

R Bluff Road 30053

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
COLUMBIA DIVISION

UNITED STATES OF AMERICA,
Plaintiff,

v. [Redacted]

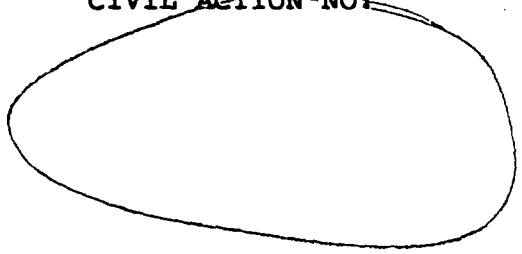
- Allied-Signal Inc.;
 - Automation Industries, Inc.;
 - EM Industries Incorporated;
 - Experimental Pathology Laboratories, Inc.;
 - Furman University;
 - Georgia Institute of Technology;
 - Georgia State University;
 - Marshall University;
 - Medical University of South Carolina;
 - Monsanto Company;
 - North Carolina State University;
 - Presbyterian College;
 - Richland Memorial Hospital;
 - Saint Joseph's Hospital of Atlanta, Inc.;
 - South Carolina Department of Health and Environmental Control;
 - Southern Engineering Co.;
 - Stanadyne Automotive Corp.;
 - Diesel Systems Division;
 - Stork Screens America, Inc.;
 - Strip Shop, Inc.;
 - Suggs Sales;
 - Tranter, Inc.;
 - University of Georgia;
 - University of Louisville;
 - University of North Carolina at Charlotte;
 - University of South Carolina;
 - Wentworth Corp.;
 - West Virginia University,
- Defendants.

04 93-CO-4
FILED
SEP 28 1992

ANN A. BIRCH, CLERK
COLUMBIA, S. C.

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CIVIL ACTION NO:



10102322



CONSENT DECREE FOR REMEDIAL DESIGN AND REMEDIAL ACTION

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IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF SOUTH CAROLINA
COLUMBIA DIVISION

UNITED STATES OF AMERICA,)
)
)
Plaintiff,)
)
v.)
)
Allied-Signal Inc.;)
Automation Industries, Inc.;)
EM Industries Incorporated;)
Experimental Pathology)
Laboratories, Inc.;)
Furman University;)
Georgia Institute of Technology;)
Georgia State University;)
Marshall University;)
Medical University of)
South Carolina;)
Monsanto Company;)
North Carolina State University;)
Presbyterian College;)
Richland Memorial Hospital;)
Saint Joseph's Hospital)
of Atlanta, Inc.;)
South Carolina Department of)
Health and Environmental Control;)
Southern Engineering Co.;)
Stanadyne Automotive Corp.;)
Diesel Systems Division;)
Stork Screens America, Inc.;)
Strip Shop, Inc.;)
Suggs Sales;)
Tranter, Inc.;)
University of Georgia;)
University of Louisville;)
University of North Carolina)
at Charlotte;)
University of South Carolina;)
Wentworth Corp.;)
West Virginia University,)
)
Defendants.)

CIVIL ACTION NO:

CONSENT DECREE FOR REMEDIAL DESIGN AND REMEDIAL ACTION

I. BACKGROUND

A. The United States of America ("United States"), on behalf of the Administrator of the United States Environmental Protection Agency ("EPA"), filed a complaint (the "Complaint") in this matter pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601 et seq., as amended (hereinafter "CERCLA").

B. The United States in its Complaint seeks:

1. reimbursement for certain costs incurred by EPA and the Department of Justice for response actions at the SCRDI Bluff Road Superfund Site, located on the north side of Highway 48 (Bluff Road) approximately ten miles southeast of Columbia, Richland County, South Carolina (the "Site"), together with accrued interest;

2. an injunction requiring Defendants to perform and/or fund studies and remedial work ("RD/RA") at the Site in conformity with the "Record of Decision," as defined below, and the National Contingency Plan ("NCP"), 40 C.F.R. Part 300, as amended;

3. recovery of past costs and oversight and other response costs that will be incurred by EPA in connection with such RD/RA; and

4. such other relief as the Court finds appropriate.

C. From approximately 1974 through 1982, the Site was operated at various times by Columbia Organic Chemical Company ("COCC"), South Carolina Recycling and Disposal, Inc. ("SCRDI"),

James Q. A. McClure, Henry M. Tischler, and Max G. Gergel, for the storage and disposal of industrial chemical wastes.

D. On July 7, 1980, the United States filed a complaint pursuant to Section 7003 of the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. § 6973, seeking injunctive relief to abate an imminent and substantial endangerment resulting from the handling, storage, and disposal of hazardous wastes at the Site and seeking reimbursement of costs, and on August 4, 1982, the United States filed an Amended and Supplemental Complaint pursuant to Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607, seeking the same relief.

E. Pursuant to a Partial Consent Decree entered on March 23, 1982, certain parties conducted and/or financed a removal action at the Site to remove drums and contaminated soil from the surface of the Site.

F. On September 8, 1983, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, the Site was listed on the National Priorities List ("NPL"), 48 Fed. Reg. 40,658 (Sept. 8, 1983).

G. On April 21, 1988, pursuant to Sections 104, 106(a), and 122 of CERCLA, 42 U.S.C. §§ 9604, 9606(a), and 9622, the Regional Administrator for EPA Region IV executed an Administrative Order by Consent (EPA Docket No. 88-16-C) (the "AOC") under which certain parties agreed to perform a Remedial Investigation and Feasibility Study ("RI/FS") at the Site, and such parties (the "Bluff Road Group") also agreed to fund 51.96% of the costs of the RD/RA at the Site, less their approved RI/FS costs.

H. Pursuant to the AOC, and consistent with 40 C.F.R. § 300.68, the RI/FS was conducted at the Site between April 1, 1988 and March 1990, which showed soil and groundwater contamination with a variety of organic and inorganic compounds.

I. Pursuant to Section 117(a) of CERCLA, 42 U.S.C. § 9617(a), on April 1, 1990, EPA published, in a major local newspaper of general circulation, a notice and brief analysis of the proposed plan for remedial action, made this plan available to the public, and provided an opportunity for written and oral comments from the public. A 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 for this Site.

J. On September 12, 1990, EPA issued a Record of Decision determining, after a reasonable opportunity for review by the State of South Carolina (the "State") and the State's concurrence, the remedial action to be implemented at the Site. The Record of Decision includes EPA's explanation for any significant differences between the final plan and the proposed plan for remedial action, as well as a responsiveness summary to the public comments. Notice of the final plan for remedial action was published in accordance with Section 117(b) of CERCLA, 42 U.S.C. § 9617.

K. In accordance with Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), on September 24, 1990, EPA notified the State of negotiations with the Defendants for the implementation of the RD/RA for the Site, and EPA has provided

the State with an opportunity to participate in such negotiations and to be a party to this settlement.

L. In accordance with 121(j)(1) of CERCLA, 42 U.S.C. § 9621(j)(1), on September 26, 1990, EPA notified the Department of Interior, as federal natural resources trustee, of negotiations for the implementation of the RD/RA for the Site, and EPA has encouraged the trustee to participate in the negotiations of this Consent Decree.

M. On March 5, 1991, pursuant to Section 117(c) of CERCLA, 42 U.S.C. § 9617 the Regional Administrator issued an Explanation of Significant Differences ("ESD"), explaining a significant change to the final remedial action selected in the ROD and setting forth the reasons for such change. Notice and a brief analysis of the ESD was published in a major local newspaper of general circulation, and a copy of the ESD was made available to the public in the administrative record for this Site.

N. The United States alleges that the Site is a "facility," as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

O. The United States alleges that "hazardous substances," as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), were sent to the Site for treatment or disposal.

P. The United States alleges that the past, present, and potential migration of hazardous substances at or from the Site constitutes an actual or threatened "release," as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

Q. EPA has determined that the actual or threatened release of hazardous substances at or from the Site requires remedial

action under CERCLA, and has determined that the actions required by this Consent Decree are necessary to protect the public health and welfare and the environment.

R. EPA has further determined that the actions required by this Consent Decree are consistent with the NCP.

S. EPA has further determined, based on the information presently available to EPA and in accordance with Sections 104(a)(1) and 122(a) of CERCLA, 42 U.S.C. §§ 9604(a)(1) and 9622(a), that the "Performing Settlers," as defined below, are qualified to perform the RD/RA, and that if the RD/RA is performed according to the terms of this Consent Decree, it will be performed properly and promptly by Performing Settlers.

T. The remedial action selected by the Record of Decision and the ESD and the "Work," as defined herein, to be performed by Performing Settlers shall constitute a response action taken or ordered by the President solely for the purposes of Section 113(j) of CERCLA, 42 U.S.C. § 9613(j).

U. EPA has further determined, in accordance with Section 122 of CERCLA, 42 U.S.C. § 9622, that expeditious remediation of the Site will be facilitated by reaching a final settlement with the "Cash-out Settlers," as defined below, and the "Federal Settling Agencies," as defined below, with respect to their liability for "Covered Matters," as defined specifically in Section VI of this Consent Decree, and further EPA has determined that this settlement as to those Covered Matters is fair, reasonable and in the public interest.

V. The United States alleges that pursuant to Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607, Performing Settlers and the Cash-out Settlers (collectively, the "Settlers"), are jointly and severally liable for injunctive relief and for the reimbursement of all funds expended by the United States that are not inconsistent with the NCP for the investigation, cleanup, enforcement and other response actions relating to the Site.

W. This Consent Decree is made and entered into by and between the United States, as defined in Section IV, Paragraph AA. of this Consent Decree, Allied-Signal Inc., EM Industries Incorporated and Monsanto Company (collectively, the "Performing Settlers"), those other potentially responsible parties listed on Appendix 1 attached to this Consent Decree, and the State of South Carolina, as represented by the South Carolina Department of Health and Environmental Control.

X. The parties to this Consent Decree recognize, and the Court by entering this Consent Decree finds, that implementation of this Consent Decree will expedite cleanup of the Site and will avoid prolonged and complicated litigation among the Parties, and that this Consent Decree is fair, reasonable and in the public interest.

NOW, THEREFORE, it is hereby ORDERED, ADJUDGED, AND DECREED as follows:

II. JURISDICTION

This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331, 1345, 42 U.S.C. §§ 9606,

9607, and 9613(b). This Court also has personal jurisdiction over the Settlers. For purposes of this Consent Decree and the underlying Complaint, the Settlers waive all objections and defenses they have to jurisdiction of the Court or to venue in this District. The Settlers shall not challenge this Court's jurisdiction to enter and enforce this Consent Decree.

III. PARTIES BOUND

A. This Consent Decree applies to and is binding upon the undersigned parties and their agents, successors and assigns. No change in ownership or corporate status of any Settlor, including but not limited to, any transfer of assets or real or personal property, shall in any way alter such Settlor's obligations under this Consent Decree. The undersigned representative of each party to this Consent Decree certifies that he or she is fully authorized by the party or parties whom she or he represents to enter into the terms and conditions of this Consent Decree, to execute this Consent Decree, and legally to bind that party or parties to it.

B. Performing Settlers shall provide a copy of this Consent Decree to all contractors and subcontractors hired to perform the work required by this Consent Decree and to each person representing any Performing Settlor with respect to the Site or said work and shall condition all contracts and subcontracts entered into for performance of such work upon performance 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 related by contract to Performing Settlers, within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

IV. DEFINITIONS

Unless otherwise expressly stated herein, terms used in this Consent Decree which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to those terms in CERCLA or in such regulations. Whenever the terms listed below are used in this Consent Decree and the Exhibits and Appendices attached hereto, the following definitions shall apply:

A. "Cash-out Settlers" shall mean, collectively, those potentially responsible parties listed on Appendix 1 to this Consent Decree.

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

C. "Consent Decree" shall mean this Decree and all Exhibits and Appendices attached hereto, which are by this reference incorporated herein and made a part hereof. In the event of conflict between the provisions in the body of this Decree and any Exhibit or Appendix, this Decree shall control.

D. "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 end of the next working day.

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

F. "Federal Settling Agencies" shall mean, collectively, the United States Army, the United States Air Force, the United States Environmental Protection Agency and the United States Centers for Disease Control.

G. "Future Response Costs" shall mean all costs, including, but not limited to, indirect costs, that the United States incurs in overseeing the Work, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Section XII (Access), and the costs of reviewing or developing plans, reports and other items pursuant to this Consent Decree, verifying the Work, or otherwise implementing or enforcing this Consent Decree. Future Response Costs shall also include all costs, including indirect costs not inconsistent with the NCP, incurred by the United States in connection with the Site between March 1, 1991, and the effective date of this Consent Decree and all interest on the Past Response Costs from September 26, 1990, to the date of the payment of the Past Response Costs.

H. "Hazardous substance" shall mean any substance meeting the definition provided in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

I. "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, including any amendments thereto.

J. "Operation and Maintenance Activities" shall mean all activities required to maintain the effectiveness of the Remedial Action at the Site, as required by the ROD, the Scope of Work and the Operation and Maintenance Plan to be developed by Performing Settlers and approved by EPA pursuant to this Consent Decree, including any additional activities explicitly identified as operation and maintenance activities in, and required by, Section X (Additional Work) and Section IX (EPA Periodic Review).

K. "Paragraph" shall mean a portion of this Consent Decree, contained within a Section of this Consent Decree, and identified by an upper-case letter of the alphabet.

L. "Parties" shall mean the United States and the Settlers.

M. "Past Response Costs" shall mean all costs, including, but not limited to, interest and indirect costs, that the United States incurred with regard to the Site prior to March 1, 1991. For the purposes of this Consent Decree, the Past Response Costs shall not include those costs and the interest thereon awarded to the United States and to the State of South Carolina Department of Health and Environmental Control in connection with the surficial cleanup of the Site under that certain "Amended Judgment in Civil Case," Case Number 3:80-1274-6, entered and filed in this Court on September 23, 1986, as such Judgment may have been amended since that date.

N. "Performing Settlers" shall mean, collectively, Allied-Signal Inc., EM Industries Incorporated and Monsanto Company. In the Scope of Work attached hereto as Appendix 3, Performing Settlers are referred to as the "Settling Defendants."

O. "Plaintiff" shall mean the United States.

P. "Pollutant or contaminant" shall mean any substance defined in Section 101(33) of CERCLA, 42 U.S.C. § 9601(33).

Q. "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).

R. "Record of Decision" or "ROD" shall mean the EPA Record of Decision documenting EPA's selection of the remedial action for the Site which was signed on September 12, 1990, by the Regional Administrator, EPA Region IV, and all attachments thereto, and shall include as well that certain Explanation of Significant Differences signed by the Regional Administrator on March 5, 1991, explaining a significant change to the final remedial action selected in the ROD and setting forth the reasons for such change. A copy of the ROD is attached as Appendix 2 to this Consent Decree.

S. "Remedial Action" shall mean those activities, except Operation and Maintenance Activities, to be undertaken by Performing Settlers to implement the remedy selected under the ROD, as required by the ROD, the Scope of Work and the Remedial Action Work Plan (as defined in Section VIII) as developed by Performing Settlers and approved by EPA pursuant to this Consent Decree.

T. "Remedial Design" shall mean all studies, investigations or surveys conducted and plans and specifications prepared that are necessary to implement the Remedial Action and Operation and Maintenance Activities required by the ROD, the Scope of Work and the Remedial Design Work Plan (as defined in Section VIII) developed by the Performing Settlers and approved by EPA pursuant to this Consent Decree.

U. "Response Costs" shall mean collectively all Past and Future Response Costs.

V. "Scope of Work," "Statement of Work" or "SOW" shall mean the statement of work for implementation of the Remedial Design, the Remedial Action, and the Operation and Maintenance Activities at the Site, as set forth in Appendix 3 attached to this Consent Decree.

W. "Section" shall mean a portion of this Consent Decree identified by a Roman numeral and including one or more paragraphs.

X. "Settlers" shall mean, collectively, the Cash-out Settlers, and Performing Settlers.

Y. "Site" shall be defined as in the NCP and shall mean the SCRDI Bluff Road Superfund Site, located approximately ten miles southeast of the city of Columbia, South Carolina on the north side of State Highway 48 (Bluff Road) in Richland County, as more particularly described in the ROD and shown in figure 2 of the ROD attached as Appendix 2 to this Consent Decree.

Z. "State" shall mean the State of South Carolina, including the agency thereof known as the South Carolina Department of Health and Environmental Control ("DHEC").

AA. "United States" shall mean the United States of America, its departments and agencies, including without limitation the Environmental Protection Agency and the other Federal Settling Agencies.

BB. "Work" shall mean all activities required by this Consent Decree in accordance with Section VIII (Performance of the Work), including without limitation, the Remedial Design, the Remedial Action, and the Operation and Maintenance Activities, and any schedules or plans required to be submitted pursuant thereto, any activities required in Section IX (EPA Periodic Review), including any additional work required under said Section VIII and Section X (Additional Work).

V. GENERAL PROVISIONS

A. Objectives of the Parties

The objectives of the parties in entering into this Consent Decree are: (i) to protect public health, welfare, and the environment from releases or threatened releases of hazardous substances, pollutants and contaminants from the Site by the investigation, development, design, and implementation of remedial actions, by the operations and maintenance of such actions, and by monitoring programs carried out by Performing Settlers, and (ii) to reimburse the Response Costs incurred by the United States.

B. Communication with EPA

All written communications, including, but not limited to, written responses, notifications or reports, provided to EPA pursuant to this Consent Decree, shall be delivered by certified mail or by hand delivery.

C. Effect of Settlement as to the Cash-Out Settlers and Federal Settling Agencies

The execution of this Consent Decree by the Cash-Out Settlers and the Federal Settling Agencies is not an admission of liability with respect to any issue dealt with in this Consent Decree nor is it an admission to the factual allegations set out in the Complaint.

D. Effect of Settlement as to the Performing Settlers

Judgment has been entered against Performing Settlers in connection with surficial cleanup at the Site in the United States District Court for the District of South Carolina in Case Number 3:80-1247-6, referred to herein as "Amended Judgment in Civil Case." While not admitting or acknowledging either liability under, or any fact alleged in, this Consent Decree or the underlying Complaint, Performing Settlers agree not to contest CERCLA liability to the United States in any future proceeding regarding this Site, including without limitation, a proceeding to enforce this Consent Decree, a proceeding to implement any "Amendment(s) to the ROD," as defined in Section X of this Consent Decree or a proceeding to remediate the soil or groundwater contamination at the Site, based on the operative facts stated in this Consent Decree and the underlying Complaint.

Nothing in this Paragraph shall be construed as an admission, waiver, estoppel or bar to the contest of any fact or liability by Performing Settlers in any other future proceeding other than those actions by the United States described in this Paragraph.

E. Commitments by Parties

1. Performing Settlers shall finance and perform all Work at the Site, in accordance with this Consent Decree, including the SOW and all standards, specifications, and schedules set forth therein or developed thereunder, and in a manner consistent with the ROD and the NCP. Performing Settlers shall also reimburse the United States for all its Past Costs and Future Costs as provided in this Consent Decree.

2. The obligations of Performing Settlers to finance and perform the Work and to reimburse the United States for Response Costs under this Consent Decree are joint and several. In the event of the insolvency or other failure of any one or more Performing Settlers to implement the requirements of this Consent Decree, the remaining Performing Settlers shall complete all such requirements.

3. Each Federal Settling Agency and each Cash-out Settlor shall make payment in the amount and in the manner hereinafter provided in Section VI (Cash-out Agreement) of this Consent Decree.

F. Permits and Approvals

1. Pursuant to Section 121(d) of CERCLA, 42 U.S.C. § 9621, all activities undertaken by Performing Settlers pursuant to this Consent Decree shall be performed in

accordance with applicable or relevant and appropriate requirements, as required by the ROD attached to this Consent Decree as Appendix 2. The United States has determined that the obligations and procedures authorized under this Consent Decree are consistent with the authority of the United States under applicable law to establish appropriate remedial action for the Site. The United States has determined that the activities contemplated by this Consent Decree are consistent with the NCP.

2. All activities undertaken by Performing Settlers shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. To the extent provided in Section 121(e), 42 U.S.C. § 9621 of CERCLA and the NCP, no permit shall be required for any portion of the Work conducted entirely on the Site. Where any portion of the Work requires a federal, state, or local permit or approval under CERCLA and the NCP, Performing Settlers shall submit timely applications and requests for any such permits and approvals to the appropriate agency.

3. Performing Settlers shall include in all contracts or subcontracts entered into for Work required under this Consent Decree provisions stating that such contractors or subcontractors, including their agents and employees, shall perform all activities required by such contracts or subcontracts in compliance with all applicable laws and regulations.

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

F. State Involvement

The State shall be provided a reasonable opportunity for review and comment on each of the following:

1. The Remedial Design;
2. Technical data, work plans and reports relating to implementation of the remedy.

VI. CASH-OUT AGREEMENT

A. General

1. The provisions of this Section VI are only applicable to the Federal Settling Agencies and the Cash-out Settlers.

2. Each Federal Settling Agency and each Cash-out Settlor desires to settle its "present liability" with respect to the Site. For the purposes of this Section "present liability" shall mean liability for Past Response Costs and for response costs for the implementation and completion of the remedy selected for the Site in the ROD, including, without limitation, Operation and Maintenance Activities costs and EPA's estimated future oversight costs. Present liability shall not include the costs and interest thereon previously awarded to the United States and to the South Carolina Department of Health and Environmental Control in connection with the surficial cleanup of the Site under that certain "Amended Judgment in Civil Case," Case Number 3:80-1274-6, entered and filed in this Court on September 23, 1986, as such Judgment may have been amended since that date. The United States, including each Federal Settling Agency, and each Cash-out Settlor agree that settlement of this

case without further litigation and without the admission or adjudication of any issue of fact or law is the most appropriate means of resolving this action.

B. Payment

1. Within ten (10) days of EPA approval of the Trust Agreement required by Section XVI of this Consent Decree, each Cash-out Settlor shall pay into the Bluff Road Site Trust Fund (the "Trust Account"), established pursuant to said Section XVI, all amounts required under the calculation of cash-out payments set forth in Appendix 4 of this Consent Decree. Within ninety (90) days of EPA approval of the Trust Agreement required by Section XVI of this Consent Decree, the State of South Carolina, on behalf of DHEC, shall pay into the Trust Account \$15,000.00. Within sixty (60) days of EPA approval of the Trust Agreement required by Section XVI of this Consent Decree, the Federal Settling Agencies shall pay into the Trust Account the amounts denominated on Appendix 4 as "RD/RA Costs" and "Orphans' Share of RD/RA Costs" for each Federal Settling Agency. Within a reasonable period of time after the effective date of this Consent Decree, the Federal Settling Agencies shall cause to be transferred to the EPA Hazardous Substance Superfund, all amounts denominated on Appendix 4 as "Past Costs" and "Orphans' Share of Past Costs" for each Federal Settling Agency. Simultaneously with such transfer, the Federal Settling Agencies shall give notice of such transfer to EPA as provided for in Paragraph B.4 of this Section and EPA shall provide Performing Settlers with a copy of such notice. No reduction, rebate, or reimbursement of

any payments made shall occur as a result of payment into the Bluff Road Site Trust Fund by any participant to the Trust Agreement not a signatory to this Consent Decree.

2. Payment shall be made by the Cash-out Settlers by certified or cashier's check made payable to the Bluff Road Site Trust Fund. Payment shall be made by the Federal Settling Agencies by U.S. Treasury check. Each check shall reference the Site name, the name and address of the payee, and the civil action number of this case.

3. Each payee shall simultaneously send a copy of its check to:

Teresa Harris Atkins
Assistant Regional Counsel
and
Steven M. Sandler
Remedial Project Manager

at the following address:

United States Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

4. No provision of this Consent Decree shall be interpreted as or shall constitute a commitment or requirement that the Settling Federal Agencies obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341.

C. Covenant Not To Sue

1. Subject to the reservations of rights in Paragraph D of this Section, in consideration of the payments that will be made by the Cash-out Settlers under the terms of this Consent Decree, the United States, including, but not limited to, the Federal Settling Agencies, covenants not to sue or to take any

other civil or administrative action against any of the Cash-out Settlers for "Covered Matters." For the purposes of this Section, "Covered Matters" shall include any and all civil liability pursuant to Sections 106 or 107(a) of CERCLA, 42 U.S.C. §§ 9606 or 9607(a), and Section 7003 of RCRA, 42 U.S.C. § 6973, with regard to the Site's present liability as defined in Section VI., Paragraph A.2. These covenants not to sue are conditioned upon complete and satisfactory performance by the Cash-out Settlers of their obligations under this Consent Decree. These covenants not to sue extend to said Cash-out Settlers and do not extend to any other person.

2. In consideration of the United States' covenant not to sue in Item 1 of Paragraph C of this Section, the Cash-out Settlers agree not to assert any claims or causes of action against the United States, including the Federal Settling Agencies, or the Hazardous Substance Superfund, arising out of Covered Matters, or, to seek any other costs, damages, or attorney's fees from the United States arising out of response activities at the Site. Furthermore, the Cash-out Settlers hereby release the United States, including, but not limited to, the Federal Settling Agencies, from all liability for CERCLA response costs, whether under CERCLA Section 107(a)(4)(B) or in contribution under Section 113(f) of CERCLA.

D. Reservation of Rights

1. Notwithstanding any other provision of this Consent Decree, the United States reserves the right to institute proceedings in this action or in a new action seeking to compel

the Cash-out Settlers to perform additional response actions at the Site or to seek reimbursement from the Cash-out Settlers for response costs, and EPA reserves any and all administrative rights it may have against the Federal Settling Agencies regarding such additional response actions or response costs, if, prior to EPA issuance of the certification of completion of the Work pursuant to Section XVII:

- (i) conditions at the Site, previously unknown to the United States, are discovered after the entry of this Consent Decree; or
- (ii) information is received, in whole or in part, after the entry of this Consent Decree, and the EPA Administrator or his delegate finds, based on these previously unknown conditions or this information together with any other relevant information, that the Work is not protective of human health and/or the environment.

2. Notwithstanding any other provision of this Consent Decree, the United States reserves the right to institute proceedings in this action or in a new action seeking to compel Cash-out Settlers to perform additional response actions at the Site or to compel the Cash-out Settlers to reimburse the United States for response costs, and EPA reserves any and all administrative rights it may have against the Federal Settling Agencies regarding such additional response actions and response costs, if, subsequent to certification of completion of the Work pursuant to Section XVII of this Consent Decree:

- (i) conditions at the Site, previously unknown to the United States, are discovered after the certification of completion; or
- (ii) information is received, in whole or in part, after the certification of completion, and the EPA Administrator or his delegate finds, based on these previously unknown conditions or this

information together with other relevant information, that the Work is not protective of human health and/or the environment.

3. For purposes of Item 1 of this Paragraph D, the information received and the conditions known to the United States shall include that information and those conditions set forth in the Record of Decision for the Site and the administrative record supporting the Record of Decision. For purposes of Item 2 of this Paragraph D, the information received by and the conditions known to the United States shall include that information and those conditions set forth in the Record of Decision and any information received by the United States pursuant to the requirements of this Consent Decree.

4. Nothing in this Section is intended to be nor shall it be construed as a release or covenant not to sue for any claim or cause of action, administrative or judicial, civil or criminal, past or future, in law or in equity, which the United States may have against any of the Cash-out Settlers for:

(i) any liability as a result of failure to make the payments required by this Consent Decree; and

(ii) any matters not expressly included in Covered Matters, including, without limitation, any liability arising from the past, present, or future disposal, release or threat of release of hazardous substances outside of the Site and not attributable to the Site, liability for the disposal of any hazardous substances taken from the Site, liability for damages for injury to, destruction of, or loss of natural resources, criminal liability, and costs and interest thereon awarded to the United States in connection with the surficial cleanup of the Site under that certain "Amended Judgment in Civil Case," Case Number 3:80-1274-6, entered and filed in this Court on September 23, 1986, as such Judgment may have been amended since that date, and not

reimbursed pursuant to Section XIX of this Consent Decree.

E. Contribution Protection

Subject to the reservations of rights in Paragraph D of this Section, the United States agrees that by entering into and carrying out the terms of this Consent Decree, each Cash-out Settlor will have resolved its liability to the United States, including, but not limited to, the Federal Settling Agencies, for Covered Matters as defined in Section VI of this Consent Decree, pursuant to Section 122(g)(5) of CERCLA, 42 U.S.C. § 9622(g)(5), and shall not be liable for claims for contribution for those Covered Matters. The Cash-out Settlers acknowledge and agree that the United States, including without limitation the Federal Settling Agencies, shall be and is entitled to the same contribution protection with respect to Covered Matters as are the Cash-out Settlers. Cash-out Settlers and Federal Settling Agencies acknowledge that Performing Settlers are entitled to contribution protection for "Covered Matters, as defined in Section XXIV of this Consent Decree.

VII. REMEDIAL PROJECT MANAGER/PROJECT COORDINATORS

A. Within fifteen (15) calendar days of the lodging of this Consent Decree, Performing Settlers and EPA shall notify each other, in writing, of the name, address and telephone number of Performing Settlers' designated Project Coordinator and Alternate Project Coordinator, and the EPA's Project Coordinator and Alternate Project Coordinator who shall be a Remedial Project Manager or On-Scene Coordinator (RPM/OSC). Performing Settlers' Project Coordinator shall have primary responsibility for

implementation of the Work at the Site. If a Project Coordinator initially designated is changed by the United States or Performing Settlers, the identity of the successor shall be given to the other party at least five (5) working days before the change.

B. Plaintiff may designate other representatives, including federal and state employees, and federal and state contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree provided that the designation of such representative is not inconsistent with the NCP. The EPA Project Coordinator shall have the authority lawfully vested in an RPM/OSC by the National Contingency Plan, 40 C.F.R. Part 300. This includes without limitation the authority to halt, conduct, or direct any work required by this Consent Decree and to take any necessary response action when he or she determines that conditions at the Site may present an imminent and substantial endangerment to public health or welfare or the environment.

C. The absence of the EPA Project Coordinator from the Site shall not be cause for stoppage or delay of Work.

VIII. PERFORMANCE OF THE WORK BY PERFORMING SETTLORS

A. All aspects of the Work to be performed by Performing Settlers pursuant to this Consent Decree shall be under the direction and supervision of a qualified contractor ("Supervising Contractor") who shall be a qualified professional engineer or geologist, with expertise in hazardous site cleanup, the selection of which shall be subject to approval by EPA. Within

fifteen (15) days after the lodging of this Consent Decree, Performing Settlers shall submit to EPA in writing, the name, title, and qualifications of the Supervising Contractor proposed to be used in carrying out the Work to be performed pursuant to this Consent Decree. EPA shall notify Performing Settlers of its approval or disapproval, in writing, within twenty (20) calendar days of its receipt of this submittal by Performing Settlers.

If EPA disapproves of the selection of any Supervising Contractor, Performing Settlers shall submit a list of contractors to EPA within fifteen (15) calendar days of receipt of EPA's disapproval of the contractor previously selected. EPA shall, within twenty (20) calendar days of receipt of the list, provide written notice of the contractors that it approves. Performing Settlers may at their election select any approved contractor from that list and shall notify EPA of the name of the contractor selected within fifteen (15) calendar days of EPA's designation of approved contractors.

If, at any time thereafter, Performing Settlers propose to change Supervising Contractors, Performing Settlers shall give such notice to EPA and shall obtain approval from EPA before the new Supervising Contractor performs any Work under this Consent Decree.

B. Scope of Work

Appendix 3 to this Consent Decree provides a statement of work (Scope of Work or SOW) for the completion of remedial design and remedial action and operation and maintenance work at

the Site. The Scope of Work is incorporated into and made an enforceable part of this Consent Decree.

C. Remedial Design

1. Performing Settlers agree to commence and perform the scoping and remedial design work as described in the SOW as a contractual obligation effective upon the lodging of this Consent Decree with the Court. Performing Settlers shall perform such remedial design work regardless of whether this Consent Decree is entered by the Court; provided, however, that Performing Settlers shall not be obliged to reimburse any costs incurred by EPA for oversight of design activities unless and until this Consent Decree has been entered; and provided further that all such costs incurred by EPA prior to the entry of the Consent Decree shall be reimbursed after entry in accordance with Section XIX.

2. Within thirty (30) days after approval of the Supervising Contractor by EPA, Performing Settlers, their Supervising Contractor and EPA shall meet as required under Task I, Scoping of the SOW. Within forty-five (45) days after this meeting, Performing Settlers shall submit for review, modification and/or approval by EPA, a work plan for the design of the remedial action at the Site ("Remedial Design Work Plan" or "RD Work Plan"). The RD Work Plan shall be developed in accordance with the SOW and be consistent with the ROD, EPA Superfund Remedial Design and Remedial Action Guidance (June, 1986) and amendments thereto, and any additional guidance documents identified by EPA in writing after the lodging of this Consent Decree but in advance of the development of the RD Work

Plan. Nothing herein shall limit the right of Performing Settlers to dispute the application of any guidance document. As approved by EPA, the RD Work Plan shall be incorporated into and become enforceable under this Consent Decree.

3. The RD Work Plan submittal shall include, but not be limited to, a schedule for submittal of the following project plans: (1) a Sampling and Analysis Plan which includes a Field Sampling and Analysis Plan and a Quality Assurance Project Plan; and (2) a Health and Safety Plan which includes a Contingency Plan. The RD Work Plan shall also include a schedule for implementation of the RD tasks identified in the SOW, submittal of RD reports, and schedule for the development of a Remedial Action Work Plan.

4. Upon approval of the RD Work Plan by EPA, Performing Settlers shall implement the Work Plan in accordance with the schedule therein. Unless otherwise directed by EPA, Performing Settlers shall not commence field activities until approval by EPA of the RD Work Plan.

D. Remedial Action

1. Concurrent with submittal of the Intermediate Design, as defined in the SOW, Performing Settlers shall submit for review, modification, and/or approval by EPA, a work plan for the performance of the remedial action at the Site ("Remedial Action Work Plan" or "RA Work Plan"). The RA Work Plan shall be developed in accordance with the SOW and be consistent with the ROD and EPA Superfund Remedial Action Guidance (June, 1986) and amendments thereto, and any additional guidance documents

identified by EPA in writing after the lodging of this Consent Decree but in advance of the development of the RA Work Plan. Nothing herein shall limit the right of Performing Settlers to dispute the application of any guidance document. As approved by EPA, the RA Work Plan shall be incorporated into and become enforceable under this Consent Decree.

2. The RA Work Plan shall include, but not be limited to, the following: (1) a Sampling and Analysis Plan which includes a Field Sampling and Analysis Plan and a Quality Assurance Project Plan; and (2) a Health and Safety Plan which includes a Contingency Plan. The Remedial Action Work Plan shall also include a schedule for implementation of all remedial action tasks identified in the SOW and submittal of RA reports.

3. Upon approval by EPA of the RA Work Plan and all Remedial Design documents, Performing Settlers shall implement the RA Work Plan in accordance with the schedules therein. Unless otherwise directed by EPA, Performing Settlers shall not commence field activities until approval by EPA of the RA Work Plan.

E. Performance Standards

1. The Work performed by Performing Settlers pursuant to this Consent Decree shall achieve the clean-up criteria set forth in Section 6.0 of the Record of Decision (the "Performance Standards"), Appendix 2, except as otherwise provided in Paragraph C of Section X (Additional Work).

F. Warranties

Performing Settlers acknowledge and agree that nothing in this Consent Decree, the SOW, the Remedial Design, or Remedial Action Work Plans to be developed, constitutes or will constitute a warranty or representation of any kind by Plaintiff that compliance with the work requirements set forth in the SOW and the Remedial Design and Remedial Action Work Plans will achieve the Performance Standards. Performing Settlers' compliance with the work requirements shall not foreclose Plaintiff from seeking performance of all terms and conditions of this Consent Decree, including but not limited to the achievement of the applicable Performance Standards; provided, however, that Performing Settlers shall not be liable for stipulated penalties for failure to achieve applicable Performance Standards (as defined in Paragraph E of this Section) notwithstanding, in and of itself, the Performing Settlers timely and proper implementation of the Work according to the Statement of Work, Remedial Design Work Plan and the Remedial Action Work Plan.

IX. U.S. EPA PERIODIC REVIEW TO ASSURE PROTECTION OF HUMAN HEALTH AND ENVIRONMENT

A. Performing Settlers shall conduct any studies and investigations as requested by EPA in order to permit EPA to conduct reviews at least every five years as required by Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and any applicable regulations.

