any damages caused, in whole or in part, by the act or omission of any person, including any contractor, who is not a federal employee as that term is defined in 28 U.S.C. § 2671; nor shall any such claim include a claim based on EPA's selection of response actions, or the oversight or approval of the Settling Defendants' plans or activities. The foregoing applies only to claims which are brought pursuant to any statute other than CERCLA and for which the waiver of sovereign immunity is found in a statute other than CERCLA.

88. Nothing in this Consent Decree shall be deemed to constitute preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

89. The Settling Defendants agree that in this action or in an new action or proceeding seeking to recover the United States' response costs, or to compel Settling Defendants to undertake a response action, or to recover Natural Resource Damages incurred for releases of hazardous substances at the Site, the United States may, at its option, use any depositions taken in the Private Party Litigation for any purpose as though the court had found that the conditions set forth in Fed. R. Civ. P. 32(a)(3) are satisfied and as though the deponent were then present and

testifying.

XXIV. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

90. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this decree may have under applicable law. Each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto.

91. The Parties agree, and by entering this Consent Decree this Court finds, that the Settling Defendants and Settling Federal Agencies are entitled, as of the effective date of this Consent Decree, to protection from contribution actions or claims as provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2) for matters addressed in this Consent Decree. "Matters addressed in this Decree" shall mean Natural Resource Damages and all response costs incurred or to be incurred by the United States or any other person or entity at the Site, but do not include natural resource damages and response costs incurred or to be incurred in connection with the presence, release or threatened release of a hazardous substance outside the Site.

92. The Settling Defendants agree that with respect to any suit or claim for contribution brought by them for matters

related to this Consent Decree they will notify the United States in writing no later than 60 days prior to the initiation of such suit or claim.

93. The Settling Defendants also agree that with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree they will notify in writing the United States within 10 days of service of the complaint on them. In addition, Settling Defendants shall notify the United States within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

94. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Defendants shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XXII (Covenants Not to Sue by Plaintiff).

## XXV. ACCESS TO INFORMATION

95. Settling Defendants shall provide to EPA, upon request, copies of all documents and information within their possession

or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Settling Defendants shall also make available to EPA, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

96. a. Settling Defendants may assert business confidentiality claims covering part or all of the documents or information submitted to Plaintiff under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to EPA, or if EPA has notified Settling Defendants that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA, the public may be given access to such documents or information without further notice to Settling Defendants.

b. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege in lieu

of providing documents, they shall provide the Plaintiff with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the contents of the document, record, or information: and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be withheld on the grounds that they are privileged.

97. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

## XXVI. RETENTION OF RECORDS

98. Except as specifically provided in Paragraph 101, until 10 years after the Settling Defendants' receipt of EPA's notification pursuant to Paragraph 47.b of Section XIV (Certification of Completion of the Work), each Settling Defendant shall preserve and retain all records and documents now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or liability of any person for response actions conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary. Until 10 years after the Settling

Defendants' receipt of EPA's notification pursuant to Paragraph 47.b of Section XIV (Certification of Completion), Settling Defendants shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the Work.

99. At the conclusion of this document retention period, or at any earlier date, Settling Defendants shall notify the United States at least 90 days prior to the destruction of any such records or documents, and, upon request by the United States Settling Defendants shall deliver any such records or documents to EPA. Settling Defendants shall be relieved of the preservation and retention obligation 180 days after giving such notice as to the specific records or documents described in the notice. The Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Settling Defendants assert such a privilege, they shall provide the Plaintiffs with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of the Consent Decree shall be

withheld on the grounds that they are privileged.

100. Each Settling Defendant hereby certifies individually that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to its potential liability regarding the Site since notification of potential liability by the United States or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

## XXVII. NOTICES AND SUBMISSIONS

101. Whenever, under the terms of this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one Party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the United States, EPA and the Settling Defendants, respectively.

As to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
Re: DJ # 90-11-3-598

and

Director, Waste Management Division
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

As to EPA:

Andrew Lincoff
EPA Project Coordinator
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

As to the Settling Defendants:

Mike McCoy
Settling Defendants' Project Coordinator
Levin Richmond Terminal
402 Wright Ave.
Richmond, CA 94804

## XXVIII. EFFECTIVE DATE

102. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

## XXIX. RETENTION OF JURISDICTION

103. This Court retains jurisdiction over both the subject matter of this Consent Decree and the Settling Defendants for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to

apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XIX (Dispute Resolution) hereof.

## XXX. APPENDICES

104. The following appendices are attached to and incorporated into this Consent Decree:

"Appendix A" is the ROD.

"Appendix B" is the SOW.

"Appendix C" is the description of the Levin Richmond Terminal.

"Appendix D" is the description and/or map of the marine portion of the Site.

"Appendix E" is a form of the deed restriction.

"Appendix F" is a map of the land portion of the Site.

## XXXI. COMMUNITY RELATIONS

105. Settling Defendants shall propose to EPA their participation in the community relations plan to be developed by EPA. EPA will determine the appropriate role for the Settling Defendants under the Plan. Settling Defendants shall also cooperate with EPA in providing information regarding the Work to the public. As requested by EPA, Settling Defendants shall participate in the preparation of such information for dissemination to the public and in public meetings which may be held or sponsored by EPA to explain activities at or relating to

the Site.

## XXXII. MODIFICATION

106. Schedules specified in this Consent Decree for completion of the Work may be modified by agreement of EPA and the Settling Defendants. All such modifications shall be made in writing.

107. Except as provided in Paragraph 14 ("Modification of the SOW or related Work Plans"), no material modifications shall be made to the SOW without written notification to and written approval of the United States, Settling Defendants, and the Court. Prior to providing its approval to any modification, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification. Modifications to the SOW that do not materially alter that document may be made by written agreement between EPA, after providing the State with a reasonable opportunity to review and comment on the proposed modification, and the Settling Defendants.

108. Nothing in this Decree shall be deemed to alter the Court's power to enforce, supervise or approve modifications to this Consent Decree.

## XXXIII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

109. This Consent Decree shall be lodged with the Court for a period of not less than thirty (30) days for public notice and comment in accordance with Section 122(d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), and 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments

regarding the Consent Decree disclose facts or considerations which indicate that the Consent Decree is inappropriate, improper, or inadequate. Settling Defendants consent to the entry of this Consent Decree without further notice. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

## XXXIV. SIGNATORIES/SERVICE

110. Each undersigned representative of a Settling Defendant to this Consent Decree and the Assistant Attorney General for Environment and Natural Resources of the Department of Justice certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Party to this document.

111. Each Settling Defendant hereby agrees not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States has notified the Settling Defendants in writing that it no longer supports entry of the Consent Decree.

112. Each Settling Defendant shall identify, on the attached signature page, the name, address and telephone number of an agent who is authorized to accept service of process by mail on behalf of that Party with respect to all matters arising under or relating to this Consent Decree. Settling Defendants hereby agree to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of

Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons.

SO ORDERED THIS _____ DAY OF _____, 19__.

_____
United States District Judge
CLAUDIA WILKEN

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: Jun 7, 1996

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice

Date: _____

HELEN H. KANG
Environmental Enforcement Section
Environment and Natural Resources Division

Date: _____

S. RANDALL HUMM
Environment & Natural Resources Division
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 514-3097

Date: _____

MICHAEL J. YAMAGUCHI
United States Attorney
Northern District of California
PATRICK BUPARA
Assistant United States Attorney

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: _____

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice

Date: June 3, 1996

HELEN H. KANG
Environmental Enforcement Section
Environment and Natural Resources Division

Date: June 3, 1996

S. RANDALL HUMM
Environment & Natural Resources Division
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 514-3097

Date: 5-29-96

MICHAEL J. YAMAGUCHI
United States Attorney
Northern District of California
PATRICK BUPARA
Assistant United States Attorney

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, related to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: 6-6-96

KEITH TAKATA
Director
Hazardous Waste Management Division
Region 9
U.S. Environmental Protection Agency

Date: June 1996

JOHN J. LYONS
Assistant Regional Counsel
U.S. Environmental Protection Agency

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, related to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANTS

LEVIN ENTERPRISES, INC.

Date: MAY 8, 1996

[signature], PRESIDENT
[NAME, TITLE] WILLIAM S. BENAK

LEVIN RICHMOND TERMINAL, INC.

Date: MAY 8, 1996

[signature], PRESIDENT
[NAME, TITLE]

# RECORD OF DECISION

United Heckathorn Superfund Site
Richmond, California

EPA ID# CAD981436363

## PART I - DECLARATION

### Statement of Basis and Purpose

This Record of Decision ("ROD") presents the selected remedial action for the United Heckathorn Superfund Site ("the Site") in Richmond, California. This document was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), 42 U.S.C. §§9601 et seq., and, to the extent practicable, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300, and the laws of the State of California. This decision is based on the Administrative Record for the Site. The administrative record index identifies the documents upon which the selection of the remedial action is based.

### Assessment of the Site

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

### Description of the Remedy

The United Heckathorn Superfund Site in Richmond, California, was used to formulate pesticides from approximately 1947 to 1966. Soils at the Site and sediments in Richmond Harbor were contaminated with various chlorinated pesticides, primarily DDT, as a result of these pesticide formulation activities. At the time of Site listing in 1990, a visible deposit of pesticide residue containing up to 100% DDT was present on the Lauritzen Channel embankment. Several response actions have already been taken to cleanup the most contaminated upland areas of the Site, including the embankment. Under EPA Removal Order 90-22, a group of Potentially Responsible Parties (PRPs) excavated the embankment deposit and transported it offsite to a permitted disposal facility. During subsequent actions through 1993 pursuant to the removal order, all known additional upland soil deposits containing high levels of pesticides were removed, as were piles of contaminated soils generated in earlier actions.

The final remedy addresses remaining hazardous substances, primarily in the marine environment. The major components of the selected remedy include:

- Dredging of all soft bay mud from the Lauritzen Channel and Parr Canal, with offsite disposal of dredged material.
- Placement of clean material after dredging.
- Construction of a cap around the former Heckathorn facility to prevent erosion.
- A deed restriction limiting use of the property at the former Heckathorn facility location to

non-residential uses.

- Marine monitoring to verify the effectiveness of the remedy.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate ("ARARs") to the remedial action, and is cost effective. The selected remedy uses engineering controls and institutional controls to address remaining hazardous substances at the Site. Concentrated wastes at the upland portion of the Site were addressed by previous removal actions.

Because this remedy will result in hazardous substances remaining onsite, a review will be conducted within five years after the commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

John Wise

Felicia Marcus for
Regional Administrator

10.26.94

Date

## PART II - DECISION SUMMARY

United Heckathorn Superfund Site
Richmond, California

1. Site Name, Location, and Description.

The United Heckathorn Site is located in Richmond Harbor, on the east side of San Francisco Bay (Figures 1 and 2) in Contra Costa County, California. The location of the former United Heckathorn facility (Figure 3) is currently being used as a marine shipping terminal operated by the Levin Richmond Terminal Corporation (LRTC). The area of contamination at the Site includes the northern five acres of the terminal and marine sediments in harbor channels including the Lauritzen, which is immediately adjacent to the location of the former Heckathorn facility, the Santa Fe, the Parr Canal, and the Inner Harbor Channel.

The upland area of the Site is currently fenced and occupied. Current and expected future zoning of the upland area of the Site permits only industrial use. Land use restrictions selected as part of the Site remedy will also permit only nonresidential, industrial or commercial uses in the future.

2. Site History and Enforcement Activities.

The upland area of the Site is currently owned by Levin Enterprises, Inc. The Site was used from approximately 1947 to 1966 by several operators, including the R.J. Prentiss Company, Heckathorn and Company, United Heckathorn, United Chemetrics, and Chemwest Incorporated (hereafter collectively referred to as "United Heckathorn") to formulate and package pesticides. No chemicals were manufactured onsite.

Documents from the 1950s and 1960s indicate that approximately 95% of Heckathorn's operations entailed processing the pesticide, DDT. The processing activities included mixing, blending, grinding, and packaging. Various solvents, including xylenes, were used to dissolve DDT and other pesticides into liquid formulations. Powder formulations were also prepared.

United Heckathorn employees apparently routinely washed out equipment containing pesticide residues. The wash water was permitted to either run through drains that discharged to the Lauritzen Channel, or to seep into the ground adjacent to the Site (Levine-Fricke, 1990). Later, settling tanks were used to recover pesticide residues from wash water; however, overflow and leakage from these tanks also occurred. In addition, accidental spills, leaks, and releases also occurred during the processing of liquid and dry pesticide formulations, which were conducted both inside and outside the United Heckathorn buildings.

In 1960, the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) inspected the facility and cited United Heckathorn for the release of DDT-laden wastewater into the Lauritzen Channel. In 1965, California Department of Fish and Game staff identified a discharge of wastewater overflow into the Lauritzen Channel and leakage from the pesticide settling tanks.

Pesticide processing activities at the Site ended in approximately 1966. Between 1966 and 1970, the United Heckathorn facility buildings were demolished and cleared from the Site. In the 1970s, the Site was apparently used primarily for bulk material storage. In 1981, the Levin Metals Corporation purchased the property from the Parr-Richmond Terminal Company and has been

operating the Site since that time as a bulk shipping facility.

In 1980, the United Heckathorn Site was inspected and sampled by CDHS as part of the Abandoned Sites Project. Chlorinated pesticides and metals were detected in soil samples, and the area was designated a state Superfund Site in March 1982. EPA listed the United Heckathorn Site on the CERCLA National Priorities List (NPL) in March 1990, and took over as lead agency in August 1990.

Interim response actions were conducted from 1982 to 1993 in the upland and embankment areas of the United Heckathorn Site. As early as 1982, contaminated soil, asphalt, and concrete from the United Heckathorn Site were excavated by the current landowner and moved to a nearby lot adjacent to the Parr Canal. These materials were subsequently transported to several hazardous waste disposal facilities. In 1983, soils containing high levels of pesticides were removed by the current landowner during routine maintenance and extension of onsite railroad lines. A 6-in. to 8-in. layer of gravel was placed over the surface of the Site, including a 6-in. layer of ballast rock over the Lauritzen Channel embankment and selected areas of high DDT concentrations. In 1986, during excavation for the construction of a train scale, high levels of pesticides were detected and approximately 60 cubic yards ($yd^3$) of soil were removed by the current landowner.

In November 1990, pursuant to EPA Removal Order 90-22, approximately 1500 $yd^3$ of soil and visible pesticide residue containing up to 100% DDT were excavated by several PRPs (Levin, Montrose, Parr, Shell, and Stauffer) from the Lauritzen Channel embankment. This excavation was taken back to the foundation of the former Heckathorn building 1, where a pesticide deposit approximately 3 ft thick was revealed beneath the foundation. Samples of this deposit contained approximately 30% DDT. An additional 1800 $yd^3$ of pesticide residue and contaminated soil were excavated by the same PRPs from this area in April 1991. The excavated material and stockpiles that had been placed onsite in the 1980s were hauled offsite by truck to permitted hazardous waste disposal facilities. A final soil removal action was completed in May 1993 by the same PRPs as well as Prentiss and Sherwin Williams. Assuming that the embankment deposit contained 30% DDT, over 99% of the mass of pesticides has been removed from the upland portion of the Site since 1990.

Marine sediment has not been the subject of prior removal actions or otherwise been remediated. However, as shown on Figure 3, the southeastern area of the Lauritzen Channel was last dredged for berth maintenance in 1985.

3. Highlights of Community Participation.

Six fact sheets have been released describing activities at the Site. In July, 1994 EPA released a proposed plan and the Administrative Record for the Site. Site documents were made available at the agency Superfund Records Center and at the Richmond Public Library, and a public notice was published allowing 30 days for public comment on the Proposed Plan. A public meeting was held on August 2, 1994 to describe the proposed remedy and receive comments. The public comment period was then extended an additional 30 days at the request of PRPs. Three persons made comments at the public meeting, and six written comments on the proposed plan were received during the comment period. Responses to all significant comments received during this period are contained in the attached "Analysis of Public Comments." The decision for this Site is based upon the Administrative Record.

4. Scope and Role of Remedial Actions.

The remedial actions selected in this Record of Decision are expected to be the final response actions performed at the Site. As described in the Site history above, significant interim response measures were performed at the Site in the past. These removal actions addressed the principal threats at the upland portion of the Site.

The selected remedy addresses the contaminants remaining in sediments at the Site, as well as the low levels of contaminants remaining in soils at the Site.

5. Site Characteristics.

The nature and extent of contamination at the United Heckathorn Site has been delineated by the combination of state-ordered Site investigations which occurred prior to NPL listing, and EPA's subsequent Remedial Investigation (Battelle, 1994). As discussed above, large deposits of extremely high levels of pesticides remained in upland soils after United Heckathorn ceased operations in 1966. These have been the subject of extensive excavation and removal actions over the past three years.

A soils database representing current Site conditions was compiled in EPA's Human Health Risk Assessment (ICF Technology, 1994) from the previous Site studies and removal action reports. A conservative estimate of the remaining mean Site soil concentrations of the primary Contaminants of Concern (COCs), DDT (total) and dieldrin, are 64 and 5.7 milligrams per kilogram (mg/kg), respectively. These estimates are conservative because the soils database includes the large number of additional samples which were taken to delineate the hot-spot areas for the removal actions. The actual mean Site concentrations are likely to be lower.

DDT at levels exceeding 1 mg/kg in upland soils extends over the upland portion of the Site as shown in Figure 4. The total mass of these upland soils is approximately 95,000 tons (Levine-Fricke, 1993). Confirmation sampling performed during the excavations of the most contaminated soil areas indicated that the concentrations drop to nondetectable levels in the younger bay mud immediately below the upland soils, demonstrating that the homogeneous silty-clay bay mud underlying the Site is an effective barrier to downward migration of Site chemicals.

Due to the Site's proximity to San Francisco Bay, the shallow groundwater at the Site is naturally saline and is not a source of drinking water under state or federal law.

In 1992, EPA performed a screening assessment of offsite soils (ICF Technology, 1994) in order to determine whether the historic operations of United Heckathorn could have released pesticides into the air in sufficient quantities to cause current levels of concern in nearby off-site residential soils. Sampling locations were chosen along Cutting Boulevard and immediately north of Highway 580, because the meteorological analysis for EPA's 1988 air monitoring program indicated that the strongest prevailing winds at the Site blow due north. The sampling program was therefore deliberately biased to target the area which would have had the highest levels of pesticides, had Heckathorn caused contamination. All off-site soil sampling results were well within acceptable levels for protection of human health.

The results of the RI of marine sediment, however, indicate that the occurrence of pesticides at the Site, particularly the Contaminants of Concern, DDT and dieldrin, is more widespread and at concentrations orders of magnitude higher relative to San Francisco Bay background levels than other detected contaminants. The areal and vertical distribution of marine contamination is summarized below.

Vertical core segments and channel edge grab samples were analyzed for chlorinated pesticides to delineate the areal and vertical extent of marine contamination. Results indicated that significant pesticide contamination was limited to the soft geologically recent "younger bay mud"; samples from the hard underlying "older bay mud" generally contained only traces of pesticides. Figure 5 presents the average total DDT concentration in the younger bay mud in the inner Richmond Harbor. It is significant to note that the concentration contours on this figure must be presented on a log scale in order to depict the gradient of six orders of magnitude between the Lauritzen Channel and Point Potrero. The maximum and median total DDT and maximum dieldrin concentrations throughout the study area are also shown.

Pesticide concentrations were highest in the Lauritzen Channel, and decreased with increasing distance from the former United Heckathorn Site, clearly indicating that Heckathorn was the source of contamination. The highest total DDT concentration of 633,000 micrograms per kilogram (μg/kg) dry wt was measured in a sample from 1 ft to 3 ft below the mudline in the center of the channel. Pesticide concentrations of greater than 100,000 μg/kg were detected in sediment from the northern and western portions of the channel. The median total DDT concentration was approximately 47,000 μg/kg at the head of the Lauritzen Channel, which has not been dredged in a number of years. The median concentration of total DDT decreased to about 14,000 μg/kg in the western, undredged portion of the channel, and to 1500 μg/kg in the dredged portion of the channel near the Levin terminal. Dieldrin concentrations were lower (maximum concentration of 16,000 μg/kg), but exhibited the same spatial trend in relative concentration.

Total DDT concentrations in sediment decreased by at least two orders of magnitude from the Lauritzen Channel to the Santa Fe Channel. The median concentration of total DDT in the younger bay mud was 110 μg/kg in the upper Santa Fe Channel and 210 μg/kg in the federally maintained portion of the channel. DDT and dieldrin concentrations were higher in the federally maintained portion of the Santa Fe Channel, which includes the area downstream of the Lauritzen Channel. Total DDT and dieldrin concentrations decreased by another order of magnitude from the Santa Fe Channel to the Inner Harbor Channel. The median total DDT concentration was 60 μg/kg in the upper Inner Harbor Channel, and 10 μg/kg in the lower Inner Harbor Channel. The maximum total DDT concentration near Point Potrero was 19 μg/kg, which is approximately equal to the median DDT concentration for the periphery of San Francisco Bay, excluding the Lauritzen Channel (Long et al., 1988).

Pesticide concentrations in Parr Canal sediment were lower than those measured in the Lauritzen Channel but greater than those measured in Santa Fe or Inner Harbor Channels. The maximum and median total DDT concentrations measured in Parr Canal sediment were 4080 μg/kg and 840 μg/kg, respectively. The maximum dieldrin concentration was 170 μg/kg. The Parr Canal is significantly narrower than it was in the 1940's, due to filling which (based on aerial photographs) occurred sometime between 1958 and 1968. Some of the material used to fill the canal may have been dredged from the harbor, possibly explaining the elevated levels of pesticides in Parr Canal sediments.

Grab samples collected from channel edges throughout the study area showed the same spatial trend in pesticide concentrations as the core samples. The total DDT concentrations in channel edge samples were consistent with the median concentration measured in core samples from that area.

Contaminant concentrations in the younger bay mud were generally not well stratified. In the shallow portions of the Lauritzen Channel, contaminant concentrations increased, and then decreased with increasing depth. The most highly contaminated sediment was generally found from 1 ft to 5 ft below the mudline. In the Santa Fe Channel, the most contaminated sediment was

found down-channel of the mouth of the Lauritzen Channel in the surface sediment, and just up-channel of the mouth in deeper sediment. Contaminant concentrations were generally higher in deeper sediment in the Inner Harbor Channel. Analysis of the volumes of contaminated sediments and the average concentrations in harbor channels indicates that 98% of the mass of DDT in harbor sediments is confined to the Lauritzen Channel.

Selected core samples collected during the marine RI were analyzed for polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), metals, and butyltins. In general, sediment from the upper Lauritzen Channel and Parr Canal had higher concentrations of PAHs, PCBs, and metals than sediment from the Santa Fe and Inner Harbor Channels. This is probably because the larger channels have been routinely dredged for navigation, whereas the northern Lauritzen and Parr have not. Only the pesticides, DDT and dieldrin, are consistently found in sediments and biota at levels orders of magnitude higher than the regional background levels.

6. Applicable or Relevant and Appropriate Requirements (ARARs)

Federal and state environmental laws which have been determined to be ARARs for the remedy are summarized below. Chemical-specific ARARs are discussed first, followed by other requirements.

Surface Waters: ARARs for surface water include EPA's ambient water quality criteria for DDT and dieldrin. These are the primary basis for the Site remediation goals.

EPA Ambient Water Quality Criteria. Section 304 of the Clean Water Act required EPA to publish criteria for water quality that accurately reflect the latest scientific knowledge on the kind and extent of all identifiable effects on health and welfare, including effects on plankton, fish, shellfish, wildlife, and plant life, which may be expected from the presence of pollutants in any body of water, based on the substances' whole-water concentration. The ambient water quality criteria for DDT and dieldrin were published in October 1980. The human health values have been updated since the original criteria publications in 1980 to reflect revised carcinogenic potency values from EPA's Integrated Risk Information System (IRIS) database (see Final Rule, 40 CFR Part 131, 57 FR 60848, December 22, 1992).

The derivation of EPA's ambient water quality criteria is discussed at length in the ecological assessment (EPA, 1994). Criteria for the protection of saltwater aquatic life are, for most pollutants, based upon toxic effects data for water-column organisms. However, for DDT and its metabolites, which bioaccumulate to high levels and may cause toxicity to organisms at higher trophic levels, it was determined that more restrictive criteria were necessary to protect fish-eating birds. The chronic marine aquatic life criterion is 1 ng/L ($10^{-9}$ g/l, EPA 1980, EPA 440/5-80-038]). The water quality criterion for the protection of human health from the consumption from the bioaccumulation of DDT in fish is 0.59 ng/l, based on achieving a 1 X $10^{-6}$ lifetime excess cancer risk level.

The chronic marine aquatic life criterion for dieldrin of 1.9 ng/l is also residue-based, and was set at the level which would result in the achievement of the Food and Drug Administration's (FDA) action level in fish oil after bioaccumulation (EPA 1980, EPA 440/5-80-019]). This criterion is protective of sensitive aquatic organisms. The water quality criterion for the protection of human health from the consumption from the bioaccumulation of dieldrin in fish is 0.14 ng/l, based on achieving a 1 X $10^{-6}$ lifetime excess cancer risk level. The EPA aquatic life and human health water quality criteria for DDT and dieldrin are listed in Table 1.

TABLE 1. EPA Ambient Water Quality Criteria

| Chemicals | Saltwater Aquatic Life (ng/L) 24-hour average | Human Health (ng/L) |
|---|---|---|
| DDT[a] | 1.0 | 0.59 |
| Dieldrin | 1.9 | 0.14 |
| (a) The sum of the 4,4'- and 2,4'- isomers of DDT, DDD (TDE), and DDE. | | |

Section 121(d)(2)(A)(ii) of CERCLA requires that remedial actions meet federal Water Quality Criteria established under Section 304 or 303 of the Clean Water Act where such WQC are determined by EPA to be relevant and appropriate to remedial actions at the Site. See 42 U.S.C. § 9621(d)(2)(A)(ii) and 40 C.F.R. § 300.430(e)(2)(i)(G). In evaluating whether specific WQC are relevant and appropriate to remedial actions at Superfund Site, CERCLA requires EPA to consider four criteria: 1. the uses of the receiving water body; 2) the media affected; 3) the purposes of the criteria and 4) current information. See 42 U.S.C. § 9621(d)(B)(i). See also U.S. EPA, CERCLA Compliance with Other Laws Manual - CERCLA Compliance with the CWA and SDWA (OSWER Pub. 9234.2-06/FS, Feb. 1990).

EPA guidance concerning determinations that WQC are relevant and appropriate to remedial action at a Superfund Site provides that:

> A water quality criteria component for aquatic life may be relevant and appropriate when there are environmental factors that are being considered at a Site, such as protection of aquatic organisms. With respect to the use of water quality criteria for the protection of human health, levels are provided for exposure both from drinking the water and from consuming aquatic organisms (primarily fish) and from fish consumption alone. Whether a water quality criterion is appropriate depends on the likely routes of exposure.

U.S. EPA, CERCLA Compliance With Other Laws Manual: Interim Final at 1-15 (EPA 540-G-89-006, Aug. 1989).

Both the marine chronic and human health WQC for DDT and dieldrin are relevant and appropriate to remedial actions at this Site since both aquatic and wildlife and humans may be exposed to these contaminants either directly or through consumption of contaminated organisms. As discussed in the Ecological Risk Assessment, aquatic organisms are present in all channels at the Site, which are a part of San Francisco Bay. Fish eating-birds feed in all channels in the harbor. In fact, the particular bird upon which the marine chronic water quality criterion for DDT was based is the California brown pelican, an endangered species, which has been observed feeding in the most contaminated channels at the Site. As discussed in the Human Health Risk Assessment, fishermen catch and consume fish from the Inner Richmond Harbor channels. In 1986, the State of California Department of Health Services ordered the posting of the Lauritzen Channel to warn fishermen of the fish and shellfish contamination. On April 7, 1994, the Cal-EPA Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor.

The beneficial uses designated by the State of California for central San Francisco Bay waters, which are discussed below, include fishing, wildlife habitat, preservation of rare and endangered species, fish migration, fish spawning, shellfish harvesting, and estuarine habitat.

EPA's Ambient Water Quality Criteria were specifically developed to protect beneficial uses such as these.

Porter-Cologne Water Quality Act, San Francisco Bay Regional Basin Plan, and Fish and Game Code. The release of hazardous substances to surface waters is controlled under the Porter-Cologne Water Quality Control Act and implementing regulations, and the state Fish and Game Code §5650.

Beneficial uses of surface waters were designated in the Water Quality Control Plan for the San Francisco Basin (the Basin Plan) adopted by the Regional Water Quality Control Board (SFBRWQCB, 1986). The Basin Plan designates the following beneficial uses of Central San Francisco Bay, which includes the waters at the Site:

Industrial Service Supply
Industrial Process Supply
Navigation
Water Contact Recreation
Non-contact Water Recreation
Commercial and Sport Fishing
Wildlife Habitat
Preservation of Rare and Endangered Species
Fish Migration
Fish Spawning
Shellfish Harvesting
Estuarine Habitat

The Basin Plan also contains the following narrative objective:

"All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species and/or significant alterations in population or community ecology or receiving water biota. Other relevant biological measures will be considered by the Regional Board in evaluating compliance with this objective. Additionally, effects on human health due to bioconcentration will be considered."

Resolution 68-16: Statement of Policy with Respect to Maintaining High Quality of Waters in California. The State Water Resources Control Board adopted Resolution 68-16 on October 28, 1968. The Basin Plan, discussed above, states: "Whenever the existing quality of water is better than the quality of water established herein as objectives, such existing water quality shall be maintained unless otherwise provided by State Water Resources Control Boars Resolution 68-16." The SFBRWQCB has identified Resolution 68-16 as a potential ARAR for the United Heckathorn Site. While EPA does not agree that Resolution 68-16 is an ARAR, EPA and the State agree that achieving the water quality criteria identified above would meet the requirements of 68-16 regardless of whether or not it is an ARAR.

Soils and Sediments

No chemical-specific ARARs were identified as remedial goals for soils or sediments at the Site. Based on the results of the ecological assessment, mean sediment levels were calculated to prevent violations of the ARARs for surface waters, and to meet the National Academy of Sciences

(NAS) action level for DDT in fish to ensure protection of fish-eating birds, including endangered species (see discussion below).

California Code of Regulations, Title 22. The state of California has developed chemical-specific regulatory criteria for the identification of hazardous and extremely hazardous wastes, based on Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) values (California Code of Regulations, Title 22, Sections 66699 and 66723). Any waste containing a substance at a concentration equal to or exceeding a listed TTLC is classified as a hazardous waste by the California Department of Toxic Substances Control (DTSC). Extremely hazardous wastes are also classified by DTSC using TTLCs. STLCs are related to the Waste Extraction Test (WET), also described in Title 22. Any waste which produces an extract in the WET test the concentration of which exceeds an STLC, is classified as a hazardous waste by DTSC. The TTLCs and STLCs for the major COCs at the Site, DDT and dieldrin, are listed in Table 2.

TABLE 2. State of California Hazardous Waste Limits

| Chemicals | TTLC (mg/kg wet wt) | STLC (mg/kg wet wt) |
|---|---|---|
| DDT, DDD, DDE | 1.0 | 0.1 |
| Dieldrin | 8.0 | 0.8 |

All materials known to contain concentrations of substances exceeding the limits which classify extremely hazardous wastes have been removed from the Site. Based on the results of previous investigations and the marine RI, approximately 95,000 tons of soils in the upland area of the Site and approximately 65,000 $yd^3$ of sediments in the Lauritzen Channel and Parr Canal exceed the California TTLC for DDT. No sediments outside these channels exceed the levels listed in Table 2. Although the TTLCs and STLCs do not represent cleanup levels, soils and sediments with chemical concentrations higher than the TTLCs or STLCs would be classified as hazardous under California law if they were dredged or excavated at the Site.

EPA has developed chemical-specific criteria for the identification of hazardous waste under the Resource Conservation and Recovery Act (RCRA). For the COCs at this Site, the criteria are not concentration-based, but are instead based on the source of the constituents (40 CFR 261.33). Product spills, for example, are RCRA-regulated, but generally releases of chemicals contained in process waste streams are not (40 CFR 261.33(d)(comment)). Based on a review of historical documents, the presence of COCs in marine sediments and remaining soils appears to be due to releases contained in waste streams from United Heckathorn's processes. Therefore, EPA has determined that the contaminated soils and marine sediments are not hazardous wastes regulated under RCRA.

Groundwater. There are no chemical-specific ARARs for the concentration of COCs in Site groundwater. Previous investigations found that salinity levels exceed federal (40 CFR 144.3) and state (SWRCB Resolution No. 88-63) limits for underground sources of drinking water. Consequently, the shallow groundwater at the Site is not considered a potential source of drinking water as defined under state and federal law.

The water quality criteria for surface waters discussed above do not apply to groundwater, although they might provide a basis for developing remediation goals in groundwater if there was a

complete pathway by which contaminants in groundwater caused violations of the criteria in surface water. However, as discussed in the previous chapter, an analysis of groundwater transport to the bay was made in 1986 as part of the initial state-ordered Site investigation. Although extremely high levels of pesticides were present in soils at that time, there were only sporadic detections of low levels of pesticides in groundwater samples, and modeling indicated that this potential pathway would not cause violations of state surface water quality objectives. Based on this analysis, groundwater monitoring was not required in subsequent state-ordered Site investigations. Subsequently, all highly contaminated soils containing approximately 99% of the mass of pesticides were removed from Site soils, further reducing any potential threat.

Air. There are no chemical-specific ARARs, such as National Ambient Air Quality Standards (NAAQS) or National Emission Standards for Hazardous Air Pollutants (NESHAPS), for the concentrations of Site COCs in the air. Air monitoring was performed at the Site prior to the removal of extremely high levels of exposed pesticides from Site soils. Even under those conditions, the concentrations in onsite and offsite air were well below levels of concern.

Fish and Shellfish. There are no chemical-specific ARARs for the concentration of COCs in fish and shellfish. The NAS saltwater action levels are TBCs, which provide an additional level of protection to fish-eating birds beyond the level that is the basis of the surface water ARARs for aquatic life. The FDA action levels for the marketability of fish and shellfish are also TBCs for protecting human health, but they are much less stringent than the levels that would be achieved by meeting the surface water ARARs discussed above.

The NAS and National Academy of Engineering published recommendations in 1972 for pollutant residues in compoSites of 25 or more whole fish of any species within the same size range as those consumed by any bird or mammal in the marine environment (EPA-R3-73-033, March 1973). The document cites studies demonstrating DDE induced shell thinning in mallards, American kestrels, Japanese quail and ring doves, and an inverse relationship between shell thickness and concentrations of DDE in eggs of wild populations of herring gulls, double-crested cormorants, great blue herons, white pelicans, brown pelicans, and peregrine falcons. The document concludes that a wet weight tissue range of 0.1 mg/kg to 0.5 mg/kg (100 $\mu$g/kg to 500 $\mu$g/kg) is "evidently higher than one which would permit successful reproduction of several fish-eating and raptorial birds." The criterion for DDT is 50 $\mu$g/kg, which is one-third the level which was the basis for the EPA water quality criteria discussed above.

Since the US Fish and Wildlife Service raised concerns that the EPA criteria for DDT might not be stringent enough for the protection of fish-eating birds, and an endangered species (the brown pelican) has been observed feeding at the Site, the NAS action level was retained as a TBC to help determine the protectiveness of remediation (see 55 FR 8745).

Other Requirements

Endangered Species Act. The Endangered Species Act of 1973, 16 USC §1531 et seq., requires the conservation of species of fish, wildlife and plants that are threatened with extinction. Compliance with the act at Superfund Sites requires the identification of any threatened or endangered species or of its critical habitat that would be affected by a proposed remedial action.

The U.S. Fish and Wildlife Service (FWS), which is the federal trustee for the protection of migratory birds, provided a list of endangered species that are known to nest in central or northern San Francisco Bay, or are likely to feed regularly in the immediate vicinity of Richmond Harbor (Table 3). Among these, the California brown pelican has been observed by EPA personnel feeding in all channels in Richmond Harbor, including the most contaminated waterways.

The FWS raised the concern that the tissue residue basis (0.15 mg/kg DDT in prey) of the surface water ARARs resulted in reproductive levels in pelicans that were still 10% to 30% below the levels needed to maintain a stable population, described in the 1976 study used to set the criteria. It should be emphasized, however, that the reproductive effects occurred when contamination was widespread in the birds' range, and that the contamination in Richmond Harbor is restricted to a small area. Nevertheless, the selected remedy is expected to also achieve the NAS saltwater action level for DDT in fish (0.05 mg/kg), which was identified as a TBC for determining the protectiveness of remediation.

TABLE 3. Endangered Species

| Common Name | Nests In SF or San Pablo Bays | Feeds In/Around Richmond Harbor | Prey |
|---|---|---|---|
| Brown Pelican | | Y | Fish[a] |
| Bald Eagle | | | Omni.[b] |
| Peregrine Falcon | Y | Y | Bird[c] |
| Clapper Rail | Y | | Invert.[d] |
| Least Tern | Y | Y | Fish |

(a) Fish: consumes primarily fish.
(b) Bird: consumes primarily birds.
(c) Omni.: diet usually omnivorous/scavenger.
(d) Invert.: consumes primarily small- to medium-sized invertebrates.

California Endangered Species Act. The goal of the California Endangered Species Act (California Fish and Game Code §2050) is to conserve, protect, restore and enhance any endangered or threatened species and its habitat. Among the birds likely to nest or feed in the area, most of those that are listed as endangered or threatened by the state are also listed federally. The one exception is the California black rail, a state threatened species.

CDFG submitted the names of two potentially-affected plant species, both of which are listed as rare and have distributions in the north Bay and delta. They are Mason's lilaeopsis, a minute, turf-forming perennial plant in the carrot family, and soft bird's-beak, a sparingly-branched, semi-parasitic herbaceous annual plant in the figwort family. The known distribution of Mason's lilaeopsis, which is found on saturated clay soils regularly inundated by waves and tidal action, appears to be limited to the bay delta. Soft bird's-beak occurs in the coastal salt marshes and brackish marshes of northern San Francisco and Suisun Bays.

The surface water ARARs discussed previously are five orders of magnitude more stringent than the levels necessary to protect aquatic plants. None of the potential remedies would involve destruction of rare plants or their habitat.

Coastal Zone Management Act (CZMA). Section 307(c)(1) of the CZMA requires that federal agencies conducting or supporting activities directly affecting the coastal zone conduct or support those activities in a manner that is consistent with approved state coastal zone management programs. All remedial alternatives analyzed would affect the coastal zone. Under CERCLA Section 121(e), 42 U.S.C. § 9621(e), onsite activities are not subject to administrative review or permitting

processes, but they must be consistent with the substantive requirements of the coastal zone management plan. The approved coastal zone management program for San Francisco Bay includes the McAteer-Petris Act and the San Francisco Bay Plan, and is administered by Bay Conservation and Development Commission (BCDC).

The McAteer-Petris Act and the Bay Plan were developed primarily to halt uncontrolled development and filling of the bay. Their broad goals include reducing bay fill and disposal of dredged materials in the bay, and maintaining water quality and the ecological integrity of the bay. Generally, filling of the bay is allowable only when public benefits exceed public detriment from the loss of water areas, the filling is for a water-oriented use, and there is no alternative upland location available.

Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbor Act, 42 U.S.C § 1344, regulates dredging and filling in waters of the United States. Several of the remedial alternatives analyzed include dredging contaminated sediments. Some of the potential disposal options include filling in waters of the United States. The United States Army Corps of Engineers (USACE) usually issues permits to conduct the above activities; however, since the actions analyzed would all occur onsite, permits would not be required pursuant to Section 121(e) of CERCLA, although the substantive requirements of the laws would still have to be met.

The determination of the acceptability of fill in waters of the United States is made under the Clean Water Act Section 404(b)(1) guidelines, which were promulgated in 40 CFR Part 230. The discharge of dredged or fill material is prohibited if there is a practicable alternative to the proposed discharge that would have less impact on the ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

California Hazardous Waste Control Law. California's hazardous waste facility closure requirements, 22 California Code of Regulations, Chapters 14 and 15, "Closure and Post Closure," are not ARARs with respect to the upland portions of the United Heckathorn Site because it is neither a hazardous waste facility nor a landfill. Some of the remedial alternatives analyzed would involve the consolidation and onsite containment of contaminated sediment. In the analysis of alternatives, operational requirements found in Title 22 of the California Code of Regulations are discussed, including limited long-term management, Site and cover maintenance, and institutional controls, including land use restrictions.

7. Summary of Site Risks and Remediation Levels.

Risk assessments were conducted by EPA to evaluate the threat to human health and the environment posed by contamination from the United Heckathorn Site. Results of these assessments and the final remediation levels established to address Site risks are summarized below.

Human Health Risk Assessment. The Baseline Human Health Risk Assessment for the Site was performed by ICF Technology Inc. for EPA (ICF Technology, 1994). The results indicate that among the various potential exposure pathways for Site contaminants, only the consumption of fish poses risks that are above EPA's acceptable risk range.

COCs at the Site were selected for evaluation in the risk assessment using the Site soil and sediment data collected by HLA (1986), Levine-Fricke (1990, 1991, 1993), and Weston (1993). The COCs selected for onsite soils were DDT (and metabolites), dieldrin, aldrin, endrin, and lead. Of

these, DDT and dieldrin are the most prevalent contaminants and are the primary contributors to risk. COCs selected for sediments were DDT and dieldrin.

Six exposure pathways were identified as potential concerns at the Site, as follows:

- ingestion and dermal adsorption of chemicals in onsite surface soils by workers at the Site;
- inhalation of fugitive dust from surface soils by onsite workers;
- ingestion and dermal adsorption of chemicals in onsite surface and subsurface soils by temporary construction workers at the Site;
- inhalation of fugitive dust from soils by temporary construction workers at the Site;
- incidental ingestion and dermal adsorption of chemicals in offsite soils by nearby residents, and;
- ingestion of contaminants in fish and shellfish from the Lauritzen, Santa Fe, and Inner Richmond Harbor Channels by fishermen and their families.

The onsite exposure pathways assume that the Site will continue to be used for commercial or industrial uses in the future. This is in accordance with the Bay Conservation and Development Commission's (BCDC) San Francisco Bay Plan which designates the area for port priority or water-related industry use, and the City of Richmond's M-3 (heavy industry) zoning of the Site and surrounding properties.

The six potential exposure pathways were evaluated according to EPA guidance, which uses conservative estimates of chemical toxicity and exposure, and cumulative risk from the addition of pathways. Chemical concentrations used in the risk assessment included both average and either Reasonable Maximum Estimates (RME) of Site concentrations or maximum measured values. EPA baseline human health risk assessments intentionally present conservative (i.e. health-protective) estimates of Site risks. Actual risks are likely to be lower and may in fact be zero.

The assessments for onsite worker exposure and offsite residential exposure are more conservative than usual because the soils databases in both cases were influenced toward higher values. The onsite soils database was skewed by the high number of samples taken to delineate the hot-spot excavation areas. Offsite soil screening samples were intentionally taken only in the immediate downwind area, which would have had the highest concentration had contamination occurred.

The cumulative risks calculated for the onsite soil exposure scenarios indicate that the removal actions that have occurred to date have reduced upland Site concentrations of chlorinated pesticides to acceptable levels. The highest RME cancer risk calculated for the various onsite upland worker scenarios (ingestion, dermal adsorption and inhalation of fugitive dusts from surface soils by a permanent worker) is $1 \times 10^{-4}$, and the maximum Hazard Index (HI) for noncarcinogenic effects is 1. More probable estimates for the same exposure scenario are $2 \times 10^{-5}$ and $<1$. Risks for other onsite worker scenarios are lower. Since the onsite soils database is skewed to produce conservative results and EPA's acceptable risk range is $10^{-4}$ to $10^{-6}$, onsite risks associated with chlorinated pesticides are acceptable.

Onsite risks for occupational exposure to lead were evaluated using EPA's 500 mg/kg to 1000 mg/kg acceptable range for residential exposure, and the state of California's draft procedure for the assessment of adult exposure to lead in soil. Mean onsite lead levels are below 500 mg/kg, and the RME lead concentration results in a 95th percentile adult blood lead level below the target concentration of 10 micrograms per deciliter ($\mu$g/dL) using the state's draft procedures. Therefore, onsite lead levels are acceptable.

Offsite residential risks for COCs in nearby soils were evaluated using the maximum values obtained in EPA's soil screening survey and conservative exposure assumptions, including childhood exposure. All results were well within the acceptable risk range for carcinogenic effects and below an HI of 1 for noncarcinogenic effects. (i.e., the maximum values measured were below a Hazard Index of 1 for noncarcinogenic effects, and below a lifetime excess cancer risk level of $10^{-4}$ for carcinogenic effects).

Risks to fishermen and their families who consume fish caught in the inner Richmond Harbor were evaluated using information from two sources: fish tissue data generated as part of EPA's ecological assessment of the Site, and community interviews with individuals who fish or are familiar with fishing practices in Richmond Harbor. The community interviews confirmed that fishing occurs regularly in Richmond Harbor, particularly at a Site in the Inner Harbor Channel near the Parr Canal that has unrestricted access. Although it could not be determined from the limited interviews performed whether fishing at subsistence rates occurs in the harbor, it is clear that the fishermen are from poor, minority communities, and that the fish are caught for consumption. Fishing in the Lauritzen Channel is restricted because it is surrounded by fenced industrial facilities, and fishing from boats is discouraged by warning signs in English, Spanish, Vietnamese and Laotian, posted under a 1986 order of the CDHS. Baseline risk assessments, however, assume that institutional controls, such as fences and posting, will be ineffective or not maintained. In fact, a person was photographed fishing from an industrial facility on the Lauritzen Channel during the EPA field sampling for the ecological assessment.

The results of the risk calculations indicate that the risks from long-term consumption of either whole fish or fillets of fish caught in the Lauritzen Channel are unacceptable. Using the exposure scenario which is the basis of EPA's water quality criteria for fish consumption, the lifetime excess cancer risk associated with Site COCs is above $10^{-3}$ for consumption of whole fish, and above $10^{-4}$ for fillets. In the Santa Fe and Richmond Inner Harbor Channels, lifetime excess cancer risks are within the acceptable range using the same exposure scenario. If consumption were to occur at subsistence rates, the associated risks would be approximately 10 fold higher. The proposed remedy is expected to achieve protective levels for contaminants of concern under either exposure scenario.

On April 7, 1994, the California Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor. The State's advisory was based on levels of contaminants found in fish purchased from resident fishermen at the Parr Canal area. These fish were larger than those in EPA's studies and had slightly higher contaminant levels. The primary risk associated with the consumption of fish caught outside the Lauritzen Channel is due to contamination with polychlorinated biphenyls (PCBs), although the State would have issued the advisory based upon DDT and dieldrin contamination alone. The source of PCBs is unknown. PCBs are not related to the United Heckathorn Site, and may be present in fish throughout the bay. PCB levels in Richmond Harbor sediments are not elevated relative to typical levels in the bay.

Ecological Assessment. The Ecological Risk Assessment for the United Heckathorn Site was performed by EPA (EPA, 1994). The operations of United Heckathorn from 1947 to 1966 resulted in the release of DDT and other pesticides to and from the shoreline of the Lauritzen Channel and to San Francisco Bay. Today, in the waters of Richmond Harbor near the former plant, high levels of DDT and dieldrin remain in marine sediments. DDT and dieldrin bioaccumulate in marine organisms to the highest levels found in the state of California.

The goals of EPA's ecological assessment were to assess the threats posed to the environment by the contaminants released from United Heckathorn and to determine cleanup levels

protective of the beneficial uses of San Francisco Bay.

The waters of Richmond Harbor are part of San Francisco Bay, the West Coast's largest estuary. The estuary sustains a complex ecosystem containing thousands of species of fish, invertebrates, birds, mammals, insects, amphibians, plants and other life, as well as nearly half the waterfowl and shorebirds migrating along the Pacific flyway. Fish-eating birds, including cormorants, grebes, loons, kingfishers, and California brown pelicans (an endangered species) feed in the most contaminated channels at the Site.

The initial components of EPA's ecological assessment included a review of previous studies in the area. Highlights of this review included the findings that sediment concentrations of DDT are elevated to acutely toxic levels in the Lauritzen Channel and decline by over four orders of magnitude to near background levels in the vicinity of Point Potrero. DDT and dieldrin concentrations are extremely elevated in transplanted mussels and resident invertebrates in the Lauritzen Channel and decline by two orders of magnitude in the Inner Richmond Harbor Channel. Fish caught in the Lauritzen Channel in 1986 contained extremely high levels of DDT, which were comparable to the levels measured in 1960. Finally, a study of migratory waterfowl in San Francisco Bay found that only those which wintered in Richmond Harbor significantly accumulated metabolites of DDT. Although other chemicals are present in Richmond Harbor, they are not consistently found at levels notably above background or above levels that are likely to cause toxicity, in marked contrast to DDT and dieldrin, which are many orders of magnitude above background and were selected as the COCs for the study.

The next preliminary phase of the study was a review of the available standards, criteria, and scientific literature regarding ecological impacts of the COCs to determine as far as possible the contaminant levels in various media that could adversely impact sensitive organisms. This review indicated the ecological receptors likely to be the most sensitive and helped guide the selection of field and laboratory studies. EPA's ambient water quality criteria for DDT and dieldrin were identified as applicable to the Site. The marine chronic criteria for DDT (1 nanogram per liter, ng/L) is based upon preventing bioaccumulation in fish to levels harmful to sensitive marine birds.

The major phase of the study involved field and laboratory measurements of contaminant concentrations in various media and the performance of standard benthic tests for determining impacts from contaminated sediments. Most of the field samples were taken in October 1991. Additional fish and shellfish samples were taken in April 1992. The studies included bulk sediment toxicity testing, benthic community analyses, bioaccumulation testing, and chemical analyses in sediments, surface waters, and tissues of benthic organisms and fish and shellfish collected in trawls. An additional goal of these studies was the determination of the relationship between sediment contaminant concentrations and the concentrations in other media so that a sediment cleanup concentration could be determined which would result in the attainment of water quality criteria and protective contaminant levels in fish and shellfish tissues.

The results of the studies are summarized below. The total DDT levels measured in surface water from the Lauritzen, Santa Fe and lower Richmond Inner Harbor Channels were 50 ng/L, 9 ng/L, and 1 ng/L, respectively. The dieldrin concentrations were 18 ng/L, 2 ng/L, and nondetectable, respectively. These results indicate that the water quality criteria are violated in the Lauritzen and Santa Fe Channels, but are achieved (within the uncertainly of the analysis) or not detectable in the lower Inner Harbor Channel. Analysis of water-to-sediment ratios indicates that the Lauritzen is a source of contamination to the other channels.

Sediment concentrations of total DDT declined from over 50 mg/kg in the Lauritzen Channel to 12 $\mu$g/kg near Point Potrero. Dieldrin concentrations declined from 570 $\mu$g/kg in the Lauritzen to

nondetectable levels in the Inner Harbor Channel. These results are consistent with those of previous researchers, and with the more extensive RI of marine sediments (White et. al 1994).

In 28-day bioaccumulation tests using *Macoma nasuta,* tissue levels of DDT over 50 mg/kg (dry wt) and 1.5 mg/kg dieldrin were obtained using Lauritzen Channel sediments. Tissue levels declined to 80 μg/kg DDT and undetectable levels of dieldrin using sediments from the vicinity of Point Potrero. These results are consistent with those of previous researchers. Further studies revealed that the tissue concentrations obtained at 28 days were approximately half those obtained after a 90-day exposure. Tissue residues of DDT and dieldrin measured in field-collected benthic infauna were as high as 46 mg/kg and 2.5 mg/kg (dry wt), respectively, in the Lauritzen Channel. Concentrations dropped by about two orders of magnitude in the Inner Harbor Channel.

Tissue residues of DDT and dieldrin measured in mussels *(Mytilus sp.)* were 2.6 mg/kg and 97 μg/kg (wet wt) in the Lauritzen Channel, and declined to 40 μg/kg and 5 μg/kg in the lower Richmond Inner Harbor Channel. These results are consistent with those of the State Mussel Watch program. Tissue levels in the lower Inner Harbor Channel are higher than would be predicted from the underlying sediment concentration, again indicating that there is water-column transport of pesticides from the Lauritzen to less contaminated areas.

Tissue residues of DDT measured in whole fish (shiner perch) were over 10 mg/kg in the Lauritzen Channel, roughly 1 mg/kg in the Santa Fe Channel, and roughly 0.1 mg/kg in the Richmond Inner Harbor Channel. Dieldrin levels were roughly 0.6 mg/kg, 0.04 mg/kg, and 0.002 mg/kg in the respective channels. The contaminant concentrations in fish from the Lauritzen Channel are in the same range as those measured in the 1960s, and exceed the levels that may cause adverse impacts to sensitive predatory birds by orders of magnitude. A sensitive bird, which had no other source of DDT in its diet and which consumed more than 0.5% to 1.5% of its diet from the Lauritzen Channel, could be adversely affected. These concentrations may also cause direct toxic impacts such as reduced fry survival in fish. The results for the Santa Fe Channel are an order of magnitude lower, but still exceed levels that may cause adverse impacts to sensitive fish-eating birds. A sensitive bird that consumed more than 5% to 15% of its diet from the Santa Fe Channel might be adversely affected.

Sediment toxicity tests using the amphipod, *Eohaustorius estuarius,* indicated significant acute toxicity in sediments from the Lauritzen Channel. Sediments from the Santa Fe Channel displayed lower but significant toxicity relative to the amphipod's native Yaquina Bay, Oregon, sediment, but were not significantly different from those in the Inner Harbor Channel or other San Francisco Bay locations. DDT was determined to be the primary cause of toxicity in the Lauritzen Channel.

Additional toxicity tests conducted during the RI using the amphipod *Rhepoxynius abronius* confirmed the acute toxicity of Lauritzen Channel sediments. In four of five Lauritzen Channel compoSite samples, there was no survival of test organisms, an extremely rare occurrence indicating severe toxicity. Amphipod survival in samples beginning at the southern end of the Lauritzen Channel and proceeding out the harbor was not significantly different than survival in the San Francisco Bay fine-grained sediment control, indicating that the toxicity is confined to the Lauritzen.

An analysis of benthic infauna indicated that amphipod abundance (with the exception of the pollutant-tolerant *Grandidierella japonica*) was inversely related to DDT concentration. The minimum benthic ecological effects concentration was determined to be 100 μg DDT/g organic carbon (equivalent to 1.9 mg/kg, dry wt, at 1.9% organic carbon).

Overall, the results indicate that the gross contaminant levels in the Lauritzen Channel threaten a variety of ecological receptors at various trophic levels, including benthic and water-column organisms and fish-eating birds. Effects are likely to be much less severe in the Santa Fe Channel, although the contaminant levels in fish are significantly higher than the levels that may threaten sensitive fish-eating birds. In the Richmond Inner Harbor Channel, the DDT levels in fish (100 μg/kg) are between the level that is the basis of EPA's chronic marine water quality criteria intended to protect marine birds (150 μg/kg), and the National Academy of Sciences (NAS) recommendation (50 μg/kg) for protecting marine birds. It is clear from the results above that the most sensitive ecological receptors to sediment organochlorines in Richmond Harbor are likely to be fish-eating marine birds.

The only contaminated medium for which applicable regulatory criteria were identified is surface water. Nonregulatory or surrogate criteria were also identified for fish and shellfish tissues and sediments. Fortunately, surface water concentrations were found to be quite consistent during different tidal cycles and seasons in each of the three channels sampled. In addition, the concentrations measured in the water column and the concentrations measured in whole fish were found to agree remarkably with the concentrations predicted by the applicable EPA marine chronic water quality criteria. This demonstrates that total DDT present in surface waters is bioavailable, and that it accumulates as predicted by the applicable marine chronic criteria.

The analysis of surface water pesticide concentrations in the three channels indicates that the concentrations in the Santa Fe and Richmond Inner Harbor Channels are likely elevated by approximately one order of magnitude over the concentrations that would result from the respective local sediment concentrations, due to the flux of contaminated water from the Lauritzen Channel. This indicates that remediation of the Lauritzen would have beneficial effects throughout the Inner Harbor.

Site Remediation Goals. The final goal of the ecological assessment was to provide sufficient information to develop Site remediation goals for contaminated marine sediments containing the COCs, DDT and dieldrin, which would be protective of the environment and human health. The DDT and dieldrin water quality criteria are near or below the levels which can be quantified by the best laboratories. Protective levels in sediments are much more readily measureable, particularly for DDT. Although DDT and dieldrin co-occur, the DDT concentration is generally 10 to 100 times higher, and DDT was detected in sediment samples over a wider area. Sediment remediation goals, which are expected to attain protective levels for both contaminants, have therefore been established based on DDT concentration.