B. If required by Sections 113(k)(2) or 117 of CERCLA, Performing Settlers and 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 any public comment period. If a public comment period is required, after the period for submission of comments is closed, the Regional Administrator, EPA Region IV, or his/her delegate will determine in writing whether further response actions are appropriate. The obligations of Performing Settlers to implement any additional response actions which EPA determines are appropriate are set forth in Section X (Additional Work) of this Consent Decree.

X. ADDITIONAL WORK

A. If EPA determines that additional response actions are necessary or appropriate to:

- (1) meet Performance Standards as defined in Section VIII, Paragraph E;
- (2) carry out the remedy selected in the ROD; or
- (3) assure protection of human health and/or the environment;

then Performing Settlers shall be obligated by this Consent Decree to perform such additional response actions except as limited by Paragraph C below, or Section XXIV (Covenant Not to Sue). Notification of such additional response actions shall be provided to the Project Coordinator for the Performing Settlers.

B. Where EPA determines that such additional response actions are necessary or appropriate, Performing Settlers shall submit a work plan for the additional response actions in

accordance with Section VIII of this Consent Decree, within 30 days of receipt of notice from EPA pursuant to Paragraph A. above, or such longer time as may be specified by EPA. The work plan shall conform to the applicable requirements of Section VIII of this Consent Decree. Upon approval by EPA of the plan in accordance with Section XIV (Submissions Requiring Agency Approval) of this Consent Decree, Performing Settlers shall implement the work plan for additional response actions in accordance with the schedule contained therein. Nothing contained in this Paragraph or elsewhere in this Section is intended to or shall be construed as altering the obligations of Performing Settlers to take action under Section XVIII (Endangerment and Future Response) of this Consent Decree.

C. If EPA determines that additional response actions are necessary to meet Performance Standards as defined in Section VIII, Paragraph E; to carry out the remedy selected in the ROD; or to assure protection of human health and/or the environment, and EPA issues any "Amendment(s) to the ROD," as hereinafter defined, to address the additional response actions, the Performing Settlers shall not be obligated by this Consent Decree to perform those additional response actions. For the purposes of this Consent Decree, Amendment(s) to the ROD shall be defined as (i) an amendment to the ROD attached hereto as Appendix 2, which fundamentally alters the basic features of the remedy selected in such ROD with respect to scope, performance or cost; or (ii) any new Record of Decision issued by EPA with respect to the Site. Notwithstanding the foregoing, for the purposes of

this Section, Amendment(s) to the ROD shall not include an amendment which sets less stringent Performance Standards than those set forth in the ROD attached hereto as Appendix 2. At the time that EPA issues any Amendment(s) to the ROD, EPA shall follow all laws and regulations applicable to the issuance of such Amendment(s) to the ROD. Performing Settlers hereby reserve all rights, as provided in applicable laws and regulations, to participate in the issuance of any such Amendment(s) to the ROD.

D. Any additional response actions that Performing Settlers determine are necessary to meet the Performance Standards or to carry out the remedy selected in the ROD shall be subject to approval by EPA, after reasonable opportunity for review and comment by the State, and, if authorized by EPA, shall be completed by Performing Settlers in accordance with plans, specifications and schedules approved by EPA pursuant to Section XIV (Submissions Requiring Agency Approval).

E. In the event that EPA issues any Amendment(s) to the ROD, Plaintiff expressly reserves all of its rights under CERCLA or any other applicable authority with regard to the further response actions specified in such Amendment(s) to the ROD, including, but not limited to, the right, at EPA's sole discretion, to implement such response actions and pursue reimbursement of the costs of the actions from Performing Settlers; the right to seek to compel Performing Settlers to perform the additional response actions; or the right to enter into negotiations with Performing Settlers under CERCLA

Section 122, 42 U.S.C. § 9622 for, Performing Settlers to implement the Amendment(s) to the ROD.

F. Performing Settlers may, subject to the unreviewable discretion of EPA, elect to perform the additional response actions specified in the Amendment(s) to the ROD under this Consent Decree. Performing Settlers shall notify EPA of their desire to perform such additional response actions specified in an Amendment(s) to the ROD within thirty (30) days of receipt of notice of the issuance of such Amendment(s) to the ROD or such longer time as may be specified by EPA. Within thirty (30) days after its receipt of Performing Settlers' notification, EPA shall notify Performing Settlers whether EPA approves or disapproves of Performing Settlers' undertaking of such additional response actions under this Consent Decree.

G. Should EPA approve Performing Settlers request to perform the additional response actions specified in an Amendment(s) to the ROD under this Consent Decree, Performing Settlers shall, have thirty (30) days from the date of approval or such longer time as may be specified by EPA in which to submit to EPA a work plan for the additional response actions. The work plan shall conform to the requirements for work plans set forth in Section VIII (Performance of the Work by Performing Settlers) of this Consent Decree, unless otherwise directed by EPA. Upon approval of the work plan by EPA pursuant to Section XIV (Submissions Requiring Agency Approval) of this Consent Decree, Performing Settlers shall implement the plan in accordance with the schedule contained therein.

H. In the event that EPA determines that Performing Settlers may implement the Amendment(s) to the ROD under this Consent Decree, the Decree shall be modified pursuant to Section XXXI (Modification) hereof, and all provisions of this Decree, including Section XXIII (Stipulated Penalties) shall apply to the implementation of such Amendment(s) to the ROD.

I. The issuance of an Amendment(s) to the ROD shall in no way alter the obligations of Performing Settlers under this Consent Decree. Performing Settlers shall continue to implement the response actions set forth in the ROD attached as Appendix 2, the SOW attached as Appendix 3, and all approved work plans developed pursuant to Section VIII of this Consent Decree in the manner provided for under this Decree, unless and until a modification of this Consent Decree or specific direction by EPA alters their obligation to do so. Any failure of Performing Settlers to carry out their obligations under this Decree shall result in the accrual of stipulated penalties pursuant to Section XXIII, hereof.

J. Performing Settlers may invoke the procedures set forth in Section XXII (Dispute Resolution) to dispute determinations by EPA under Paragraphs A through C above. Such disputes shall be deemed issues pertaining to the selection or adequacy of response actions and shall be resolved pursuant to the Paragraphs A to D of Section XXII of this Consent Decree.

XI. QUALITY ASSURANCE, SAMPLING AND DATA ANALYSIS

A. Performing Settlers shall use quality assurance, quality control, and chain of custody procedures in accordance

with EPA's "Interim Guidelines and Specifications For Preparing Quality Assurance Project Plan" (QAMS-005/80) and the "EPA Region IV Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual" (U.S. EPA Region IV, Environmental Services Division, April 1, 1986) and subsequent amendments to such guidelines upon notification to Performing Settlers of such amendment by EPA. Amended guidelines shall apply only to procedures conducted after such notification. Prior to the commencement of any monitoring project under this Consent Decree, Performing Settlers shall submit for review, modification and/or approval by EPA, a Quality Assurance Project Plan ("QAPP") that is consistent with applicable guidelines. The parties to this Consent Decree waive any objection as to the admissibility into evidence (without waiving any objection as to weight and relevance) of sampling data generated consistent with the QAPP(s) in any proceeding under Section XXII of this Decree. Performing Settlers shall assure that EPA personnel or authorized representatives are allowed access to any laboratory utilized by Performing Settlers in implementing this Consent Decree.

B. Performing Settlers shall make available to EPA the results of all sampling and/or tests or other data generated by Performing Settlers with respect to the implementation of this Consent Decree.

C. At the request of EPA, Performing Settlers shall allow split or duplicate samples to be taken by EPA, and/or their authorized representatives, of any samples collected by Performing Settlers pursuant to the implementation of this

Consent Decree. Performing Settlers shall notify EPA not less than fourteen (14) days in advance of any sample collection activity. In addition, EPA shall have the right to take any additional samples that EPA deems necessary. Performing Settlers shall be allowed split samples of any such additional samples.

D. Performing Settlers shall ensure that the laboratory(ies) utilized by Performing Settlers for analyses participates in an EPA quality assurance/quality control program equivalent to that which is followed by EPA and which is consistent with EPA document QAMS-005/80. In addition, EPA may require Performing Settlers to submit data packages equivalent to those generated in the EPA Contract Laboratory Program (CLP) and may require laboratory analysis by Performing Settlers of performance samples (blank and/or spike samples) in sufficient number to determine the capabilities of the laboratory.

E. Notwithstanding any provision of this Consent Decree, the United States hereby retains all of its information gathering, inspection and enforcement authorities and rights under CERCLA, RCRA, and any other applicable statute or regulation.

XII. ACCESS

A. From the date of lodging of this Consent Decree until EPA certifies completion of the Work pursuant to Section XVII, the United States and its representatives, including EPA and its contractors, shall have access at all times to the Site and any property to which access is required for the implementation of this Consent Decree, or to conduct actions

authorized under CERCLA to the extent access to the property is controlled by or available to Performing Settlers, for the purposes of conducting any activity authorized by or related to this Consent Decree, including, but not limited to:

1. Monitoring the Work or any other activities taking place on the property;

2. Verifying any data or information submitted to the United States;

3. Conducting investigations relating to contamination at or near the Site;

4. Obtaining samples;

5. Assessing the need for or planning and implementing additional remedial or response actions at or near the Site;

6. Inspecting and copying records, operating logs, contracts, or other documents required to assess Performing Settlers' compliance with this Consent Decree; and

7. Using a camera, sound recording, or other documentary type of equipment.

B. To the extent that the Site or any other area where work is to be performed under this Consent Decree is owned or controlled by persons other than Performing Settlers, Performing Settlers, upon the request of the United States, shall use their best efforts to secure from such persons access for Performing Settlers, as well as for EPA and authorized representatives or agents of EPA, as necessary to effectuate this Consent Decree. If access is not obtained within thirty (30) days following such

request by the United States, Performing Settlers shall promptly notify the United States in writing. The United States may thereafter assist Performing Settlers in obtaining access. Performing Settlers shall, in accordance with Section XIX, herein, reimburse the United States for all costs incurred by it in obtaining access, whether incurred before or after any request to the United States by Performing Settlers to assist Performing Settlers in obtaining access, including but not limited to, attorneys' fees and the amount of just compensation and costs incurred by the United States in obtaining access.

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

XIII. REPORTING REQUIREMENTS

A. Performing Settlers shall submit to EPA and the State written monthly progress reports which: (1) describe the actions which have been taken toward achieving compliance with this Consent Decree during the previous month; (2) include a summary of results of validated sampling and tests and all other data received by Performing Settlers during the previous month; (3) identify all plans, reports, and deliverables required by this Consent Decree submitted during the previous month; (4) describe all actions, including data collection and implementation of workplans, which are scheduled for the next month, and provide other information relating to the progress of the work as deemed necessary by EPA, including, but not limited to, critical path

diagrams, Gantt charts and Pert charts; and (5) include information regarding percentage of completion and unresolved delays, encountered or anticipated, that may affect the future schedule for implementation of the Scope of Work and/or RD or RA Work Plans, and a description of efforts made to mitigate those delays or anticipated delays. Notwithstanding the foregoing, upon EPA's request, Performing Settlers shall make available all sampling and/or test results or other data generated by Performing Settlers and summarized in the monthly progress reports, including, without limitation, all raw data of sampling and tests. The progress reports required under this Paragraph are to be submitted to EPA and the State by the tenth day of every month following the effective date of this Consent Decree until certification of completion of the Work pursuant to Section XVII, unless otherwise directed in writing by EPA. In addition, EPA may request periodic briefings by Performing Settlers to discuss the progress of the Work.

B. If during the performance of the Work by Performing Settlers, an event occurs that Performing Settlers are required to report pursuant to Section 103 of CERCLA or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), Performing Settlers shall promptly orally notify the EPA Project Coordinator. In the event that the EPA Project Coordinator is unavailable, Performing Settlers shall inform the Superfund Emergency Response and Removal Branch, Region IV, United States Environmental Protection Agency. These reporting requirements are in addition to the reporting required by Section 103 of

CERCLA or Section 304 of EPCRA. Within ten (10) days of the onset of such an event, Performing Settlers shall furnish to Plaintiff a written report setting forth the events which occurred and the measures taken, and to be taken, in response thereto. Performing Settlers shall be deemed in compliance with this requirement of the Consent Decree if the report submitted meets the requirements of Section 304(b)(2) of EPCRA and states the actions taken to respond to the event that the Performing Settlers anticipate will be taken in response to the event. Within thirty (30) days of the conclusion of such an event, Performing Settlers shall submit a report setting forth all actions taken. Performing Settlers shall be deemed in compliance with this requirement of the Consent Decree if the report submitted meets the requirements of Section 304(c) of EPCRA.

XIV. SUBMISSIONS REQUIRING AGENCY APPROVAL

A. Upon receipt of any plan, report or other item which is required to be submitted for approval pursuant to this Consent Decree, EPA shall either: (1) approve the submission; or (2) disapprove the submission, notifying Performing Settlers of deficiencies. If such submission is disapproved, EPA shall either (1) notify Performing Settlers that EPA will modify the submission to correct the deficiencies; or (2) direct Performing Settlers to modify the submission to correct the deficiencies. Notwithstanding the foregoing, provided Performing Settlers make a good faith submission, then EPA shall not exercise its option to unilaterally modify any good faith submission unless and until

Performing Settlers have been given one opportunity to correct the deficiencies identified in EPA's notice.

B. In the event of approval or EPA modification, Performing Settlers shall proceed to take any action required by the plan, report, or other item, as approved or modified.

C. Upon receipt of a notice of disapproval and notification directing modification, Performing Settlers shall, within thirty (30) days, correct the deficiencies and resubmit the plan, report, or other item for approval. Notwithstanding the notice of disapproval, Performing Settlers shall proceed to take any action required by any nondeficient portion of the submission.

D. If, upon resubmission, the plan, report, or item is not approved by EPA, Performing Settlers shall be deemed to be in violation of this Consent Decree and stipulated penalties shall begin to accrue pursuant to Section XXIII of this Consent Decree.

Stipulated penalties shall begin to accrue on the date on which Performing Settlers must resubmit the plan, report, or item to EPA.

E. The time periods established for submission or resubmission of any plan, report or other item shall be practicable from an engineering perspective and appropriate given all circumstances affecting the Site and the Work to be performed under this Consent Decree. In the event of any dispute regarding the time established for any such submission or resubmission, such practicability and appropriateness will be given due consideration in any dispute resolution regarding such issue

pursuant to Section XXII of this Consent Decree (Dispute Resolution).

F. The provisions of this Consent Decree shall govern all proceedings regarding the Work performed pursuant to this Consent Decree. In the event of any inconsistency between this Consent Decree and any required deliverable submitted by Performing Settlers, the inconsistency will be resolved in favor of this Consent Decree.

XV. ASSURANCE OF ABILITY TO COMPLETE WORK

A. Performing Settlers shall demonstrate their ability to complete the Work and to pay all claims that arise from the performance of the Work including any obligation pursuant to Section XX, Paragraph C., by obtaining, and presenting to EPA for approval within thirty (30) days of the entry of this Consent Decree, one of the following: (1) performance bond; (2) letters of credit; (3) guarantee by a third party; or (4) internal financial information sufficient to demonstrate to Plaintiff's satisfaction that Performing Settlers have sufficient net assets to complete the Work. Plaintiff will have ninety (90) days from the receipt of the information or other Settlers assurance to make a determination of the adequacy of the financial assurance and to communicate that determination to Performing Settlers. If Performing Settlers seek to demonstrate ability to complete the Work by means of internal financial information, it shall resubmit such information annually, on the anniversary of the effective date of this Consent Decree. In the event that Plaintiff determines that such internal financial information is

inadequate, Performing Settlers shall, within thirty (30) days of receipt of written notice of Plaintiff's determination, obtain and present to EPA for approval one of the other three forms of financial assurance listed above. Performing Settlers' lack of ability to demonstrate financial ability to complete Work shall not excuse performance of this Consent Decree or any term thereof.

XVI. TRUST FUND

A. Within ten (10) days following the entry of this Consent Decree, Performing Settlers shall present to EPA for approval a fully executed trust agreement (the "Trust Agreement") establishing the Bluff Road Site Trust Fund (the "Trust Fund"). The Trust Agreement shall confer upon the Trustee all powers and authorities necessary to finance the obligations of Performing Settlers under this Consent Decree. Within ten (10) days of approval of the Trust Agreement by EPA, Performing Settlers shall file a fully executed Trust Agreement with the Court. Performing Settlers shall make all necessary payments to fully fund the Trust Agreement in the manner and according to the schedule set forth in the Trust Agreement. Money paid into the Trust Fund by Settlers shall be used by Performing Settlers solely to pay proper and necessary expenses of the Work to be conducted pursuant to this Consent Decree, as well as payments required pursuant to Section XIX, including expenses of administering the Trust. The Trust Fund may not be used to pay stipulated penalties pursuant to Section XXIII.

B. Notwithstanding anything in the Trust Agreement, Settlers shall be responsible for compliance with this Consent Decree. Performing Settlers shall provide EPA with written notice at least ten (10) days in advance of any proposed change in the Trust Agreement or the Trustee.

C. The Trust Agreement shall provide that the Trustee will, within sixty (60) days of his/her appointment and every ninety (90) days thereafter, submit to Performing Settlers and EPA financial reports that include cash flow projections showing the level of funds that will be necessary to pay for the obligations of Performing Settlers under this Consent Decree for the next ninety (90) days and the amount of money currently in the Trust Fund. If the amount of money in the Trust Fund is less than the amount projected in the Trustee's report to be needed for the next ninety (90) days, Performing Settlers shall, within thirty (30) days of issuance of the Trustee's report, deposit into the Trust Fund amounts sufficient to bring the level of the Trust Fund up to that projected amount. Performing Settlers shall in any event make payments to the Trust Fund when and to the extent necessary to ensure the uninterrupted progress and timely completion of the Work. Any money remaining in the Trust Fund upon certification by Plaintiff that all of the Work has been satisfactorily completed and that all response costs have been paid shall be disbursed in accordance with the terms of the Trust Agreement.

D. The United States promptly shall make available to Performing Settlers for payment of proper and necessary expenses

of the Work the monies it receives, under the AOC, as defined in Paragraph 3 of Section I of this Consent Decree, for "remedial design and remedial action (RD/RA) costs," "operation and maintenance (OM) costs," and the "share attributable to insolvent or bankrupt companies," all as more specifically defined in and determined pursuant to the applicable sections of the ACC, including, without limitation, Section XXIII, entitled "Credit For Expenditures Made Pursuant to this Order."

XVII. CERTIFICATION OF COMPLETION

A. Within ninety (90) days after Performing Settlers conclude that the Work has been fully performed, Performing Settlers shall so notify the United States and EPA by submitting a certified written report by a registered professional engineer or geologist stating that all such activities have been completed in full satisfaction of the requirements of this Consent Decree. If EPA determines that the Work or any portion thereof has not been completed in accordance with this Consent Decree, EPA shall notify Performing Settlers in writing of the activities that must be done to complete the Work and shall set forth in the notice a schedule for performance of the activities. Performing Settlers shall perform all Work described in the notice in accordance with the specifications and schedules established therein.

B. If EPA concludes, following the initial or any subsequent notification of completion by Performing Settlers, that the Work has been fully performed in accordance with this Consent Decree, EPA shall so certify in writing to Performing Settlers. This certification shall constitute the "certification

of completion of the Work" for purposes of this Consent Decree. EPA shall respond to any notification of completion by Performing Settlers under Paragraphs A or B of this Section, within one hundred and thirty days.

XVIII. ENDANGERMENT AND FUTURE RESPONSE

A. In the event of any action or occurrence during the performance of the Work which causes or threatens a release of a hazardous substance, pollutant or contaminant that constitutes an emergency situation or may present an imminent and substantial endangerment to public health or welfare or the environment, Performing Settlers shall immediately take all appropriate action to prevent, abate, or minimize such release or endangerment. Performing Settlers shall immediately notify the Project Coordinator, or, if the Project Coordinator is unavailable, the EPA Superfund Emergency Response and Removal Branch, Region IV. Performing Settlers shall take such action in accordance with all applicable provisions of the Health and Safety/Contingency Plan developed pursuant to the SOW. In the event that Performing Settlers fail to take appropriate response action as required by this Section, and EPA take such action instead, Performing Settlers shall reimburse all cost of the response action not inconsistent with the RFP. Payment of such response costs shall be made in the manner described in Section XIX, within thirty (30) days of Performing Settlers' receipt of demand for payment.

B. Nothing in the preceding Paragraph shall be deemed to limit the power and authority of the United States, or this Court to take, direct, or order all appropriate action to protect human

health and/or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances on, at, or from the Site.

C. Nothing in this Section XVIII in this Consent Decree is intended to waive Performing Settlers rights under Section 107 of CERCLA, 42 U.S.C. § 9607(b).

XIX. REIMBURSEMENT OF RESPONSE COSTS

A. Within 15 days of the approval of the Trust Agreement, Performing Settlers shall jointly and severally pay to EPA \$933,091.06 in the form of a certified check or checks made payable to "EPA Hazardous Substance Superfund," and referencing CERCLA Number 15 and DOJ Case Number 90-7-1-61A, in reimbursement of Past Response Costs. The parties acknowledge that the sum of \$933,091.06 does not include, and Performing Settlers are not obligated hereunder to pay the Past Costs and Orphans' Share of Past Costs, as set forth in Appendix 4 to this Decree, which the Federal Settling Agencies are obligated to pay directly into the Hazardous Substance Superfund pursuant to Section VI of this Consent Decree. Notwithstanding the foregoing, if any Federal Settling Agency listed in Appendix 4 of this Consent Decree fails to execute this Consent Decree, then Past Response Costs shall include, and Performing Settlers shall be liable hereunder for, the amounts attributable to such Federal Settling Agency in Appendix 4 for Past Costs and Orphans' Share of Past Costs. The certified check(s) shall be forwarded to the United States Environmental Protection Agency, Region IV, ATTENTION: Superfund Accounting, P.O. Box 100142, Atlanta, Georgia 30384. Copies of

the check(s) and any transmittal letter(s) shall be sent to the Department of Justice and the EPA pursuant to the notice provisions of Section XXVIII.

B. Performing Settlers shall, jointly and severally, reimburse the United States for all Future Response Costs, not inconsistent with the NCP, incurred by the United States. Any necessary summaries, including, but not limited to EPA's certified Agency Financial Management System summary data (SPUR Reports), or such other summary as certified by EPA, shall serve as basis for payment demands. The United States shall send Performing Settlers a demand for payment of such costs on an annual basis, with the demand to be made as soon as practicable after the anniversary date of the entry of this Consent Decree. Payments shall be made in the manner set forth in Paragraph A of this Section within thirty (30) days of Performing Settlers' receipt of each demand for payment. Performing Settlers may request cost documentation regarding any demand for payment hereunder, within ten (10) days of receipt of the demand, and payments shall be due within thirty (30) days of receipt by Performing Settlers of that cost documentation. Performing Settlers may request, and EPA shall provide, cost documentation in accordance with EPA's existing policy at the time of the request. Information provided pursuant to this paragraph is subject to the provisions of 5 U.S.C. § 552 and 40 C.F.R. Part 2.

C. Copies of checks paid pursuant to Paragraph B of this Section, and any accompanying transmittal letters, shall be sent to the United States as provided in Section XXVIII.

Additionally, copies of check(s) paid pursuant to Paragraphs A and B, and accompanying transmittal letter(s), shall be sent to the office of the United States Attorney, the District of South Carolina, Columbia Division.

D. Performing Settlers may contest payment of any Future Response Cost under this Section if they determine that EPA has made an accounting error or if they allege that a cost item that is included represents costs incurred for efforts undertaken in a manner that was inconsistent with the NCP. Such objection shall be made in writing within thirty (30) days of receipt of EPA's demand for payment or within thirty (30) days of receipt of cost documentation whichever time is later, and must be sent to the United States pursuant to Section XXVIII. Any such objection shall specifically identify the contested Future Response Cost and the basis for the objection. In the event of an objection, the Performing Settlers shall within the thirty (30) day period remit a certified or cashier's check for an amount covering any non-contested Future Response Cost to the United States in the manner described in Paragraphs A and C of this Section. Simultaneously Performing Settlers shall initiate the dispute resolution procedures in Section XXII. If the United States prevails in the dispute, within five days of the resolution of the dispute, Performing Settlers shall pay to the United States the disputed monies and accrued interest in the manner described in Paragraphs A and C of this Section. The dispute resolution procedures set forth in Section XXII shall be the exclusive mechanisms for resolving disputes regarding Performing Settlers'

obligation to reimburse the United States for its Future Response Costs.

E. In the event that the payments required by this Consent Decree are not timely made, Performing Settlers shall pay interest on the unpaid balance at the rate established pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607. Payments made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiff by virtue of Performing Settlers' failure to make timely payments under this Section.

XX. INDEMNIFICATION AND INSURANCE

A. The United States does not assume any liability for entering into this agreement or for designating Performing Settlers as EPA's authorized representatives under Section 104(e) of CERCLA, 42 U.S.C. § 9604(e). Performing Settlers shall indemnify and save and hold harmless the United States, its officials, agents, employees, contractors, or representatives from any and all claims or causes of action arising from or on account of acts or omissions of Performing Settlers, their officers, 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 Performing Settlers in carrying out activities pursuant to this Consent Decree. Neither Performing Settlers nor any such contractor shall be considered an agent of the United States.

B. Performing Settlers waive, and shall indemnify and hold harmless the United States with respect to any claims for damages or reimbursement from the United States 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 Performing Settlers and any person for performance of work on or relating to the Site, including claims due to construction delays. Nothing in Paragraphs A or B of this Section XX shall be construed as or deemed a waiver of Performing Settlers' rights to pursue an action against the United States under the Federal Tort Claims Act or protections under 107(d) of CERCLA, 42 U.S.C. § 9607(d).

C. No later than ten (10) days prior to commencing any Work, Performing Settlers shall secure, and shall maintain until the fifth anniversary of the termination of this Consent Decree comprehensive general liability and automobile insurance with limits of fifteen million dollars, combined single limit or a substitute for such insurance as provided for in Section XV of this Consent Decree (and in addition to the Financial Assurance for the ability to complete Work) that is satisfactory to EPA. In addition, for the duration of this Consent Decree, Performing Settlers shall satisfy, or shall ensure that their contractors or contractors satisfy, all applicable laws and regulations regarding the provision of workmen's compensation insurance for all persons performing the Work on behalf of Performing Settlers in furtherance of this Consent Decree. Prior to commencement of the Work under this Consent Decree, Performing Settlers shall

provide to EPA certificates of such insurance and at the request of Plaintiff a copy of each insurance policy. If Performing Settlers 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, Performing Settlers need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor.

XXI. FORCE MAJEURE

A. "Force Majeure" is defined for the purposes of this Consent Decree as any event arising from causes beyond the control of Performing Settlers and of any entity controlled by Performing Settlers, including their contractors and subcontractors, which could not have been overcome by due diligence, which delays or prevents the performance of any obligation under this Consent Decree. "Force Majeure" does not include financial inability to complete the work or a failure to attain the Performance Standards.

B. When circumstances occur which may delay or prevent the completion of any phase of the Work or access to the Site or to any property on which part of the Work is to be performed, whether or not caused by a force majeure event, Performing Settlers shall notify the EPA Project Coordinator orally of the circumstances within forty-eight (48) hours of when Performing Settlers first knew or should have known that the event might cause delay. If the EPA Project Coordinator is unavailable,

Performing Settlers shall notify the alternate Project Coordinator or the Director of the Waste Management Division, EPA Region IV. Within five (5) working days after Performing Settlers first became aware of such circumstances, Performing Settlers shall supply to Plaintiff in writing: (1) the reasons for the delay; (2) the anticipated duration of the delay; (3) all actions taken or to be taken to prevent or minimize the delay; and (4) a schedule for implementation of any measures to be taken to mitigate the effect of the delay. Performing Settlers shall exercise best efforts to avoid or minimize any delay and any effects of a delay. Failure to comply with the above requirements shall preclude Performing Settlers from asserting any claim of force majeure.

C. If EPA agrees that a delay is or was caused by a force majeure event, the time for performance of the obligations under this Consent Decree that are directly affected by the force majeure event shall be extended by agreement of the parties, pursuant to Section XXXI, for a period of time not to exceed the actual duration of the delay caused by the force majeure event. An extension of the time for performance of the obligation directly affected by the force majeure event shall not necessarily justify an extension of time for performance of any subsequent obligation.

D. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, or does not agree with Performing Settlers on the length of the extension, the issue shall be subject to the dispute resolution

procedures set forth in Section XXII of the Consent Decree. In any such proceeding, to qualify for a force majeure defense, Performing Settlers shall have the burden of proving 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 was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Performing Settlers complied with the requirements of Paragraph B of this Section. Should Performing Settlers carry this burden, the delay at issue shall be deemed not to be a violation by Performing Settlers of the affected obligation of the Consent Decree.

XXII. DISPUTE RESOLUTION

A. 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 and shall apply to all provisions of this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of Performing Settlers that have not been disputed in accordance with this Section.

B. 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 twenty (20) days from the time the dispute arises, unless it is modified by agreement of the parties to the dispute. The dispute shall be

considered to have arisen when one party notifies the other parties in writing that there is a dispute.

C. In the event that the parties cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within fourteen (14) days after the conclusion of the informal negotiation period, Performing Settlers 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 Performing Settlers.

D. 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 response actions performed pursuant to this Consent Decree.

1. An administrative record of the dispute governed by this Paragraph D shall be maintained by EPA and shall contain all statements of position including supporting documentation,

submitted pursuant to this Paragraph and Paragraph C of this Section.

2. Within fourteen (14) business days after receipt of Performing Settlers' statement of position submitted pursuant to Paragraph C, EPA will serve on Performing Settlers 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, in response to Performing Settlers' statement of position. Where appropriate, EPA may allow submission of supplemental statements of position by both parties to the dispute.

3. The Director of the Waste Management Division, EPA Region IV, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph D.1. This decision shall be binding upon Performing Settlers subject only to the right to seek judicial review pursuant to Paragraph D.4 and D.5.

4. Any administrative decision by EPA pursuant to Paragraph D.3 shall be reviewable by this Court, provided that notice of judicial appeal is filed by Performing Settlers with the Court and served on all parties within fourteen (14) business days of receipt of EPA's decision. The notice of judicial appeal 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 Performing Settlers' notice of judicial appeal.

5. In proceeding on any dispute governed by this Paragraph, Performing Settlers 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 the law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Paragraphs D.1 and D.2.

E. Formal dispute resolution for disputes that neither pertains 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.

1. Following receipt of Performing Settlers' statement of position submitted pursuant to Paragraph C, the Waste Management Division Director will issue a final decision resolving the dispute. The Waste Management Division Director's decision shall be binding on Performing Settlers unless, within ten (10) days of receipt of the decision, Performing Settlers file with the Court and serve on all parties a notice of judicial appeal 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 Performing Settlers' notice of judicial appeal.

2. Notwithstanding Paragraph S of Section I (Background) of this Consent Decree, judicial review of any dispute governed by this Paragraph shall be governed by applicable provisions of law.

F. The invocation of formal dispute resolution procedures under this Section shall not of itself extend, postpone or affect in any way any obligation of Performing Settlers under this Consent Decree, except that payment of stipulated penalties with respect to the disputed matter shall be stayed pending resolution of the dispute as provided in Section XXIII. 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 Performing Settlers do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XXIII (Stipulated Penalties).

G. Nothing in this Consent Decree shall be construed to allow any dispute by Performing Settlers regarding the validity of the ROD's provisions. Notwithstanding the foregoing, if, after the first periodic review under Section IX of this Consent Decree, Performing Settlers believe they can demonstrate that it is technically impracticable (within the meaning of CERCLA Section 121(d)(4)(C), 42 U.S.C. § 9621(d)(4)(C), to achieve the Performance Standards for groundwater, then they may petition EPA for a modification of such standards. Such petition shall include, without limitation, comprehensive groundwater monitoring data that has been generated in accordance with Section XI

(Quality Assurance) of this Consent Decree and has been subject to quality assurance procedures, to support a finding of technical impracticability. EPA may decide to approve or to deny such petition. EPA's determination shall be a matter pertaining to the selection or adequacy of a response action and shall be subject to the dispute resolution provisions of Paragraphs A through D of this Section.

H. Performing Settlers acknowledge that any decision to approve Performing Settlers' petition shall be subject to all applicable provisions of CERCLA and the NCP, including, without limitation, public notice and comment procedures and participation by the State of South Carolina. On the basis of any new data that Performing Settlers believe will support a finding of technical impracticability, Performing Settlers may re-petition EPA under this provision; provided, however, that Performing Settlers shall not be permitted to do so more than once every twelve (12) months.

XXIII. STIPULATED PENALTIES

A. Performing Settlers shall be jointly and severally liable for stipulated penalties, in the amounts set forth in Paragraphs H and I of this Section, to the United States for violations of this Consent Decree. "Compliance" by Performing Settlers shall include completion of any activity under this Consent Decree or any plan approved under this Consent Decree in an acceptable manner and within the specified time schedules established by and approved under this Consent Decree.

B. All penalties shall begin to accrue on the day that complete performance is due or a violation occurs, and continue to accrue through the final day of correction of the noncompliance. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

C. Following EPA's determination that Performing Settlers have failed to comply with the requirements of this Consent Decree, EPA shall give Performing Settlers written notification of the same and describe the noncompliance within ten (10) business days of making said determination. The notification shall also indicate the amount of penalties due. Notwithstanding the foregoing, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified the Performing Settlers of a violation, and regardless of whether such notice is given within the ten-day time period specified herein.

D. All penalties owed to the United States under this Section shall be payable within thirty (30) days of receipt of the notification of noncompliance, unless Performing Settlers invoke the dispute resolution procedures under Section XXII. Penalties shall accrue from the date of violation regardless of whether the United States has notified Performing Settlers of a violation. Performing Settlers shall pay interest on the unpaid balance, which shall begin to accrue at the end of the thirty-day period at the rate established pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607. All payments under this Section shall

be paid by certified check made payable to "EPA Hazardous Substance Superfund," shall be mailed to Superfund Accounting, P.O. Box 100142, Atlanta, Georgia 30384, and shall reference CERCLA Number 15 and DOJ Case Number 90-7-1-61A. Copies of the transmittal letters shall be mailed to the Department of Justice and EPA at the addresses listed in Section XXVIII.

E. Neither the filing of a petition to resolve a dispute nor the payment of penalties shall alter in any way Performing Settlers' obligation to complete the performance required hereunder.

F. Performing Settlers may dispute the United States' right to the stated amount of penalties by invoking the dispute resolution procedures under Section XXII herein. Penalties shall accrue but need not be paid during the dispute resolution period. If a disputed matter is submitted to the District Court, the period of dispute shall end upon the rendering of a decision by the District Court regardless of whether any party appeals such decision. If Performing Settlers do not prevail upon resolution, the United States has the right to collect all penalties which accrued prior to and during the period of dispute. If Performing Settlers prevail upon resolution, no penalties shall be paid.

G. If Performing Settlers fail to pay stipulated penalties, the United States may institute proceedings to collect the penalties, as well as interest. However, nothing in this Section shall be construed as prohibiting, altering, or in any way limiting the ability of Plaintiff to seek any other remedies or sanctions available by virtue of Performing Settlers'

violation of this Decree or of the statutes and regulations upon which it is based.

H. Schedule of Payments for Stipulated Penalties.

SCHEDULE A

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$ 1,500	1st thru 7th day
\$ 5,000	8th thru 15th day
\$ 7,500	16th thru 30th day
\$10,000	31st day and beyond

The Schedule A payments will apply to any noncompliance with this Consent Decree identified as follows:

1. Payments of all monies required to be paid under this Consent Decree, including Section XIX (Reimbursement of Response Costs), but excluding stipulated penalties assessed under this Section XXIII.
2. Full implementation and completion of the RA Work Plan according to the schedule therein and as required by this Consent Decree, and other actions required under Section XVIII (Endangerment and Future Response).
3. Failure to timely submit the RD Work Plan under Section VIII C of this Consent Decree.
4. Failure to timely submit the RA Work Plan under Section VIII D of this Consent Decree.
5. Failure to perform the Operation and Maintenance Plan, required under the SOW, and any modifications thereto.

SCHEDULE B

<u>Penalty Per Violation</u> <u>Per Day</u>	<u>Period of</u> <u>Noncompliance</u>
\$ 750	1st thru 7th day
\$2,000	8th thru 15th day
\$3,000	16th thru 30th day
\$5,000	31st day and beyond

The Schedule B payment will apply to any noncompliance of this Consent Decree identified as follows:

1. Failure to timely provide Assurance of Ability to complete work as required under Section XV of this Consent Decree.
2. Failure to timely submit the RD Work Plan major deliverables required under Section VIII C of this Consent Decree.
3. Failure to timely submit the RA Work Plan major deliverables required under Section VIII D of this Consent Decree.
4. Failure to timely submit any modifications requested by EPA or its representatives to the RD Work Plan.
5. Failure to timely submit any modifications requested by EPA or its representatives to the RA Work Plan.
6. Performing Settlers' failure to perform additional response actions as required under Section X (Additional Work) of this Consent Decree.

For the purpose of Schedule B, major deliverables shall be deemed those deliverables designated as "Major" on the list of deliverables attached to the Statement of Work in Appendix 3.

I. Except as provided in Paragraph H of this Section, Performing Settlers shall be liable for stipulated penalties in the amount of \$500 per violation for each day of noncompliance with all requirements of this Consent Decree other than those specified in Paragraph H. of this Section.

J. Performing Settlers shall not be liable for stipulated penalties for failure to achieve applicable Performance Standards notwithstanding, in and of itself, the Performing Settlers' timely and proper implementation of the Work according to the Statement of Work, Remedial Design Work Plan and the Remedial Action Work Plan.

K. Performing Settlers agree not to deduct the payment of stipulated penalties for federal tax purposes.

L. In imposing stipulated penalties under this Section, good faith efforts of Performing Settlers to comply or a good faith dispute as to the underlying requirement shall be considered.

M. Notwithstanding anything to the contrary contained in this Section, while stipulated penalties may be imposed for Performing Settlers' failure to comply with any obligations that Performing Settlers have agreed to undertake prior to entry of this Consent Decree, no stipulated penalties shall be due and payable with respect to any such failure until such time as this Consent Decree is entered by the United States District Court and Performing Settlers have had an opportunity to invoke the dispute resolution procedures of Section XXII. Performing Settlers shall invoke such procedures with respect to any alleged violation of

which they have been given notice prior to the entry of the Decree within thirty (30) days after entry of this Consent Decree.

XXIV. COVENANTS NOT TO SUE BY PLAINTIFF

A. In consideration of the actions that will be performed and the payments that will be made by Performing Settlers under the terms of the Consent Decree, and except as specifically provided in Paragraphs B through F of this Section, the United States covenants not to sue or to take administrative action against Performing Settlers for "Covered Matters." With respect to this Site and for the purposes of this Section, Covered Matters shall include civil liability to the United States for causes of action arising under Sections 106 and 107(a) 42 U.S.C. §§ 9606 or 9607(a) of CERCLA, and under Section 7003 of RCRA, 42 U.S.C. § 6973, and for performance of the Work and for recovery of Response Costs as defined in this Consent Decree.

Notwithstanding the foregoing, "Covered Matters" shall not include:

(1) Performing Settlers' liability to the United States for the costs awarded to it under the Judgment referenced in Paragraph M of Section IV of this Consent Decree. This Consent Decree is not intended to and shall not be construed as affecting Plaintiff's rights to recover such costs from Performing Settlers. Performing Settlers shall remain liable to the United States for the costs awarded to it under that Judgment referenced in Paragraph M of Section IV of this Consent Decree until such time as that judgment is satisfied, and;

(2) Performing Settlers' liability to the United States to perform or finance additional response actions that Performing Settlers are not obligated to perform under Section X of this Consent Decree, and that Performing Settlers do not perform pursuant to said Section. This Consent Decree is not intended to and shall not prevent EPA from exercising any of its rights under CERCLA or any other applicable authority with regard to any such additional response actions, including, but not limited to, its right to implement such actions and seek to recover those response costs from Performing Settlers; its right to seek to compel Performing Settlers to perform such additional response actions; or its right to take any other judicial or administrative actions against Performing Settlers with respect to such additional response actions and any response costs associated with such actions.

B. Except with respect to future liability relating to additional response activities at the Site not identified in the ROD or the SOW and except as specifically provided in Paragraphs C through D of this Section, these covenants not to sue shall take effect upon the receipt by EPA of the payments required by this Consent Decree under Section XIX. With respect to such future liability, these covenants not to sue shall take effect upon EPA issuance of the certification of completion of the Work pursuant to Section XVII. These covenants not to sue are conditioned upon complete and satisfactory performance by Performing Settlers of their obligations under this Consent

Decree. These covenants not to sue extend to Performing Settlers and do not extend to any other person.

C. United States' Pre-Certification reservations

Notwithstanding any other provision of this Consent Decree, the United States reserves the right to institute proceedings in this action or in a new action seeking to compel Performing Settlers (1) to perform additional response actions at the Site or (2) to reimburse the United States for response costs if, prior to EPA issuance of the certification of completion of the Work pursuant to Section XVII:

- (i) conditions at the Site, previously unknown to the United States, are discovered after the entry of this Consent Decree, or
- (ii) information is received, in whole or in part, after the entry of this Consent Decree,

and the EPA Administrator or his delegate finds, based on these previously unknown conditions or this information together with any other relevant information, that the Work is not protective of human health and/or the environment.

D. United States' Post-Certification reservations

Notwithstanding any other provision of this Consent Decree, the United States reserves the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Performing Settlers (1) to perform additional response actions at the Site or (2) to reimburse the United States for response costs if, subsequent to certification of completion of the Work:

- (i) conditions at the Site, previously unknown to the United States, are discovered after the certification of completion; or

- (ii) information is received, in whole or in part, after the certification of completion, and the EPA Administrator or his delegate finds, based on these previously unknown conditions or this information together with other relevant information, that the Work is not protective of human health and/or the environment.

The above-mentioned reservation of rights includes the right to institute proceedings in this action or in a new action to seek reimbursement of costs incurred as a result of actions undertaken pursuant to Section 121(c) of CERCLA, 42 U.S.C. § 9621(c).

E. For purposes of Paragraph C of this Section, the information received and the conditions known to the United States shall include that information and those conditions set forth in the Record of Decision for the Site and the administrative record supporting the Record of Decision. For purposes of Paragraph D of this Section, the information received by and the conditions known to the United States shall include that information and those conditions set forth in the Record of Decision and any information received by the United States pursuant to the requirements of this Consent Decree prior to the certification of completion of the Work.

F. United States' General reservations of rights

The covenants not to sue set forth above do not pertain to any matters other than those expressly specified to be Covered Matters as defined in this Section. The United States reserves, and this Consent Decree is without prejudice to, all rights against Performing Settlers with respect to all other matters, including but not limited to:

1. claims based on a failure by Performing Settlers to meet a requirement of this Consent Decree;
2. liability arising from the past, present, or future disposal, release, or threat of release of hazardous substances outside of the Site and not attributable to the Site;
3. liability for the disposal of any hazardous substances taken from the Site;
4. liability for damages for injury to, destruction of, or loss of natural resources;
5. any matter as to which the United States is owed indemnification under this Consent Decree;
6. criminal liability;
7. liability for violations of federal law which occur during implementation of the remedial action;
8. liability for costs that the United States will incur related to the Site that are not within the definition of Future Response Costs; and
9. previously incurred response costs not included in the amounts reimbursed pursuant to Section XIX, including, without limitation, those response costs awarded to the United States in connection with the surficial cleanup of the Site under the judgment referenced in Paragraph M of Section IV.
10. liability for additional response actions as provided for in item (1) of Paragraph A of this Section.

H. 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.

I. Subject to the reservations of rights in this Section, the United States agrees that by entering into and carrying out the terms of this Consent Decree, each of the Performing Settlers will have resolved their liability to the United States for Covered Matters, as defined in this Section, pursuant to Section 122(g)(5) of CERCLA, 42 U.S.C. § 9622(g)(5), and shall not be liable for claims for contribution for Covered Matters as defined in this Section.

XXV. COVENANTS BY PERFORMING SETTLORS

Performing Settlers hereby covenant not to sue the United States for any claims related to or arising from any response action taken with respect to the Site or this Consent Decree, including any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established pursuant to Section 221 of CERCLA, 42 U.S.C. § 9631, or to seek any other costs, damages, attorney's fees from the United States arising out of response activities at the Site. Furthermore, the Performing Settlers hereby release the United States from all liability for CERCLA response costs, whether under Section 107(a)(4)(B) of CERCLA, 42 U.S.C. § 9607 or in contribution under Section 113(f) of CERCLA, 42 U.S.C. § 9613. 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. § 300.25(d). However, Performing Settlers reserve, and this Consent Decree is without prejudice to: (i) actions against the United States based on negligent actions taken directly by the United States (not including oversight or approval of Performing

Settlors' plans or activities) that 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; or (ii) actions against the Federal Settling Agencies for matters related to or arising from any response action taken with respect to the Site and for which the Federal Settling Agencies are not entitled to contribution protection under Section VI of this Consent Decree. Performing Settlers acknowledge that Cash-out Settlers and the Federal Settling Agencies are entitled to contribution protection from actions by Performing Settlers for Covered Matters as defined in Section VI of this Consent Decree.

XXVI. ACCESS TO INFORMATION

A. Performing Settlers shall provide to EPA, upon request, all documents and information within their possession and/or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Consent Decree, including sampling, and analysis records, chain of custody records, manifests, shipping logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work undertaken pursuant to this Consent Decree. Performing Settlers shall also make available to EPA, for the purposes of investigation or information gathering, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

B. Performing Settlers 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). Such an assertion will be adequately substantiated when the assertion is made. 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 specific documents or information when they are submitted to EPA, or if EPA has notified Performing Settlers that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA, 42 U.S.C. § 604(e)(7), and 40 .F.R. § .203(b), the public may be given access to such documents or information without further notice to Performing Settlers.

C. No claim of confidentiality shall be made with respect to any sampling or analytical data or any other documents or information evidencing conditions at or around the Site.

D. The parties to this Consent Decree waive any objection to the admissibility into evidence (without waiving any objection as to weight and relevance) of the results of any analyses of sampling conducted by or for them at the Site or of other data gathered pursuant to this Consent Decree that has been verified by the quality assurance/quality control procedures established pursuant to Section XI.

XXVII. RETENTION OF RECORDS

A. Until EPA issuance of the certification of completion of the Work pursuant to Section XVII and termination of this Consent Decree, Performing Settlers shall preserve, and shall 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.

B. For six (6) years after EPA issuance of the certification of completion of the Work pursuant to Section XVII, Performing Settlers shall preserve and retain all records and documents now in its possession or control that relate in any manner to the Site. After this document retention period, Performing Settlers shall notify the United States at least ninety (90) calendar days prior to the destruction of any such records or documents, and upon request by the United States, Performing Settlers shall relinquish custody of the records or documents to EPA. Additionally, if the United States requests all documents be preserved for a longer period of time, Performing Settlers shall comply with the request.

XXVIII. NOTICES AND SUBMISSIONS

A. 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 and the addresses specified below, unless those individuals or their successors give notice of a change to the other parties in writing. 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 Settlers, respectively.

B. Unless noted otherwise, where written notice is required to be given or a report or other document is required to be submitted, such notice shall be sent to:

The United States Environmental Protection Agency

Steven M. Sandler
Remedial Project Manager
Waste Management Division
U. S. Environmental Protection Agency, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Copies of checks and payment transmittal letters:

Accounts Receivable Specialist
Financial Management Office
U. S. Environmental Protection Agency, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

The Settlers and Federal Settling Agencies

See Appendix 5 attached to this Order and incorporated herein by this reference.

For Informational Purposes Only

The Department of Justice
Chief, Environmental Enforcement Section
Land and Natural Resources Division
10th & Pennsylvania Avenue, N.W.
Washington, D.C. 20530
RE: DOJ #90-7-1-61A

and

Teresa Harris Atkins
Assistant Regional Counsel
United States Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

As to the State of South Carolina

Keith Lindler
South Carolina Department of Health and Environmental
Control
2600 Bull Street
Columbia, South Carolina 29201

XIX. EFFECTIVE AND TERMINATION DATES

A. 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.

B. Upon notice by EPA to the Court that EPA has issued the certification of completion of the Work pursuant to Section XVII and that Performing Settlers have satisfied their obligations under Sections XIX (Reimbursement of Response Costs) and XXIII (Stipulated Penalties), this Consent Decree shall terminate upon the motion of any party. Termination of this Consent Decree shall not affect the Covenants Not to Sue (Sections XXIV and XXV above), including all reservations pertaining to those covenants, and shall not affect any continuing obligation of Performing Settlers under Sections IX, XII, XIII, XX, XXVI and XXVII.

XXX. RETENTION OF JURISDICTION

This Court will retain jurisdiction for the purpose of enabling any of the parties to this Consent Decree 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 XXII hereof.

XXXI. MODIFICATION

No material modifications shall be made to this Consent Decree without written notification to and written approval of the parties whose rights and obligations are altered by such modifications and of the Court except as provided in Section XIV.

The notification required by this Section shall set forth the nature of and reasons for the requested modification. No oral modification of this Consent Decree shall be effective.

Modifications that do not materially alter the requirements of this Consent Decree, such as minor schedule changes, may be made upon the written consent of all parties whose rights and obligations are altered by such modifications, which consent shall be filed with this Court. Nothing in this Section shall be deemed to alter the Court's power to supervise or modify this Consent Decree.

XXXII. COMMUNITY RELATIONS

Performing Settlers shall cooperate with EPA in providing information regarding the Work to the public. As requested by EPA, Performing Settlers 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.

XXXIII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

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. Settlers consent to the entry of this Consent Decree without further notice.

XXXIV. SIGNATORIES

A. Each undersigned representative of a party to this Consent Decree 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.

B. Each Settlor shall identify, on the attached signature page, the name and address of an agent who is authorized to accept service of process by mail on its behalf with respect to all matters arising under or relating to this Consent Decree. Settlers 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, including service of a summons, and any applicable local rules of this Court.

SO ORDERED THIS 28th DAY OF September, 1992.




 United States District Judge

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of the United States of America v. Allied-Signal Inc. et. al., relating to the SCRDI Bluff Road Superfund Site.

FOR THE UNITED STATES OF AMERICA:

Date: 8-17-92



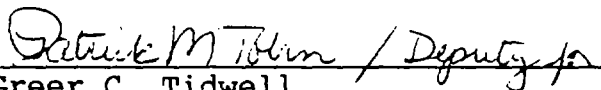
 Barry J. Hartman ROGER CLEGG
 Acting Assistant Attorney General
 Environment and Natural Resources
 Division
 Washington, D.C. 20530

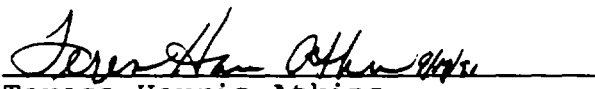
Quentin C. Pair
Environmental Enforcement Section
Environment and Natural Resources
Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044
(202) 514-1999

E. Bart Daniel
United States Attorney

By: John B. Grimball

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Assistant United States Attorney
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United States Department of Justice
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Columbia, South Carolina 29202
(803) 765-5483


Greer C. Tidwell
Regional Administrator
Region IV
U.S. Environmental Protection
Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

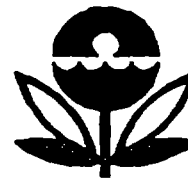

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Harriet M. Deal

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EXPLANATION OF SIGNIFICANT DIFFERENCES AND START OF REMEDIATION ACTIVITIES



SCRDI BLUFF ROAD SUPERFUND SITE

Richland County, South Carolina

JUNE 1994

This fact sheet is one of a series of seven designed to inform residents and local officials of the on-going cleanup efforts at the site. A number of terms specific to the Superfund process (printed in bold print) are defined in the glossary at the end of this publication.

INTRODUCTION

This fact sheet constitutes an *Explanation of Significant Differences* providing information to the public concerning the selected cleanup alternative for the SCRDI Bluff Road Site in Columbia, Richland County, South Carolina, and provides notice of the start of remediation activities. As the lead agency at this Site, EPA issued a *Record of Decision (ROD)* on September 12, 1990, following a *Remedial Investigation/Feasibility Study (RI/FS)* performed by the *Potentially Responsible Parties (PRPs)*. The South Carolina Department of Health and Environmental Control (SCDHEC) is the support agency for remedial activities at the Site.

In the ROD, EPA stated that air emissions from the *Soil Vapor Extraction (SVE)* system, the system selected to treat contaminated soils, would be treated through use of vapor phase carbon adsorption filters (carbon filters) or by fume incineration (also known as catalytic oxidation or "CATOX"). Subsequent analysis during the remedial design process has shown that the use of CATOX (also known as fume incineration or catalytic oxidation) would be more efficient, allow greater operational flexibility, allow for higher extraction rates of contaminants, and be more cost effective than carbon filters. Also the use of catalytic oxidation rather than carbon filters eliminates the need to ship spent carbon to a landfill for

disposal.

This Explanation of Significant Differences (ESD) represents part of EPA's public participation requirements under Section 117(c) of the *Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)*, also known as Superfund. This ESD will become part of the *Administrative Record (AR)* file, which contains the information upon which EPA based its selection of the remedy described in the ROD. Additionally, the AR contains documents EPA considered in deciding to issue this ESD. The Administrative Record for the SCRDI Bluff Road Site is available to the public at the location listed on page 7. This fact sheet on the South Carolina Recycling and Disposal, Inc. (SCRDI) Bluff Road Superfund Site (Bluff Road Site) in Richland County, South Carolina has been prepared by the Region IV Office of the U.S. Environmental Protection Agency (EPA). The purpose of this fact sheet is to inform area citizens and local elected officials of the use of the CATOX unit for the soil remediation and to serve as an Explanation of Significant Differences (ESD). In addition, this ESD provides a history of past site activities and informs the public of the beginning of site remediation activities. EPA issued a separate fact sheet in early May 1994 advertising a public meeting and the beginning of a public comment period on possible issuance of an ESD documenting the use of a CATOX unit.

The public comment period ended on May 1990 with no comments received by EPA. This is the seventh in a series of fact sheets on the Bluff Road Site. Copies of fact sheets, and other site specific information can be found in the local information repository, which is listed on page 7 of this fact sheet.

SITE DESCRIPTION AND HISTORY

The SCRDI Bluff Road Site is located in Richland County, South Carolina about ten miles south of the City of Columbia along State Highway 48, also known as Bluff Road. The SCRDI property consists of a single rectangular parcel of land approximately four (4) acres in size. The site is directly across Bluff Road from the entrance to the Westinghouse Nuclear Fuel Rod Plant.

Surface water flow from the SCRDI property and the adjacent study area is directed to one of two main drainage channels, a drainage ditch parallel to Bluff Road that is a tributary to Myers Creek, and Myers Creek itself. Groundwater flow is to the south-south east.

The front half of the property was cleared, and then used for various industrial and commercial purposes. The back half of the site is heavily wooded. Two lagoons remain at the site that were utilized during the past operations. The SCRDI Bluff Road Site was operated as a collection center for Columbia Organic Chemicals from 1975 to 1982 to store, recycle, and dispose of chemical wastes. Before 1975, the site was operated as an acetylene gas manufacturing facility.

In March 1980, EPA conducted a site visit and saw a number of leaking storage

drums. Samples of the drums contents and the adjacent surficial soils were collected and analyzed. The analyses showed the presence of volatile organic and other chemical compounds. An investigation of groundwater quality was performed by the South Carolina Department of Health and Environmental Control (SCDHEC) in the fall of 1980 which indicated that the groundwater had been impacted by chemical releases. Operations at the SCRDI Site were shut down in 1982.

A cleanup of the surface of the site was done in 1982 and 1983 under the direction of the USEPA and SCDHEC. Over 7500 drums containing chemicals were removed for proper disposal. Visibly contaminated soil and all above ground structures were also removed and clean fill material was used to fill excavations and provide clean access road surfaces.

In September 1983, the site was listed on the *National Priorities List (NPL)* under the (CERCLA). Remedial Investigation (RI) work was begun in 1984 and a Remedial Investigation/Feasibility Study (RI/FS), indicating cleanup alternatives for remaining soil and groundwater contamination was finalized in March 1990.

In May of 1990, EPA issued a Proposed Plan for the cleanup of the SCRDI Bluff Road Site. The Proposed Plan recommended thermal desorption for the cleanup of contaminated soils remaining at the site, and extraction and treatment for contaminated groundwater. During the public comment period on the Proposed Plan, comments were received that supported a different alternative, Soil Vapor Extraction (SVE) to clean up the soils. Under EPA oversight, a pilot scale test of SVE was conducted at the SCRDI Bluff Road Site in

July and August 1990. The pilot test demonstrated that SVE was a feasible remedial technology for this site and was capable of achieving the required target soil clean-up levels in the *vadose zone*. Concerns that EPA had regarding the amount of clay in site soils and the effectiveness of SVE were satisfactorily addressed. A Record of Decision (ROD) was issued for the site by EPA on September 12, 1990 which identified SVE as the recommended remedial alternative for soils, and groundwater extraction and treatment as the recommended alternative for groundwater.

In addition to specifying Soil Vapor Extraction as the preferred alternative for treatment of the contaminated soils at the SCRDI Bluff Road Site, the Record of Decision specifies two options for the treatment of the extracted vapors. The ROD specifies that the extracted vapors will be run through a vapor/liquid separator and then finally treated either with vapor phase carbon adsorption, or by fume incineration.

Since the ROD was issued in September 1990, EPA has negotiated with over 100 *Potentially Responsible Parties (PRPs)* that had either operated, or had hazardous wastes transported and disposed at the SCRDI Bluff Road Site. The end product of the negotiations was a Consent Decree (CD), a contractual agreement where the PRPs agreed to pay site cleanup and EPA oversight costs. Litigation with adjacent property owners over the PRP's and EPA's access to property surrounding the site caused significant delays (over two years) in beginning remediation of the site.

On September 3, 1993, in accordance with the requirements of the Consent Decree, the PRP's submitted a draft design for the SVE

system, which both EPA and SCDHEC have reviewed and issued comments on. Of the two options identified in the ROD for SVE vapor treatment, the draft design and its revisions have selected fume incineration, specifically, a catalytic oxidizer, or CATOX unit, in lieu of the vapor phase carbon (carbon filters). The PRP's consultants have revised the draft design to incorporate EPA and SCDHEC comments.

The project is in the Remedial Design (RD) stage. The groundwater remediation is under design. This ESD marks the completion of the design for the soil remediation. The actual construction and operation of the remediation cleanup is called a Remedial Action (RA).

Catalytic oxidation is the exact process used to control exhaust emissions from automobiles - except in the case of automobiles, it is called a "catalytic converter". The process uses a heated catalyst to break down the vapors to primarily water and carbon dioxide.

EXPLANATION OF SIGNIFICANT DIFFERENCES

EPA policy requires that changes to RODs have either a ROD Amendment or Explanation of Significant Differences (ESD) issued to describe the rationale for the change, in this case, for the selection of CATOX over vapor phase carbon adsorption. EPA solicited comments prior to the issuance of this ESD allowing the use of CATOX in the SVE design. This fact sheet documents the reasons for the use of the CATOX unit in lieu of vapor phase carbon adsorption for the treatment of the vapors extracted by the SVE system.

Citizen concern over delays in the remediation of the SCRDI Bluff Road site was the primary reason for this fact sheet, the May 16th Public Meeting, and EPA's issuance of an ESD, as the ROD did document the possible use of fume incineration in the soil remediation by SVE. Where a possible change has been discussed in the ROD, issuance of an ESD is not required. To further emphasize the importance that EPA Region IV places on citizen input, a public informational meeting was held on May 16, 1994 in the neighborhood adjacent to the site, the Hopkins community. EPA provided a public comment period for this ESD that concluded two weeks following the meeting to decide whether to issue this ESD to implement the SVE with the CATOX unit rather than vapor phase carbon adsorption (carbon filters).

SOIL VAPOR EXTRACTION

While the previous removal actions conducted in 1982 and 1983 have removed all leaking containers of contaminants off the SCRDI property, soil contamination still remains at the site. The *Baseline Risk Assessment* presented in the Remedial Investigation Report concluded that the surface soils do not pose an unacceptable risk to either human health or the environment. However, the more highly contaminated subsurface soils continue to leach contaminants into the groundwater below the site at unacceptable concentrations. For this reason, a method of cleaning the contaminated subsurface soils was selected by EPA in the September, 1990 Record of Decision. That method is soil vapor extraction, also commonly called soil vacuum extraction or soil venting. The term "in-situ" is often added to the description to indicate that the soil is remediated in place

without excavation.

In-situ soil vacuum extraction is a proven technology and was applied in an August, 1990 pilot test at the SCRDI Bluff Road Site as well as in full scale remediation programs at other Superfund Sites and chemical spills. SVE has been selected for remediation of soils at 107 Superfund Sites, including 7 in USEPA Region IV. SVE can remove *volatile organic compounds (VOCs)* and a limited number of *semi-volatile compounds (SVOCs)* from unsaturated soils and bedrock. The vapors removed from the contaminated soils containing the VOC's and SVOC's can be treated by either vapor phase carbon or fume incineration (such as the CATOX unit mentioned earlier). During the operation of the SVE system the effectiveness will be monitored by periodically monitoring contaminant concentrations in: 1) the treated soil, 2) the untreated vapor entering the system, and 3) in the treated vapor.

The SVE system to be constructed at the Bluff Road Site consists of 19 air vacuum wells installed in the unsaturated zone, up to depths of some 12 to 14 feet below ground surface. The actual wells will be constructed of PVC pipe with a pump and manifold system to apply a vacuum on the air wells. The extracted vapors will be processed through an in-line vapor/liquid separator (to separate water from the vapor) with the extracted VOC and SVOC vapors finally treated by either vapor phase carbon adsorption or a fume incinerator, in this case, a catalytic oxidizer. The separated water (a product of the extraction whether the carbon filters or fume incineration is used) will be containerized, treated as necessary and disposed of at an EPA approved facility. The treated air stream will be monitored, and will comply with the terms of a SCDHEC-issued air discharge

and discharged to the atmosphere.

The contractor selected to design and build the SVE system has experience in over 300 other SVE installations, including many other Superfund sites. The CATOX unit that has been proposed has been utilized at other remedial sites, including the Verona Superfund Site, with a treatment efficiency comparable to vapor phase carbon (carbon filters). Because the exact quantity of contaminants present in the subsurface soils is not known, the CATOX unit provides greater flexibility for continuous operations. There is no need to routinely shut down the system, as would be required to change carbon filters when their capacity is reached. This approach maximizes the system operating time and provides for a reduced remedial time period. The CATOX unit will also provide for total on-site treatment of the soils without the need for shipment of the spent carbon to a landfill. Finally, the CATOX unit can treat a greater mass of contaminants per day than a vapor phase carbon system, is more cost effective, and allows for higher extraction rates during initial operations.

SITE ACTIVITIES - CURRENT AND PLANNED

In September, 1993 site access was obtained to the properties surrounding the site, enabling remedial design activities to begin. A lengthy legal process was necessary to obtain access. Since access was granted, the condition of monitoring wells on and around the site was determined. Several wells were judged to be compromised for the collection of meaningful data, and were therefore abandoned. Several new wells were then installed and sampled. Early data indicated

that the groundwater contaminant plume had expanded, therefore additional new wells were installed to determine the extent of the movement of the plume.

The plume is still sufficiently far from the boundary of the Hopkins-Helms property to the south of the site, and therefore poses no current threat to area well users or the creek. EPA Region IV will initiate appropriate limited monitoring of private wells between the plume and area residents to insure that groundwater contamination will not reach private wells. It should be noted that during the Remedial Investigation, and subsequent sampling events, no contamination was, or has been found in the lower aquifer.

Details of the two most current sampling events are available for public review at the site information repository listed on page 7 of this document.

During the week of April 25, 1994, a pump test was initiated at the site to determine the most current characteristics of the groundwater aquifer that the remediation will address. The water extracted from the aquifer for this pump test was monitored and treated before discharge to an area creek. The level of treatment for the extracted groundwater is specified in a permit issued by SCDHEC called a temporary NPDES permit. After the test results are interpreted, design will proceed for the groundwater remedy. Specific design elements include the location and sizing of extraction wells which will intercept the further travel potential of the groundwater contaminant plume. The goal of the groundwater remediation system will be to treat the groundwater to cleanup levels specified in the ROD. The above planned future events compose the groundwater remediation.

SUPPORT AGENCY COMMENTS

The South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed, and concurs, with this ESD.

STATUTORY DETERMINATIONS

Considering the information developed during the remedial design and described above, EPA believes that the selected remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for the SCRDI Bluff Road Site.

PUBLIC PARTICIPATION

Relative to the soil remediation, it is anticipated that the actual soil remediation will begin equipments construction will be complete within twelve weeks from the publication date of this ESD. After construction is completed, and an air discharge permit granted by SCDHEC, the system can begin operations. When the system is up and running, EPA will arrange a site tour for interested members of the community.

Additional fact sheets will be prepared and public meetings will be held as necessary to provide the public with current information on site activities. Members of the community and local officials can contact Cynthia Peurifoy or Steven Sandler at the 300 number listed below for periodic updates on site activities.

SITE INFORMATION REPOSITORY:

Southeast Regional Library
Richland County Public Library
7421 Garners Ferry Road
Columbia, South Carolina 29209
(803)776-2778

FOR MORE INFORMATION CONTACT:

Remedial Project Manager:
Steven Sandler
or

Community Relations Coordinator:
Cynthia Peurifoy

U.S. Environmental Protection Agency -
Region IV
North Superfund Remedial Branch
345 Courtland Street, N.E.,
Atlanta, GA 30365
1 (800) 435-9233, or (404) 347-7791

Richard Haynes, District Engineer
South Carolina Department of Health &
Environmental Control
2600 Bull Street,
Columbia, South Carolina 29147
(803) 734-5487

This ESD is issued by EPA Region IV this
22nd day of June, 1994.

by John H. Hankinson, Jr.
John H. Hankinson, Jr.
Regional Administrator

GLOSSARY

Baseline Risk Assessment - A means of estimating the amount of damage a Superfund site could cause to human health and the environment if not cleaned up. Objectives of a risk assessment are to: help determine the need for action; help determine the levels of chemicals that can remain on the site and still protect human health and the environment; and provide a basis for comparing different cleanup methods.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) - A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Act created a trust fund, known as Superfund to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Explanation of Significant Differences (ESD) - A document prepared by EPA to document and explain to the public any significant change made to a site's selected remedy, after a ROD has been issued for the Site. The ESD sets forth the reasons or issues EPA has considered in deciding to alter the remedy. EPA must publish a notice to the public of the ESD and its availability for public review, and may also elect to hold a public meeting concerning the ESD.

Information Repository - Materials on Superfund and a specific site located conveniently for local residents.

Potentially Responsible Parties (PRP's) - This may be an individual, a company or a group of companies who may have contributed to the hazardous conditions at a site. These parties may be held liable for costs of the remedial activities by the EPA through CERCLA Laws.

Remedial Investigation/Feasibility Study (RI/FS) - Two distinct but related studies, normally conducted together, intended to define the nature and extent of contamination at a site and to evaluate appropriate, site specific remedies.

Semi-Volatile Organic Compounds (SVOCs) - Carbon-containing chemical compounds that, at a relatively low temperature, fluctuate between a vapor state (a gas) and a liquid state.

Soil Vapor Extraction (SVE) - Remediation technology for collection of volatile organic compounds from soil for treatment.

Vadose Zone - That portion of the soil laying above the water table.

Vapor Phase Carbon Adsorption (Carbon Filters) - A device which uses activated carbon to adsorb volatile organic compounds (VOCs) from a gas stream. The VOCs are later recovered from the carbon.

Volatile Organic Compounds (VOCs) - A group of organic compounds characterized by their greater tendency to change into a gaseous state.

REQUEST TO BE PLACED ON THE SCRDI BLUFF ROAD SUPERFUND SITE MAILING LIST

If you would like to be placed on the mailing list for the Bluff Road Site, please complete this form and return to: Cynthia Peurifoy, Community Relations Coordinator, EPA-Region IV, North Superfund Remedial Branch, 345 Courtland Street, Atlanta, Georgia 30365, or call 1-800-435-9233.

NAME: _____

ADDRESS: _____

TELEPHONE: _____

AFFILIATION: _____



United States
Environmental Protection
Agency

North Superfund Remedial Branch

Region 4

345 Courtland Street, NE
Atlanta, Georgia 30365

Official Business
Penalty for Private Use
\$300

Cynthia Fourley
Community Relations Coordinator
(SCRDI Bluff Road ESD - June 1994)

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

SCRCI BLUFF ROAD SITE
COLUMBIA, RICHLAND COUNTY
SOUTH CAROLINA

PREPARED BY:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

APPENDIX 2

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principle element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Because this remedy will not result in hazardous substances remaining on-site above health based levels, the five-year facility review will not apply to this action.

Greer C. Tidwell
Greer C. Tidwell
Regional Administrator
SEP 14 1992
Date _____

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

**SCRDI BLUFF ROAD SITE
COLUMBIA, RICHLAND COUNTY
SOUTH CAROLINA**

PREPARED BY:

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA**

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1.0 Introduction

1.1 Site Location and Description

The SCRS Bluff Road Site is a four acre parcel of land located in Richland County, South Carolina and is approximately 10 miles south of the City of Columbia on the north side of State Highway 48. (Figure 1) The site is a rectangular parcel of land measuring 133 feet of frontage on Bluff Road (Highway 48), and extending back from the road approximately 1,300 feet. (Figure 2) The site is relatively level with ground elevation varying from approximately 139 feet near the highway to 134 feet above mean sea level at the rear of the property. The front portion of the site, extending to approximately 600 feet from the road, is cleared and has been used for various industrial and commercial purposes. The back portion of the site, encompassing one half of the area, is heavily wooded. Surrounding and adjacent properties are wooded and rural. The nearest residences are approximately a mile away.

The soils identified in the project by the Richland County Soil Survey include loams, which are mixtures of sand, silt, and clay. The specific soil types present in the vicinity of the site are Orangeburg loamy sand, Persanti very fine sand loams, Smithboro loam, and Cantry loam. A low permeability surface clay layer was predominant in areas adjacent to the site.

The local hydrogeology pertinent to the site is defined by a surficial aquifer and a deep aquifer with the two formations separated by a clay aquitard. The shallow aquifer typically extends to a depth of 45 to 50 feet and is composed primarily of sands which range from coarse and well sorted to silty and poorly sorted. This aquifer has been classified as a potable aquifer by the State of South Carolina. The ground water table in the shallow aquifer generally lies 10 to 15 feet below ground surface based on the three rounds of ground water level measurements taken. The deep aquifer is separated from the shallow aquifer by a clay and silt unit which ranges in thickness from 1.5 to 25 feet. This partial confining layer is thinnest upgradient of the site and thickens to the south and west. The State still has a question as to whether or not the clay layer is continuous over the area of the site. This will be resolved during the Remedial Design development. The lithology of the deep aquifer is similar to that of the shallow aquifer, though clay-rich layers are more common. Both the clay aquitard and the deep aquifer are thought to be units in the Black Creek Formation.

Most of the nearby property and rear portions of the site have been classified by the Corps of Engineers as wetlands. A Westinghouse Nuclear fuel rod manufacturing plant is located across Bluff Road. Current use of the Site and nearby properties is rural and wooded (with the exception of the Westinghouse plant). Future use of the property is likely to be light industrial development.