As indicated above, it was determined that the minimum ecological effects concentration for benthic organisms was 100 μg DDT/g of organic carbon, which is equivalent to 1,900 μg/kg (dry wt) at 1.9% organic carbon. Sediment concentrations exceeding this value might cause local chronic adverse impacts to benthic organisms. EPA has reviewed data for other DDT-contaminated Sites, and found a similar threshold for benthic effects. Sediments in the Lauritzen Channel and Parr Canal exceed this level. The maximum concentrations outside these channels are below this level.

The EPA marine chronic water quality criteria of 1 ng/L DDT is likely to be achieved if the average channel sediment concentration is below 1,000 μg/kg DDT (dry wt); and the human health criteria of 0.6 ng/L is likely to be achieved if the average sediment concentration is below 590 μg/kg DDT.

TABLE 4. Remediation Levels

| Final Remediation Levels | | | | Cancer Risk Level |
|---|---|---|---|---|
| Medium | Chemical | Level | Basis | |
| Surface Water | DDT<br>Dieldrin | 0.59 ng/l<br>0.14 ng/l | EPA AWQC | $1 \times 10^{-6}$<br>$1 \times 10^{-6}$ |
| Sediment | DDT | Avg: 590 $\mu$g/kg | Ecological Assessment | $1 \times 10^{-6}$ |

The average sediment concentrations in the Lauritzen Channel and Parr Canal exceed the 590 $\mu$g/kg DDT level, while the average concentrations in the Santa Fe and Inner Harbor Channels are below the level. Therefore the remediation of sediments will be limited to the Lauritzen Channel and Parr Canal. Although the concentrations of pesticides in upland soils are acceptable for human exposure, they exceed the protective levels for sediments in the adjacent channels, indicating that erosion of upland soils and stormwater runoff to the marine environment should be prevented.

The NAS action level for the concentration of DDT in fish to protect fish-eating birds is not an ARAR but was identified as a TBC to assist in determining the protectiveness of remediation. The NAS action level is likely to be achieved if the average channel DDT sediment concentration is below 420 $\mu$g/kg. Since the average concentrations of DDT in the Santa Fe and Inner Harbor Channels are below this level, cleanup of sediments in the Lauritzen Channel and Parr Canal is expected to result in achievement of the NAS action level.

8. Description of Alternatives.

The environmental media requiring remediation are soft marine sediments (young bay muds) in the Lauritzen Channel and Parr Canal. Contamination is confined to softer younger bay mud, and has not migrated into the underlying older bay mud. The volume of contaminated sediment in the Lauritzen Channel and Parr Canal is approximately 65,000 $yd^3$. Remediation of this sediment is expected to result in achievement of the remedial action goals. In addition, erosion of upland soils containing DDT at concentrations exceeding the final remediation level for sediments must be prevented. No action will be taken in other areas in Richmond Harbor, such as the Santa Fe Channel and Inner Harbor Channel, because sediment levels are below the remediation levels established above.

The action alternatives presented below all include dredging of contaminated sediments and paving of upland soils on the northern half of the Levin Richmond Terminal. The principal difference among these alternatives is in the location chosen for disposal of dredged sediments. In addition, the "no action" alternative has been retained as a baseline for comparison with the other alternatives, as required by the National Contingency Plan, 40 C.F.R. § 300.430(e)(6). The four alternatives are summarized below:

Alternative 1: no action

Alternative 2: confined disposal of marine sediment in the Port of Richmond's Point Potrero graving docks, and capping of upland areas

Alternative 3: confined disposal of marine sediment in the Lauritzen Channel, and capping of upland areas

Alternative 4: offsite disposal of marine sediment by rail, and capping of upland areas.

With the exception of "no action," all of the alternatives have been developed to meet the remedial action goals. In addition to the components listed above, each action alternative includes environmental monitoring to evaluate the effectiveness of the remedy, and institutional measures to limit future Site uses to those considered in the human health risk assessment.

Common Elements

Elements which are common to two or more alternatives, including dredging, monitoring, paving of upland areas, and institutional controls, are discussed below.

Dredging. Alternatives 2 through 4 would involve dredging of the younger bay mud from the Lauritzen Channel and Parr Canal. The total volume of these sediments is estimated to be 65,000 $yd^3$, although if Alternative 2 were selected, some of the most contaminated sediments would remain in place in the Lauritzen Channel within a Confined Disposal Facility (CDF). In areas to be dredged, all soft sediments down to the hard older bay mud contact would be removed.

Silt curtains would be erected across the mouths of the channels prior to dredging to prevent transport of sediment disturbed by the dredging process out of the excavation area. In addition, control measures would be implemented to prevent or minimize the runoff or return of sediment back to the excavation areas. The surface water ARARs for the concentrations of COCs are not currently achieved, and would not be expected to be achieved in the Lauritzen Channel and Parr Canal during the dredging phase of remediation at the Site. The surface water ARARs are remedial action goals which are expected to be achieved after the dredging is completed.

Two sunken barges, one small tank, and other debris (see Figure 3) would have to be removed from the Lauritzen Channel prior to dredging under Alternatives 2 through 4. In one of the configurations of Alternative 3, a CDF would be constructed in the northern end of the channel, allowing one barge and the small tank to remain in place. Samples of sediment taken by EPA divers from inside the barge and tank indicated that they are not sources of contamination.

Monitoring. In order to determine the effectiveness of the remedial action, a post-remedial monitoring program would be required. Monitoring would be expected to occur annually for at least five years or until it was demonstrated that the remediation goals had been achieved, and could continue at longer intervals (e.g., once every five years) for an additional period of time. The monitoring program would also be implemented as part of the "no action" alternative.

The post-remedial monitoring program would include surface water and biological monitoring components. Periodic collection and analysis of surface water samples would determine compliance with EPA ambient water quality criteria, which are ARARs. Bioaccumulation could be monitored through the periodic deployment and subsequent collection and analysis of mussels, as is done in the State Mussel Watch program. Mussels provide the most consistent, readily obtainable biological data. These data can be compared to the historic State Mussel Watch bioaccumulation

database for Richmond Harbor to confirm reductions in tissue residues. Sampling locations to confirm the effectiveness of the remedy would be in the Lauritzen, Santa Fe and Richmond Inner Harbor Channels. Additional sampling might be required based on the remedy selected. For example, if confined disposal at the Port of Richmond's graving docks were selected, an additional monitoring station would be established outside the facility.

Capping of Upland Area. The results of the human health risk assessment indicate that the removal actions performed at the Site between 1990 and 1993 reduced contaminant concentrations in upland soils to levels that are acceptable for current and expected future commercial or industrial uses. Nevertheless, roughly 95,000 tons of soils over a large area of the Site exceed the much lower remedial action goal for marine sediments. Therefore, a remediation goal of erosion prevention was established for upland soils. The northern half of the Levin Richmond Terminal, which is where the United Heckathorn facility was located and where concentrations exceed 1 mg/kg DDT, is currently unpaved. Each of the action alternatives includes paving this area with asphalt. The area of the upland asphalt cap is shown in Figure 6. The cost of capping this area was estimated in the FS performed by Levine-Fricke (1991). The estimate of $400,000 includes a 20% contingency. This cost is included in the estimates generated for each remedial alternative except "no action."

Institutional Controls. The human health risk assessment concluded that the concentrations of COCs in upland soils at the Levin Richmond Terminal had been reduced to acceptable levels for current and expected future industrial uses. This is consistent with the San Francisco Bay Plan under which the area is zoned for port priority or water-related industrial use. In order to provide an additional measure of assurance that the Site could not be converted to other use, such as residential, without further study and possibly further remediation, a deed restriction on the property will be included as part of Alternatives 2 through 4.

The Lauritzen Channel is currently posted with signs warning fishermen that fish and shellfish may be contaminated with DDT and other pesticides. These signs will remain in place until post-remedial monitoring confirms that concentrations of the COCs have been reduced to acceptable levels.

Alternative 1: No Action with Monitoring. The NCP requires the analysis of no action as an alternative (40 CFR 300.430(e)(6)). Under no action, no further remediation would be conducted at the Site, although the monitoring program would still be performed to evaluate the effects of the remaining contamination. The existing institutional controls would remain in place.

The no action alternative does not meet either of the two threshold criteria described below (overall protection of human health and the environment, and compliance with ARARs). Because the threshold criteria are not met, this alternative is not eligible for selection.

Alternative 2: Dredging with Containment at the Point Potrero Graving Docks. The major components of this alternative are dredging approximately 65,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and disposing of the sediment in a CDF constructed at the Port of Richmond's graving docks.

The graving docks are located at Point Potrero, at the southern end of the Richmond Inner Harbor Channel, approximately one mile from the location of the former United Heckathorn facility (see Figure 2). A sediment containment facility constructed at the graving docks could be determined to be "onsite" under the definition of the NCP, which includes all locations within the areal extent of contamination and all suitable areas in very close proximity necessary for implementation of the response action (40 CFR 300.5).

Graving docks are concrete box structures used to drydock ships. The Point Potrero graving docks were built during World War II and, due to their relatively small size, are obsolete for modern vessels. The Port of Richmond suggested that the graving docks be analyzed as a potential disposal Site for contaminated sediments because they have the capacity to effectively contain very large volumes. Depending on the configuration and number of basins used, the facility could contain between 89,000 $yd^3$ and 500,000 $yd^3$ of sediment. The facility would not be simply a disposal Site, but would be constructed so that it would be suitable for use as a marine shipping terminal. Use of the graving docks would not be offered by the Port of Richmond for disposal alone. The Port has analyzed a number of alternative configurations which would accommodate varying volumes of dredged material and provide the Port an additional berth or pier of at least 600 ft. The Port's cost estimates for each of the various configurations include the costs of preparing the basins to receive dredged material, and the costs of enhancing the facility for Port use.

The configuration chosen for analysis would entail filling Basin 1 with approximately 65,000 $yd^3$ of sediment dredged from the Lauritzen Channel and Parr Canal, and 24,000 $yd^3$ of additional material to produce a total of 89,000 $yd^3$. This is the lowest cost configuration which would provide sufficient volume to contain sediments dredged from the Lauritzen Channel and Parr Canal. Prior to receiving sediment, Basin 1 would be inspected and repaired if necessary, and then sealed with a concrete bulkhead. Wick drains would be installed for dewatering. The pier between Basins 2 and 3 would be removed, and Basin 3 would be lengthened from 500 ft to 750 ft, creating a new berth for large ships.

Dredged sediment would be barged to the drydock and depoSited by mechanical means in order to minimize entrainment of water. It is estimated that consolidation of the sediment within the basin would take a minimum of four years. If hydraulic dredging were used, consolidation would probably take longer. The average concentration of DDT in the sediment would be 30 mg/kg wet wt. Based on the results of the treatability testing performed during the marine RI, it is expected that treatment by filtration and carbon adsorption would be required before effluent produced by dewatering could be discharged from the basin to the bay. Although a Waste Discharge Permit would not be required under CERCLA, substantive requirements would have to be achieved, including toxicity limits and compliance with numeric water quality criteria. A possible alternative would be to discharge effluent to a sanitary sewer under permit from the local agency. Discharges to the sewer system would be "offsite" and require permitting.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, removal of the sunken barges and other debris from the Lauritzen Channel, asphalt paving of the northern half of the Levin Richmond Terminal, and institutional controls. The estimated cost of this alternative included roughly $700,000 to prepare Basin 1 and close it after filling, and roughly $1.8 million to remove the pier between Basins 2 and 3, and lengthen Basin 3 to produce a 750-ft berth. Annual overhead and maintenance costs include evaluation and repair of the graving docks, operation and maintenance of an effluent treatment system for dewatering sediment, and post-remediation monitoring. The total estimated cost for this alternative is $5.6 million. This estimate does not include the costs, which could be substantial, of obtaining an agreement among various parties regarding the use of the facility and future liability. In addition, state and federal agencies have indicated that they might seek mitigation to compensate for the fill associated with this alternative. The costs of mitigation would also significantly increase the total cost of this alternative.

This alternative would be expected to meet the remedial action goals defined in Table 4 and provide effective long-term protection of human health and the environment. It is unclear, however, whether it would comply with ARARs related to bay fill unless an upland alternative were unavailable. Dredging would cause short-term impacts within the excavation areas. Because the

dredged sediment would be classified as hazardous waste pursuant to State of California regulations, this alternative would require agreements between a number of government and private parties regarding long-term liability and operations and maintenance, limiting its implementability.

Alternative 3: Dredging with Containment at Lauritzen Canal. The major components of this alternative would be dredging between 44,000 $yd^3$ and 52,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and depositing it in a CDF constructed within the Lauritzen Channel. Two variations of CDFs were analyzed for this alternative based on alternatives developed by Levine-Fricke (1991). The first consists of a steel sheetpile wall approximately 1300 ft long constructed along the eastern shoreline of the channel. The sheetpile wall would be tied to anchors placed in the soil at the Levin Richmond Terminal. This configuration does not interfere with either the storm drain at the northern end of the channel, or with properties across the channel from Levin.

The second variation of a CDF in the Lauritzen would consist of a rock dam across the northern end of the Lauritzen Channel. Advantages of this configuration are that it would minimize the dredging of the most contaminated sediments in the channel; the barge, tank, and debris in the northern end of the channel could remain in place; it would require less maintenance than a steel sheetpile wall; and it would be less costly to construct.

Dredged sediment could be depoSited in the CDF by mechanical means, or by hydraulic dredging. Consolidation of the sediment within the basin would take several years. The average concentration of DDT in the sediment would be 30 mg/kg wet wt. Based on the results of the treatability testing performed during the marine RI, it is expected that treatment by filtration and carbon adsorption would be required before effluent produced by dewatering could be discharged from the basin to the bay. Although under CERCLA a Waste Discharge Permit need not be obtained, substantive requirements would have to be achieved, including toxicity limits and compliance with numeric water quality criteria. A possible alternative would be to discharge effluent to a sanitary sewer under permit from the local agency. Discharges to the sewer system in this case would be "offsite" and require permitting.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, asphalt paving of the northern half of the Levin Richmond Terminal, removal of at least one sunken barge from the Lauritzen Channel, and institutional controls. Annual overhead and maintenance costs include evaluation and repair of the CDF, operation and maintenance of an effluent treatment system for dewatering sediment; and post-remediation monitoring. The cost of dredging the sediment for this alternative would be slightly lower than the costs described for the previous alternative since some of the sediment would remain in place and transportation would not be required. The estimated cost range is $13 million for the sheet-pile wall variation and $4.3 million for the rock dam. In addition, state and federal agencies and the Port of Richmond have indicated that they might seek mitigation to compensate for the fill associated with this alternative. The cost of mitigation would also significantly increase the total cost of this alternative.

This alternative would be expected to meet the remedial action goals defined in Table 4 and provide effective long-term protection of human health and the environment. It is unclear, however, whether it would comply with ARARs related to bay fill unless an upland alternative were unavailable. This alternative would require the least amount of dredging, which would minimize short-term impacts within the excavation areas. The rock dam variation of this alternative would have an impact on adjacent property owners, which could hinder implementability. In addition, because the dredged sediment would be classified as hazardous waste pursuant to State of California regulations, this alternative would require agreements between a number of government and private parties regarding long term liability and operations and maintenance, limiting the

implementability of this alternative.

Alternative 4: Dredging with Offsite Disposal. The major components of this alternative are dredging approximately 65,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and transportation of the sediment by rail to a permitted offsite disposal facility. Transport by rail offers several significant advantages. The Levin Richmond Terminal is a rail facility with lines running the length of the shoreline of the Lauritzen Channel. Since dredging can produce very large volumes of sediment very quickly, the limiting factor in removing sediment from the Site would be the time required to load it for transport. Watertight rail cars would be used to prevent releases during transportation. A rail car can carry 100 tons, and a single train can transport approximately 8000 tons. It is estimated that the entire project could be accomplished in about two months.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, asphalt paving of the northern half of the Levin Richmond Terminal, removal of barges and debris from the Lauritzen Channel, and institutional controls. The estimated cost for this alternative is $7.3 million. Since the sediments would be transported offsite to a permitted disposal facility, long-term operations and maintenance costs are only those associated with the monitoring program and maintenance of the asphalt paving at the Site. The estimated disposal cost for this alternative includes transportation by rail and was provided by the East Carbon Development Corporation, a facility in eastern Utah which is permitted to receive non-RCRA wastes.

This alternative would be expected to meet the remedial action goals defined in Table 4, provide effective long-term protection of human health and the environment, and comply with all ARARs. Dredging would cause short-term impacts within the excavation areas. Disposal of sediments at an offsite facility would require no bay fill, and would minimize long-term maintenance costs and liabilities. Offsite disposal by rail appears to be implementable at a reasonable cost.

9. Summary of Comparative Analysis of Alternatives.

The alternatives were analyzed using the nine criteria of the NCP (see 40 CFR 300.430(f)(5)(i)). The comparative analysis with respect to each criteria is summarized below. Overall, it was determined that Alternative 4, Dredging with Off-Site Disposal provides the best balance among the alternatives with respect to the evaluation criteria.

Overall Protection of Human Health and the Environment: All of the alternatives except "no action" are expected to provide adequate protection of human health and the environment. The risks associated with the COCs are due to their current location in or near the aquatic environment. Alternatives 2 and 3 would achieve protection by isolating the contaminants from the aquatic environment in onsite confined disposal facilities which would require perpetual maintenance to ensure that contaminants were not re-released to the marine environment. Alternative 4 would achieve protection by transporting contaminants offsite.

Compliance with ARARs: The "no action" alternative would not result in compliance with ARARs. Alternative 2, confinement in the Port of Richmond's graving docks, relies on the dual purpose of the remedy to create a port facility in order to achieve consistency with the CZMA and compliance with the Clean Water Act. Alternative 3, confinement in the Lauritzen Channel, would probably not be consistent with the CZMA or the Clean Water Act unless it was determined that there was no practicable alternative. Alternative 4, offsite disposal, complies with all ARARs, and appears to be practicable.

Long-term Effectiveness and Permanence: Alternatives 2 through 4 are all expected to provide adequate long-term effectiveness and permanence. Concrete vaults and shoreline CDFs have been

used successfully at other Sites to contain contaminated sediments, although they require perpetual maintenance. Alternative 4, offsite disposal, provides the highest degree of permanence because the contaminated sediments would be stored far from the aquatic environment. Although the contaminated sediment presents an unacceptable threat to human health and the environment because of its current location which allows exposure to marine organisms and biomagnification in the food chain, the expected average concentration after dredging of approximately 30 mg/kg is well within the acceptable range for direct human exposure, and would not present a direct threat when contained in a disposal facility.

Reduction of Toxicity, Mobility, or Volume through Treatment: None of the alternatives employs treatment. Alternatives 2 through 4 meet the expectation of the NCP for containment of high volumes of waste which have relatively low contaminant concentrations. Based on the process screening conducted in the FS, treatment of the COCs in Site sediments would not be practicable. Site upland soils which contained extremely high levels of contaminants were addressed in previous removal actions.

Short-term Effectiveness: None of the alternatives would be expected to cause short-term risks to the community. The risks to workers are expected to be primarily those associated with construction, transportation, dredging, and solids handling. All of the dredging alternatives would cause short-term impacts within the excavation areas, and would remove the existing benthic communities from the bottoms of the Lauritzen Channel and Parr Canal. However, it is expected that the channel bottoms would be recolonized by more diverse populations. Alternative 4, offsite disposal, would achieve protection in the shortest amount of time.

Implementability: Alternative 4 is the most readily implementable. It would require the least amount of onsite construction and preparation, and should have no administrative impediments. Alternative 2, consolidation at the Port of Richmond's graving docks, would require a complex agreement between the City of Richmond and other parties regarding ownership, operations, and liability. Alternative 3, consolidation in a CDF in the Lauritzen Channel, would likely encounter state opposition, and could require agreements among adjacent property owners regarding loss of shoreline and access, as well as agreements with PRPs and several government agencies, including the City of Richmond, DTSC and EPA.

Cost: The estimated costs for all of the alternatives are comparable. The cost for Alternative 4, offsite disposal, while not the lowest, is the most certain. The estimated costs for Alternative 2, confinement at the Port of Richmond's graving docks, and Alternative 3, confinement at the Lauritzen Channel, would be more likely to change given the need for agreements among parties regarding ownership, maintenance and liability for facilities containing wastes exceeding state hazardous levels. The costs for construction, dewatering, effluent disposal, and hazardous waste storage are also less certain than the offsite transportation and disposal costs. In addition, the cost estimates for alternatives 2 and 3 did not include possibly significant costs for mitigation of bay fill, which had been proposed by state and local agencies.

State Acceptance: The Department of Toxic Substances Control of Cal-EPA, which is the lead state agency for oversight at this Superfund Site, agrees with the selected remedy. In addition, the San Francisco Bay Regional Water Quality Control Board and the San Francisco Bay Conservation and Development Commission also agree with the selected remedy.

Community Acceptance: Based on the comments received during the Proposed Plan comment period, it is evident that the selected remedy is acceptable to the community. No comments were received from the community opposing the selected remedy or supporting other alternatives.

10. Selected Remedy.

The selected alternative is dredging with off-site disposal. Components of the selected remedy include:

- Dredging of all soft bay mud from the Lauritzen Channel and Parr Canal, with off-site disposal by rail of dredged material.
- Placement of clean sediment after dredging.
- Capping of areas around the former Heckathorn facility, shown in Figure 6.
- A deed restriction or notice limiting use of the Levin-Richmond terminal to the current industrial classification.
- Marine monitoring to determine the effectiveness of the remedy.

The remedy will involve dredging of the younger bay mud from the Lauritzen Channel and Parr Canal. The total volume of these sediments is estimated to be 65,000 $yd^3$. In areas to be dredged, all soft sediments down to the hard older bay mud contact would be removed. Two sunken barges, one small tank, and other debris (see Figure 3) would be removed from the Lauritzen Channel prior to dredging. In limited areas dredging may be impractical or of limited effectiveness in removing all contaminated sediments because of obstructions such as rip-rap and capping may be required.

Silt curtains will be erected across the mouths of the channels prior to dredging to prevent transport of sediment disturbed by the dredging process out of the excavation area. Dredged material will either be loaded directly onto rail cars or stockpiled on a barge or on land to facilitate loading. Excess water, if any, produced during dredging and initial handling will be returned to the dredging area inside the silt curtains. However, control measures, such as physical separation or filtration, will be implemented to prevent or minimize the runoff or return of sediment back to the excavation areas. The surface water ARARs for the concentrations of COCs are not currently achieved, and would not be expected to be achieved in the Lauritzen Channel and Parr Canal during the remediation. The surface water ARARs are remedial action goals which are expected to be achieved after the remediation is complete.

The dredged material will be transported by rail to a permitted land disposal facility which meets the requirements of the CERCLA offsite policy. The expected average concentration of approximately 30 mg/kg, is well within the acceptable range for direct human exposure, and will not present a long-term threat at a disposal facility. Monitoring of surface water and biota will occur for at least five years or until it is demonstrated that the remediation goals have been achieved, and could continue for a longer period of time. To promote the return of flora and fauna to the dredged areas, a 1/2 foot layer of clean material will be placed after dredging. The material will not significantly alter the existing bathymetry or impede navigation. The estimated cost for the selected remedy is $7 million.

The selected remedy provides overall protection of human health and the environment, complies with ARARs, and provides the best overall balance of alternatives under the nine selection criteria of the NCP.

11. Statutory Determinations

The selected remedy is protective of human health and the environment, complies with ARARs, and is cost effective. The principal threats at the Site were addressed by removal actions. Because this remedy will result in hazardous materials remaining onsite, a review will be conducted five years after the commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

12. Documentation of Significant Changes.

The proposed plan for the Site was released for public comment in July, 1994. The proposed plan identified alternative 4, dredging with offsite disposal as the preferred alternative. EPA reviewed all written and oral comments submitted during the comment period. Upon review of these comments, EPA determined that no significant changes to the remedy, as it was originally identified in the proposed plan, were necessary.

During the proposed plan comment period, the National Oceanic and Atmospheric Administration and the U.S. Fish and Wildlife Service recommended that a layer of clean material be placed in the channels after dredging for restoration. The material would promote the return of habitat and fauna to the dredged areas. The proposed plan included the placement of clean fill in limited areas. The final remedy includes placement of a 1/2 foot layer of clean material after dredging in the Lauritzen Channel and Parr Canal. The cost of placing clean material, which would apply to all alternatives except "no action," was not included in the estimates contained in the FS or proposed plan. The estimated cost is $200,000, which increases the total estimated cost from $6.8 million in the proposed plan to $7 million for the final remedy.

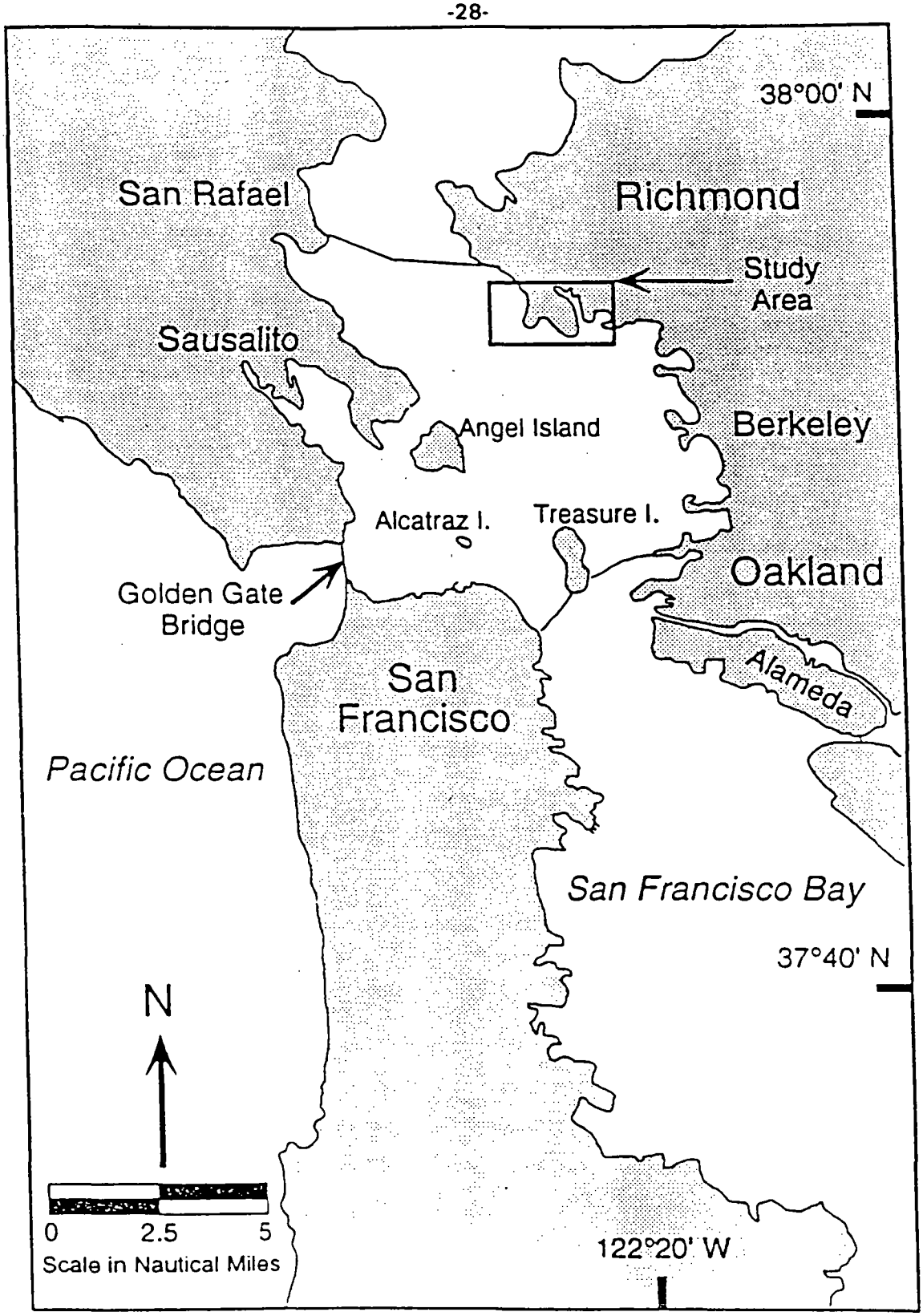



Figure 1. Site location map.

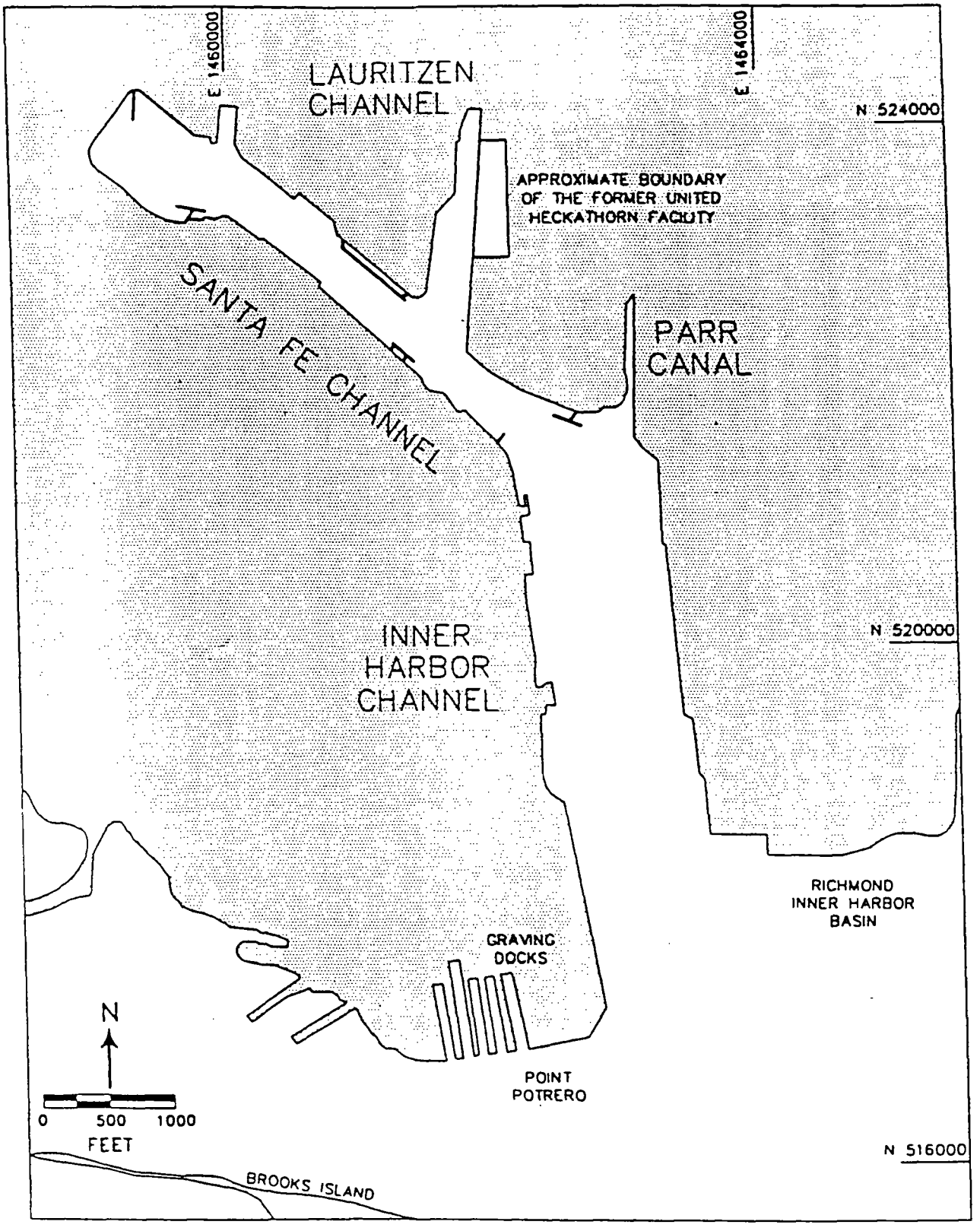



Figure 2. Map of Richmond Harbor.

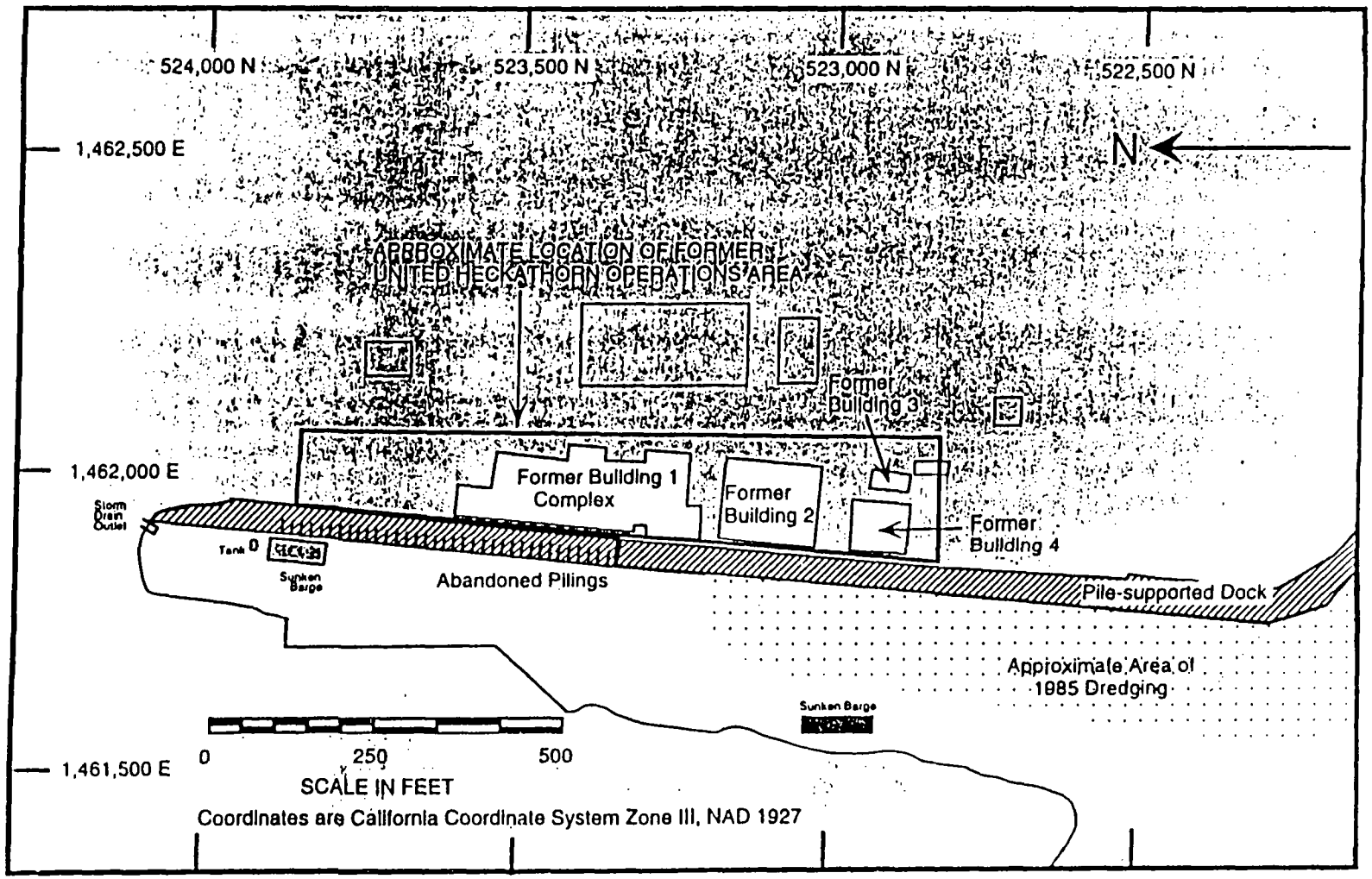
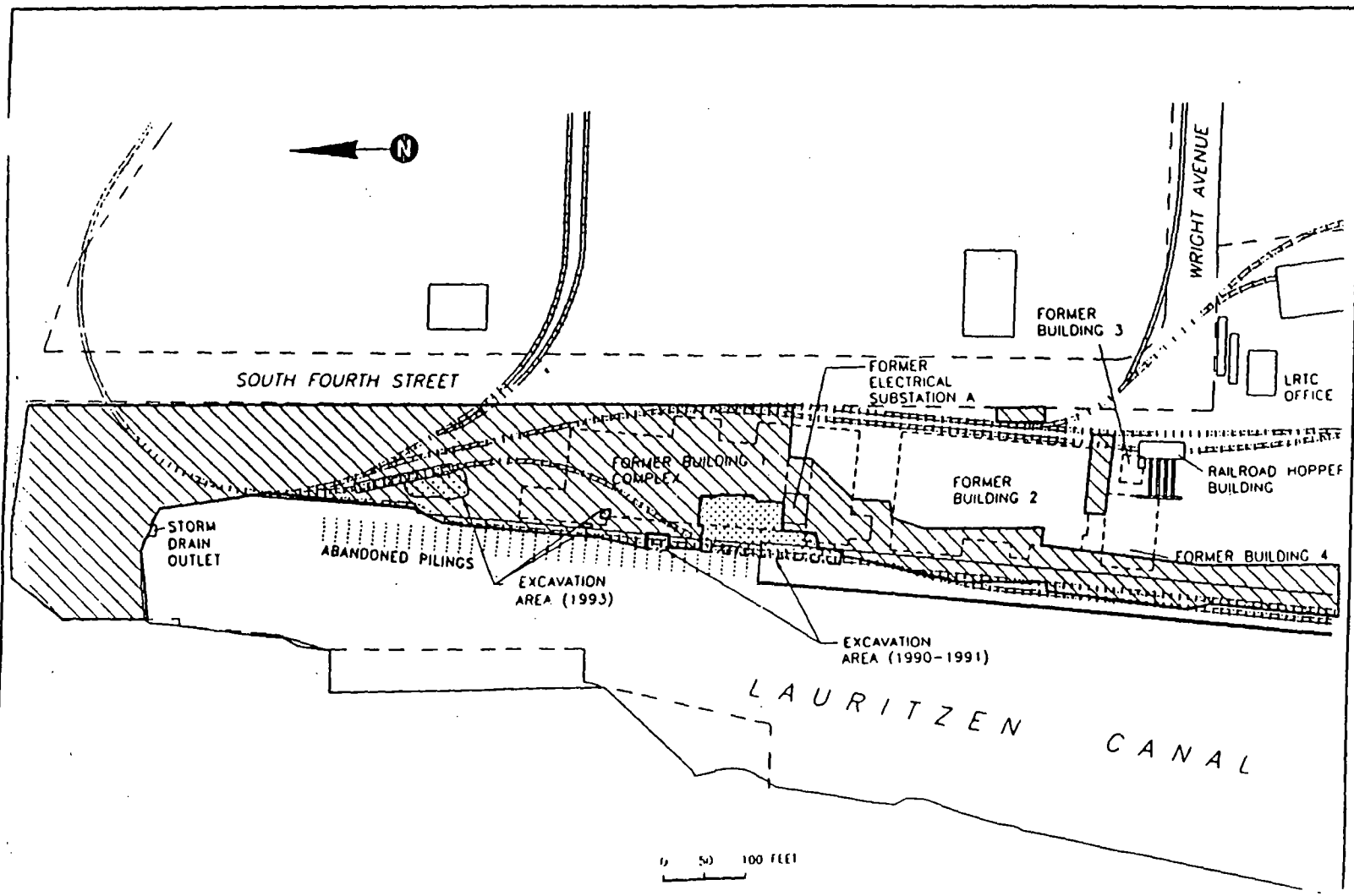



Figure 3. Map of the Lauritzen Channel.




From 12/22/93 letter from Levine-Fricke to EPA.

Figure 4. Upland soils with pesticide concentrations exceeding 1 ppm.

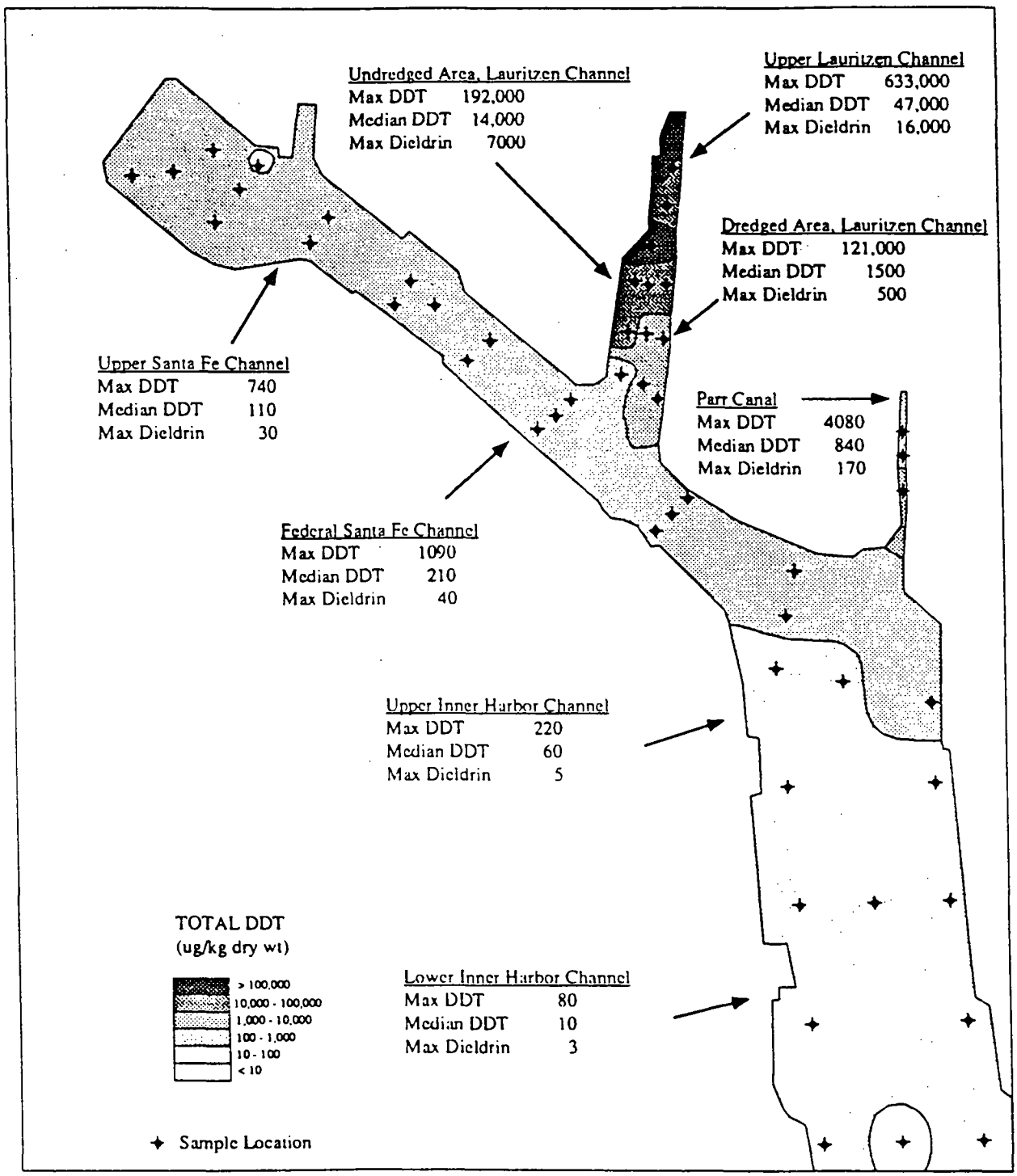
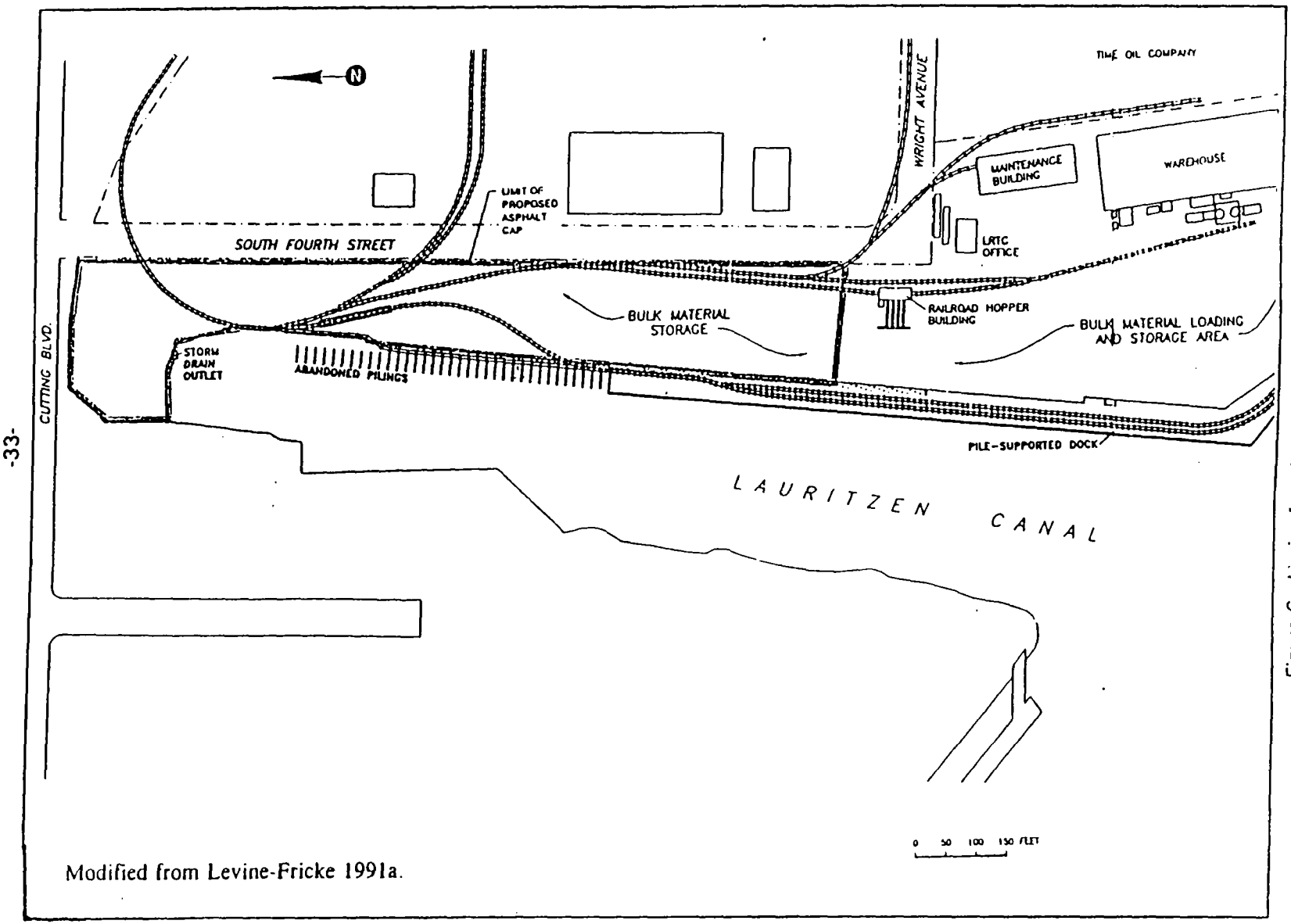



Figure 5. Average total DDT in younger bay mud, Richmond Harbor.




Modified from Levine-Fricke 1991a.

Figure 6. Limit of asphalt cap for upland soils.

## RESPONSE TO COMMENTS

United Heckathorn Superfund Site
Richmond, California

October 14, 1994

EPA released the Proposed Plan for the United Heckathorn Superfund Site for public comment on July 15, 1994. The comment period included a 30-day extension which was requested by Potentially Responsible Parties (PRPs). Consequently, the public comment period closed on September 14, 1994.

Three persons made comments at the Public Hearing on August 2, 1994, one of which was also submitted in writing. Six additional written comments on the Proposed Plan were submitted during the comment period. The oral and written comments are addressed below in the order in which they were made. Two additional comments, one on the final human health risk assessment and one on the Feasibility Study, were also received during the comment period. These are discussed after the comments on the Proposed Plan.

EPA reviewed all written comments submitted during the public comment period and all oral comments made at the Public Hearing. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary. However, a minor change has been made in response to comments from the United States Fish and Wildlife Service and the National Oceanic and Atmospheric Administration. The Proposed Plan included a provision for minor amounts of clean material to be placed in limited areas after dredging. The comments specified that six inches of clean material be placed in dredged areas to promote restoration. The ROD specifies the six-inch layer, and includes a total estimated cost for placement of $200,000, raising the final remedy cost from the proposed $6.8 million to $7 million.

*1. The Bay Conservation and Development Commission stated that EPA's preferred alternative for remediation "appears to be the most consistent with the Commission's laws and policies [and] best achieves compliance with federal and state environmental laws while ensuring the protection of San Francisco Bay's diverse natural resources, and the health and safety of the surrounding human community." (letter, 7/21/94)*

*2. The Save San Francisco Bay Association expressed its support for EPA's Proposed Plan, stating that it "is the best way to deal with United Heckathorn's legacy of chemical contamination in the Richmond Harbor. Other proposed alternatives are unacceptable because of the need for bay fill and maintenance." (letter, 7/29/94)*

*3. The Director of the Port of Richmond spoke at the public hearing and also submitted his comments in writing (8/2/94). Although the Port supports the selected remedy, it is concerned that lower levels of contaminants elsewhere in the harbor may impact disposal options for material dredged for navigation purposes. The Port stated that it would hold EPA responsible for the costs of disposal of any sediments not addressed by the remedy.*

Response: EPA appreciates the Port and the City of Richmond's constructive participation throughout the remedy selection process. Based on the results of the Remedial Investigation and Human Health and Ecological Risk Assessments, EPA concluded that cleanup of those channels

with mean sediment DDT concentrations above 590 ppb is necessary to protect human health and the environment. Channels and private berths outside the cleanup area may still contain sediments with DDT levels below a mean of 590 ppb or with measurable levels of other site-related and/or non site-related contaminants which might affect dredge spoils disposal options. However, based on the results of EPA's RI, HHRA and ERA, contaminant levels in sediment in the Santa Fe Channel and the Inner Richmond Harbor Channel do not pose a significant risk to human health and the environment that would trigger remediation under Superfund. Consequently, EPA in the Record of Decision for the Site has determined that no remedial action is necessary with regard to sediments in the Santa Fe Channel and Inner Richmond Harbor Channel. Under the authority established in CERCLA, particularly in Section 104(a) and Section 121, 42 U.S.C. § 9604(a) and § 9621, EPA is authorized to select remedial actions to protect human health and the environment. EPA is not authorized under CERCLA to make remedial decisions solely to redress economic or property damage that may result or may have resulted from the presence of low levels of hazardous substances or other contaminants. Should the Port incur additional dredge spoil disposal costs because of low level contamination present in the dredged sediment, the City is free to pursue any available legal remedies against parties responsible for the contamination.

*4. Mr. Richard Oba, vice president of United Anglers of California spoke at the public meeting and expressed support for EPA's proposed alternative, stating, "we would like to see the job finished."*

*5. Ms. V. Peters spoke at the public meeting and expressed concern that EPA does not have a community public alert system already in place, stating, "should there be a railway accident, I think you really should have a plan that you can present to the community."*

Response: At the time of the public meeting for a Superfund Proposed Plan, EPA has not yet selected the remedy. In this case, of four alternatives considered, three did not involve offsite transportation and disposal of waste. EPA must solicit and consider comments on all alternatives prior to making a final selection.

EPA efforts to inform and involve the community will continue throughout the period of remedial design and remedial action. A health and safety plan will be prepared and made available to the public prior to initiating any action at the site. This plan will address transportation safety and contain procedures to ensure that the dredged sediment is safely contained during transport and that if a spill occurs specific procedures will be implemented to immediately clean up the spill and minimize any risk that the community could come in contact with the spilled sediment. Transportation of the dredged sediment will be conducted by licensed transporters with oversight by EPA acting in cooperation with local and state authorities.

*6. Mr. Nicholas Pinette, a resident of Richmond, stated that the preferred offsite disposal alternative makes good sense, but questioned where the dredged material would be transported to for disposal and how it would be stored. (letter, 8/7/94)*

Response: EPA has not selected a particular landfill as part of this Record of Decision. The dredged material will be transported to a landfill which is permitted to receive the waste and meets the CERCLA offsite policy which requires EPA to determine that the facility is operating in compliance with all federal and state permits prior to shipment. The choice of landfill will be made by the parties who ultimately perform the remedy, subject to the determination of compliance by EPA. The contaminated sediment currently presents a threat because of its location in the marine environment, which allows direct exposure to sensitive aquatic organisms and bioaccumulation in the food chain. Once it is removed and placed in a landfill it should pose no unacceptable risks to the environment or to human health including that of workers at the disposal site.

*7. The Point Richmond Neighborhood Council supported EPA's proposal for offsite disposal stating: "To move this sediment... to any other location within the City of Richmond would be an injustice to the people of the City of Richmond." (letter, 8/10/94)*

*8. The Montrose Chemical Corporation of California, a DDT manufacturer and Potentially Responsible Party (PRP) at the United Heckathorn Site, submitted extensive comments arguing that the proper remedy for the site is no-action. (letter, 9/13/94)*

*I. Without risk, no action is necessary.*

**Response:** The contamination at United Heckathorn presents unacceptable threats to human health and the environment. These threats are summarized in Section 7 of the ROD. It should also be noted that two previous PRP-lead site investigations (Harding Lawson, 1986, and Levine-Fricke, 1991) recommended dredging the Lauritzen Channel and concluded that "no action" would not be protective of the environment.

*II. EPA's Human Health Risk Assessment (HHRA) fails to demonstrate that DDT or dieldrin in sediments in the Lauritzen Channel or Parr Canal pose any significant threat to human health for the following reasons:*

*A. The only significant health risk calculated by EPA was for consumption of fish from the Lauritzen Channel. However, EPA has not established that fishing occurs in the Lauritzen Channel, but only in the Santa Fe Channel near the Parr Canal. The Lauritzen Channel is posted to discourage fishing. All available evidence suggests that significant exposure to fish from the Lauritzen Channel does not occur.*

Response: EPA risk assessment guidance assumes that institutional controls will not be maintained, or will be ineffective in the long term in eliminating threats to human health. In addition, EPA believes that institutional controls, such as fences and warning signs, cannot be relied upon at this site to prevent fishing in the Lauritzen Channel and Parr Canal. Fish and shellfish in the Lauritzen Channel contain concentrations of DDT and dieldrin which exceed acceptable levels for human consumption. In 1986, CDHS ordered Levin to post warnings around its property, including the eastern shoreline of the Lauritzen to warn boaters about the DDT contamination in fish and shellfish. In 1991, after EPA personnel observed a person fishing from a facility on the shoreline opposite the former Heckathorn location, EPA immediately advised that facility's manager in writing about the State's 1986 health warning. Recently, the State issued a fishing advisory throughout Richmond Harbor. Signs were posted at the popular harbor fishing location near the Parr Canal where there is unrestricted shoreline access. Despite the signs, State personnel report still finding people catching fish for consumption.

*B. EPA overestimated the risk from fish consumption by assuming consumption rates of 132 mg/day (sic) for subsistence fishermen and 54 mg/day (sic) for recreational fishermen.*

**Response:** EPA's current risk assessment guidance recommends assuming consumption rates of 54 grams per day (g/day) for recreational fishermen, and 132 g/day for subsistence fishermen. Potential risks were calculated by EPA (see HHRA, Table 5-11) using standard exposure assumptions which included both the 132 g/day subsistence rate, and a much lower rate of 6.5 g/day, which was the rate assumed in the development of EPA's Water Quality Criteria for the protection of human health (1980). These criteria are ARARs at the site. The two consumption scenarios are likely to bracket current and potential future exposures. Calculated risks for consumption of fish from the Lauritzen Channel were unacceptable using either exposure assumption. Risks for consumption of fish from the Santa Fe Channel were within EPA's

acceptable risk range using the low consumption rate, but unacceptable using the subsistence rate. Therefore, EPA concluded that consumption of fish from the Santa Fe Channel may be acceptable. EPA expects that remediation of sediments from the Lauritzen Channel will reduce the concentrations of pesticides in Santa Fe Channel fish as well.

Using the responses from EPA's limited fishing survey, Montrose's consultant, Terra, Inc. (August 17, 1994) calculated a consumption rate of 27 g/day for local fishermen. As stated in the HHRA, EPA's survey was intended only to provide general information on local fishing practices. Even with a much larger survey it would be difficult to accurately quantify current, much less future, consumption rates. For these reasons EPA has included the assumptions discussed above in its risk calculations to ensure that a reasonable maximum exposure scenario is evaluated in order to ensure that EPA actions are fully protective of human health.

*C. The risks calculated for fish consumption are also overestimated because they do not account for the effects of cooking. There is no evidence that fishermen eat raw fish. Cooking reduces the concentrations of DDT in fish by 39% to 74%. In addition, absent evidence that whole fish are eaten routinely, EPA should have based its risk calculation on fillets rather than whole fish. EPA guidance states that most humans consume only fillets.*

Response: EPA calculated risks for consumption of both whole and filleted fish from the Lauritzen and Richmond Inner Harbor Channels. Risks for fish from the Lauritzen were unacceptable regardless of whether the fish were whole or fillets. A group of recent Laotian immigrants interviewed by EPA stated that they consume raw fish caught in Richmond Harbor. Small fish, such as shiner surf perch, are mashed whole. When fish are filleted, the carcass is also used in the preparation of soup. In order to be protective of diverse ethnic groups known to fish in Richmond Harbor, it is prudent to assume that fish may be eaten raw and that entire fish may be consumed.

The State of California has written fact sheets for fishermen to encourage practices, such as cooking and draining away fat, which will reduce contaminant concentrations. However, even the reductions in concentrations reported by Montrose would be insufficient to make fish from the Lauritzen suitable for consumption (see previous response to this comment, ICF, May 11, 1994).

*D. EPA compared fish tissue concentrations with the State of California's Water Quality Objectives which were recently held invalid.*

Response: The State of California's Water Quality Objectives for DDT and dieldrin were adopted on April 11, 1991. They were based upon, and are equal to EPA's Ambient Water Quality Criteria, published in 1980. The final HHRA (May, 1994) cited both EPA's criteria, and the equivalent State objectives. EPA's criteria were identified in the July, 1994 Proposed Plan and selected in the ROD as ARARs. It should be noted that although the 1991 State objectives were recently invalidated on procedural grounds, the San Francisco Bay Basin Plan (1986), designated fish and shellfish harvesting and commercial and recreational fishing as beneficial uses of all waters of San Francisco Bay, which supports EPA's determination in the Record of Decision (Section 6) that the federal Ambient Water Quality Criteria are relevant and appropriate ARARs at this site.

*E. EPA's HHRA failed to cite epidemiology studies for DDT.*

Response: EPA has previously responded to this comment. See final HHRA response to comments, May 11, 1994, pp.8 and 9. In addition, there is currently a great deal of research being performed on DDT and related chemicals regarding their estrogenic effects, links with breast cancer and feminization of males. Appendix 1 of this Response to Comments is a timely news article describing some of this research.

*III. EPA's Ecological Risk Assessment of marine sediments (ERA) fails to demonstrate that DDT or dieldrin in sediments in the Lauritzen Channel or Parr Canal pose any significant threat to the environment health for the following reasons:*

*A. In identifying chemicals of concern, EPA improperly excluded from consideration chemical and physical stressors such as PAHs, PCBs, shipping disturbance and industrial activity.*

**Response:** Physical stressors, such as shipping disturbance, were discussed and considered in the ERA, but they are neither site-related, nor are such stressors chemicals and so cannot be identified as "chemicals of concern." Non site-related chemicals, including PAHs and PCBs were also discussed and considered in the ERA. Although PAHs and PCBs are present in Richmond Harbor, they are not consistently elevated above effects thresholds or background concentrations for San Francisco Bay. By contrast, DDT concentrations in sediments in the Lauritzen Channel are on average 10,000 times higher than the San Francisco Bay background level. These facts are graphically illustrated in Figures 8, 9 and 10 of NOAA's March, 1992 evaluation of chemical contaminants in San Francisco Bay, (Technical Memorandum NOS ORCA 64) which are attached as Appendix 2 of this Response to Comments. In viewing Figure 8, it should be noted that if the vertical bar representing the concentration of DDT in the Lauritzen was drawn to the same scale as the bars representing the concentrations of DDT found elsewhere in San Francisco Bay, it would be 2,715 feet, or over a half-mile, high.

*B. EPA has not shown that fish-eating birds are exposed to significant, if any amounts of DDT in the Richmond Inner Harbor. EPA did not analyze any birds or provide dose-response data for individual species. Birds are not feeding in Richmond Harbor. If fish-eating birds are not exposed, the elementary conclusion is that they are not at risk. Andrew Lincoff, Remedial Project Manager stated in a letter dated July 31, 1992 that brown pelicans only feed occasionally in Richmond Harbor.*

Response: The US Fish and Wildlife Service (USFWS), which is the federal trustee for avian resources, provided EPA with a list of over 70 species of "birds known to nest in central or northern San Francisco Bay or likely to regularly feed in the immediate vicinity of Richmond Harbor." (EPA, 1994, Table 4-1). While engaged in site investigations, removal actions and other activities at the site, EPA personnel and contractors observed that numerous fish-eating birds including cormorants, western grebes, kingfishers, loons, and California brown pelicans, an endangered species, commonly feed throughout the Richmond Inner Harbor, including the Lauritzen Channel.

The Project Manager's 1992 statement that brown pelicans may only occasionally feed in the harbor was made based on the assertion in a previous PRP Remedial Investigation Report (Levine-Fricke, 1990) that no endangered species had been seen in the vicinity of the site. However, since EPA began working at the site, endangered brown pelicans have been seen commonly in the Inner Richmond Harbor. In response to repeated unsupported claims by Montrose and its consultants that birds would not be found in an industrialized harbor, EPA, with minimal effort (EPA memoranda 12/8/93 and 12/16/93), was able to observe and photograph numerous species of birds in the harbor, including an additional species of shorebird which had not been listed by USFWS. These photographs also include a group of endangered brown pelicans which were feeding at the confluence of the Lauritzen and Santa Fe Channels, and document a brown pelican in the act of plunge-diving for fish at the same location.

It is not subject to any reasonable doubt that DDT in Richmond Harbor accumulates in the food chain and that predatory birds are being exposed. In a 1985 study (Ohlendorf, 1991) the concentration of DDE (a metabolite of DDT) in surf scoters, a migratory shellfish-eating bird which winters in San Francisco Bay, was measured in 39 birds shot in January and compared with the

concentrations in 40 shot in March. The body burdens of birds wintering in Richmond Harbor increased by over four-fold in three months, clearly demonstrating that even birds which feed for only part of the year in and near the harbor can have significant bioaccumulation. No significant increases in concentration occurred in birds which wintered elsewhere in San Francisco Bay.

It is outside the scope of the EPA ecological risk assessment process to conduct new studies to determine dose response information for birds species present at the site. Furthermore, studies of higher organisms, especially birds, are not necessary because criteria are available for their protection (EPA's Ambient Water Quality Criteria and California's Water Quality Objectives) which are based upon achieving much more easily measurable contaminant concentrations in fish and the water column. The primary field sampling for EPA's United Heckathorn ecological assessment took only six days. As discussed in the assessment (Chapter 5), "studies of more mobile species, particularly migratory birds, would require much more effort and would be subject to inherently higher uncertainty regarding pollutant sources and effects than the study of sessile and relatively non-mobile organisms chosen here."

EPA assessed the risks posed by DDT to fish-eating birds using two published criteria for the protection of birds which are based upon contaminant concentrations in fish. EPA's marine chronic Ambient Water Quality Criteria for DDT (1980), which is an ARAR, is based upon a fish tissue residue of 150 ppb. This concentration is a Lowest Observed Adverse Effect Level at which reproduction in California brown pelicans was reduced to a level below that necessary to sustain a stable population. The more protective National Academy of Sciences (NAS) action level for the protection of fish-eating birds is 50 ppb (published by EPA in 1973). The concentration of DDT in fish caught in the Lauritzen Channel is over two orders-of-magnitude (100 times) higher than the NAS level. In the ERA, (Figure 9-19) EPA estimated that if a bird consumed prey from the Lauritzen for more than about one day per year, its annual average diet would exceed the NAS action level. At more than three days per year, it would exceed the level at which reproduction is reduced in pelicans. These calculations may well underestimate risk for a number of reasons, including the fact that they assume that the bird is exposed to no other source of DDT. California brown pelicans, for example, migrate during non-breeding months from nesting areas in southern California (US Department of the Interior, Final Report: California Seabird Ecology Study, MMS 87-0055) where they may be exposed to DDT contaminated prey while feeding in the southern California bight: an area still heavily contaminated from the historic discharges of PRP Montrose's former Torrance, California DDT manufacturing plant.

EPA did not report dose-response data for all species of birds likely to feed in Richmond Harbor because such data does not exist. Dose-response data is available for only a few species of wild birds, including American kestrels, mallard ducks, and a bird which does feed in the most contaminated channels in Richmond Harbor - the California brown pelican. Available effects data is routinely used in developing criteria for the protection of other aquatic organisms and wildlife. Recently, for example, the same effects data discussed above for California brown pelicans were used as the basis of the proposed Wildlife Criteria for DDT to protect fish-eating birds in the Great Lakes (58 FR 20802, April 16, 1993).

*C. The ERA fails to demonstrate that sediment-contained DDT or dieldrin pose any significant risk to benthic invertebrates. The diversity indices for the benthic community structure and number of mollusks actually increase with concentrations of DDT. The poorest community structure was observed at locations with the lowest concentrations of DDT. The predominant effect on benthic community structure is shipping disturbance which the ERA fails to consider as a stressor.*

**Response:** There is ample evidence that DDT contamination in the Lauritzen Channel poses a significant risk to benthic invertebrates. Invertebrate toxicity tests conducted during the ERA indicated that Lauritzen Channel sediments are among the most toxic ever tested by the EPA personnel who developed the standard methods for sediment toxicity tests which are used worldwide. The extraordinarily high levels of DDT were determined in the ERA to be the primary cause of toxicity in the Lauritzen. Additional invertebrate toxicity tests conducted during the RI (Battelle, 1994) found no survival of test organisms throughout most of the Lauritzen Channel.

Although disturbances relating to shipping (including dredging to maintain required depths for navigation and propeller wash from ships) can remove or displace benthic organisms, it does not follow that chemical contamination of the benthos is acceptable. The Richmond Harbor federal channel is dredged annually to maintain a 35 ft navigation depth. The federal channel runs from Point Potrero up the Richmond Inner Harbor and lower Santa Fe Channels, but does not enter the Lauritzen Channel. There is one shipping berth at the mouth of the Lauritzen, which PRP Levin has been unable to dredge since 1985 because of the DDT contamination. Large ships cannot enter the shallower northern Lauritzen Channel which is not maintenance dredged. Absent the very high levels of DDT in the Lauritzen one would expect, based on shipping and dredging history, to find healthy benthic communities there and poorer communities in the navigation channels.

The diversity, number and biomass of mollusks are in fact lower in the shipping channels and increase in the northern Lauritzen, as would be expected from the dredging and shipping history, and the fact that mollusks are known to be insensitive to DDT. The number of amphipods, on the other hand, is opposite of what would be expected from dredging and shipping disturbances, and declines in the Lauritzen Channel because of the DDT (EPA, 1994). Amphipods are crustaceans, which are known to be sensitive to DDT. In the development of the federal water quality criteria for DDT (EPA, 1980), a crustacean was found to be the most sensitive marine aquatic organism. The sensitivity of crustaceans to DDT may be explained by their phylogentic affinity with insects (both are in the phylum Arthropoda, and DDT's purpose was to eradicate insects). An overall measure of benthic community structure is the Infaunal Index, which is a composite measure of the abundance of pollutant-sensitive and pollutant-tolerant taxa. The Infaunal Index declines significantly as DDT concentrations increase in Richmond Harbor.

Finally, it should be emphasized that even though some taxa, such as mollusks, can survive in areas like the Lauritzen which are heavily contaminated with DDT this does not mean that there is no biological effect resulting from their exposure. The California State Mussel Watch found that by far the highest levels of DDT bioaccumulation in the State occur in the Lauritzen. Bioaccumulated contaminants can move up the food chain and affect animals at higher trophic levels. The levels of DDT in benthic invertebrates, like those in fish, are far above the dietary levels which may cause reproductive impacts to birds.

*D. The ERA fails to provide the required uncertainty analysis.*

**Response:** Uncertainties relating to a myriad of factors are discussed throughout the ERA, consistent with EPA guidance. Those study results and conclusions about which there is the least uncertainty are listed in the executive summary.

*E. The ERA offers no evidence that fish are being affected by DDT or dieldrin.*

**Response:** EPA's 1980 Ambient Water Quality Criteria document for DDT reported that levels of 3 to 6.25 ppm DDT caused reduced survival in the fry of fish tested. The average concentration of fish caught in the Lauritzen is above these levels. Therefore one of the conclusions of the ERA was that the concentrations of DDT in the Lauritzen "may also cause direct chronic effects such as

reduced fry survival in fish." Montrose's complaint stems from the fact that the fish caught in the Lauritzen (mostly shiner surf perch) are not the same species as those which have been used in research. In order to determine the level of DDT which causes reduced fry survival in shiner perch, it would be necessary to start a research project, which, as Montrose also points out, is not the purpose of ecological assessments. The ERA reported numerous species of fish potentially affected by the contamination in Richmond Harbor. Since one cannot assume that the few species which have been tested are likely to be the most sensitive to the toxic effects of DDT, it would be prudent to divide the values for tested species by a factor of 10 or more to account for the uncertainty in extrapolating toxicity data from test species to those fish found in Richmond Harbor . Using this approach, one would conclude that fish in the Santa Fe Channel as well as the Lauritzen may suffer chronic impacts from current levels of DDT contamination.

*F. National Academy of Sciences (NAS) action levels should not be used to demonstrate risk in an ecological assessment because they're not ARARs and do not even qualify as to-be-considered material because NAS is not a state or federal agency. NAS action levels only assume that effects will occur, EPA has not demonstrated that actual effects have occurred. EPA failed to follow NAS sampling recommendations and should have sampled fish from a variety of locations throughout known foraging ranges.*

Response: The National Academy of Sciences action levels were published by EPA as 1972 Water Quality Criteria. The criteria for DDT states:

> "It is recommended that DDT concentrations in any sample consisting of a homogenate of 25 or more fish of any species that is consumed by fish eating birds and mammals, within the same size range as the fish consumed by any bird or mammal, be no greater than 50 $\mu$g/kg of the wet weight."

EPA analyzed a total of 23 shiner surf perch from the Lauritzen Channel in the ERA and in support of the HHRA. The average concentration was 9,200 $\mu$g/kg (wet weight), which is over 180 times the NAS action level. Assuming that the two additional fish needed for a sample of 25 contained no DDT, the average would still be 170 times the action level. Looked at another way, even if sufficient time and resources were spent to determine the foraging ranges of the various species of fish-eating birds which feed in Richmond Harbor and to sample fish throughout those ranges, the concentration of DDT in the Lauritzen Channel is so high that a single fish would cause a homogenate of 25 or even 170 fish of equal size to exceed the action level, even if the all of the fish in the rest of the foraging range contained no DDT at all.

In regard to the assertion that the NAS action level only *assumes* that damage will occur from DDT exposure, Montrose, a DDT manufacturer, should recall that DDT was responsible for great reductions in populations of predatory birds over vast areas and the almost complete extirpation of some species. The California brown pelican is endangered because of exposure to DDT (EPA, 1994).

In regard to EPA's not sampling birds or documenting actual damage in this study, it should also be remembered (in addition to the responses to this issue in previous comments) that the purpose of risk assessments is to evaluate risk, not to document or quantify damage. There is ample evidence that the high levels of DDT in Richmond Harbor threaten a variety of ecological receptors at various trophic levels including benthic and water column organisms and fish-eating birds. The benthic community structure analyses in fact are evidence of damage. EPA guidance recommends that when criteria exist, ecological assessments should include monitoring to determine the extent to which those criteria are exceeded by the environmental concentrations at the site. EPA has done this with the NAS action levels.

*III. In the absence of risk, ARARs are irrelevant. EPA's Water Quality Criteria are not ARARs because they are not promulgated. CERCLA §121(d)(2) states that EPA criteria may be relevant and appropriate considering "the designated or potential use of the surface or groundwater, the environmental media affected, the purposes for which such criteria were developed, and the latest information available." Since the criteria for DDT was set to protect fish-eating birds, and birds are not feeding in the Richmond Inner Harbor the "potential use" of the surface water and the "environmental media affected" do not warrant application of the criteria.*

**Response:** Risks to human health and the environment have been discussed at length above. Section 121(d)(2)(A)(ii) of CERCLA requires that remedial actions meet federal Water Quality Criteria established under Section 304 or 303 of the Clean Water Act where such WQC are determined by EPA to be relevant and appropriate to remedial actions at the site. See 42 U.S.C. § 9621(d)(2)(A)(ii) and 40 C.F.R. § 300.430(e)(2)(i)(G). In evaluating whether specific WQC are relevant and appropriate to remedial actions at Superfund site, CERCLA requires EPA to consider four criteria: 1. the uses of the receiving water body; 2) the media affected; 3) the purposes of the criteria and 4) current information. See 42 U.S.C. § 9621(d)(B)(i). See also U.S. EPA, CERCLA Compliance with Other Laws Manual - CERCLA Compliance with the CWA and SDWA (OSWER Pub. 9234.2-06/FS, Feb. 1990).

EPA guidance concerning determinations that WQC are relevant and appropriate to remedial action at a Superfund site provides that:

> A water quality criteria component for aquatic life may be relevant and appropriate when there are environmental factors that are being considered at a site, such as protection of aquatic organisms. With respect to the use of water quality criteria for the protection of human health, levels are provided for exposure both from drinking the water and from consuming aquatic organisms (primarily fish) and from fish consumption alone. Whether a water quality criterion is appropriate depends on the likely routes of exposure.

U.S. EPA, CERCLA Compliance With Other Laws Manual: Interim Final at 1-15 (EPA 540-G-89-006, Aug. 1989).

Both the marine chronic and human health WQC for DDT and dieldrin are relevant and appropriate to remedial actions at this site since both aquatic and wildlife and humans may be exposed to these contaminants either directly or through consumption of contaminated organisms. As discussed in the Ecological Risk Assessment, aquatic organisms are present in all channels at the site, which are a part of San Francisco Bay. Fish eating-birds feed in all channels in the harbor. In fact, the particular bird upon which the marine chronic water quality criterion for DDT was based is the California brown pelican, an endangered species, which has been observed feeding in the most contaminated channels at the site. As discussed in the Human Health Risk Assessment, fishermen catch and consume fish from the Inner Richmond Harbor channels. In 1986, the State of California Department of Health Services ordered the posting of the Lauritzen Channel to warn fishermen of the fish and shellfish contamination. On April 7, 1994, the Cal-EPA Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor.

The beneficial uses designated by the State of California for central San Francisco Bay waters, which are listed in Section 6 of the Record of Decision, include fishing, wildlife habitat, preservation of rare and endangered species, fish migration, fish spawning, shellfish harvesting, and estuarine habitat. EPA's Ambient Water Quality Criteria were specifically developed to protect such beneficial uses.

*IV. Background risks to human health and the environment from other stressors exceed the purported risks associated with DDT and dieldrin. The human health risk associated with PCBs found in fish exceed the risks of DDT and dieldrin. Other environmental stressors, including PAHs, PCBs and shipping disturbance are relevant to evaluating the long-term effectiveness of the chosen remedy. If the remedy will not reduce existing risk then it should be rejected in favor of no action.*

**Response:** Both natural and anthropogenic background risks are common at Superfund sites and EPA guidance (EPA/540/1-89/002) states that they may be eliminated from risk assessments. The guidance also allows, however, that they may be considered separately in order to provide information to those potentially exposed. This was done for PCBs in the United Heckathorn risk assessment. As a result of EPA's sampling and risk analysis, the California Department of Health Services conducted a further study of fishing in Richmond Harbor and recently issued an advisory for the entire harbor based on both the Heckathorn contaminants and PCBs.

Recent research suggests PCBs may be present in the water throughout San Francisco Bay. EPA's fish sampling found that PCB mixture Aroclor 1254 is present in fish in Richmond Harbor. There is no cancer potency data available for Aroclor 1254. Therefore risks associated with PCBs were calculated using the potency factor for Aroclor 1260 which likely has higher potency. The human health risks associated with PCBs in fish from Richmond Harbor may be overstated for this reason alone. In addition, absent the distinction between Aroclors 1254 and 1260, Montrose's consultant Terra, Inc. stated that it had independently derived a potency factor for PCBs which indicated that human health risks from PCBs were overstated by "1-2 orders of magnitude." Nevertheless, the human health risk assessment still found that the risks calculated for the sum of site-related chemicals of concern (DDT and dieldrin) in the Lauritzen Channel were 2 to 3 times the risk for PCBs (ICF, 1994, Table 5-11). It should also be noted that fish in the Lauritzen exceed the Food and Drug Administration Action Levels for DDT and dieldrin, but not for PCBs. In the Santa Fe Channel, the calculations indicate that PCBs become a greater human health risk than site contaminants, but again the risk from PCBs may be overestimated.

The selected remedy will remove contaminated sediments from the Lauritzen Channel and Parr Canal and reduce human health risks from DDT and dieldrin exposure throughout Richmond Harbor. The sediments to be remediated also contain non site-related chemicals, including PCBs, although the levels of these contaminants relative to bay background concentrations is minute compared to the relative levels of DDT (see Appendix 2). Nevertheless, since the remedy will result in the removal of PCBs from portions of Richmond Harbor, there may be a reduction in human health risk associated with PCBs as well.

Other environmental stressors have been discussed in previous responses. DDT is the primary cause of toxicity in the Lauritzen Channel, and existing threats to benthos, water column organisms, and fish-eating birds are expected to be eliminated by the selected remedy.

*V. Selection of the No-Action alternative is consistent with CERCLA, the NCP, and EPA guidance.*

**Response:** EPA disagrees. As discussed in the Record of Decision, the no-action alternative fails to meet the NCP's threshold criteria for remedy selection. In addition, as mentioned previously, it should be noted that two previous PRP-lead site investigations (Harding Lawson, 1986, and Levine-Fricke, 1991) also recommended dredging the Lauritzen Channel and concluded that "no action" would not be protective of the environment.

*9. The National Oceanic and Atmospheric Administration (NOAA), which is the federal trustee for marine resources, submitted comments (September 14, 1994) supporting EPA's proposed plan. NOAA also recommended: 1) not dredging during the Pacific herring spawning season (December 1 to March 1); 2) the evaluation of dredging techniques to minimize resuspension and avoid spillage during transportation; 3) various types of remedial and post-remedial monitoring, and; 4) the placement of approximately six inches of clean material over dredged areas to help restore the area immediately after implementation of the remedy. (letter, 9/14/94)*

Response: EPA appreciates the information provided by NOAA and will ensure that the remedy is not implemented between December 1 and March 1. The detailed selection of dredging and monitoring techniques will be made during the remedial design phase and EPA looks forward to NOAA's participation in that process.

Several commenters before and during the comment period recommended the placement of clean material as part of the remedy. Morrison-Knudsen, consultant to Montrose, recommended the placement of clean material in areas, such as those with rip-rap, in which dredging would be impractical or of limited effectiveness. USFWS (see comment 10, below) recommended placement of clean material after remediation to bury any remaining contaminants and help restore habitat.

The Proposed Plan stated: "Minor capping, which would not significantly alter the existing depths of water, might also be used if determined to be necessary during the remedial design or remedial action phases," although a cost for this activity was not estimated. EPA has contacted Manson Construction, which provided estimates of dredging costs used in the Feasibility Study. Assuming that the total area of the Lauritzen Channel and Parr Canal is 50,000 square yards, a six-inch layer would require approximately 8000 cubic yards of clean material. Manson indicated that the cost of placement is relatively high, and estimated $25 per yard total. A six-inch layer of clean material would therefore cost approximately $200,000. This cost has been added to the estimate for the final remedy, bringing the total estimate to $7 million. There may also be an opportunity to save costs and obtain appropriately sized clean dredged material from the Richmond Harbor deepening project.

**Other Comments**

*10. The US Fish and Wildlife Service submitted comments, dated August 15, 1994, on the FS. USFWS supported EPA's preferred alternative, and made the following recommendations: 1) removal of the upper layer of old bay mud to ensure that median DDT levels are below a deleterious effects range; 2) placement of a clean layer of fill after dredging (discussed in comment 9, above), and; 3) hazing to prevent seabirds from entering the dredging area during remediation. (letter, 8/15/94)*

Response: The placement of clean fill after dredging has been discussed above. Additional recommendations regarding activities during remediation will be considered in the remedial design phase, in which USFWS is encouraged to participate. The proposed remedy including dredging of all soft sediments down to the Old Bay Mud contact. In practice, this will result in the removal of the top layer of old bay mud. Sampling conducted during the RI indicates that the medial concentration of contaminants in the upper layer of old bay mud is well below the range which may be deleterious to benthic organisms.

*11. Montrose also submitted comments dated August 17, 1994 from its contractor, Terra Inc., on the final human health risk assessment. With the exception of the following comment, Terra's comments were either repeated in Montrose's comments on the proposed plan, discussed above, or were responded to in earlier responses to comments on the draft human health risk assessment. Exposure point concentrations were improperly estimated for upland soils resulting in the overestimation of risk. Due to its overstatement of risk, the final risk assessment cannot be reliably used to develop remedial alternatives or to determine whether there is any necessity to remediate surface soils.*

Response: This comment ignores both the conclusions of the risk assessment and EPA's proposed remediation. The EPA human health risk assessment clearly states that conservative estimates were used, and that risks due to exposure to contaminates in upland soils are within EPA's acceptable risk range even using these conservative estimates. EPA has proposed no further remediation to reduce the concentrations of contaminants in site soils. Therefore, the entire discussion of whether the risk estimates for soils are overly conservative is moot.

Two tables in the final risk assessment (Tables 3-2 and 3-3) did in fact contain typographical errors. Corrected tables enclosed with a memo from ICF are provided as Appendix 3 of this Response to Comments. Because none of the risk calculations contained in the assessment were derived from the erroneous values, the errors had no effect on the final conclusions.

United Heckathorn Response to Comments

Appendix 1

San Francisco Chronicle, October 4, 1994
p. A9

# Clue in Pesticide Link to Breast Cancer

## Exposure to some poisons raises level of 'bad' estrogen

*Associated Press*

New York

Researchers trying to explain the disturbing link between pesticides and breast cancer have discovered that pesticides appear to raise levels of a harmful form of estrogen.

The finding comes as a surprise to the director of the research, who undertook the study expecting to show that pesticides had no effect on estrogen.

"I was wrong," said H. Leon Bradlow, a biochemist with the Strang Cancer Prevention Center at Cornell University Medical School. The study showed that after exposure to pesticides, "your risk ratio is greater than what it was before," Bradlow said yesterday.

Several earlier studies have linked pesticides to an increased risk of breast cancer, although one study failed to find a link. The new study shows how pesticides may be exerting a harmful effect, Bradlow said.

Penelope Fenner-Crisp, a pharmacologist and pesticide specialist with the Environmental Protection Agency, said the EPA is taking the link between pesticides and hormones very seriously. "We should think about how we might go about encouraging exposure reduction," she said.

The study, which will be published soon in Environmental Health Perspectives, a journal of the National Institute of Environmental Health Sciences, builds on Bradlow's previous research showing that there is a "good estrogen" that protects against breast cancer and a "bad estrogen" that is associated with increased risk of the disease.

The researchers exposed human breast cells in the test tube to DDT and other chlorine-containing pesticides. They found that the pesticides' effect on bad estrogen was three to four times as great as that of a known human carcinogen that was used as a comparison.

In a separate study, Bradlow and his colleagues found that women who eat "cruciferous" vegetables — broccoli, cauliflower, brussels sprouts and cabbage — appear to counteract the harmful effects of pesticides. An anti-cancer substance found in these vegetables called indole-3-carbinol was found to increase the ratio of good estrogen to bad estrogen.

Bradlow said a woman who eats such vegetables regularly could significantly reduce her risk of breast cancer, although he cannot yet say precisely how much lower the risk would be.

United Heckathorn Response to Comments

Appendix 2

NOAA Technical Memorandum NOS ORCA 64
Figures 8, 9 and 10

NOAA Technical Memorandum NOS ORCA 64

# AN EVALUATION OF THE EXTENT AND MAGNITUDE OF BIOLOGICAL EFFECTS ASSOCIATED WITH CHEMICAL CONTAMINANTS IN SAN FRANCISCO BAY, CALIFORNIA

Seattle, Washington
March 1992

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

National Ocean Service

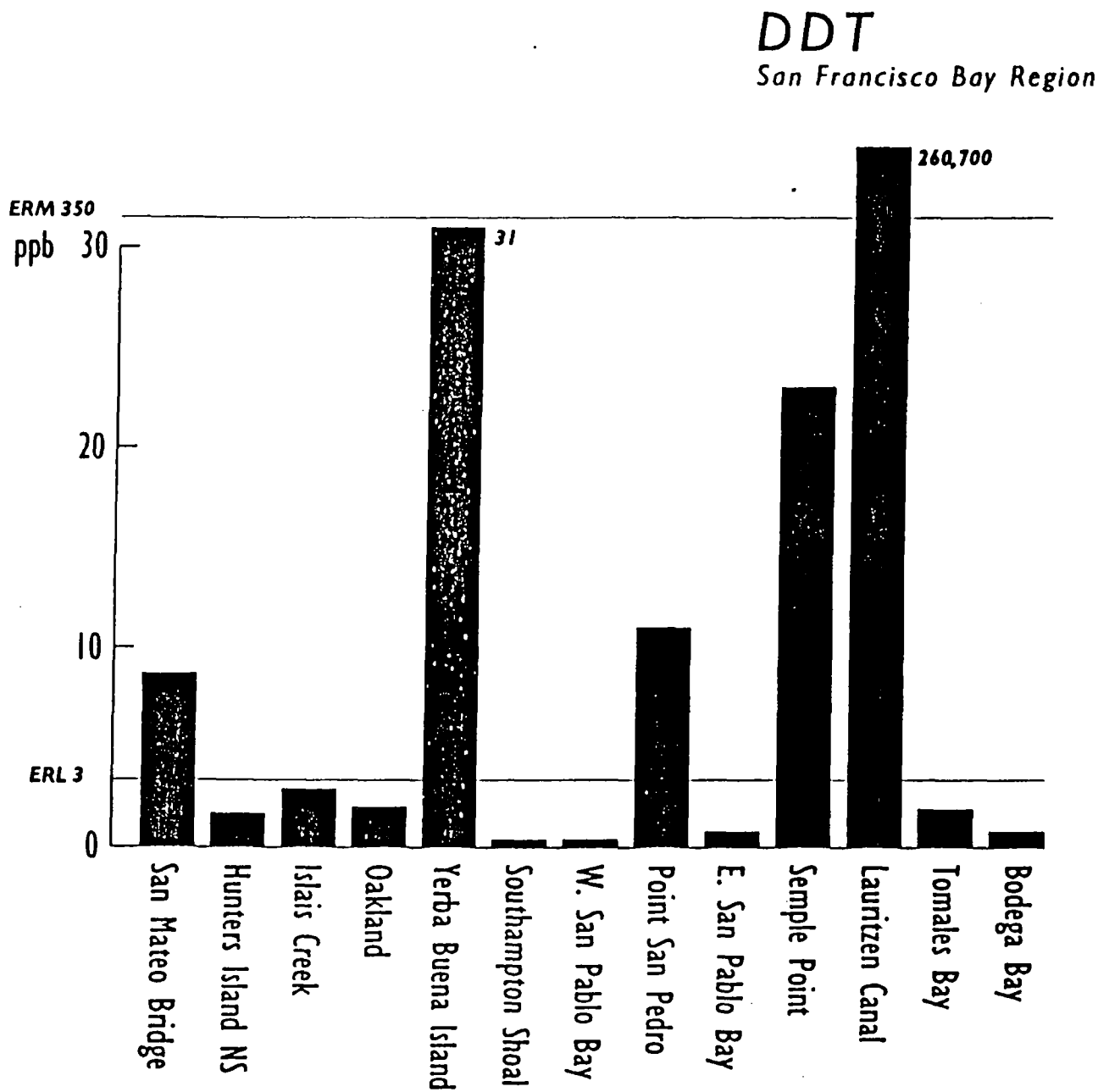



Figure 8. Mean tDDT concentrations at specific sampling sites in San Francisco Bay (from Long et *al.*, 1988) and ERL and ERM values for tDDT (from Long and Morgan, 1990).

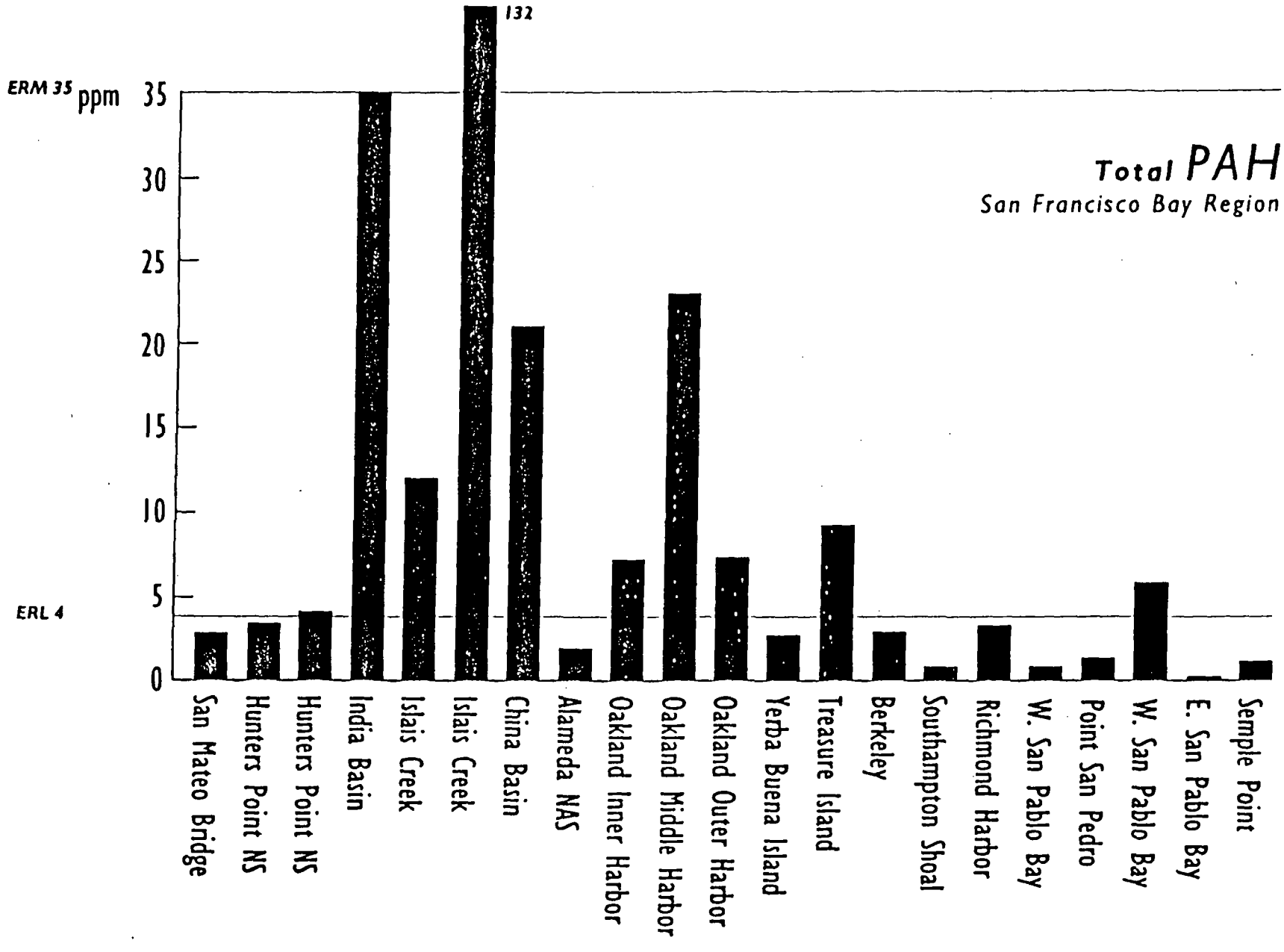



**Figure 9. Mean tPAH concentrations (sum of 18 compounds) at specific sampling sites in San Francisco Bay (from Long *et al.*, 1988) and ERL and ERM values for tPAH (from Long and Morgan, 1990).**

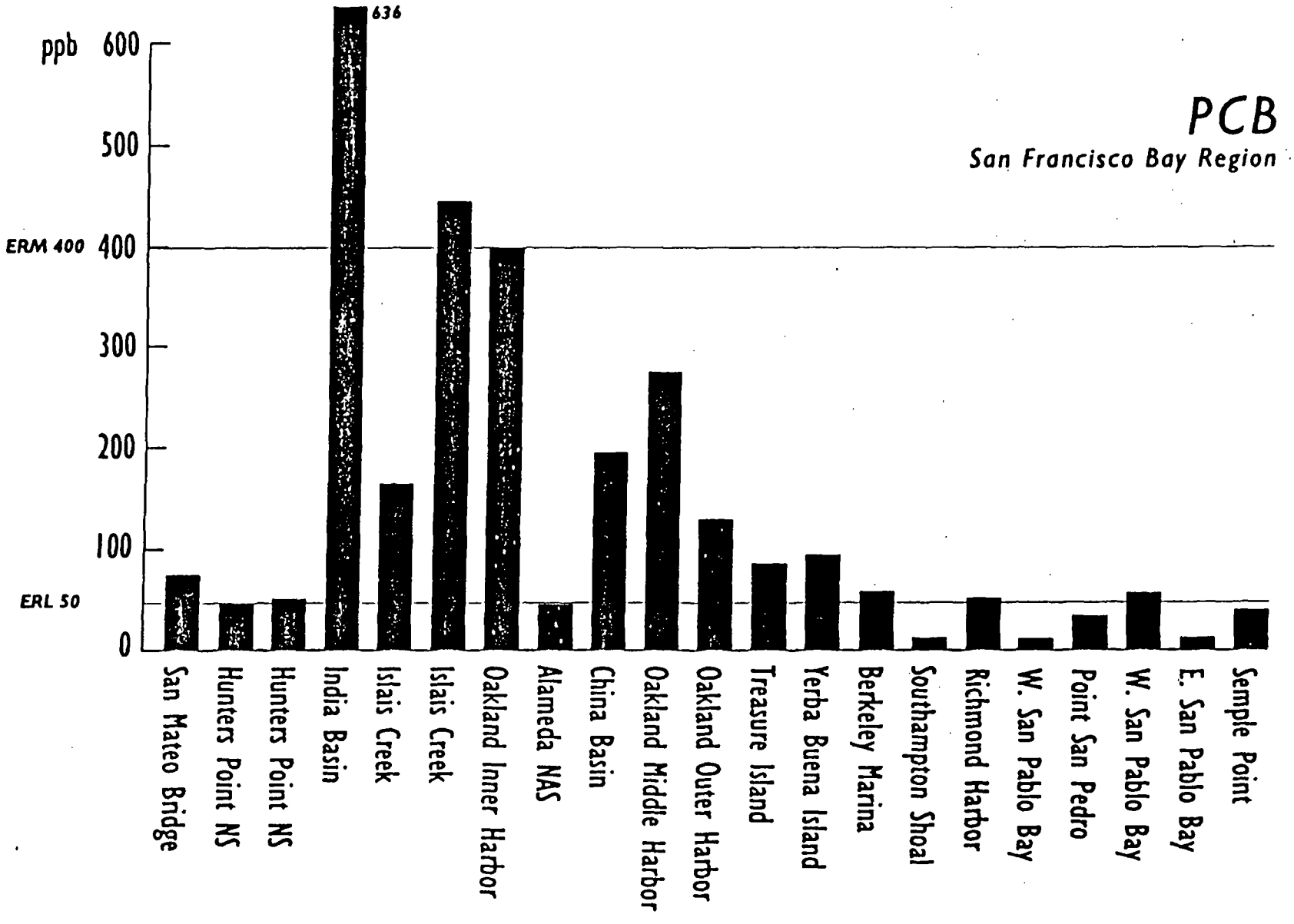



**Figure 10. Mean tPCB concentrations at specific sampling sites in San Francisco Bay (from Long et al., 1988) and ERL and ERM values for tPCB (from Long and Morgan, 1990).**

United Heckathorn Response to Comments

Appendix 3

ICF Kaiser Engineers Memorandum
September 7, 1994

1800 Harrison Street
Oakland, California
94612-2321

510/419-6000

# ICF TECHNOLOGY INCORPORATED

**MEMORANDUM**
**September 7, 1994**

**TO:** **Andy Lincoff**

**FROM: D. Wayne Berman** DWB

**RE: Corrections to the final, "Human Health Risk Assessment for the United Heckathorn Superfund Site, Richmond, California."**

In response to the August 17, 1994 comments from Terra Inc. concerning the values reported in Tables 3-2 and 3-3 of the risk assessment report, it appears that a few minor typographical errors were in fact committed. Corrected tables are attached.

First, regarding the column in Table 3-2 in which 95% UCLs are supposed to have been reported, an incorrect direction command in the underlying spreadsheet to the table resulted in the RME exposure point concentrations being repeated in this column rather than the UCLs.

Note that, in no case are the correct UCLs equal to the corresponding maximum detected values, which are reported in the next column of the table. In some cases the correct UCLs are greater than the maximum detected values but this is not unusual for small or highly variable data sets, particularly when the data are adequately described by a lognormal distribution. Because none of the subsequent calculations performed to complete the risk assessment are based on the UCLs reported in this column, no material changes in the risk assessment resulted from this typographical error.

Regarding the column in Table 3-3 in which RME exposure point concentrations in soil were supposed to have been reproduced, a similar direction error in the underlying spreadsheet caused the 95% UCLs to be reported in this column rather than the RME values. Correcting this column of this table changes a small number of other values in this table; however the changes are minor and none of them affect the overall conclusions drawn from this table. Because none of the other calculations in the rest of the risk assessment are derived from the values reported in the corrected column of Table 3-3, no material changes in the risk assessment resulted from this typographical error.

Please call me if you have any further questions concerning these corrections.

TABLE 3-2
ESTIMATED EXPOSURE POINT CONCENTRATIONS IN SOIL[1]

| COC | Simplified Maximum Likelihood Estimate of the Arithmetic Mean[2] (mg/kg) | Coefficient of Variation (mg/kg) | 95% UCL[3] (mg/kg) | Maximum Detected Value (mg/kg) | RME Exposure Point Concentration[4] (mg/kg) |
|---|---|---|---|---|---|
| Surface Soil (less than equal to 1 foot) | | | | | |
| Aldrin | 9.0E-02 | 15.46 | 6.6E-01 | 4.1E+00 | 6.6E-01 |
| 4,4'-DDD | 1.1E+01 | 13.90 | 3.5E+01 | 5.3E+01 | 3.5E+01 |
| 4,4'-DDE | 1.4E+01 | 21.49 | 5.6E+01 | 7.8E+01 | 5.6E+01 |
| 2,4'-DDT | 4.8E+01 | 32.23 | 4.4E+02 | 1.2E+02 | 1.2E+02 |
| 4,4'-DDT | 1.6E+02 | 34.29 | 7.9E+02 | 7.0E+02 | 7.0E+02 |
| DDT (total)[5] | 1.8E+02 | 25.79 | 7.7E+02 | 7.4E+02 | 7.4E+02 |
| Dieldrin | 2.3E+00 | 60.50 | 1.7E+02 | 1.7E+01 | 1.7E+01 |
| Endrin | 4.6E-02 | 8.44 | 4.8E-01 | 1.2E-01 | 1.2E-01 |
| Lead | 5.5E+02 | 3.14 | 1.3E+03 | 4.0E+03 | 1.3E+03 |
| Subsurface Soil (greater than 1 foot) | | | | | |
| Aldrin | 6.2E-01 | 128.69 | 1.9E+00 | 2.1E+01 | 1.9E+00 |
| 4,4'-DDD | 5.6E+00 | 46.84 | 1.3E+01 | 2.2E+02 | 1.3E+01 |
| 4,4'-DDE | 5.7E+00 | 106.18 | 1.5E+01 | 3.0E+01 | 1.5E+01 |
| 2,4'-DDT | 7.4E+00 | 53.67 | 1.9E+01 | 5.3E+01 | 1.9E+01 |
| 4,4'-DDT | 1.6E+01 | 41.83 | 3.6E+01 | 2.8E+02 | 3.6E+01 |
| DDT (total) | 2.6E+01 | 36.80 | 5.7E+01 | 3.1E+02 | 5.7E+01 |
| Dieldrin | 6.3E+00 | 278.36 | 2.3E+01 | 2.4E+01 | 2.3E+01 |
| Endrin | 4.7E+00 | 282.40 | 1.7E+01 | 6.6E+02 | 1.7E+01 |
| Lead | 2.9E+02 | 2.98 | 9.0E+02 | 2.8E+03 | 9.0E+02 |
| Soils at All Depths | | | | | |
| Aldrin | 4.6E-01 | 92.57 | 1.2E+00 | 2.1E+01 | 1.2E+00 |
| 4,4'-DDD | 8.7E+00 | 47.61 | 1.8E+01 | 2.2E+02 | 1.8E+01 |
| 4,4'-DDE | 1.2E+01 | 127.04 | 2.9E+01 | 7.8E+01 | 2.9E+01 |
| 2,4'-DDT | 1.5E+01 | 72.20 | 3.7E+01 | 1.2E+02 | 3.7E+01 |
| 4,4'-DDT | 4.7E+01 | 69.45 | 1.0E+02 | 7.0E+02 | 1.0E+02 |
| DDT (total) | 6.4E+01 | 52.91 | 1.3E+02 | 7.4E+02 | 1.3E+02 |
| Dieldrin | 5.7E+00 | 236.55 | 1.9E+01 | 2.4E+01 | 1.9E+01 |
| Endrin | 3.1E+00 | 208.73 | 1.0E+01 | 6.6E+02 | 1.0E+01 |
| Lead | 4.4E+02 | 3.14 | 8.2E+02 | 4.0E+03 | 8.2E+02 |

[1] The values presented in this table include the changes to the database necessitated by the new data reported in Levine-Fricke (1993) and Weston (1993). Units are in mg/kg (ppm) unless otherwise stated.

[2] This is a maximum likelihood estimate of the arithmetic mean of the data assuming the data are lognormally distributed. This is assumed to be the best estimate available for the value of the concentration. Even these values, however, are expected to be somewhat conservative.

[3] The 95% UCL is based on Land (1975) as discussed in Gilbert (1987).

[4] RME exposure point concentration determination is the lesser of the maximum detected value and the 95% UCL. This is expected to represent the reasonable maximum estimate of soil concentrations.

[5] The representative concentration for total DDT were derived by summing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT measured in each individual sample and then deriving separate summary statistics for this parameter. Therefore, the sum of the summary statistics representing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT do not strictly add to the summary

TABLE 3-3
ESTIMATED EMISSION RATES AND AIRBORNE EXPOSURE POINT CONCENTRATIONS
(ASSUMING VARIOUS EMISSION MECHANISMS)

| COCs | CS RME Exposure Point Concentration in Soil[1] (mg/kg) | $Q_{10}$ Estimated Chemical-specific $PM_{10}$ Emission Rates: Wind Erosion (mg/sec) | Vehicular Traffic (mg/sec) | Excavation and Dumping (mg/sec) | $CA_{10}$ Estimated RME Exposure Point Concentration in Air[2]: Wind Erosion (mg/m³) | Vehicular Traffic (mg/m³) | Excavation and Dumping (mg/m³) |
|---|---|---|---|---|---|---|---|
| Surface Soil (≤ 1 foot) | | | | | | | |
| Aldrin | 6.6E-01 | 2.1E-08 | 1.5E-04 | 7.5E-05 | 3.8E-12 | 2.7E-08 | 1.4E-08 |
| 4,4'-DDD | 3.5E+01 | 1.1E-06 | 8.1E-03 | 4.0E-03 | 2.1E-10 | 1.5E-06 | 7.3E-07 |
| 4,4'-DDE | 5.6E+01 | 1.8E-06 | 1.3E-02 | 6.4E-03 | 3.3E-10 | 2.3E-06 | 1.2E-06 |
| 2,4'-DDT[3] | 1.2E+02 | 3.8E-06 | 2.7E-02 | 1.4E-02 | 6.9E-10 | 4.9E-06 | 2.4E-06 |
| 4,4'-DDT | 7.0E+02 | 2.3E-05 | 1.6E-01 | 8.0E-02 | 4.1E-09 | 2.9E-05 | 1.4E-05 |
| DDT (total)[3,4,5] | 7.4E+02 | 2.4E-05 | 1.7E-01 | 8.4E-02 | 4.3E-09 | 3.1E-05 | 1.5E-05 |
| Dieldrin | 1.7E+01 | 5.3E-07 | 3.8E-03 | 1.9E-03 | 9.6E-11 | 6.8E-07 | 3.4E-07 |
| Endrin | 1.2E-01 | 3.9E-09 | 2.7E-05 | 1.4E-05 | 7.0E-13 | 5.0E-09 | 2.5E-09 |
| Lead | 1.3E+03 | 4.2E-05 | 3.0E-01 | 1.5E-01 | 7.6E-09 | 5.4E-05 | 2.7E-05 |
| Subsurface Soil (>1 foot) | | | | | | | |
| Aldrin | 1.9E+00 | 6.1E-08 | 4.3E-04 | 2.2E-04 | 1.1E-11 | 7.9E-08 | 3.9E-08 |
| 4,4'-DDD | 1.3E+01 | 4.1E-07 | 2.9E-03 | 1.4E-03 | 7.4E-11 | 5.3E-07 | 2.6E-07 |
| 4,4'-DDE | 1.5E+01 | 4.9E-07 | 3.5E-03 | 1.7E-03 | 8.9E-11 | 6.3E-07 | 3.1E-07 |
| 2,4'-DDT[3] | 1.9E+01 | 6.2E-07 | 4.4E-03 | 2.2E-03 | 1.1E-10 | 7.9E-07 | 3.9E-07 |
| 4,4'-DDT | 3.6E+01 | 1.2E-06 | 8.2E-03 | 4.1E-03 | 2.1E-10 | 1.5E-06 | 7.4E-07 |
| DDT (total)[3,4,5] | 5.7E+01 | 1.9E-06 | 1.3E-02 | 6.5E-03 | 3.4E-10 | 2.4E-06 | 1.2E-06 |
| Dieldrin | 2.3E+01 | 7.5E-07 | 5.4E-03 | 2.7E-03 | 1.4E-10 | 9.7E-07 | 4.8E-07 |
| Endrin | 1.7E+01 | 5.6E-07 | 4.0E-03 | 2.0E-03 | 1.0E-10 | 7.1E-07 | 3.6E-07 |
| Lead | 9.0E+02 | 2.9E-05 | 2.1E-01 | 1.0E-01 | 5.3E-09 | 3.7E-05 | 1.9E-05 |
| Soil at All Depths | | | | | | | |
| Aldrin | 1.2E+00 | 3.8E-08 | 2.7E-04 | 1.4E-04 | 7.0E-12 | 4.9E-08 | 2.5E-08 |
| 4,4'-DDD | 1.8E+01 | 5.7E-07 | 4.1E-03 | 2.0E-03 | 1.0E-10 | 7.4E-07 | 3.7E-07 |
| 4,4'-DDE | 2.9E+01 | 9.5E-07 | 6.7E-03 | 3.3E-03 | 1.7E-10 | 1.2E-06 | 6.0E-07 |
| 2,4'-DDT[3] | 3.7E+01 | 1.2E-06 | 8.5E-03 | 4.2E-03 | 2.2E-10 | 1.5E-06 | 7.7E-07 |
| 4,4'-DDT | 1.0E+02 | 3.4E-06 | 2.4E-02 | 1.2E-02 | 6.1E-10 | 4.3E-06 | 2.1E-06 |
| DDT (total)[3,4,5] | 1.3E+02 | 4.3E-06 | 3.1E-02 | 1.5E-02 | 7.8E-10 | 5.5E-06 | 2.7E-06 |
| Dieldrin | 1.9E+01 | 6.0E-07 | 4.3E-03 | 2.1E-03 | 1.1E-10 | 7.8E-07 | 3.9E-07 |
| Endrin | 1.0E+01 | 3.2E-07 | 2.3E-03 | 1.1E-03 | 5.8E-11 | 4.1E-07 | 2.1E-07 |
| Lead | 8.2E+02 | 2.7E-05 | 1.9E-01 | 9.3E-02 | 4.8E-09 | 3.4E-05 | 1.7E-05 |

Methodology for estimating exposure point concentration in air is presented in Appendix C.

[1] RME Exposure Point Concentration determination: the lesser of the 95% UCL and the Maximum Detected Value. See Table 3-2.

[2] Exposure Point Concentration in Air (mg/m³) = Chemical-specific $PM_{10}$ Emission (mg/sec) x 1/HxWxU (sec/m³)

[3] 2,4'-DDT was analyzed for in 85% of the samples so that sufficient data is available to include this isomer in our risk analysis. However, because approximately 15% of the samples analyzed for 4,4-'DDT were not also analyzed for the 2,4'-DDT isomer, the 2,4'-DDT isomer could not be properly incorporated into the parameter representing total DDT. Thus, 2,4'-DDT is carried through the risk assessment as a separate analyte. In any case, as demonstrated on these tables, the error contributed to risk if the 2,4'-DDT isomer is ignored is less than 30%, which is small compared to other sources of error in risk assessment.

[4] The representative concentrations for total DDT were derived by summing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT measured in each individual sample and then deriving separate summary statistics for this parameter. Therefore, the sum of the summary statistics representing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT (presented in this table) do not strictly add to the summary statistic presented for total DDT.

[5] 2,4'-DDD and 2,4'-DDE were not included in this analysis because fewer than 30% of the samples were analyzed for these isomers. It is expected, however, that the

**Statement of Work for
Upland Cap Remedial Design and Remedial Action at the
United Heckathorn Superfund Site
Richmond, California**

**September 28, 1995**

**1. Purpose.**

The purpose of Remedial Design and Remedial Action at the United Heckathorn Site is to implement the remedy selected in the Record of Decision dated October 26, 1994. The goal of the upland cap portion of the remedy is to reduce the potential for future pesticide contamination in the marine environment by containing contaminated soils and preventing erosion.

**2. Site Background.**

The United Heckathorn Superfund Site in Richmond, California, was used to formulate pesticides from approximately 1947 to 1966. Soils at the Site and sediments in Richmond Harbor were contaminated with various chlorinated pesticides, primarily DDT and dieldrin, as a result of these pesticide formulation activities. At the time of Site listing in 1990, a visible deposit of pesticide residue was present on the Lauritzen Channel embankment. Several response actions have already been taken to cleanup the most contaminated upland areas of the Site, including the Lauritzen Channel embankment. Under EPA Removal Order 90-22, a group of Potentially Responsible Parties (PRPs) excavated the embankment deposit and transported it offsite to a permitted disposal facility. During subsequent actions through 1993 pursuant to the removal order, all known additional upland soil deposits containing high levels of pesticides were removed, as were piles of contaminated soils generated in earlier actions.

A soils database representing current site conditions was compiled in EPA's Human Health Risk Assessment (ICF Technology, 1994) from the previous site studies and removal action reports. A conservative estimate of the remaining mean site soil concentrations of the primary Contaminants of Concern (COCs), DDT (total) and dieldrin, are 64 and 5.7 milligrams per kilogram (mg/kg), respectively. These estimates are conservative because the soils database includes the large number of additional samples which were taken to delineate the hot-spot areas for the removal actions. The actual mean site concentrations are likely to be lower.

DDT at levels exceeding 1 mg/kg in upland soils extends over approximately 5 acres of the northern unpaved portion of the site as shown in Figure 4 of the ROD. The total mass of these upland soils is approximately 95,000 tons (Levine-Fricke, 1993). Confirmation sampling performed during the excavations of the most contaminated areas indicated that the concentrations drop to

nondetectable levels in the younger bay mud immediately below the upland soils, demonstrating that the homogeneous silty-clay bay mud underlying the site is an effective barrier to downward migration of site chemicals. Due to the Site's proximity to San Francisco Bay, the shallow groundwater at the Site is naturally saline and is not a source of drinking water under state or federal law.

**3. Description of Remedy.**

The selected remedial action for the upland portion of the site include:

- Capping of areas around the former Heckathorn facility.
- A deed restriction or notice limiting use of the Levin-Richmond terminal to the current industrial classification.

Tasks are described in more detail below. It is the responsibility of the Settling Work Defendants to ensure that the Remedial Design addresses the overall project goals and requirements of the Record of Decision.

Capping of Upland Area. The results of the human health risk assessment indicate that the removal actions performed at the site between 1990 and 1993 reduced contaminant concentrations in upland soils to levels that are acceptable for current and expected future commercial or industrial uses. Nevertheless, roughly 95,000 tons of soils over a large area of the site exceed the much lower remedial action goal for marine sediments. Therefore, a remediation goal of erosion prevention was established for upland soils. The cap must be designed, constructed, and operated and maintained to prevent loss of soil from the site caused by wind, rain, or facility activities.

Institutional Controls. The human health risk assessment concluded that the concentrations of COCs in upland soils at the Levin Richmond Terminal had been reduced to acceptable levels for current and expected future industrial uses. This is consistent with the San Francisco Bay Plan under which the area is zoned for port priority or water-related industrial use. In order to provide an additional measure of assurance that the site could not be converted to other use without further study and possibly further remediation, a deed restriction or notice on the property is required as part of the remedy.