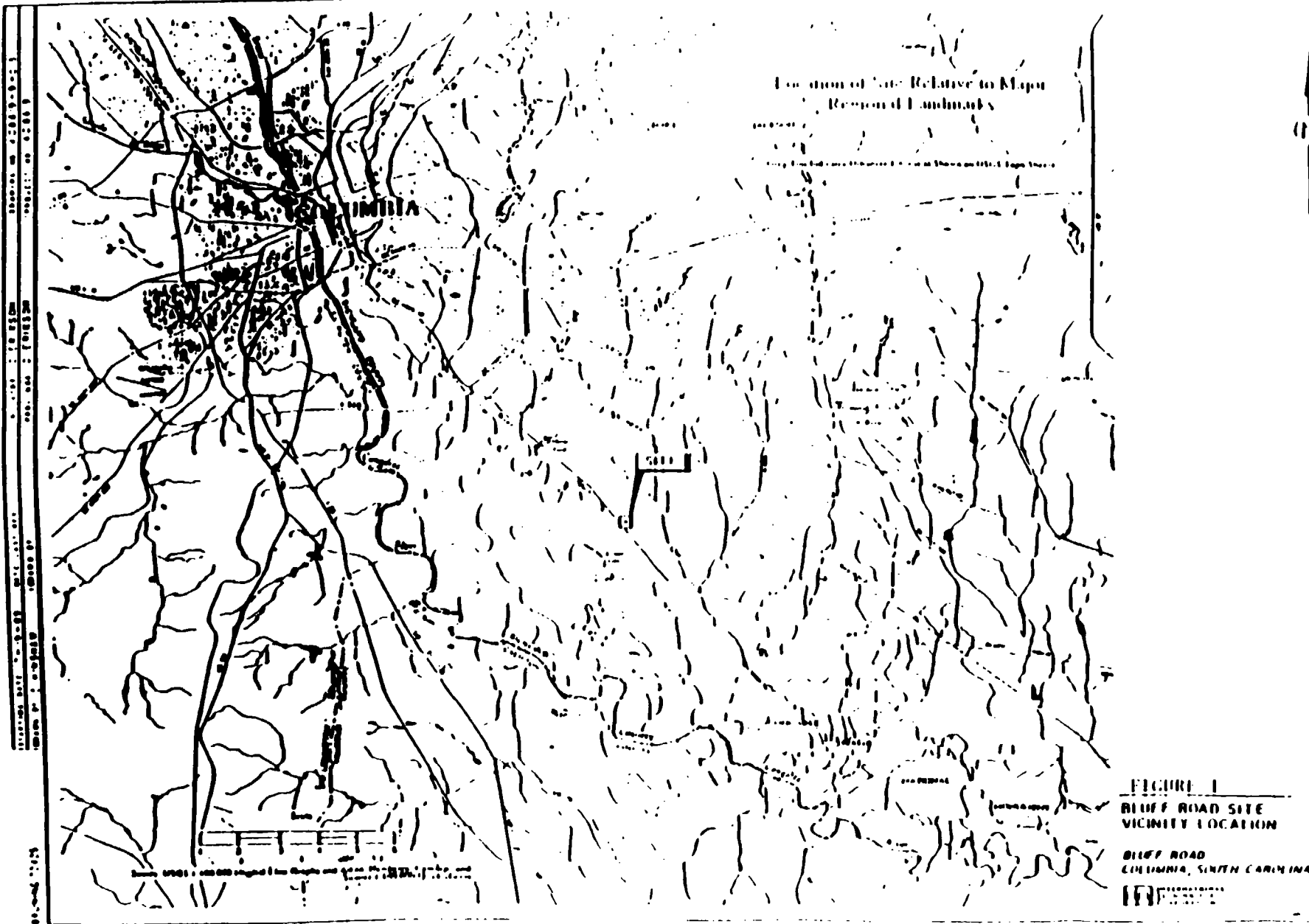
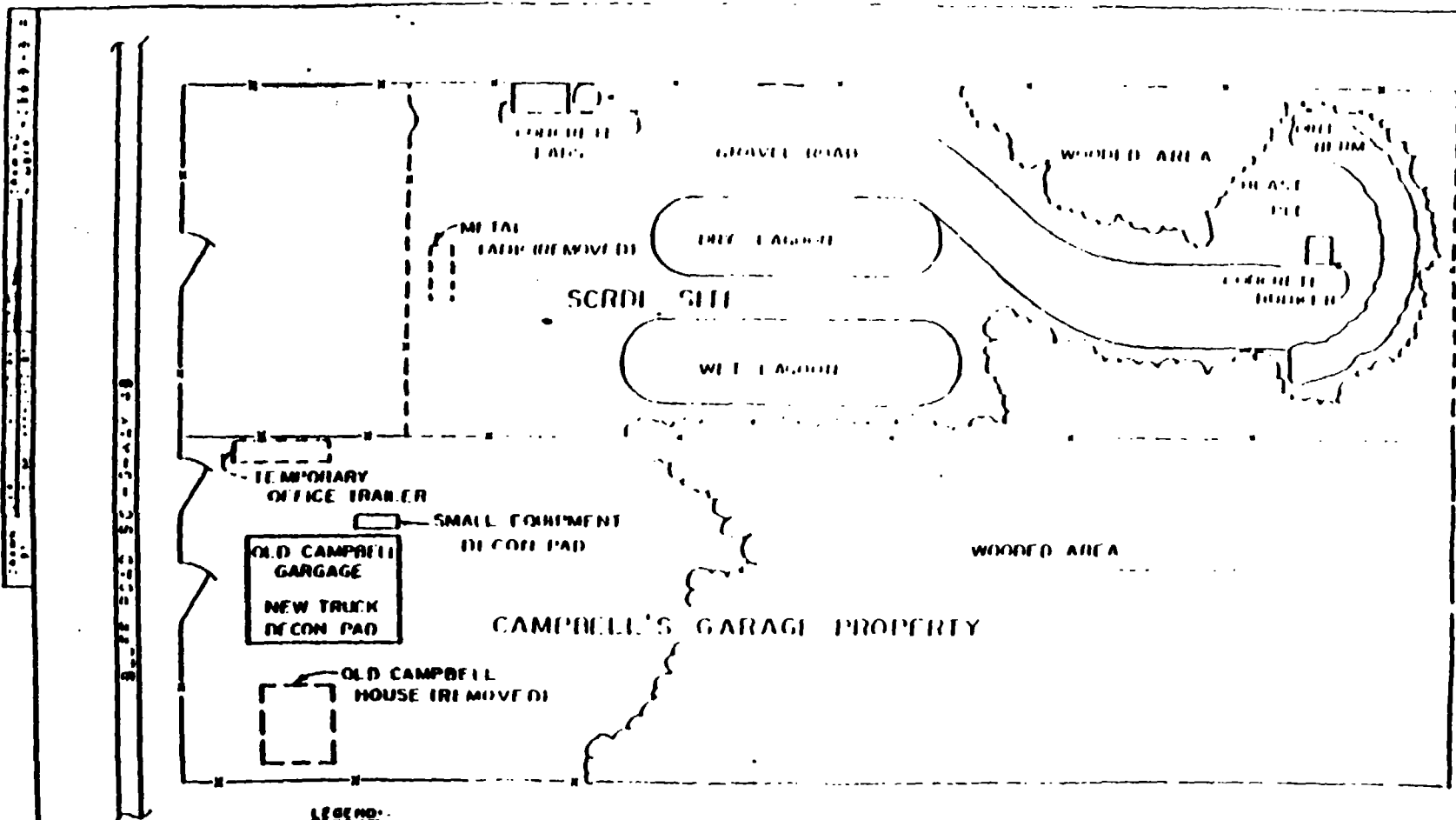


FIGURE 1
BLUFF ROAD SITE
VICINITY LOCATION
BLUFF ROAD
COLUMBIA, SOUTH CAROLINA
1970



LEGEND:

- PERMANENT FENCE
- - - TEMPORARY FENCE
- NO FENCE

BLUFF ROAD SITE DIAGRAM

NOT TO SCALE

1.2 Site History

The first reported use of the site was as an acetylene gas manufacturing facility. Specific dates and other details regarding the facility operations are not available. However, two lagoons were constructed at the north end of the cleared area of the site to support acetylene manufacturing.

In 1975, the site became a marshalling center for Columbia Organic Chemical Company. Columbia Organic Chemical Company funded the operations of Bluff Road which used the site beginning in 1976 to store, recycle, and dispose of chemical wastes. The site was closed in 1982 after a ground water investigation conducted by the South Carolina Department of Health and Environmental Control (SCDHEC) and EPA revealed the presence of site contamination of soils and groundwater.

A surficial cleanup of the site was performed in 1982 and 1983. Over 7,500 drums containing various chemicals were removed from the site for disposal. Visibly contaminated soil and all above ground structures were removed from the site. Clean fill and gravel were placed on the site to fill in excavations and provide clean roads. The two lagoons and an above ground tank containing approximately 100 gallons of sludge were left on-site. This above ground tank was removed in 1989 as part of the RI/FS at the site.

2.0 Enforcement Analysis

The Bluff Road Site is ranked 83rd on the National Priorities List by the U. S. Environmental Protection Agency under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The site is also listed as the top priority site in the State of South Carolina. Special notice letters were sent to approximately one hundred thirty-nine potentially responsible parties to give them the opportunity to conduct the RI/FS. An Administrative Order on Consent to perform the RI/FS was entered into by a group of forty-three of the PRPs on April 21, 1988.

3.0 COMMUNITY RELATIONS

An information repository for this site was established in the Landmark Square Branch of the Richland County Library on Garner's Ferry Road in Columbia, South Carolina. Information is also available in Atlanta, Georgia, in the EPA Region IV Regional Office. Fact sheets and press advisories were prepared prior to each public meeting. Prior to the Feasibility Study Public Meeting, a public notice ran in the local newspaper (The State).

A public availability session was held on June 7, 1989 to discuss the site status. A Community Relations Plan identifying a positive public outreach strategy was developed at the

direction of EPA Region IV staff and submitted to the repository in October 1988. Another availability session was held November 2, 1989 in the Hopkins Community Center to present and discuss the findings of the Remedial Investigation. A Public Meeting was held on April 10, 1990 in the Hopkins Community Center to present to the public the findings of the Feasibility Study Report and to present the Agency's preferred alternative. This meeting also opened the public comment period. During the initial thirty day public comment period, a request for an extension was received by the Agency. The public comment period was extended an additional 30 days. The public comment period ended on June 10, 1990. The comments received are addressed in the Responsiveness Summary.

4.0 Scope of Response Action

The remedial action addressed by this ROD will prevent current or future exposure posed by this site. The action will remove the threat posed by contaminated groundwater at the site and will remediate the soil so that it no longer acts as a continuing source for the groundwater contamination. This is the only ROD contemplated for the site. No other operable units have been identified as necessary at this site.

5.0 Summary of Site Characteristics

5.1 Hydrogeological Setting

The stratigraphy of the study area may be divided into four hydrologically connected water-bearing units underlying the site. Hydrogeologic units are as follows:

- o A shallow, surficial aquifer in the Okefenokee terrace, underlain by a clay or sandy clay aquitard, part of the Black Creek Formation
- o A deep aquifer consisting of sand and clay, also part of the Black Creek Formation, underlain by another aquitard of sandy clay
- o The deepest aquifer, the Middendorf Formation, consisting of sand, silt, and clay (which many geologists call the Tuscaloosa Aquifer)
- o The crystalline pre-Mesozoic basement which has virtually no primary porosity but possibly has significant high secondary fracture porosity.

5.1.2 Local Hydrogeology of the Shallow Aquifer

The shallow aquifer typically extends to a depth of 45 to 50 feet and is composed primarily of sands which range from coarse and well sorted to silty and poorly sorted. It is semiconfined by a resistant layer composed of varying amounts of clay, silt, and sand which usually lies from the surface to a depth ranging from 5 to 15 feet.

The ground water table in the shallow aquifer generally lies 10 to 15 feet below ground surface based on the three rounds of ground water level measurements taken. The overall ground water flow is approximately to the east. The gradient of the potentiometric surface is about 0.003 near Bluff Road and flattens dramatically to less than 0.001 in the vicinity of MW-4, MW-6, MW-8, and MW-12. The Remedial Investigation data indicate that there is a downward head in the surficial aquifer and it could recharge the deeper aquifer. The surface in this area is very irregular and flow patterns are subject to local influences. Overall discharge may be to Myers Creek.

5.1.3 Local Hydrogeology of the Deep Aquifer

The deep aquifer is separated from the shallow aquifer by a clay and silt unit which ranges in thickness from 1.5 to 25 feet. This partial confining layer is thinnest in the vicinity of MW-6 and MW-7 and thickens to the south and west. The lithology of the deep aquifer is similar to that of the shallow aquifer, though clay-rich layers are more common. Both the clay aquitard and the deep aquifer are thought to be units in the Black Creek Formation.

The gradient of the potentiometric surface in the deep aquifer is 0.0003 ft/ft toward the south based on water level data gathered from the four wells installed by IT Corporation.

5.2 Site Contamination

In 1989, a remedial investigation (RI) involving sampling of the soil, surface waters, sediments, ground water, and air was conducted at the SCRDI site to define the characteristics and extent of contamination at the site. Comparison of the detected levels of specific compounds to developed target cleanup criteria is presented in Section 4.0.

5.2.1 Ground Water

5.2.1.1 Surficial Aquifer

Nineteen monitoring wells were installed in the surficial aquifer to define the extent and characteristics of ground water contamination. The analytical results defined a contaminant plume approximately 1000 feet wide extending approximately 2200

feet southeast of the site (see Figure 3). The depth of the surficial aquifer is approximately 40 feet. Based on a medium sand porosity of 0.4, the estimated volume of the plume is 253,295,000 gallons. The primary components of the contamination are volatile and semi-volatile organic compounds. The detected volatile and semi-volatile compounds, highest concentrations detected and frequency of detected are summarized in Table 1. Trace levels of semi-volatile compounds were detected in three wells. Detected metals, highest concentration and frequency of detection are summarized in Table 2. Additional work, including further groundwater investigation, will be required for the development of the Remedial Design.

5.2.1.2 Deep Aquifer

Four monitoring wells were installed in the upper portion of the deep aquifer regionally downgradient of the site. These wells were completed below a clay aquitard found to be continuous over the area encompassed by well installation. Analytical results for samples of these four lower aquifer wells showed no contamination, indicating the deep aquifer has not been impacted by contamination detected in the surficial aquifer.

5.2.2 Soils

The RI investigated surface and subsurface soils as potential source areas contributing contaminants to the surficial aquifer. Dry lagoon sediments identified in the RI are included as soils for this and subsequent evaluations. Wet lagoon sediments are addressed in Section 3.2.3.1.

5.2.2.1 Surface Soils

Forty-two surface soil samples were taken on and off the site in areas of known or suspected contamination. Sampling locations and the areas of significant organic compound content are shown on Figure 4. The areas associated with volatile and semi-volatile detection are approximately the same. Tables 3 and 4 summarize the detected compounds, frequency of detection for volatile compounds and semi-volatile compounds respectively.

Two general areas of surface soil contamination were identified. The most significant area of surface soil contamination is found on the southwestern edge of the SCRDI Site and encompasses approximately 350 feet X 200 feet (70,000 sq ft).

A second area of surface soil contamination was identified in the central portion of the SCRDI property (the dry lagoon area) at lower concentrations than those seen at the southwestern edge of the property. This second area encompasses approximately 100 feet X 100 feet (10,000 sq ft).

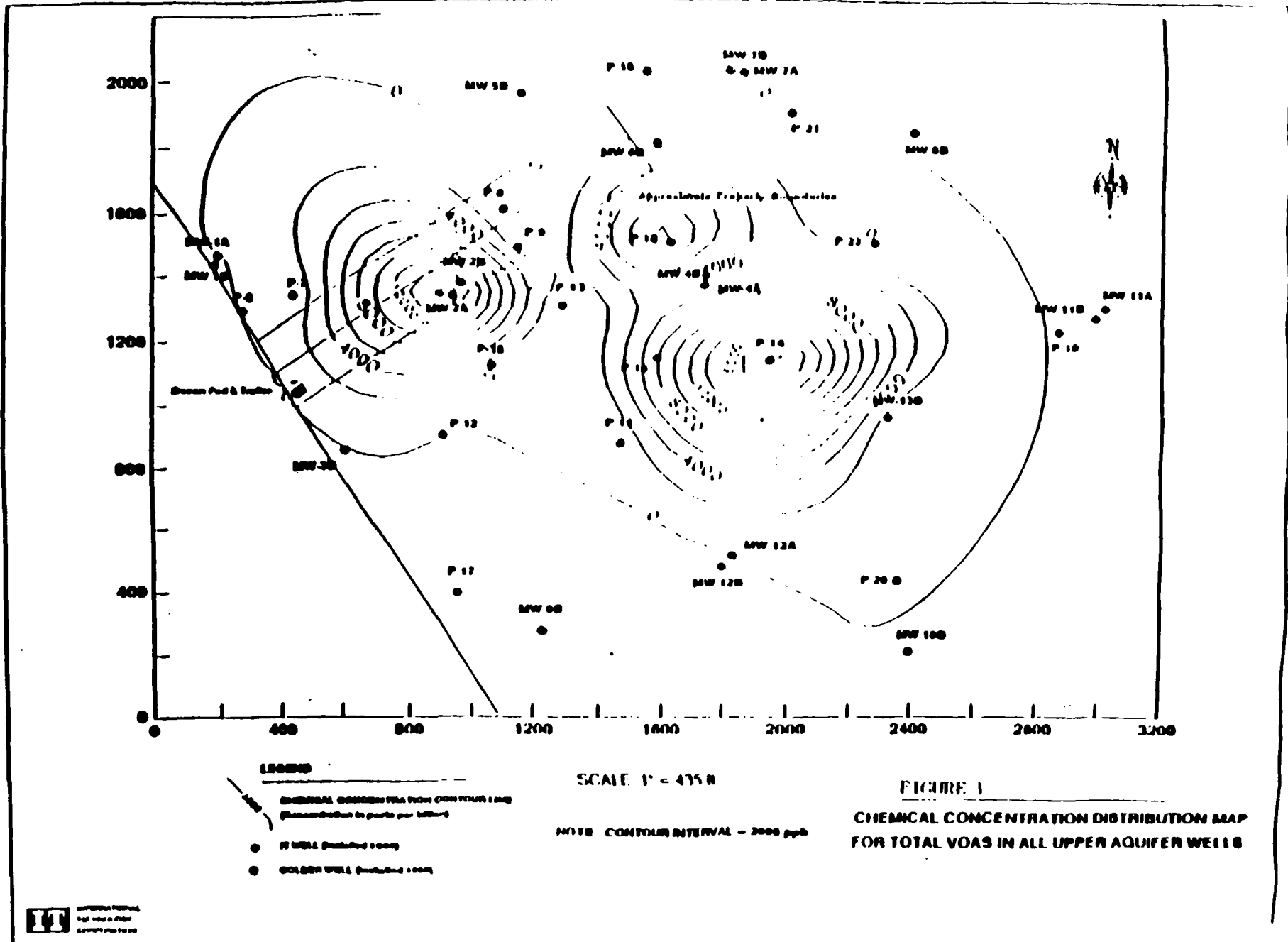


TABLE I
GROUNDWATER SURVEY
ORGANICS

COMPOUND	HIGH CONC. PPM	LOW CONC. PPM	HIGH CONCENTR.	NO. OF OBSERVATIONS/ NO. OF SAMPLES
VOLATILES				
Carbon tetrachloride	700	ND	110	1/23
Acetone	10000	?	7A	2/23
Chloroform	21000	ND	60	10/23
Benzene	110	ND	7A	2/23
1,1,1-Trichloroethane	260	ND	110	6/23
Methylene chloride	15	ND	6A	7/23
Carbon disulfide	6	ND	1A	1/23
1,1-Dichloroethane	21000	ND	7A	6/23
1,1-Dichloroethane	1700	ND	7A	7/23
1,2-Dichloroethane	73	ND	7A	3/23
2-Butanone	2100	ND	7A	1/23
1,1,2-Trichloroethane	9	ND	7A	3/23
Trichloroethane	270	ND	6A	6/23
1,1,2,2-Tetrachloroethane	660	ND	6A	6/23
Ethylbenzene	270	ND	7A	2/23
1,2-Dichloroethane	700	ND	7A	3/23
4-Methyl-2-Pentanone	90	ND	7A	1/23
Toluene	900	ND	7A	2/23
Chlorobenzene	16	ND	7A	1/23
tetrachloroethane	60	ND	110	7/23
1,2-Dichloroethane	6000	ND	7A	5/23
Total Nylons	160	ND	7A	2/23
SEMI-VOLATILES				
Diethylphthalate	7	ND	71	1/23
N-Nitrosodiphenylamine	6	ND	70	1/23
1,2-Dichlorobenzene	6	ND	6A	1/23

TABLE 7
GROUNDWATER SUMMARY
RESULTS

ELEMENT	HIGH CONC.	LOW CONC.	HIGH	NO. OF DETECTIONS/ NO. OF SAMPLES
	PPM	PPM	IN ACTION	
Aluminum	310	ND	20	22/25
Iron	156	0.06	2A	23/25
Magnesium	15.6	0.156	2A	23/25
Manganese	1.06	0.011	2A	23/25
Nickel	0.105	ND	20	23/25
Potassium	7.41	ND	2A	16/25
Sodium	37.5	ND	2A	22/25
Borism	3.27	0.03	20	23/25
Beryllium	0.066	ND	20	9/25
Cadmium	0.037	ND	7C	6/25
Chromium	0.315	ND	20	10/25
Cobalt	0.156	ND	100	9/25
Copper	0.411	ND	20	17/25
Vanadium	0.033	ND	20	9/25
Zinc	0.551	0.009	20	23/25
Calcium	84.5	1.01	11A	23/25
Lead	0.257	ND	20	13/25
Arsenic	0.006	ND	7C	1/25
Selenium	0.003	ND	7C	2/25
Mercury	0.0009	ND	20	6/25

- 10 -

Low levels of pesticides/PCBs were also detected in the area of SS-4 and SS-5. Compounds detected, the location of the highest concentration detected and frequency of detection are summarized in Table 5.

A summary of metals detected, the location of the highest concentration detected, and frequency of detection is provided in Table 6. Two samples out of thirty-four (SS-4 and SS-5) had concentrations of mercury above the background range. The levels detected and the localized area indicate that metals in the surface soil are not of primary concern.

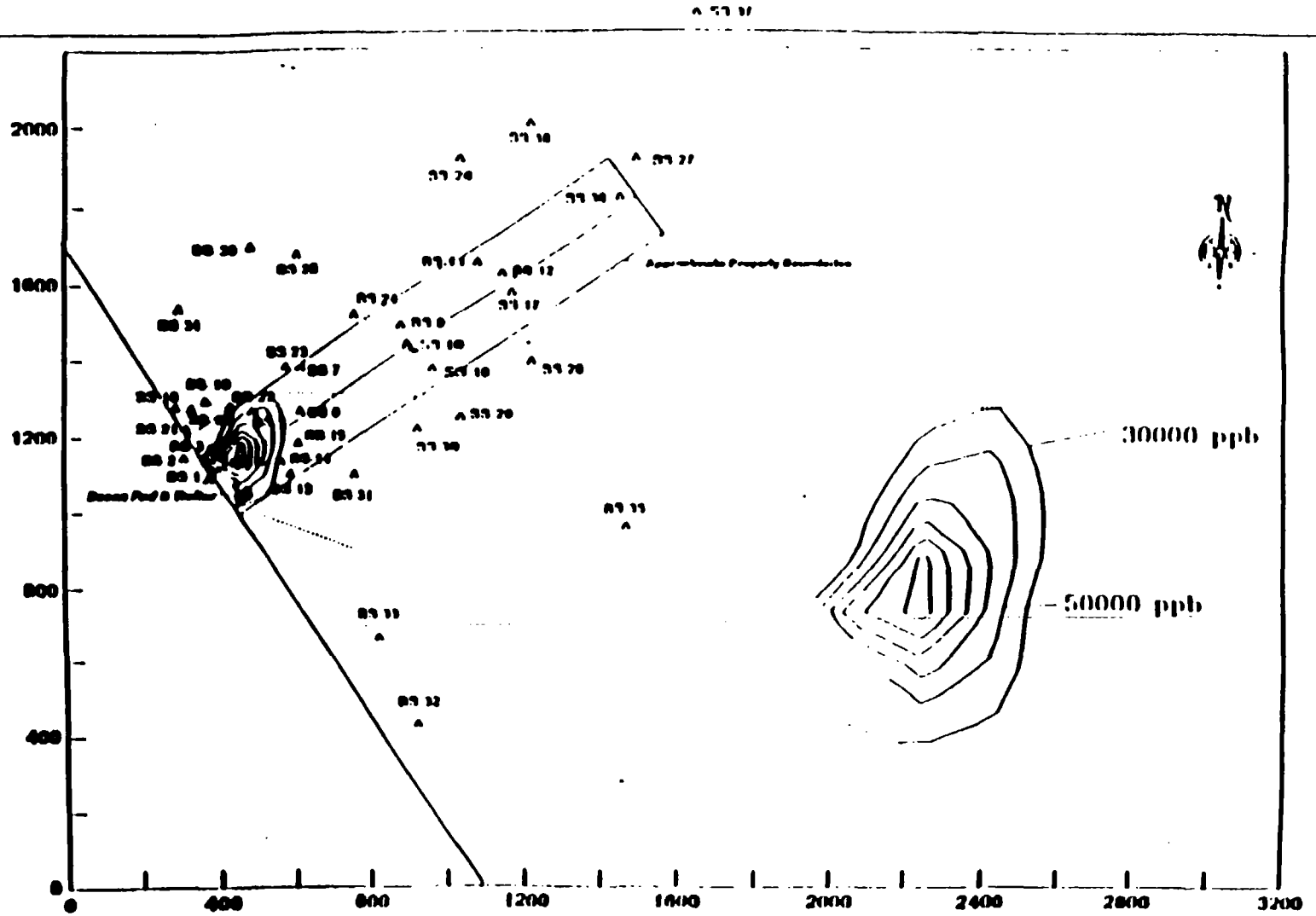
5.3.2.2 Subsurface Soils

Twenty-nine soil borings were taken on and off the site. Samples were taken at 3 to 7 and 7 to 11 foot intervals at each location. One additional sample at 11 to 15 feet was taken at B9. Figure 5 shows the sampling locations and areas of significant volatile compound content. The volatile compounds detected, the location of the highest concentration depth, and frequency of detection are summarized in Table 7. Elevated levels of volatile compounds are limited to the upper 7 feet of the unconsolidated zone. The areas of detected elevated levels are limited to the proximity of B8 and B9 (approximately 300 feet ENE of B4/B5). This encompasses an area of approximately 400 feet X 250 feet (112,500 sq ft) that essentially overlaps that area identified with elevated volatile concentrations in surface soils. Concentrations generally decreased with depth.

Semi-volatile compounds were also detected in the same limited areas of B4/B5 and B8/B9. The highest concentrations were primarily limited to the upper 7 feet of the unconsolidated zone with concentrations decreasing significantly with depth. Semi-volatile compounds detected, the location of the highest concentration and depth, second highest location and depth, and frequency of detection are summarized in Table 8.

Low levels of pesticides/PCBs were detected in the subsurface soils in the B5, B8/B9 area, limited to the upper 7 ft of the unconsolidated zone. Table 9 summarizes the compounds detected, the location of the highest concentration detected and frequency of detection.

A summary of metals detected, the location of the highest concentration detected and frequency of detection is provided in Table 10. One boring out of the twenty-nine taken (B13) has a concentration of selenium above the background range. The levels detected and the localized area indicate that metals in the surface soil are not of concern.



LEGEND

--- APPROXIMATE PROPERTY BOUNDARY

--- CONTOUR INTERVAL - 10000 ppb

▲ SURFACE SOIL SAMPLE

SCALE: 1" = 435 ft

FIGURE 4
CHEMICAL CONCENTRATION DISTRIBUTION MAP
FOR TOTAL VOCs IN SURFACE SOIL SAMPLES
 * EXCLUDES ACETONE AND METHYLENE CHLORIDE

TABLE I
 SURFACE SOIL SUMMARY
 VOLATILES

<u>COMPOUND</u>	<u>HIGH CONC.</u> <u>PPB</u>	<u>LOW CONC.</u> <u>PPB</u>	<u>HIGH</u> <u>IN AIR/CM</u>	<u>NO. OF DETECTIONS/</u> <u>NO. OF SAMPLES</u>
Acetone	45,000	6	554	62/62
Chloroform	10,000	ND	555	9/62
1,1,1-Trichloroethane	14,000	ND	555	4/62
Methylene Chloride	4,700	ND	0152	60/62
Carbon Disulfide	1	ND	5516	1/62
1,1-Dichloroethane	500	ND	555	23/62
2-Butanone	55	ND	551	1/62
Trichloroethane	44,000	ND	555	0/62
1,1,2,2-Tetrachloroethane	100,000	ND	554	1/62
Ethylbenzene	700	ND	555	1/62
4-Methyl-2-Pentanone	1	ND	551	1/62
Toluene	29,000	ND	554	10/62
Chlorobenzene	14,000	ND	554	1/62
Tetrachloroethane	54,000	ND	554	0/62
1,2-Dichloroethane	55	ND	551	2/62
Total Xylenes	5,700	ND	554	4/62
Styrene	6	ND	5510	1/62
Vinyl Chloride	24	ND	0151	1/62
1,1-Dichloroethane	240	ND	0155	2/62
Benzene	500	ND	0152	2/62
1,2-Dichloroethane	170	ND	0151	1/62

TABLE 4
SUMMARY OF THE SUMMARY
Semi-Volatiles

COMPOUND	HIGH CONC.	LOW CONC.	HIGH	NO. OF DETECTIONS/ NO. OF SAMPLES
	PPB	PPB	CONCENTR	
Benzoic Acid	3,000	ND	5510	10/42
Di-n-butylphthalate	2,700	ND	556	0/42
Naphthalene	1,700	ND	556	1/42
2-Methylphenol	50,000	ND	556	1/42
2-Chlorophenol	200,000	ND	556	2/42
2,4,5-Trichlorophenol	810	ND	556	1/42
Benzyl Alcohol	110,000	ND	556	1/42
4-Methyl Phenol	14,000	ND	556	3/42
Phenol	210,000	ND	555	30/42
Bis(2-Ethylhexyl) Phthalate	7,600	ND	555	41/42
Di-n-octylphthalate	44,000	ND	556	5/42
Hexachlorobenzene	7,200	ND	556	3/42
Isophorone	450	ND	556	1/42
2,4-Dichlorophenol	20,000	ND	656	1/42
Diethylphthalate	1,500	ND	656	1/42
N-Nitrosodiphenylamine	50	ND	6521	1/42

TABLE 5
 CORREAL SOIL SURVEY
 PESTICIDES/PPM'S

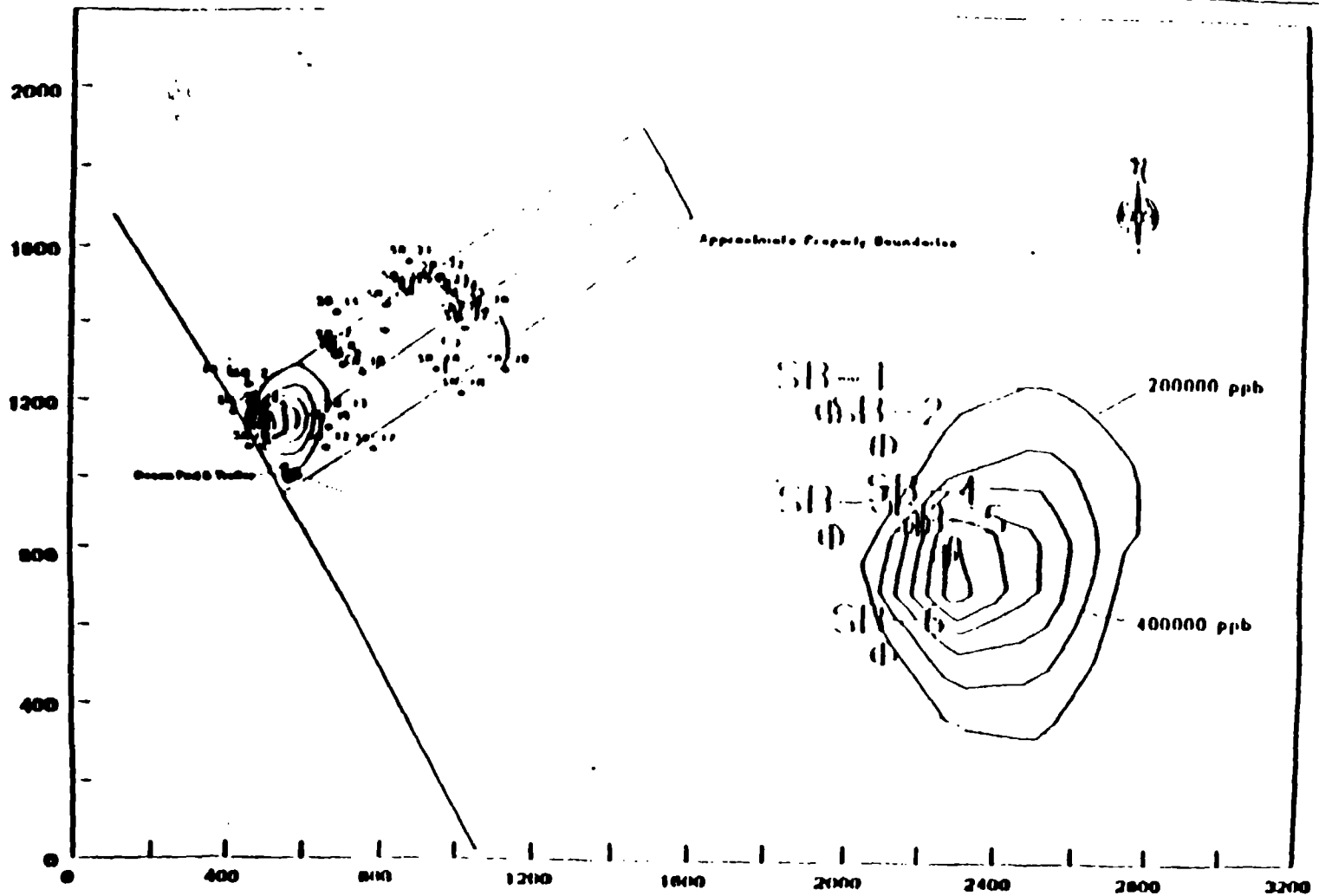
<u>COMPOUND</u>	<u>HIGH CONC.</u> <u>PPM</u>	<u>LOW CONC.</u> <u>PPM</u>	<u>HIGH</u> <u>CONCENTR.</u>	<u>NO. OF DETECTIONS,</u> <u>NO. OF SAMPLES</u>
4,4'-DDE	85	ND	SSS	3/62
4,4'-DDD	4A	ND	SSIV	1/62
4,4'-DDT	220	ND	SSS	4/62
Methoxychlor	2700	ND	SSS	3/62
Dieldrin	52	ND	SS/0	1/62
Endosulfan II	26	ND	SS/0	1/62
Arachlor 1242	1900	ND	SSS	2/62
Endosulfan Sulfate	600	ND	DESB	1/62

TABLE 6
SURFACE SOIL SUMMARY
METALS

ELEMENT	HIGH CONC.	LOW CONC.	HIGH RELATION	NO. IN DETERMINATIONS	BLANK DETERMINATION	ESTIMATED BACKGROUND CONCENTRATION		NO. OF DETERMINATIONS ABOVE BACKGROUND RANGE
	PPM	PPM				RANGE	AVERAGE PPM	
Aluminum	13,500	1070	SS10	14/14	ND	7000-100,000 ^a	18,000	0
Iron	30,000	9300	SS11	14/14	ND	1000-100,000 ^a	14,000	0
Magnesium	813	16	SS4	14/14	ND	50-50,000 ^a	2,000	0
Manganese	1,240	2.5	SS21 ^b	14/14	ND	2-7,000 ^a	250	0
Nickel	34	ND	SS5	11/14	ND	5-700 ^a	15	0
Potassium	2,400	ND	SS4	8/14	ND	50-17,000 ^a	12,000	0
Silver	5	ND	SS10	5/14	ND	.01-5 ^b	0.05 ^b	0
Sodium	346	ND	SS5	23/14	ND	500-50,000 ^a	2,500	0
Antimony	6	ND	SS10	7/14	ND	.1-8.8 ^a	0.52	0
Barium	100	10	SS1	14/14	ND	10-1500 ^a	200	0
Beryllium	1.3	ND	SS10	12/14	ND	.1-7 ^a	0.55	0
Cadmium	4	ND	SS5	5/14	ND	.0-2.5 ^b	0.5 ^b	1
Chromium	64	2	SS4	14/14	ND	1-1000 ^a	33	0
Cobalt	9	ND	SS5	16/14	ND	.0-1.70 ^a	5.0	0
Copper	205	ND	SS5	12/14	ND	.1-700 ^a	15	0
Vanadium	64	4	SS11	14/14	ND	.7-300 ^a	48	0
Zinc	730	3	SS5	12/14	ND	.5-2000 ^a	40	0
Calcium	94,000	86	SS24	14/14	ND	100-200,000	3,400	0
Lead	150	7	SS5	14/14	ND	.10-300 ^a	14	0
Arsenic	0.2	ND	SS5	15/14	ND	.0-1.75 ^a	4.0	0
Selenium	3.6	ND	SS20	3/14	ND	.0-1.30 ^a	0.5	0
Mercury	6.56	ND	SS5	20/14	ND	0.01-3.4 ^a	0.001	2
Thallium	0.9	ND	SS17	7/14	ND	2.2-25	7.7	0

^a USGS Paper 1270 (1984).

^b Office of Toxic Substances, USEPA (1984).