The Lauritzen Channel is currently posted with signs warning fishermen that fish and shellfish may be contaminated with DDT and other pesticides. These signs will remain in place until post-remedial monitoring confirms that concentrations of the COCs have been reduced to acceptable levels.

**4. Project Documents.**

A. RD/RA Workplan.

The Settling Work Defendants shall prepare and submit a draft RD/RA Work Plan within 60 calendar days after signing of the Consent Decree (CD). The Work Plan shall include a description of the activities to be performed and the plans and specifications to be prepared. A schedule for completion of each activity and submittal shall also be included.

Specifically, the Work Plan shall present the following:

- A statement of the problem(s) and potential problem(s) posed by the site and how the objectives of the RD/RA will address the problem(s).
- A background summary setting forth: (1) a brief description of the site; (2) a brief synopsis of the history of the site; (3) a summary of the existing data including physical and chemical characteristics of the contaminants identified and their distribution among the environmental media at the site.
- The Settling Work Defendants's technical approach to each task to be performed, including a detailed description of each task.
- A schedule for completion of each required activity and submission of each deliverable required by this SOW.
- An organizational structure which outlines the responsibilities and authority of all organizations and key personnel involved in the RD/RA. A description of key project personnel's qualifications (project manager, resident engineer, quality assurance official, etc.) shall be provided.

B. Health and Safety Plan.

The Settling Work Defendants shall prepare a site-specific HASP that specifies employee training, protective equipment, medical surveillance requirements, standard operating procedures, and a contingency plan in accordance with 40 CFR 300.150 of the NCP and 29 CFR 1910.120. Health and Safety Plans prepared previously for the site may be reviewed to determine whether they are sufficient to satisfy this requirement.

C. Operation and Maintenance.

The purpose of O&M is to protect the integrity of the cap and to evaluate performance. The plan shall describe and analyze potential operating problems such as disturbance by heavy equipment and failure to prevent contaminant releases through stormwater. The Settling Work Defendants shall identify any potential failures and develop corrective action plans.

The Operations and Maintenance manual shall include a Field Sampling Plan (FSP) which will define the sampling and data collection methods that will be used to analyze the stormwater pathway to confirm the long-term effectiveness of the cap. The FSP shall include sampling objectives; sample locations and frequency; sampling equipment and procedures; and sample handling and analysis. A Quality Assurance Project Plan (QAPP) shall also be prepared to describe the project objectives and organization, functional activities, and quality assurance/quality control (QA/QC) protocols to shall be used.

The Settling Work Defendants shall review and update the O&M Manual, as necessary, to include as-built drawings. The final O&M manual shall be submitted with the closeout report.

D. Preliminary Design.

Preliminary Design begins with the initial design and ends with the completion of approximately 30 percent of the design effort. At this stage, the Settling Work Defendants shall have field-verified the existing conditions of the site, as necessary.

E. Pre-final/Final Design.

The Prefinal Design shall function as the draft version of the Final Design. The Prefinal Design shall address comments generated from the Preliminary Design Review and clearly show any modifications of the design as a result of incorporation of the comments. After EPA review and comment on the Prefinal Design, the Final Design shall be submitted. All Final Design documents shall be approved by a Professional Engineer registered in California. EPA approval of the Final Design is required before initiating the RA, unless specifically authorized by EPA. The pre-final design shall include a complete set of construction drawings and specifications (general specifications, drawings, and schematics) shall be submitted at the prefinal stage.

F. Closeout Report.

After implementation of the Remedial Action, the Settling Work Defendants shall conduct the necessary inspections to verify completed work and prepare a Remedial Action Report.

**5. Schedule**

The Settling Work Defendants shall submit deliverables and implement Remedial Action according to the following schedule.

A. Draft Work Plan
Draft Health and Safety Plan
Draft Operations and Maintenance Manual

Draft Deed Restriction

60 days after signing of the Consent Decree or 10 days after EPA's issuance of an authorization to proceed pursuant to Paragraph 10 of the Levin Group RD/RA Consent Decree, whichever is later.

B. Final Work Plan
Final Health and Safety Plan
Final Deed Restriction

20 days after receiving comments from EPA.

C. Preliminary Design

45 days after finalization of the workplan.

D. Pre-final/Final Design

30 days after receiving comment on the Preliminary Design from EPA.

E. Begin Remedy Implementation

90 days after receiving notice from EPA of completion of marine remediation.

F. Closeout Report and Final Operations and Maintenance Manual

30 days after completion of Remedial Action.

THE LAND REFERRED TO HEREIN IS SITUATED IN THE STATE OF CALIFORNIA, COUNTY OF CONTRA COSTA, CITY OF RICHMOND, DESCRIBED AS FOLLOWS:

PARCEL 1:

PORTION OF TIDE LAND LOTS 26 AND 27, SECTION 13, PORTION OF TIDE LAND LOTS 6, 7, 10 AND 11, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AND A PORTION OF SWAMP AND OVERFLOW LANDS IN SAID TOWNSHIP AND RANGE, DESCRIBED AS FOLLOWS:

BEGINNING ON THE SOUTH LINE OF THE 3.39 ACRE STRIP OF LAND DESCRIBED IN THE DEED TO THE CITY OF RICHMOND, RECORDED AUGUST 11, 1948, BOOK 1272, OFFICIAL RECORDS, PAGE 161, AT THE NORTHWEST CORNER OF THE 8.93 ACRE PARCEL OF LAND DESCRIBED IN THE DEED TO TIME OIL COMPANY, RECORDED JUNE 23, 1950, BOOK 1580, OFFICIAL RECORDS, PAGE 53; THENCE FROM SAID POINT OF BEGINNING ALONG THE WEST LINES OF SAID 8.938 ACRE PARCEL SOUTH 7° 22' 42" EAST, 755.15 FEET AND SOUTH 39° 35' 54" WEST, 183.99 FEET TO THE SOUTHWEST CORNER THEREOF; THENCE CONTINUING SOUTH 39° 35' 54" WEST, 148.21 FEET TO THE SOUTH LINE OF THE PARCEL OF LANC FIRSTLY DESCRIBED IN THE DEED TO PARR-RICHMOND INDUSTRIAL CORPORATION, RECORDED JUNE 1, 1949, BOOK 1394, OFFICIAL RECORDS, PAGE 370; THENCE ALONG THE EXTERIOR BOUNDARY LINES OF SAID PARCEL (1394 OR 370), AS FOLLOWS:

NORTH 50° 45' 20" WEST, 837.27 FEET; NORTH 0° 08; EAST, 287.09 FEET; NORTH 41° 46' EAST, 94.75 FEET; NORTH 4° 45' EAST, 646.21 FEET; SOUTH 89° 50' 50" EAST, 75.64 FEET; NORTH 12° 47' 24" EAST, 231.34 FEET; NORTH 89° 55' EAST, 39.57 FEET; NORTH 0° 05' WEST, 309.99 FEET; NORTH 16° 00' 31" EAST, 60.11 FEET; NORTH 6° 09' 11" EAST, 121.33 FEI NORTH 89° 55' EAST, 8.55 FEET AND NORTH 0° 08' EAST, 30.82 FEET; THEI LEAVING SAID EXTERIOR BOUNDARY LINE SOUTH 89° 35' EAST, 144.10 FEET; THENCE SOUTH 6° 53' EAST, 49.45 FEET; THENCE SOUTH 5° 04' WEST, 833.1 FEET; THENCE SOUTH 84° 56' EAST, 173.95 FEET TO THE WEST LINE OF SAII 3.39 ACRE PARCEL; THENCE ALONG THE WEST AND SOUTH LINES OF SAID 3.39 ACRE PARCEL, SOUTH 0° 31' WEST, 373.95 FEET AND SOUTH 89° 31' EAST, 195.48 FEET TO THE POINT OF BEGINNING.

PARCEL 2:

PORTION OF BLOCK 50 AND A PORTION OF FOURTH STREET AS SHOWN ON THE REVISED MAP OF SANTA FE, FILED AUGUST 24, 1915, IN BOOK 12 OF MAPS, PAGE 280; PORTION OF LOT 42 AS SHOWN ON THE MAP OF SAN PABLO RANCHO, FILED MARCH 1, 1894; PORTION OF TIDE LOT 27, SECTION 13 AND A PORTIO OF TIDE LOT 6, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AS SHOWN ON MAP NO. 1 SALT MARSH AND TIDE

LANDS, FILED JUNE 11, 1917, IN RACK MAP NO. 9, IN THE OFFICE OF THE COUNTY RECORDER OF CONTRA COSTA COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING ON THE MOST WESTERN LINE OF THAT CERTAIN STRIP OF LAND CONTAINING 3.39 ACRE, MORE OR LESS, DESCRIBED IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO CITY OF RICHMOND, RECORDED AUGUST 11, 1948, IN BOOK 1272 OF OFFICIAL RECORDS, PAGE 161, AT THE EASTERN TERMINUS OF THE LINE GIVEN AS "NORTH 84° 56' WEST, 173.95 FEET" THE BEARING OF SAID LINE BEING TAKEN AS NORTH 83° 58' 39" WEST FOR THE PURPOSE OF THIS DESCRIPTION, IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO PARR-RICHMOND TERMINAL COMPANY, RECORDED DECEMBER 30, 1955, IN BOOK 2681 OF OFFICIAL RECORDS, PAGE 353; THENCE FROM SAID POIN OF BEGINNING ALONG THE EXTERIOR LINES OF SAID PARCEL (2681 OR 353) AS FOLLOWS:

NORTH 83° 58' 39" WEST, 173.95 FEET; NORTH 6° 01' 21" EAST, 833.81 FEE NORTH 5° 55' 39" WEST, 49.45 FEET AND NORTH 88° 37' 39" WEST, 18.85 FEET; THENCE NORTH 4° 14' 09" WEST, 44.61 FEET; THENCE NORTHERLY ALONG THE ARC OF A TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 360 FEET AN ARC DISTANCE OF 51.31 FEET; THENCE NORTH 3° 55' 51" EAST, 88.52 FEET T THE SOUTH LINE OF CUTTING BOULEVARD; THENCE SOUTH 88° 39' 09" EAST ALONG SAID SOUTH LINE 24.79 FEET TO THE SOUTH LINE OF THE PARCEL OF LA DESCRIBED AS PARCEL ONE IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO SOUTHERN PACIFIC RAILROAD COMPANY, RECORDED AUGUST 7, 1953, IN BOOK 2172 OF OFFICIAL RECORDS, PAGE 514; THENCE ALONG SAID SOU LINE AS FOLLOWS:

SOUTH 83° 58' 13" EAST, 68.37 FEET; EASTERLY ALONG THE ARC OF A TANGEN CURVE TO THE RIGHT HAVING A RADIUS OF 291.90 FEET OF 35.37 FEET AND SOUTH 73° 32' 21" EAST, 7.49 FEET TO THE EXTENSION NORTH 1° 28' 21" EAST AT THE MOST WESTERN LINE OF SAID CITY OF RICHMON PARCEL (1272 OR 161); THENCE SOUTH 1° 28" 21' WEST ALONG SAID EXTENSIO AND ALONG SAID WESTERN LINE 1057.71 FEET TO THE POINT OF BEGINNING.

PARCEL 4:

A PORTION OF AMENDMENT TO MAP OF ELLIS LANDING, FILED OCTOBER 28, 1913 IN BOOK 11 OF MAPS, PAGE 247; AND A PORTION OF TIDE LOTS 5 AND 12, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AS SHOWN ON MAP NO. 1, SALT MARSH AND TIDE LANDS, FILED JUNE 11, 1917, SAID MAPS BEING FILED IN THE OFFICE OF THE COUNTY RECORDER OF CONTRA COSTA COUNTY AND MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE WESTERN LINE OF EIGHTH STREET AS SAID STREET IS SHOWN ON SAID AMENDMENT TO MAP OF ELLIS LANDING, SAID POINT

BEING ALSO THE SOUTHEAST CORNER OF THE 3.39 ACRE STRIP DESCRIBED IN DEED FROM PARR RICHMOND INDUSTRIAL CORPORATION TO THE CITY OF RICHMOND FOR STREET PURPOSES, (SAID PORTION OF SAID STRIP BEING COMMONLY CALLED WRIGHT AVENUE), RECORDED AUGUST 11, 1948, IN BOOK 1272 OF OFFICIAL RECORDS, PAGE 161; THENCE SOUTH 1° 26' 21" WEST ALONG THE WESTERN LINE OF SAID EIGHTH STREET AND ITS SOUTHERLY PROJECTION 1229.02 FEET TO THE SOUTHERLY LINE OF DOCK AVENUE AS SAID DOCK AVENUE IS SHOWN ON SAID AMENDMENT TO MAP OF ELLIS LANDING; THENCE SOUTH 62° 53' 39" EAST ALONG SAID SOUTHERLY LINE OF DOCK AVENUE, 15.76 FEET TO THE NORTHERN CORNER OF THE TRACT OF LAND DESCRIBED AS PARCEL ONE IN THE DEED FROM ELLIS LANDING AND DOCK CO., A CORPORATION, TO THE CITY OF RICHMOND, DATED FEBRUARY 10, 1926, RECORDED APRIL 22, 1926, IN BOOK 29 OF OFFICIAL RECORDS, PAGE 283; THENCE SOUTH 4° 19' 34" EAST ALONG THE WEST LINE OF SAID LAST MENTIONED PARCEL AND ALONG THE WEST LINE OF PARCEL TWO DESCRIBED IN SAID DEED (29 OR 283), 120.30 FEET TO THE NORTHERLY U.S. PIERHEAD AND BULKHEAD LINE OF SAID RICHMOND INNER HARBOR; THENCE NORTH 71° 04' 25" WEST ALONG SAID NORTHERLY LINE 467.0 FEET TO THE SOUTHERLY EXTENSION OF THE EASTERLY LINE OF THE PARCEL OF LAND DESCRIBED IN DEED FROM PARR RICHMOND INDUSTRIAL CORPORATION TO TIME OIL CO., DATED JUNE 9, 1950 AND RECORDED JUNE 23, 1950, IN BOOK 1580 OF OFFICIAL RECORDS, PAGE 553; THENCE NORTH 2° 38' 09" WEST ALONG SAID SOUTHERLY EXTENSION AND SAID EASTERLY LINE, 1218.26 FEET TO THE SOUTHERLY LINE OF THE SAID 3.39 ACRE STRIP (1272 OR 161); THENCE SOUTH 88° 33' 39" EAST ALONG SAID SOUTHERLY LINE, 505.76 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM:

THE PARCEL OF LAND DESCRIBED IN THE DEED TO TIME OIL CO., RECORDED NOVEMBER 23, 1966, BOOK 5250, OFFICIAL RECORDS, PAGE 411.

PARCEL 6:

BEGINNING AT THE NORTHWESTERN CORNER OF THE LAND DESIGNATED AS PARCEL 2 IN THE QUIT CLAIM DEED TO PARR-RICHMOND INDUSTRIAL CORPORATION, RECORDED JUNE 1, 1949 IN BOOK 1394 OF OFFICIAL RECORDS OF CONTRA COSTA COUNTY, PAGE 370; RUNNING THENCE ALONG THE NORTHERN LINE OF SAID LAND, BEING THE SOUTHERN LINE OF CUTTING BOULEVARD, EASTERLY, 88.61 FEET TO THE EASTERN LINE OF THE LAND SECONDLY DESCRIBED IN THE DEED TO PARR-RICHMOND TERMINAL CORPORATION, RECORDED DECEMBER 30, 1953, IN BOOK 2681 OF OFFICIAL RECORDS OF CONTRA COSTA COUNTY, PAGE 353; THENCE ALONG THE LAST NAMED LINE SOUTH 1° 56' WEST, SAID BEARINGS USED FOR THE PURPOSE OF THIS DESCRIPTION, 139.51 FEET AND SOUTH 6° 53' WEST 38.59 FEET TO THE NORTHERN LINE OF THE LAND FIRSTLY DESCRIBED IN SAID LAST MENTIONED DEED; THENCE ALONG THE LAST NAMED LINE NORTH 89° 34' WEST 144.10 FEET TO THE WESTERN LINE OF SAID LAND FIRST MENTIONED 1394 OR 370; AND THENCE ALONG THE LAST NAMED LINE NORTH 83 FEET AND NORTH 39° 53' EAST 84.13 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM:

THAT PORTION THEREOF LYING WITHIN THE LINES OF THE PARCEL OF LAND DESCRIBED AS PARCEL ONE IN THE DEED TO PARR-RICHMOND TERMINAL CORP.

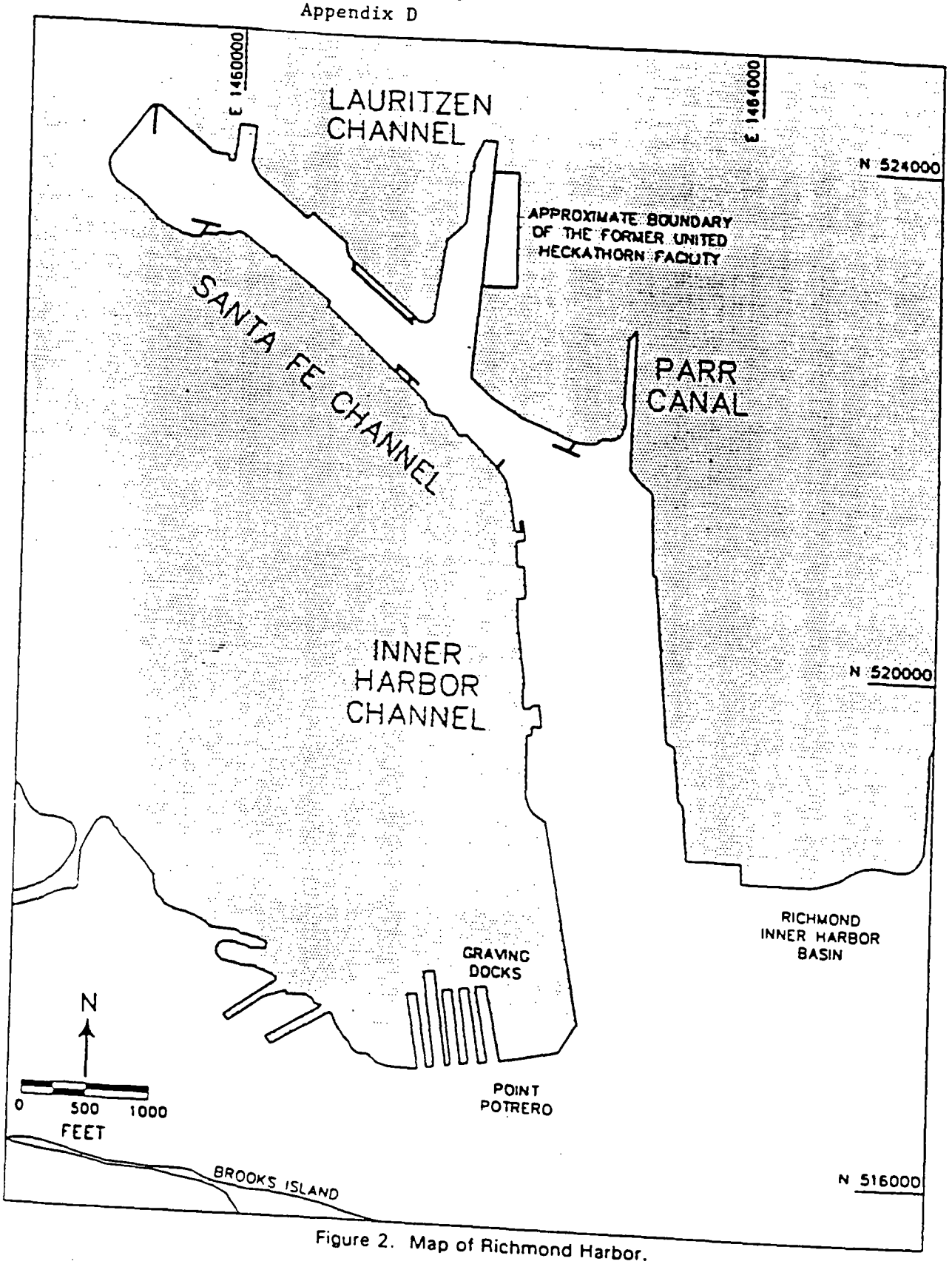



Figure 2. Map of Richmond Harbor.

Recording Requested By:
Keith Howard, Cooper White & Cooper
1333 North California Blvd., Suite 450
Walnut Creek, CA 94596

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When Recorded, Mail To:
Keith Howard, Cooper White & Cooper
1333 North California Blvd., Suite 450
Walnut Creek, CA 94596

# COVENANT

## TO RESTRICT USE OF PROPERTY

## Levin Enterprises, Inc. - Richmond Site

This Covenant and Agreement ("Covenant") is made on the ___ day of May 1996, by Levin Enterprises, Inc. ("Covenantor"), who is the owner of record of certain Property situated in the City of Richmond, County of Contra Costa, State of California, described in Exhibit "A" attached hereto and incorporated herein by this reference ("the Property"), with reference to the following facts:

A. The Property contains hazardous substances;

B. Portions of the Property have been designated by the United States Environmental Protection Agency as a Superfund site on the National Priorities' List. Potentially responsible parties at the site have been identified by the Environmental Protection Agency, and such parties have entered into a series of four Consent Decrees with the United States providing for the

remediation of the Site in accordance with the United States Environmental Protection Agency's Record of Decision executed on October 26, 1994 (ROD). Covenantor has entered into such a Consent Decree with the United States in an action entitled United States of America, Plaintiff vs. Montrose Chemical Corporation of California, et al., Defendants, No. _____ (Consent Decree) in the United States District Court, Northern District of California,. (Hereinafter referred to as Covenantor Consent Decree).

B.1. Contamination of the Property. Portions of the soil on the Property and adjoining underwater sediments have become contaminated with hazardous substances, including Dichlorodiphenylchloroethane (DDT), Dichlorodiphenyl-dechloroethylene (DDE), and Dieldrin. Remedial activities that have occurred at the Property and that will occur pursuant to the above-referenced Consent Decrees are designed to eliminate any significant risk to human health and/or the environment from the above-referenced contaminants.

B.2. Surrounding Land use and Population Potentially Affected. Land use in the immediate vicinity of the Property is industrial. The nearest residential area is approximately one quarter of a mile to the Northeast of the Property.

C. Covenantor desires and intends that in order to protect

the present or future public health and safety, the Property shall be used in such a manner as to avoid potential harm to persons or Property which may result from hazardous substances which have been deposited on portions of the Property.

## ARTICLE I

## GENERAL PROVISIONS

1.01 Provisions to Run With the Land. This Covenant sets forth protective provisions, covenants, restrictions and conditions (collectively referred to as "Restrictions") upon and subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered and/or conveyed. Each and all of the Restrictions shall run with the land, and pass with each and every portion of the Property, and shall apply to, inure to the benefit of and bind the respective successors in interest thereof. Each and all of the Restrictions are imposed upon the entire Property unless expressly stated as applicable to a specific portion of the Property. Each and all of the restrictions are for the benefit of and enforceable by the United States Environmental Protection Agency.

1.02 Concurrence of Owners Presumed. All purchasers, lessees, or possessors of any portion of the Property shall be deemed by their purchase, leasing, or possession of such Property, to be in accord with the foregoing and to agree for and among

themselves, their heirs, successors, and assignees, and the agents, employees, and lessees of such owners, heirs, successors, and assignees, that the Restrictions as herein established must be adhered to for the benefit of future Owners and Occupants and that their interest in the Property Shall be subject to the Restrictions contained herein.

1.03 Notice of Entry of Consent Decree On _____ 1996 the Covenantor Consent Decree was entered in the United States District Court, Northern District of California. A copy of the Covenantor Consent Decree is available for inspection at the Property subject to this Covenant.

1.04 Incorporation into Deeds and Leases. Covenantor desires and covenants that the Restrictions set out herein and in the Covenantor Consent Decree shall be incorporated by reference in each and all deeds and leases of any portion of the Property.

**ARTICLE II**

**DEVELOPMENT, USE AND CONVEYANCE OF THE PROPERTY**

2.01 Restrictions on Development and Use. Covenantor promises to restrict the use of that portion of the Property as described in Exhibit B as follows:

a. Development of the Property shall be restricted to commercial or industrial use.

b. No residence for human habitation shall be permitted on the Property.

c. No hospitals shall be permitted on the Property.

d. No schools for persons under 18 years of age shall be permitted on the Property.

e. No day care centers for children shall be permitted on

the Property.

2.02 Conveyance of Property. The Covenantor shall provide a thirty (30) day advance notice to the United States Environmental Agency of any lease of the entire Property or other conveyance of the Property or an interest in the Property to a third person.

2.03 Notice in Agreements. Covenantor shall execute a written instrument which shall accompany all purchase, lease, sublease, or rental agreements relating to the Property. The instrument shall contain the following statement:

"The land described herein contains hazardous substances and therefore is subject to a Covenant to Restrict Use of Property which has been recorded. This statement is not a declaration that a hazard exists."

**ARTICLE III**

**ACCESS**

3.01 Notice of Obligation to Provide Access. Beginning on June 1, 1996, the Covenantor agrees to provide access at all reasonable times to the Site and, to the extent access to the Property is controlled by Covenantor, any other Property to which access is required for the implementation of the response actions called for in the ROD. Such access shall be provided to the United States and its representatives, (including EPA and its contractors); the Supervising Contractor and its employees, agents and subcontractors, and

technical representatives of any potentially responsible party performing response actions at the Site pursuant to an EPA order or agreement. Access shall be for the purposes of conducting any activity related to the Consent Decree including, but not limited to:

a. Monitoring the Work;

b. Verifying any data or information submitted to the United States;

c. Conducting investigations relating to contamination at or near the Site;

d. Obtaining samples;

e. Assessing the need for, planning, or implementing additional response actions at or near the Site;

f. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents; and

g. Assessing Covenantor's compliance with this Consent Decree, or assessing other potentially responsible parties' compliance with an EPA order or agreement.

## IV.

## MISCELLANEOUS

4.01 Partial Invalidity. If any potion of the Restriction or terms set forth herein is determined to be involved for any reason, the remaining portion shall remain in full force and effect as if such portion had not been included herein.

4.02 Recordation. This instrument shall be executed by the Covenantor and shall be recorded by the Covenantor in the County

of Contra Costa within ten (10) days of the date of entry of the Covenantor Consent Decree.

IN WITNESS WHEREOF, the parties execute this Covenant as of the date set forth above.

OWNER:

By: _____

Title: _____

Date: _____

STATE OF CALIFORNIA )
) ss.
COUNTY OF _____ )

On this the ____ day of _____, 1996, before me, the undersigned Notary Public, personally appeared _____, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument and acknowledged that he/she executed the same in his/her authorized capacity, and that by his/her signature on the instrument the person or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

_____
Notary's Signature

137313.1

THE LAND REFERRED TO HEREIN IS SITUATED IN THE STATE OF CALIFORNIA, COUNTY OF CONTRA COSTA, CITY OF RICHMOND, DESCRIBED AS FOLLOWS:

PARCEL 1:

PORTION OF TIDE LAND LOTS 26 AND 27, SECTION 13, PORTION OF TIDE LAND LOTS 6, 7, 10 AND 11, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AND A PORTION OF SWAMP AND OVERFLOW LANDS IN SAID TOWNSHIP AND RANGE, DESCRIBED AS FOLLOWS:

BEGINNING ON THE SOUTH LINE OF THE 3.39 ACRE STRIP OF LAND DESCRIBED IN THE DEED TO THE CITY OF RICHMOND, RECORDED AUGUST 11, 1948, BOOK 1272, OFFICIAL RECORDS, PAGE 161, AT THE NORTHWEST CORNER OF THE 8.93 ACRE PARCEL OF LAND DESCRIBED IN THE DEED TO TIME OIL COMPANY, RECORDED JUNE 23, 1950, BOOK 1580, OFFICIAL RECORDS, PAGE 53; THENCE FROM SAID POINT OF BEGINNING ALONG THE WEST LINES OF SAID 8.938 ACRE PARCEL SOUTH 7° 22' 42" EAST, 755.15 FEET AND SOUTH 39° 35' 54" WEST, 183.99 FEET TO THE SOUTHWEST CORNER THEREOF; THENCE CONTINUING SOUTH 39° 35' 54" WEST, 148.21 FEET TO THE SOUTH LINE OF THE PARCEL OF LAND FIRSTLY DESCRIBED IN THE DEED TO PARR-RICHMOND INDUSTRIAL CORPORATION, RECORDED JUNE 1, 1949, BOOK 1394, OFFICIAL RECORDS, PAGE 370; THENCE ALONG THE EXTERIOR BOUNDARY LINES OF SAID PARCEL (1394 OR 370), AS FOLLOWS:

NORTH 50° 45' 20" WEST, 837.27 FEET; NORTH 0° 08; EAST, 287.09 FEET; NORTH 41° 46' EAST, 94.75 FEET; NORTH 4° 45' EAST, 646.21 FEET; SOUTH 89° 50' 50" EAST, 75.64 FEET; NORTH 12° 47' 24" EAST, 231.34 FEET; NORTH 89° 55' EAST, 39.57 FEET; NORTH 0° 05' WEST, 309.99 FEET NORTH 16° 00' 31" EAST, 60.11 FEET; NORTH 6° 09' 11" EAST, 121.33 FEET NORTH 89° 55' EAST, 8.55 FEET AND NORTH 0° 08' EAST, 30.82 FEET; THENCE LEAVING SAID EXTERIOR BOUNDARY LINE SOUTH 89° 35' EAST, 144.10 FEET; THENCE SOUTH 6° 53' EAST, 49.45 FEET; THENCE SOUTH 5° 04' WEST, 833. FEET; THENCE SOUTH 84° 56' EAST, 173.95 FEET TO THE WEST LINE OF SAID 3.39 ACRE PARCEL; THENCE ALONG THE WEST AND SOUTH LINES OF SAID 3.39 ACRE PARCEL, SOUTH 0° 31' WEST, 373.95 FEET AND SOUTH 89° 31' EAST, 195.48 FEET TO THE POINT OF BEGINNING.

PARCEL 2:

PORTION OF BLOCK 50 AND A PORTION OF FOURTH STREET AS SHOWN ON THE REVISED MAP OF SANTA FE, FILED AUGUST 24, 1915, IN BOOK 12 OF MAPS, PAGE 280; PORTION OF LOT 42 AS SHOWN ON THE MAP OF SAN PABLO RANCHO, FILED MARCH 1, 1894; PORTION OF TIDE LOT 27, SECTION 13 AND A PORTION OF TIDE LOT 6, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AS SHOWN ON MAP NO. 1 SALT MARSH AND TIDE

LANDS, FILED JUNE 11, 1917, IN RACK MAP NO. 9, IN THE OFFICE OF THE COUNTY RECORDER OF CONTRA COSTA COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING ON THE MOST WESTERN LINE OF THAT CERTAIN STRIP OF LAND CONTAINING 3.39 ACRE, MORE OR LESS, DESCRIBED IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO CITY OF RICHMOND, RECORDED AUGUST 11, 1948, IN BOOK 1272 OF OFFICIAL RECORDS, PAGE 161, AT THE EASTERN TERMINUS OF THE LINE GIVEN AS "NORTH 84° 56' WEST, 173.95 FEET" THE BEARING OF SAID LINE BEING TAKEN AS NORTH 83° 58' 39" WEST FOR THE PURPOSE OF THIS DESCRIPTION, IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO PARR-RICHMOND TERMINAL COMPANY, RECORDED DECEMBER 30, 1955, IN BOOK 2681 OF OFFICIAL RECORDS, PAGE 353; THENCE FROM SAID POINT OF BEGINNING ALONG THE EXTERIOR LINES OF SAID PARCEL (2681 OR 353) AS FOLLOWS:

NORTH 83° 58' 39" WEST, 173.95 FEET; NORTH 6° 01' 21" EAST, 833.81 FEET NORTH 5° 55' 39" WEST, 49.45 FEET AND NORTH 88° 37' 39" WEST, 18.85 FEET; THENCE NORTH 4° 14' 09" WEST, 44.61 FEET; THENCE NORTHERLY ALONG THE ARC OF A TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 360 FEET AN ARC DISTANCE OF 51.31 FEET; THENCE NORTH 3° 55' 51" EAST, 88.52 FEET TO THE SOUTH LINE OF CUTTING BOULEVARD; THENCE SOUTH 88° 39' 09" EAST ALONG SAID SOUTH LINE 24.79 FEET TO THE SOUTH LINE OF THE PARCEL OF LANI DESCRIBED AS PARCEL ONE IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO SOUTHERN PACIFIC RAILROAD COMPANY, RECORDED AUGUST 7, 1953, IN BOOK 2172 OF OFFICIAL RECORDS, PAGE 514; THENCE ALONG SAID SOUTI LINE AS FOLLOWS:

SOUTH 83° 58' 13" EAST, 68.37 FEET; EASTERLY ALONG THE ARC OF A TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 291.90 FEET OF 35.37 FEET AND SOUTH 73° 32' 21" EAST, 7.49 FEET TO THE EXTENSION NORTH 1° 28' 21" EAST AT THE MOST WESTERN LINE OF SAID CITY OF RICHMOND PARCEL (1272 OR 161); THENCE SOUTH 1° 28" 21' WEST ALONG SAID EXTENSION AND ALONG SAID WESTERN LINE 1057.71 FEET TO THE POINT OF BEGINNING.

PARCEL 4:

A PORTION OF AMENDMENT TO MAP OF ELLIS LANDING, FILED OCTOBER 28, 1913, IN BOOK 11 OF MAPS, PAGE 247; AND A PORTION OF TIDE LOTS 5 AND 12, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AS SHOWN ON MAP NO. 1, SALT MARSH AND TIDE LANDS, FILED JUNE 11, 1917, SAID MAPS BEING FILED IN THE OFFICE OF THE COUNTY RECORDER OF CONTRA COSTA COUNTY AND MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE WESTERN LINE OF EIGHTH STREET AS SAID STREET IS SHOWN ON SAID AMENDMENT TO MAP OF ELLIS LANDING, SAID POINT

BEING ALSO THE SOUTHEAST CORNER OF THE 3.39 ACRE STRIP DESCRIBED IN DEED FROM PARR RICHMOND INDUSTRIAL CORPORATION TO THE CITY OF RICHMOND FOR STREET PURPOSES, (SAID PORTION OF SAID STRIP BEING COMMONLY CALLED WRIGHT AVENUE), RECORDED AUGUST 11, 1948, IN BOOK 1272 OF OFFICIAL RECORDS, PAGE 161; THENCE SOUTH 1° 26' 21" WEST ALONG THE WESTERN LINE OF SAID EIGHTH STREET AND ITS SOUTHERLY PROJECTION 1229.02 FEET TO THE SOUTHERLY LINE OF DOCK AVENUE AS SAID DOCK AVENUE IS SHOWN ON SAID AMENDMENT TO MAP OF ELLIS LANDING; THENCE SOUTH 62° 53' 39" EAST ALONG SAID SOUTHERLY LINE OF DOCK AVENUE, 15.76 FEET TO THE NORTHERN CORNER OF THE TRACT OF LAND DESCRIBED AS PARCEL ONE IN THE DEED FROM ELLIS LANDING AND DOCK CO., A CORPORATION, TO THE CITY OF RICHMOND, DATED FEBRUARY 10, 1926, RECORDED APRIL 22, 1926, IN BOOK 29 OF OFFICIAL RECORDS, PAGE 283; THENCE SOUTH 4° 19' 34" EAST ALONG THE WEST LINE OF SAID LAST MENTIONED PARCEL AND ALONG THE WEST LINE OF PARCEL TWO DESCRIBED IN SAID DEED (29 OR 283), 120.30 FEET TO THE NORTHERLY U.S. PIERHEAD AND BULKHEAD LINE OF SAID RICHMOND INNER HARBOR; THENCE NORTH 71° 04' 25" WEST ALONG SAID NORTHERLY LINE 467.06 FEET TO THE SOUTHERLY EXTENSION OF THE EASTERLY LINE OF THE PARCEL OF LAND DESCRIBED IN DEED FROM PARR RICHMOND INDUSTRIAL CORPORATION TO TIME OIL CO., DATED JUNE 9, 1950 AND RECORDED JUNE 23, 1950, IN BOOK 1580 OF OFFICIAL RECORDS, PAGE 553; THENCE NORTH 2° 38' 09" WEST ALONG SAID SOUTHERLY EXTENSION AND SAID EASTERLY LINE, 1218.26 FEET TO THE SOUTHERLY LINE OF THE SAID 3.39 ACRE STRIP (1272 OR 161); THENCE SOUTH 88° 33' 39" EAST ALONG SAID SOUTHERLY LINE, 505.76 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM:

THE PARCEL OF LAND DESCRIBED IN THE DEED TO TIME OIL CO., RECORDED NOVEMBER 23, 1966, BOOK 5250, OFFICIAL RECORDS, PAGE 411.

PARCEL 6:

BEGINNING AT THE NORTHWESTERN CORNER OF THE LAND DESIGNATED AS PARCEL 2 IN THE QUIT CLAIM DEED TO PARR-RICHMOND INDUSTRIAL CORPORATION, RECORDED JUNE 1, 1949 IN BOOK 1394 OF OFFICIAL RECORDS OF CONTRA COSTA COUNTY, PAGE 370; RUNNING THENCE ALONG THE NORTHERN LINE OF SAID LAND, BEING THE SOUTHERN LINE OF CUTTING BOULEVARD, EASTERLY, 88.61 FEET TO THE EASTERN LINE OF THE LAND SECONDLY DESCRIBED IN THE DEED TO PARR-RICHMOND TERMINAL CORPORATION, RECORDED DECEMBER 30, 1953, IN BOOK 2681 OF OFFICIAL RECORDS OF CONTRA COSTA COUNTY, PAGE 353; THENCE ALONG THE LAST NAMED LINE SOUTH 1° 56' WEST, SAID BEARINGS USED FOR THE PURPOSE OF THIS DESCRIPTION, 139.51 FEET AND SOUTH 6° 53' WEST 38.59 FEET TO THE NORTHERN LINE OF THE LAND FIRSTLY DESCRIBED IN SAID LAST MENTIONED DEED; THENCE ALONG THE LAST NAMED LINE NORTH 89° 34' WEST 144.10 FEET TO THE WESTERN LINE OF SAID LAND FIRST MENTIONED 1394 OR 370; AND THENCE ALONG THE LAST NAMED LINE NORTH 83 FEET AND NORTH 39° 53' EAST 84.13 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM:

THAT PORTION THEREOF LYING WITHIN THE LINES OF THE PARCEL OF LAND DESCRIBED AS PARCEL ONE IN THE DEED TO PARR-RICHMOND TERMINAL COMPANY

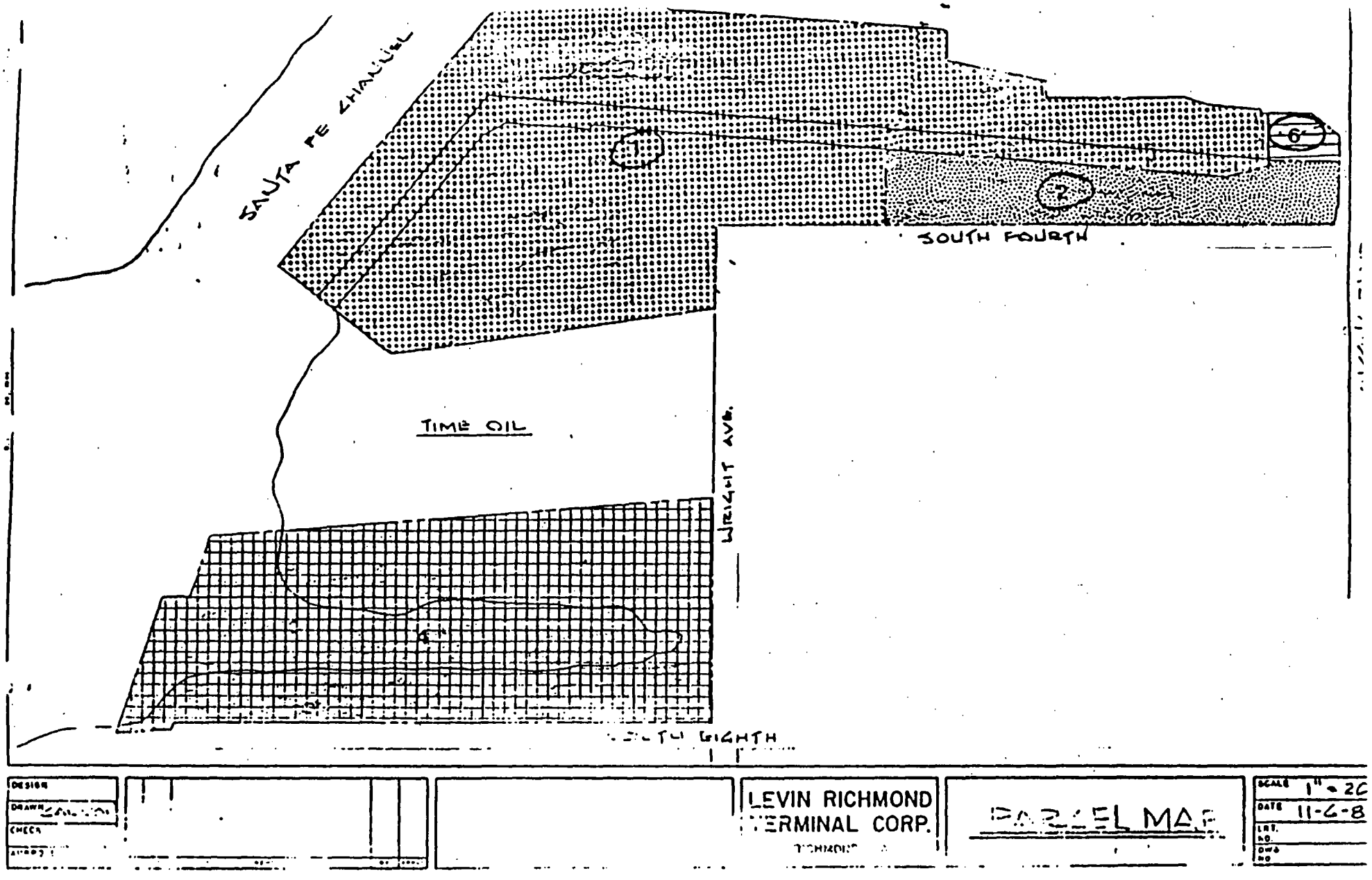
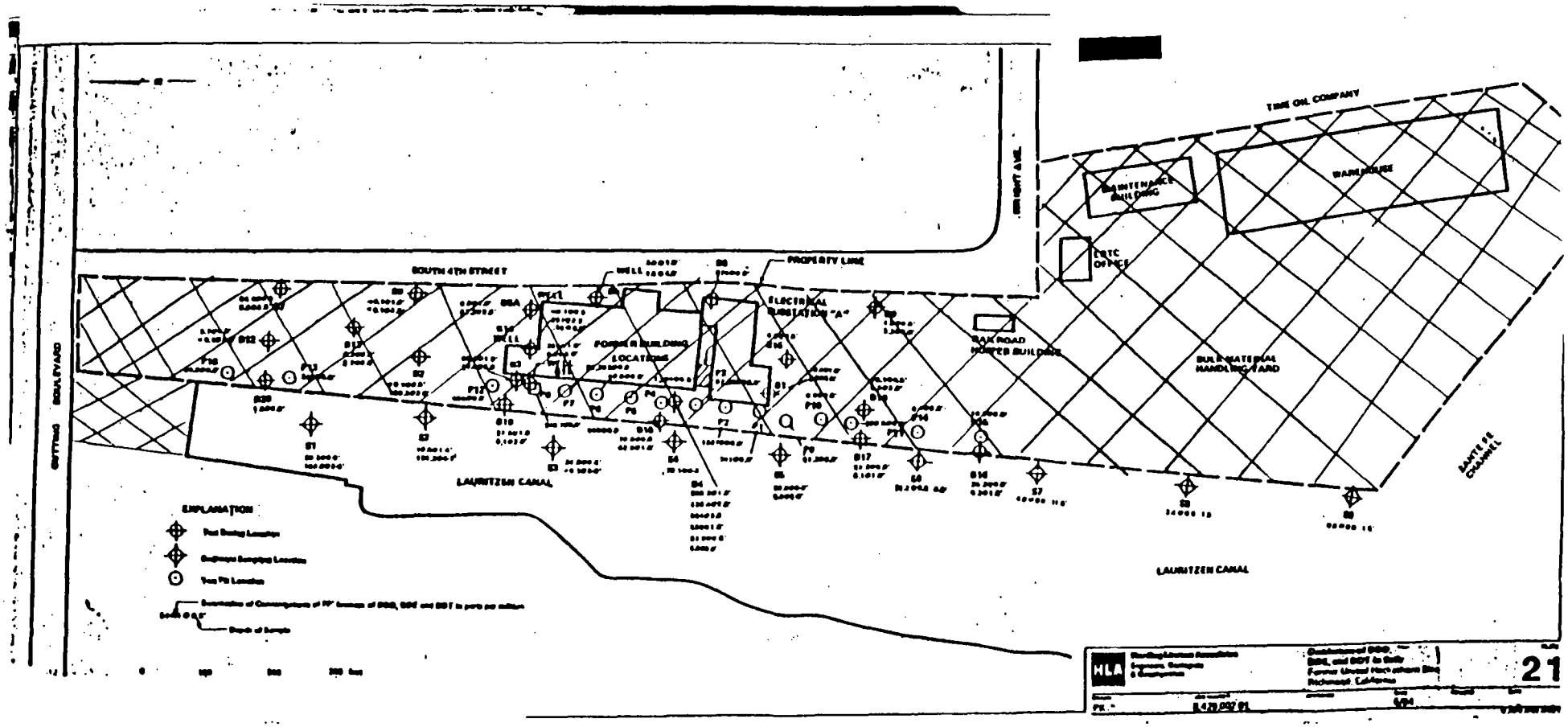

SANTA FE CHANNEL
1
2
6
SOUTH FOURTH
TIME OIL
WRIGHT AVE.
SOUTH EIGHTH
DESIGN
DRAWN
CHECK
LEVIN RICHMOND
TERMINAL CORP.
PARCEL MAP
SCALE 1" = 20
DATE 11-6-8

EXHIBIT B

Levin Group Consent Decree
Appendix F



**CD 03**

**Consent Decree**

**Parr Group RD/RA**

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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

| | |
|---|---|
| UNITED STATES OF AMERICA,<br><br>Plaintiff,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants.<br><br>AND RELATED ACTIONS | NO.<br><br>CONSENT DECREE<br>[Parr Group] |

This Consent Decree ("Decree") is made and entered into by and among the United States of America (the "United States"), on behalf of the Environmental Protection Agency, National Oceanic and Atmospheric Administration, the Department of the Interior and the Settling Federal Agencies, and the Settling Defendants.

INTRODUCTION

A. The United States, on behalf of the Administrator of the Environmental Protection Agency ("EPA"), the Secretary of Commerce and the Secretary of the Interior, has filed a civil action for recovery of response costs and natural resource damages, and for injunctive and declaratory relief, pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606, 9607, with respect to releases of hazardous substances from a former pesticide formulating and packaging facility now known as the United Heckathorn NPL Site in the City of Richmond, County of Contra Costa, State of California.

B. Before the United States filed suit in this matter, several related actions had been pending in this Court arising out of the release or threat of release of hazardous substances from the Site, namely Levin Metals Corporation v. Parr-Richmond Terminal Co. and related actions, Case Nos. C 84 6273; C 84 6324; and C 85 4776 ("Private Party Litigation"). The Honorable Claudia Wilken ordered the parties in the Private Party Litigation, and invited EPA, to engage in mediation to attempt to settle matters. From October 1994 through January 1995, EPA, the Settling Federal Agencies and the private litigants participated

in alternative dispute resolution ("ADR") mediated by Judge Coleman Fannin (Ret.) and Lester Levy of J.A.M.S. Endispute, a private firm offering ADR services. This mediation process involved sustained, vigorous and substantial negotiation among the parties. As a result of the mediation and subsequent negotiations, the United States has reached four inter-dependent settlement agreements with regard to the Site ("Four Decrees"), including this Decree.

C. The Settling Defendants do not admit any liability to the Plaintiff arising out of the transactions or occurrences alleged in the complaint.

D. The United States, on behalf of the Settling Federal Agencies, does not admit any liability arising out of the transactions or occurrences alleged in any claim or counterclaim asserted by the Settling Defendants.

E. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on March 14, 1990, 55 Fed. Reg. 9,688.

F. In response to a release or a substantial threat of a release of a hazardous substances at or from the Site, EPA commenced on December 5, 1991, a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. § 300.430.

G. EPA completed a Remedial Investigation ("RI") Report in February 1994, and EPA completed a Feasibility Study ("FS") Report on July 5, 1994.

H. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action on July 15, 1994, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

I. The decision by EPA on the remedial action to be implemented at the Site is embodied in a Record of Decision ("ROD"), executed on October 26, 1994, to which the State of California ("State") has given its concurrence. The ROD includes a summary of responses to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA. A copy of the ROD is included as Appendix D to this Decree.

J. Pursuant to consent decrees, the Remedial Action at the Site will be implemented by the Montrose Group and the Levin Group. The United States intends to use certain payments made by Settling Defendants and Settling Federal Agencies pursuant to this Decree first to pay the cost of certain portions of the Remedial Action and for EPA's oversight costs associated with the Remedial Action, and then, to the extent funds remain available, to pay EPA's response costs.

K. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been

negotiated by the Parties in good faith and implementation of this Consent Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

THEREFORE, with the consent of the Parties to this Decree, it is ORDERED, ADJUDGED, AND DECREED:

JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9607 and 9613(b), and personal jurisdiction over the Settling Defendants. The Settling Defendants will not challenge the terms of this Decree, the venue in this District or this Court's jurisdiction to enter and enforce this Decree.

PARTIES BOUND

2. This Consent Decree is binding upon the United States and upon the Settling Defendants and their heirs, successors and assigns. Any change in ownership or corporate or other legal status, including but not limited to any transfer of assets or real or personal property, shall in no way alter the status or responsibilities of the Settling Defendants under this Consent Decree.

CONDITION PRECEDENT

3. This Decree will be effective to bind the Parties only upon entry by this Court of all Four Decrees, which terms were negotiated as described in Paragraph B (Introduction) above and which are contemplated for simultaneous lodging with and entry by

the Court.

DEFINITIONS

4. Unless otherwise expressly provided herein, terms used in this Consent Decree which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

a. "Damage Assessment Costs" shall mean NOAA's and DOI's costs incurred in connection with activities and studies performed to determine injury to or loss of natural resources, including lost interim uses, resulting from releases of hazardous substances from the United Heckathorn NPL Site.

b. "EPA" shall mean the United States Environmental Protection Agency and any successor departments, agencies or instrumentalities of the United States.

c. "DOI" shall mean the United States Department of the Interior and any successor departments, agencies or instrumentalities of the United States.

d. "John Parr Cox" shall mean John Parr Cox individually and in, or without regard to, any capacity in which he acted with respect to the Site, whether as corporate officer, director, manager, agent, shareholder, distributee, successor, assignee, operator, trustee or otherwise.

e. "Levin Group" shall mean Levin Enterprises, Inc. and Levin Richmond Terminal, Inc., which have agreed, in a related

Consent Decree to be lodged simultaneously with this Decree in this matter, to construct a cap around the former Heckathorn plant to prevent erosion, as called for in the ROD.

f. "Marine Remedial Action" shall mean those response actions selected in the ROD for the Lauritzen Channel and Parr Canal.

g. "Marine Response Costs" shall mean all expenses, fees and costs that must be paid by the Montrose Group related to the Marine Remedial Action that are recoverable under Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613. Examples of "Marine Response Costs" include but are not limited to:

- payments to EPA for Interim Response Costs, as defined in the Montrose Group Consent Decree
- costs to identify and select consultants/contractors to implement the Marine Remedial Action at the Site;
- costs of consultants/contractors to implement the Marine Remedial Action;
- costs of consultants/contractors to meet with EPA and or State agencies as required to, inter alia, finalize documents, discuss the Marine Remedial Action, project status and schedule;
- costs of consultants/contractors for development and finalization of documents, work plans, and reports required by the Montrose Group Consent Decree;
- any costs of an escrow agent to administer the United Heckathorn Site Escrow;
-fees and taxes that the Montrose Group must pay to remove

Waste Material from the Site and dispose of it in a licensed landfill elsewhere.

Marine Response Costs shall not include:

- any legal fees incurred by the Montrose Group;
- any costs of the Montrose Group to communicate between themselves or costs of the Montrose Group incurred for internal organizational purposes;
- any civil penalties assessed against the Montrose Group.

h. "Montrose Group" shall mean that group of defendants which has agreed, in a related Consent Decree to be lodged simultaneously with this Decree in this matter, to dredge soft bay mud from the Lauritzen Channel and Parr Canal and to dispose of the dredged material offsite, all as called for in the ROD. The Montrose Group is specifically identified in Appendix A hereto.

i. "Natural Resource Damages" shall mean damages, including Damage Assessment Costs and lost use value, recoverable under Section 107 of CERCLA, 42 U.S.C. § 9607, for injury to, destruction of, or loss of any and all Natural Resources at the United Heckathorn Site.

j. "Natural Resources" shall have the meaning provided in Section 101(16) of CERCLA, 42 U.S.C. § 9601(16).

k. "NOAA" shall mean the National Oceanic and Atmospheric Administration, an agency of the United States Department of Commerce, and any successor departments, agencies or instrumentalities of the United States.

l. "Parties" shall mean the United States and the Settling Defendants.

m. "Remedial Action" shall mean those activities, except for operation and maintenance, to be undertaken, or which have been undertaken, to implement the ROD.

n. "Response Costs" shall mean all costs of response as provided in Section 107(a)(1-4)(A) of CERCLA, 42 U.S.C. §§ 9607(a)(1-4)(A), and as defined in Section 101(25) of CERCLA, 42 U.S.C. § 9601(25), including oversight costs, that the United States has incurred or will incur with respect to the United Heckathorn NPL Site.

o. "Settling Defendants" or the "Parr Group" shall mean Parr-Richmond Terminal Company, Parr Industrial Corporation, and John Parr Cox.

p. "Settling Federal Agencies" shall mean the General Services Administration and the Agency for International Development, and any successor departments, agencies or instrumentalities of the United States.

q. "Site" or the "United Heckathorn NPL Site" shall mean: the northern half of the Levin Richmond Terminal property bounded by the Lauritzen Channel, Cutting Boulevard, and South Fourth Street in Richmond, California, as depicted as the cross-hatched area in the map attached hereto as Appendix B; and the Lauritzen Channel, the Santa Fe Channel, the Parr Canal and the Inner Harbor Channel, all as depicted in Appendix C hereto.

r. "United States" shall mean the United States of America, including all of its departments, agencies and

instrumentalities.

s. "Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); (3) any "solid waste" under Section 1004(27) of the Resource Conservation and Recovery Act, 42 U.S.C. § 6903(27); and (4) any "hazardous waste" under 22 Cal. Code of Regulations Section 66600 et seq..

SETTLING DEFENDANTS' PAYMENTS INTO THE GROUP ESCROW

5. On or before May 31, 1996, Settling Defendants shall establish an escrow account (the "Group Escrow"), bearing interest at commercially reasonable rates. Settling Defendants shall deposit into the Group Escrow $3,500,000, in settlement of EPA's claims, and $133,333.33, in settlement of the United States' Natural Resource Damages claims. The allocation to Settling Defendants of $133,333.33, out of the United States' total Natural Resource Damages recovery of $400,000 from defendants which are parties to the Four Decrees, was determined solely by potentially responsible parties, including Settling Defendants.

6. On May 31, 1996, Settling Defendants shall send to the United States, as provided in Paragraph 33, a copy of the correspondence that establishes and funds the Group Escrow account, including, but not limited to, information containing the identity of the bank and the bank account under which the escrow is established, as well as a bank statement showing the initial balance of the Group Escrow account. Thereafter, if

requested to do so by the United States, Settling Defendants shall provide all other documentation concerning the account, including any agreement concerning the determination of interest rates.

7. Settling Defendants shall bear all costs of establishing, administering and terminating the Group Escrow.

8. Settling Defendants' failure to establish and fund the Group Escrow by May 31, 1996 shall constitute a material default, for which this Decree may be voidable by the United States.