(LEGEND)
 --- Concentration Contours (ppb) (200,000 ppb interval)
 ● Soil Boring Location (Numbered 1-6)

SCALE 1" = 475'
 CONTOUR INTERVAL = 200,000 ppb

FIGURE 5
 CHEMICAL CONCENTRATION DISTRIBUTION MAP
 FOR TOTAL VOCs* IN SOIL BORINGS

* EXCLUDES ACETONE AND METHYLENE CHLORIDE

TABLE 7
SOIL BORING SUMMARY
VOLATILES

COMPOUND	HIGH CONC.	AVE ACROSS	HIGH	HIGH	SECOND HIGH	SECOND HIGH	SECOND HIGH	NO. OF DEPTHS/ NO. OF LOCATIONS
	PPB	HIGH BORING	LOCATION	DEPTH	DEPTH	DEPTH	DEPTH	
Carbon tetrachloride	4,100*	2,050	05	3 7	0	N/A	N/A	1/20
Acetone	160,000*	92,000	05	3 7	56(M)	07	3 7	20/20
Chloroform	160	81.5	00	3 7	51	09	7 11	6/20
Benzene	7	2.3	09	7 11	3	00	3 7	2/20
1,1,1-Trichloroethane	6,000*	3,400	05	3 7	270	09	7 11	3/20
Methylene Chloride	39,000*	22,750	05	3 7	140	09	7 11	20/20
Carbon Disulfide	2	1	015	7 11	2	015	7 11	2/20
1,1-Dichloroethane	69	23	09	7 11	3	015	7 11	5/20
1,1-Dichloroethene	44	27.7	09	11-15	4	015	7 11	2/20
2-Butanone	89,000*	51,500	05	3 7	14(M)	04	3 7	13/20
1,1,2-Trichloroethane	7	2.3	09	7 11	0	N/A	N/A	1/20
Trichloroethene	25,000	12,500	05	3 7	270	09	7 11	3/20
1,1,2,2-Tetrachloroethane	2,300,000	1,260,000	05	3 7	11(M)	09	3 7	0/20
Ethylbenzene	10,000	9,000	05	7 11	630	00	3 7	3/20
4-Methyl-2-Pentanone	340	106	04	7 11	10	09	11-15	6/20
Toluene	340,000	176,000	05	3 7	10(M)	09	7 11	20/20
Chlorobenzene	25,000*	11,500	05	3 7	3	00	3 7	2/20
Tetrachloroethene	95,000	47,500	05	3 7	940	00	3 7	3/20
1,2-Dichloroethylene	40	17.3	09	7 11	0	N/A	N/A	1/20
Total Nylenes	62,000	31,000	05	3 7	16(M)	09	7 11	11/20

*Duplicate is significantly lower. Higher value used for this summary

29 soil boring, samples at every location taken at 3 7-ft, 7 11-ft, at 0 9 an additional sample at 11-15-ft was taken, total of 50 samples not including duplicates

TABLE II
 SOIL BORING SUMMARY
 SITE MOULLETS

COMPOUND	HIGH CONC.	AVE ACROSS	HIGH	HIGH	SECOND HIGH	SECOND HIGH	SECOND HIGH	NO. OF DETECTIONS/ NO. OF LOCATIONS
	PPB	HIGH BORING	(LOCATION)	DEPTH	CONC.	PPB	(LOCATION)	
Benzoic Acid	110,000	54,331	09	1 7	5,600	07	7 11	1/20
Hexachloroethane	1200	600	05	1 7	0	N/A	N/A	1/20
01-N Butylphthalate	250	125	04	1 7	92	01	1 7	3/19
N-Nitrosodiphenylamine	020	410	05	1 7	260	027	3 7	11/20
2,4,6-Trichlorophenol	200	140	05	1 7	0	N/A	N/A	1/20
Naphthalene	3000	1,950	05	1 7	0	N/A	N/A	1/20
2-Methylphenol	120,000	65,500	05	1 7	43	06	7 11	2/20
2-Chlorophenol	2,000,000	1,033,500	05	1 7	290	012	3 7	5/20
2,4,5-Trichlorophenol	200	100	05	1 7	0	N/A	N/A	1/20
Nitrobenzene	11,000	5,405	05	7 11	0	N/A	N/A	1/20
Benzyl Alcohol	350,000	102,000	05	1 7	250,000	09	3 7	2/20
4-Methylphenol	3,600	1,000	05	3 7	260	06	7 11	3/20
Phenol	6,300,000	3,375,000	05	3 7	1,000	09	7 11	1/20
Bis(2-Ethylhexyl) Phthalate	2,400	1,000	04	3 7	1,900	05	3 7	20/20
01-N-Octyl Phthalate	1,700	050	00	1 7	450	05	3 7	3/20
Hexachlorobenzene	190	41.1	09	7 11	0	N/A	N/A 1/20	
2,4-Dichlorophenol	150,000	65,000	05	1 7	0	N/A	N/A	1/20

5.2.3 Other Media

5.2.3.1 On-site Surface Water and Surface Water Sediment

The wet lagoon water and sediment samples contained trace amounts of volatile and semi-volatile constituents. Sediment metals concentrations were within background ranges with the exception of calcium. Summaries for compounds detected and frequencies are provided in Tables 11 & 12.

5.2.3.2 Off-Site Surface Water and Surface Water Sediment

Samples of off-site surface water and surface water sediment indicated no site related contamination. One sample (RS2) showed an elevated level of the naturally occurring compound benzoic acid.

5.2.3.3 Ambient Air

Ambient air samples were collected on the SCRDI property. Toluene was detected in two of three bag samples at 22 and 27 ppb. No other constituents were detected. Air contamination is not considered to be significant at the site.

5.3 Risk Assessment Summary

A baseline risk assessment was performed as part of the Remedial Investigation to evaluate the potential for off-site migration of constituents from the site and the impacts on public health and/or the environment. The baseline risk is associated with the No-Action Alternative.

The extent of constituents in environmental media at the SCRDI site was shown to be limited to the on-site soils and shallow ground water aquifer underlying the site. Elevated levels of site related constituents were not found in off-site soil samples, sediment or water samples from drainage ditches, the deep ground water aquifer, or in surface water in local creeks.

The primary potential route of off-site migration was shown to be via the shallow ground water aquifer. This aquifer may recharge Myers creek, 3,200 feet northeast of the site boundary. However, site-related constituents have not been detected in Myers Creek.

Direct consumption of ground water from the surficial aquifer within the contaminant plume would present unacceptable levels of exposure. A trespasser scenario indicated that the presence of site-related constituents in the soils do not present a significant risk to the health of trespassers on the site.

TABLE 9
 2011 PORTUGAL SUPERFUND
 HIGHLIGHTS

ELEMENT	HIGH CONC. PPB	HIGH LOCATIONS	NO. OF DETECTION/ NO. OF LOCATIONS	ESTIMATED BACKGROUND CONCENTRATION		NO. OF LOCATIONS ABOVE BACKGROUND RANGE
				RANGE PPM	AVERAGE PPM	
Aluminum	22,100	B75	29/29	7000-100,000 ^a	33,000	0
Iron	22,700	B7	29/29	100-100,000 ^a	14,000	0
Magnesium	816	B75	29/29	50-50,000 ^a	2,100	0
Manganese	211	B7	29/29	2-2,000 ^a	250	0
Nickel	8	B8	10/29	5-700 ^a	11	0
Potassium	663	B8	10/29	50-37,000 ^a	12,000	0
Silver	2.1	B16	3/29	0-0.5 ^b	0.05	0
Sodium	800	B78	26/29	500-50,000 ^a	2,500	0
Barium	103	B75	29/29	10-15,000 ^a	290	0
Beryllium	1	B75	23/29	<1-7 ^a	0.55	0
Cadmium	0.2	B76	2/29	<0.2-1 ^b	0.50	0
Chromium	24	B75	29/29	1-1000 ^a	33	0
Cobalt	13	B75	8/29	1-1000 ^a	5.9	0
Copper	30	B7	29/29	0.3-70 ^a	13	0
Vanadium	62	B7	29/29	<1-700 ^a	63	0
Zinc	34	B8	29/29	<7-3400 ^a	40	0
Calcium	3,430	B15	29/29	<5-2900 ^a	3,400	0
Lead	20	B13	29/29	100-200,000 ^a	34	0
Arsenic	0.4	B6	1/29	<10-300 ^a	4.8	0
Thallium	0.4	B73	1/29	<0.1-75 ^a	7.7	0
Selenium	9.7	B13	5/29	<0.1-3.9 ^a	0.3	1
Mercury	0.37	B5	13/29	0-0.1-3.4 ^a	0.081	0

^a USGS Paper 1270 (1984).

^b Office of Toxic Substances, USEPA (1984).

TABLE 10
 SOIL MONITORING SUMMARY
 PESTICIDES AND PCB'S

CROPPING	HIGH CONC.	AVE ACROSS	HIGH	HIGH	SECOND HIGH	SECOND HIGH	SECOND HIGH	NO. OF DETECTIONS/ NO. OF LOCATIONS
	PPM	HIGH BORING	LOCATION	DEPTH	TIME	PPM	LOCATION	DEPTH
Lindane	12	6	BR	3.7	0	N/A	N/A	1/29
Aroclor 1242	510	170	BY	3.7	260	BR	3.7	2/29
Methoxychlor	160	80	DS	3.7	0	N/A	N/A	1/29
Toxaphene	470	235	BS	3.7	0	N/A	N/A	1/29
Heptachlor	84	43	BS	3.7	0	N/A	N/A	1/29
Bidrin Ketone	67	23.5	BS	3.7	0	N/A	N/A	1/29

TABLE II
WET FACTORY SEDIMENT SUMMARY
ORGANICS

VOIATILES

<u>COMPOUND</u>	MEAN CONC. C/MG. P/B	NO. OF DETECTIONS/ SAMPLINGS
Methylene Chloride	35	1/3
Acetone	340	1/3
Carbon Disulfide	10	2/3
Toluene	5	2/3

SEMI-VOIATILES

<u>COMPOUND</u>	MEAN CONC. C/MG. P/B	NO. OF DETECTIONS/ SAMPLINGS
Bis(2-ethylhexyl) phthalate	1700	1/3
Phenol	810	1/3
Di-n-butylphthalate	180	2/3

PESTICIDES/PCBs

<u>COMPOUND</u>	MEAN CONC. C/MG. P/B	NO. OF DETECTIONS/ SAMPLINGS
ND	ND	11/3

TABLE 12
 WET TAILOR NEEMO DE SURVEY
 RESULTS

<u>COMPOND</u>	<u>WGT CONC.</u> <u>(PPM)</u>	<u>NO. OF DEFECTIONS/ NO. OF SAMPLES</u>
Aluminum	14,500	3/3
Antimony	6	3/3
Arsenic	1.6	3/3
Barium	166	3/3
Beryllium	0.0	3/3
Calcium	443,000	3/3
Chromium	42	3/3
Copper	13	3/3
Iron	7,710	3/3
Lead	10	3/3
Magnesium	496	3/3
Manganese	100	3/3
Mercury	0.67	2/3
Nickel	13	3/3
Sodium	470	3/3
Vanadium	20	3/3
Zinc	32	3/3
Cyanide	13.2	1/3

The predicted constituent concentrations in Myers Creek that could result from direct undiluted discharge of the plume into the creek would not have a significant impact upon the indigenous aquatic populations. The predicted chemical concentrations in Myers Creek are over three orders of magnitude lower than the maximum acceptable toxicant concentration (MATCs) for the most sensitive species which may be found in Myers Creek.

The effects or potential for bioconcentrations or bioaccumulation were determined to be negligible at the site.

6.0 Clean-up Criteria (ARARs)

6.1 Chemical Specific ARARs

6.1.1 Ground water

Ground water at the Bluff Road Site is designated as Class GB in accordance with the South Carolina water classification system. The GB designation is used to classify water quality suitable as a potential drinking water supply. Therefore, Federal and State regulations governing the quality and usage of drinking water is applicable.

The Safe Drinking Water Act and the State Primary Water Regulations establish Maximum Contaminant Levels (MCLs) and non-zero maximum contaminant level goals (MCLGs) for numerous organic and inorganic constituents. The Cleanup Criteria shown in Table 13 were established based on MCLs and proposed MCLs. Where MCLs were not available, risk based numbers were calculated as indicated by the appropriate table footnotes.

6.1.2 Soils

Although there were no chemical specific ARARs identified for site soils, the potential for contaminants leaching from the soils as a continuing source that could further degrade ground water quality was considered. Therefore, a soil leachability model was used to calculate cleanup criteria as shown in Tables 14 & 15. Where the model calculated soil cleanup criteria lower than the ground water MCL for a specific constituent, the MCL was used as the soil concentration. The model and appropriate calculations are provided in Appendix A of the final draft Feasibility Study Report.

6.2 Location Specific ARARs

Since the Bluff Road Site may affect Myers Creek through discharge from the shallow aquifer, the Fish and Wildlife Coordination Act would be applicable. Portions of the site and surrounding areas have been designated as wetlands, therefore, the following ARARs apply:

TABLE 11
GROUNDWATER CLEANUP CRITERIA

<u>COMPOUND</u>	<u>TARGET CLEANUP LEVELS (PPM)</u>	<u>NO. OF LOCATIONS EXCEEDING FOR NO. OF SAMPLE</u>
Carbon Tetrachloride	5.00E-03 ^a	6/23
Acetone	1.10E+00 ^d	2/23
Chloroform	2.09E-02 ^c	5/23
Benzene	5.00E-03 ^a	2/23
1,1,1-Trichloroethane	2.00E-01 ^a	1/23
Methylene Chloride	1.70E-02 ^c	1/23
1,1-Dichloroethane	5.00E-01 ^a	5/23
1,1-Dichloroethene	7.00E-03 ^a	3/23
1,2-Dichloroethane	5.00E-01 ^a	1/23
2-Butanone	5.50E-01 ^a	1/23
1,1,1,2-Tetrachloroethane	2.20E-01 ^c	2/23
1,1-Dichloroethene	5.00E-01 ^a	5/23
1,1,1,2,2-Pentachloroethane	6.00E-04 ^c	6/23
Ethylbenzene	7.00E-01 ^a	0/23
1,2-Dichloroethane	5.00E-01 ^a	3/23
4-Methyl-2-Pentanone	5.50E-01 ^a	0/23
Toluene	2.00E+00 ^a	0/23
Chlorobenzene	1.00E-01 ^a	0/23
Tetrachloroethene	5.00E-01 ^a	5/23
1,2-Dichloroethene	7.00E-02 ^a	1/23
Total Xylenes	1.00E-01 ^a	0/23
2-Chlorophenol	5.50E-02 ^a	0/23
<u>METALS</u>		
Iron	3.00E-01 ^e	16/23
Manganese	5.00E-02 ^e	15/23
Barium	1.00E+00 ^a	2/23
Cadmium	5.00E-03 ^a	2/23
Chromium	5.00E-02 ^a	3/23
Copper	1.00E+00 ^a	0/23
Zinc	5.00E+00 ^a	0/23
Lead	5.00E-03 ^a	3/23
Arsenic	5.00E-02 ^a	0/23
Selenium	1.00E-02 ^a	0/23
Mercury	2.00E-03 ^a	0/23

^aSWDA, MCLs, proposed MCLs, non-zero MCLGs.

^cDerived from CPF and exposure model.

^dDerived from RFD and exposure model.

^eSouth Carolina MCL's for Class GB groundwater.

TABLE 1
SOIL CLEANUP CRITERIA

COMPOUND	TARGET CLEANUP LEVEL (PPM)	NO. OF LOCATIONS > T NO. OF SAMPLE LOCATIONS
Carbon Tetrachloride	5.30E-02	1/71
Chloroform	1.10E-00 ^a	14/71
Chlorobenzene	2.10E-02	5/71
1,1,1-Trichloroethane	1.03E-00	2/71
1,1,2-Trichloroethane	1.70E-02 ^a	20/71
1,1-Dichloroethane	6.00E-03	3/71
1,1-Dichloroethene (MVE)	5.50E-02 ^a	3/71
1,1-Dichloroethane	1.80E-02	6/71
1,1,1-Trichloroethane	1.00E-03	5/71
1,1,2-Trichloroethane	2.20E-03	0/71
1,1,2-Trichloroethane	5.50E-02 ^a	0/71
1,1,2-Trichloroethane	1.70E-02	2/71
1,1,2-Trichloroethane	5.50E-02	2/71
1,1,2-Trichloroethane	5.30E-02	5/71
1,1,2-Trichloroethane	1.20E-02	0/71
1,1,2-Trichloroethane	6.50E-02	0/71
1,1,2-Trichloroethane	3.00E-02	1/71
1,1,2-Trichloroethane	1.30E-02	3/71
1,1,2-Trichloroethane	1.20E-02	1/71
1,1,2-Trichloroethane	5.00E-02	2/71
1,1,2-Trichloroethane	5.50E-02	0/71
1,1,2-Trichloroethane	3.50E-02	4/71
1,1,2-Trichloroethane	1.00E-03	1/71

^a Ground Water Target Cleanup Level.

TABLE 15
 WET LAGOON SEDIMENT CLEANUP CRITERIA

VOLATILES

<u>COMPOUND</u>	<u>TARGET CLEANUP LEVEL PPM</u>	<u>LOCATIONS > TOL</u>
Methylene Chloride	1.70E-02	2
Acetone	1.10E-00	0
Toluene	1.74E-01	0

SEMI-VOLATILES

<u>COMPOUND</u>	<u>TARGET CLEANUP LEVEL-PPM</u>	<u>LOCATIONS > TOL</u>
Phenol	1.95E-00	0

TABLE 16
ACTION-SPECIFIC ARARS FOR SOIL AND GROUNDWATER TREATMENT
REED ROAD SITE

ARARS	STATUS	REQUIREMENT SUMMARIES	ACTION TO BE TAKEN TO ATTAIN ARARS
A. COMMON TO ALL ALTERNATIVES: OSHA-General Industry Standards (29CFR 1910)	Applicable	These regulations specify the 8 hour time weighted average concentration for worker exposure to various organic compounds. Limiting requirements for workers at hazardous waste operations are specified in 29 CFR 1910.120.	Proper respiratory equipment will be worn if it is not possible to maintain the work atmosphere below these concentrations.
OSHA-Safety and Health Standards (29CFR 1926)	Applicable	This regulation specifies the type of safety equipment and procedures to be followed during site remediation.	All appropriate safety equipment will be on site and appropriate procedures will be followed during treatment activities.
OSHA-Record keeping, reporting and Related Regulations, (29 CFR 1904)	Applicable	This regulation outlines the record keeping and reporting requirements for an employer under OSHA.	These regulations apply to the company(s) contracted to install, operate, and maintain the treatment site.
RCRA-Standards for Owners/Operators of Permitted Hazardous Waste Facilities (40 CFR 264.10-264.18)	Relevant & Appropriate	General facility requirements outline general waste analysis, security measures, inspections and training requirements.	Facility will be designed, constructed, and operated in accordance with this requirement. All workers will be properly trained.
RCRA-Preparedness and Prevention (40 CFR 264.30-264.31)	Relevant & Appropriate	This regulation outlines the requirements for safety equipment and spill control.	Safety and communication equipment will be installed at the site. Local authorities will be familiarized with the site.
RCRA-Contingency Plan and Emergency Procedures (40 CFR 264.50-264.56)	Relevant & Appropriate	This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc.	Plans will be developed and implemented during remedial design. Copies of the plan will be kept on site.
RCRA-Closure and Post-Closure (40 CFR 264.110-264.120)	Relevant & Appropriate	The regulations details specific requirements for closure and post closure of hazardous waste facilities.	Since groundwater will be cleaned to drinking water standards, post closure standards will be met.
<u>Waste Transportation:</u>			
DOT Rules for Transportation of Hazardous Materials (49 CFR Parts 171-177)	Applicable	This regulation outlines procedures for the packaging, labeling, manifesting, and	This regulation will be applicable to any

TABLE 16 (CONTINUED)

ARARS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARS
<u>Thermal Treatment:</u>			
40 CFR 60.52: NSPS	Applicable	Provides particulate emission limits for incinerators.	Particulate emission limits should be specified for compliance.
40 CFR 264: Subpart 0	Applicable	Provides performance standards for hazardous waste incinerators.	Performance standards should be specified for compliance.
40 CFR 264.361-365	Applicable	Provides performance standards and closure requirements for incinerator design and operation for destruction of PCBs, and limits emissions of HCl, particulates, and carbon monoxide.	Proper designs will be implemented to meet these requirements.
40 CFR 264.367	Applicable	Provides monitoring and inspection requirements while incinerating waste.	These requirements will be included to meet these regulations.
40 CFR 264.351	Applicable	Provides requirements for disposal of incinerated ash, scrapper waste, and scrapper sludge.	These requirements will be included to meet these regulations.
CAA-MAAS (40 CFR 1-99)	Applicable	Applies to major stationary sources such as treatment units that have the potential to emit significant amounts of pollutants such as NO _x , SO ₂ , CO, lead, mercury and particulates (more than 250 tons/year). Regulations under CAA do not specifically regulate emissions from hazardous waste incinerators, but it is likely that Prevention of Significant Deterioration (PSD) provisions would apply to an on site treatment facility.	The treatment system will be designed to meet these emission limits. PSD procedure was not included in this phase of FS.
Interim RCRA/CERCLA Guidance on Non-Contiguous Sites and On-Site Management of Waste and Treated Residue (USEPA Policy Statement, March 27, 1986)	To be Considered	If a treatment or storage unit is to be constructed for on site remedial action, there should be a clear intent to dismantle, remove, or close the unit after the CERCLA action is completed.	Only properly permitted facilities will be considered for disposal of hazardous materials.

TABLE 16 (CONTINUED)

PROGS	STATUS	REGULATORY SUMMARY	ACTION TO BE TAKEN TO ATTAIN PROGS
<u>Waste Transportation (Cont'd):</u>			
Standards Applicable to Transporters of Hazardous Waste-RCRA Section 3003, (40 CFR 262 and 263, 40 CFR 170 to 179)	Applicable	Establishes the responsibility of off site transporters of hazardous waste in the handling, transportation, and management of the waste. Requires a manifest, recordkeeping, and immediate action in the event of a discharge of hazardous waste.	This regulation will be applicable to a company contracted to transport hazard material from the site.
<u>General:</u>			
RCRA Land Disposal Restrictions (40 CFR 268, Subpart D)	Applicable	Since November 8, 1980, movement of excavated materials to new location and placement in or on land trigger land disposal restrictions.	Any regulated contaminants found in a excavated will be properly disposed as required by the regulations.
EPA Administered Permit Program: The Hazardous Waste Permit Program RCRA Section 3005, 40 CFR 270, 274	Applicable	Covers the issues permitting, application, monitoring and reporting requirements for off site hazardous waste management facilities.	Any off site facility accepting hose from the site must be properly permit implementation of the alternative w/ consideration of requirements.
<u>B. SOIL TREATMENT:</u> <u>Excavation:</u>			
40 CFR 262: RCRA	Applicable	Establishes standards for generators of hazardous wastes including waste determination, manifests, and pre transport requirements.	This regulation will be applicable excavation and on site storage of a
<u>Leak Flowing:</u>			
RCRA General Standards (40 CFR 264.111)	Relevant & Applicable	General performance standard requires minimization of need for further maintenance and control, minimization or elimination of just closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste incineration products. Also requires disposal in circumstances of treatment, stabilization, and solids	Proper design considerations will to minimize the need for future decontamination facility will be

TABLE 16 (CONTINUED)

ARARS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARS
<u>Thermal Treatment:</u>			
40 CFR 60.52; NSPS	Applicable	Provides particulate emission limits for incinerators.	Particulate emission limits should be specified for compliance.
40 CFR 264; Subpart 0	Applicable	Provides performance standards for hazardous waste incinerators.	Performance standards should be specified for compliance.
40 CFR 264.361-365	Applicable	Provides performance standards and closure requirements for incinerator design and operation for destruction of POM, and limits emissions of HCl, particulates, and carbon monoxide.	Proper designs will be implemented to meet these requirements.
40 CFR 264.367	Applicable	Provides monitoring and inspection requirements while incinerating waste.	These requirements will be included to meet these regulations.
40 CFR 264.351	Applicable	Provides requirements for disposal of incinerated ash, scrubber waste, and scrubber sludge.	These requirements will be included to meet these regulations.
CAA-MAQS (40 CFR 1-99)	Applicable	Applies to major stationary sources such as treatment units that have the potential to emit significant amounts of pollutants such as NO _x , SO ₂ , CO, lead, mercury and particulates (more than 250 tons/year). Regulations under CAA do not specifically regulate emissions from hazardous waste incinerators, but it is likely that Prevention of Significant Deterioration (PSD) provisions would apply to an on-site treatment facility.	The treatment system will be designed to meet these emission limits. PSD procedure was not included in this phase of FS.
Interim RCRA/CERCLA Guidance on Non-Contiguous Sites and On-Site Management of Waste and Treated Residue (USEPA Policy Statement, March 27, 1994)	To be Considered	If a treatment or storage unit is to be constructed for on-site remedial action, there should be a clear intent to dismantle, remove, or close the unit after the CERCLA action is completed.	Only properly permitted facilities will be considered for disposal of hazardous materials.

TABLE 16. (CONTINUED)

ARARS	STATUS	REQUIREMENT SUMMARY	ACTION TO BE TAKEN TO ATTAIN ARARS
CAA-NAQS for Particulate Matter less than 10 Microns in Diameter (40 CFR Part 60, Appendix J)	Relevant & Appropriate	This regulation specifies maximum annual arithmetic mean and maximum 24-hour	Equipment will be designed to meet these requirements.
C. GROUNDWATER TREATMENT:			
<u>Discharge of Treated Groundwater:</u> 40 CFR 122.41 and 46	Relevant & Appropriate	Requires use of best available technology (BAT) to control toxic and nonconventional pollutants; use of best conventional pollutant control technology (BCT) for conventional pollutants. Technology based limitations may be determined on a case by case basis.	The water treatment system will be designed, constructed, and operated to ensure that a discharge effluents are in compliance with NPDES requirements.
South Carolina Pollution Control Act	Relevant & Appropriate	Provides requirements for discharges to the waters of South Carolina	The water treatment will be designed, constructed, and operated to ensure that a discharge effluents are in compliance with these requirements.
Ambient Water Quality Criteria	To Be Considered	Provides requirements for discharges to streams which are protective of aquatic life	Same as above.
40 CFR 146.12, 146.13, 146.16, 146.20, 146.51, 146.55	Relevant & Appropriate	Provides criteria for injection of treated water	Treated water will be analyzed to meet these criteria.
40 CFR 147	Relevant & Appropriate	Provides requirements to comply with State underground injection regulations.	Proper design of injection system will be implemented to these regulations.
South Carolina Underground Injection Regulations	Applicable	Provides underground injection standards in South Carolina	Same as above.

TABLE 16 (CONTINUED)

ARARS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARS
Air Emissions NSR/NSAP (40 CFR 61)	Applicable	Provides emission standards for hazardous air pollutants such as beryllium, mercury, vinyl chloride, benzene, arsenic, and lead.	Proper designs on air emissions controls will be implemented to these regulations.
MAAQDS (40 CFR 50)	Applicable	Provides air quality standards for particulates, lead and ozone.	Same as above.
PSD (40 CFR 51, 2)	Applicable	New major stationary sources may be subject to PSD review, i.e., require best available control technology (BACT), lowest achievable emission limit (LAEI), and/or emission offsets.	PSD procedures have not been included in this IS but could be expanded to BACT and LAER evaluations.
South Carolina Pollution Control Act	Applicable	Provides air quality standards for emissions in South Carolina	Proper designs on air emissions controls will be implemented to these regulations.

1
2
3
4

TABLE 10. OTHER FEDERAL AND STATE CRITERIA, ADVISORIES
AND GUIDANCE TO BE CONSIDERED AT R1

REQUIREMENTS	RATIONALE
1. Health Advisories, EPA Office of Drinking Water	R1 Activities identified presence of chemicals for which health advisories are listed
2. Reference Doses (RfDs), EPA Office of Research and Development	Considered in the public health evaluation
3. Health Effects Assessments	Considered in the public health evaluation
4. Carcinogenic Potency Factors, EPA Environmental Criteria and Assessment Office, EPA Carcinogen Assessment Group	Considered in the public health evaluation
5. U.S. Environmental Protection Agency Exposure Factors Handbook, 1989	Considered in the public health evaluation
6. Agency for Toxic Substances and Disease Registry, Toxicological Profiles	Considered in the public health evaluation
7. U.S. Environmental Protection Agency Risk Assessment Guidance for Superfund Human Health Manual Part A, Interim Final, 1989b	Considered in the public health evaluation
8. CERCLA Compliance With Other Laws Manual, 1988a	Considered in the public health evaluation

- o Clean Water Act, Section 404
- o Protection of Flood Plain (40 CFR 6, Appendix A) Fish and Wildlife Coordination Act
- o General RCRA Facility Location Standards (40 CFR 264.13)

6.3 Action Specific ARARs

The action specific ARARs for this site are summarized in Table 16. The ARARs are divided into three categories:

- o ARARs for actions taken in all alternatives
- o ARARs for actions involving soil treatment
- o ARARs for actions involving ground water treatment

The first category is requirements for safety and health, hazardous waste facilities, and transportation. The second category is requirements for excavation, thermal treatment, soil vapor extraction, and clean closure of site soils. The third category includes ARARs concerning discharge of treated ground water and related air emissions.

6.4 Other Criteria, Advisories and Guidance

Other to-be-considered (TBC) Criteria, Advisories and Guidance which were used in the public health evaluations and determinations of some of the cleanup criteria are shown in Table 17.

7.0 Documentation of Significant Changes

The preferred alternative presented in the proposed plan identified excavation and treatment by thermal desorption of contaminated soils at the site and extraction and treatment by air stripping/carbon adsorption of contaminated groundwater. The source control (soil) remedial action presented in this ROD differs from the proposed plan in that this ROD documents selection of soil vacuum extraction as the preferred alternative for treating contaminated soil at the site. Soil vacuum extraction was chosen over thermal desorption based on preliminary pilot tests indicating the semi-volatile contaminants can be removed using the soil vacuum extraction technique. The pilot test also demonstrated that the clay layers and saturated conditions will not pose the impediment originally anticipated. The results of the pilot test give a good indication that the cleanup criteria are achievable using soil vacuum extraction.

8.0 Alternative Evaluation

8.1 No Action Alternative

The no-action alternative serves as a baseline for comparison of the overall effectiveness of each ground water remediation alternative.

8.1.1 Technical Description

The no action alternative would not utilize any active remedial technology for the ground water contaminant plume. The current interaction between the ground water plume and the surrounding environment would be allowed to continue. The site currently has a fence around the accessible perimeter.

In addition, ground water sampling and analysis would be conducted for the upper aquifer and lower aquifer to monitor any migration (horizontal and vertical) of the ground water plume.

8.1.2 Short-Term Effectiveness

The only potential impacts on workers would occur during ground water sampling events. Personnel involved with ground water sampling at the site would be required to comply with a site specific Health and Safety Plan to mitigate the potential impacts from worker exposure to ground water. Installation of shallow drinking water wells on-site would pose an immediate threat to the user.

8.1.3 Long-Term Effectiveness

The baseline risk assessment presented in the Remedial Investigation Report concluded that the site poses no unacceptable levels of risk to public health or environment associated with the migration of the ground water plume. This is due to the fact the site is abandoned and no wells have been installed immediately downgradient of the site in the contaminated portion of the aquifer. For the future use scenarios, there is a potential for unacceptable levels of exposure.

Groundwater quality monitoring is demonstrated and reliable for detecting the migration of the ground water plume. Potential migration pathways would be monitored by ground water sampling and analysis over time.

8.1.4 Reduction of Toxicity, Mobility, or Volume

Under the no action alternative, treatment of the ground water plume would not occur. Therefore, the toxicity, mobility, or volume of the ground water plume contaminants would not be reduced. The rate of dilution would be slow and the time required to reach an acceptable concentration level of contaminants in the ground water is unknown.

8.1.5 Implementability

The no action alternative is technically feasible and would employ common techniques for continued monitoring of the ground water plume. This alternative would not require any specific permits to implement.

8.1.6 Compliance with ARARs

Chemical Specific ARARs

Implementation of the no action alternative would not achieve compliance with the chemical specific ARARs (identified in Section 4.0) for ground water since the chemical compounds to remain in the ground water plume would exceed the cleanup criteria.

Location Specific ARARs

Because the no action alternative would potentially allow the ground water plume contaminants to migrate into the lower aquifer and/or discharge into Myers Creek, the following location specific ARARs would apply:

- o Clean Water Act, Section 404
- o Fish and Wildlife Coordination Act

It is not possible at this time to determine if the migration of the ground water plume contaminants into Myers Creek would comply with the above listed location specific ARARs.

Action Specific ARARs

The applicable requirements associated with the no action alternative would be the regulations governing work at the site for the ground water monitoring actions and fence maintenance. These regulations are as follows:

- o OSHA - General Industry Standards (29 CFR 1910) which require respiratory protection and training for workers at the site;
- o OSHA - Safety and Health Standards (29 CFR 1926) which dictate safety procedures for work activities; and
- o OSHA - Record keeping, Reporting and Related Regulations (29 CFR 1904).

The ground water monitoring program and maintenance activities to be performed at the site would be designed to comply with the above listed action specific ARARs.

8.1.7 Overall Protection of Human Health and the Environment

The baseline risk assessment concluded that there appears to be concentrations of certain compounds in the ground water that may result in elevated levels of exposure if all the health protective assumptions of the future use scenarios are realized (i.e. future drinking water scenario). The site could pose an exposure threat if no action is taken.

The no action alternative would not comply with the chemical specific ARARs for groundwater. Activities under the no action alternative (ground water sampling, etc.) would comply with the identified action specific ARARs. It is not possible at this time to determine if any location specific ARARs would apply to the no action alternative because the ground water plume has not migrated to Myers Creek.

8.1.8 Cost

The costs associated with the no action alternative were assumed to include quarterly sampling of 16 monitoring wells (MW-1A, 1B, 3A, 3B, 7A, 7B, 7C, 8B, 9B, 9C, 10B, 11A, 11B, 12B, 12C, and 13B) for metals, volatile and semi-volatile organics for a period of thirty years. Reduction in the sampling frequency would be evaluated based on the results of the first five year's quarterly monitoring. In addition, there would be the cost of fence and roadway maintenance at the site. The total 30 year present worth cost of the no action alternative is \$760,000. A breakdown of the estimated no action alternative cost is presented in the final draft Feasibility Study Report.