PAYMENTS FROM THE GROUP ESCROW

9. Within 10 days after entry of this Decree, Settling Defendants shall transfer the funds in the Group Escrow as follows:

a. Transfer to an escrow set up by the Montrose Group, in part to pay for the Remedial Action (the "United Heckathorn Site Escrow"), $3,500,000, plus accrued interest allocable to that amount. Settling Defendants shall send notice that such payment has been made to the United States as specified in Paragraph 33. Within 10 days after entry of this Decree, the United States will provide to James Ratcliff of Thatcher, Albrecht & Ratcliff, acting for Settling Defendants, information about the United Heckathorn Site Escrow to enable Settling Defendants to make the transfer required herein.

b. Pay $133,333.33, plus accrued interest allocable to that amount, to DOI. The check shall be made payable to the Secretary of the Interior and delivered to Chief, Division of Finance Division, United States Fish and Wildlife Service, 4401

North Fairfax Drive, Room 380, Arlington, VA, 22203 (phone (703) 358-1742). The check shall reflect that it is a payment to the "Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198" and reference the "Levin Richmond/United Heckathorn Site." DOI will assign these funds a special project number to allow the funds to be maintained as a segregated account within the DOI Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198 ("Trustees Account"). DOI shall, in accordance with law, manage and invest funds in the Trustees Account and segregate in the Account any return on investments or interest accrued for use by the natural resource Trustees. DOI shall not make any charge against the Account for any investment or management services provided. DOI shall hold all funds in the Account, including return on investments or accrued interest, subject to the provisions of this Decree and any agreement DOI and NOAA may reach regarding the use of the funds.

FAILURE TO MAKE TIMELY PAYMENTS

10. In the event Settling Defendants fail to make timely payments, Settling Defendants shall pay a stipulated penalty as follows:

a. For failure to fund the Group Escrow with $3,500,000 (*i.e.*, the EPA settlement) as set forth in Paragraph 5 or for failure to make the transfer of funds as set forth in Paragraph 9.a, Settling Defendants shall pay a total of $25,000 for any delay of up to seven days and $5,000 each day thereafter.

b. Stipulated penalties are due within 30 days following receipt by the Settling Defendants of a written demand by the

United States for payment of such stipulated penalties.

c. Stipulated penalties shall be paid by certified or cashier's check made payable to "EPA Hazardous Substance Superfund;" shall be mailed to U.S. EPA, Region IX, Attention: Superfund Accounting, P.O. Box 360863M, Pittsburgh, PA 15251; shall indicate that the payment is for stipulated penalties; and shall reference EPA Region 9 and Site/Spill ID #09R3, the DOJ Case Number 90-11-3-598, and the name and address of the party making payment. Copies of any checks paid pursuant to this subparagraph and accompanying transmittal letters shall be sent to the United States as provided in Paragraph 33 (Notice).

d. Payment of any stipulated penalty pursuant to this Paragraph shall be in addition to any other remedy or sanction available to the United States for the failure of the Settling Defendants to make timely payment of the settlement amounts.

11. If Settling Defendants do not timely pay the amount specified in Paragraph 9.b (Natural Resource Damages), this Consent Decree shall be considered an enforceable judgment, under Rule 69 of the Federal Rules of Civil Procedure and other applicable statutory authority, for purposes of post-judgment collection of the amount due the Trustees, without further order of this Court. Interest shall be assessed at the annual rate established pursuant to 31 U.S.C. § 3717 on the overdue amount from the due date set forth in Paragraph 9 through the date of payment. In addition, in the event the United States takes action to enforce the judgment, Settling Defendants shall reimburse the United States for costs and reasonable attorney's

fees incurred in enforcing Settling Defendants' obligation.

12. The obligations of Settling Defendants to pay amounts owed the United States under this Consent Decree are joint and several. In the event of the failure of any one or more Settling Defendants to make the payments required under this Consent Decree, the other Settling Defendants shall be responsible for such payments.

13. In the event the United States must bring an action to collect any payment required under this Decree, Settling Defendants shall reimburse the United States for all costs of such action, including but not limited to attorney's fees, except as set forth in Paragraph 11.

COVENANT NOT TO SUE BY THE UNITED STATES
AND RESERVATION OF RIGHTS

14. In consideration of the payments to be made by the Settling Defendants under the terms of this Decree and except as specifically provided in Paragraphs 15-22 of this Decree, the United States hereby covenants not to sue or take administrative action against any of the Settling Defendants, and the Settling Defendants' past and present officers, directors and employees acting in such respective capacities for the Settling Defendants, pursuant to Sections 106, 107(a) and (f), and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and (f), 9613(f), at the Site. These covenants are conditioned upon the satisfactory performance by Settling Defendants of their obligations under this Consent Decree. These covenants extend only to the Settling Defendants, and the Settling Defendants' past and present officers, directors

and employees acting in such respective capacities for the Settling Parties, and do not extend to any other person.

15. Reservation. Notwithstanding any other provision of this Decree, the United States reserves, and this Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants to perform response actions relating to the Site or to reimburse the United States for additional response costs if:

(i) conditions at the Site, previously unknown to EPA, are discovered, or

(ii) information, previously unknown to EPA, is received, in whole or in part,

and these previously unknown conditions or information together with any other relevant information indicate that the Remedial Action is not protective of human health or the environment.

16. For purposes of Paragraph 15, the information and the conditions known to EPA shall include only that information and those conditions set forth in (1) the Record of Decision for the Site, (2) the administrative record supporting the Record of Decision, and (3) records relating to the Site, generated or received by EPA after issuance of the Record of Decision, which are in the EPA Site file as of December 31, 1995, as reflected in the Site file index.

17. Reservation Concerning Natural Resource Damages. Notwithstanding any other provision of this Decree, the United

States, on behalf of its natural resource Trustees, reserves, and this Decree is without prejudice to, the right to bring an action against any Settling Defendant in this action or in a new action to seek recovery of Natural Resource Damages, based on (i) conditions with respect to the Site unknown to the Trustees as of the date this Decree is lodged with the court, that result in or contribute to injury to, destruction of or loss of natural resources; or (ii) information received by the Trustees after the date the Decree is lodged with the court which indicates that there is injury to, destruction of, or loss of natural resources of a type unknown, or a magnitude greater than was known, to the Trustees.

18. Dollar Limit. Notwithstanding any other provision of this Decree, the United States reserves, and this Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order, seeking to compel Settling Defendants to perform response actions relating to the Site or to reimburse the United States for response costs, including all past costs unreimbursed by potentially responsible parties at the Site, if the total of the following costs, as calculated by EPA, exceeds $12.8 million (for all Settling Defendants, except defendant John Parr Cox) or $24 million (for defendant John Parr Cox):

(i) EPA's past response costs (including, but not limited to, direct and indirect costs) incurred for response actions at the Site, which for the purpose of this calculation shall be in the sum of $2,693,428.22,

as reflected in EPA's cost summary dated August 30, 1994;

(ii) The costs incurred or to be incurred by the Levin Group for constructing, maintaining and overseeing a cap around the former Heckathorn plant to prevent erosion, as called for in the ROD, which for the purpose of this calculation shall be the sum of $500,000;

(iii) all Marine Response Costs incurred by the Montrose Group and paid to third parties related to the Marine Remedial Action; and

(iv) all response costs incurred by EPA in performing marine monitoring to verify the effectiveness of the remedy called for in the ROD or in overseeing the work performed by the Levin Group and the Montrose Group, which for the purpose of this calculation shall be the sum of $300,000.

19. For purposes of calculating whether the $12.8 million (or, in the case of John Parr Cox, $24 million) limit has been reached pursuant to Paragraph 18, the category of costs enumerated therein shall not be reduced even if the costs are not consistent with the NCP or "necessary," within the meaning of Section 107(a)(4)(A-B) of CERCLA, 42 U.S.C. § 9607(a)(4)(A-B).

20. Notwithstanding any other provision of this Decree, the United States reserves, and this Decree is without prejudice to, the right to institute proceedings in this action or in a new

action, or to issue an administrative order seeking to compel Settling Defendants to perform response actions relating to the Site or to reimburse the United States for response costs, including all past costs unreimbursed by potentially responsible parties at the Site, if EPA determines, through an amendment to the ROD, that the Remedial Action is not protective of human health and the environment and EPA selects further response actions at the Site.

21. General Reservation of Rights. The covenants not to sue set forth above do not pertain to any matters other than those expressly specified in Paragraph 14. Notwithstanding any other provision of this Decree, the United States reserves, and this Consent Decree is without prejudice to, all rights against Settling Defendants with respect to all other matters, including, but not limited to the following:

(1) claims based on a failure by Settling Defendants to meet a requirement of this Consent Decree;

(2) liability arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the Site, including liability for damages for injury to, destruction of, or loss of natural resources occurring outside of the Site, and for the costs of any natural resource damage assessments;

(3) liability for future disposal of Waste Material at the Site, other than as provided in the ROD or otherwise ordered by EPA;

(4) criminal liability; and

(5) liability for violations of federal or state law by Settling Defendants which occur during or after implementation of the Remedial Action.

COVENANTS BY SETTLING DEFENDANTS

22. Each of the Settling Defendants covenants not to sue and agrees not to assert any claims or causes of action against the United States, or any employee, officer, department, agency or instrumentality thereof, with respect to any matters relating to the United Heckathorn NPL Site or this Consent Decree, including but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 107, 111, 112, 113 or any other provision of law;

b. any claims against the United States under CERCLA Sections 107 or 113 related to the Site; or

c. any claims arising out of response activities at the Site, including claims based on EPA's selection of response actions, oversight of response activities or approval of plans for such activities.

The Settling Defendants reserve the right to assert any counterclaims against the United States arising out of any action filed by the United States pursuant to Paragraphs 15, 17, 18 or 20.

23. Nothing in this Decree shall be deemed to constitute preauthorization of a claim within the meaning of Section 111 of

CERCLA, 42 U.S.C. § 9611 or 40 C.F.R. § 300.700(d).

EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

24. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this decree may have under applicable law. Each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto.

25. The Parties agree, and by entering this Consent Decree this Court finds, that Settling Defendants and Settling Federal Agencies are entitled, as of the effective date of this Consent Decree, to protection from contribution actions or claims as provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2), for matters addressed in this Consent Decree. "Matters addressed in this Decree" shall mean Natural Resource Damages and all response costs incurred or to be incurred by the United States or any other person or entity at the Site, but do not include natural resource damages and response costs incurred or to be incurred in connection with the presence, release or threatened release of a hazardous substance outside the Site. Any rights Settling Defendants or Settling Federal Agencies may have to obtain contribution or otherwise recover costs or damages from persons

not party to this Decree are preserved.

26. The Settling Defendants agree that, with respect to any suit or claim for contribution brought by them for matters related to this Consent Decree, they will notify the United States in writing no later than 60 days prior to the initiation of such suit or claim.

27. The Settling Defendants also agree that, with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree, they will notify the United States in writing within 10 days of service of the complaint on them. In addition, Settling Defendants shall notify the United States within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

28. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of response costs or Natural Resource Damages, or other appropriate relief relating to the Site, Settling Defendants shall not assert, and may not maintain, any defense or claim against the United States based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Paragraph 14.

## RETENTION OF RECORDS

29. Until seven years after the issuance of the Certification of Completion of the Remedial Action, each Settling Defendant shall preserve and retain one set of all records and documents (originals or, if originals do not exist, copies) now in its possession or control or which come into its possession or control, that relate in any manner to the performance of the work called for in the ROD or liability of any person for response actions conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary.

30. At the conclusion of this document retention period, each Settling Defendant shall notify the United States at least 90 days prior to the destruction of any such records or documents, and upon request by the United States, each Settling Defendant shall make available any such records or documents at a location within Region IX of EPA designated by the United States. Each Settling Defendant may assert that certain documents, records and other information are privileged under attorney client privilege, or any other privilege recognized under state or federal law. In connection with the assertion of any such claim of privilege, the Settling Defendant shall provide the United States with the following: (1) title of document or record; (2) date of document or record; (3) name and position of the author of the document or record; (4) description of the subject of the document or record; and (5) the specific basis for the privilege asserted.

31. Each Settling Defendant hereby certifies individually that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any original records, documents or other information (or where originals did not exist, the last copy of such records, documents or other information) relating to its potential liability regarding the Site since written notification of potential liability by the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

## NOTICE

32. Any notice required hereunder shall be in writing and shall be delivered by hand, facsimile or overnight mail as follows:

Notice to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
Re: DJ # 90-11-3-598

Chief, Environmental Defense Section
U.S. Department of Justice
Environment and Natural Resources Division
Environmental Defense Section
P.O. Box 23986
Washington, D.C. 20026-20531
Re: DJ # 90-11-3-1291

Notice to EPA:

Regional Counsel
Office of Regional Counsel
United States EPA
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Notice to Settling Defendants:

John Parr Cox (for John Parr Cox himself and for Parr-Richmond Terminal Company):
655 Sutter Street, Suite 610
San Francisco, CA 94102

Parr Industrial Corporation:
Kenneth E. Keller
Bronson, Bronson & McKinnon
505 Montgomery Street
San Francisco, CA 94111-2514

Each Party to this Decree may change the person(s) it has designated to receive notice for that Party, or the addresses for such notice, by filing a written notice of such change with the Court and serving said notice on the Parties.

EFFECTIVE DATE

33. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

RETENTION OF JURISDICTION

34. The Court shall retain jurisdiction of this matter for the purpose of entering such further order, direction, or relief as may be necessary or appropriate for the construction, implementation, or enforcement of this Decree.

AUTHORIZED REPRESENTATIVE

35. Each undersigned representative of Setting Defendants and the Assistant Attorney General, for the United States,

certifies that he or she is fully authorized to enter into the terms and conditions of this Decree and to legally execute and bind that Party to this Decree.

MODIFICATION

36. The terms of this Decree may be modified only by a subsequent written agreement signed by the affected parties and approved by the Court as a modification to this Decree.

PUBLIC COMMENT

37. The Parties agree that this Decree will be subject to a 30-day public comment period as provided in 28 C.F.R. § 50.7. The United States reserves the right to withdraw its consent to this Decree if comments received disclose facts or considerations which show that this Decree is inappropriate, improper, or inadequate. The Settling Defendants consent to the entry of this Decree by the Court without further notice.

ENTIRE AGREEMENT

38. This Consent Decree contains the entire agreement between the United States and Settling Defendants with respect to the Site. Any oral representations or modifications concerning this Decree shall be of no force unless contained in a subsequent modification signed by the Parties.

TERMINATION DATE

39. Any Settling Defendant may move to terminate this Decree, but only after demonstrating to the Court that all the Settling Defendants have fulfilled all of their obligations under this Decree and after giving the United States 45 days' notice of

their intent to so move. Termination of this Decree shall not affect the provisions herein for contribution protection, document retention, the covenants not to sue and reservations of rights, which shall remain in effect as an agreement among the Parties.

40. The following Appendices are attached to and incorporated into this Consent Decree:

"Appendix A is a complete list of the Montrose Group.

"Appendix B" is the map of the land portion of the Site.

"Appendix C" is the map of the marine portion of the Site.

"Appendix D" is the ROD.

COUNTERPARTS

41. This Decree may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument.

ORDER

THE FOREGOING Consent Decree is hereby APPROVED. There being no just reason for delay, this Court expressly directs, pursuant to Rule 54(b), Federal Rules of Civil Procedure, ENTRY OF FINAL JUDGMENT in accordance with the terms of this Consent Decree this _____ DAY of _____, 1996, each party to bear its own costs and attorney's fees, except as specifically provided herein.

_____
United States District Judge
CLAUDIA WILKEN

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of the United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: June 4 1996

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice
Washington, D.C. 20530

Date: _____

HELEN H. KANG
Environment Enforcement Section
Environment and Natural Resources Division

Date: _____

S. RANDALL HUMM
Environmental Defense Section
Environment & Natural Resources Division
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 514-3097

Date: _____

MICHAEL J. YAMAGUCHI
United States Attorney
Northern District of California
PATRICK RAMIREZ S. BUPARA
Assistant United States Attorney

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of the United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: _____

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice
Washington, D.C. 20530

Date: June 3, 1996

HELEN H. KANG
Environment Enforcement Section
Environment and Natural Resources Division

Date: June 3, 1996

S. RANDALL HUMM
Environmental Defense Section
Environment & Natural Resources Division
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 514-3097

Date: 5-29-96

MICHAEL J. YAMAGUCHI
United States Attorney
Northern District of California
PATRICK RAMIREZ S. BUPARA
Assistant United States Attorney

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of the United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: 6-6-96

KEITH TAKATA
Director
Hazardous Waste Management Division
Region 9
U.S. Environmental Protection Agency

Date: June 6, 1996

JOHN J. LYONS
Assistant Regional Counsel
Region 9
U.S. Environmental Protection Agency

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANTS

PARR-RICHMOND TERMINAL COMPANY

Date: _____

_____
JOHN PARR COX

PARR INDUSTRIAL CORPORATION

Date: _____

_____
[NAME, TITLE]
FRED PARR COX
FORMER PRESIDENT

JOHN PARR COX

Date: _____

_____
JOHN PARR COX

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANTS

PARR-RICHMOND TERMINAL COMPANY

Date: 5/10/96

JOHN PARR COX

PARR INDUSTRIAL CORPORATION

Date: _____

[NAME, TITLE]

JOHN PARR COX

Date: 5/10/96

JOHN PARR COX

Parr Group Consent Decree
Appendix A
Montrose Group

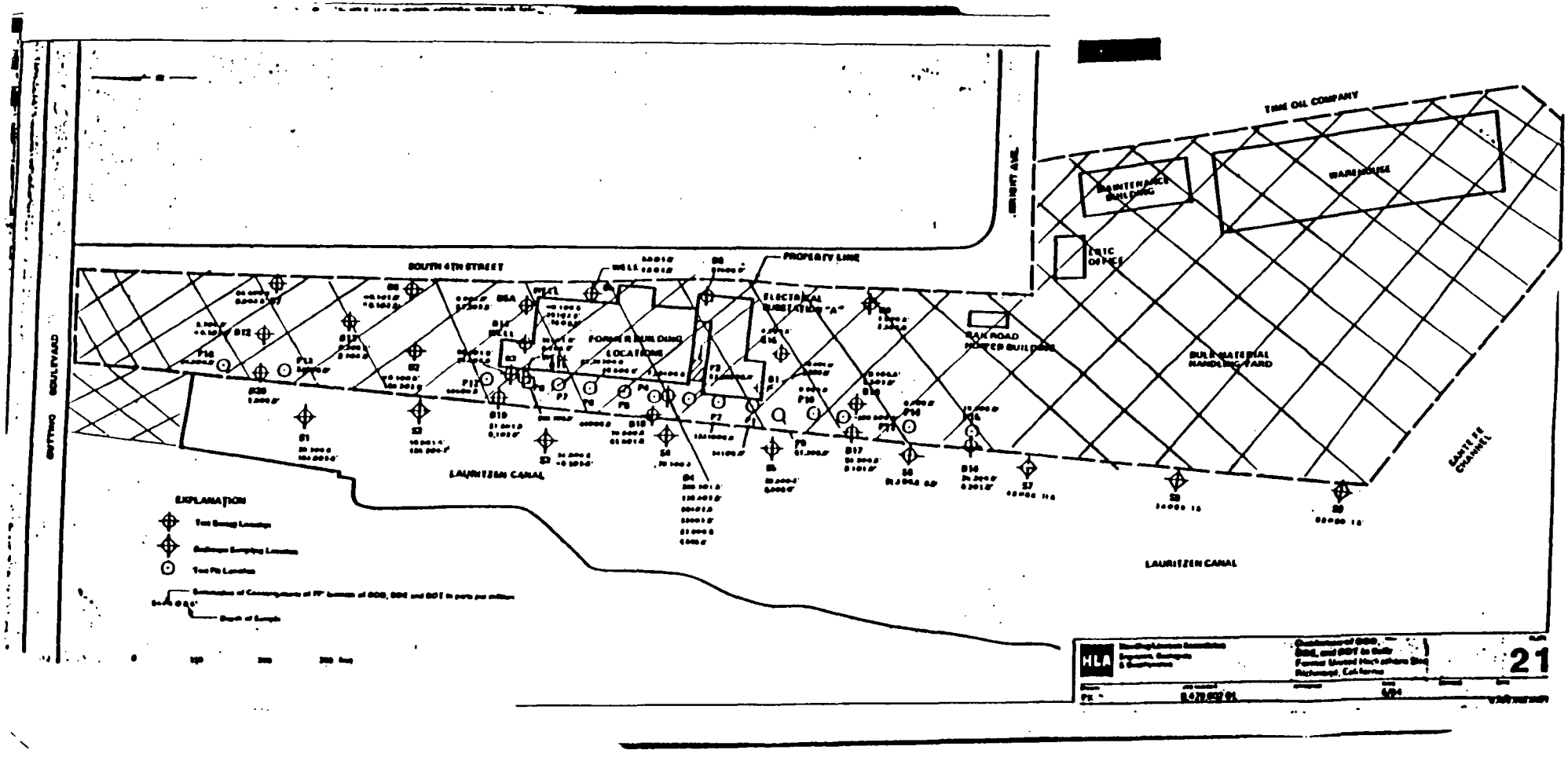
Montrose Chemical Corporation of California

Rhone-Poulenc, Inc.

Stauffer Management Company

Chris-Craft Industries, Inc.

Parr Group Consent Decree
Appendix B



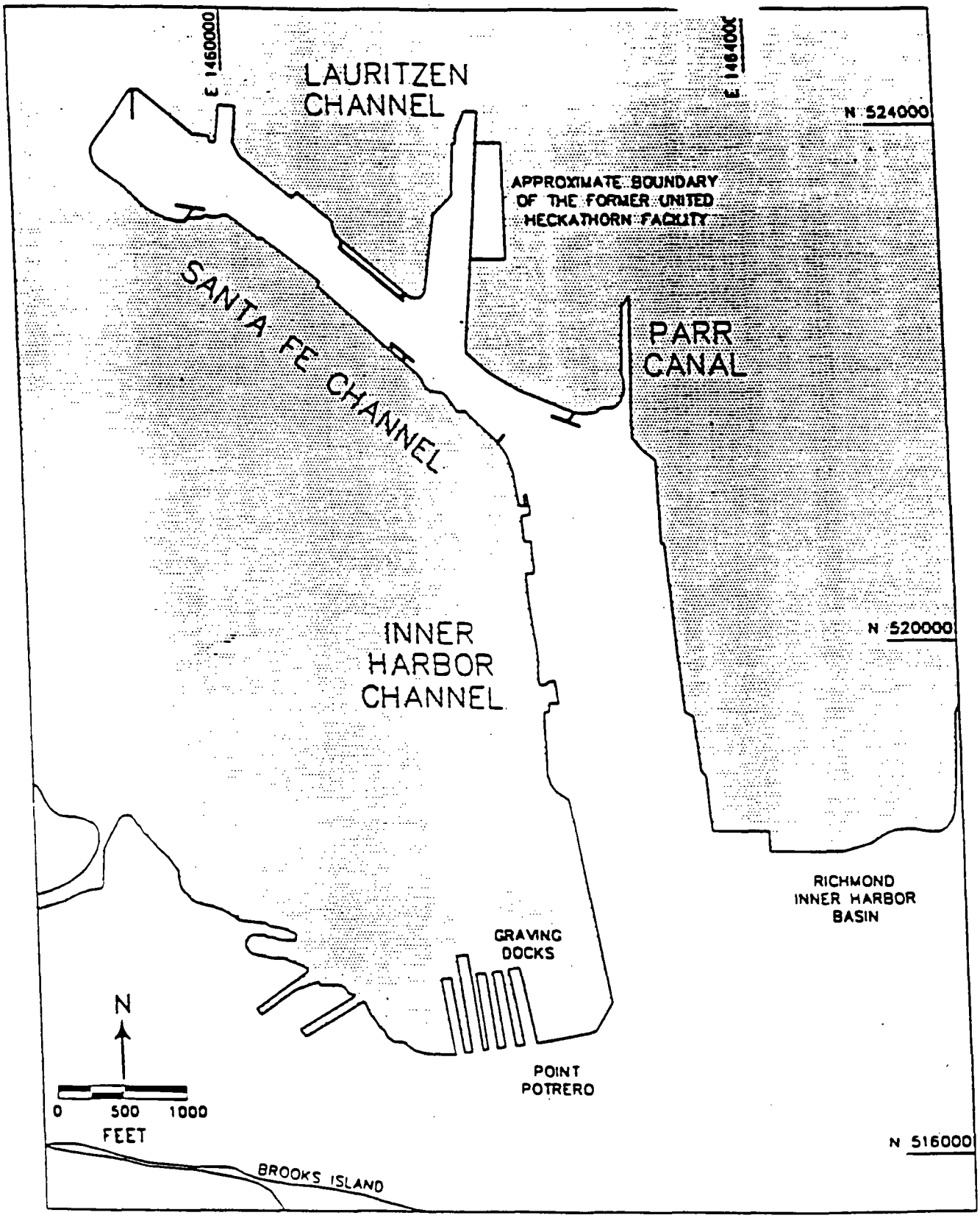



Figure 2. Map of Richmond Harbor.

**CD 04**

**Consent Decree**

**Miscellanous Defendants Group RD/RA**

LOIS J. SCHIFFER
Assistant Attorney General
Environment & Natural Resources Division
United States Department of Justice

HELEN H. KANG
Environmental Enforcement Section
Environment & Natural Resources Division
United States Department of Justice
301 Howard Street, Suite 870
San Francisco, CA 94105
(415) 744-6491

MICHAEL J. YAMAGUCHI
United States Attorney for the
Northern District of California
PATRICK RAMIREZ S. BUPARA
Assistant United States Attorney
450 Golden Gate Avenue
P.O. Box 36055
San Francisco, CA 94102
(415) 436-7200

United Heckathorn CD04

Attorneys for Plaintiff United States of America

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

| | |
|---|---|
| UNITED STATES OF AMERICA,<br><br>Plaintiff,<br><br>v.<br><br>MONTROSE CHEMICAL CORPORATION OF CALIFORNIA, et al.,<br><br>Defendants. | NO.<br><br>CONSENT DECREE<br>[Miscellaneous Defendants Group] |
| AND RELATED ACTIONS | |

This Consent Decree ("Decree") is made and entered into by and among the United States of America (the "United States"), on behalf of the Environmental Protection Agency, National Oceanic and Atmospheric Administration, the Department of the Interior and the Settling Federal Agencies; and the "Settling Defendants" identified in Appendix A hereto.

INTRODUCTION

A. The United States, on behalf of the Administrator of the Environmental Protection Agency ("EPA"), the Secretary of Commerce and the Secretary of the Interior, has filed a civil action for recovery of response costs and natural resource damages, and for injunctive and declaratory relief, pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9606, 9607, with respect to releases of hazardous substances from a former pesticide formulating and packaging facility now known as the United Heckathorn NPL Site in the City of Richmond, County of Contra Costa, State of California.

B. Before the United States filed suit in this matter, several related actions had been pending in this Court arising out of the release or threat of release of hazardous substances from the Site, namely Levin Metals Corporation v. Parr-Richmond Terminal Co. and related actions, Case Nos. C 84 6273; C 84 6324; and C 85 4776 ("Private Party Litigation"). The Honorable Claudia Wilken ordered the parties in the Private Party Litigation, and invited EPA, to engage in mediation to attempt to settle matters. From October 1994 through January 1995, EPA, the

Settling Federal Agencies and the private litigants participated in alternative dispute resolution ("ADR") mediated by Judge Coleman Fannin (Ret.) and Lester Levy of J.A.M.S. Endispute, a private firm offering ADR services. This mediation process involved sustained, vigorous and substantial negotiation among the parties. As a result of the mediation and subsequent negotiations, the United States has reached four inter-dependent settlement agreements with regard to the Site ("Four Decrees"), including this Decree.

C. The Settling Defendants do not admit any liability to the Plaintiff arising out of the transactions or occurrences alleged in the complaint.

D. The United States, on behalf of the Settling Federal Agencies, does not admit any liability arising out of the transactions or occurrences alleged in any claim or counterclaim asserted by the Settling Defendants.

E. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on March 14, 1990, 55 Fed. Reg. 9,688.

F. In response to a release or a substantial threat of a release of hazardous substances at or from the Site, EPA commenced on December 5, 1991, a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. § 300.430.

G. EPA completed a Remedial Investigation ("RI") Report in February 1994, and EPA completed a Feasibility Study ("FS")

Report on July 5, 1994.

H. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and of the proposed plan for remedial action on July 15, 1994, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

I. The decision by EPA on the remedial action to be implemented at the Site is embodied in a Record of Decision ("ROD"), executed on October 26, 1994, to which the State of California ("State") has given its concurrence. The ROD includes a summary of responses to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA. A copy of the ROD is attached as Appendix E to this Decree.

J. Pursuant to consent decrees, the Remedial Action at the Site will be implemented by the Montrose Group and the Levin Group. The United States intends to use certain payments made by Settling Defendants and Settling Federal Agencies pursuant to this Decree first to pay the cost of certain portions of the Remedial Action and for EPA's oversight costs associated with the Remedial Action, and then, to the extent funds remain available, to pay EPA's response costs.

K. The Parties recognize, and the Court by entering this

Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and implementation of this Consent Decree will expedite the cleanup of the Site and will avoid prolonged and complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

THEREFORE, with the consent of the Parties to this Decree, it is ORDERED, ADJUDGED, AND DECREED:

JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9607 and 9613(b), and personal jurisdiction over the Settling Defendants. The Settling Defendants will not challenge the terms of this Decree, the venue in this District or this Court's jurisdiction to enter and enforce this Decree.

PARTIES BOUND

2. This Consent Decree is binding upon the United States and upon the Settling Defendants and their successors and assigns. Any change in ownership or corporate or other legal status, including but not limited to any transfer of assets or real or personal property, shall in no way alter the status or responsibilities of the Settling Defendants under this Consent Decree.

CONDITION PRECEDENT

3. This Decree will be effective to bind the Parties only upon entry by this Court of all Four Decrees, which terms were negotiated as described in Paragraph B (Introduction) above and

which are contemplated for simultaneous lodging with and entry by the Court.

DEFINITIONS

4. Unless otherwise expressly provided herein, terms used in this Consent Decree which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

a. "Damage Assessment Costs" shall mean NOAA's and DOI's costs incurred in connection with activities and studies performed to determine injury to or loss of natural resources, including lost interim uses, resulting from releases of hazardous substances from the United Heckathorn NPL Site.

b. "EPA" shall mean the United States Environmental Protection Agency and any successor departments, agencies or instrumentalities of the United States.

c. "DOI" shall mean the United States Department of the Interior and any successor departments, agencies or instrumentalities of the United States.

d. "Levin Group" shall mean Levin Enterprises, Inc. and Levin Richmond Terminal, Inc., which have agreed, in a related Consent Decree to be lodged simultaneously with this Decree in this matter, to construct a cap around the former Heckathorn plant to prevent erosion, as called for in the ROD.

e. "Marine Remedial Action" shall mean those response

actions selected in the ROD for the Lauritzen Channel and Parr Canal.

f. "Marine Response Costs" shall mean all expenses, fees and costs that must be paid by the Montrose Group related to the Marine Remedial Action that are recoverable under Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613. Examples of "Marine Response Costs" include but are not limited to:

- a payment to EPA for Interim Response Costs, as defined in Paragraph 37 of the Montrose Group Consent Decree;

- costs to identify and select consultants/contractors to implement the Marine Remedial Action at the Site;

- costs of consultants/contractors to implement the Marine Remedial Action;

- costs of consultants/contractors to meet with EPA and or State agencies as required to, inter alia, finalize documents, discuss the Marine Remedial Action, project status and schedule;

- costs of consultants/contractors for development and finalization of documents, work plans, and reports required by the Montrose Group Consent Decree;

- any costs of an escrow agent to administer the United Heckathorn Site Escrow;

- fees and taxes that the Montrose Group must pay to remove Waste Material from the Site and dispose of it in a licensed landfill elsewhere.

Marine Response Costs shall not include:

- any legal fees incurred by the Montrose Group;

- any costs of the Montrose Group to communicate between themselves or costs of the Montrose Group incurred for internal organizational purposes;

- any civil penalties assessed against the Montrose Group.

g. "Montrose Group" shall mean that group of defendants which has agreed, in a related Consent Decree to be lodged

simultaneously with this Decree in this matter, to dredge soft bay mud from the Lauritzen Channel and Parr Canal and to dispose of the dredged material offsite, all as called for in the ROD. The Montrose Group is specifically identified in Appendix B hereto.

h. "Natural Resource Damages" shall mean damages, including Damage Assessment Costs and lost use value, recoverable under Section 107 of CERCLA, 42 U.S.C. § 9607, for injury to, destruction of, or loss of any and all Natural Resources at the United Heckathorn Site.

i. "Natural Resources" shall have the meaning provided in Section 101(16) of CERCLA, 42 U.S.C. § 9601(16).

j. "NOAA" shall mean the National Oceanic and Atmospheric Administration, an agency of the United States Department of Commerce, and any successor departments, agencies or instrumentalities of the United States.

k. "Parties" shall mean the United States, including the Settling Federal Agencies, and the Settling Defendants.

l. "Remedial Action" shall mean those activities, except for operation and maintenance, to be undertaken, or which have been undertaken, to implement the ROD.

m. "Response Costs" shall mean all costs of response as provided in Section 107(a)(1-4)(A) of CERCLA, 42 U.S.C. §§ 9607(a)(1-4)(A), and as defined in Section 101(25) of CERCLA, 42 U.S.C. § 9601(25), including oversight costs, that the United States has incurred or will incur with respect to the United Heckathorn NPL Site.

n. "Settling Defendants" or the "Miscellaneous Defendants Group" shall mean those entities identified in Appendix A hereto.

o. "Settling Federal Agencies" shall mean the General Services Administration and the Agency for International Development, and any successor departments, agencies or instrumentalities of the United States.

p. "Site" or the "United Heckathorn NPL Site" shall mean: the northern half of the Levin Richmond Terminal property bounded by the Lauritzen Channel, Cutting Boulevard, and South Fourth Street in Richmond, California, depicted as a cross-hatched area in the map attached hereto as Appendix C; and the Lauritzen Channel, the Santa Fe Channel, the Parr Canal and the Richmond Inner Harbor Channel, all as depicted in Appendix D hereto.

q. "United States" shall mean the United States of America, including all of its departments, agencies and instrumentalities.

r. "Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); (3) any "solid waste" under Section 1004(27) of the Resource Conservation and Recovery Act, 42 U.S.C. § 6903(27); and (4) any "hazardous waste" under 22 Cal. Code of Regulations Section 66600 et seq..

SETTLING DEFENDANTS' PAYMENTS INTO THE GROUP ESCROW

5. On or before May 31, 1996, Settling Defendants shall establish an escrow account (the "Group Escrow"). Settling Defendants shall deposit into the Group Escrow $2,680,535.28, in

settlement of EPA's claims, and $102,190.44, in settlement of the United States' Natural Resource Damages claims. The allocation to Settling Defendants of $102,190.44, out of the United States' total Natural Resource Damages recovery of $400,000 from defendants which are parties to the Four Decrees, was determined solely by potentially responsible parties, including Settling Defendants.

6. On May 31, 1996, Settling Defendants shall send to the United States, as provided in Paragraph 38, a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and the bank account under which the escrow is established, as well as a bank statement showing the initial balance of the Group Escrow account. Thereafter, if requested to do so by the United States, Settling Defendants shall provide all other documentation concerning the account, including any agreement concerning the determination of interest rates.

7. Settling Defendants shall bear all costs of establishing, administering and terminating the Group Escrow.

8. Settling Defendants' failure to establish and fund the Group Escrow by May 31, 1996 shall constitute a material default, for which this Decree may be voidable by the United States.

PAYMENTS FROM THE GROUP ESCROW

9. Within 10 days after entry of this Decree, Settling Defendants shall transfer the funds in the Group Escrow as follows:

a. Pay to the EPA Hazardous Substance Superfund

$380,535.28, in reimbursement of Response Costs, by FedWire Electronic Funds Transfer to the U.S. Department of Justice account in accordance with current electronic funds transfer procedures, referencing U.S.A.O. file number 9600022, EPA Region 9 and Site/Spill ID #09R3, and DOJ case number 90-11-3-598. This payment shall be made in accordance with instructions provided to the Settling Defendants by the Financial Litigation Unit of the United States Attorney's Office for the Northern District of California, following lodging of this Decree. Settling Defendants shall send notice that such payment has been made to the United States as specified in Paragraph 38 and to David Wood, Chief, Cost Accounting Section, EPA Region 9, 75 Hawthorne Street, San Francisco, CA 94105.

b. Transfer to an escrow set up by the Montrose Group, in part to pay for the Remedial Action (the "United Heckathorn Site Escrow"), $2,300,000, plus accrued interest allocable to the principal amount of $2,680,535.28, referenced in Paragraph 5 of this Decree. Settling Defendants shall send notice that such payment has been made to the United States as specified in Paragraph 38. Within 10 days after entry of this Decree, the United States will provide to Settling Defendants information about the United Heckathorn Site Escrow to enable Settling Defendants to make the transfer required herein.

c. Pay $15,000.00 to DOI, as reimbursement for Damage Assessment Costs. Payment shall be made by certified check made payable to Secretary of the Interior and delivered to Chief, Division of Finance, U.S. Fish and Wildlife Service, 4401 North

Fairfax Drive, Room 380, Arlington, VA 22203. The check shall reflect that it is a payment to the "Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198 -- Assessment Cost Reimbursement" and reference the "Levin Richmond/United Heckathorn Superfund Site."

d. Pay $20,000 to NOAA, as reimbursement for Damage Assessment Costs. Payment shall be made by certified check made payable to NOAA, Department of Commerce. The check shall indicate that the payment is for "reimbursement of damage assessment costs for the United Heckathorn Superfund Site." The check shall be delivered to Chief, Damage Assessment Center, NOS, NOAA, Room 10218, 1305 East West Highway, Silver Spring, MD 20910.

e. Pay $67,190.44, plus accrued interest allocable to the principal amount of $102,190.44 referenced in Paragraph 5 of this Decree, to DOI. The check shall be made payable to the Secretary of the Interior and delivered to Chief, Division of Finance Division, United States Fish and Wildlife Service, 4401 North Fairfax Drive, Room 380, Arlington, VA, 22203 (phone (703) 358-1742). The check shall reflect that it is a payment to the "Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198" and reference the "Levin Richmond/United Heckathorn Site." DOI will assign these funds a special project number to allow the funds to be maintained as a segregated account within the DOI Natural Resource Damage Assessment and Restoration Fund, Account No. 14X5198 ("Trustees Account"). DOI intends to, in accordance with law, manage and invest funds in the Trustees

Account and segregate in the Account any return on investments or interest accrued for use by the natural resource Trustees. DOI will not make any charge against the Account for any investment or management services provided. DOI will hold all funds in the Account, including return on investments or accrued interest, subject to the provisions of this Decree and any agreement DOI and NOAA may reach regarding the use of the funds. DOI's failure to discharge its obligations under this subparagraph e shall not affect the United States' covenants.

PAYMENTS BY SETTLING FEDERAL AGENCIES

10. As soon as practicable after entry of this Consent Decree, the United States, on behalf of the Settling Federal Agencies, shall cause to be transferred to the United Heckathorn Site Escrow the sum of $300,000, in settlement of EPA's claims.

11. As soon as practicable after entry of this Consent Decree, the United States, on behalf of the Settling Federal Agencies, shall pay $11,678.17 to DOI, in settlement of the United States' Natural Resource Damages claims. Payment shall be made in the manner specified in Paragraph 9.e. The allocation to Settling Federal Agencies of $11,678.17, out of the United States' total Natural Resource Damages recovery of $400,000 from defendants which are parties to the Four Decrees, was determined solely by potentially responsible parties, including Settling Federal Agencies.

12. Notwithstanding any other provisions of this Consent Decree, the Parties to this Consent Decree recognize and acknowledge that the payment obligations imposed upon the

Settling Federal Agencies by this Consent Decree can only be paid from appropriated funds legally available for such purpose. Nothing in this Consent Decree shall be interpreted or construed as a commitment or requirement that any Settling Federal Agency obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341, or any other applicable provision of law.

CONTINGENT PAYMENT BY SHELL OIL CO.

13. Within 10 days of receiving written notice from the Montrose Group that Marine Response Costs are expected to exceed $8.1 million, Shell Oil Company ("Shell") shall deposit an additional $500,000.00 into the United Heckathorn Site Escrow, to be used only if the total of the following amounts, as calculated by EPA, exceeds $8.9 million:

(i) all Marine Response Costs incurred by the Montrose Group and paid to third parties related to the Marine Remedial Action;

(ii) the costs incurred or to be incurred by the Levin Group for constructing, maintaining and overseeing a cap around the former Heckathorn plant property, as called for in the ROD, which for the purpose of this calculation shall be in the sum of $500,000; and

(iii) all Response Costs incurred by EPA in performing marine monitoring to determine the effectiveness of the remedy called for in the ROD or in overseeing the work performed by the Levin Group or the Montrose Group, which for the purpose of this calculation shall be in the sum of $300,000.

If, under the terms of the Montrose Group Consent Decree, this $500,000 is not fully used for the Marine Remedial Action performed by the Montrose Group, the balance, together with any accrued interest, shall be returned to Shell in accordance with the terms of the Montrose Group Consent Decree.

On or before August 1, 1996, Shell shall also establish an irrevocable letter of credit in the amount of $500,000 that the Escrow Agent for the United Heckathorn Site Escrow may draw upon in the event that Shell fails to deposit $500,000 in the United Heckathorn Site Escrow within 10 days of receiving notice from the Montrose Group as set out above. Provided that Shell has not previously received such notice from the Montrose Group, Shell may terminate the letter of credit following EPA issuance of a Certification of Completion to the Montrose Group as provided in Paragraph 50(c) of the Montrose Group Consent Decree. Otherwise, Shell may terminate the letter of credit following the termination of the United Heckathorn Site Escrow (as provided in Paragraph 47 of the Montrose Group Consent Decree) or when the Escrow Agent for the United Heckathorn Site Escrow has drawn on the letter of credit up to the limit of the letter of credit, $500,000.

FAILURE TO MAKE TIMELY PAYMENTS

14. In the event Settling Defendants fail to make timely payments, Settling Defendants shall pay a stipulated penalty as follows:

a. For failure to fund the Group Escrow with $2,680,535.28 (i.e., the EPA settlement) as set forth in Paragraph 5 or for

failure to make the transfer of funds as set forth in Paragraph 9.b, Settling Defendants shall pay a total of $25,000 for any delay of up to seven days and $5,000 each day thereafter.

b. For failure to make the transfer of funds as set forth in Paragraph 9.a, Settling Defendants shall pay $200 for each day of delay.

c. For failure to pay the amounts required by Paragraph 13, Shell shall pay a total of $25,000 for any delay of up to seven days and $5,000 each day thereafter.

d. Stipulated penalties are due within 30 days following receipt by the Settling Defendants of a written demand by the United States for payment of such stipulated penalties.

e. Stipulated penalties shall be paid by certified or cashier's check made payable to "EPA Hazardous Substance Superfund;" shall be mailed to U.S. EPA, Region IX, Attention: Superfund Accounting, P.O. Box 360863M, Pittsburgh, PA 15251; shall indicate that the payment is for stipulated penalties; and shall reference the EPA Region and Site/Spill ID #09R3, the DOJ Case Number 90-11-3-598, and the name and address of the party making payment. Copies of any checks paid pursuant to this subparagraph and accompanying transmittal letters shall be sent to the United States as provided in Paragraph 38 (Notice).

f. Payment of any stipulated penalty pursuant to this Paragraph shall be in addition to any other remedy or sanction available to the United States for the failure of the Settling Defendants to make timely payment of the settlement amounts.

g. Notwithstanding any other provision of this paragraph,

the United States may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Consent Decree.

15. If Settling Defendants do not timely pay the amount specified in Paragraph 9.c-e (Natural Resource Damages), this Consent Decree shall be considered an enforceable judgment, under Rule 69 of the Federal Rules of Civil Procedure and other applicable statutory authority, for purposes of post-judgment collection of the amount due the Trustees, without further order of this Court. Interest shall be assessed at the annual rate established pursuant to 31 U.S.C. § 3717 on the overdue amount from the due date set forth in Paragraph 9 through the date of payment. In addition, in the event the United States takes action to enforce the judgment, defaulting Settling Defendants shall reimburse the United States for costs and reasonable attorney's fees incurred in enforcing Settling Defendants' obligation.

16. The obligations of Settling Defendants to pay amounts owed the United States under this Consent Decree are joint and several, with the exception of Shell's obligations set forth in Paragraphs 13 and 14.d, which are those of Shell only. In the event of the failure of any one or more Settling Defendants to make the payments required under this Consent Decree, the other Settling Defendants shall be responsible for such payments.

17. In the event the United States must bring an action to collect any payment required under this Decree, defaulting Settling Defendants shall reimburse the United States for all

costs of such action, including but not limited to attorney's fees, except as set forth in Paragraph 15.

18. In the event one or more Settling Defendants must bring an action against any other Settling Defendant for the latter's failure to make any payment required under this Decree, the latter shall reimburse the Settling Defendants which brought suit for all costs of such action, including but not limited to attorney's fees and for all costs or fees incurred in any action brought by the EPA under this Consent Decree.

COVENANT NOT TO SUE OR TAKE ADMINISTRATIVE ACTION BY THE UNITED STATES AND RESERVATION OF RIGHTS

19. In consideration of the payments to be made by the Settling Defendants and Settling Federal Agencies under the terms of this Decree and except as specifically provided in Paragraphs 20-27 of this Decree, the United States hereby covenants not to sue or take administrative action against any of the Settling Defendants, and the Settling Defendants' past and present officers, directors and employees acting in such respective capacities for the Settling Defendants, and EPA, DOI and NOAA covenant not to take any action against any of the Settling Federal Agencies, pursuant to Sections 106, 107(a) and (f), and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and (f), 9613(f), relating to hazardous substances present at the Site. These covenants are conditioned upon the satisfactory performance by Settling Defendants and Settling Federal Agencies of their obligations under this Consent Decree. These covenants do not extend to persons other than Settling Defendants, and the

Settling Defendants' past and present officers, directors and employees acting in such respective capacities for the Settling Defendants, and Settling Federal Agencies.

20. Reservation. Notwithstanding any other provision of this Decree, the United States reserves, and this Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants, and the United States reserves the right to issue an administrative order seeking to compel Settling Federal Agencies, to perform response actions relating to the Site or to reimburse the United States for additional response costs if:

(i) conditions at the Site, previously unknown to EPA, are discovered, or

(ii) information, previously unknown to EPA, is received, in whole or in part,

and these previously unknown conditions or information together with any other relevant information indicate that the Remedial Action is not protective of human health or the environment.

21. For purposes of Paragraph 20, the information and the conditions known to EPA shall include only that information and those conditions set forth in (1) the Record of Decision for the Site, (2) the administrative record supporting the Record of Decision, and (3) records relating to the Site, generated or received by EPA after issuance of the Record of Decision, which are in the EPA Site file as of December 31, 1995, as reflected in the Site file index.

22. Reservation Concerning Natural Resource Damages. Notwithstanding any other provision of this Decree, the United States, on behalf of its natural resource Trustees, reserves, and this Decree is without prejudice to, the right to bring an action against any Settling Defendant in this action or in a new action to seek recovery of Natural Resource Damages, based on (i) conditions with respect to the Site unknown to the Trustees as of the date this Decree is lodged with the court, that result in or contribute to injury to, destruction of or loss of natural resources; or (ii) information received by the Trustees after the date the Decree is lodged with the court which indicates that there is injury to, destruction of, or loss of natural resources of a type unknown, or a magnitude greater than was known, to the Trustees.

23. Dollar Limit. Notwithstanding any other provision of this Decree, the United States reserves, and this Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants, and the United States reserves the right to issue an administrative order seeking to compel the Settling Federal Agencies, to perform response actions relating to the Site or to reimburse the United States for response costs, including all past costs unreimbursed by potentially responsible parties at the Site, if the total of the following costs, as calculated by EPA, exceeds $12.8 million:

(i) EPA's past response costs (including, but not limited to, direct and indirect costs) incurred for

response actions at the Site, which for the purpose of this calculation shall be in the sum of $2,693,428.22, as reflected in EPA's cost summary dated August 30, 1994;

(ii) The costs incurred or to be incurred by the Levin Group for constructing, maintaining and overseeing a cap around the former Heckathorn plant, as called for in the ROD, which for the purpose of this calculation shall be the sum of $500,000;

(iii) all Marine Response Costs incurred by the Montrose Group and paid to third parties related to the Marine Remedial Action; and

(iv) all response costs incurred by EPA in performing marine monitoring to verify the effectiveness of the remedy called for in the ROD or in overseeing the work performed by the Levin Group and the Montrose Group or in overseeing the work performed by the Levin Group or the Montrose Group, which for the purpose of this calculation shall be the sum of $300,000.

24. For purposes of calculating whether the $8.9 million limit has been reached pursuant to Paragraph 13 or whether the $12.8 million limit has been reached pursuant to Paragraph 23, the category of costs enumerated therein shall not be reduced even if the costs are not consistent with the NCP or "necessary," within the meaning of Section 107(a)(4)(A-B) of CERCLA, 42 U.S.C. § 9607(a)(4)(A-B).

25. Notwithstanding any other provision of this Decree, the

United States reserves, and this Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants, and the United States reserves the right to issue an administrative order seeking to compel the Settling Federal Agencies, to perform response actions relating to the Site or to reimburse the United States for response costs, including all past costs unreimbursed by potentially responsible parties at the Site, if EPA determines, through an amendment to the ROD, that the Remedial Action is not protective of human health and the environment and EPA selects further response actions at the Site.

26. General Reservation of Rights. The covenants not to sue or to take administrative action set forth above do not pertain to any matters other than those expressly specified in Paragraph 19. Notwithstanding any other provision of this Decree, the United States reserves, and with respect to Settling Federal Agencies, EPA and federal natural resource Trustees reserve, and this Consent Decree is without prejudice to, all rights against Settling Defendants and Settling Federal Agencies with respect to all other matters, including but not limited to, the following:

(1) claims based on a failure by Settling Defendants or Settling Federal Agencies to meet a requirement of this Consent Decree;

(2) liability arising from the past, present, or future disposal, release, or threat of release of Waste

Materials outside of the Site, including liability for damages for injury to, destruction of, or loss of natural resources occurring outside of the Site, and for the costs of any natural resource damage assessments;

(3) liability for future disposal of Waste Material at the Site, other than as provided in the ROD or otherwise ordered by EPA;

(4) criminal liability; and

(5) liability for violations of federal or state law by Settling Defendants which occur during or after implementation of the Remedial Action at the Site.

COVENANTS BY SETTLING DEFENDANTS

27. Each of the Settling Defendants covenants not to sue and agrees not to assert any claims or causes of action against the United States, or any employee, officer, department, agency or instrumentality thereof, with respect to any matters relating to the United Heckathorn NPL Site or this Consent Decree, including but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 107, 111, 112, 113 or any other provision of law;

b. any claims against the United States under CERCLA Sections 107 or 113 related to the Site; or

c. any claims arising out of response activities at the Site, including claims based on EPA's selection of response actions, oversight of response activities or approval of plans

for such activities.

The Settling Defendants reserve the right to assert any counterclaims against the United States arising out of any action filed by the United States pursuant to Paragraphs 20, 22, 23 or 25.

28. Nothing in this Decree shall be deemed to constitute preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611 or 40 C.F.R. § 300.700(d).

EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

29. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this decree may have under applicable law. Each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto.

30. The Parties agree, and by entering this Consent Decree this Court finds, that Settling Defendants and Settling Federal Agencies are entitled, as of the effective date of this Consent Decree, to protection from contribution actions or claims as provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2), for matters addressed in this Consent Decree. "Matters addressed in this Decree" shall mean Natural Resource Damages and all response

costs incurred or to be incurred by the United States or any other person or entity at the Site, but do not include natural resource damages and response costs incurred or to be incurred in connection with the presence, release or threatened release of a hazardous substance outside the Site. Any rights Settling Defendants or Settling Federal Agencies may have to obtain contribution or otherwise recover costs or damages from persons not party to this Decree are preserved.

31. The Settling Defendants agree that, with respect to any suit or claim for contribution brought by them for matters related to this Consent Decree, they will notify the United States in writing no later than 60 days prior to the initiation of such suit or claim.

32. The Settling Defendants also agree that, with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree, they will notify the United States in writing within 10 days of service of the complaint on them. In addition, Settling Defendants shall notify the United States within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

33. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of response costs or Natural Resource Damages, or other appropriate relief relating to the Site, Settling Defendants shall not assert, and may not maintain, any defense or claim against the United States based upon the principles of waiver, res judicata,

collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Paragraph 19.

RETENTION OF RECORDS

34. Until seven years after the issuance of the Certification of Completion of the Remedial Action, each Settling Defendant shall preserve and retain one set of all records and documents (originals or, if originals do not exist, copies) now in its possession or control or which come into its possession or control, that relate in any manner to activities at the Site or to transactions between Settling Defendants and the pesticide formulators who operated at the Site, including, but not limited to, documents produced by Settling Defendants in the Private Party Litigation, regardless of any corporate retention policy to the contrary.

35. At the conclusion of this document retention period, each Settling Defendant shall notify the United States at least 90 days prior to the destruction of any such records or documents, and upon request by the United States, each Settling Defendant shall make available any such records or documents at a location within Region IX of EPA designated by the United States. Each Settling Defendant may assert that certain documents, records and other information are privileged under attorney client privilege, or any other privilege recognized under state

or federal law. In connection with the assertion of any such claim of privilege, the Settling Defendant shall provide the United States with the following: (1) title of document or record; (2) date of document or record; (3) name and position of the author of the document or record; (4) description of the subject of the document or record; and (5) the specific basis for the privilege asserted.

36. Each Settling Defendant hereby certifies individually that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any original records, documents or other information (or where originals did not exist, the last copy of such records, documents or other information) relating to its activities at the Site or to transactions between Settling Defendants and the pesticide formulators who operated at the Site since notification of potential liability by the United States and that it has fully complied with any and all EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of the Resource Conservation and Recovery Act, 42 U.S.C. § 6927.

NOTICE

37. Any notice required hereunder shall be in writing and shall be delivered by hand, facsimile or overnight mail as follows:

United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
Re: DJ # 90-11-3-598

Chief, Environmental Defense Section
U.S. Department of Justice
Environment and Natural Resources Division
Environmental Defense Section
P.O. Box 23986
Washington, D.C. 20026-20531
Re: DJ # 90-11-3-1291

EPA:

Regional Counsel
Office of Regional Counsel
United States EPA
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Settling Defendants:

Elf Atochem North America
Andrew C. Peterson. Esq.
Morgan, Lewis & Bockius
801 South Grand Avenue, Suite 2100
Los Angeles, CA 90071-3189

Olin Corporation (John Powell & Company)
Ken Wright, Esq.
Morgan, Lewis & Bockius
801 South Grand Ave., Suite 2100
Los Angeles, CA 90017-3189

Prentiss Incorporated (R.J. Prentiss & Company)
Anthony C. Ching, Esq.
Graham & James
801 South Figueroa St., 14th Fl.
Los Angeles, CA 90017-5554

Puregro Company
April V. Pearson, Esq.
Unocal Corporation
376 S. Valencia Avenue
Brea, CA 92621

Shell Oil Company
Randy Heldt, Esq.
Shell Oil Company
One Shell Plaza
P.O. Box 2463
Houston, TX 77252-2463

The Sherwin-Williams Company
Mark E. Robson, Esq.
Littler, Mendelson, Fastiff, Tichy & Mathiason
2175 North California Blvd., Suite 835
Walnut Creek, CA 94596

Wilmington Securities, Inc.
Richard Patch
Coblentz, Cahen, McCabe & Breyer
222 Kearny Street, 7th Floor
San Francisco, CA 94108

Each Party to this Decree may change the person(s) it has designated to receive notice for that Party, or the addresses for such notice, by filing a written notice of such change with the Court and serving said notice on the Parties.

EFFECTIVE DATE

38. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

RETENTION OF JURISDICTION

39. The Court shall retain jurisdiction of this matter for the purpose of entering such further order, direction, or relief as may be necessary or appropriate for the construction, implementation, or enforcement of this Decree.

AUTHORIZED REPRESENTATIVE

40. Each undersigned representative of Setting Defendants and the Assistant Attorney General, for the United States, certifies that he or she is fully authorized to enter into the

terms and conditions of this Decree and to legally execute and bind that Party to this Decree.

MODIFICATION

41. The terms of this Decree may be modified only by a subsequent written agreement signed by all of the Parties signatory hereto, and approved by the Court as a modification to this Decree.

PUBLIC COMMENT

42. The Parties agree that this Decree will be subject to a 30-day public comment period as provided in 28 C.F.R. § 50.7. The United States reserves the right to withdraw its consent to this Decree if comments received disclose facts or considerations which show that this Decree is inappropriate, improper, or inadequate. The Settling Defendants consent to the entry of this Decree by the Court without further notice.

ENTIRE AGREEMENT

43. This Consent Decree contains the entire agreement between the United States and Settling Defendants with respect to the Site. Any oral representations or modifications concerning this Decree shall be of no force unless contained in a subsequent modification signed by the Parties.

TERMINATION DATE

44. The Settling Defendants may jointly move to terminate this Decree, but only after demonstrating to the Court that they have fulfilled all of their obligations under this Decree and after giving the United States 45 days' notice of their intent to so move. Termination of this Decree shall not affect the

provisions herein for contribution protection, document retention, the covenants not to sue and reservations of rights, which shall remain in effect as an agreement among the Parties.

45. The following appendices are attached to and incorporated into this Consent Decree:

"Appendix A" is the complete list of the Miscellaneous Group Settling Defendants.

"Appendix B" is the complete list of the Montrose Group.

"Appendix C" is the map of the land portion of the Site.

"Appendix D" is the map of the marine portion of the Site.

"Appendix E" is the ROD.

COUNTERPARTS

46. This Decree may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument.

ORDER

THE FOREGOING Consent Decree is hereby APPROVED. There being no just reason for delay, this Court expressly directs, pursuant to Rule 54(b), Federal Rules of Civil Procedure, ENTRY OF FINAL JUDGMENT in accordance with the terms of this Consent Decree this _____ DAY of _____, 1996, each party to bear its own costs and attorney's fees, except as specifically provided herein.

_____
United States District Judge
CLAUDIA WILKEN

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: Jan 4, 1996

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice
Washington, D.C. 20530

Date: _____

HELEN H. KANG
Environmental Enforcement Section
Environment and Natural Resources Division

Date: _____

S. RANDALL HUMM
Environmental Defense Section
Environment & Natural Resources Division
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 514-3097

Date: _____

MICHAEL J. YAMAGUCHI
United States Attorney
Northern District of California
PATRICK RAMIREZ S. BUPARA
Assistant United States Attorney

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: _____

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
U.S. Department of Justice
Washington, D.C. 20530

Date: June 3, 1996

Helen H. Kang

HELEN H. KANG
Environmental Enforcement Section
Environment and Natural Resources Division

Date: June 3, 1996

S. Randall Humm/by Helen H. Kang

S. RANDALL HUMM
Environmental Defense Section
Environment & Natural Resources Division
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 514-3097

Date: 5-29-96

MICHAEL J. YAMAGUCHI
United States Attorney
Northern District of California
PATRICK RAMIREZ S. BUPARA
Assistant United States Attorney

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: 6-6-96

KEITH TAKATA
Director
Hazardous Waste Management Division
Region 9
U.S. Environmental Protection Agency

Date: June 6, 1996

JOHN J. LYONS
Assistant Regional Counsel
Region 9
U.S. Environmental Protection Agency

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANT

ELF ATOCHEM NORTH AMERICA

Date: May 16, 1996

FRANK B. FRIEDMAN
Senior Vice President
Health, Environment and Safety

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANT

MTR OLIN CORPORATION

Date: May 15, 1996

Kosche

[NAME, TITLE]

Peter C. Kosche
Senior VP Corporate Affairs

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANT

PRENTISS, INC.

Date: 5/15/96

Richard A. Fritz, President
[NAME, TITLE]

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANT

PUREGRO COMPANY

Date: 14 May 96

[NAME, TITLE]

April V Pearson
Asst. Secretary

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANTS

SHELL OIL COMPANY

Date: MAY 9, 1996

[NAME, TITLE]
MGR REMEDIATION

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANT

THE SHERWIN-WILLIAMS COMPANY

Date: May 9, 1996

[NAME, TITLE]

Louis E. Stellato
Vice President, General Counsel & Secretary

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States v. Montrose Chemical Corporation of California, relating to the United Heckathorn Superfund Site.

FOR SETTLING DEFENDANT

WILMINGTON SECURITIES, INC.

Date: 5/9/96

[NAME, TITLE] Darlene Clarke Vice President

Miscellaneous Defendants Group Consent Decree
Appendix A
Settling Defendants

Elf Atochem North America (Pennsylvania Salt Manufacturing Co.)

Olin Corporation (John Powell & Company, Inc.)

Prentiss, Inc. (R.J. Prentiss & Company)

Puregro Company

Shell Oil Company (Shell Chemical Company)

The Sherwin-Williams Company

Wilmington Securities, Inc.

Miscellaneous Group Consent Decree
Appendix B
Montrose Group

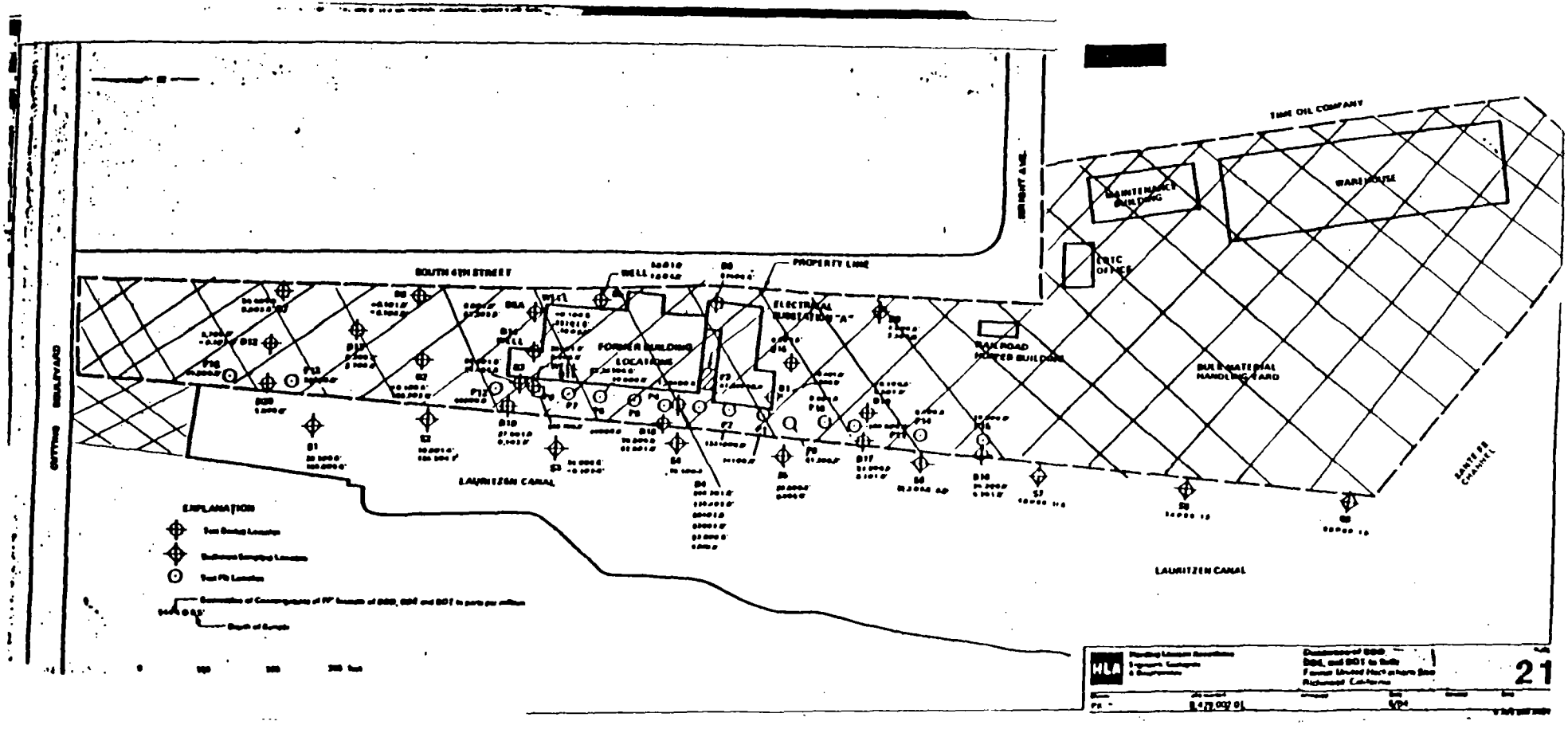
Montrose Chemical Corporation of California

Rhone-Poulenc, Inc.

Stauffer Management Company

Chris-Craft Industries, Inc.

Miscellaneous Defendants Group
Consent Decree
Appendix C



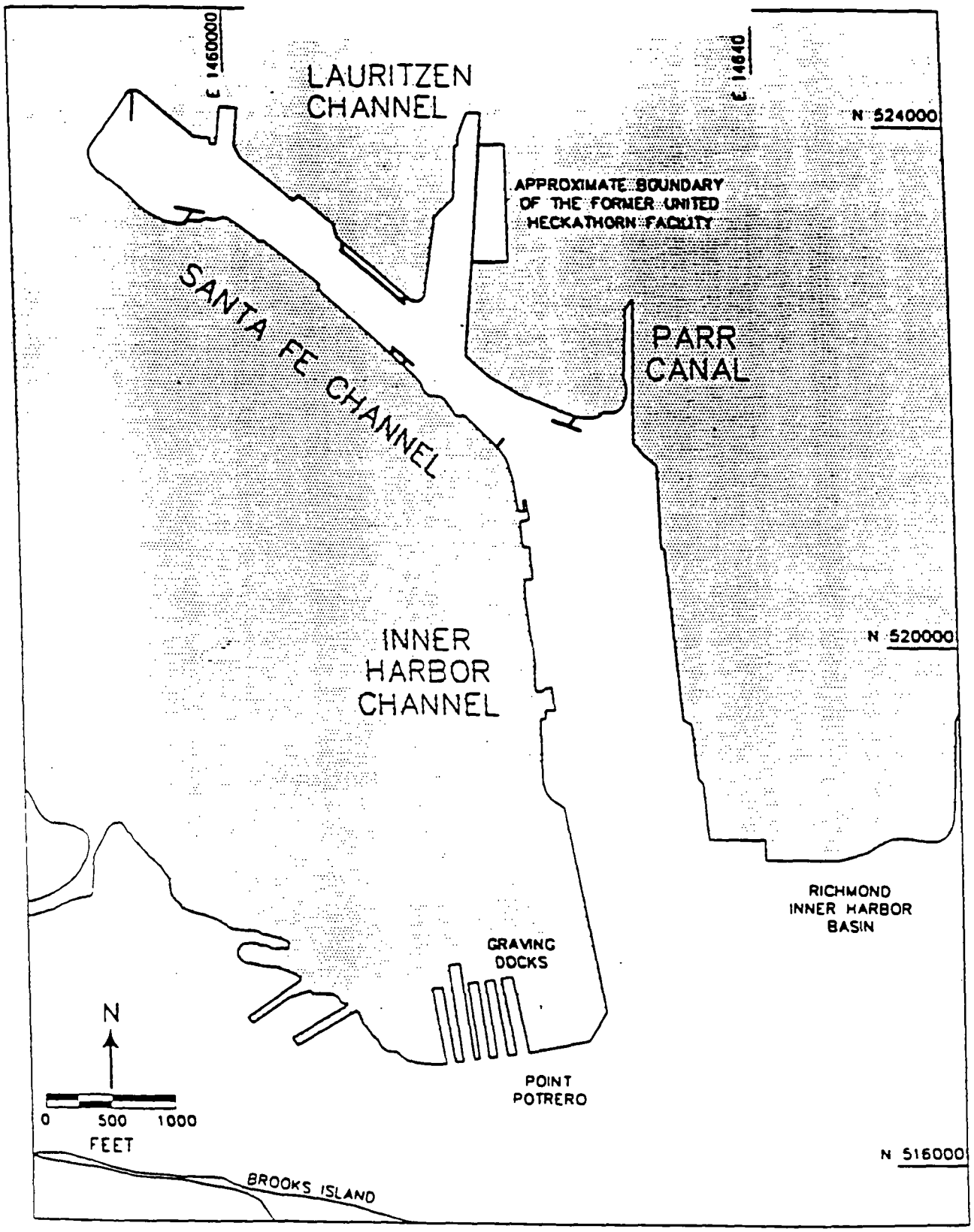



Figure 2. Map of Richmond Harbor.

# RECORD OF DECISION

United Heckathorn Superfund Site
Richmond, California

EPA ID# CAD981436363

## PART I - DECLARATION

### Statement of Basis and Purpose

This Record of Decision ("ROD") presents the selected remedial action for the United Heckathorn Superfund Site ("the Site") in Richmond, California. This document was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), 42 U.S.C. §§9601 et seq., and, to the extent practicable, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300, and the laws of the State of California. This decision is based on the Administrative Record for the Site. The administrative record index identifies the documents upon which the selection of the remedial action is based.

### Assessment of the Site

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

### Description of the Remedy

The United Heckathorn Superfund Site in Richmond, California, was used to formulate pesticides from approximately 1947 to 1966. Soils at the Site and sediments in Richmond Harbor were contaminated with various chlorinated pesticides, primarily DDT, as a result of these pesticide formulation activities. At the time of Site listing in 1990, a visible deposit of pesticide residue containing up to 100% DDT was present on the Lauritzen Channel embankment. Several response actions have already been taken to cleanup the most contaminated upland areas of the Site, including the embankment. Under EPA Removal Order 90-22, a group of Potentially Responsible Parties (PRPs) excavated the embankment deposit and transported it offsite to a permitted disposal facility. During subsequent actions through 1993 pursuant to the removal order, all known additional upland soil deposits containing high levels of pesticides were removed, as were piles of contaminated soils generated in earlier actions.

The final remedy addresses remaining hazardous substances, primarily in the marine environment. The major components of the selected remedy include:

- Dredging of all soft bay mud from the Lauritzen Channel and Parr Canal, with offsite disposal of dredged material.
- Placement of clean material after dredging.
- Construction of a cap around the former Heckathorn facility to prevent erosion.
- A deed restriction limiting use of the property at the former Heckathorn facility location to

non-residential uses.

- Marine monitoring to verify the effectiveness of the remedy.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate ("ARARs") to the remedial action, and is cost effective. The selected remedy uses engineering controls and institutional controls to address remaining hazardous substances at the Site. Concentrated wastes at the upland portion of the Site were addressed by previous removal actions.

Because this remedy will result in hazardous substances remaining onsite, a review will be conducted within five years after the commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

John Wise

Felicia Marcus for
Regional Administrator

10.26.94
Date

## PART II - DECISION SUMMARY

United Heckathorn Superfund Site
Richmond, California

1. Site Name, Location, and Description.

The United Heckathorn Site is located in Richmond Harbor, on the east side of San Francisco Bay (Figures 1 and 2) in Contra Costa County, California. The location of the former United Heckathorn facility (Figure 3) is currently being used as a marine shipping terminal operated by the Levin Richmond Terminal Corporation (LRTC). The area of contamination at the Site includes the northern five acres of the terminal and marine sediments in harbor channels including the Lauritzen, which is immediately adjacent to the location of the former Heckathorn facility, the Santa Fe, the Parr Canal, and the Inner Harbor Channel.

The upland area of the Site is currently fenced and occupied. Current and expected future zoning of the upland area of the Site permits only industrial use. Land use restrictions selected as part of the Site remedy will also permit only nonresidential, industrial or commercial uses in the future.

2. Site History and Enforcement Activities.

The upland area of the Site is currently owned by Levin Enterprises, Inc. The Site was used from approximately 1947 to 1966 by several operators, including the R.J. Prentiss Company, Heckathorn and Company, United Heckathorn, United Chemetrics, and Chemwest Incorporated (hereafter collectively referred to as "United Heckathorn") to formulate and package pesticides. No chemicals were manufactured onsite.

Documents from the 1950s and 1960s indicate that approximately 95% of Heckathorn's operations entailed processing the pesticide, DDT. The processing activities included mixing, blending, grinding, and packaging. Various solvents, including xylenes, were used to dissolve DDT and other pesticides into liquid formulations. Powder formulations were also prepared.

United Heckathorn employees apparently routinely washed out equipment containing pesticide residues. The wash water was permitted to either run through drains that discharged to the Lauritzen Channel, or to seep into the ground adjacent to the Site (Levine-Fricke, 1990). Later, settling tanks were used to recover pesticide residues from wash water; however, overflow and leakage from these tanks also occurred. In addition, accidental spills, leaks, and releases also occurred during the processing of liquid and dry pesticide formulations, which were conducted both inside and outside the United Heckathorn buildings.

In 1960, the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) inspected the facility and cited United Heckathorn for the release of DDT-laden wastewater into the Lauritzen Channel. In 1965, California Department of Fish and Game staff identified a discharge of wastewater overflow into the Lauritzen Channel and leakage from the pesticide settling tanks.

Pesticide processing activities at the Site ended in approximately 1966. Between 1966 and 1970, the United Heckathorn facility buildings were demolished and cleared from the Site. In the 1970s, the Site was apparently used primarily for bulk material storage. In 1981, the Levin Metals Corporation purchased the property from the Parr-Richmond Terminal Company and has been

operating the Site since that time as a bulk shipping facility.

In 1980, the United Heckathorn Site was inspected and sampled by CDHS as part of the Abandoned Sites Project. Chlorinated pesticides and metals were detected in soil samples, and the area was designated a state Superfund Site in March 1982. EPA listed the United Heckathorn Site on the CERCLA National Priorities List (NPL) in March 1990, and took over as lead agency in August 1990.

Interim response actions were conducted from 1982 to 1993 in the upland and embankment areas of the United Heckathorn Site. As early as 1982, contaminated soil, asphalt, and concrete from the United Heckathorn Site were excavated by the current landowner and moved to a nearby lot adjacent to the Parr Canal. These materials were subsequently transported to several hazardous waste disposal facilities. In 1983, soils containing high levels of pesticides were removed by the current landowner during routine maintenance and extension of onsite railroad lines. A 6-in. to 8-in. layer of gravel was placed over the surface of the Site, including a 6-in. layer of ballast rock over the Lauritzen Channel embankment and selected areas of high DDT concentrations. In 1986, during excavation for the construction of a train scale, high levels of pesticides were detected and approximately 60 cubic yards ($yd^3$) of soil were removed by the current landowner.

In November 1990, pursuant to EPA Removal Order 90-22, approximately 1500 $yd^3$ of soil and visible pesticide residue containing up to 100% DDT were excavated by several PRPs (Levin, Montrose, Parr, Shell, and Stauffer) from the Lauritzen Channel embankment. This excavation was taken back to the foundation of the former Heckathorn building 1, where a pesticide deposit approximately 3 ft thick was revealed beneath the foundation. Samples of this deposit contained approximately 30% DDT. An additional 1800 $yd^3$ of pesticide residue and contaminated soil were excavated by the same PRPs from this area in April 1991. The excavated material and stockpiles that had been placed onsite in the 1980s were hauled offsite by truck to permitted hazardous waste disposal facilities. A final soil removal action was completed in May 1993 by the same PRPs as well as Prentiss and Sherwin Williams. Assuming that the embankment deposit contained 30% DDT, over 99% of the mass of pesticides has been removed from the upland portion of the Site since 1990.

Marine sediment has not been the subject of prior removal actions or otherwise been remediated. However, as shown on Figure 3, the southeastern area of the Lauritzen Channel was last dredged for berth maintenance in 1985.

3. Highlights of Community Participation.

Six fact sheets have been released describing activities at the Site. In July, 1994 EPA released a proposed plan and the Administrative Record for the Site. Site documents were made available at the agency Superfund Records Center and at the Richmond Public Library, and a public notice was published allowing 30 days for public comment on the Proposed Plan. A public meeting was held on August 2, 1994 to describe the proposed remedy and receive comments. The public comment period was then extended an additional 30 days at the request of PRPs. Three persons made comments at the public meeting, and six written comments on the proposed plan were received during the comment period. Responses to all significant comments received during this period are contained in the attached "Analysis of Public Comments." The decision for this Site is based upon the Administrative Record.

4. Scope and Role of Remedial Actions.

The remedial actions selected in this Record of Decision are expected to be the final response actions performed at the Site. As described in the Site history above, significant interim response measures were performed at the Site in the past. These removal actions addressed the principal threats at the upland portion of the Site.

The selected remedy addresses the contaminants remaining in sediments at the Site, as well as the low levels of contaminants remaining in soils at the Site.

5. Site Characteristics.

The nature and extent of contamination at the United Heckathorn Site has been delineated by the combination of state-ordered Site investigations which occurred prior to NPL listing, and EPA's subsequent Remedial Investigation (Battelle, 1994). As discussed above, large deposits of extremely high levels of pesticides remained in upland soils after United Heckathorn ceased operations in 1966. These have been the subject of extensive excavation and removal actions over the past three years.

A soils database representing current Site conditions was compiled in EPA's Human Health Risk Assessment (ICF Technology, 1994) from the previous Site studies and removal action reports. A conservative estimate of the remaining mean Site soil concentrations of the primary Contaminants of Concern (COCs), DDT (total) and dieldrin, are 64 and 5.7 milligrams per kilogram (mg/kg), respectively. These estimates are conservative because the soils database includes the large number of additional samples which were taken to delineate the hot-spot areas for the removal actions. The actual mean Site concentrations are likely to be lower.

DDT at levels exceeding 1 mg/kg in upland soils extends over the upland portion of the Site as shown in Figure 4. The total mass of these upland soils is approximately 95,000 tons (Levine-Fricke, 1993). Confirmation sampling performed during the excavations of the most contaminated soil areas indicated that the concentrations drop to nondetectable levels in the younger bay mud immediately below the upland soils, demonstrating that the homogeneous silty-clay bay mud underlying the Site is an effective barrier to downward migration of Site chemicals.

Due to the Site's proximity to San Francisco Bay, the shallow groundwater at the Site is naturally saline and is not a source of drinking water under state or federal law.

In 1992, EPA performed a screening assessment of offsite soils (ICF Technology, 1994) in order to determine whether the historic operations of United Heckathorn could have released pesticides into the air in sufficient quantities to cause current levels of concern in nearby off-site residential soils. Sampling locations were chosen along Cutting Boulevard and immediately north of Highway 580, because the meteorological analysis for EPA's 1988 air monitoring program indicated that the strongest prevailing winds at the Site blow due north. The sampling program was therefore deliberately biased to target the area which would have had the highest levels of pesticides, had Heckathorn caused contamination. All off-site soil sampling results were well within acceptable levels for protection of human health.

The results of the RI of marine sediment, however, indicate that the occurrence of pesticides at the Site, particularly the Contaminants of Concern, DDT and dieldrin, is more widespread and at concentrations orders of magnitude higher relative to San Francisco Bay background levels than other detected contaminants. The areal and vertical distribution of marine contamination is summarized below.

Vertical core segments and channel edge grab samples were analyzed for chlorinated pesticides to delineate the areal and vertical extent of marine contamination. Results indicated that significant pesticide contamination was limited to the soft geologically recent "younger bay mud"; samples from the hard underlying "older bay mud" generally contained only traces of pesticides. Figure 5 presents the average total DDT concentration in the younger bay mud in the inner Richmond Harbor. It is significant to note that the concentration contours on this figure must be presented on a log scale in order to depict the gradient of six orders of magnitude between the Lauritzen Channel and Point Potrero. The maximum and median total DDT and maximum dieldrin concentrations throughout the study area are also shown.

Pesticide concentrations were highest in the Lauritzen Channel, and decreased with increasing distance from the former United Heckathorn Site, clearly indicating that Heckathorn was the source of contamination. The highest total DDT concentration of 633,000 micrograms per kilogram (µg/kg) dry wt was measured in a sample from 1 ft to 3 ft below the mudline in the center of the channel. Pesticide concentrations of greater than 100,000 µg/kg were detected in sediment from the northern and western portions of the channel. The median total DDT concentration was approximately 47,000 µg/kg at the head of the Lauritzen Channel, which has not been dredged in a number of years. The median concentration of total DDT decreased to about 14,000 µg/kg in the western, undredged portion of the channel, and to 1500 µg/kg in the dredged portion of the channel near the Levin terminal. Dieldrin concentrations were lower (maximum concentration of 16,000 µg/kg), but exhibited the same spatial trend in relative concentration.

Total DDT concentrations in sediment decreased by at least two orders of magnitude from the Lauritzen Channel to the Santa Fe Channel. The median concentration of total DDT in the younger bay mud was 110 µg/kg in the upper Santa Fe Channel and 210 µg/kg in the federally maintained portion of the channel. DDT and dieldrin concentrations were higher in the federally maintained portion of the Santa Fe Channel, which includes the area downstream of the Lauritzen Channel. Total DDT and dieldrin concentrations decreased by another order of magnitude from the Santa Fe Channel to the Inner Harbor Channel. The median total DDT concentration was 60 µg/kg in the upper Inner Harbor Channel, and 10 µg/kg in the lower Inner Harbor Channel. The maximum total DDT concentration near Point Potrero was 19 µg/kg, which is approximately equal to the median DDT concentration for the periphery of San Francisco Bay, excluding the Lauritzen Channel (Long et al., 1988).

Pesticide concentrations in Parr Canal sediment were lower than those measured in the Lauritzen Channel but greater than those measured in Santa Fe or Inner Harbor Channels. The maximum and median total DDT concentrations measured in Parr Canal sediment were 4080 µg/kg and 840 µg/kg, respectively. The maximum dieldrin concentration was 170 µg/kg. The Parr Canal is significantly narrower than it was in the 1940's, due to filling which (based on aerial photographs) occurred sometime between 1958 and 1968. Some of the material used to fill the canal may have been dredged from the harbor, possibly explaining the elevated levels of pesticides in Parr Canal sediments.

Grab samples collected from channel edges throughout the study area showed the same spatial trend in pesticide concentrations as the core samples. The total DDT concentrations in channel edge samples were consistent with the median concentration measured in core samples from that area.

Contaminant concentrations in the younger bay mud were generally not well stratified. In the shallow portions of the Lauritzen Channel, contaminant concentrations increased, and then decreased with increasing depth. The most highly contaminated sediment was generally found from 1 ft to 5 ft below the mudline. In the Santa Fe Channel, the most contaminated sediment was

found down-channel of the mouth of the Lauritzen Channel in the surface sediment, and just up-channel of the mouth in deeper sediment. Contaminant concentrations were generally higher in deeper sediment in the Inner Harbor Channel. Analysis of the volumes of contaminated sediments and the average concentrations in harbor channels indicates that 98% of the mass of DDT in harbor sediments is confined to the Lauritzen Channel.

Selected core samples collected during the marine RI were analyzed for polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), metals, and butyltins. In general, sediment from the upper Lauritzen Channel and Parr Canal had higher concentrations of PAHs, PCBs, and metals than sediment from the Santa Fe and Inner Harbor Channels. This is probably because the larger channels have been routinely dredged for navigation, whereas the northern Lauritzen and Parr have not. Only the pesticides, DDT and dieldrin, are consistently found in sediments and biota at levels orders of magnitude higher than the regional background levels.

6. Applicable or Relevant and Appropriate Requirements (ARARs)

Federal and state environmental laws which have been determined to be ARARs for the remedy are summarized below. Chemical-specific ARARs are discussed first, followed by other requirements.

Surface Waters: ARARs for surface water include EPA's ambient water quality criteria for DDT and dieldrin. These are the primary basis for the Site remediation goals.

EPA Ambient Water Quality Criteria. Section 304 of the Clean Water Act required EPA to publish criteria for water quality that accurately reflect the latest scientific knowledge on the kind and extent of all identifiable effects on health and welfare, including effects on plankton, fish, shellfish, wildlife, and plant life, which may be expected from the presence of pollutants in any body of water, based on the substances' whole-water concentration. The ambient water quality criteria for DDT and dieldrin were published in October 1980. The human health values have been updated since the original criteria publications in 1980 to reflect revised carcinogenic potency values from EPA's Integrated Risk Information System (IRIS) database (see Final Rule, 40 CFR Part 131, 57 FR 60848, December 22, 1992).

The derivation of EPA's ambient water quality criteria is discussed at length in the ecological assessment (EPA, 1994). Criteria for the protection of saltwater aquatic life are, for most pollutants, based upon toxic effects data for water-column organisms. However, for DDT and its metabolites, which bioaccumulate to high levels and may cause toxicity to organisms at higher trophic levels, it was determined that more restrictive criteria were necessary to protect fish-eating birds. The chronic marine aquatic life criterion is 1 ng/L ($10^{-9}$ g/l, EPA 1980, EPA 440/5-80-038]). The water quality criterion for the protection of human health from the consumption from the bioaccumulation of DDT in fish is 0.59 ng/l, based on achieving a $1 \times 10^{-6}$ lifetime excess cancer risk level.

The chronic marine aquatic life criterion for dieldrin of 1.9 ng/l is also residue-based, and was set at the level which would result in the achievement of the Food and Drug Administration's (FDA) action level in fish oil after bioaccumulation (EPA 1980, EPA 440/5-80-019]). This criterion is protective of sensitive aquatic organisms. The water quality criterion for the protection of human health from the consumption from the bioaccumulation of dieldrin in fish is 0.14 ng/l, based on achieving a $1 \times 10^{-6}$ lifetime excess cancer risk level. The EPA aquatic life and human health water quality criteria for DDT and dieldrin are listed in Table 1.

TABLE 1. EPA Ambient Water Quality Criteria

| Chemicals | Saltwater Aquatic Life (ng/L) 24-hour average | Human Health (ng/L) |
|---|---|---|
| DDT[a] | 1.0 | 0.59 |
| Dieldrin | 1.9 | 0.14 |
| (a) The sum of the 4,4'- and 2,4'- isomers of DDT, DDD (TDE), and DDE. | | |

Section 121(d)(2)(A)(ii) of CERCLA requires that remedial actions meet federal Water Quality Criteria established under Section 304 or 303 of the Clean Water Act where such WQC are determined by EPA to be relevant and appropriate to remedial actions at the Site. See 42 U.S.C. § 9621(d)(2)(A)(ii) and 40 C.F.R. § 300.430(e)(2)(i)(G). In evaluating whether specific WQC are relevant and appropriate to remedial actions at Superfund Site, CERCLA requires EPA to consider four criteria: 1. the uses of the receiving water body; 2) the media affected; 3) the purposes of the criteria and 4) current information. See 42 U.S.C. § 9621(d)(B)(i). See also U.S. EPA, CERCLA Compliance with Other Laws Manual - CERCLA Compliance with the CWA and SDWA (OSWER Pub. 9234.2-06/FS, Feb. 1990).

EPA guidance concerning determinations that WQC are relevant and appropriate to remedial action at a Superfund Site provides that:

> A water quality criteria component for aquatic life may be relevant and appropriate when there are environmental factors that are being considered at a Site, such as protection of aquatic organisms. With respect to the use of water quality criteria for the protection of human health, levels are provided for exposure both from drinking the water and from consuming aquatic organisms (primarily fish) and from fish consumption alone. Whether a water quality criterion is appropriate depends on the likely routes of exposure.

U.S. EPA, CERCLA Compliance With Other Laws Manual: Interim Final at 1-15 (EPA 540-G-89-006, Aug. 1989).

Both the marine chronic and human health WQC for DDT and dieldrin are relevant and appropriate to remedial actions at this Site since both aquatic and wildlife and humans may be exposed to these contaminants either directly or through consumption of contaminated organisms. As discussed in the Ecological Risk Assessment, aquatic organisms are present in all channels at the Site, which are a part of San Francisco Bay. Fish eating-birds feed in all channels in the harbor. In fact, the particular bird upon which the marine chronic water quality criterion for DDT was based is the California brown pelican, an endangered species, which has been observed feeding in the most contaminated channels at the Site. As discussed in the Human Health Risk Assessment, fishermen catch and consume fish from the Inner Richmond Harbor channels. In 1986, the State of California Department of Health Services ordered the posting of the Lauritzen Channel to warn fishermen of the fish and shellfish contamination. On April 7, 1994, the Cal-EPA Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor.

The beneficial uses designated by the State of California for central San Francisco Bay waters, which are discussed below, include fishing, wildlife habitat, preservation of rare and endangered species, fish migration, fish spawning, shellfish harvesting, and estuarine habitat.

EPA's Ambient Water Quality Criteria were specifically developed to protect beneficial uses such as these.

Porter-Cologne Water Quality Act, San Francisco Bay Regional Basin Plan, and Fish and Game Code. The release of hazardous substances to surface waters is controlled under the Porter-Cologne Water Quality Control Act and implementing regulations, and the state Fish and Game Code §5650.

Beneficial uses of surface waters were designated in the Water Quality Control Plan for the San Francisco Basin (the Basin Plan) adopted by the Regional Water Quality Control Board (SFBRWQCB, 1986). The Basin Plan designates the following beneficial uses of Central San Francisco Bay, which includes the waters at the Site:

Industrial Service Supply
Industrial Process Supply
Navigation
Water Contact Recreation
Non-contact Water Recreation
Commercial and Sport Fishing
Wildlife Habitat
Preservation of Rare and Endangered Species
Fish Migration
Fish Spawning
Shellfish Harvesting
Estuarine Habitat

The Basin Plan also contains the following narrative objective:

"All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species and/or significant alterations in population or community ecology or receiving water biota. Other relevant biological measures will be considered by the Regional Board in evaluating compliance with this objective. Additionally, effects on human health due to bioconcentration will be considered."

Resolution 68-16: Statement of Policy with Respect to Maintaining High Quality of Waters in California. The State Water Resources Control Board adopted Resolution 68-16 on October 28, 1968. The Basin Plan, discussed above, states: "Whenever the existing quality of water is better than the quality of water established herein as objectives, such existing water quality shall be maintained unless otherwise provided by State Water Resources Control Boars Resolution 68-16." The SFBRWQCB has identified Resolution 68-16 as a potential ARAR for the United Heckathorn Site. While EPA does not agree that Resolution 68-16 is an ARAR, EPA and the State agree that achieving the water quality criteria identified above would meet the requirements of 68-16 regardless of whether or not it is an ARAR.

Soils and Sediments

No chemical-specific ARARs were identified as remedial goals for soils or sediments at the Site. Based on the results of the ecological assessment, mean sediment levels were calculated to prevent violations of the ARARs for surface waters, and to meet the National Academy of Sciences

(NAS) action level for DDT in fish to ensure protection of fish-eating birds, including endangered species (see discussion below).

California Code of Regulations, Title 22. The state of California has developed chemical-specific regulatory criteria for the identification of hazardous and extremely hazardous wastes, based on Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) values (California Code of Regulations, Title 22, Sections 66699 and 66723). Any waste containing a substance at a concentration equal to or exceeding a listed TTLC is classified as a hazardous waste by the California Department of Toxic Substances Control (DTSC). Extremely hazardous wastes are also classified by DTSC using TTLCs. STLCs are related to the Waste Extraction Test (WET), also described in Title 22. Any waste which produces an extract in the WET test the concentration of which exceeds an STLC, is classified as a hazardous waste by DTSC. The TTLCs and STLCs for the major COCs at the Site, DDT and dieldrin, are listed in Table 2.

TABLE 2. State of California Hazardous Waste Limits

| Chemicals | TTLC (mg/kg wet wt) | STLC (mg/kg wet wt) |
|---|---|---|
| DDT, DDD, DDE | 1.0 | 0.1 |
| Dieldrin | 8.0 | 0.8 |

All materials known to contain concentrations of substances exceeding the limits which classify extremely hazardous wastes have been removed from the Site. Based on the results of previous investigations and the marine RI, approximately 95,000 tons of soils in the upland area of the Site and approximately 65,000 $yd^3$ of sediments in the Lauritzen Channel and Parr Canal exceed the California TTLC for DDT. No sediments outside these channels exceed the levels listed in Table 2. Although the TTLCs and STLCs do not represent cleanup levels, soils and sediments with chemical concentrations higher than the TTLCs or STLCs would be classified as hazardous under California law if they were dredged or excavated at the Site.

EPA has developed chemical-specific criteria for the identification of hazardous waste under the Resource Conservation and Recovery Act (RCRA). For the COCs at this Site, the criteria are not concentration-based, but are instead based on the source of the constituents (40 CFR 261.33). Product spills, for example, are RCRA-regulated, but generally releases of chemicals contained in process waste streams are not (40 CFR 261.33(d)(comment)). Based on a review of historical documents, the presence of COCs in marine sediments and remaining soils appears to be due to releases contained in waste streams from United Heckathorn's processes. Therefore, EPA has determined that the contaminated soils and marine sediments are not hazardous wastes regulated under RCRA.

Groundwater. There are no chemical-specific ARARs for the concentration of COCs in Site groundwater. Previous investigations found that salinity levels exceed federal (40 CFR 144.3) and state (SWRCB Resolution No. 88-63) limits for underground sources of drinking water. Consequently, the shallow groundwater at the Site is not considered a potential source of drinking water as defined under state and federal law.

The water quality criteria for surface waters discussed above do not apply to groundwater, although they might provide a basis for developing remediation goals in groundwater if there was a

complete pathway by which contaminants in groundwater caused violations of the criteria in surface water. However, as discussed in the previous chapter, an analysis of groundwater transport to the bay was made in 1986 as part of the initial state-ordered Site investigation. Although extremely high levels of pesticides were present in soils at that time, there were only sporadic detections of low levels of pesticides in groundwater samples, and modeling indicated that this potential pathway would not cause violations of state surface water quality objectives. Based on this analysis, groundwater monitoring was not required in subsequent state-ordered Site investigations. Subsequently, all highly contaminated soils containing approximately 99% of the mass of pesticides were removed from Site soils, further reducing any potential threat.

Air. There are no chemical-specific ARARs, such as National Ambient Air Quality Standards (NAAQS) or National Emission Standards for Hazardous Air Pollutants (NESHAPS), for the concentrations of Site COCs in the air. Air monitoring was performed at the Site prior to the removal of extremely high levels of exposed pesticides from Site soils. Even under those conditions, the concentrations in onsite and offsite air were well below levels of concern.

Fish and Shellfish. There are no chemical-specific ARARs for the concentration of COCs in fish and shellfish. The NAS saltwater action levels are TBCs, which provide an additional level of protection to fish-eating birds beyond the level that is the basis of the surface water ARARs for aquatic life. The FDA action levels for the marketability of fish and shellfish are also TBCs for protecting human health, but they are much less stringent than the levels that would be achieved by meeting the surface water ARARs discussed above.

The NAS and National Academy of Engineering published recommendations in 1972 for pollutant residues in compoSites of 25 or more whole fish of any species within the same size range as those consumed by any bird or mammal in the marine environment (EPA-R3-73-033, March 1973). The document cites studies demonstrating DDE induced shell thinning in mallards, American kestrels, Japanese quail and ring doves, and an inverse relationship between shell thickness and concentrations of DDE in eggs of wild populations of herring gulls, double-crested cormorants, great blue herons, white pelicans, brown pelicans, and peregrine falcons. The document concludes that a wet weight tissue range of 0.1 mg/kg to 0.5 mg/kg (100 $\mu$g/kg to 500 $\mu$g/kg) is "evidently higher than one which would permit successful reproduction of several fish-eating and raptorial birds." The criterion for DDT is 50 $\mu$g/kg, which is one-third the level which was the basis for the EPA water quality criteria discussed above.

Since the US Fish and Wildlife Service raised concerns that the EPA criteria for DDT might not be stringent enough for the protection of fish-eating birds, and an endangered species (the brown pelican) has been observed feeding at the Site, the NAS action level was retained as a TBC to help determine the protectiveness of remediation (see 55 FR 8745).

Other Requirements

Endangered Species Act. The Endangered Species Act of 1973, 16 USC §1531 et seq., requires the conservation of species of fish, wildlife and plants that are threatened with extinction. Compliance with the act at Superfund Sites requires the identification of any threatened or endangered species or of its critical habitat that would be affected by a proposed remedial action.

The U.S. Fish and Wildlife Service (FWS), which is the federal trustee for the protection of migratory birds, provided a list of endangered species that are known to nest in central or northern San Francisco Bay, or are likely to feed regularly in the immediate vicinity of Richmond Harbor (Table 3). Among these, the California brown pelican has been observed by EPA personnel feeding in all channels in Richmond Harbor, including the most contaminated waterways.

The FWS raised the concern that the tissue residue basis (0.15 mg/kg DDT in prey) of the surface water ARARs resulted in reproductive levels in pelicans that were still 10% to 30% below the levels needed to maintain a stable population, described in the 1976 study used to set the criteria. It should be emphasized, however, that the reproductive effects occurred when contamination was widespread in the birds' range, and that the contamination in Richmond Harbor is restricted to a small area. Nevertheless, the selected remedy is expected to also achieve the NAS saltwater action level for DDT in fish (0.05 mg/kg), which was identified as a TBC for determining the protectiveness of remediation.

TABLE 3. Endangered Species

| Common Name | Nests In SF or San Pablo Bays | Feeds In/Around Richmond Harbor | Prey |
|---|---|---|---|
| Brown Pelican | | Y | Fish[a] |
| Bald Eagle | | | Omni.[b] |
| Peregrine Falcon | Y | Y | Bird[c] |
| Clapper Rail | Y | | Invert.[d] |
| Least Tern | Y | Y | Fish |

(a) Fish: consumes primarily fish.
(b) Bird: consumes primarily birds.
(c) Omni.: diet usually omnivorous/scavenger.
(d) Invert.: consumes primarily small- to medium-sized invertebrates.

California Endangered Species Act. The goal of the California Endangered Species Act (California Fish and Game Code §2050) is to conserve, protect, restore and enhance any endangered or threatened species and its habitat. Among the birds likely to nest or feed in the area, most of those that are listed as endangered or threatened by the state are also listed federally. The one exception is the California black rail, a state threatened species.

CDFG submitted the names of two potentially-affected plant species, both of which are listed as rare and have distributions in the north Bay and delta. They are Mason's lilaeopsis, a minute, turf-forming perennial plant in the carrot family, and soft bird's-beak, a sparingly-branched, semi-parasitic herbaceous annual plant in the figwort family. The known distribution of Mason's lilaeopsis, which is found on saturated clay soils regularly inundated by waves and tidal action, appears to be limited to the bay delta. Soft bird's-beak occurs in the coastal salt marshes and brackish marshes of northern San Francisco and Suisun Bays.

The surface water ARARs discussed previously are five orders of magnitude more stringent than the levels necessary to protect aquatic plants. None of the potential remedies would involve destruction of rare plants or their habitat.

Coastal Zone Management Act (CZMA). Section 307(c)(1) of the CZMA requires that federal agencies conducting or supporting activities directly affecting the coastal zone conduct or support those activities in a manner that is consistent with approved state coastal zone management programs. All remedial alternatives analyzed would affect the coastal zone. Under CERCLA Section 121(e), 42 U.S.C. § 9621(e), onsite activities are not subject to administrative review or permitting

processes, but they must be consistent with the substantive requirements of the coastal zone management plan. The approved coastal zone management program for San Francisco Bay includes the McAteer-Petris Act and the San Francisco Bay Plan, and is administered by Bay Conservation and Development Commission (BCDC).

The McAteer-Petris Act and the Bay Plan were developed primarily to halt uncontrolled development and filling of the bay. Their broad goals include reducing bay fill and disposal of dredged materials in the bay, and maintaining water quality and the ecological integrity of the bay. Generally, filling of the bay is allowable only when public benefits exceed public detriment from the loss of water areas, the filling is for a water-oriented use, and there is no alternative upland location available.

Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbor Act, 42 U.S.C § 1344, regulates dredging and filling in waters of the United States. Several of the remedial alternatives analyzed include dredging contaminated sediments. Some of the potential disposal options include filling in waters of the United States. The United States Army Corps of Engineers (USACE) usually issues permits to conduct the above activities; however, since the actions analyzed would all occur onsite, permits would not be required pursuant to Section 121(e) of CERCLA, although the substantive requirements of the laws would still have to be met.

The determination of the acceptability of fill in waters of the United States is made under the Clean Water Act Section 404(b)(1) guidelines, which were promulgated in 40 CFR Part 230. The discharge of dredged or fill material is prohibited if there is a practicable alternative to the proposed discharge that would have less impact on the ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

California Hazardous Waste Control Law. California's hazardous waste facility closure requirements, 22 California Code of Regulations, Chapters 14 and 15, "Closure and Post Closure," are not ARARs with respect to the upland portions of the United Heckathorn Site because it is neither a hazardous waste facility nor a landfill. Some of the remedial alternatives analyzed would involve the consolidation and onsite containment of contaminated sediment. In the analysis of alternatives, operational requirements found in Title 22 of the California Code of Regulations are discussed, including limited long-term management, Site and cover maintenance, and institutional controls, including land use restrictions.

7. Summary of Site Risks and Remediation Levels.

Risk assessments were conducted by EPA to evaluate the threat to human health and the environment posed by contamination from the United Heckathorn Site. Results of these assessments and the final remediation levels established to address Site risks are summarized below.

Human Health Risk Assessment. The Baseline Human Health Risk Assessment for the Site was performed by ICF Technology Inc. for EPA (ICF Technology, 1994). The results indicate that among the various potential exposure pathways for Site contaminants, only the consumption of fish poses risks that are above EPA's acceptable risk range.

COCs at the Site were selected for evaluation in the risk assessment using the Site soil and sediment data collected by HLA (1986), Levine-Fricke (1990, 1991, 1993), and Weston (1993). The COCs selected for onsite soils were DDT (and metabolites), dieldrin, aldrin, endrin, and lead. Of

these, DDT and dieldrin are the most prevalent contaminants and are the primary contributors to risk. COCs selected for sediments were DDT and dieldrin.

Six exposure pathways were identified as potential concerns at the Site, as follows:

- ingestion and dermal adsorption of chemicals in onsite surface soils by workers at the Site;
- inhalation of fugitive dust from surface soils by onsite workers;
- ingestion and dermal adsorption of chemicals in onsite surface and subsurface soils by temporary construction workers at the Site;
- inhalation of fugitive dust from soils by temporary construction workers at the Site;
- incidental ingestion and dermal adsorption of chemicals in offsite soils by nearby residents, and;
- ingestion of contaminants in fish and shellfish from the Lauritzen, Santa Fe, and Inner Richmond Harbor Channels by fishermen and their families.

The onsite exposure pathways assume that the Site will continue to be used for commercial or industrial uses in the future. This is in accordance with the Bay Conservation and Development Commission's (BCDC) San Francisco Bay Plan which designates the area for port priority or water-related industry use, and the City of Richmond's M-3 (heavy industry) zoning of the Site and surrounding properties.

The six potential exposure pathways were evaluated according to EPA guidance, which uses conservative estimates of chemical toxicity and exposure, and cumulative risk from the addition of pathways. Chemical concentrations used in the risk assessment included both average and either Reasonable Maximum Estimates (RME) of Site concentrations or maximum measured values. EPA baseline human health risk assessments intentionally present conservative (i.e. health-protective) estimates of Site risks. Actual risks are likely to be lower and may in fact be zero.

The assessments for onsite worker exposure and offsite residential exposure are more conservative than usual because the soils databases in both cases were influenced toward higher values. The onsite soils database was skewed by the high number of samples taken to delineate the hot-spot excavation areas. Offsite soil screening samples were intentionally taken only in the immediate downwind area, which would have had the highest concentration had contamination occurred.

The cumulative risks calculated for the onsite soil exposure scenarios indicate that the removal actions that have occurred to date have reduced upland Site concentrations of chlorinated pesticides to acceptable levels. The highest RME cancer risk calculated for the various onsite upland worker scenarios (ingestion, dermal adsorption and inhalation of fugitive dusts from surface soils by a permanent worker) is $1 \times 10^{-4}$, and the maximum Hazard Index (HI) for noncarcinogenic effects is 1. More probable estimates for the same exposure scenario are $2 \times 10^{-5}$ and $<1$. Risks for other onsite worker scenarios are lower. Since the onsite soils database is skewed to produce conservative results and EPA's acceptable risk range is $10^{-4}$ to $10^{-6}$, onsite risks associated with chlorinated pesticides are acceptable.

Onsite risks for occupational exposure to lead were evaluated using EPA's 500 mg/kg to 1000 mg/kg acceptable range for residential exposure, and the state of California's draft procedure for the assessment of adult exposure to lead in soil. Mean onsite lead levels are below 500 mg/kg, and the RME lead concentration results in a 95th percentile adult blood lead level below the target concentration of 10 micrograms per deciliter ($\mu$g/dL) using the state's draft procedures. Therefore, onsite lead levels are acceptable.

Offsite residential risks for COCs in nearby soils were evaluated using the maximum values obtained in EPA's soil screening survey and conservative exposure assumptions, including childhood exposure. All results were well within the acceptable risk range for carcinogenic effects and below an HI of 1 for noncarcinogenic effects. (i.e., the maximum values measured were below a Hazard Index of 1 for noncarcinogenic effects, and below a lifetime excess cancer risk level of $10^{-4}$ for carcinogenic effects).

Risks to fishermen and their families who consume fish caught in the inner Richmond Harbor were evaluated using information from two sources: fish tissue data generated as part of EPA's ecological assessment of the Site, and community interviews with individuals who fish or are familiar with fishing practices in Richmond Harbor. The community interviews confirmed that fishing occurs regularly in Richmond Harbor, particularly at a Site in the Inner Harbor Channel near the Parr Canal that has unrestricted access. Although it could not be determined from the limited interviews performed whether fishing at subsistence rates occurs in the harbor, it is clear that the fishermen are from poor, minority communities, and that the fish are caught for consumption. Fishing in the Lauritzen Channel is restricted because it is surrounded by fenced industrial facilities, and fishing from boats is discouraged by warning signs in English, Spanish, Vietnamese and Laotian, posted under a 1986 order of the CDHS. Baseline risk assessments, however, assume that institutional controls, such as fences and posting, will be ineffective or not maintained. In fact, a person was photographed fishing from an industrial facility on the Lauritzen Channel during the EPA field sampling for the ecological assessment.

The results of the risk calculations indicate that the risks from long-term consumption of either whole fish or fillets of fish caught in the Lauritzen Channel are unacceptable. Using the exposure scenario which is the basis of EPA's water quality criteria for fish consumption, the lifetime excess cancer risk associated with Site COCs is above $10^{-3}$ for consumption of whole fish, and above $10^{-4}$ for fillets. In the Santa Fe and Richmond Inner Harbor Channels, lifetime excess cancer risks are within the acceptable range using the same exposure scenario. If consumption were to occur at subsistence rates, the associated risks would be approximately 10 fold higher. The proposed remedy is expected to achieve protective levels for contaminants of concern under either exposure scenario.

On April 7, 1994, the California Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor. The State's advisory was based on levels of contaminants found in fish purchased from resident fishermen at the Parr Canal area. These fish were larger than those in EPA's studies and had slightly higher contaminant levels. The primary risk associated with the consumption of fish caught outside the Lauritzen Channel is due to contamination with polychlorinated biphenyls (PCBs), although the State would have issued the advisory based upon DDT and dieldrin contamination alone. The source of PCBs is unknown. PCBs are not related to the United Heckathorn Site, and may be present in fish throughout the bay. PCB levels in Richmond Harbor sediments are not elevated relative to typical levels in the bay.

Ecological Assessment. The Ecological Risk Assessment for the United Heckathorn Site was performed by EPA (EPA, 1994). The operations of United Heckathorn from 1947 to 1966 resulted in the release of DDT and other pesticides to and from the shoreline of the Lauritzen Channel and to San Francisco Bay. Today, in the waters of Richmond Harbor near the former plant, high levels of DDT and dieldrin remain in marine sediments. DDT and dieldrin bioaccumulate in marine organisms to the highest levels found in the state of California.

The goals of EPA's ecological assessment were to assess the threats posed to the environment by the contaminants released from United Heckathorn and to determine cleanup levels

protective of the beneficial uses of San Francisco Bay.

The waters of Richmond Harbor are part of San Francisco Bay, the West Coast's largest estuary. The estuary sustains a complex ecosystem containing thousands of species of fish, invertebrates, birds, mammals, insects, amphibians, plants and other life, as well as nearly half the waterfowl and shorebirds migrating along the Pacific flyway. Fish-eating birds, including cormorants, grebes, loons, kingfishers, and California brown pelicans (an endangered species) feed in the most contaminated channels at the Site.

The initial components of EPA's ecological assessment included a review of previous studies in the area. Highlights of this review included the findings that sediment concentrations of DDT are elevated to acutely toxic levels in the Lauritzen Channel and decline by over four orders of magnitude to near background levels in the vicinity of Point Potrero. DDT and dieldrin concentrations are extremely elevated in transplanted mussels and resident invertebrates in the Lauritzen Channel and decline by two orders of magnitude in the Inner Richmond Harbor Channel. Fish caught in the Lauritzen Channel in 1986 contained extremely high levels of DDT, which were comparable to the levels measured in 1960. Finally, a study of migratory waterfowl in San Francisco Bay found that only those which wintered in Richmond Harbor significantly accumulated metabolites of DDT. Although other chemicals are present in Richmond Harbor, they are not consistently found at levels notably above background or above levels that are likely to cause toxicity, in marked contrast to DDT and dieldrin, which are many orders of magnitude above background and were selected as the COCs for the study.

The next preliminary phase of the study was a review of the available standards, criteria, and scientific literature regarding ecological impacts of the COCs to determine as far as possible the contaminant levels in various media that could adversely impact sensitive organisms. This review indicated the ecological receptors likely to be the most sensitive and helped guide the selection of field and laboratory studies. EPA's ambient water quality criteria for DDT and dieldrin were identified as applicable to the Site. The marine chronic criteria for DDT (1 nanogram per liter, ng/L) is based upon preventing bioaccumulation in fish to levels harmful to sensitive marine birds.

The major phase of the study involved field and laboratory measurements of contaminant concentrations in various media and the performance of standard benthic tests for determining impacts from contaminated sediments. Most of the field samples were taken in October 1991. Additional fish and shellfish samples were taken in April 1992. The studies included bulk sediment toxicity testing, benthic community analyses, bioaccumulation testing, and chemical analyses in sediments, surface waters, and tissues of benthic organisms and fish and shellfish collected in trawls. An additional goal of these studies was the determination of the relationship between sediment contaminant concentrations and the concentrations in other media so that a sediment cleanup concentration could be determined which would result in the attainment of water quality criteria and protective contaminant levels in fish and shellfish tissues.

The results of the studies are summarized below. The total DDT levels measured in surface water from the Lauritzen, Santa Fe and lower Richmond Inner Harbor Channels were 50 ng/L, 9 ng/L, and 1 ng/L, respectively. The dieldrin concentrations were 18 ng/L, 2 ng/L, and nondetectable, respectively. These results indicate that the water quality criteria are violated in the Lauritzen and Santa Fe Channels, but are achieved (within the uncertainly of the analysis) or not detectable in the lower Inner Harbor Channel. Analysis of water-to-sediment ratios indicates that the Lauritzen is a source of contamination to the other channels.

Sediment concentrations of total DDT declined from over 50 mg/kg in the Lauritzen Channel to 12 $\mu$g/kg near Point Potrero. Dieldrin concentrations declined from 570 $\mu$g/kg in the Lauritzen to

nondetectable levels in the Inner Harbor Channel. These results are consistent with those of previous researchers, and with the more extensive RI of marine sediments (White et. al 1994).

In 28-day bioaccumulation tests using *Macoma nasuta,* tissue levels of DDT over 50 mg/kg (dry wt) and 1.5 mg/kg dieldrin were obtained using Lauritzen Channel sediments. Tissue levels declined to 80 µg/kg DDT and undetectable levels of dieldrin using sediments from the vicinity of Point Potrero. These results are consistent with those of previous researchers. Further studies revealed that the tissue concentrations obtained at 28 days were approximately half those obtained after a 90-day exposure. Tissue residues of DDT and dieldrin measured in field-collected benthic infauna were as high as 46 mg/kg and 2.5 mg/kg (dry wt), respectively, in the Lauritzen Channel. Concentrations dropped by about two orders of magnitude in the Inner Harbor Channel.

Tissue residues of DDT and dieldrin measured in mussels *(Mytilus sp.)* were 2.6 mg/kg and 97 µg/kg (wet wt) in the Lauritzen Channel, and declined to 40 µg/kg and 5 µg/kg in the lower Richmond Inner Harbor Channel. These results are consistent with those of the State Mussel Watch program. Tissue levels in the lower Inner Harbor Channel are higher than would be predicted from the underlying sediment concentration, again indicating that there is water-column transport of pesticides from the Lauritzen to less contaminated areas.

Tissue residues of DDT measured in whole fish (shiner perch) were over 10 mg/kg in the Lauritzen Channel, roughly 1 mg/kg in the Santa Fe Channel, and roughly 0.1 mg/kg in the Richmond Inner Harbor Channel. Dieldrin levels were roughly 0.6 mg/kg, 0.04 mg/kg, and 0.002 mg/kg in the respective channels. The contaminant concentrations in fish from the Lauritzen Channel are in the same range as those measured in the 1960s, and exceed the levels that may cause adverse impacts to sensitive predatory birds by orders of magnitude. A sensitive bird, which had no other source of DDT in its diet and which consumed more than 0.5% to 1.5% of its diet from the Lauritzen Channel, could be adversely affected. These concentrations may also cause direct toxic impacts such as reduced fry survival in fish. The results for the Santa Fe Channel are an order of magnitude lower, but still exceed levels that may cause adverse impacts to sensitive fish-eating birds. A sensitive bird that consumed more than 5% to 15% of its diet from the Santa Fe Channel might be adversely affected.