8.2 Ground Water Extraction and Treatment by Carbon Adsorption

8.2.1 Technical Description

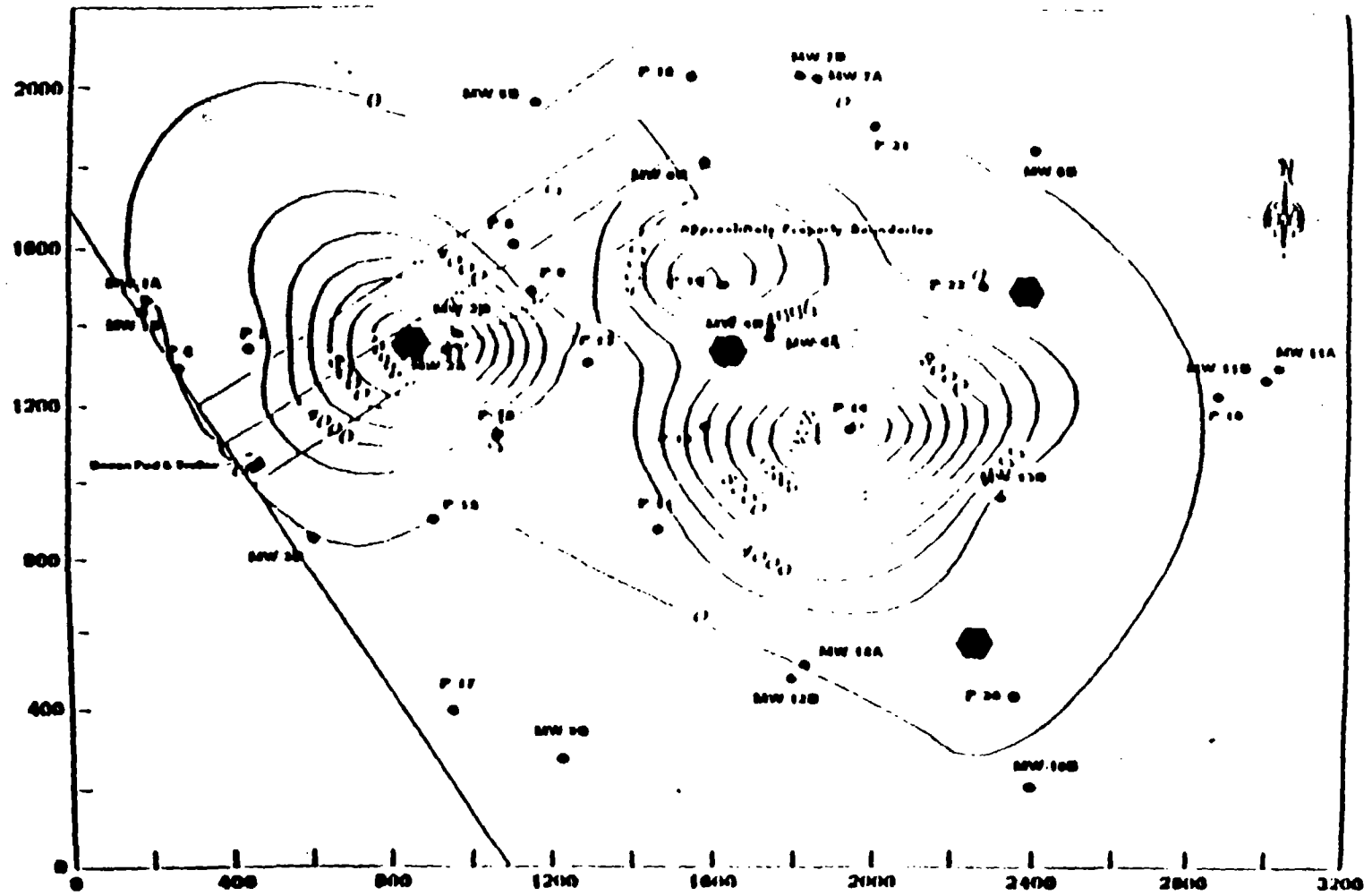
This alternative consists of a combination of ground water extraction and ground water treatment. Contaminated ground water would be extracted from the upper aquifer by installing recovery wells. Ground water treatment would be accomplished by means of carbon adsorption. A pretreatment process, such as precipitation or flocculation, may be necessary to remove metals from the ground water prior to treatment by carbon adsorption. The need for any such pretreatment process would be evaluated as part of the remedial design activities.

The ground water extraction system would consist of a combination of recovery wells located within the contaminant plume, and at the periphery of the plume. Recovery wells would be placed in the more highly contaminated zone of the plume to facilitate rapid removal of organic contaminants. The periphery wells would be used to limit expansion of the plume. Figure 6 shows potential location of the ground water extraction wells.

The actual extraction system including number, location, and configuration of wells would be developed during the remedial design. Pump tests and ground water modeling would be required to adequately define the extraction system. For the purpose of this analysis, four extraction wells and a total flow of 100 gpm were used. The pumping rate is a conservative value based on data from the RI. Carbon adsorption is a process by which the organic molecules in a waste stream are selectively attracted to the internal pores of the activated carbon granules. Adsorption is a surface attraction phenomenon which depends on the strength of the molecular attraction between adsorbent and adsorbent, electrokinetic charge, pH, and surface area. The waste stream would be usually contacted with the activated carbon by means of flow through a series of packed bed reactors.

Once the micropore surfaces of the carbon are saturated with organics, the carbon is "spent" and must either be replaced with virgin carbon or removed, thermally regenerated, and replaced. The time to reach "breakthrough" or exhaustion is the single most critical operating parameter. Carbon longevity balanced against influent concentrations governs operating economics.

The ground water from the extraction wells would be pumped into a surge tank before it is fed to the carbon adsorption system. The carbon adsorption system would consist of units which contain granular activated carbon (GAC) and operate in a downflow mode. The downflow fixed bed mode has been found to be generally most cost-effective and produces the lowest effluent concentrations relative to other carbon adsorber configurations. The units will be connected in parallel to provide increased hydraulic capacity.



- LEGEND**
- CONTAMINANT CONCENTRATION FROM EXISTING WELLS (Interpolation to points per contour)
 - MONITORING POINT (Detailed Contour)
 - DATA POINT WELLS (Detailed Contour)
 - GROUND WATER EXTRACTION WELL

SCALE: 1" = 435'

MAXIMUM CONTAMINANT CONCENTRATION = 2000 ppb

FIGURE 6
POTENTIAL LOCATIONS OF
GROUND WATER EXTRACTION WELLS



In order to minimize the carbon regeneration requirements, the carbon may be preceded by a pretreatment system (e.g. precipitation, filtration, etc.) to reduce suspended solids and inorganics such as iron. The carbon adsorption system evaluated for the Bluff Road Site would include two-dual bed carbon units with each bed containing 20,000 lbs. of GAC each. Four units would be needed to provide backup of other units during GAC regeneration. Field pilot plant testing would be performed to accurately predict performance, longevity and operating costs.

8.2.2 Short-Term Effectiveness

Carbon adsorption is a proven technology that if properly designed and operated, will remove the semi-volatile and volatile contaminants and not pose a human health hazard during operation. The system would be a closed system with no air emissions, therefore, there would be no risk through the inhalation pathway.

The potential short-term risks to site workers, public health and the environment are:

- o Exposure to contaminated drilling fluids and soil during the installation of the ground water extraction wells.
- o Release of contaminated water because of accidental spillage.

To mitigate risk posed by exposure to site constituents during well installations, workers would be required to comply with a site specific health and safety plan (including requirements for protective clothing). The potential environmental risk due to accidental spillage of ground water would be mitigated by proper process design. The treatment system design would incorporate process controls such as level switches and extraction pump shut-off controls.

8.2.3 Long-Term Effectiveness and Permanence

Magnitude of Residual Risk: The ground water treatment system would be designed such that all contaminants contained in extracted ground water would be reduced to levels at or below cleanup criteria.

The residuals resulting from operation of the treatment system would include filtered solids or settled solids and spent carbon. The carbon would be either regenerated or would be disposed by incineration or landfilling at an off-site RCRA treatment, storage, and disposal facility. The filtered or settled solids would be disposed in accordance with applicable regulations depending upon the hazardous characteristics exhibited by the solids.

8.2.4 Reduction in Toxicity, Mobility, or Volume

The pumping system would control the mobility of contaminants by extracting ground water within the upper aquifer and, therefore, stopping further migration. The contaminated water would be treated by the carbon adsorption unit, thereby reducing the toxicity of the ground water.

8.2.5 Implementability

Technical Feasibility: Carbon adsorption has been used extensively to treat contaminated ground water and has shown success in removing organic contaminants from ground water. Design and construction of the necessary treatment units would not pose a problem. Some equipment manufacturers offer modular units that can be made to fit an individual application with minor modification. Precipitation and filtration have been well demonstrated for removal of inorganic compounds from aqueous streams. The equipment used in these processes is proven and reliable, thus downtime for repairs and maintenance should be minimal.

During operation of the treatment system, the effectiveness of the treatment process would be monitored by periodically analyzing contaminant concentrations in the treated water prior to discharge. Monitoring of ground water would be necessary during the operation of the system to ensure that the periphery of the plume is being treated.

Administrative Feasibility: The use of carbon adsorption would require compliance with U.S. EPA, U.S. Department of Transportation, and SCDHEC regulations regarding the transport and disposal of hazardous materials (spent carbon, filtered and settled solids from pretreatment system). In addition, disposal regulations and criteria must be met for discharge of the treated water.

Availability of Services and Materials: A range of vendors are available to supply all necessary units of the treatment systems. Because of the large number of equipment suppliers, availability and scheduling considerations would not be anticipated to pose problems.

8.2.6 Compliance with ARARs

Chemical-Specific: This alternative is designed to treat the ground water contaminants to attain the cleanup criteria. Chemical-specific ARARs for the Bluff Road Site were identified and discussed in Section 4.0. Several Federal and State regulations govern the quality, usage and discharge of ground water. Since ground water at the site has been classified as a drinking water source, all Federal and/or State drinking water standards would apply.

Location-Specific: The ground water extraction and treatment system would be located on the Bluff Road Site which is proximate to a wetland. Construction of this system as conceived may impact the wetland. The extent of the impact will be carefully considered during the remedial design. The impact to wetlands will be minimized and where it cannot be avoided the damage will be mitigated.

Action-Specific: This alternative would be designed to comply with action-specific ARARs. The action-specific ARARs for construction of the extraction and treatment systems, the treatment and subsequent disposal of the treated ground water and the management of treatment residuals were summarized in Section 4.0. Many RCRA Subtitle C requirements may apply because the site contains hazardous waste. RCRA Part 264 requirements may apply including standards for owners and operators of permitted hazardous waste facilities, preparedness and prevention, contingencies and emergency procedures, recordkeeping and reporting, and ground water monitoring. Federal OSHA worker health and safety requirements would be applicable to the construction and operation activities.

8.2.7 Overall Protection of Human Health and the Environment

This alternative would decrease the potential risk resulting from direct contact and ingestion of site ground water because the ground water would be treated to meet the clean-up criteria. This alternative can be implemented to meet identified ARARs.

8.2.8 Cost

The present worth cost of the Carbon Adsorption alternative, would be approximately \$16,105,000.00. This cost would include a capital cost of \$1,390,000.00, and present worth O & M cost of \$14,715,000. A complete cost summary is included in the final draft Feasibility Study Report.

8.3 Ground Water Extraction and Treatment by Air Stripping

8.3.1 Technical Description

This alternative consists of a combination of ground water extraction and ground water treatment. Contaminated ground water would be extracted from the upper aquifer by installing recovery wells. Ground water treatment would be accomplished by means of air stripping towers, followed by a granular activated

carbon (GAC) system. The more volatile constituents in ground water would be removed by air stripping, while semi-volatiles would be removed by the GAC system. A pretreatment process, such as precipitation or flocculation, may be necessary to remove metals from the ground water prior to treatment by air stripping and GAC. The need for any such pretreatment process would be evaluated as part of the remedial design activities.

The ground water extraction system would consist of a combination of recovery wells located within the contaminant plume, and at the periphery of the plume. Recovery wells would be placed in the more highly contaminated zone of the plume to facilitate rapid removal of organics. The periphery wells would be used to limit expansion of the plume.

The extraction system including number, location, and configuration of wells would be developed during the remedial design. Pump tests and ground water modeling would be required for the design of the extraction system. For the purpose of this analysis, four extraction wells and a total flow of 100 gpm were used. The pumping rate is a conservative value based on data from the RI.

The ground water from the extraction wells would be pumped into a surge tank before it is fed to the air stripping system. The air stripping system would consist of two towers arranged in series. Both towers would have 12 feet of packing material, 30 inches in diameter and use high air-to-water ratios. The use of two air strippers in series offers the following benefits over a single air stripper with comparable treatment capacity:

- If one of the air strippers would require maintenance, the other air stripper could continue to operate;
- Treatment capacity could be increased by running the strippers in parallel, should expansion of the extraction system become necessary.

Prior to treatment, the extracted ground water would contain the compounds identified in Tables 1 and 2 at the measured maximum concentration shown in column 1. Contaminant concentrations should steadily decrease from these levels. Actual treatment system influent composition would be defined during remedial design.

Air stripping can effectively remove most of these contaminants found in ground water at the Bluff Road Site (Golder, 1986). The exceptions would be 2-chlorophenol and phenols which would be removed by adsorption on the GAC.

After air stripping, the ground water would be pumped through cartridge filters and two carbon beds, also arranged in series. When the carbon in the first bed is spent, it would be replaced. A valve on the adsorption system would then be switched to reverse the order of the beds in the series. The beds are sized so that carbon would be expected to be replaced every 4 to 6 weeks. The system would be automated and designed for unattended operation. The final design of the ground water extraction system, air stripper, and GAC systems would require additional data collection prior to design.

As a result of ground water extraction and treatment, a discharge stream of treated ground water would be generated. As a best engineering judgement based on available data, the volumetric flow of the discharge stream is assumed to be 144,000 gallons per day based on 100 gpm ground water recovery system operating 24 hours per day. More precise ground water withdrawal and discharge values would be determined as part of the remedial design. Further discussion of effluent discharge alternatives is presented in Section 5.4.

8.3.2 Short-Term Effectiveness

Potential short-term risks to public health and the environment during the implementation of this alternative include the potential inhalation of organic vapors released from the air stripping process. An air dispersion model was used to calculate the ambient air quality resulting from the organic vapor emissions from the air stripper after vapor phase carbon adsorption treatment. The air dispersion modeling was conducted in accordance with applicable EPA guidance documents. Based on the results of the air dispersion model, a health evaluation was conducted to determine the potential risk, if any, to public health from the inhalation of organic vapors. The air dispersion model results and associated risk health evaluation are presented in Appendix C of the final draft Feasibility Study Report.

The air dispersion modeling for this alternative identified the downwind location where the maximum one-hour concentrations would be expected and the location where the maximum annual concentrations would be expected. The ambient air concentrations for the chemicals of concern at these locations determined by the air dispersion model were used to determine the potential risk, if any, to public health from the inhalation of organic vapors generated by the air stripping process.

The public health evaluation identified the following potential receptor groups which may experience maximum exposures to airborne contaminants:

1. Remediation workers in the immediate vicinity of the air stripper who might be exposed to short-term (one hour) peak concentrations;
2. Remediation workers present at the site for the duration of the remedial action (15 years) who might be exposed to airborne contaminants; and
3. Off-site residents who might be exposed to airborne contaminants for the duration of the remedial action (15 years).

For the first receptor group (remediation workers exposed for one hour to peak concentrations) the maximum predicted one-hour concentrations for each chemical of concern were compared to the Threshold Limit Values for those chemicals. Threshold Limit Values have been developed by the American Conference of Governmental and Industrial Hygienists (ACGIH) and are occupational exposure criteria that represent airborne concentrations of substances to which nearly all workers may be repeatedly exposed without adverse effects. The maximum predicted one-hour concentrations are far below the threshold limit values for occupational exposure, therefore, it is concluded that there is no danger of acute toxicity due to exposure to short-term emissions from the air stripper system.

For the second receptor group (remediation workers present at the site for the duration of the remedial action), the total cancer risk associated with exposure to maximum concentrations of all the chemicals of concern is estimated at 5.9×10^{-9} under the conditions of this scenario presented in Appendix C of the revised draft Feasibility Study Report. The total hazard index for non-carcinogenic effects is 3.5×10^{-7} which is below the 1.0 hazard index value which indicates a potential hazard.

To represent the third receptor group (off-site residents who might be exposed for the duration of the remedial action), a child was used because of higher inhalation rate to body weight ratio, thus resulting in a worst case exposure scenario. For this receptor group, the total estimated cancer risk associated with exposure to maximum concentrations of all the chemicals of concern is 1.1×10^{-9} . The total hazard index for non-carcinogenic effects is 2.7×10^{-7} , which is far below the 1.0 hazard index value which indicates a potential hazard.

Two other potential short-term risks to site workers and the environment are:

- o Exposure to drilling fluids and soil during the installation of the ground water extraction wells.
- o Release of contaminated water because of accidental spillage.

To mitigate risk posed by exposure to site constituents during well installations, workers would be required to comply with a site specific health and safety plan (including requirements for protective clothing). The potential environmental risk due to accidental spillage of ground water would be mitigated by proper process design. The treatment system design would incorporate process controls such as level switches and extraction pump shut-off controls.

8.3.3 Long Term Effectiveness

Magnitude of Residual Risks

This ground water alternative would be implemented until the ground water concentrations are reduced to the cleanup criteria. To determine the magnitude of residual risk at the site after the ground water remedial action is complete, the drinking water scenario was reevaluated based on the cleanup criteria. The results of the post remediation risk assessment for ground water ingestion is represented in Appendix B of the final draft Feasibility Study report.

The residuals resulting from operation of the treatment system would include filtered solids and spent carbon. The filtered solids and the carbon would be either regenerated at a permitted facility or would be disposed of by incineration or landfilling at a RCRA treatment storage and disposal facility.

8.3.4 Reduction in Toxicity, Mobility, and Volume

The pumping system would control the mobility of contaminants present by extracting ground water within the upper aquifer. Contaminated water would be treated by the air stripping and carbon adsorption units, thereby reducing the toxicity of the ground water.

8.3.5 Implementability

Technical Feasibility: Both air stripping and carbon adsorption have been used extensively at CERCLA sites and have been successful in removing organic constituents from ground water. Design and construction of the necessary treatment units would not pose a problem. Some equipment manufacturers offer modular units that can be made to fit an individual application with minor modification.

During operation of the treatment system, the effectiveness of the treatment process would be monitored by periodically analyzing constituent concentrations of the treated water prior to discharge.

This alternative is designed to treat the ground water contaminants to attain cleanup criteria. Chemical-specific ARARs were identified and discussed in Section 4.0. Several Federal and State regulations govern the quality, usage and discharge of ground water.

Location-Specific: The ground water extraction and treatment system would be located on the Bluff Road Site which is proximate to a wetland. Construction of this system as conceived may impact the wetland. The extent of the impact will be carefully considered during the remedial design. The impact to wetlands will be minimized and where it cannot be avoided the damage will be mitigated.

Action-Specific: This alternative would be designed to comply with action-specific ARARs. The action-specific ARARs for construction of the extraction and treatment systems, the treatment and subsequent disposal of the treated ground water, and the management of treatment residuals are summarized in Section 4.0. Many RCRA Subtitle C requirements would apply because the Bluff Road Site contains hazardous waste. RCRA Part 264 requirements that may apply include standards for owners and operators of permitted hazardous waste facilities, preparedness and prevention, contingency plan and emergency procedures, recordkeeping and reporting, and ground water monitoring. Federal OSHA worker health and safety requirements would be applicable to the construction and operation activities.

8.3.7 Overall Protection of Human Health and Environment

This alternative would decrease the potential risks resulting from direct contact and ingestion of site ground water because the ground water would be treated to meet the health protective cleanup criteria. This alternative can be implemented to meet the identified ARARs.

8.3.8 Cost

The present worth cost for the Air Stripping alternative, would be approximately \$4,339,500. This cost would include a capital cost of \$1,013,000, and estimated annual O&M expenditures of \$306,875. A complete cost summary is included in the final draft Feasibility Study Report.

8.4 Effluent Discharge Alternatives:

Effluent from either the air stripper or the GAC will require discharge of treated water to some location. The alternatives that have been evaluated as part of completion of the RI/FS include the following:

- Injection into the subsurface
- Discharge to Myers Creek
- Discharge to the Congaree River
- Spray irrigation into the wetland area

8.4.1 Subsurface Injection of Effluent

Infiltration galleries are a proven and viable alternative for effluent discharge. The process involves the use of drains, trenches and/or piping to introduce the treated ground water into the vadose zone where it is allowed to percolate into the soil. There are two basic types of infiltration galleries, horizontal and vertical. The horizontal system uses trenches

lined with gravel or perforated piping to introduce the ground water into the vadose zone. Vertical infiltration uses vertical perforated piping with appropriate packing materials to allow radial infiltration over the depth of the vadose zone. Due to the clay content of the soils in the vadose zone, infiltration galleries may not operate effectively as a discharge alternative during extended wet periods.

Discharge limitations for subsurface infiltration of the treated ground water will be the cleanup criteria. This effluent discharge option would establish the discharge design requirements for the ground water treatment system.

The effectiveness of this method is dependent on vadose zone acceptance of the treated water. A preliminary assessment of infiltration rates based on aquifer and near aquifer vadose zone soil classification indicates that this technology would be feasible for the Bluff Road Site.

Percolation testing must be performed to determine permissible application rates of treated ground water and to establish the most appropriate process alternative (i.e., horizontal or vertical). The infiltration gallery must be located so that recharge to the aquifer does not interfere with the performance of the extraction system (hydraulic control). These considerations can be addressed adequately in design. The basis for conceptual cost evaluation is a horizontal infiltration gallery. The estimated infiltration area required was determined using the lowest permeability determined by

performing slug tests on shallow wells in the upper aquifer (9.27×10^{-4} cm/sec). This equates to an estimated permissible application rate of 50 gallons/day/ft². With an estimated flow rate of 100 gpm, approximately 3000 ft. of infiltration trenches would be required for horizontal infiltration. The infiltration trenches would be distributed over an area of approximately 15,000 square feet. This is based on a trench width of approximately 2 feet and trench spacing of approximately 7.5 feet (center to center). Again, permissible application rates would have to be confirmed during remedial design.

The present worth cost for the infiltration gallery effluent discharge alternative would be approximately \$165,484. This cost would include a capital cost of \$117,656, and estimated annual O&M expenditures of \$4,412. A complete cost summary is included in the final draft Feasibility Study Report.

8.4.2. Discharge to Myers Creek

The maximum allowable chemical concentrations to a receiving Class A stream such as Myers Creek or the Congaree River (see Section 5.4.3. below) would be based on Ambient Water Quality Criteria (where available) or RFSs.

The volumetric flow of the discharge stream is assumed to be 144,000 gallons per day. The estimated average daily volumetric flow in Myers Creek is 154,000 gallons per day (IT Corp., 1989).

8.4.3. Discharge to Congaree River

The Congaree River is classified the same as Myers Creek (Class A). Maximum allowable chemical concentrations in the treatment system discharge would be calculated as described in Section 5.3.4.3. of the final draft Feasibility Study Report.

Discharge of effluent to the Congaree River would require an extensive overland piping system to transport the water approximately 2 to 3 miles to the river. This would also require access agreements and easements.

As with Myers Creek, the impacts of the discharge on river levels (e.g. flood levels) should be evaluated as part of the remedial design.

8.4.4. Spray Irrigation

Spray irrigation is a procedure by which effluent is discharged through a surface spray system. Spray irrigation is limited to those times when the ground is not frozen.

This alternative would be further evaluated during remedial design if it appears that the ground water recovery network will impact the water levels in the wetland area. The spray irrigation design to recharge the wetland and offset the impacts of ground water withdrawal would be difficult due to poor percolation in off-site surface soils and potential flooding resulting from sheet flow to down gradient areas. Feasibility of this alternative is considered marginal.

DETAILED ANALYSIS OF SOIL REMEDIATION ALTERNATIVES

8.5 No Action Alternative

The no action alternative serves as a baseline for comparison of the overall effectiveness of each soil remediation alternative.

8.5.1 Technical Description

The no action alternative would not utilize any active remedial technology for the site soils that are currently above the target cleanup levels. The current interaction between the site soils and the surrounding environment would be allowed to continue.

According to the Remedial Investigation Report, the principle environmental and human health threat posed by the site soils is the effect the soils have on the ground water plume due to leaching of soil contaminants.

8.5.2 Short Term Effectiveness

Because remedial action for the soils would not be implemented, there would be no short-term environmental impacts or risks from activities associated with this alternative.

8.5.3 Long-Term Effectiveness

The baseline risk assessment presented in the Remedial Investigation Report concluded that the surface soils do not pose an unacceptable risk to human health or the environment. However, the more highly contaminated subsurface soils continue to leach contaminants into the ground water below the site at unacceptable concentrations. The baseline risk assessment concluded that there are concentrations of compounds in the ground water that could result in exposure if the water were to be used as drinking water source.

8.5.4 Reduction of Toxicity, Mobility, or Volume

The toxicity, mobility, or volume of the contaminants present in the soils would not be reduced under the no action alternative because no treatment technologies would be employed.

8.5.5. Implementability

The no action alternative is technically feasible. This alternative would not require any special permits to implement.

8.5.6 Compliance with ARARs

Chemical Specific ARARs

There are currently no ARARs for soils. However, because the contaminated site soils are a source that will further degrade ground water quality, a soil/water partitioning model (available for review in the final draft Feasibility Study Report) was used to calculate cleanup criteria for the soils. The no action alternative would not meet the calculated cleanup criteria for soils.

Location Specific ARARs

As stated in the detailed analysis for the no action ground water alternative, the following potential ARARs would apply if the ground water plume contaminants reached Myers Creek:

- o Clean Water Act, Section 404
- o Fish and Wildlife Coordination Act

Under the no action soil alternative, these ARARs may potentially apply if contaminants present in the soils leach into the ground water plume and subsequently migrate into Myers Creek.

Action Specific ARARs

There are no action specific ARARs for the no action soil remediation alternative.

8.5.7 Overall Protection of Human Health and the Environment

The no action alternative for soils may increase the potential risks associated with the ground water plume by contaminant leaching if the ground water plume is not remedied. There are no direct risks resulting from the no action soil remediation alternative. The no action alternative would not meet the calculated cleanup criteria for soils.

8.5.8 Cost

There are no capital or operational and maintenance costs associated with the no action alternative. The cost of monitoring the effect of site soils on the ground water plume are included in the cost for ground water quality monitoring under the ground water remedial alternatives.

8.6. In-Situ Soil Vacuum Extraction (Soil Venting)

8.6.1 Technology Description

Soil vacuum extraction as proposed herein is an in-situ treatment process used to clean up soils that contain volatile and some semi-volatile organic compounds. The process utilizes extraction wells to induce a vacuum on subsurface soils. The subsurface vacuum propagates laterally, causing in-situ volatilization of compounds that are adsorbed to soils. Vaporized compounds and subsurface air migrate rapidly to extraction wells, essentially air stripping the soils in-place.

A vacuum extraction system consists of a network of air withdrawal (or vacuum) wells installed in the unsaturated zone. A pump and manifold system of PVC pipes is used for applying a vacuum on the air wells which feed an in-line water removal system, and an in-line vapor phase carbon adsorption system for VOC removal. Vacuum wells can either be installed vertically to the full depth of the contaminated unsaturated zone or installed horizontally within the contaminated unsaturated zone. If horizontal vacuum wells are utilized, the wells would require construction by trenching to mid-depth in the soil column. For the purposes of this evaluation, vertical wells were selected due to the depth of the soil strata requiring remediation, geotechnical conditions, and the depth to groundwater.

Once the well system has been installed and the vacuum becomes fully established in the soil column, VOCs would be drawn out of the soil and through the vacuum wells. In all soil venting operations, the daily VOC removal rates eventually decrease as volatiles are recovered from the soil. This occurs since volatile recovery decreases the VOC concentration in the soil, and consequently reduces the diffusion rate of volatiles from the soil. Volatiles in the air stream are removed by the carbon adsorption system or destroyed by fume incineration, after which the cleaned air is discharged to the atmosphere.

The application of soil venting to the unsaturated zone remediation is a multi-step process. Specifically, full-scale vacuum extraction systems are designed with the aid of laboratory and pilot-scale VOC stripping tests. This would be performed as part of remedial design.

8.6.2 Short-Term Effectiveness

An air dispersion model was used to calculate the ambient air quality resulting from the organic vapor emissions from the soil venting system after vapor phase carbon adsorption treatment. The air dispersion modeling was conducted in accordance with applicable EPA guidance documents. Based on the results of the air dispersion

model, a health evaluation was conducted to determine the potential risks, if any, to public health from inhalation of organic vapors. The air dispersion model results and associated health evaluations are presented in Appendix E of the revised draft Feasibility Study Report.

The air dispersion modeling for this alternative identified the downwind location where the maximum one-hour concentrations would be expected and the location where the maximum annual concentrations would be expected. The ambient air concentrations for the chemicals of concern at these locations determine the potential risk, if any, to public health from the inhalation of organic vapors generated by the in-situ soil venting process.

The public health evaluation identified the following potential receptor groups which may experience maximum exposures to airborne contaminants:

1. Remediation workers in the immediate vicinity of the soil venting system who might be exposed to short-term (one-hour) peak concentrations;
2. Remediation workers present at the site for the duration of the remedial action (18 months) who might be exposed to airborne contaminants; and
3. Off-site residents who might be exposed to airborne contaminants for the duration of the remedial action (18 months).

For the first receptor group (remediation workers exposed for one hour to peak concentrations) the maximum predicted one-hour concentration for each chemical of concern as compared to the Threshold Limit Values that have been developed by the American Conference of Governmental and Industrial Hygienists (ACGIH) and are occupational exposure criteria that represent airborne concentrations of substances to which nearly all workers may be repeatedly exposed without adverse effects. The maximum predicted one-hour concentrations are far below the Threshold Limit Values for occupational exposure, therefore, it is concluded that there is no danger of acute toxicity due to exposure to short-term emissions from the in-situ soil venting system.

For the second receptor group (remediation workers present at the site for the duration of the remedial action), the total cancer risk associated with exposure to maximum concentrations of all the chemicals of concern is estimated at 1.5×10^{-10} under the conditions of this scenario presented in Appendix E of the revised draft Feasibility Study Report. The total hazard index for non-carcinogenic effects is 1.7×10^{-9} which is far below the 1.0 hazard index value which indicates a potential hazard.

To represent the third receptor group (off-site residents who might be exposed for the duration of the remedial action), a child was used because of higher inhalation rate to body weight ratio, thus resulting in a worst case exposure scenario. For this receptor group, the total estimated cancer risk associated with exposure to maximum concentrations of all the chemicals of concern is 2.1×10^{-7} . The total hazard for non-carcinogenic effects is 2.3×10^{-9} which is far below the 1.0 hazard index value which indicates a potential hazard.

The potential short-term risks to site workers would be the exposure to drilling fluids and soil during the installation of the soil venting extraction wells. To mitigate these risks, workers would be required to comply with a site-specific health and safety plan (including provisions for protective equipment).

8.6.3 Long-Term Effectiveness

Magnitude of Residual Risk

The soil venting system would be designed and operated such that those contaminants in the soil which are considered to be a source of ground water contamination would be reduced to the cleanup criteria identified by the soil partitioning model. Therefore, the soils would no longer be a source contributing to the ground water plume and the remedial action objective for soil would be met.

Adequacy and Reliability of Controls

The residues resulting from the treatment system would include spent carbon used for vapor phase adsorption. This carbon would contain organic compounds and would be disposed in a RCRA landfill or would be incinerated. The regeneration of spent carbon would also be a viable residuals management alternative. The adequacy and reliability of residuals management would be assured by using a permitted regeneration facility or a RCRA treatment, storage, and disposal facility.

8.6.4 Reduction of Toxicity, Mobility, and Volume

Soil vacuum extraction would significantly reduce the volume of volatile organic contaminants in the soil. Results of the plant test at the site indicated significant quantities of semi-volatile organic compounds will be removed, reducing to volume of these contaminants in the soil.

8.6.5 Implementability

Technical Feasibility

In-situ soil vacuum extraction is a proven technology and has been applied in both pilot test and full scale remediation programs for stripping volatile organic and a limited number of semi-volatile compounds from unsaturated soils and bedrock. The organic vapor treatment facilities (i.e. vapor phase carbon adsorption or fume incineration) have also been successfully implemented. Golder (1988) conducted laboratory testing on contaminated soils which showed that the affected site soils are amenable to air stripping. Pilot tests indicate that some semi-volatile compound removal does occur during the vacuum process. During operation, the effectiveness of the system would be monitored by periodically analyzing contaminant concentration of the following:

- o Treated Soil
- o Untreated Vapor Entering the System
- o Treated Vapor

Administrative Feasibility:

This alternative would require compliance with EPA, U.S. Department of Transportation, and SCDHEC regulations regarding transportation and disposal of hazardous materials (i.e. spent carbon). SCDHEC may require permits for the vapor discharge.

8.6.6 Compliance with ARARs

Chemical Specific: Implementation of this alternative would achieve the cleanup criteria for volatile organic compounds in the soils as identified in the soil partitioning model. It is uncertain as to whether or not the technology would achieve cleanup criteria for the semi-volatiles, however, the pilot test indicates semi-volatile organic compounds may be removed by this process.

Action-Specific: The alternative would be designed, constructed and operated to comply with action-specific ARARs. The action-specific ARARs for construction of the extraction and treatment system, the treatment and disposal of treated vapor, and disposal of residuals (spent carbon) are summarized in the revised draft Feasibility Study Report (Table 3-5). Federal OSHA worker health and safety requirements would be applicable to the construction and operation activities and would be complied with by adhering to an approved work plan and health and safety plan. Many RCRA requirements may apply because the Bluff Road Site contains hazardous waste. RCRA Part 264 requirements that may apply include standards for owners and operators of permitted hazardous waste facilities, preparedness and prevention, contingency plan and emergency procedures, recordkeeping and reporting.

It is anticipated that this alternative would comply with applicable portions of the Clean Air Act and the South Carolina Pollution Control Act.

8.6.7 Overall Protection of Human Health and the Environment

This alternative would decrease the potential risks associated with the migration of organic contaminants into ground water from the soils.

8.6.8 Cost

The estimated total cost for the soil vacuum extraction system with vapor phase carbon adsorption would be approximately \$1,070,000. This capital cost includes the anticipated O&M expenditures since this remedial action is not expected to last over 2 years.

Capital cost would include construction of the soil vapor extraction system, vapor treatment system, and all associated piping/mechanical facilities.

8.7 High Temperature Incineration

8.7.1 Technical Description

This alternative consists of excavation and treatment of the contaminated soils on-site using high temperature incineration. This treatment technology has been proven effective at treating soils that contain elevated levels of organic contaminants. Prior to initiation of this remedial alternative, supplementary soil sampling would be performed to adequately delineate the volume of soil present above the target clean-up levels. Approximately 23,000 to 45,000 cubic yards of soil at the site is estimated to be above the cleanup criteria.

Process Description

For the development of this alternative, the representative process option for high temperature incineration is the commercially available transportable rotary kiln incineration system.

This system uses a rotating refractory lined kiln to treat solids, soils, sludges and liquid wastes. The kiln is approximately 8 feet in diameter and 60 feet long. The soils would be heated to 1200°F to 1500°F by 60 mm BTU per hour oil fired fuel burners. The rotating kiln serves to mix, convey, and agitate the contaminated soil. After processing, the treated soil would be discharged from the kiln into a pug mill where it is moisturized by the addition of water to reduce dusting.

During incineration, combustion gas leaves the kiln at 1400°F to 1600°F and contains partially combusted organics, acid gases, entrained soil particles, and ash particulate. The combustion gas would pass through a hot cyclone for removal of relatively large particulates and would flow into a secondary combustion chamber (SCC). The SCC completes the combustion of the organic vapors from the soil by exposing the remaining organic vapors, carbon monoxide (CO) and carbonaceous particulates to temperatures in the range of 1800°F to 2200°. The SCC is sized for a combustion gas residence time of at least two seconds at 2200°F.

For the organics present in the site soils, a temperature of 1800°F should be adequate to produce destruction and removal efficiencies (DREs) of at least 99.99%. The operational temperature necessary to achieve DREs of at least 99.99% would be determined during a pre-operational trial burn. The SCC will be fired by a 40 mm BTU per hour burner.

The combustion gas would leave the SCC at approximately 1800°F and enter the air pollution control (APC) system. The APC system would include an evaporative cooler, a baghouse, and a packed bed alkaline scrubbing unit.

The purge stream from the packed bed would be used for the evaporative cooler. Salts such as sodium chloride and sodium sulfate, which are formed in the packed bed, would be evaporated in the evaporative cooler and removed by a fabric filter. The combustion gas would leave the evaporative cooler at 300°F to 350°F, and enter the fabric filter where most of the remaining particulate would be removed. The combustion gas would then enter the packed bed for alkaline scrubbing removal of most of the acid gases. The combustion gas would exit the packed bed at approximately 120°F and enter the induced draft (ID) fan. The ID fan pulls the combustion gas through the entire incineration system and exhausts the combustion gas to the stack and out to the atmosphere. Stack emissions would be continuously monitored for carbon monoxide, oxygen, and the combustion gas velocity to verify compliance with Federal and State Regulations. An automatic waste feed cutoff system would be tied into various incinerator monitoring parameters such as temperature, carbon monoxide and waste feed rates in accordance with 40 CFR 264 Subpart O regulations and appropriate guidance documents. The system requires an area of two to three acres. The soil would be processed at a rate of approximately 20 tons per hour (for soil with a moisture content of about 20 percent). At an operating factor of about 80%, 190 days of continuous operation would be required to treat 72,900 tons (45,000 cubic yards) of soil. Mobilization, demobilization and decontamination of the incineration equipment will take about 60 days. Therefore implementation of on-site high temperature incineration is expected to take less than one year from the initial mobilization and start-up.

Site Preparation and Preprocessing

Prior to excavation, the site would be cleared of vegetation. Any existing foundations or concrete pads would be decontaminated and disposed accordingly.

Excavation and treatment would proceed in stages. The excavation rate should match the treatment rate in order to minimize the storage space required. Water spray would be used for dust control, if necessary. Vapor suppression foams or some other form of emission control would be used if high levels of organic vapors in the breathing zone are detected during excavation. The excavated soil would be preprocessed in a tent structure of pole-barn construction and placed in containers or tanks as required by the RCRA definition of storage. The storage space should be sized for adequate processing capacity to assure continuous operation during inclement weather.