Sediment toxicity tests using the amphipod, *Eohaustorius estuarius,* indicated significant acute toxicity in sediments from the Lauritzen Channel. Sediments from the Santa Fe Channel displayed lower but significant toxicity relative to the amphipod's native Yaquina Bay, Oregon, sediment, but were not significantly different from those in the Inner Harbor Channel or other San Francisco Bay locations. DDT was determined to be the primary cause of toxicity in the Lauritzen Channel.

Additional toxicity tests conducted during the RI using the amphipod *Rhepoxynius abronius* confirmed the acute toxicity of Lauritzen Channel sediments. In four of five Lauritzen Channel compoSite samples, there was no survival of test organisms, an extremely rare occurrence indicating severe toxicity. Amphipod survival in samples beginning at the southern end of the Lauritzen Channel and proceeding out the harbor was not significantly different than survival in the San Francisco Bay fine-grained sediment control, indicating that the toxicity is confined to the Lauritzen.

An analysis of benthic infauna indicated that amphipod abundance (with the exception of the pollutant-tolerant *Grandidierella japonica*) was inversely related to DDT concentration. The minimum benthic ecological effects concentration was determined to be 100 µg DDT/g organic carbon (equivalent to 1.9 mg/kg, dry wt, at 1.9% organic carbon).

Overall, the results indicate that the gross contaminant levels in the Lauritzen Channel threaten a variety of ecological receptors at various trophic levels, including benthic and water-column organisms and fish-eating birds. Effects are likely to be much less severe in the Santa Fe Channel, although the contaminant levels in fish are significantly higher than the levels that may threaten sensitive fish-eating birds. In the Richmond Inner Harbor Channel, the DDT levels in fish (100 µg/kg) are between the level that is the basis of EPA's chronic marine water quality criteria intended to protect marine birds (150 µg/kg), and the National Academy of Sciences (NAS) recommendation (50 µg/kg) for protecting marine birds. It is clear from the results above that the most sensitive ecological receptors to sediment organochlorines in Richmond Harbor are likely to be fish-eating marine birds.

The only contaminated medium for which applicable regulatory criteria were identified is surface water. Nonregulatory or surrogate criteria were also identified for fish and shellfish tissues and sediments. Fortunately, surface water concentrations were found to be quite consistent during different tidal cycles and seasons in each of the three channels sampled. In addition, the concentrations measured in the water column and the concentrations measured in whole fish were found to agree remarkably with the concentrations predicted by the applicable EPA marine chronic water quality criteria. This demonstrates that total DDT present in surface waters is bioavailable, and that it accumulates as predicted by the applicable marine chronic criteria.

The analysis of surface water pesticide concentrations in the three channels indicates that the concentrations in the Santa Fe and Richmond Inner Harbor Channels are likely elevated by approximately one order of magnitude over the concentrations that would result from the respective local sediment concentrations, due to the flux of contaminated water from the Lauritzen Channel. This indicates that remediation of the Lauritzen would have beneficial effects throughout the Inner Harbor.

Site Remediation Goals. The final goal of the ecological assessment was to provide sufficient information to develop Site remediation goals for contaminated marine sediments containing the COCs, DDT and dieldrin, which would be protective of the environment and human health. The DDT and dieldrin water quality criteria are near or below the levels which can be quantified by the best laboratories. Protective levels in sediments are much more readily measureable, particularly for DDT. Although DDT and dieldrin co-occur, the DDT concentration is generally 10 to 100 times higher, and DDT was detected in sediment samples over a wider area. Sediment remediation goals, which are expected to attain protective levels for both contaminants, have therefore been established based on DDT concentration.

As indicated above, it was determined that the minimum ecological effects concentration for benthic organisms was 100 µg DDT/g of organic carbon, which is equivalent to 1,900 µg/kg (dry wt) at 1.9% organic carbon. Sediment concentrations exceeding this value might cause local chronic adverse impacts to benthic organisms. EPA has reviewed data for other DDT-contaminated Sites, and found a similar threshold for benthic effects. Sediments in the Lauritzen Channel and Parr Canal exceed this level. The maximum concentrations outside these channels are below this level.

The EPA marine chronic water quality criteria of 1 ng/L DDT is likely to be achieved if the average channel sediment concentration is below 1,000 µg/kg DDT (dry wt); and the human health criteria of 0.6 ng/L is likely to be achieved if the average sediment concentration is below 590 µg/kg DDT.

TABLE 4. Remediation Levels

| Final Remediation Levels | | | | Cancer Risk Level |
|---|---|---|---|---|
| Medium | Chemical | Level | Basis | |
| Surface Water | DDT<br>Dieldrin | 0.59 ng/l<br>0.14 ng/l | EPA AWQC | $1 \times 10^{-6}$<br>$1 \times 10^{-6}$ |
| Sediment | DDT | Avg: 590 µg/kg | Ecological Assessment | $1 \times 10^{-6}$ |

The average sediment concentrations in the Lauritzen Channel and Parr Canal exceed the 590 µg/kg DDT level, while the average concentrations in the Santa Fe and Inner Harbor Channels are below the level. Therefore the remediation of sediments will be limited to the Lauritzen Channel and Parr Canal. Although the concentrations of pesticides in upland soils are acceptable for human exposure, they exceed the protective levels for sediments in the adjacent channels, indicating that erosion of upland soils and stormwater runoff to the marine environment should be prevented.

The NAS action level for the concentration of DDT in fish to protect fish-eating birds is not an ARAR but was identified as a TBC to assist in determining the protectiveness of remediation. The NAS action level is likely to be achieved if the average channel DDT sediment concentration is below 420 µg/kg. Since the average concentrations of DDT in the Santa Fe and Inner Harbor Channels are below this level, cleanup of sediments in the Lauritzen Channel and Parr Canal is expected to result in achievement of the NAS action level.

8. Description of Alternatives.

The environmental media requiring remediation are soft marine sediments (young bay muds) in the Lauritzen Channel and Parr Canal. Contamination is confined to softer younger bay mud, and has not migrated into the underlying older bay mud. The volume of contaminated sediment in the Lauritzen Channel and Parr Canal is approximately 65,000 $yd^3$. Remediation of this sediment is expected to result in achievement of the remedial action goals. In addition, erosion of upland soils containing DDT at concentrations exceeding the final remediation level for sediments must be prevented. No action will be taken in other areas in Richmond Harbor, such as the Santa Fe Channel and Inner Harbor Channel, because sediment levels are below the remediation levels established above.

The action alternatives presented below all include dredging of contaminated sediments and paving of upland soils on the northern half of the Levin Richmond Terminal. The principal difference among these alternatives is in the location chosen for disposal of dredged sediments. In addition, the "no action" alternative has been retained as a baseline for comparison with the other alternatives, as required by the National Contingency Plan, 40 C.F.R. § 300.430(e)(6). The four alternatives are summarized below:

Alternative 1: no action

Alternative 2: confined disposal of marine sediment in the Port of Richmond's Point Potrero graving docks, and capping of upland areas

Alternative 3: confined disposal of marine sediment in the Lauritzen Channel, and capping of upland areas

Alternative 4: offsite disposal of marine sediment by rail, and capping of upland areas.

With the exception of "no action," all of the alternatives have been developed to meet the remedial action goals. In addition to the components listed above, each action alternative includes environmental monitoring to evaluate the effectiveness of the remedy, and institutional measures to limit future Site uses to those considered in the human health risk assessment.

Common Elements

Elements which are common to two or more alternatives, including dredging, monitoring, paving of upland areas, and institutional controls, are discussed below.

Dredging. Alternatives 2 through 4 would involve dredging of the younger bay mud from the Lauritzen Channel and Parr Canal. The total volume of these sediments is estimated to be 65,000 $yd^3$, although if Alternative 2 were selected, some of the most contaminated sediments would remain in place in the Lauritzen Channel within a Confined Disposal Facility (CDF). In areas to be dredged, all soft sediments down to the hard older bay mud contact would be removed.

Silt curtains would be erected across the mouths of the channels prior to dredging to prevent transport of sediment disturbed by the dredging process out of the excavation area. In addition, control measures would be implemented to prevent or minimize the runoff or return of sediment back to the excavation areas. The surface water ARARs for the concentrations of COCs are not currently achieved, and would not be expected to be achieved in the Lauritzen Channel and Parr Canal during the dredging phase of remediation at the Site. The surface water ARARs are remedial action goals which are expected to be achieved after the dredging is completed.

Two sunken barges, one small tank, and other debris (see Figure 3) would have to be removed from the Lauritzen Channel prior to dredging under Alternatives 2 through 4. In one of the configurations of Alternative 3, a CDF would be constructed in the northern end of the channel, allowing one barge and the small tank to remain in place. Samples of sediment taken by EPA divers from inside the barge and tank indicated that they are not sources of contamination.

Monitoring. In order to determine the effectiveness of the remedial action, a post-remedial monitoring program would be required. Monitoring would be expected to occur annually for at least five years or until it was demonstrated that the remediation goals had been achieved, and could continue at longer intervals (e.g., once every five years) for an additional period of time. The monitoring program would also be implemented as part of the "no action" alternative.

The post-remedial monitoring program would include surface water and biological monitoring components. Periodic collection and analysis of surface water samples would determine compliance with EPA ambient water quality criteria, which are ARARs. Bioaccumulation could be monitored through the periodic deployment and subsequent collection and analysis of mussels, as is done in the State Mussel Watch program. Mussels provide the most consistent, readily obtainable biological data. These data can be compared to the historic State Mussel Watch bioaccumulation

database for Richmond Harbor to confirm reductions in tissue residues. Sampling locations to confirm the effectiveness of the remedy would be in the Lauritzen, Santa Fe and Richmond Inner Harbor Channels. Additional sampling might be required based on the remedy selected. For example, if confined disposal at the Port of Richmond's graving docks were selected, an additional monitoring station would be established outside the facility.

Capping of Upland Area. The results of the human health risk assessment indicate that the removal actions performed at the Site between 1990 and 1993 reduced contaminant concentrations in upland soils to levels that are acceptable for current and expected future commercial or industrial uses. Nevertheless, roughly 95,000 tons of soils over a large area of the Site exceed the much lower remedial action goal for marine sediments. Therefore, a remediation goal of erosion prevention was established for upland soils. The northern half of the Levin Richmond Terminal, which is where the United Heckathorn facility was located and where concentrations exceed 1 mg/kg DDT, is currently unpaved. Each of the action alternatives includes paving this area with asphalt. The area of the upland asphalt cap is shown in Figure 6. The cost of capping this area was estimated in the FS performed by Levine-Fricke (1991). The estimate of $400,000 includes a 20% contingency. This cost is included in the estimates generated for each remedial alternative except "no action."

Institutional Controls. The human health risk assessment concluded that the concentrations of COCs in upland soils at the Levin Richmond Terminal had been reduced to acceptable levels for current and expected future industrial uses. This is consistent with the San Francisco Bay Plan under which the area is zoned for port priority or water-related industrial use. In order to provide an additional measure of assurance that the Site could not be converted to other use, such as residential, without further study and possibly further remediation, a deed restriction on the property will be included as part of Alternatives 2 through 4.

The Lauritzen Channel is currently posted with signs warning fishermen that fish and shellfish may be contaminated with DDT and other pesticides. These signs will remain in place until post-remedial monitoring confirms that concentrations of the COCs have been reduced to acceptable levels.

Alternative 1: No Action with Monitoring. The NCP requires the analysis of no action as an alternative (40 CFR 300.430(e)(6)). Under no action, no further remediation would be conducted at the Site, although the monitoring program would still be performed to evaluate the effects of the remaining contamination. The existing institutional controls would remain in place.

The no action alternative does not meet either of the two threshold criteria described below (overall protection of human health and the environment, and compliance with ARARs). Because the threshold criteria are not met, this alternative is not eligible for selection.

Alternative 2: Dredging with Containment at the Point Potrero Graving Docks. The major components of this alternative are dredging approximately 65,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and disposing of the sediment in a CDF constructed at the Port of Richmond's graving docks.

The graving docks are located at Point Potrero, at the southern end of the Richmond Inner Harbor Channel, approximately one mile from the location of the former United Heckathorn facility (see Figure 2). A sediment containment facility constructed at the graving docks could be determined to be "onsite" under the definition of the NCP, which includes all locations within the areal extent of contamination and all suitable areas in very close proximity necessary for implementation of the response action (40 CFR 300.5).

Graving docks are concrete box structures used to drydock ships. The Point Potrero graving docks were built during World War II and, due to their relatively small size, are obsolete for modern vessels. The Port of Richmond suggested that the graving docks be analyzed as a potential disposal Site for contaminated sediments because they have the capacity to effectively contain very large volumes. Depending on the configuration and number of basins used, the facility could contain between 89,000 $yd^3$ and 500,000 $yd^3$ of sediment. The facility would not be simply a disposal Site, but would be constructed so that it would be suitable for use as a marine shipping terminal. Use of the graving docks would not be offered by the Port of Richmond for disposal alone. The Port has analyzed a number of alternative configurations which would accommodate varying volumes of dredged material and provide the Port an additional berth or pier of at least 600 ft. The Port's cost estimates for each of the various configurations include the costs of preparing the basins to receive dredged material, and the costs of enhancing the facility for Port use.

The configuration chosen for analysis would entail filling Basin 1 with approximately 65,000 $yd^3$ of sediment dredged from the Lauritzen Channel and Parr Canal, and 24,000 $yd^3$ of additional material to produce a total of 89,000 $yd^3$. This is the lowest cost configuration which would provide sufficient volume to contain sediments dredged from the Lauritzen Channel and Parr Canal. Prior to receiving sediment, Basin 1 would be inspected and repaired if necessary, and then sealed with a concrete bulkhead. Wick drains would be installed for dewatering. The pier between Basins 2 and 3 would be removed, and Basin 3 would be lengthened from 500 ft to 750 ft, creating a new berth for large ships.

Dredged sediment would be barged to the drydock and depoSited by mechanical means in order to minimize entrainment of water. It is estimated that consolidation of the sediment within the basin would take a minimum of four years. If hydraulic dredging were used, consolidation would probably take longer. The average concentration of DDT in the sediment would be 30 mg/kg wet wt. Based on the results of the treatability testing performed during the marine RI, it is expected that treatment by filtration and carbon adsorption would be required before effluent produced by dewatering could be discharged from the basin to the bay. Although a Waste Discharge Permit would not be required under CERCLA, substantive requirements would have to be achieved, including toxicity limits and compliance with numeric water quality criteria. A possible alternative would be to discharge effluent to a sanitary sewer under permit from the local agency. Discharges to the sewer system would be "offsite" and require permitting.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, removal of the sunken barges and other debris from the Lauritzen Channel, asphalt paving of the northern half of the Levin Richmond Terminal, and institutional controls. The estimated cost of this alternative included roughly $700,000 to prepare Basin 1 and close it after filling, and roughly $1.8 million to remove the pier between Basins 2 and 3, and lengthen Basin 3 to produce a 750-ft berth. Annual overhead and maintenance costs include evaluation and repair of the graving docks, operation and maintenance of an effluent treatment system for dewatering sediment, and post-remediation monitoring. The total estimated cost for this alternative is $5.6 million. This estimate does not include the costs, which could be substantial, of obtaining an agreement among various parties regarding the use of the facility and future liability. In addition, state and federal agencies have indicated that they might seek mitigation to compensate for the fill associated with this alternative. The costs of mitigation would also significantly increase the total cost of this alternative.

This alternative would be expected to meet the remedial action goals defined in Table 4 and provide effective long-term protection of human health and the environment. It is unclear, however, whether it would comply with ARARs related to bay fill unless an upland alternative were unavailable. Dredging would cause short-term impacts within the excavation areas. Because the

dredged sediment would be classified as hazardous waste pursuant to State of California regulations, this alternative would require agreements between a number of government and private parties regarding long-term liability and operations and maintenance, limiting its implementability.

Alternative 3: Dredging with Containment at Lauritzen Canal. The major components of this alternative would be dredging between 44,000 $yd^3$ and 52,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and depositing it in a CDF constructed within the Lauritzen Channel. Two variations of CDFs were analyzed for this alternative based on alternatives developed by Levine-Fricke (1991). The first consists of a steel sheetpile wall approximately 1300 ft long constructed along the eastern shoreline of the channel. The sheetpile wall would be tied to anchors placed in the soil at the Levin Richmond Terminal. This configuration does not interfere with either the storm drain at the northern end of the channel, or with properties across the channel from Levin.

The second variation of a CDF in the Lauritzen would consist of a rock dam across the northern end of the Lauritzen Channel. Advantages of this configuration are that it would minimize the dredging of the most contaminated sediments in the channel; the barge, tank, and debris in the northern end of the channel could remain in place; it would require less maintenance than a steel sheetpile wall; and it would be less costly to construct.

Dredged sediment could be depoSited in the CDF by mechanical means, or by hydraulic dredging. Consolidation of the sediment within the basin would take several years. The average concentration of DDT in the sediment would be 30 mg/kg wet wt. Based on the results of the treatability testing performed during the marine RI, it is expected that treatment by filtration and carbon adsorption would be required before effluent produced by dewatering could be discharged from the basin to the bay. Although under CERCLA a Waste Discharge Permit need not be obtained, substantive requirements would have to be achieved, including toxicity limits and compliance with numeric water quality criteria. A possible alternative would be to discharge effluent to a sanitary sewer under permit from the local agency. Discharges to the sewer system in this case would be "offsite" and require permitting.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, asphalt paving of the northern half of the Levin Richmond Terminal, removal of at least one sunken barge from the Lauritzen Channel, and institutional controls. Annual overhead and maintenance costs include evaluation and repair of the CDF, operation and maintenance of an effluent treatment system for dewatering sediment; and post-remediation monitoring. The cost of dredging the sediment for this alternative would be slightly lower than the costs described for the previous alternative since some of the sediment would remain in place and transportation would not be required. The estimated cost range is $13 million for the sheet-pile wall variation and $4.3 million for the rock dam. In addition, state and federal agencies and the Port of Richmond have indicated that they might seek mitigation to compensate for the fill associated with this alternative. The cost of mitigation would also significantly increase the total cost of this alternative.

This alternative would be expected to meet the remedial action goals defined in Table 4 and provide effective long-term protection of human health and the environment. It is unclear, however, whether it would comply with ARARs related to bay fill unless an upland alternative were unavailable. This alternative would require the least amount of dredging, which would minimize short-term impacts within the excavation areas. The rock dam variation of this alternative would have an impact on adjacent property owners, which could hinder implementability. In addition, because the dredged sediment would be classified as hazardous waste pursuant to State of California regulations, this alternative would require agreements between a number of government and private parties regarding long term liability and operations and maintenance, limiting the

implementability of this alternative.

Alternative 4: Dredging with Offsite Disposal. The major components of this alternative are dredging approximately 65,000 $yd^3$ of contaminated sediment from the Lauritzen Channel and Parr Canal, and transportation of the sediment by rail to a permitted offsite disposal facility. Transport by rail offers several significant advantages. The Levin Richmond Terminal is a rail facility with lines running the length of the shoreline of the Lauritzen Channel. Since dredging can produce very large volumes of sediment very quickly, the limiting factor in removing sediment from the Site would be the time required to load it for transport. Watertight rail cars would be used to prevent releases during transportation. A rail car can carry 100 tons, and a single train can transport approximately 8000 tons. It is estimated that the entire project could be accomplished in about two months.

In addition to the actions described above, this alternative would include the post-remedial monitoring program, asphalt paving of the northern half of the Levin Richmond Terminal, removal of barges and debris from the Lauritzen Channel, and institutional controls. The estimated cost for this alternative is $7.3 million. Since the sediments would be transported offsite to a permitted disposal facility, long-term operations and maintenance costs are only those associated with the monitoring program and maintenance of the asphalt paving at the Site. The estimated disposal cost for this alternative includes transportation by rail and was provided by the East Carbon Development Corporation, a facility in eastern Utah which is permitted to receive non-RCRA wastes.

This alternative would be expected to meet the remedial action goals defined in Table 4, provide effective long-term protection of human health and the environment, and comply with all ARARs. Dredging would cause short-term impacts within the excavation areas. Disposal of sediments at an offsite facility would require no bay fill, and would minimize long-term maintenance costs and liabilities. Offsite disposal by rail appears to be implementable at a reasonable cost.

9. Summary of Comparative Analysis of Alternatives.

The alternatives were analyzed using the nine criteria of the NCP (see 40 CFR 300.430(f)(5)(i)). The comparative analysis with respect to each criteria is summarized below. Overall, it was determined that Alternative 4, Dredging with Off-Site Disposal provides the best balance among the alternatives with respect to the evaluation criteria.

Overall Protection of Human Health and the Environment: All of the alternatives except "no action" are expected to provide adequate protection of human health and the environment. The risks associated with the COCs are due to their current location in or near the aquatic environment. Alternatives 2 and 3 would achieve protection by isolating the contaminants from the aquatic environment in onsite confined disposal facilities which would require perpetual maintenance to ensure that contaminants were not re-released to the marine environment. Alternative 4 would achieve protection by transporting contaminants offsite.

Compliance with ARARs: The "no action" alternative would not result in compliance with ARARs. Alternative 2, confinement in the Port of Richmond's graving docks, relies on the dual purpose of the remedy to create a port facility in order to achieve consistency with the CZMA and compliance with the Clean Water Act. Alternative 3, confinement in the Lauritzen Channel, would probably not be consistent with the CZMA or the Clean Water Act unless it was determined that there was no practicable alternative. Alternative 4, offsite disposal, complies with all ARARs, and appears to be practicable.

Long-term Effectiveness and Permanence: Alternatives 2 through 4 are all expected to provide adequate long-term effectiveness and permanence. Concrete vaults and shoreline CDFs have been

used successfully at other Sites to contain contaminated sediments, although they require perpetual maintenance. Alternative 4, offsite disposal, provides the highest degree of permanence because the contaminated sediments would be stored far from the aquatic environment. Although the contaminated sediment presents an unacceptable threat to human health and the environment because of its current location which allows exposure to marine organisms and biomagnification in the food chain, the expected average concentration after dredging of approximately 30 mg/kg is well within the acceptable range for direct human exposure, and would not present a direct threat when contained in a disposal facility.

Reduction of Toxicity, Mobility, or Volume through Treatment: None of the alternatives employs treatment. Alternatives 2 through 4 meet the expectation of the NCP for containment of high volumes of waste which have relatively low contaminant concentrations. Based on the process screening conducted in the FS, treatment of the COCs in Site sediments would not be practicable. Site upland soils which contained extremely high levels of contaminants were addressed in previous removal actions.

Short-term Effectiveness: None of the alternatives would be expected to cause short-term risks to the community. The risks to workers are expected to be primarily those associated with construction, transportation, dredging, and solids handling. All of the dredging alternatives would cause short-term impacts within the excavation areas, and would remove the existing benthic communities from the bottoms of the Lauritzen Channel and Parr Canal. However, it is expected that the channel bottoms would be recolonized by more diverse populations. Alternative 4, offsite disposal, would achieve protection in the shortest amount of time.

Implementability: Alternative 4 is the most readily implementable. It would require the least amount of onsite construction and preparation, and should have no administrative impediments. Alternative 2, consolidation at the Port of Richmond's graving docks, would require a complex agreement between the City of Richmond and other parties regarding ownership, operations, and liability. Alternative 3, consolidation in a CDF in the Lauritzen Channel, would likely encounter state opposition, and could require agreements among adjacent property owners regarding loss of shoreline and access, as well as agreements with PRPs and several government agencies, including the City of Richmond, DTSC and EPA.

Cost: The estimated costs for all of the alternatives are comparable. The cost for Alternative 4, offsite disposal, while not the lowest, is the most certain. The estimated costs for Alternative 2, confinement at the Port of Richmond's graving docks, and Alternative 3, confinement at the Lauritzen Channel, would be more likely to change given the need for agreements among parties regarding ownership, maintenance and liability for facilities containing wastes exceeding state hazardous levels. The costs for construction, dewatering, effluent disposal, and hazardous waste storage are also less certain than the offsite transportation and disposal costs. In addition, the cost estimates for alternatives 2 and 3 did not include possibly significant costs for mitigation of bay fill, which had been proposed by state and local agencies.

State Acceptance: The Department of Toxic Substances Control of Cal-EPA, which is the lead state agency for oversight at this Superfund Site, agrees with the selected remedy. In addition, the San Francisco Bay Regional Water Quality Control Board and the San Francisco Bay Conservation and Development Commission also agree with the selected remedy.

Community Acceptance: Based on the comments received during the Proposed Plan comment period, it is evident that the selected remedy is acceptable to the community. No comments were received from the community opposing the selected remedy or supporting other alternatives.

10. Selected Remedy.

The selected alternative is dredging with off-site disposal. Components of the selected remedy include:

- Dredging of all soft bay mud from the Lauritzen Channel and Parr Canal, with off-site disposal by rail of dredged material.
- Placement of clean sediment after dredging.
- Capping of areas around the former Heckathorn facility, shown in Figure 6.
- A deed restriction or notice limiting use of the Levin-Richmond terminal to the current industrial classification.
- Marine monitoring to determine the effectiveness of the remedy.

The remedy will involve dredging of the younger bay mud from the Lauritzen Channel and Parr Canal. The total volume of these sediments is estimated to be 65,000 $yd^3$. In areas to be dredged, all soft sediments down to the hard older bay mud contact would be removed. Two sunken barges, one small tank, and other debris (see Figure 3) would be removed from the Lauritzen Channel prior to dredging. In limited areas dredging may be impractical or of limited effectiveness in removing all contaminated sediments because of obstructions such as rip-rap and capping may be required.

Silt curtains will be erected across the mouths of the channels prior to dredging to prevent transport of sediment disturbed by the dredging process out of the excavation area. Dredged material will either be loaded directly onto rail cars or stockpiled on a barge or on land to facilitate loading. Excess water, if any, produced during dredging and initial handling will be returned to the dredging area inside the silt curtains. However, control measures, such as physical separation or filtration, will be implemented to prevent or minimize the runoff or return of sediment back to the excavation areas. The surface water ARARs for the concentrations of COCs are not currently achieved, and would not be expected to be achieved in the Lauritzen Channel and Parr Canal during the remediation. The surface water ARARs are remedial action goals which are expected to be achieved after the remediation is complete.

The dredged material will be transported by rail to a permitted land disposal facility which meets the requirements of the CERCLA offsite policy. The expected average concentration of approximately 30 mg/kg, is well within the acceptable range for direct human exposure, and will not present a long-term threat at a disposal facility. Monitoring of surface water and biota will occur for at least five years or until it is demonstrated that the remediation goals have been achieved, and could continue for a longer period of time. To promote the return of flora and fauna to the dredged areas, a 1/2 foot layer of clean material will be placed after dredging. The material will not significantly alter the existing bathymetry or impede navigation. The estimated cost for the selected remedy is $7 million.

The selected remedy provides overall protection of human health and the environment, complies with ARARs, and provides the best overall balance of alternatives under the nine selection criteria of the NCP.

11. Statutory Determinations

The selected remedy is protective of human health and the environment, complies with ARARs, and is cost effective. The principal threats at the Site were addressed by removal actions. Because this remedy will result in hazardous materials remaining onsite, a review will be conducted five years after the commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

12. Documentation of Significant Changes.

The proposed plan for the Site was released for public comment in July, 1994. The proposed plan identified alternative 4, dredging with offsite disposal as the preferred alternative. EPA reviewed all written and oral comments submitted during the comment period. Upon review of these comments, EPA determined that no significant changes to the remedy, as it was originally identified in the proposed plan, were necessary.

During the proposed plan comment period, the National Oceanic and Atmospheric Administration and the U.S. Fish and Wildlife Service recommended that a layer of clean material be placed in the channels after dredging for restoration. The material would promote the return of habitat and fauna to the dredged areas. The proposed plan included the placement of clean fill in limited areas. The final remedy includes placement of a 1/2 foot layer of clean material after dredging in the Lauritzen Channel and Parr Canal. The cost of placing clean material, which would apply to all alternatives except "no action," was not included in the estimates contained in the FS or proposed plan. The estimated cost is $200,000, which increases the total estimated cost from $6.8 million in the proposed plan to $7 million for the final remedy.

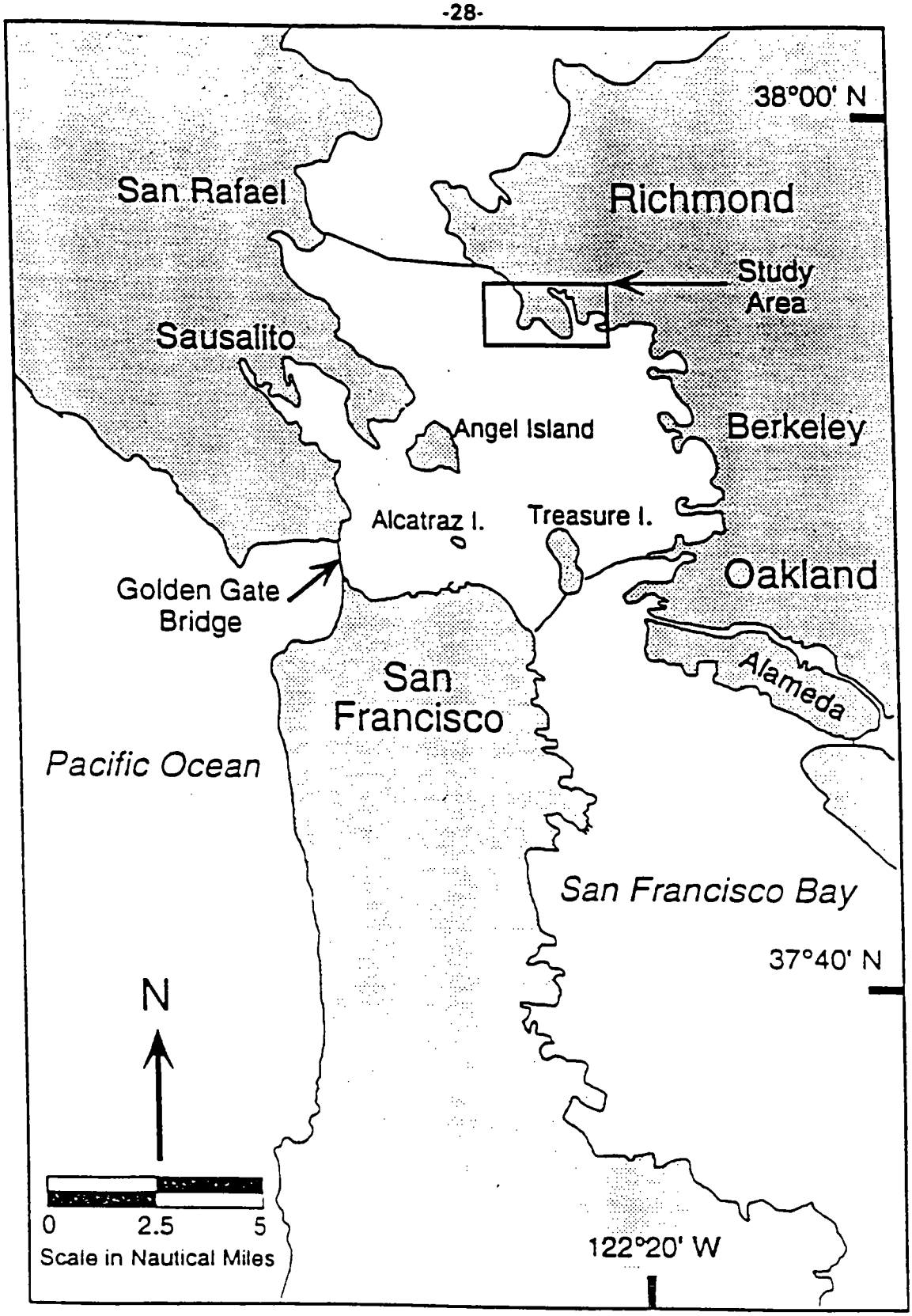



Figure 1. Site location map.

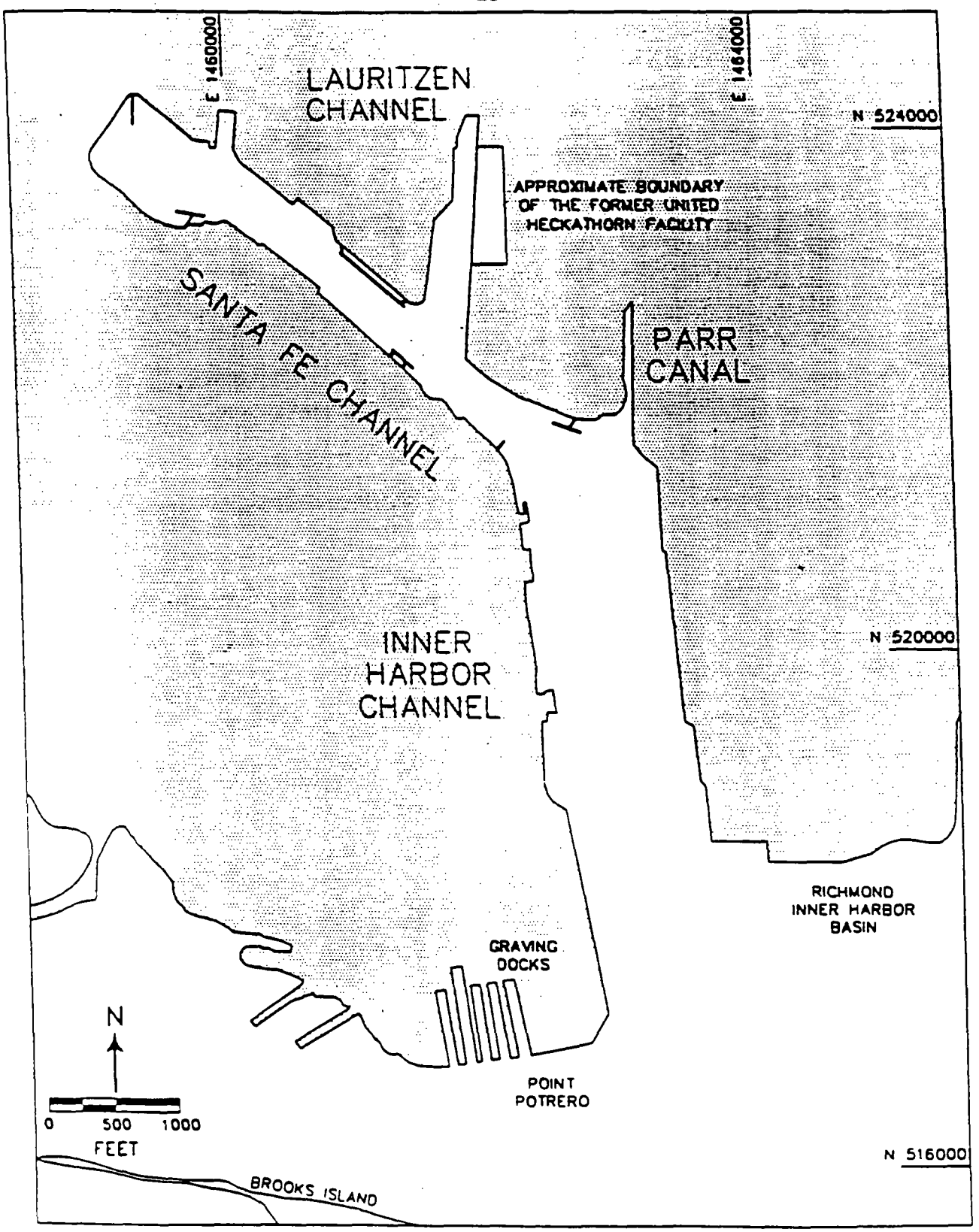



Figure 2. Map of Richmond Harbor.

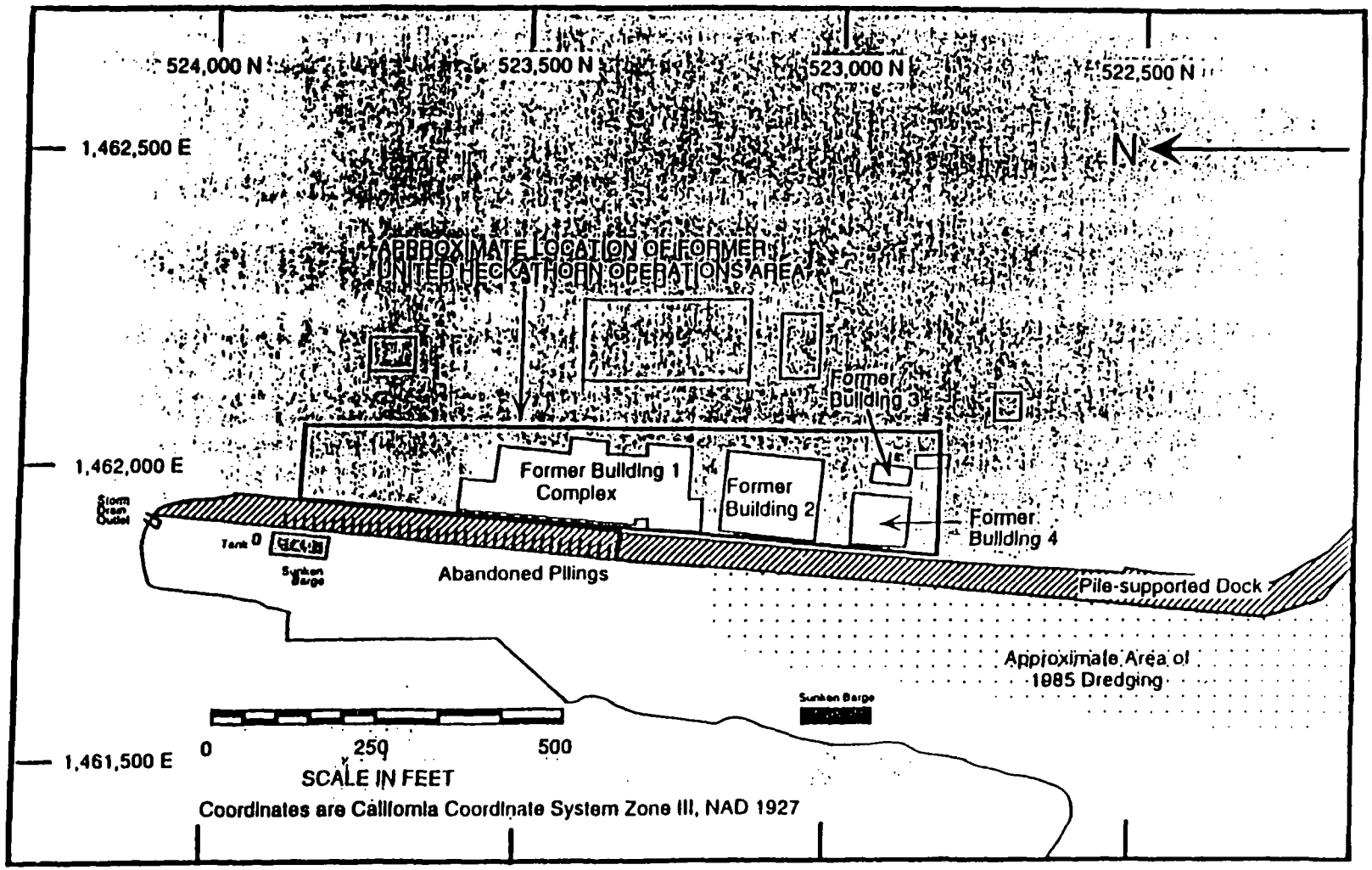
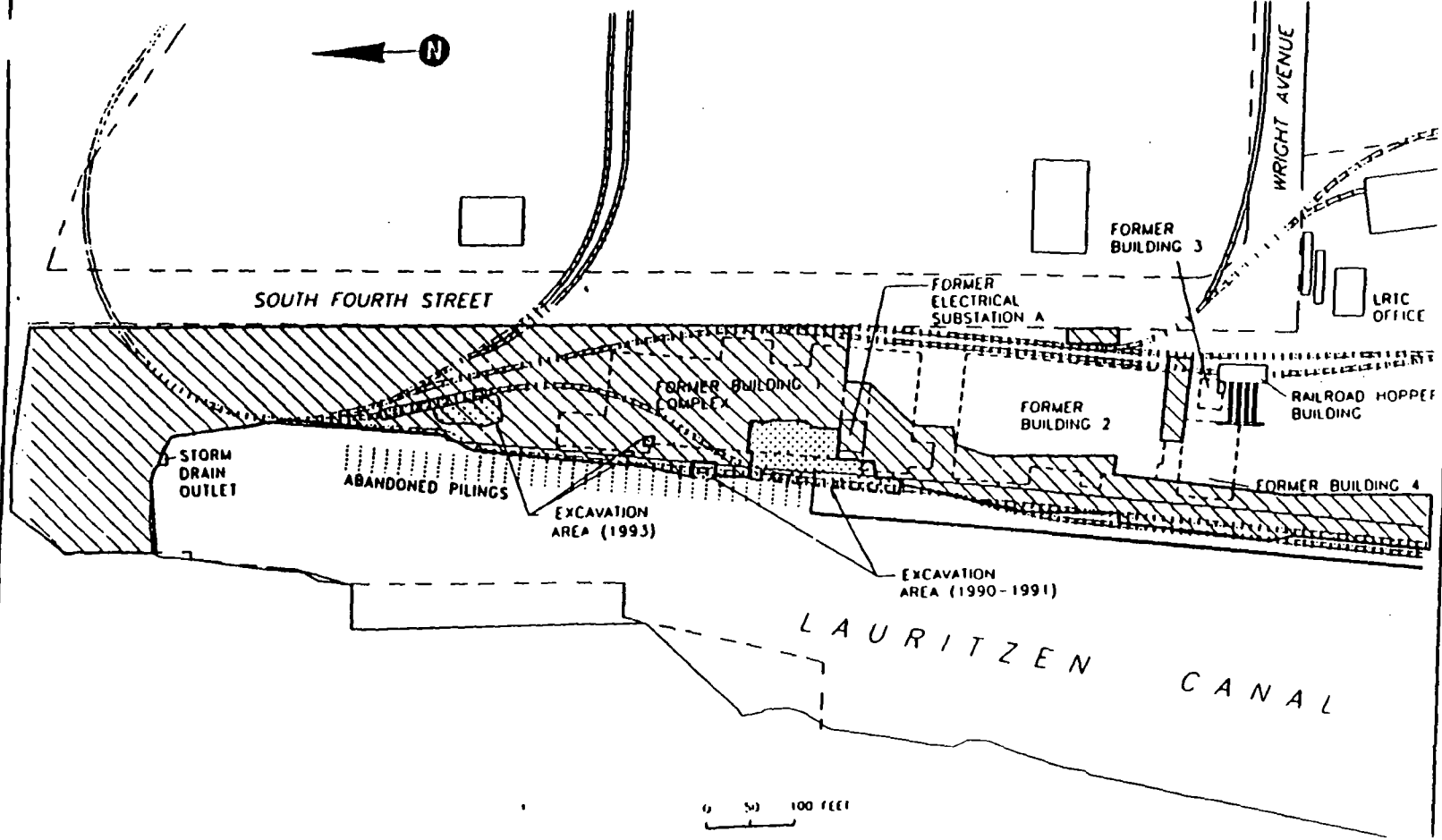



Figure 3. Map of the Lauritzen Channel.




From 12/22/93 letter from Levine-Fricke to EPA.

Figure 4. Upland soils with pesticide concentrations exceeding 1 ppm.

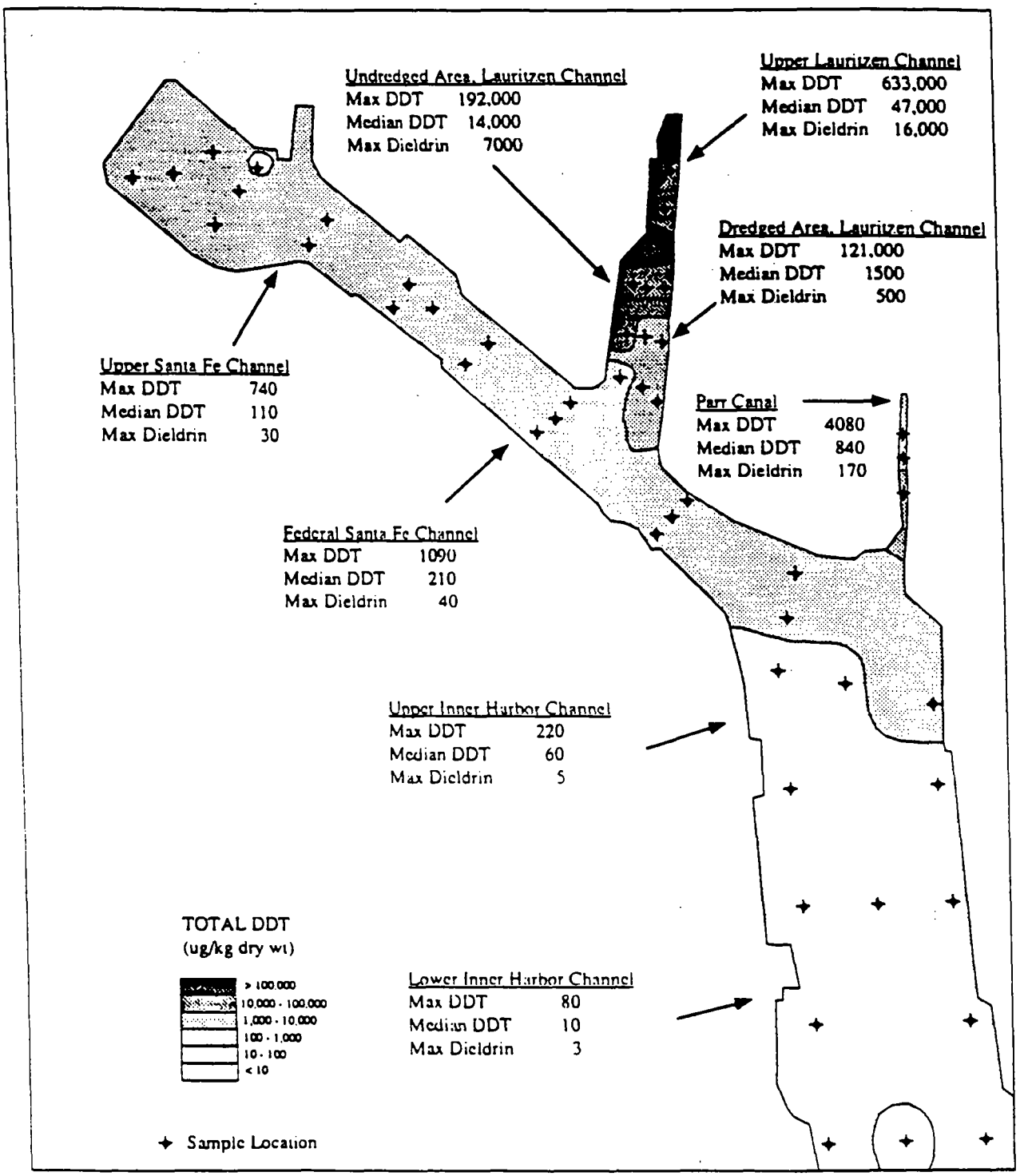
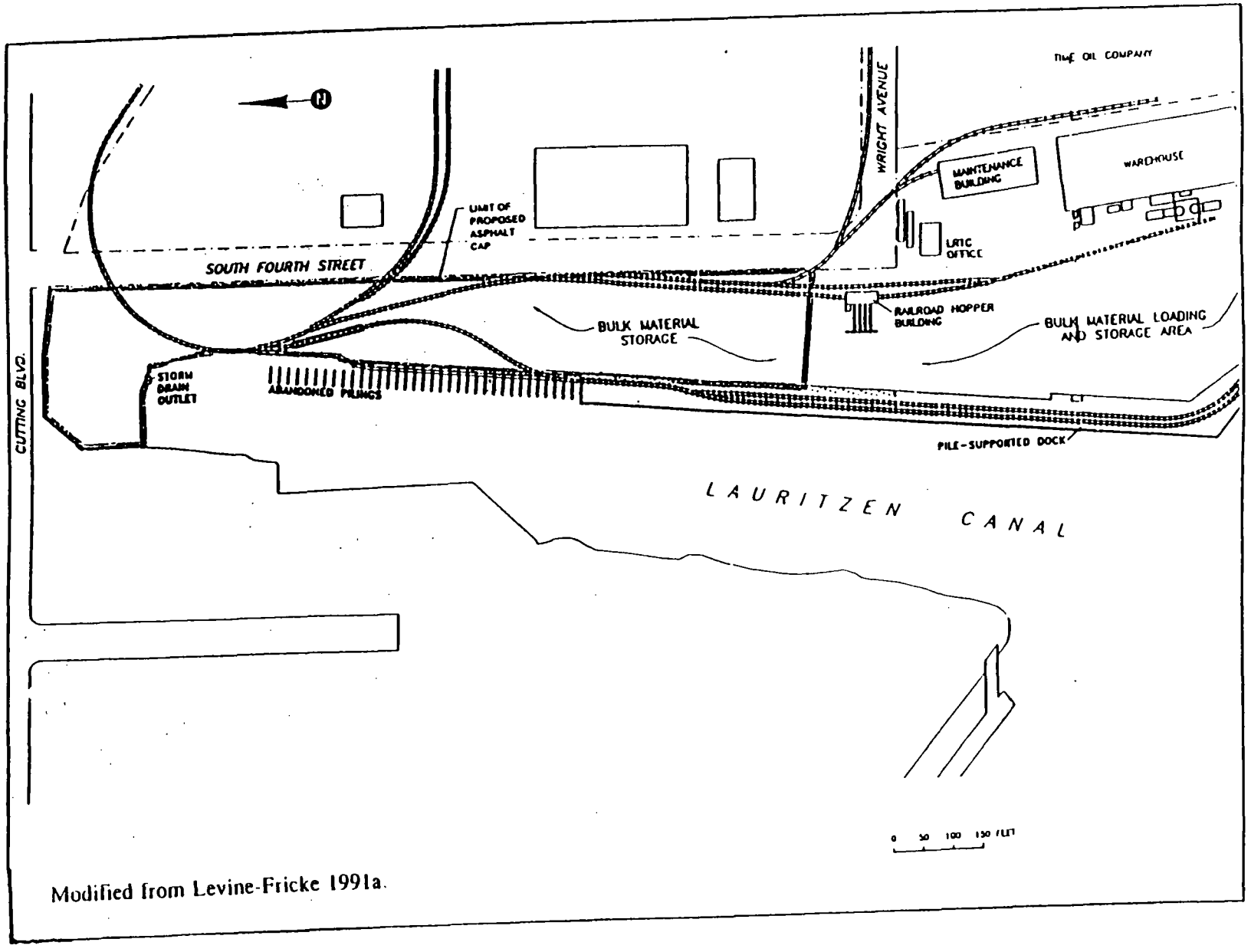



Figure 5. Average total DDT in younger bay mud, Richmond Harbor.




Modified from Levine-Fricke 1991a.

Figure 6. Limit of asphalt cap for upland soils.

**RESPONSE TO COMMENTS**

**United Heckathorn Superfund Site**
**Richmond, California**

**October 14, 1994**

EPA released the Proposed Plan for the United Heckathorn Superfund Site for public comment on July 15, 1994. The comment period included a 30-day extension which was requested by Potentially Responsible Parties (PRPs). Consequently, the public comment period closed on September 14, 1994.

Three persons made comments at the Public Hearing on August 2, 1994, one of which was also submitted in writing. Six additional written comments on the Proposed Plan were submitted during the comment period. The oral and written comments are addressed below in the order in which they were made. Two additional comments, one on the final human health risk assessment and one on the Feasibility Study, were also received during the comment period. These are discussed after the comments on the Proposed Plan.

EPA reviewed all written comments submitted during the public comment period and all oral comments made at the Public Hearing. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary. However, a minor change has been made in response to comments from the United States Fish and Wildlife Service and the National Oceanic and Atmospheric Administration. The Proposed Plan included a provision for minor amounts of clean material to be placed in limited areas after dredging. The comments specified that six inches of clean material be placed in dredged areas to promote restoration. The ROD specifies the six-inch layer, and includes a total estimated cost for placement of $200,000, raising the final remedy cost from the proposed $6.8 million to $7 million.

*1. The Bay Conservation and Development Commission stated that EPA's preferred alternative for remediation "appears to be the most consistent with the Commission's laws and policies [and] best achieves compliance with federal and state environmental laws while ensuring the protection of San Francisco Bay's diverse natural resources, and the health and safety of the surrounding human community." (letter, 7/21/94)*

*2. The Save San Francisco Bay Association expressed its support for EPA's Proposed Plan, stating that it "is the best way to deal with United Heckathorn's legacy of chemical contamination in the Richmond Harbor. Other proposed alternatives are unacceptable because of the need for bay fill and maintenance." (letter, 7/29/94)*

*3. The Director of the Port of Richmond spoke at the public hearing and also submitted his comments in writing (8/2/94). Although the Port supports the selected remedy, it is concerned that lower levels of contaminants elsewhere in the harbor may impact disposal options for material dredged for navigation purposes. The Port stated that it would hold EPA responsible for the costs of disposal of any sediments not addressed by the remedy.*

Response: EPA appreciates the Port and the City of Richmond's constructive participation throughout the remedy selection process. Based on the results of the Remedial Investigation and Human Health and Ecological Risk Assessments, EPA concluded that cleanup of those channels

with mean sediment DDT concentrations above 590 ppb is necessary to protect human health and the environment. Channels and private berths outside the cleanup area may still contain sediments with DDT levels below a mean of 590 ppb or with measurable levels of other site-related and/or non site-related contaminants which might affect dredge spoils disposal options. However, based on the results of EPA's RI, HHRA and ERA, contaminant levels in sediment in the Santa Fe Channel and the Inner Richmond Harbor Channel do not pose a significant risk to human health and the environment that would trigger remediation under Superfund. Consequently, EPA in the Record of Decision for the Site has determined that no remedial action is necessary with regard to sediments in the Santa Fe Channel and Inner Richmond Harbor Channel. Under the authority established in CERCLA, particularly in Section 104(a) and Section 121, 42 U.S.C. § 9604(a) and § 9621, EPA is authorized to select remedial actions to protect human health and the environment. EPA is not authorized under CERCLA to make remedial decisions solely to redress economic or property damage that may result or may have resulted from the presence of low levels of hazardous substances or other contaminants. Should the Port incur additional dredge spoil disposal costs because of low level contamination present in the dredged sediment, the City is free to pursue any available legal remedies against parties responsible for the contamination.

*4. Mr. Richard Oba, vice president of United Anglers of California spoke at the public meeting and expressed support for EPA's proposed alternative, stating, "we would like to see the job finished."*

*5. Ms. V. Peters spoke at the public meeting and expressed concern that EPA does not have a community public alert system already in place, stating, "should there be a railway accident, I think you really should have a plan that you can present to the community."*

Response: At the time of the public meeting for a Superfund Proposed Plan, EPA has not yet selected the remedy. In this case, of four alternatives considered, three did not involve offsite transportation and disposal of waste. EPA must solicit and consider comments on all alternatives prior to making a final selection.

EPA efforts to inform and involve the community will continue throughout the period of remedial design and remedial action. A health and safety plan will be prepared and made available to the public prior to initiating any action at the site. This plan will address transportation safety and contain procedures to ensure that the dredged sediment is safely contained during transport and that if a spill occurs specific procedures will be implemented to immediately clean up the spill and minimize any risk that the community could come in contact with the spilled sediment. Transportation of the dredged sediment will be conducted by licensed transporters with oversight by EPA acting in cooperation with local and state authorities.

*6. Mr. Nicholas Pinette, a resident of Richmond, stated that the preferred offsite disposal alternative makes good sense, but questioned where the dredged material would be transported to for disposal and how it would be stored. (letter, 8/7/94)*

Response: EPA has not selected a particular landfill as part of this Record of Decision. The dredged material will be transported to a landfill which is permitted to receive the waste and meets the CERCLA offsite policy which requires EPA to determine that the facility is operating in compliance with all federal and state permits prior to shipment. The choice of landfill will be made by the parties who ultimately perform the remedy, subject to the determination of compliance by EPA. The contaminated sediment currently presents a threat because of its location in the marine environment, which allows direct exposure to sensitive aquatic organisms and bioaccumulation in the food chain. Once it is removed and placed in a landfill it should pose no unacceptable risks to the environment or to human health including that of workers at the disposal site.

*7. The Point Richmond Neighborhood Council supported EPA's proposal for offsite disposal stating: "To move this sediment... to any other location within the City of Richmond would be an injustice to the people of the City of Richmond." (letter, 8/10/94)*

*8. The Montrose Chemical Corporation of California, a DDT manufacturer and Potentially Responsible Party (PRP) at the United Heckathorn Site, submitted extensive comments arguing that the proper remedy for the site is no-action. (letter, 9/13/94)*

*I. Without risk, no action is necessary.*

Response: The contamination at United Heckathorn presents unacceptable threats to human health and the environment. These threats are summarized in Section 7 of the ROD. It should also be noted that two previous PRP-lead site investigations (Harding Lawson, 1986, and Levine-Fricke, 1991) recommended dredging the Lauritzen Channel and concluded that "no action" would not be protective of the environment.

*II. EPA's Human Health Risk Assessment (HHRA) fails to demonstrate that DDT or dieldrin in sediments in the Lauritzen Channel or Parr Canal pose any significant threat to human health for the following reasons:*

*A. The only significant health risk calculated by EPA was for consumption of fish from the Lauritzen Channel. However, EPA has not established that fishing occurs in the Lauritzen Channel, but only in the Santa Fe Channel near the Parr Canal. The Lauritzen Channel is posted to discourage fishing. All available evidence suggests that significant exposure to fish from the Lauritzen Channel does not occur.*

Response: EPA risk assessment guidance assumes that institutional controls will not be maintained, or will be ineffective in the long term in eliminating threats to human health. In addition, EPA believes that institutional controls, such as fences and warning signs, cannot be relied upon at this site to prevent fishing in the Lauritzen Channel and Parr Canal. Fish and shellfish in the Lauritzen Channel contain concentrations of DDT and dieldrin which exceed acceptable levels for human consumption. In 1986, CDHS ordered Levin to post warnings around its property, including the eastern shoreline of the Lauritzen to warn boaters about the DDT contamination in fish and shellfish. In 1991, after EPA personnel observed a person fishing from a facility on the shoreline opposite the former Heckathorn location, EPA immediately advised that facility's manager in writing about the State's 1986 health warning. Recently, the State issued a fishing advisory throughout Richmond Harbor. Signs were posted at the popular harbor fishing location near the Parr Canal where there is unrestricted shoreline access. Despite the signs, State personnel report still finding people catching fish for consumption.

*B. EPA overestimated the risk from fish consumption by assuming consumption rates of 132 mg/day (sic) for subsistence fishermen and 54 mg/day (sic) for recreational fishermen.*

Response: EPA's current risk assessment guidance recommends assuming consumption rates of 54 grams per day (g/day) for recreational fishermen, and 132 g/day for subsistence fishermen. Potential risks were calculated by EPA (see HHRA, Table 5-11) using standard exposure assumptions which included both the 132 g/day subsistence rate, and a much lower rate of 6.5 g/day, which was the rate assumed in the development of EPA's Water Quality Criteria for the protection of human health (1980). These criteria are ARARs at the site. The two consumption scenarios are likely to bracket current and potential future exposures. Calculated risks for consumption of fish from the Lauritzen Channel were unacceptable using either exposure assumption. Risks for consumption of fish from the Santa Fe Channel were within EPA's

acceptable risk range using the low consumption rate, but unacceptable using the subsistence rate. Therefore, EPA concluded that consumption of fish from the Santa Fe Channel may be acceptable. EPA expects that remediation of sediments from the Lauritzen Channel will reduce the concentrations of pesticides in Santa Fe Channel fish as well.

Using the responses from EPA's limited fishing survey, Montrose's consultant, Terra, Inc. (August 17, 1994) calculated a consumption rate of 27 g/day for local fishermen. As stated in the HHRA, EPA's survey was intended only to provide general information on local fishing practices. Even with a much larger survey it would be difficult to accurately quantify current, much less future, consumption rates. For these reasons EPA has included the assumptions discussed above in its risk calculations to ensure that a reasonable maximum exposure scenario is evaluated in order to ensure that EPA actions are fully protective of human health.

*C. The risks calculated for fish consumption are also overestimated because they do not account for the effects of cooking. There is no evidence that fishermen eat raw fish. Cooking reduces the concentrations of DDT in fish by 39% to 74%. In addition, absent evidence that whole fish are eaten routinely, EPA should have based its risk calculation on fillets rather than whole fish. EPA guidance states that most humans consume only fillets.*

Response: EPA calculated risks for consumption of both whole and filleted fish from the Lauritzen and Richmond Inner Harbor Channels. Risks for fish from the Lauritzen were unacceptable regardless of whether the fish were whole or fillets. A group of recent Laotian immigrants interviewed by EPA stated that they consume raw fish caught in Richmond Harbor. Small fish, such as shiner surf perch, are mashed whole. When fish are filleted, the carcass is also used in the preparation of soup. In order to be protective of diverse ethnic groups known to fish in Richmond Harbor, it is prudent to assume that fish may be eaten raw and that entire fish may be consumed.

The State of California has written fact sheets for fishermen to encourage practices, such as cooking and draining away fat, which will reduce contaminant concentrations. However, even the reductions in concentrations reported by Montrose would be insufficient to make fish from the Lauritzen suitable for consumption (see previous response to this comment, ICF, May 11, 1994).

*D. EPA compared fish tissue concentrations with the State of California's Water Quality Objectives which were recently held invalid.*

Response: The State of California's Water Quality Objectives for DDT and dieldrin were adopted on April 11, 1991. They were based upon, and are equal to EPA's Ambient Water Quality Criteria, published in 1980. The final HHRA (May, 1994) cited both EPA's criteria, and the equivalent State objectives. EPA's criteria were identified in the July, 1994 Proposed Plan and selected in the ROD as ARARs. It should be noted that although the 1991 State objectives were recently invalidated on procedural grounds, the San Francisco Bay Basin Plan (1986), designated fish and shellfish harvesting and commercial and recreational fishing as beneficial uses of all waters of San Francisco Bay, which supports EPA's determination in the Record of Decision (Section 6) that the federal Ambient Water Quality Criteria are relevant and appropriate ARARs at this site.

*E. EPA's HHRA failed to cite epidemiology studies for DDT.*

Response: EPA has previously responded to this comment. See final HHRA response to comments, May 11, 1994, pp.8 and 9. In addition, there is currently a great deal of research being performed on DDT and related chemicals regarding their estrogenic effects, links with breast cancer and feminization of males. Appendix 1 of this Response to Comments is a timely news article describing some of this research.

*III. EPA's Ecological Risk Assessment of marine sediments (ERA) fails to demonstrate that DDT or dieldrin in sediments in the Lauritzen Channel or Parr Canal pose any significant threat to the environment health for the following reasons:*

*A. In identifying chemicals of concern, EPA improperly excluded from consideration chemical and physical stressors such as PAHs, PCBs, shipping disturbance and industrial activity.*

Response: Physical stressors, such as shipping disturbance, were discussed and considered in the ERA, but they are neither site-related, nor are such stressors chemicals and so cannot be identified as "chemicals of concern." Non site-related chemicals, including PAHs and PCBs were also discussed and considered in the ERA. Although PAHs and PCBs are present in Richmond Harbor, they are not consistently elevated above effects thresholds or background concentrations for San Francisco Bay. By contrast, DDT concentrations in sediments in the Lauritzen Channel are on average 10,000 times higher than the San Francisco Bay background level. These facts are graphically illustrated in Figures 8, 9 and 10 of NOAA's March, 1992 evaluation of chemical contaminants in San Francisco Bay, (Technical Memorandum NOS ORCA 64) which are attached as Appendix 2 of this Response to Comments. In viewing Figure 8, it should be noted that if the vertical bar representing the concentration of DDT in the Lauritzen was drawn to the same scale as the bars representing the concentrations of DDT found elsewhere in San Francisco Bay, it would be 2,715 feet, or over a half-mile, high.

*B. EPA has not shown that fish-eating birds are exposed to significant, if any amounts of DDT in the Richmond Inner Harbor. EPA did not analyze any birds or provide dose-response data for individual species. Birds are not feeding in Richmond Harbor. If fish-eating birds are not exposed, the elementary conclusion is that they are not at risk. Andrew Lincoff, Remedial Project Manager stated in a letter dated July 31, 1992 that brown pelicans only feed occasionally in Richmond Harbor.*

Response: The US Fish and Wildlife Service (USFWS), which is the federal trustee for avian resources, provided EPA with a list of over 70 species of "birds known to nest in central or northern San Francisco Bay or likely to regularly feed in the immediate vicinity of Richmond Harbor." (EPA, 1994, Table 4-1). While engaged in site investigations, removal actions and other activities at the site, EPA personnel and contractors observed that numerous fish-eating birds including cormorants, western grebes, kingfishers, loons, and California brown pelicans, an endangered species, commonly feed throughout the Richmond Inner Harbor, including the Lauritzen Channel.

The Project Manager's 1992 statement that brown pelicans may only occasionally feed in the harbor was made based on the assertion in a previous PRP Remedial Investigation Report (Levine-Fricke, 1990) that no endangered species had been seen in the vicinity of the site. However, since EPA began working at the site, endangered brown pelicans have been seen commonly in the Inner Richmond Harbor. In response to repeated unsupported claims by Montrose and its consultants that birds would not be found in an industrialized harbor, EPA, with minimal effort (EPA memoranda 12/8/93 and 12/16/93), was able to observe and photograph numerous species of birds in the harbor, including an additional species of shorebird which had not been listed by USFWS. These photographs also include a group of endangered brown pelicans which were feeding at the confluence of the Lauritzen and Santa Fe Channels, and document a brown pelican in the act of plunge-diving for fish at the same location.

It is not subject to any reasonable doubt that DDT in Richmond Harbor accumulates in the food chain and that predatory birds are being exposed. In a 1985 study (Ohlendorf, 1991) the concentration of DDE (a metabolite of DDT) in surf scoters, a migratory shellfish-eating bird which winters in San Francisco Bay, was measured in 39 birds shot in January and compared with the

concentrations in 40 shot in March. The body burdens of birds wintering in Richmond Harbor increased by over four-fold in three months, clearly demonstrating that even birds which feed for only part of the year in and near the harbor can have significant bioaccumulation. No significant increases in concentration occurred in birds which wintered elsewhere in San Francisco Bay.

It is outside the scope of the EPA ecological risk assessment process to conduct new studies to determine dose response information for birds species present at the site. Furthermore, studies of higher organisms, especially birds, are not necessary because criteria are available for their protection (EPA's Ambient Water Quality Criteria and California's Water Quality Objectives) which are based upon achieving much more easily measurable contaminant concentrations in fish and the water column. The primary field sampling for EPA's United Heckathorn ecological assessment took only six days. As discussed in the assessment (Chapter 5), "studies of more mobile species, particularly migratory birds, would require much more effort and would be subject to inherently higher uncertainty regarding pollutant sources and effects than the study of sessile and relatively non-mobile organisms chosen here."

EPA assessed the risks posed by DDT to fish-eating birds using two published criteria for the protection of birds which are based upon contaminant concentrations in fish. EPA's marine chronic Ambient Water Quality Criteria for DDT (1980), which is an ARAR, is based upon a fish tissue residue of 150 ppb. This concentration is a Lowest Observed Adverse Effect Level at which reproduction in California brown pelicans was reduced to a level below that necessary to sustain a stable population. The more protective National Academy of Sciences (NAS) action level for the protection of fish-eating birds is 50 ppb (published by EPA in 1973). The concentration of DDT in fish caught in the Lauritzen Channel is over two orders-of-magnitude (100 times) higher than the NAS level. In the ERA, (Figure 9-19) EPA estimated that if a bird consumed prey from the Lauritzen for more than about one day per year, its annual average diet would exceed the NAS action level. At more than three days per year, it would exceed the level at which reproduction is reduced in pelicans. These calculations may well underestimate risk for a number of reasons, including the fact that they assume that the bird is exposed to no other source of DDT. California brown pelicans, for example, migrate during non-breeding months from nesting areas in southern California (US Department of the Interior, Final Report: California Seabird Ecology Study, MMS 87-0055) where they may be exposed to DDT contaminated prey while feeding in the southern California bight: an area still heavily contaminated from the historic discharges of PRP Montrose's former Torrance, California DDT manufacturing plant.

EPA did not report dose-response data for all species of birds likely to feed in Richmond Harbor because such data does not exist. Dose-response data is available for only a few species of wild birds, including American kestrels, mallard ducks, and a bird which does feed in the most contaminated channels in Richmond Harbor - the California brown pelican. Available effects data is routinely used in developing criteria for the protection of other aquatic organisms and wildlife. Recently, for example, the same effects data discussed above for California brown pelicans were used as the basis of the proposed Wildlife Criteria for DDT to protect fish-eating birds in the Great Lakes (58 FR 20802, April 16, 1993).

*C. The ERA fails to demonstrate that sediment-contained DDT or dieldrin pose any significant risk to benthic invertebrates. The diversity indices for the benthic community structure and number of mollusks actually increase with concentrations of DDT. The poorest community structure was observed at locations with the lowest concentrations of DDT. The predominant effect on benthic community structure is shipping disturbance which the ERA fails to consider as a stressor.*

Response: There is ample evidence that DDT contamination in the Lauritzen Channel poses a significant risk to benthic invertebrates. Invertebrate toxicity tests conducted during the ERA indicated that Lauritzen Channel sediments are among the most toxic ever tested by the EPA personnel who developed the standard methods for sediment toxicity tests which are used worldwide. The extraordinarily high levels of DDT were determined in the ERA to be the primary cause of toxicity in the Lauritzen. Additional invertebrate toxicity tests conducted during the RI (Battelle, 1994) found no survival of test organisms throughout most of the Lauritzen Channel.

Although disturbances relating to shipping (including dredging to maintain required depths for navigation and propeller wash from ships) can remove or displace benthic organisms, it does not follow that chemical contamination of the benthos is acceptable. The Richmond Harbor federal channel is dredged annually to maintain a 35 ft navigation depth. The federal channel runs from Point Potrero up the Richmond Inner Harbor and lower Santa Fe Channels, but does not enter the Lauritzen Channel. There is one shipping berth at the mouth of the Lauritzen, which PRP Levin has been unable to dredge since 1985 because of the DDT contamination. Large ships cannot enter the shallower northern Lauritzen Channel which is not maintenance dredged. Absent the very high levels of DDT in the Lauritzen one would expect, based on shipping and dredging history, to find healthy benthic communities there and poorer communities in the navigation channels.

The diversity, number and biomass of mollusks are in fact lower in the shipping channels and increase in the northern Lauritzen, as would be expected from the dredging and shipping history, and the fact that mollusks are known to be insensitive to DDT. The number of amphipods, on the other hand, is opposite of what would be expected from dredging and shipping disturbances, and declines in the Lauritzen Channel because of the DDT (EPA, 1994). Amphipods are crustaceans, which are known to be sensitive to DDT. In the development of the federal water quality criteria for DDT (EPA, 1980), a crustacean was found to be the most sensitive marine aquatic organism. The sensitivity of crustaceans to DDT may be explained by their phylogentic affinity with insects (both are in the phylum Arthropoda, and DDT's purpose was to eradicate insects). An overall measure of benthic community structure is the Infaunal Index, which is a composite measure of the abundance of pollutant-sensitive and pollutant-tolerant taxa. The Infaunal Index declines significantly as DDT concentrations increase in Richmond Harbor.

Finally, it should be emphasized that even though some taxa, such as mollusks, can survive in areas like the Lauritzen which are heavily contaminated with DDT this does not mean that there is no biological effect resulting from their exposure. The California State Mussel Watch found that by far the highest levels of DDT bioaccumulation in the State occur in the Lauritzen. Bioaccumulated contaminants can move up the food chain and affect animals at higher trophic levels. The levels of DDT in benthic invertebrates, like those in fish, are far above the dietary levels which may cause reproductive impacts to birds.

*D. The ERA fails to provide the required uncertainty analysis.*

Response: Uncertainties relating to a myriad of factors are discussed throughout the ERA, consistent with EPA guidance. Those study results and conclusions about which there is the least uncertainty are listed in the executive summary.

*E. The ERA offers no evidence that fish are being affected by DDT or dieldrin.*

Response: EPA's 1980 Ambient Water Quality Criteria document for DDT reported that levels of 3 to 6.25 ppm DDT caused reduced survival in the fry of fish tested. The average concentration of fish caught in the Lauritzen is above these levels. Therefore one of the conclusions of the ERA was that the concentrations of DDT in the Lauritzen "may also cause direct chronic effects such as

reduced fry survival in fish." Montrose's complaint stems from the fact that the fish caught in the Lauritzen (mostly shiner surf perch) are not the same species as those which have been used in research. In order to determine the level of DDT which causes reduced fry survival in shiner perch, it would be necessary to start a research project, which, as Montrose also points out, is not the purpose of ecological assessments. The ERA reported numerous species of fish potentially affected by the contamination in Richmond Harbor. Since one cannot assume that the few species which have been tested are likely to be the most sensitive to the toxic effects of DDT, it would be prudent to divide the values for tested species by a factor of 10 or more to account for the uncertainty in extrapolating toxicity data from test species to those fish found in Richmond Harbor . Using this approach, one would conclude that fish in the Santa Fe Channel as well as the Lauritzen may suffer chronic impacts from current levels of DDT contamination.

*F. National Academy of Sciences (NAS) action levels should not be used to demonstrate risk in an ecological assessment because they're not ARARs and do not even qualify as to-be-considered material because NAS is not a state or federal agency. NAS action levels only assume that effects will occur, EPA has not demonstrated that actual effects have occurred. EPA failed to follow NAS sampling recommendations and should have sampled fish from a variety of locations throughout known foraging ranges.*

Response: The National Academy of Sciences action levels were published by EPA as 1972 Water Quality Criteria. The criteria for DDT states:

> "It is recommended that DDT concentrations in any sample consisting of a homogenate of 25 or more fish of any species that is consumed by fish eating birds and mammals, within the same size range as the fish consumed by any bird or mammal, be no greater than 50 μg/kg of the wet weight."

EPA analyzed a total of 23 shiner surf perch from the Lauritzen Channel in the ERA and in support of the HHRA. The average concentration was 9,200 μg/kg (wet weight), which is over 180 times the NAS action level. Assuming that the two additional fish needed for a sample of 25 contained no DDT, the average would still be 170 times the action level. Looked at another way, even if sufficient time and resources were spent to determine the foraging ranges of the various species of fish-eating birds which feed in Richmond Harbor and to sample fish throughout those ranges, the concentration of DDT in the Lauritzen Channel is so high that a single fish would cause a homogenate of 25 or even 170 fish of equal size to exceed the action level, even if the all of the fish in the rest of the foraging range contained no DDT at all.

In regard to the assertion that the NAS action level only *assumes* that damage will occur from DDT exposure, Montrose, a DDT manufacturer, should recall that DDT was responsible for great reductions in populations of predatory birds over vast areas and the almost complete extirpation of some species. The California brown pelican is endangered because of exposure to DDT (EPA, 1994).

In regard to EPA's not sampling birds or documenting actual damage in this study, it should also be remembered (in addition to the responses to this issue in previous comments) that the purpose of risk assessments is to evaluate risk, not to document or quantify damage. There is ample evidence that the high levels of DDT in Richmond Harbor threaten a variety of ecological receptors at various trophic levels including benthic and water column organisms and fish-eating birds. The benthic community structure analyses in fact are evidence of damage. EPA guidance recommends that when criteria exist, ecological assessments should include monitoring to determine the extent to which those criteria are exceeded by the environmental concentrations at the site. EPA has done this with the NAS action levels.

*III. In the absence of risk, ARARs are irrelevant. EPA's Water Quality Criteria are not ARARs because they are not promulgated. CERCLA §121(d)(2) states that EPA criteria may be relevant and appropriate considering "the designated or potential use of the surface or groundwater, the environmental media affected, the purposes for which such criteria were developed, and the latest information available." Since the criteria for DDT was set to protect fish-eating birds, and birds are not feeding in the Richmond Inner Harbor the "potential use" of the surface water and the "environmental media affected" do not warrant application of the criteria.*

**Response:** Risks to human health and the environment have been discussed at length above. Section 121(d)(2)(A)(ii) of CERCLA requires that remedial actions meet federal Water Quality Criteria established under Section 304 or 303 of the Clean Water Act where such WQC are determined by EPA to be relevant and appropriate to remedial actions at the site. See 42 U.S.C. § 9621(d)(2)(A)(ii) and 40 C.F.R. § 300.430(e)(2)(i)(G). In evaluating whether specific WQC are relevant and appropriate to remedial actions at Superfund site, CERCLA requires EPA to consider four criteria: 1. the uses of the receiving water body; 2) the media affected; 3) the purposes of the criteria and 4) current information. See 42 U.S.C. § 9621(d)(B)(i). See also U.S. EPA, CERCLA Compliance with Other Laws Manual - CERCLA Compliance with the CWA and SDWA (OSWER Pub. 9234.2-06/FS, Feb. 1990).

EPA guidance concerning determinations that WQC are relevant and appropriate to remedial action at a Superfund site provides that:

> A water quality criteria component for aquatic life may be relevant and appropriate when there are environmental factors that are being considered at a site, such as protection of aquatic organisms. With respect to the use of water quality criteria for the protection of human health, levels are provided for exposure both from drinking the water and from consuming aquatic organisms (primarily fish) and from fish consumption alone. Whether a water quality criterion is appropriate depends on the likely routes of exposure.

U.S. EPA, CERCLA Compliance With Other Laws Manual: Interim Final at 1-15 (EPA 540-G-89-006, Aug. 1989).

Both the marine chronic and human health WQC for DDT and dieldrin are relevant and appropriate to remedial actions at this site since both aquatic and wildlife and humans may be exposed to these contaminants either directly or through consumption of contaminated organisms. As discussed in the Ecological Risk Assessment, aquatic organisms are present in all channels at the site, which are a part of San Francisco Bay. Fish eating-birds feed in all channels in the harbor. In fact, the particular bird upon which the marine chronic water quality criterion for DDT was based is the California brown pelican, an endangered species, which has been observed feeding in the most contaminated channels at the site. As discussed in the Human Health Risk Assessment, fishermen catch and consume fish from the Inner Richmond Harbor channels. In 1986, the State of California Department of Health Services ordered the posting of the Lauritzen Channel to warn fishermen of the fish and shellfish contamination. On April 7, 1994, the Cal-EPA Department of Toxic Substances Control issued an advisory against consuming any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor.

The beneficial uses designated by the State of California for central San Francisco Bay waters, which are listed in Section 6 of the Record of Decision, include fishing, wildlife habitat, preservation of rare and endangered species, fish migration, fish spawning, shellfish harvesting, and estuarine habitat. EPA's Ambient Water Quality Criteria were specifically developed to protect such beneficial uses.

*IV. Background risks to human health and the environment from other stressors exceed the purported risks associated with DDT and dieldrin. The human health risk associated with PCBs found in fish exceed the risks of DDT and dieldrin. Other environmental stressors, including PAHs, PCBs and shipping disturbance are relevant to evaluating the long-term effectiveness of the chosen remedy. If the remedy will not reduce existing risk then it should be rejected in favor of no action.*

Response: Both natural and anthropogenic background risks are common at Superfund sites and EPA guidance (EPA/540/1-89/002) states that they may be eliminated from risk assessments. The guidance also allows, however, that they may be considered separately in order to provide information to those potentially exposed. This was done for PCBs in the United Heckathorn risk assessment. As a result of EPA's sampling and risk analysis, the California Department of Health Services conducted a further study of fishing in Richmond Harbor and recently issued an advisory for the entire harbor based on both the Heckathorn contaminants and PCBs.

Recent research suggests PCBs may be present in the water throughout San Francisco Bay. EPA's fish sampling found that PCB mixture Aroclor 1254 is present in fish in Richmond Harbor. There is no cancer potency data available for Aroclor 1254. Therefore risks associated with PCBs were calculated using the potency factor for Aroclor 1260 which likely has higher potency. The human health risks associated with PCBs in fish from Richmond Harbor may be overstated for this reason alone. In addition, absent the distinction between Aroclors 1254 and 1260, Montrose's consultant Terra, Inc. stated that it had independently derived a potency factor for PCBs which indicated that human health risks from PCBs were overstated by "1-2 orders of magnitude." Nevertheless, the human health risk assessment still found that the risks calculated for the sum of site-related chemicals of concern (DDT and dieldrin) in the Lauritzen Channel were 2 to 3 times the risk for PCBs (ICF, 1994, Table 5-11). It should also be noted that fish in the Lauritzen exceed the Food and Drug Administration Action Levels for DDT and dieldrin, but not for PCBs. In the Santa Fe Channel, the calculations indicate that PCBs become a greater human health risk than site contaminants, but again the risk from PCBs may be overestimated.

The selected remedy will remove contaminated sediments from the Lauritzen Channel and Parr Canal and reduce human health risks from DDT and dieldrin exposure throughout Richmond Harbor. The sediments to be remediated also contain non site-related chemicals, including PCBs, although the levels of these contaminants relative to bay background concentrations is minute compared to the relative levels of DDT (see Appendix 2). Nevertheless, since the remedy will result in the removal of PCBs from portions of Richmond Harbor, there may be a reduction in human health risk associated with PCBs as well.

Other environmental stressors have been discussed in previous responses. DDT is the primary cause of toxicity in the Lauritzen Channel, and existing threats to benthos, water column organisms, and fish-eating birds are expected to be eliminated by the selected remedy.

*V. Selection of the No-Action alternative is consistent with CERCLA, the NCP, and EPA guidance.*

Response: EPA disagrees. As discussed in the Record of Decision, the no-action alternative fails to meet the NCP's threshold criteria for remedy selection. In addition, as mentioned previously, it should be noted that two previous PRP-lead site investigations (Harding Lawson, 1986, and Levine-Fricke, 1991) also recommended dredging the Lauritzen Channel and concluded that "no action" would not be protective of the environment.

*9. The National Oceanic and Atmospheric Administration (NOAA), which is the federal trustee for marine resources, submitted comments (September 14, 1994) supporting EPA's proposed plan. NOAA also recommended: 1) not dredging during the Pacific herring spawning season (December 1 to March 1); 2) the evaluation of dredging techniques to minimize resuspension and avoid spillage during transportation; 3) various types of remedial and post-remedial monitoring, and; 4) the placement of approximately six inches of clean material over dredged areas to help restore the area immediately after implementation of the remedy. (letter, 9/14/94)*

**Response:** EPA appreciates the information provided by NOAA and will ensure that the remedy is not implemented between December 1 and March 1. The detailed selection of dredging and monitoring techniques will be made during the remedial design phase and EPA looks forward to NOAA's participation in that process.

Several commenters before and during the comment period recommended the placement of clean material as part of the remedy. Morrison-Knudsen, consultant to Montrose, recommended the placement of clean material in areas, such as those with rip-rap, in which dredging would be impractical or of limited effectiveness. USFWS (see comment 10, below) recommended placement of clean material after remediation to bury any remaining contaminants and help restore habitat.

The Proposed Plan stated: "Minor capping, which would not significantly alter the existing depths of water, might also be used if determined to be necessary during the remedial design or remedial action phases," although a cost for this activity was not estimated. EPA has contacted Manson Construction, which provided estimates of dredging costs used in the Feasibility Study. Assuming that the total area of the Lauritzen Channel and Parr Canal is 50,000 square yards, a six-inch layer would require approximately 8000 cubic yards of clean material. Manson indicated that the cost of placement is relatively high, and estimated $25 per yard total. A six-inch layer of clean material would therefore cost approximately $200,000. This cost has been added to the estimate for the final remedy, bringing the total estimate to $7 million. There may also be an opportunity to save costs and obtain appropriately sized clean dredged material from the Richmond Harbor deepening project.

**Other Comments**

*10. The US Fish and Wildlife Service submitted comments, dated August 15, 1994, on the FS. USFWS supported EPA's preferred alternative, and made the following recommendations: 1) removal of the upper layer of old bay mud to ensure that median DDT levels are below a deleterious effects range; 2) placement of a clean layer of fill after dredging (discussed in comment 9, above), and; 3) hazing to prevent seabirds from entering the dredging area during remediation. (letter, 8/15/94)*

Response: The placement of clean fill after dredging has been discussed above. Additional recommendations regarding activities during remediation will be considered in the remedial design phase, in which USFWS is encouraged to participate. The proposed remedy including dredging of all soft sediments down to the Old Bay Mud contact. In practice, this will result in the removal of the top layer of old bay mud. Sampling conducted during the RI indicates that the medial concentration of contaminants in the upper layer of old bay mud is well below the range which may be deleterious to benthic organisms.

*11. Montrose also submitted comments dated August 17, 1994 from its contractor, Terra Inc., on the final human health risk assessment. With the exception of the following comment, Terra's comments were either repeated in Montrose's comments on the proposed plan, discussed above, or were responded to in earlier responses to comments on the draft human health risk assessment. Exposure point concentrations were improperly estimated for upland soils resulting in the overestimation of risk. Due to its overstatement of risk, the final risk assessment cannot be reliably used to develop remedial alternatives or to determine whether there is any necessity to remediate surface soils.*

Response: This comment ignores both the conclusions of the risk assessment and EPA's proposed remediation. The EPA human health risk assessment clearly states that conservative estimates were used, and that risks due to exposure to contaminates in upland soils are within EPA's acceptable risk range even using these conservative estimates. EPA has proposed no further remediation to reduce the concentrations of contaminants in site soils. Therefore, the entire discussion of whether the risk estimates for soils are overly conservative is moot.

Two tables in the final risk assessment (Tables 3-2 and 3-3) did in fact contain typographical errors. Corrected tables enclosed with a memo from ICF are provided as Appendix 3 of this Response to Comments. Because none of the risk calculations contained in the assessment were derived from the erroneous values, the errors had no effect on the final conclusions.

United Heckathorn Response to Comments

Appendix 1

San Francisco Chronicle, October 4, 1994
p. A9

# Clue in Pesticide Link to Breast Cancer

## Exposure to some poisons raises level of 'bad' estrogen

*Associated Press*

New York

Researchers trying to explain the disturbing link between pesticides and breast cancer have discovered that pesticides appear to raise levels of a harmful form of estrogen.

The finding comes as a surprise to the director of the research, who undertook the study expecting to show that pesticides had no effect on estrogen.

"I was wrong," said H. Leon Bradlow, a biochemist with the Strang Cancer Prevention Center at Cornell University Medical School. The study showed that after exposure to pesticides, "your risk ratio is greater than what it was before," Bradlow said yesterday.

Several earlier studies have linked pesticides to an increased risk of breast cancer, although one study failed to find a link. The new study shows how pesticides may be exerting a harmful effect, Bradlow said.

Penelope Fenner-Crisp, a pharmacologist and pesticide specialist with the Environmental Protection Agency, said the EPA is taking the link between pesticides and hormones very seriously. "We should think about how we might go about encouraging exposure reduction," she said.

The study, which will be published soon in Environmental Health Perspectives, a journal of the National Institute of Environmental Health Sciences, builds on Bradlow's previous research showing that there is a "good estrogen" that protects against breast cancer and a "bad estrogen" that is associated with increased risk of the disease.

The researchers exposed human breast cells in the test tube to DDT and other chlorine-containing pesticides. They found that the pesticides' effect on bad estrogen was three to four times as great as that of a known human carcinogen that was used as a comparison.

In a separate study, Bradlow and his colleagues found that women who eat "cruciferous" vegetables — broccoli, cauliflower, brussels sprouts and cabbage — appear to counteract the harmful effects of pesticides. An anti-cancer substance found in these vegetables called indole-3-carbinol was found to increase the ratio of good estrogen to bad estrogen.

Bradlow said a woman who eats such vegetables regularly could significantly reduce her risk of breast cancer, although he cannot yet say precisely how much lower the risk would be.

United Heckathorn Response to Comments

Appendix 2

NOAA Technical Memorandum NOS ORCA 64
Figures 8, 9 and 10

NOAA Technical Memorandum NOS ORCA 64

# AN EVALUATION OF THE EXTENT AND MAGNITUDE OF BIOLOGICAL EFFECTS ASSOCIATED WITH CHEMICAL CONTAMINANTS IN SAN FRANCISCO BAY, CALIFORNIA

Seattle, Washington
March 1992

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

National Ocean Service

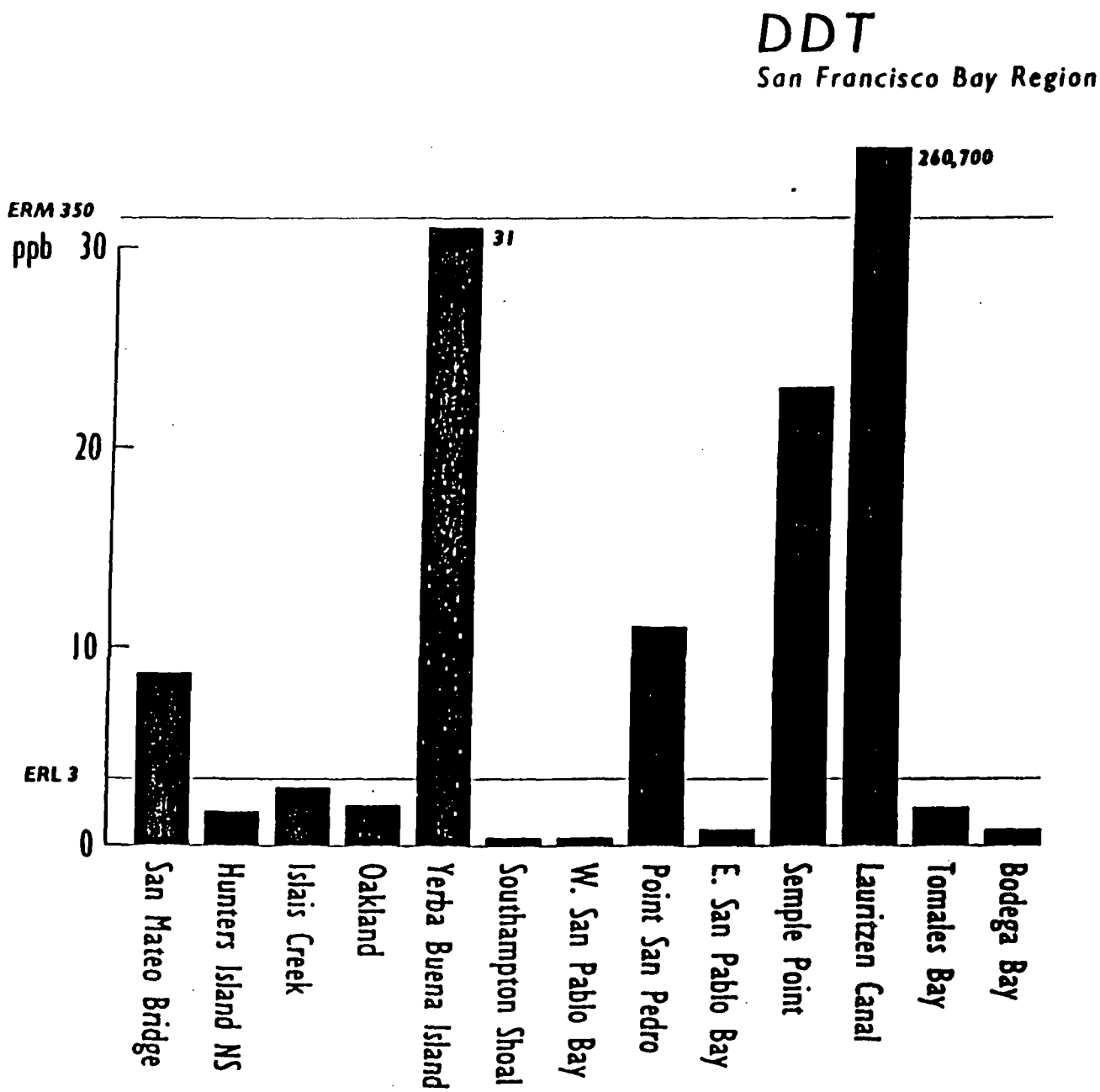



**Figure 8. Mean tDDT concentrations at specific sampling sites in San Francisco Bay (from Long *et al.*, 1988) and ERL and ERM values for tDDT (from Long and Morgan, 1990).**

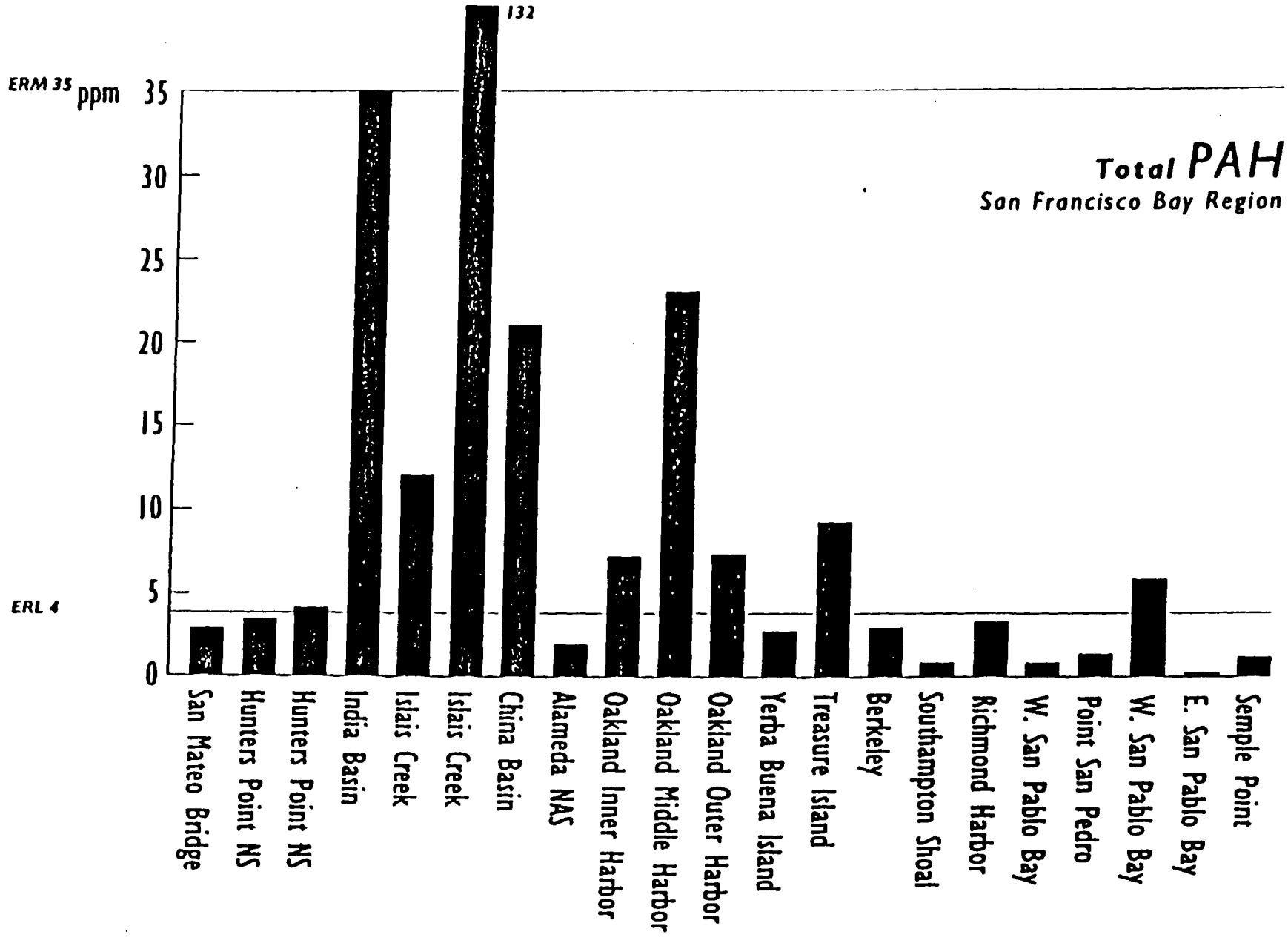



**Figure 9. Mean tPAH concentrations (sum of 18 compounds) at specific sampling sites in San Francisco Bay (from Long et *al.*, 1988) and ERL and ERM values for tPAH (from Long and Morgan, 1990).**

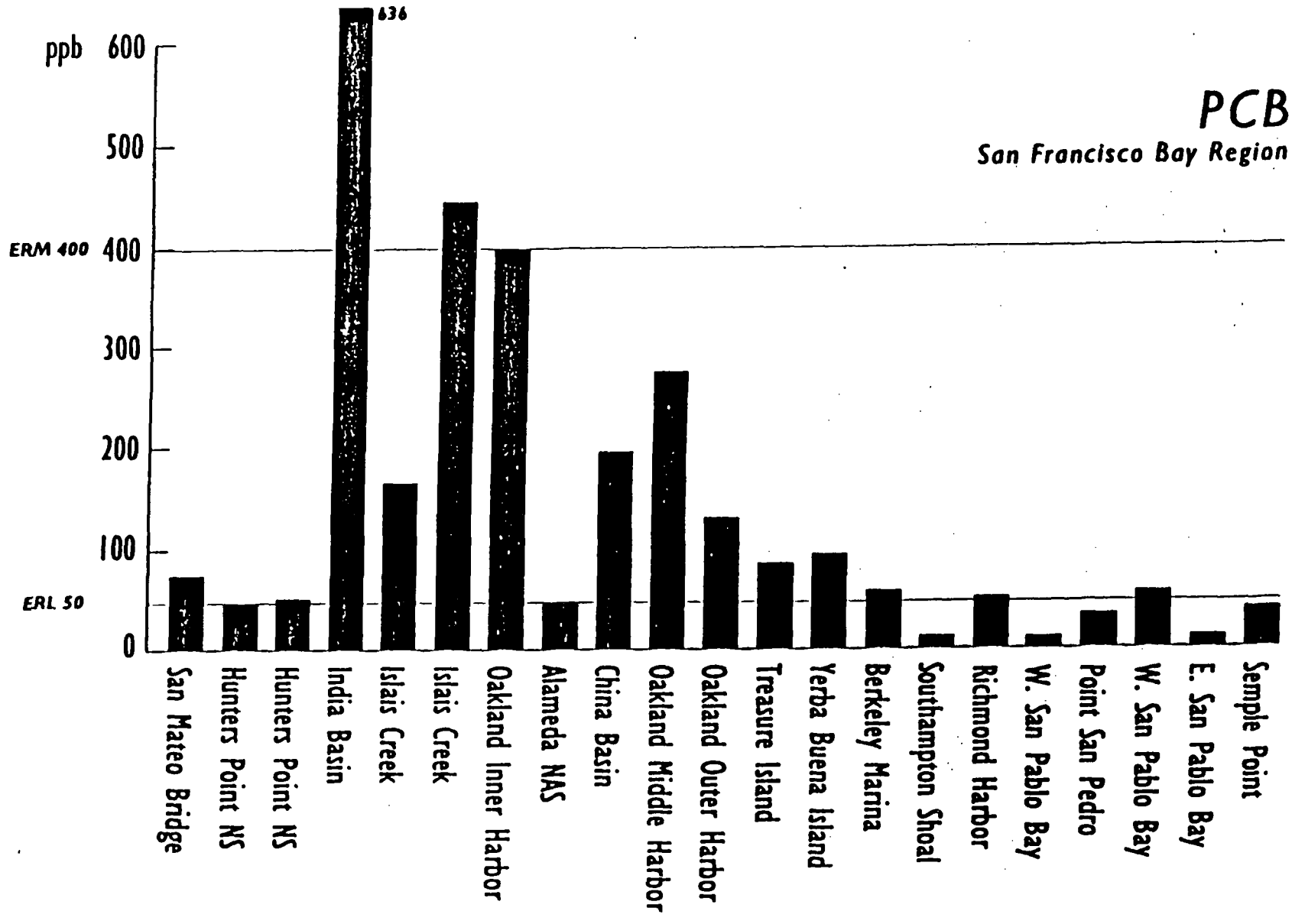



**Figure 10. Mean tPCB concentrations at specific sampling sites in San Francisco Bay (from Long et al., 1988) and ERL and ERM values for tPCB (from Long and Morgan, 1990).**

United Heckathorn Response to Comments

Appendix 3

ICF Kaiser Engineers Memorandum
September 7, 1994

1800 Harrison Street
Oakland, California
94612-2321

510/419-6000

# ICF TECHNOLOGY INCORPORATED

**MEMORANDUM**
**September 7, 1994**

**TO: Andy Lincoff**

**FROM: D. Wayne Berman** DWB

**RE: Corrections to the final, "Human Health Risk Assessment for the United Heckathorn Superfund Site, Richmond, California."**

In response to the August 17, 1994 comments from Terra Inc. concerning the values reported in Tables 3-2 and 3-3 of the risk assessment report, it appears that a few minor typographical errors were in fact committed. Corrected tables are attached.

First, regarding the column in Table 3-2 in which 95% UCLs are supposed to have been reported, an incorrect direction command in the underlying spreadsheet to the table resulted in the RME exposure point concentrations being repeated in this column rather than the UCLs.

Note that, in no case are the correct UCLs equal to the corresponding maximum detected values, which are reported in the next column of the table. In some cases the correct UCLs are greater than the maximum detected values but this is not unusual for small or highly variable data sets, particularly when the data are adequately described by a lognormal distribution. Because none of the subsequent calculations performed to complete the risk assessment are based on the UCLs reported in this column, no material changes in the risk assessment resulted from this typographical error.

Regarding the column in Table 3-3 in which RME exposure point concentrations in soil were supposed to have been reproduced, a similar direction error in the underlying spreadsheet caused the 95% UCLs to be reported in this column rather than the RME values. Correcting this column of this table changes a small number of other values in this table; however the changes are minor and none of them affect the overall conclusions drawn from this table. Because none of the other calculations in the rest of the risk assessment are derived from the values reported in the corrected column of Table 3-3, no material changes in the risk assessment resulted from this typographical error.

Please call me if you have any further questions concerning these corrections.

cl

TABLE 3-2
ESTIMATED EXPOSURE POINT CONCENTRATIONS IN SOIL[1]

| COC | Simplified Maximum Likelihood Estimate of the Arithmetic Mean[2] (mg/kg) | Coefficient of Variation (mg/kg) | 95% UCL[3] (mg/kg) | Maximum Detected Value (mg/kg) | RME Exposure Point Concentration[4] (mg/kg) |
|---|---|---|---|---|---|
| Surface Soil (less than equal to 1 foot) | | | | | |
| Aldrin | 9.0E-02 | 15.46 | 6.6E-01 | 4.1E+00 | 6.6E-01 |
| 4,4'-DDD | 1.1E+01 | 13.90 | 3.5E+01 | 5.3E+01 | 3.5E+01 |
| 4,4'-DDE | 1.4E+01 | 21.49 | 5.6E+01 | 7.8E+01 | 5.6E+01 |
| 2,4'-DDT | 4.8E+01 | 32.23 | 4.4E+02 | 1.2E+02 | 1.2E+02 |
| 4,4'-DDT | 1.6E+02 | 34.29 | 7.9E+02 | 7.0E+02 | 7.0E+02 |
| DDT (total)[5] | 1.8E+02 | 25.79 | 7.7E+02 | 7.4E+02 | 7.4E+02 |
| Dieldrin | 2.3E+00 | 60.50 | 1.7E+02 | 1.7E+01 | 1.7E+01 |
| Endrin | 4.6E-02 | 8.44 | 4.8E-01 | 1.2E-01 | 1.2E-01 |
| Lead | 5.5E+02 | 3.14 | 1.3E+03 | 4.0E+03 | 1.3E+03 |
| Subsurface Soil (greater than 1 foot) | | | | | |
| Aldrin | 6.2E-01 | 128.69 | 1.9E+00 | 2.1E+01 | 1.9E+00 |
| 4,4'-DDD | 5.6E+00 | 46.84 | 1.3E+01 | 2.2E+02 | 1.3E+01 |
| 4,4'-DDE | 5.7E+00 | 106.18 | 1.5E+01 | 3.0E+01 | 1.5E+01 |
| 2,4'-DDT | 7.4E+00 | 53.67 | 1.9E+01 | 5.3E+01 | 1.9E+01 |
| 4,4'-DDT | 1.6E+01 | 41.83 | 3.6E+01 | 2.8E+02 | 3.6E+01 |
| DDT (total) | 2.6E+01 | 36.80 | 5.7E+01 | 3.1E+02 | 5.7E+01 |
| Dieldrin | 6.3E+00 | 278.36 | 2.3E+01 | 2.4E+01 | 2.3E+01 |
| Endrin | 4.7E+00 | 282.40 | 1.7E+01 | 6.6E+02 | 1.7E+01 |
| Lead | 2.9E+02 | 2.98 | 9.0E+02 | 2.8E+03 | 9.0E+02 |
| Soils at All Depths | | | | | |
| Aldrin | 4.6E-01 | 92.57 | 1.2E+00 | 2.1E+01 | 1.2E+00 |
| 4,4'-DDD | 8.7E+00 | 47.61 | 1.8E+01 | 2.2E+02 | 1.8E+01 |
| 4,4'-DDE | 1.2E+01 | 127.04 | 2.9E+01 | 7.8E+01 | 2.9E+01 |
| 2,4'-DDT | 1.5E+01 | 72.20 | 3.7E+01 | 1.2E+02 | 3.7E+01 |
| 4,4'-DDT | 4.7E+01 | 69.45 | 1.0E+02 | 7.0E+02 | 1.0E+02 |
| DDT (total) | 6.4E+01 | 52.91 | 1.3E+02 | 7.4E+02 | 1.3E+02 |
| Dieldrin | 5.7E+00 | 236.55 | 1.9E+01 | 2.4E+01 | 1.9E+01 |
| Endrin | 3.1E+00 | 208.73 | 1.0E+01 | 6.6E+02 | 1.0E+01 |
| Lead | 4.4E+02 | 3.14 | 8.2E+02 | 4.0E+03 | 8.2E+02 |

[1] The values presented in this table include the changes to the database necessitated by the new data reported in Levine-Fricke (1993) and Weston (1993). Units are in mg/kg (ppm) unless otherwise stated.

[2] *This is a maximum likelihood estimate of the arithmetic mean of the data assuming the data are lognormally distributed. This is assumed to be the* best estimate available for the value of the concentration. Even these values, however, are expected to be somewhat conservative.

[3] *The 95% UCL is based on Land (1975) as discussed in Gilbert (1987).*

[4] RME exposure point concentration determination is the lesser of the maximum detected value and the 95% UCL. This is expected to represent the reasonable maximum estimate of soil concentrations.

[5] The representative concentration for total DDT were derived by summing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT measured in each individual sample and then deriving separate summary statistics for this parameter. Therefore, the sum of the summary statistics representing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT do not strictly add to the summary

TABLE 3-3
ESTIMATED EMISSION RATES AND AIRBORNE EXPOSURE POINT CONCENTRATIONS
(ASSUMING VARIOUS EMISSION MECHANISMS)

| COCs | CS RME Exposure Point Concentration in Soil[1] (mg/kg) | $Q_{10}$ Estimated Chemical-specific $PM_{10}$ Emission Rates: Wind Erosion (mg/sec) | Vehicular Traffic (mg/sec) | Excavation and Dumping (mg/sec) | $CA_{10}$ Estimated RME Exposure Point Concentration in Air[2]: Wind Erosion (mg/m³) | Vehicular Traffic (mg/m³) | Excavation and Dumping (mg/m³) |
|---|---|---|---|---|---|---|---|
| Surface Soil (≤ 1 foot) | | | | | | | |
| Aldrin | 6.6E-01 | 2.1E-06 | 1.5E-04 | 7.5E-05 | 3.8E-12 | 2.7E-08 | 1.4E-08 |
| 4,4'-DDD | 3.5E+01 | 1.1E-06 | 8.1E-03 | 4.0E-03 | 2.1E-10 | 1.5E-06 | 7.3E-07 |
| 4,4'-DDE | 5.6E+01 | 1.8E-06 | 1.3E-02 | 6.4E-03 | 3.3E-10 | 2.3E-06 | 1.2E-06 |
| 2,4'-DDT[3] | 1.2E+02 | 3.8E-06 | 2.7E-02 | 1.4E-02 | 6.9E-10 | 4.9E-06 | 2.4E-06 |
| 4,4'-DDT | 7.0E+02 | 2.3E-05 | 1.6E-01 | 8.0E-02 | 4.1E-09 | 2.9E-05 | 1.4E-05 |
| DDT (total)[3,4,5] | 7.4E+02 | 2.4E-05 | 1.7E-01 | 8.4E-02 | 4.3E-09 | 3.1E-05 | 1.5E-05 |
| Dieldrin | 1.7E+01 | 5.3E-07 | 3.8E-03 | 1.9E-03 | 9.6E-11 | 6.8E-07 | 3.4E-07 |
| Endrin | 1.2E-01 | 3.9E-09 | 2.7E-05 | 1.4E-05 | 7.0E-13 | 5.0E-09 | 2.5E-09 |
| Lead | 1.3E+03 | 4.2E-05 | 3.0E-01 | 1.5E-01 | 7.6E-09 | 5.4E-05 | 2.7E-05 |
| Subsurface Soil (> 1 foot) | | | | | | | |
| Aldrin | 1.9E+00 | 6.1E-08 | 4.3E-04 | 2.2E-04 | 1.1E-11 | 7.9E-08 | 3.9E-08 |
| 4,4'-DDD | 1.3E+01 | 4.1E-07 | 2.9E-03 | 1.4E-03 | 7.4E-11 | 5.3E-07 | 2.6E-07 |
| 4,4'-DDE | 1.5E+01 | 4.9E-07 | 3.5E-03 | 1.7E-03 | 8.9E-11 | 6.3E-07 | 3.1E-07 |
| 2,4'-DDT[3] | 1.9E+01 | 6.2E-07 | 4.4E-03 | 2.2E-03 | 1.1E-10 | 7.9E-07 | 3.9E-07 |
| 4,4'-DDT | 3.6E+01 | 1.2E-06 | 8.2E-03 | 4.1E-03 | 2.1E-10 | 1.5E-06 | 7.4E-07 |
| DDT (total)[3,4,5] | 5.7E+01 | 1.9E-06 | 1.3E-02 | 6.5E-03 | 3.4E-10 | 2.4E-06 | 1.2E-06 |
| Dieldrin | 2.3E+01 | 7.5E-07 | 5.4E-03 | 2.7E-03 | 1.4E-10 | 9.7E-07 | 4.8E-07 |
| Endrin | 1.7E+01 | 5.6E-07 | 4.0E-03 | 2.0E-03 | 1.0E-10 | 7.1E-07 | 3.6E-07 |
| Lead | 9.0E+02 | 2.9E-05 | 2.1E-01 | 1.0E-01 | 5.3E-09 | 3.7E-05 | 1.9E-05 |
| Soil at All Depths | | | | | | | |
| Aldrin | 1.2E+00 | 3.8E-08 | 2.7E-04 | 1.4E-04 | 7.0E-12 | 4.9E-08 | 2.5E-08 |
| 4,4'-DDD | 1.8E+01 | 5.7E-07 | 4.1E-03 | 2.0E-03 | 1.0E-10 | 7.4E-07 | 3.7E-07 |
| 4,4'-DDE | 2.9E+01 | 9.5E-07 | 6.7E-03 | 3.3E-03 | 1.7E-10 | 1.2E-06 | 6.0E-07 |
| 2,4'-DDT[3] | 3.7E+01 | 1.2E-06 | 8.5E-03 | 4.2E-03 | 2.2E-10 | 1.5E-06 | 7.7E-07 |
| 4,4'-DDT | 1.0E+02 | 3.4E-06 | 2.4E-02 | 1.2E-02 | 6.1E-10 | 4.3E-06 | 2.1E-06 |
| DDT (total)[3,4,5] | 1.3E+02 | 4.3E-06 | 3.1E-02 | 1.5E-02 | 7.8E-10 | 5.5E-06 | 2.7E-06 |
| Dieldrin | 1.9E+01 | 6.0E-07 | 4.3E-03 | 2.1E-03 | 1.1E-10 | 7.8E-07 | 3.9E-07 |
| Endrin | 1.0E+01 | 3.2E-07 | 2.3E-03 | 1.1E-03 | 5.8E-11 | 4.1E-07 | 2.1E-07 |
| Lead | 8.2E+02 | 2.7E-05 | 1.9E-01 | 9.3E-02 | 4.8E-09 | 3.4E-05 | 1.7E-05 |

Methodology for estimating exposure point concentration in air is presented in Appendix C.

[1] RME Exposure Point Concentration determination: the lesser of the 95% UCL and the Maximum Detected Value. See Table 3-2.

[2] Exposure Point Concentration in Air (mg/m³) = Chemical-specific $PM_{10}$ Emission (mg/sec) x 1/HxWxU (sec/m³)

[3] 2,4'-DDT was analyzed for in 85% of the samples so that sufficient data is available to include this isomer in our risk analysis. However, because approximately 15% of the samples analyzed for 4,4-'DDT were not also analyzed for the 2,4'-DDT isomer, the 2,4'-DDT isomer could not be properly incorporated into the parameter representing total DDT. Thus, 2,4'-DDT is carried through the risk assessment as a separate analyte. In any case, as demonstrated on these tables, the error contributed to risk if the 2,4'-DDT isomer is ignored is less than 30%, which is small compared to other sources of error in risk assessment.

[4] The representative concentrations for total DDT were derived by summing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT measured in each individual sample and then deriving separate summary statistics for this parameter. Therefore, the sum of the summary statistics representing 4,4'-DDD, 4,4'-DDE and 4,4'-DDT (presented in this table) do not strictly add to the summary statistic presented for total DDT.

[5] 2,4'-DDD and 2,4'-DDE were not included in this analysis because fewer than 30% of the samples were analyzed for these isomers. It is expected, however, that the error in risk estimates contributed by these omissions are small. See footnote 3.