The soil would be removed from the storage area in the tent using a covered belt conveying system and would drop into a hopper over a scalping screen or shedder to remove oversized (greater than 2-inch) material and debris. The sorted material would then be transported by an enclosed drag conveyor to a hopper that directly feeds the incinerator. Rocks and other large objects would be screened and removed from the feed system, stockpiled on a pad, and decontaminated by steam cleaning. These materials would then be used as backfill on-site, after confirmatory sampling to assure adequate decontamination.

Residuals Treatment

Purge water from the scrubber would be recycled to the evaporative cooler where it would be evaporated. The salts and suspended solids contained in the purge water would be captured in the fabric filter.

Solids from the cyclone and fabric filter would be mixed with the treated soil after analytical testing verifies the absence of organic compounds and metals. If the solids are unacceptable for mixing with the soil, they would be stabilized and disposed off-site.

The treated soils would also be analyzed for the presence of organic compounds and TCLP Metals. If the treated soils fail to meet these criteria, the soils would be stabilized prior to backfilling.

6.7.2 Short-Term Effectiveness

Potential risks to public health and the environment are associated with the excavation and treatment of the contaminated soils.

Air pollution control systems would be an integral part of the on-site high temperature incinerator to limit air emissions to within the regulatory requirements. Stack and site perimeter monitoring will ensure that the discharge limits are not exceeded. An air dispersion model was used to calculate the ambient air quality resulting from the anticipated incineration air emissions (after treatment with air pollution control systems). The air dispersion model was conducted in accordance with applicable EPA guidance documents. Based on the results of the air dispersion model, a health evaluation was conducted to determine the potential risks, if any, to public health from the inhalation of emitted compounds. The air dispersion model results (including associated input data calculations) and the health evaluations are presented in Appendix F of the revised draft Feasibility Study Report.

The air dispersion modeling for this alternative identified the downwind location where the maximum one-hour concentrations would be expected and the location where the maximum annual concentrations would be expected. The ambient air concentrations for the chemicals of concern at these locations determined by the air dispersion model were used to determine the potential risk, if any, to public health from the inhalation of emitted compounds generated by the high temperature incineration process.

The public health evaluation identified the following potential receptor groups which may experience maximum exposures to airborne contaminants;

1. Remediation workers in the immediate vicinity of the incinerator who might be exposed to short-term (one hour) peak concentrations;
2. Remediation workers present at the site for the duration of the remedial action (200 days) who might be exposed to airborne contaminants; and
3. Off-site residents who might be exposed to airborne contaminants for the duration of the remedial action. (200 days)

For the first receptor group (remediation workers exposed for one hour to peak concentrations) the maximum predicted one-hour concentrations for each chemical of concern were compared to the Threshold Limit values for those chemicals. Threshold Limit Values have been developed by the American Conference of Governmental and Industrial Hygienist (ACGIH) and are occupational exposure criteria that represent airborne concentrations of substances to which nearly all workers may be repeatedly exposed without adverse effects. The maximum predicted one-hour concentrations are far below the Threshold Limit Values for occupational exposure, therefore, it is concluded that there is no danger of acute toxicity due to exposure to short-term emissions from the high temperature incinerator.

For the second receptor group (remediation workers present at the site for the duration of the remedial action), the total cancer risk associated with exposure to maximum concentrations of all the chemicals of concern is estimated at 1.7×10^{-7} under the conditions of this scenario presented in the revised draft Feasibility Study Report. The total hazard index for non-carcinogenic effects is 4.9×10^{-4} which is far below the 1.0 hazard index value which indicates a potential hazard.

To represent the third receptor group (off-site residents who might be exposed for the duration of the remedial action), a child was used because of higher inhalation rate to body weight ratio, thus resulting in a worst case exposure scenario. For this receptor group, the total estimated cancer risk associated with exposure to maximum concentrations of all the chemicals of concern is 2.2×10^{-7} . The total hazard index for non-carcinogenic effects is 6.6×10^{-4} which is far below the 1.0 hazard index value which indicates a potential hazard.

Short term emissions of dust and organic vapors may occur during the excavation and pretreatment activities. These emissions may be mitigated by the proper use of water sprays, foams, and vapor control techniques. Downwind air monitoring for organics will be used to detect any off-site air emissions. In addition, risks to workers may occur because of contaminant volatilization during waste excavation, and at the processing and stockpile areas. Workers involved with the waste excavation and processing activities may also be exposed to the additional risks associated with dermal contact with contaminated soils. Therefore, all workers would be required to wear appropriate protective equipment, as specified in the site specific health and safety plan.

6.7.3 Long-Term Effectiveness

Magnitude of Residual Risks The treated soil would be tested for leaching potential and organic compounds to ensure treatment to established clean-up levels is achieved. Treatability testing would be conducted to determine the expected organic and metal concentrations after treatment.

Adequacy of Controls Data available from vendors indicates an organic removal rate of 99.99 percent or greater is achievable by high temperature incineration. Therefore, it is expected that the clean-up criteria can be achieved by this technology.

Reliability of Controls The removal of organic compounds from the soil followed by incineration of the vapors is a permanent process.

The thermal destruction of organic compounds from the soils provides the multiple benefit of reducing the toxicity, mobility, and volume of the organic compounds present in the soil. Destruction of at least 99.99% of the organics vaporized from the soil would be expected. The treatment process is irreversible and the treated soil is expected to meet the soil remediation goals. The volume of soil may be less than was processed in the system.

8.7.5 Implementability

Technical Feasibility The high temperature rotary kiln incineration process has been used in many projects to treat organic compounds present in soil. The soils present at these sites were treated to meet the respective remedial action objectives and the incineration processes were conducted to comply with the applicable ARARs.

Administrative Feasibility Acquisition of regulatory permits may not be required. However, the documentation for technical permit requirements would be provided to EPA for approval prior to implementation of any remedial activities.

Currently, three vendors are known to have a total of five mobile rotary incineration systems in this size category. Treatment units are available that would have sufficient capacity to perform soils treatment at the site within a reasonable period of time. Advanced scheduling would be required to ensure that a mobile incineration system is available.

8.7.6 Compliance with ARARs

Chemical Specific ARARs

This alternative is expected to meet the calculated clean-up criteria for soils. The site soils above the cleanup criteria would be excavated and treated by high temperature incineration to those concentrations.

Action Specific ARARs

Action specific ARARs for this alternative apply to the excavation of contaminated soils, monitoring requirements, and operation of a thermal treatment unit. Workers and worker activities that would occur during the implementation of this alternative must comply with the OSHA requirements for training, safety equipment and procedures, monitoring, recordkeeping, and reporting. In addition, the RCRA requirements for preparedness and prevention, contingency plans, and emergency procedures would also apply to this alternative. Compliance with the above mentioned ARARs would be achieved by following an EPA approved work plan and a site-specific health and safety plan.

The RCRA standards for permitted hazardous waste facilities, including performance standards (40 CFR 264), may apply to the high temperature incineration unit. To achieve compliance with these ARARs, the unit used would be designed, constructed, and operated in accordance with the provisions contained in the RCRA hazardous waste facility regulations.

This alternative would result in air emissions. The applicable requirements for air emissions would be the Prevention and Significant Deterioration (PSD) air emission provision contained in the Clean Air Act and the requirements contained in the South Carolina Pollution Control Act. It is anticipated that the treatment system will not exceed the PSD limits and would comply with South Carolina Pollution Control Act requirements for air emissions. The action specific ARAR of the RCRA Land Disposal Restrictions would be met if the cleanup criteria in Tables 3-3 and 3-4 are met.

8.7.7 Overall Protection of Human Health and the Environment

This alternative would destroy the organic contaminants present in the soils thus reducing the toxicity, mobility, and volume of the contaminants. Therefore, this alternative would meet the remedial action objectives for soil. Protection of human health and the environment would be achieved by meeting the remedial objectives and by complying with the identified ARARs.

8.7.8 Cost

The capital cost associated with this alternative include site preparation, incineration unit mobilization and demobilization, pilot testing, the construction of support facilities, soil excavation and treatment, site restoration, and a mobile laboratory. Due to the short implementation period associated with this alternative the operation and maintenance cost for this alternative are incorporated in the capital cost. Therefore, a present worth analysis has not been performed for this alternative. The estimated cost of this alternative (based on 45,000 cubic yard of soil) is \$28,260,000. A detailed breakdown of the estimated costs associated with this alternative are presented in the final draft Feasibility Study Report.

8.8. Low Temperature Thermal Desorption

8.8.1 Technical Description

This alternative consists of excavating the site soils and treating the soils on-site using low temperature thermal desorption. This treatment technology has been proven effective at treating soils that contain elevated levels of organic contaminants. Approximately 16,000 to 45,000 cubic yards of soil at the site is estimated to be above the target clean-up levels. Prior to initiation of this remedial alternative, supplementary soil sampling would be performed to adequately delineate the volume of soil present above these levels.

Process Description

For the development of this alternative, the representative process option for low temperature thermal desorption is the commercially available modified asphalt kiln. This system uses a rotating kiln with soil lifters inside the kiln to mechanically agitate the soil and improve heat transfer. The kiln is approximately 8 feet in diameter and 40 feet long. The soil would be heated to approximately 600°F by a 50mm BTU per hour fuel oil burner firing in the kiln.

The rotating kiln and lifters serve to mix, convey, and agitate the contaminated soil, allowing the moisture and organic compounds to vaporize and escape from the soil. After processing, the soil would be discharged from the kiln into a pug mill where it is moisturized by the addition of water to reduce dusting problems.

The combustion gas leaves the kiln at about 300 to 400°F and contains vaporized organic compounds and extrained soil particles. The combustion gas would pass through a cyclone, a baghouse, a wet scrubber, and a bed of granular activated carbon. The cyclone and baghouse remove the soil particulates. The wet scrubber removes acid gases, and the carbon bed removes any remaining organic compounds. Stack emissions would be monitored to verify compliance with federal and state regulations, including those for volatile organic compounds, hydrochloric acid (HCl), carbon monoxide (CO) and particulate loading.

The system requires an area of about 100 feet by 100 feet. The equipment is assembled on seven trailers for easy transportation. The soil would be processed at a rate of approximately 40 tons per hour (for soil with a moisture content of approximately 20 percent).

At an operating factor of about 80%, approximately 95 days of continuous operation would be required to treat 72,000 tons (45,000 cubic yards) of soil. Mobilization, demobilization and decontamination of the low temperature desorption equipment will take about 30 days. Therefore, implementation of on-site low temperature thermal desorption is expected to take less than one year.

Site Preparation and Preprocessing

Prior to excavation, the site would be cleared of vegetation. Any existing foundations or concrete pads would be decontaminated and disposed accordingly. Excavation and treatment will progress in stages. The excavation rate should match the treatment rate in order to minimize the storage space required. Water spray would be used for dust control, if necessary. Vapor suppression foams would be used if high levels of organic vapors in the breathing zone are detected during excavation. The excavated soil would be preprocessed in a tent structure of pole-barn construction and placed in containers or tanks. The storage space should be sized for adequate processing capacity to assure continuous operation during inclement weather.

The soil would be removed from the storage area in the tent using a covered belt conveying system and would drop into a hopper over a scalping screen or shredder to remove oversized (greater than 2-inch) material and debris. The sorted material would then be transported by an enclosed drag conveyor to a hopper that directly feeds the low temperature thermal desorption unit.

Rocks and other large objects would be screened and removed from the feed system, stockpiled on a pad, decontaminated by steam cleaning. These materials would then be used as backfill on-site, after confirmatory sampling to assure adequate decontamination.

Residuals Treatment

The water from the wet scrubber would be treated with a two-stage carbon adsorption system, and then used for ash quenching. Spent carbon from the system would be sent to an off-site hazardous waste incinerator for disposal. Soil particles from the cyclone and baghouse would be mixed with the treated soil from the thermal adsorber after analytical testing verifies the absence of organic compounds and metals. The excavated area would be backfilled with the treated soil. The treated soil would be analyzed for organic compounds prior to backfilling. If treated soil contains organic compounds above the clean-up criteria, then these soils would be recycled back into the treatment unit. The treated soils would also be analyzed for TCLP metals. If the treated soils fail to meet these criteria, the soils would be stabilized prior to backfilling. The treated soil would have sufficient properties to allow for standard grading and compaction equipment for backfilling operations. The area would be graded to match with existing drainage, covered with one foot of topsoil, and revegetated to minimize erosion.

6.6.2 Short-Term Effectiveness

Potential risks to public health and the environment are associated with the excavation and treatment of the contaminated soils.

Air pollution control systems will be an integral part of the low temperature thermal desorption system to limit air emissions to within the regulatory requirements. Stack and site perimeter monitoring will ensure that the discharge limits are not exceeded. An air dispersion model was used to calculate the ambient air quality resulting from the anticipated thermal desorption air emissions (after treatment with air pollution control systems). The air dispersion modeling was conducted in accordance with applicable EPA guidance documents. Based on the results of the air dispersion model, a health evaluation was conducted to determine the potential risk, if any, to public health from the inhalation of emitted compounds. The air dispersion model results (including associated input data calculations) and the health evaluations are presented in

Appendix G of the revised draft Feasibility Study Report. The air dispersion modeling for this alternative identified the downwind location where the maximum one-hour concentrations would be expected and the location where the maximum annual concentrations would be expected. The ambient air concentrations for the chemicals of concern at these locations determined by the air dispersion model were used to determine the potential risk, if any, to public health from the inhalation of emitted compounds generated by the thermal desorption process.

The public health evaluation identified the following potential receptor groups which may experience maximum exposures to airborne contaminants;

1. Remediation workers in the immediate vicinity of the thermal adsorber who might be exposed to short-term (one hour) peak concentrations;
2. Remediation workers present at the site for the duration of the remedial action (100 days) who might be exposed to airborne contaminants; and
3. Off-site residents who might be exposed to airborne contaminants for the duration of the remedial action (100 days).

For the first receptor group (remediation workers exposed for one hour to peak concentrations) the maximum predicted one-hour concentrations for each chemical of concern were compared to the Threshold Limit Values for these chemicals. Threshold Limit Values have been developed by the American Conference of Governmental and Industrial Hygienists (ACGIH) and are occupational exposure criteria that represent airborne concentrations of substances to which nearly all workers may be repeatedly exposed to without adverse effects.

The maximum predicted one-hour concentrations are far below the Threshold Limit Values for occupational exposure, therefore, it is concluded that there is no danger of acute toxicity due to exposure to short-term emissions from the thermal desorption unit.

For the second receptor group (remediation workers present at the site for the duration of the remedial action), the total cancer risk associated with exposure to maximum concentrations of all the chemicals of concern is estimated at 4.3×10^{-7} under the conditions of this scenario presented in Appendix F of the revised draft Feasibility Study Report. The total hazard index for non-carcinogenic effects is 9.1×10^{-4} which is far below the 1.0 hazard index value which indicates a potential hazard.

To represent the third receptor group (off-site residents who might be exposed for the duration of the remedial action), a child was used because of higher inhalation rate to body weight ratio, thus resulting in a worst case exposed scenario. For this receptor group, the total estimated cancer risk associated with exposure to maximum concentrations of all the chemical of concern is 5.7×10^{-7} . The total hazard index for non-carcinogenic effects is 1.2×10^{-3} which is below the 1.0 hazard index value which indicates a potential hazard.

Short term emissions of dust and organic vapors may occur during the excavation and pretreatment activities. These emissions may be mitigated by the proper use of water sprays, foams, and vapor control techniques. Downwind air monitoring for organics will be used to detect any off-site air emissions.

In addition, risks to workers may occur because of contaminant volatilization during excavation, and at the processing and stockpile areas. Workers involved with the waste excavation and processing activities may also be exposed to the additional risks associated with dermal contact contaminated soils. Therefore, all workers would be required to wear appropriate protective equipment, as specified in the site specific health and safety plan.

Short term emissions of dust, and organic vapors, may occur during the excavation and pretreatment activities. These emissions would be mitigated by the proper use of water sprays, foams, and vapor control techniques. Downwind air monitoring for organic compounds will be used to detect any off-site air emissions.

8.8.3 Long-Term Effectiveness

Magnitude of Residual Risks:

The treated soil would be tested for organic compounds to ensure treatment below established clean-up levels is achieved. Since the extraction efficiency for volatile organics is expected to be high, treatment residuals are not expected to contain organic contaminants above the clean-up criteria. Treatability testing would be conducted during remedial design to determine the expected organic concentrations after treatment. Carbon used for vapor treatment would be disposed of off-site at a RCRA incineration and/or landfill facility or would be regenerated at an approved facility.

Adequacy and Reliability of Controls:

Data available from a vendor indicates a volatile organic removal rate of 99.9 percent or greater is achievable by low temperature thermal desorption. Therefore, it is expected that the clean-up levels can be achieved by this technology. The removal of volatile organics from the soil by low temperature thermal desorption followed by the carbon bed adsorption of the collected vapors is a permanent process.

The spent carbon or carbon regeneration waste would be disposed at a permitted RCRA incineration and/or landfill facility to ensure adequate management of the treatment residuals.

6.8.4 Reduction in Mobility, Toxicity, or Volume

This alternative provides the multiple benefit of reducing the toxicity and mobility of organic contaminants present in the soil. The treatment process is irreversible and the treated soil is expected to meet the soil remediation goals. The volume of treated soil may be less than was processed in the system.

6.8.5 Implementability

Technical Feasibility:

The low temperature thermal desorption process has been used in several projects to treat organic compounds in soil. The system is commercially available through several vendors as trailer mounted transportable systems. The thermal desorption process has been used at a number of CERCLA sites.

Administrative Feasibility:

Acquisition of regulatory permits may not be required, although documentation for meeting the technical permit requirements would be provided to EPA for approval prior to implementation of remedial activities. The thermal desorption process has been used at a number of CERCLA sites.

Currently, five vendors are known to own low temperature desorption process equipment. Therefore, treatment units are available that would have sufficient capacity to perform soils treatment at the site within a reasonable period of time. Advanced scheduling will be required to ensure that a low temperature thermal desorption unit is available.

6.8.6 Compliance With ARARs

Chemical Specific ARARs

This alternative is expected to meet the calculated clean-up criteria for soils. The site soils above the cleanup criteria would be excavated and treated by low temperature thermal desorption.

Action Specific ARARs

Action specific ARARs for this alternative apply to the excavation of contaminated soils, monitoring requirements, and operation of a thermal treatment unit.

Workers and worker activities that would occur during the implementation of this alternative must comply with the OSHA requirements for training, safety equipment and procedures, monitoring, recordkeeping, and reporting. In addition, the RCRA requirements for preparedness and prevention, contingency plans, and emergency procedures would also apply to this alternative. Compliance with the above mentioned ARARs would be achieved by following an EPA approved work plan and a site-specific health and safety plan.

The RCRA standards for permitting hazardous waste facilities including performance standards (40 CFR 264) would apply to the low temperature thermal desorption unit. To achieve compliance with these ARARs, the unit used would be designed, constructed, and operated in accordance with the provisions contained in the RCRA waste facility regulations.

This alternative will result in air emissions. The applicable requirements for air emissions would be the Prevention and Significant Deterioration (PSD) air emission provisions contained in 40 CFR 51 and the requirements contained in the South Carolina Pollution Control Act. It is anticipated that the treatment system will not exceed the PSD limits and will comply with South Carolina Pollution Control Act requirements for air emissions.

The action specific ARAR of the RCRA Land Disposal Restrictions would apply for the backfilling of treated soils at the Bluff Road site. The cleanup criteria in the ROD (Tables 3-3 and 3-3) are below the LDR treatment standards (and the applicable Toxicity Characteristic levels).

The activated carbon, which would contain elevated levels of organic compounds, would be transported and incinerated off-site. The RCRA and U.S. Department of Transportation requirements for the packaging and transportation of hazardous waste would be applicable. Compliance with these ARARs would be complied with by disposing of the carbon at an EPA permitted RCRA incineration facility.

8.8.7 Overall Protection of Human Health and the Environment

This alternative would remove the organic contaminants from the soil to meet the remedial objectives for soil. The toxicity, mobility, and volume of the contaminants present in the soil would be reduced. Protection of human health and the environment would be achieved by complying with the identified ARARs.

8.8.8 Costs

The capital costs associated with this alternative include site preparation, thermal treatment unit mobilization and demobilization, pilot testing, construction of support facilities, soil excavation and treatment, backfilling, revegetation, mobile laboratory, and environmental monitoring. Due to the short implementation period associated with this alternative the operational and maintenance costs for this alternative are incorporated in the capital costs. Therefore, a present worth analysis has not been performed for this alternative. The estimated cost of this alternative (based on 45,000 cubic yards of soil) is \$18,250,000. A detailed breakdown of the estimated costs associated with this alternative are presented in the final draft Feasibility Study Report.

8.9. Soil Excavation and Off-Site Disposal

8.9.1. This alternative consists of excavating the site soils that are above the clean-up criteria and transporting the excavated soils to an off-site RCRA landfill for disposal. Prior to initiation of the remedial design for this alternative, supplementary soil sampling would be performed to adequately delineate the volume of soil present above the target clean-up levels. Approximately 16,000 to 45,000 cubic yards of soil is estimated to be above the clean-up criteria at the site.

Prior to excavation, the site would be cleared of vegetation. Any existing foundations or concrete pads would be decontaminated and disposed accordingly.

An equipment staging area would be constructed for equipment storage. In addition, a mobile analytical laboratory would be installed on-site and used to provide quick turn around on soil sample analyses to verify that the affected site soils have been adequately removed. Excavation at the site is expected to be routine and would be accomplished using conventional construction equipment. Excavated soil would be placed directly into lined 20 cubic yard capacity trucks. Trucks would be decontaminated prior to leaving the site. Disposal of the site soils would be accomplished at a RCRA landfill. Analytical testing of the soils with the Toxicity Characteristic Leaching Procedure (TCLP) will be required to determine if the soils can be disposed of untreated in a RCRA landfill, in accordance with the RCRA Land Disposal Restrictions (40 CFR 268). The Land Disposal Restrictions go into effect for CERCLA soils in May, 1992. If the soil cannot be land disposed, then pretreatment of the soils (i.e. solidification/fixation) would be required.

The excavated areas would be backfilled with clean fill/backfill material. A one-foot layer of topsoil would also be installed. The site would be graded to promote drainage and would be revegetated.

8.9.2 Short-Term Effectiveness

Potential risks posed to the community and the environment from volatilized organics or dust would be mitigated by the use of water sprays and foam suppressants during the remedial action. In addition, downwind air sampling would be performed to monitor any off-site emissions of volatile organics.

A site-specific health and safety plan (including protective equipment and monitoring equipment to be used) would be prepared and adhered to during the remedial action to minimize risks posed to workers.

To reduce the potential risks to public health or the environment resulting from an accident during transportation of the soils, a traffic control plan including routing of trucks to avoid populated areas would be developed and followed.

8.9.3 Long-Term Effectiveness

Magnitude of Residual Risks

Upon removal and disposal of the site soils that are above the clean-up criteria, the soil remediation objective will be achieved. Therefore, the leaching potential of the site soils into the groundwater plume would be eliminated.

Adequacy of Controls

There would be no soils left at the site that have concentrations above the clean-up criteria, therefore monitoring of the backfill and remaining site soils is not necessary. The ground water plume would be monitored no matter which ground water remedial action is implemented.

Reliability of Controls

Disposal of the excavated soils at a RCRA landfill would effectively isolate the contaminants of concern presented in the soils. Monitoring programs required at RCRA landfills are designed to detect potential failures so that corrective actions can be undertaken to mitigate the threat of a release.

8.9.4 Reduction of Toxicity, Mobility, or Volume

If no treatment technology (i.e. stabilization to meet Land Ban requirements) is employed, there would be no reduction in toxicity or volume of the contaminants. However the mobility of the contaminants would be decreased by placing the soils in a RCRA landfill.

Technical Feasibility

Excavation and transportation of contaminated soils are common construction activities, and are considered technically feasible. The removal and transport of the contaminated soils is limited by its removal/excavation rate and/or the rate at which the materials can be accepted at the RCRA landfill facility. A waste profile sheet and a statement certifying the material as nonreactive must be provided to the landfill facility before the waste can be accepted.

RCRA manifest requirements must be complied with for all wastes shipped off-site. Effective May 8, 1992, discarded commercial chemical product contaminated soil and debris are prohibited from land disposal without treatment if the soils contain contaminants above certain limits established in 40 CFR 268. Pretreatment of the soils may be necessary at the site or may be accomplished at the disposal facility. The Land Disposal Restriction regulations will significantly increase the cost of disposed soils by landfilling.

Administrative Feasibility

Implementation of this alternative may require coordination with municipalities to determine the appropriate transportation routes.

Numerous remedial action contractors and hazardous waste transporters are available for the excavation and transportation of the site soils. Coordination and advanced planning is required to ensure that capacity is available at a RCRA landfill.

6.9.6 Compliance with ARARs

Chemical Specific ARARs

Action specific ARARs for this alternative apply to the excavation of contaminated soils, monitoring requirements, and transportation and disposal requirements.

Workers and worker activities that would occur during the implementation of this alternative must comply with the OSHA requirements for training, safety equipment and procedures, monitoring, recordkeeping and reporting. Also, the RCRA requirements for preparedness and prevention, contingency plans, and emergency procedures would apply to this alternative. Compliance with the above mentioned ARARs would be achieved by following an EPA approved work plan and a site-specific health and safety plan.

The action specific ARARs for disposal of soils in a RCRA landfill resulting from a CERCLA remedial activity are the RCRA Land Disposal Restriction regulations in 40 CFR 268 (effective November 1990). The site soils would be analyzed for EP toxicity metals and TCLP parameters. If the soils are above the concentration limits acceptable for disposal in a RCRA landfill, then pretreatment of the soils to meet the land disposal regulations would be required to comply with this ARAR.

The RCRA and U.S. Department of Transportation requirements for the packaging and transportation of hazardous waste would be applicable to this alternative. Compliance with these ARARs would be achieved by utilizing a licensed hazardous waste transporter.

8.9.7 Overall Protection of Human Health and the Environment

The excavation of the site soils and subsequent disposal in a RCRA landfill would meet the soil remediation objectives. The mobility of the soil contaminants would be reduced by placement of the soils in a RCRA landfill. Protection of human health and the environment would be achieved by complying with the identified ARARs.

8.9.8 Cost

The capital costs associated with the alternative include site preparation, excavation, transportation and disposal costs, and site restoration. Because of the relatively short implementation period associated with this alternative, operational and maintenance costs are incorporated in the capital cost. Therefore, a present worth analysis has not been performed for this alternative. The established cost of this alternative (based on 45,000 cubic yards of soil) is \$20,700,000. A detailed breakdown of the estimated costs associated with this alternative are presented in the final draft Feasibility Study Report.

8.10. Soil Excavation and Off-Site Thermal Treatment

8.10.1 Technical Description

This alternative consists of excavating the site soils that are above the clean-up criteria and transporting the excavated soils to an off-site RCRA incinerator for treatment and disposal. Prior to initiation of the remedial design for this alternative, supplementary soil sampling would be performed to adequately delineate the volume of soil present above the clean-up criteria. Approximately 16,000 to 45,000 cubic yards of soil is estimated to be above the clean-up criteria at the site.

Prior to excavation, the site would be cleared of vegetation. Any existing foundations or concrete pads would be decontaminated and disposed of accordingly. An equipment staging area would be constructed of equipment storage. In addition, a mobile analytical laboratory would be installed on-site and used to provide quick turn around on soil samples to verify that the affected site soils have been adequately removed.

site. Thermal treatment of the soil would be completed at a RCRA-permitted incineration facility. Treated soil would then be disposed of in a landfill (most incineration facilities have associated landfills for disposal of treated wastes).

The excavated areas would be backfilled with clean fill/backfill material. A one-foot layer of topsoil would also be installed. The site would be graded to promote drainage and would be revegetated.

6.10.2 Short-Term Effectiveness

Potential short-term risks to public health and the environment are associated with the excavation and handling of the contaminated soil. Potential risks to the public may result from inhalation of volatilized contaminants or fugitive dust during excavation and from accidents during transportation of excavated soil. The potential risks posed to the community and the environment from volatilized organics or dust would be mitigated by the use of water sprays and foam suppressants during the remedial action. In addition, downwind air sampling would be performed to monitor any off-site emissions of volatile organic compounds.

A site-specific health and safety plan (including protective equipment and monitoring equipment to be used) would be prepared and adhered to during the remedial action to minimize risks posed to workers.

To reduce the potential risks to public health or the environment resulting from an accident during transportation of the soils, a traffic control plan including routing of trucks to avoid populated areas would be developed and implemented.

6.10.3 Long-Term Effectiveness

Magnitude of Residual Risks

The soil remediation objectives will be achieved upon the excavation and disposal of the site soils that are above the target clean-up levels. Therefore, the leaching potential of the site soils into the ground water plume will be eliminated.

No soils will be left at the site that have concentrations above the clean-up criteria, therefore monitoring of the backfill and remaining site soils is not necessary. The ground water plume will be monitored no matter which source control remedial action is implemented.

Adequacy and Reliability of Controls

The off-site RCRA incineration and landfill facility should operate within its permit(s) requirements and comply with all applicable regulations. Monitoring programs required at RCRA landfills are designed to detect potential failures so that the necessary actions would be implemented to control the treatment residuals.

8.10.4 Reduction of Toxicity, Mobility, or Volume

Implementation of this alternative would reduce the toxicity, mobility, and volume of the contaminants present in the site soils. This reduction of toxicity, mobility, and volume is accomplished by the thermal destruction of organic contaminants.

8.10.5 Implementability

Technical Feasibility

Excavation and transportation of contaminated soils are common construction activities, and are considered technically feasible. The removal and transport of the contaminated soils is limited by the excavation rate and/or the rate at which the materials can be accepted at the RCRA incineration facility. RCRA hazardous waste requirements must be complied with for all wastes transported off-site.

The RCRA incinerator would be effective at destroying the organic compounds present in the soils. The landfill would reliably isolate the treated soils.

Administrative Feasibility

Implementation of this alternative may require coordination with municipalities to determine the appropriate transportation routes. Numerous remedial action contractors and hazardous waste transporters are available for the excavation and transportation of the site soils. Coordination and advanced planning is required to ensure that capacity is available at a RCRA incineration facility.

8.10.6 Compliance with ARARs

Chemical Specific ARARs

This alternative is expected to meet the calculated clean-up criteria for soils. The site soils above the cleanup criteria would be excavated and treated at a RCRA incineration facility.

...soils, monitoring requirements, and transportation, treatment and disposal requirements.

Workers and worker activities that would occur during the implementation of this alternative must comply with the OSHA requirements for training, safety, equipment and procedures, monitoring, recordkeeping and reporting. Also, the RCRA requirements for preparedness and prevention, contingency plans, and emergency procedures would apply to this alternative. Compliance with the above mentioned ARARs would be achieved by following an EPA approved work plan and a site-specific health and safety plan.

The action specific ARARs associated with the incineration and disposal of treated soils at a RCRA facility include the RCRA Standards for Owners/Operators of Permitted Hazardous Waste Facilities (40 CFR 264), the air emission standards contained in 40 CFR 60, and the Prevention of Significant Deterioration provisions of the Clean Air Act. A permitted RCRA incineration and disposal facility must comply with these action specific ARARs.

The RCRA and U.S. Department of Transportation requirements for the packaging and transportation of hazardous waste would be applicable to this alternative. Compliance with these ARARs would be achieved by utilizing a licensed hazardous waste transporter.

8.10.7 Overall Protection of Human Health and the Environment

The excavation of the site soils and subsequent incineration and disposal of the treated soils at a RCRA facility would meet the soil remedial action objectives. The toxicity, mobility and volume of the soil contaminants would be reduced. Protection of human health and the environment would be achieved by complying with the identified ARARs for this alternative.

8.10.8 Cost

The capital cost associated with this alternative include site preparation and restoration and the cost of soil excavation, transportation and incineration. Because of the relatively short implementation period associated with this alternative, operational and maintenance costs are incorporated in the capital cost. Therefore, a present worth analysis has not been performed for this alternative. The estimated cost of this alternative (based on 45,000 cubic yards of soil) is \$100,100,000.00. A detailed breakdown of the estimated cost associated with this alternative are presented in the final draft Feasibility Study Report.

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Overall Protection of Human Health and the Environment

Groundwater Treatment

Both air stripping (with carbon adsorption) of extracted groundwater and carbon adsorption of extracted groundwater would decrease the potential threat to current and future users of contaminated ground water at the site or downgradient of the site. Both alternatives would be implemented until ARARs are met in the aquifer. In addition, effluent from the treatment system will meet the appropriate criteria for the chosen discharge alternative.

Discharge Alternatives

All of the discharge alternatives considered would protect human health and the environment with the exception of discharging the effluent to Myers Creek. Preliminary estimates of the volume of water to be discharged indicate the sensitive wetlands surrounding Myers Creek would be flooded due to the discharge. This flooding would destroy the wetlands and perhaps cause other damage as well. In light of this, discharge to Myers Creek has been eliminated as an option.

Source Treatment

The goal at the site is to protect ground water at the site from further degradation from the source and thereby diminish the time required to remediate the contaminated aquifer. Incineration of the source, on or off-site, and excavation with off-site disposal would provide the best overall protection of human health and the environment at this site. On-site thermal desorption will meet the cleanup goals established for the site and will allow for the treatment of any residual contamination through solidification of the treated soil. In-situ soil vacuum extraction has shown great potential as an effective remediation technique for soils contaminated with organic compounds. While it is unknown whether or not cleanup criteria for semivolatile organic compounds can be met, it is very probable that this technique may achieve all the cleanup criteria established for the soil contamination at the site. Overall, incineration would provide the most protection for human health and the environment, however, all of the alternatives will have the potential to meet the cleanup criteria for the contaminants identified for cleanup.

Compliance with ARARs

Groundwater Treatment and Discharge, Source Treatment

No alternative requires a separate ARAR waiver. All alternatives requiring excavation and treatment may require a "Soil and Debris Treatability Variance for Remedial Actions". EPA regulations provide that treatability variances may be issued on a site-specific basis. 40 CFR 268.44(h). Thus, they may be approved simultaneously with the selection of a remedy in a CERCLA response action in the ROD. All other remedial alternatives (excluding no-action) are expected to meet ARARs.

Long-term effectiveness and permanence

Ground water treatment and discharge

Carbon adsorption and air stripping both provide long-term effectiveness and permanent solutions for ground water treatment.

Long-term effectiveness of the discharged treated water is best provided by reinjection or spray irrigation back into the wetlands area. This would minimize the impact on the wetlands over the long term.

Source treatment

Soil vacuum extraction provides for removal of the volatile fraction of the contaminants in soil. The long-term effectiveness is unknown, however, it has been established that soil vacuum extraction removes large quantities of contaminants and would therefore provide a permanent solution. Thermal desorption provides for long-term effectiveness and permanence since the organic contaminants are removed from the soil and, if necessary, remaining contaminants are solidified. On-site incineration or excavation and off-site treatment/disposal would also provide long-term effectiveness and permanence.

Reduction of mobility, toxicity, or volume

Air stripping increases the mobility of the contaminants after their extraction, allowing it to be captured through the carbon adsorption phase of treatment and as part of the emission controls. Carbon adsorption reduces the mobility of contaminants by capturing it in the treatment process.

Source treatment

Incineration destroys the contaminants, thereby eliminating toxicity and mobility, and reducing volume. Soil vacuum extraction and thermal desorption do not affect toxicity in and of themselves, however the treatment of the removed contaminants effectively destroy the contaminants. They both increase mobility by transferring contaminants to the air, thereby reducing their volume in the soil. Mobility of the contaminants in air for all the alternatives can be controlled by requiring strict emission control procedures as part of the remedy. Off-site disposal of wastes does not affect the inherent toxicity, mobility, or volume of the waste.

Short-term effectiveness

Ground water treatment and discharge

Both air stripping and carbon adsorption may have the following short-term effects:

risks to workers from exposure to drilling fluids and soil during the installation of the ground water extraction wells.

risks to workers and environment from release of contaminated water because of accidental spillage.

risks to workers, environment and nearby members of the public from uncontrolled emissions.

The Remedial Design will include all necessary measures to minimize potential adverse short-term effects on public health or the environment.

Source treatment

All alternatives with the exception of in-situ soil vacuum extraction require excavation of contaminated soils and have short-term impacts on the environment due to the release of organic contaminants (VOCs) into the air. Soil vacuum extraction, thermal desorption and incineration may have short-term impacts due to emissions from the various systems.

Off-site disposal of contaminated soils or off-site incineration of these wastes involve transportation of the waste, increasing short-term risk to populations along the transport route.

Implementability

Groundwater treatment and discharge

Air stripping and carbon adsorption are both proven technologies. Treatment systems and vendors are readily available and no impediment to implementation of either alternative is foreseen.

Discharge to the Congaree river, two to three miles away, would be difficult to achieve and to maintain over the time estimated to complete the groundwater treatment. Spray irrigation and injection into the subsurface are both implementable at the site.

Source Treatment

Soil vacuum extraction is a relatively new technology, but it is expected to be fully implementable. This technology is expected to be the most easily implemented due to a minimal necessity for intrusive activities. Additionally, very few materials handling difficulties are anticipated. Incineration is a proven technology. On-site incineration often invokes a negative reaction from local citizens. On-site thermal desorption and incineration are subject to substantive but not to administrative requirements, and are fully implementable. Excavation and off-site incineration may be difficult to implement due to availability of incinerator capacity in South Carolina. Off-site disposal of the contaminated soil is implementable.

Cost-Effectiveness

In-situ soil vacuum extraction is the most cost-effective remedy. All cost estimates for remedies involving excavation in the Feasibility Study Report are based on an estimated 45,000 cubic yards of soil to be remediated. This estimate is very high. An independent calculation of the volume of soil contaminated at concentrations greater than the cleanup criteria resulted in an estimate of approximately 23,000 cubic yards. This independent estimate was prepared by RAI, the EPA oversight contractor. The actual costs for all remedies requiring excavation and treatment would be lower than given in the Feasibility Study for less volume. Detailed estimated costs (based on 45,000 cubic yards of soil) are as follows:

Groundwater treatment	
No Action Alternative	\$.76M
Carbon Adsorption	\$ 16.10M
Air Stripping	\$ 4.34M
Discharge Alternatives	
Subsurface Infiltration	\$.16M
Myers Creek	\$.42M
Surface Irrigation	\$.45M
Congaree River Discharge	\$ 3.32M
Source Treatments	
In-situ Soil Vacuum Extraction	\$ 1.07M
On-site incineration with stabilization of treated soils	\$ 28.26M
On-site thermal desorption with stabilization of treated soils	\$ 18.75M
Off-site Disposal of contaminated soils	\$ 20.70M
Off-site Thermal Treatment of contaminated soils	\$100.10M

The Carbon Adsorption alternative provides the same benefit as the Air Stripping alternative yet costs a great deal more.

Therefore, the Air Stripping Alternative is the most cost-effective alternative for treatment of the contaminated groundwater at the site.

Reinjection of groundwater is the least expensive of the discharge alternatives. This alternative will also help mitigate any potential impacts to the surrounding wetlands. Subsurface injection of the treated water is a cost-effective alternative.

Soil vacuum extraction is the most cost-effective alternative, assuming all ARARs can be met. The benefits provided by the

other alternatives as compared to this in-situ alternative do not justify additional expenditure. The in-situ soil vacuum extraction alternative is more cost-effective than the other alternatives primarily because it provides an equal benefit for less cost. Long-term effectiveness, permanence, and protectiveness are achieved, and reduction of toxicity, mobility and volume is achieved.

State Acceptance

The State of South Carolina has indicated verbally that they concur with the selected remedy. All the excavation and treatment alternatives are acceptable to the State if they include treatment of residual metals contamination. The State has stipulated that they will not concur with a ROD unless given assurances that an additional groundwater investigation is conducted. Additional groundwater studies, including the installation of a minimum of two deep wells, will be necessary during the Remedial Design development to further define the contamination.

Community Acceptance

The public meeting was well-attended. Local citizens voiced concerns over the Agency's timetable and urged rapid action at the site. Written comments were received from the Bluff Road Group, representatives of a local citizen's group and from the South Carolina Department of Health and Environmental Control. The latter comments are described under "State Acceptance". The private citizens voiced a preference for off-site incineration. It is likely the Agency's chosen alternative will be readily accepted by the public. A more detailed response to all comments received during the public comment period is provided in the responsiveness summary.

10.0 SELECTED REMEDY

The remedy selected for this site is:

extraction and on-site treatment by air stripping of contaminated ground water at the site

in-situ soil vacuum extraction of contaminated soils at the site

monitoring

subsurface injection of treated water

This remedy will attain a 10^{-6} cancer risk level as it removes the source of the groundwater contamination as well as the contaminated groundwater.

10.1 Description of Recommended Alternative

Groundwater treatment and discharge

This alternative consists of a combination of ground water extraction and ground water treatment. Contaminated ground water would be extracted from the upper aquifer by installing recovery wells. Ground water treatment would be accomplished by means of air stripping towers, followed by a granular activated carbon (GAC) system. The more volatile constituents in ground water would be removed by air stripping, while semi-volatiles would be removed by the GAC system. A pretreatment process, such as precipitation or flocculation, may be necessary to remove metals from the ground water prior to treatment by air stripping and GAC. The need for any such pretreatment process would be evaluated as part of the remedial design activities.

The ground water extraction system would consist of a combination of recovery wells located within the contaminant plume, and at the periphery of the plume. Recovery wells would be placed in the more highly contaminated zone of the plume to facilitate rapid removal of organics. The periphery wells would be used to limit expansion of the plume.

The extraction system including number, location, and configuration of wells would be developed during the remedial design. Pump tests and ground water modeling would be required for the design of the extraction system. For the purpose of this analysis, four extraction wells and a total flow of 100 gpm were used. The pumping rate is a conservative value based on data from the RI.

The ground water from the extraction wells would be pumped into a surge tank before it is fed to the air stripping system. The air stripping system would consist of two towers arranged in series. Both towers would have 12 feet of packing material, 30 inches in diameter and use high air-to-water ratios.

Prior to treatment, the extracted ground water would contain the compounds identified in Tables 1 and 2 at the measured maximum concentration shown in column 1. Contaminant concentrations should steadily decrease from these levels. Actual treatment system influent composition would be defined during remedial design.

... of the contaminants
ground water at the Bluff Road Site (Golder, 1986).
The exceptions would be 2-chlorophenol and phenols which would
be removed by adsorption on the GAC.

After air stripping, the ground water would be pumped through
cartridge filters and two carbon beds, also arranged in series.
When the carbon in the first bed is spent, it would be
replaced. A valve on the adsorption system would then be
switched to reverse the order of the beds in the series. The
beds are sized so that carbon would be expected to be replaced
every 4 to 6 weeks. The system would be automated and designed
for unattended operation. The final design of the ground water
extraction system, air stripper, and GAC systems would require
additional data collection prior to design.

As a result of ground water extraction and treatment, a
discharge stream of treated ground water would be generated. As
a best engineering judgement based on available data, the
volumetric flow of the discharge stream is assumed to be 144,000
gallons per day based on 100 gpm ground water recovery system
operating 24 hours per day. More precise ground water
withdrawal and discharge values would be determined as part of
the remedial design.

Infiltration galleries are a proven and viable alternative for
effluent discharge. The process involves the use of drains,
trenches and/or piping to introduce the treated ground water
into the vadose zone where it is allowed to percolate into the
soil. There are two basic types of infiltration galleries,
horizontal and vertical. The horizontal system uses trenches
lined with gravel or perforated piping to introduce the ground
water into the vadose zone. Vertical infiltration uses vertical
perforated piping with appropriate packing materials to allow
radial infiltration over the depth of the vadose zone.

Discharge limitations for subsurface infiltration of the treated
ground water will be the cleanup criteria. This effluent
discharge option would establish the discharge design
requirements for the ground water treatment system.

The effectiveness of this method is dependent on vadose zone
acceptance of the treated water. A preliminary assessment of
infiltration rates based on aquifer and near aquifer vadose zone
soil classification indicates that this technology would be
feasible for the Bluff Road Site.

Percolation testing must be performed to determine permissible
application rates of treated ground water and to establish the

most appropriate process alternative (i.e., horizontal or vertical). The infiltration gallery must be located so that recharge to the aquifer does not interfere with the performance of the extraction system (hydraulic control). These considerations can be addressed adequately in design. The basis for conceptual cost evaluation is a horizontal infiltration gallery. The estimated infiltration area required was determined using the lowest permeability determined by performing slug tests on shallow wells in the upper aquifer (9.27×10^{-4} cm/sec). This equates to an estimated permissible application rate of 50 gallons/day/ft². With an estimated flow rate of 100 gpm, approximately 3000 ft. of infiltration trenches would be required for horizontal infiltration. The infiltration trenches would be distributed over an area of approximately 15,000 square feet. This is based on a trench width of approximately 2 feet and trench spacing of approximately 7.5 feet (center to center). Again, permissible application rates would have to be confirmed during remedial design.

Source Remediation

The vacuum extraction system would consist of air vacuum wells installed in the unsaturated zone. A pump and manifold system of PVC pipes will be used for applying a vacuum on the air wells which feed an in-line water removal system, and an in-line vapor phase carbon adsorption system for VOC removal. Once the well system has been installed and the vacuum becomes fully established in the soil column, VOCs are drawn out of the soil and through the vacuum wells. This treatment technology has been proven effective at treating soils that contain elevated levels of organic contaminants. Prior to initiation of this remedial alternative, supplementary soil sampling would be performed to adequately delineate the aerial extent of the necessary vacuum influence areas.

Process Description

Soil vacuum extraction as proposed herein is an in-situ treatment process used to clean up soils that contain volatile and some semi-volatile organic compounds. The process utilizes extraction wells to induce a vacuum on subsurface soils. The subsurface vacuum propagates laterally, causing in-situ volatilization of compounds that are adsorbed to soils. Vaporized compounds and subsurface air migrate rapidly to extraction wells, essentially air stripping the soils in-place.

A vacuum extraction system consists of a network of air withdrawal (or vacuum) wells installed in the unsaturated zone.

A pump and manifold system of PVC pipes is used for applying a vacuum on the air wells which feed an in-line water removal system, and an in-line vapor phase carbon adsorption system for VOC removal. Vacuum wells can be installed vertically to the full depth of the contaminated unsaturated zone. Vertical wells were selected due to the depth of the soil strata requiring remediation, geotechnical conditions, and the depth to groundwater.

Once the well system has been installed and the vacuum becomes fully established in the soil column, VOCs would be drawn out of the soil and through the vacuum wells. In all soil vacuum extraction operations, the daily VOC removal rates eventually decrease as volatiles are recovered from the soil. This occurs since volatile recovery decreases the VOC concentration in the soil, and consequently reduces the diffusion rate of volatiles from the soil. Volatiles in the air stream are removed by the carbon adsorption system or destroyed by fume incineration, after which the cleaned air is discharged to the atmosphere.

The application of soil vacuum extraction to the unsaturated zone remediation is a multi-step process. Specifically, full-scale vacuum extraction systems are designed with the aid of laboratory and pilot-scale VOC stripping tests. Further testing would be performed as part of remedial design.

10.2 Cost of Recommended Alternative

Groundwater Treatment and discharge

The present worth cost of the Air Stripping alternative would be approximately \$4,339,500. This cost would include a capital cost of \$1,012,000 for construction of the groundwater extraction system, the treatment units, a treated water discharge system, and all associated piping. This cost also includes annual expenditures for operation and upkeep of the system of \$306,875. The total of the annual costs over 16 years, using a 5% discount rate is \$3,326,500.

The present worth cost of the infiltration gallery/reinjection discharge alternative is approximately \$165,484.

The estimated total cost for the soil vacuum extraction system with vapor phase carbon adsorption would be approximately \$1,070,000. This capital cost includes the anticipated O&M expenditures since this remedial action is not expected to last over 2 years.

Capital cost would include construction of the soil vapor extraction system, vapor treatment system, and all associated piping/mechanical facilities.

The total present worth cost for the remedial action is \$5,574,984 based on the information in the Feasibility Study Report. A detailed cost breakdown for each alternative and the selected remedy is given in the tables at the end of Chapter 5 in the Feasibility Study Report.

10.3 Schedule

The Remedial Design is to begin in the winter/spring of 1991 and be completed no later than one year later. Construction of the Remedial Action should begin in January 1992.

10.4 Future Actions

After groundwater remediation shutdown, a post closure groundwater monitoring program is to be initiated to determine the permanence of remediation. No other remedial actions, other than those described herein, are anticipated in the future at this site. The selected remedy addresses all known areas of contamination at the site.

11.0 STATUTORY DETERMINATIONS

The selected remedy satisfies the requirements of Section 121 of CERCLA.

Protection of Human Health and the Environment

The selected remedy will permanently treat the groundwater and soil and removes or minimizes the potential risks associated with the wastes. Dermal, ingestion, and inhalation contact with site contaminants would be eliminated, and risks posed by continued groundwater contamination would be reduced.

Attainment of ARARs

This alternative will comply with ARARs.

This alternative will comply with the substantive technical requirements of the Clean Air Act 40 CFR Part 50 concerning particulates and volatile organic emissions during excavation.

Cost-Effectiveness

The groundwater and source remediation technologies are more cost-effective than the other alternatives considered primarily because they provide greater benefit for the cost.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The recommended alternative represents the maximum extent to which permanent solutions and treatment can be practicably utilized for this action.

Preference for Treatment as a Principal Element

The preference for treatment is satisfied by the use of a vacuum extraction system to remove contamination from soil at the site and the use of air stripping to treat contaminated ground water at the site. The principal threats at the site will be mitigated by use of these treatment technologies.

SCOPE OF WORK FOR THE
REMEDIAL DESIGN AND REMEDIAL ACTION
AT THE SCRDI BLUFF ROAD SUPERFUND SITE

INTRODUCTION

The purpose of this Remedial Design/Remedial Action (RD/RA) is to design, construct, operate and maintain, monitor, and complete the selected remedy to ensure protection of human health and the environment. Remedial Design (RD) is generally defined as those activities to be undertaken by Settling Defendants to develop the final plans and specifications, general provisions and special requirements necessary to translate the Record of Decision (ROD) into the remedy to be constructed under the Remedial Action (RA) phase. RA is generally the implementation phase of site remediation or actual construction of the remedy, including necessary operation and maintenance, and performance monitoring. The RA is based on the RD to achieve the remediation goals specified in the ROD. This Scope of Work (SOW) is designed to provide a framework for conducting the RD/RA activities at this Site and is the "technical" portion of this Consent Decree. This SOW provides for a number of detailed documents which shall be used to guide each component of the RD/RA process at this Site.

Settling Defendants shall conduct an RD/RA that is in accordance with this SOW and consistent with the Record of Decision (ROD) issued on September 12, 1990, the Explanation of Significant Differences issued on March 5, 1991, the Superfund Remedial Design and Remedial Action Guidance (U.S. EPA Office of Solid Waste and Emergency Response Directive 9355.0-4A, June 1986) (the "RD/RA Guidance"), and other guidances used by EPA in conducting an RD/RA (a list of the primary guidances is attached), as well as any additional requirements in this Consent Decree. Settling Defendants shall furnish all necessary personnel, materials, and services needed, or incidental to, performing and completing the RD/RA, including necessary operation and maintenance, and performance monitoring.

EPA shall provide oversight of Settling Defendants' activities throughout the RD/RA. Settling Defendants shall support EPA's initiation and conduct of activities related to the implementation of oversight activities. However, the responsibility for conducting an adequate RD/RA to satisfactorily implement the selected remedy shall lie with Settling Defendants. EPA review and approval of deliverables is a tool to assist this process and to satisfy, in part, EPA's responsibility to provide effective protection of public health, welfare, and the environment. EPA approval of a task or deliverable shall not be construed as a guarantee as to the ultimate adequacy of such task or deliverable. A summary of the

major deliverables that Settling Defendants shall submit for the RD/RA is attached.

TASK I - SCOPING

Scoping is the initial planning process of the RD/RA and has been initiated by EPA through this document to determine how the site-specific remediation goals as specified in the ROD will be met. The specific project scope shall be planned by Settling Defendants and EPA. Settling Defendants shall document the specific project scope in an Remedial Design (RD) Work Plan and an Remedial Action (RA) Work Plan. Because of the unknown nature of the Site, additional data requirements may be identified throughout the RD/RA process. Settling Defendants shall submit a technical memorandum documenting any need for additional data along with the proposed Data Quality Objectives (DQOs) whenever such requirements are identified. In any event, Settling Defendants are responsible for fulfilling additional data and analysis needs identified by EPA consistent with the general scope and objectives of the Consent Decree, including this SOW.

The RD/RA Site Objectives for the SCRDI Bluff Road Superfund Site have been determined preliminarily, based on available information, to be the following:

1. Review of existing information pertaining to the Site. This includes the ROD, the Remedial Investigation/Feasibility Study (RI/FS), and other reports or related information.
2. Review of relevant guidance (see attached references) to understand the RD/RA process. This information shall be used in performing the RD/RA and preparing all deliverables under this SOW.
3. Collection of additional data, as required. This includes additional sampling, geotechnical investigations, surveys, modeling, etc.
4. Performance of bench and/or pilot Treatability Studies to evaluate and properly design the selected remedy.
5. Preparation of detailed design plans and specifications necessary to construct the selected remedy.
6. Actual implementation of the selected remedy, including construction of facilities necessary to implement the selected remedy.

7. Operation and maintenance of the facilities necessary to implement the selected remedy, as required.
8. Monitoring of the selected remedy to ensure all cleanup goals are met. The cleanup goals are the same as "Performance Standards," as defined in the Consent.
9. Ensuring that all Federal and State applicable or relevant and appropriate requirements (ARARs) identified in the ROD are met.

When scoping the specific aspects of the project, Settling Defendants must meet with EPA to discuss all project planning decisions and special concerns associated with the Site. The following activities shall be performed by Settling Defendants as a function of the project scoping process.

A. Site Background

Settling Defendants shall gather and analyze the existing information regarding the Site and shall conduct a visit to the Site to assist in planning the scope of the RD/RA as follows:

1. Collect and Analyze Existing Data and Document the Need for Any Additional Data

Before planning RD/RA activities, all existing Site data shall be thoroughly compiled and reviewed by Settling Defendants. Specifically, this shall include the ROD, RI/FS, and other available data related to the Site. This information shall be utilized in determining if any additional data is needed for RD/RA implementation. Decisions on the necessary data and Data Quality Objectives (DQOs) shall be made by EPA.

2. Conduct Site Visit

Settling Defendants shall conduct a visit to the Site with the EPA Remedial Project Manager (RPM) during the project scoping phase to assist in developing a conceptual understanding of the RD/RA requirements for the Site. Information gathered during this visit shall be utilized to better scope the project and to determine the extent of additional data necessary to implement the RD/RA.

B. Project Planning

Once Settling Defendants have collected and analyzed existing data and conducted a visit to the Site, the specific project scope shall be planned. Settling Defendants shall meet with EPA regarding the following activities and before proceeding with Task II.

1. Refine the Site Objectives

Once existing information about the Site has been analyzed, Settling Defendants shall review and, if necessary, refine the Site Objectives. Any revised Site Objectives shall be documented in a technical memorandum to be prepared by Settling Defendants and are subject to EPA approval prior to proceeding with Task II.

2. Document the Need for Treatability Studies

Treatability Studies shall be conducted by Settling Defendants to insure that the selected remedy will attain all applicable or relevant and appropriate requirements (ARARs) as well as any other treatment requirements outlined in the ROD. Treatability Studies shall be required except where Settling Defendants can demonstrate to EPA's satisfaction that they are not needed. The study results and operating conditions shall be used in the detailed design of the selected remedy. Where Treatability Studies are needed, Treatability Study activities shall be planned to occur concurrently with additional data collection activities (see Task II).

3. Evaluate Treatability Studies

Where Treatability Studies are required, Settling Defendants shall propose and EPA shall approve the type of Treatability Studies to be used (e.g., bench versus pilot versus bench and pilot). The decision to perform pilot testing shall be made as early in the process as possible to minimize potential delays.

TASK II - REMEDIAL DESIGN

Remedial Design shall be performed to support the response actions selected in the ROD. The Remedial Design shall provide the technical details for implementation of the Remedial Action in accordance with currently accepted environmental protection technologies and standard professional engineering and construction practices. The design shall include clear and comprehensive design plans and specifications.

A. Remedial Design Planning

At the conclusion of the project planning phase, Settling Defendants shall submit the following: a RD Work Plan, a Sampling and Analysis Plan, a Health and Safety Plan, and a Treatability Study Work Plan.

The RD Work Plan, Sampling and Analysis Plan, and Treatability Study Work Plan must be reviewed and approved and the Health and Safety Plan reviewed by EPA prior to the initiation of field activities.

Upon approval of the RD Work Plan, Settling Defendants shall implement the RD Work Plan in accordance with the EPA-approved design management schedule contained therein. Such implementation shall include EPA review and/or approval of plans, specifications, submittals, and other deliverables. The purpose of these design reviews is for EPA to assess the feasibility of the design to achieve the Site Objectives in accordance with the ROD and Consent Decree, including this SOW. Review and/or approval of design submittals only allows Settling Defendants to proceed to the next step of the design process. It does not imply acceptance of later design submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards and be accepted.

1. RD Work Plan

A Work Plan documenting the decisions and evaluations completed during the scoping process shall be submitted to EPA for review and approval. The Work Plan shall include a comprehensive description of the additional data collection and evaluation activities to be performed, if any, and the plans and specifications to be prepared. A comprehensive design management schedule for completion of each major activity and submission of each deliverable shall also be included. The Work Plan shall be developed in conjunction with the Health and Safety Plan, the Sampling and Analysis Plan, and the Treatability Study Work Plan, although each plan may be delivered under separate cover.

Specifically, the Work Plan shall present the following:

- a. A statement of the problem(s) and potential problem(s) posed by the Site and the objectives of the RD/RA.
- b. A background summary setting forth the following:
 - 1) A brief description of the Site including the geographic location, and a description of the physiographic, hydrologic, geologic, demographic, ecological, cultural and natural resource features of the Site;
 - 2) A brief synopsis of the history of the Site including a summary of past disposal practices and

a description of previous responses that have been conducted by local, State, Federal, or private parties at the Site;

3) A summary of the existing data in terms of physical and chemical characteristics of the contaminants identified and their distribution among the environmental media at the Site.

- c. A detailed description of the tasks to be performed, information needed for each task, information to be produced during and at the conclusion of each task, and a description of the work products that shall be submitted to EPA. This includes the deliverables set forth in the remainder of Task II.
- d. A schedule with specific dates for completion of each required activity and submission of each deliverable required by this Consent Decree, including those in this SOW. This schedule shall also include information regarding timing, initiation and completion of all critical path milestones for each activity and/or deliverable. Settling Defendants may request EPA to change the specific dates for each deliverable required by this Consent Decree. Along with the request Settling Defendants must submit an explanation of the reason for the request and its impact upon the project's completion and remaining due dates. This request and accompanying explanations must be submitted to EPA no later than sixty (60) days before the scheduled due date of the deliverable that Settling Defendants are requesting EPA to change. EPA, in its unreviewable discretion, shall disapprove or approve such requested schedule changes.
- e. A project management plan, including a data management plan, monthly reports to EPA, and meetings and presentations to EPA at the conclusion of each major phase of the RD/RA. The data management plan shall address the requirements for project management systems, including tracking, storing, and retrieving the data along with identifying software to be used, minimum data requirements, data format and backup data management. The plan shall address both data management and document control for all activities conducted during the RD/RA.

- f. A description of the community relations support activities to be conducted during the RD. At EPA's request, it is expected that Settling Defendants will assist EPA in preparing and disseminating information to the public regarding the RD work to be performed.

2. Sampling and Analysis Plan

Settling Defendants shall prepare a Sampling and Analysis Plan (SAP) to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that the data generated will meet the DQOs established. The SAP provides a mechanism for planning field activities and consists of a Field Sampling and Analysis Plan (FSAP) and a Quality Assurance Project Plan (QAPP).

The FSAP shall define in detail the sampling and data-gathering methods that shall be used on the project. It shall include sampling objectives, sample location (horizontal and vertical) and frequency, sampling equipment and procedures, and sample handling and analysis. The Field Sampling and Analysis Plan shall be written so that a field sampling team unfamiliar with the site would be able to gather the samples and field information required. The QAPP shall describe the project objectives and organization, functional activities, and quality assurance and quality control (QA/QC) protocols that shall be used to achieve the desired DQOs. The DQOs shall, at a minimum, reflect use of analytical methods for identifying contamination and addressing contamination consistent with the levels for remedial action objectives identified in the National Contingency Plan. In addition, the QAPP shall address personnel qualifications, sampling procedures, sample custody, analytical procedures, and data reduction, validation, and reporting. These procedures must be consistent with the Region IV Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual.

Settling Defendants shall demonstrate, in advance and to EPA's satisfaction, that each laboratory it may use is qualified to conduct the proposed work. This includes use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved by EPA in the QAPP for the site. The laboratory must have and follow an approved QA program. Settling Defendants shall provide assurances that EPA has access to

laboratory personnel, equipment and records for sample collection, transportation, and analysis. EPA may require that Settling Defendants submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment and material specifications. In addition, EPA may require submittal of data packages equivalent to those generated in the EPA Contract Laboratory Program (CLP) and may require laboratory analysis of performance samples (blank and/or spike samples) in sufficient number to determine the capabilities of the laboratory. If a laboratory not in the CLP is selected, methods consistent with CLP methods that would be used at this Site for the purposes proposed and QA/QC procedures approved by EPA shall be used. In addition, if the laboratory is not in the CLP program, a laboratory QA program must be submitted for EPA review and approval.

3. Health and Safety Plan

A Health and Safety Plan shall be prepared in conformance with Settling Defendants' health and safety program, and in compliance with OSHA regulations and protocols. The Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. Note that EPA does not "approve" Settling Defendants' Health and Safety Plan, but rather EPA reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

4. Treatability Study Work Plan

Settling Defendants shall prepare a Treatability Study Work Plan for EPA review and approval. This Plan shall describe the remedial technology to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for the Treatability Study shall be documented as well. If a pilot-scale Treatability Study is to be performed, the Treatability Study Work Plan shall also describe pilot plant installation and start-up, pilot plant operation and maintenance procedures, and operating conditions to be tested. If testing is to be performed off-site, permitting requirements must be addressed. A schedule for performing the Treatability Studies shall be included with specific dates for the tasks, including, but not limited to, the procurement

of contractors and the completion of sample collection, performance, sample analysis, and report preparation.

5. Treatability Study Sampling and Analysis Plan

If the SAP is not adequate for defining the activities to be performed during the Treatability Study, a separate Treatability Study SAP shall be prepared by Settling Defendants for EPA review and approval. It shall be designed to monitor pilot plant performance.

6. Treatability Study Health and Safety Plan

If the Health and Safety Plan is not adequate for defining the activities to be performed during the Treatability Study, a separate Study Health and Safety Plan shall be developed by Settling Defendants. Note that EPA does not "approve" Settling Defendants' Study Health and Safety Plan, but rather EPA reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment.

B. Preliminary Design

Preliminary Design begins with initial design and ends with the completion of approximately 30 percent of the design effort. At this stage Settling Defendants shall have field verified, as necessary, the existing conditions of the Site. The Preliminary Design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the final design will provide an operable and usable remedial project. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the project. EPA approval of the Preliminary Design is required before proceeding with further design work, unless specifically authorized by EPA. EPA has the unreviewable discretion to waive the requirement for the submission of the respective Intermediate Design for each respective treatment technology in EPA's Preliminary Design review comments. The Preliminary Design shall include the results of additional data acquisition activities, a Treatability Study Evaluation Report, a Design Criteria Report, preliminary plans and specifications, a Project Delivery Strategy, and a Plan for Satisfying Permitting Requirements. In accordance with the design management schedule established in the approved Remedial Design Work Plan, Settling Defendants shall submit to EPA the Preliminary Design submittal which shall consist of the following:

1. Results of Data Acquisition Activities

Data gathered during the project planning phase shall be compiled, summarized, and submitted along with an analysis of the impact of the results on design activities. In addition, surveys conducted to establish topography, rights-of-way, easements, and utility lines shall be documented. Utility requirements and acquisition of access, through purchases or easements, that are necessary to implement the RA shall also be discussed.

2. Design Criteria Report

The concepts supporting the technical aspects of the design shall be defined in detail and presented in this report. Specifically, the Design Criteria Report shall include the preliminary design assumptions and parameters, including:

- a. Waste characterization
- b. Pretreatment requirements
- c. Volume of each media requiring treatment
- d. Treatment schemes (including all media and by-products)
- e. Input/output rates
- f. Influent and effluent qualities
- g. Materials and equipment
- h. Performance standards
- i. Long-term performance monitoring requirements

3. Preliminary Plans and Specifications

Settling Defendants shall submit an outline of the required drawings, including preliminary sketches and layouts, describing conceptual aspects of the design, unit processes, etc. In addition, an outline of the required specifications, including performance standards, ARARs, etc., shall be submitted. The initiation of the construction drawings shall reflect organization and clarity. The scope of the technical specifications shall be outlined in a manner reflecting the final specifications.

4. Plan for Satisfying Permitting Requirements

The remedial action must be in full compliance with the requirements of all Federal, State, and local air, water, and waste disposal standards and the Federal Endangered Species Act. Any off-site disposal shall be in compliance with the policies stated in the Procedure for Planning and Implementing Off-site Response Actions

(Federal Register, Volume 50, Number 214, November, 1985, pages 45933-45937). The final design plans and specifications must be consistent with the technical requirements of all applicable or relevant and appropriate requirements unless a waiver has been issued. The plan shall identify the off-site disposal/discharge permits that are required, the time required to process the permit applications, and a schedule for submittal of the permit applications.

5. Treatability Study Evaluation Report

Following completion of Treatability Studies, Settling Defendants shall analyze and interpret the testing results in a technical report to EPA. Depending on the sequence of activities, this report may be submitted with the Preliminary Design or as a separate deliverable, as approved in the RD Work Plan. The report shall evaluate the treatment technology's effectiveness, implementability, cost, and actual results as compared with predicted results. The report shall also evaluate full-scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

C. Intermediate Design

The Intermediate Design ends with the completion of approximately 60 percent of the design effort. Settling Defendants shall submit to EPA the Intermediate Design submittal which shall consist of a continuation and expansion of the Preliminary Design submittal as may be modified by any value engineering recommendations adopted by Settling Defendants. EPA has the unreviewable discretion to waive the submission of the Intermediate Design upon completion of EPA's review of the Preliminary Design. Any value engineering recommendations adopted by Settling Defendants shall be summarized in a report submitted with the Intermediate Design. EPA review comments on the Intermediate Design shall be reflected in the Prefinal/Final Design. The Intermediate Design submittal shall be submitted in accordance with the approved design management schedule and shall consist of the following:

1. Draft Design Analyses

The evaluations conducted to select the design approach shall be described. Design calculations shall be included.

2. Draft Plans and Specifications

Draft construction drawings and specifications for all components of the Remedial Action shall be prepared and presented.

3. Draft Construction Schedule

Settling Defendants shall develop a Draft Construction Schedule for construction and implementation of the remedial action which identifies timing for initiation and completion of all critical path tasks. Settling Defendants shall specifically identify dates for completion of the project and major milestones.

D. Prefinal/Final Design

Settling Defendants shall submit the Prefinal Design when the work is approximately 90 percent complete in accordance with the approved design management schedule. The Prefinal Design shall have addressed comments generated from the Intermediate Design Review and clearly show any modification of the design as a result of incorporation of the comments. Essentially, the Prefinal Design shall function as the draft version of the Final Design. After EPA review and comment on the Prefinal Design, the Final Design shall be submitted. All Final Design documents shall be certified by a Professional Engineer registered in the State of South Carolina. EPA approval of the Final Design is required before initiating the RA, unless specifically authorized by EPA. The following items shall be submitted as part of the Prefinal/Final Design:

1. Complete Design Analyses

The selected design shall be presented along with an analysis supporting the design approach. Design calculations shall be included.

2. Complete Plans and Specifications

A complete set of construction drawings and specifications shall be submitted which describe the selected design.

3. Final Construction Schedule

4. Construction Cost Estimate

A construction cost estimate accurate to within +15 percent to -10 percent shall be submitted.

TASK III - REMEDIAL ACTION

Remedial Action shall be performed to implement the response actions selected in the ROD. The Remedial Action shall consist of all activities necessary to implement the response actions selected in the ROD prior to operation and maintenance and long-term performance monitoring activities.

A. Remedial Action Planning

Concurrent with the submittal of the Intermediate Design, Settling Defendants shall submit the following: a RA Work Plan, a Construction Management Plan, a Construction Quality Assurance Plan, and a Construction Health and Safety Plan/Contingency Plan.

The RA Work Plan, Construction Management Plan, and Construction Quality Assurance Plan must be reviewed and approved and the Construction Health and Safety Plan/Contingency Plan reviewed by EPA prior to the initiation of the Remedial Action.

Upon approval of the RA Work Plan and the Final Design, Settling Defendants shall implement the RA Work Plan in accordance with the construction management schedule. Significant "field" changes to the RA as set forth in the RA Work Plan and Final Design shall not be undertaken without the approval of EPA. The RA shall be documented in enough detail to produce "as-built" construction drawings certified by a Professional Engineer registered in the State of South Carolina after the RA is complete. Implementation of the RA shall include EPA review and/or approval of required deliverables. The purpose of these reviews is for EPA to assess the feasibility of the project to achieve the Site Objectives in accordance with the ROD and Consent Decree, including this SOW. Review and/or approval of submittals does not imply acceptance of later submittals that have not been reviewed, nor that the remedy, when constructed, will meet Performance Standards and be accepted.

1. RA Work Plan

A Work Plan which provides a detailed plan of action for completing the RA activities shall be submitted to EPA for review and approval. The objective of this work plan is to provide for the safe and efficient completion of the RA. The Work Plan shall include a comprehensive description of the work to be performed and a construction management schedule for completion of each major activity and submission of each deliverable. The Work Plan shall be developed in conjunction with the Construction Management Plan, the Construction Quality Assurance Plan, and the Construction Health and Safety Plan/Contingency Plan, although each plan may be delivered under separate cover.

Specifically, the Work Plan shall present the following:

- a. A detailed description of the tasks to be performed and a description of the work products to be submitted to EPA. This includes the deliverables set forth in the remainder of Task III.
- b. A schedule for completion of each required activity and submission of each deliverable required by this Consent Decree, including those in this SOW.
- c. A project management plan, including monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the RA.
- d. A description of the community relations support activities to be conducted during the RA. At EPA's request, it is expected that Settling Defendants will assist EPA in preparing and disseminating information to the public regarding the RA work to be performed.

2. Project Delivery Strategy

This describes Settling Defendants' strategy for delivering the project. It focuses on the management approach to carry out the design and implement the Remedial Action. Items to be addressed include procurement method and contracting strategy, phasing alternatives, and contractor and equipment availability concerns. If the construction of the selected remedy is to be accomplished by Settling Defendants' "in-house" resources, the Strategy shall identify these resources.

3. Construction Management Plan

A Construction Management Plan shall be developed to indicate how the construction activities are to be implemented and coordinated during the RA. Settling Defendants shall designate a person to be their representative on-site during the Remedial Action. This plan shall identify this representative along with other key project management personnel and lines of authority as well as provide descriptions of the duties of the key personnel along with an organizational chart. In addition, a plan for the administration of

construction changes and EPA review and approval of those changes shall be included.

4. Construction Quality Assurance Plan

Settling Defendants shall develop and implement a Construction Quality Assurance Program to ensure, with a reasonable degree of certainty, that the completed remedial action meets or exceeds all design criteria, plans and specifications, and Site Objectives. The Construction Quality Assurance Plan shall incorporate relevant areas of the Cleanup Goal Verification Plan (see Task V). At a minimum, the Construction QA plan shall include the following elements:

- a. A description of the quality control organization, including a chart showing lines of authority, identification of the members of the Independent Quality Assurance Team (IQAT), and acknowledgment that the IQAT will implement the control system for all aspects of the work specified and shall report to the project coordinator and EPA. The IQAT members shall be representatives from testing and inspection organizations and/or the Supervising Contractor and shall be responsible for the QA/QC of the RA. The members of the IQAT shall have a good professional and ethical reputation, previous experience in the type of QA/QC activities to be implemented, and demonstrated capability to perform the required activities. They shall also be independent of the construction contractor.
- b. The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function.
- c. Documentation of the observations and control testing that will be used to monitor the construction and/or installation of the components of the remedial action. This includes information which certifies that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used complies with applicable standards. Any laboratories to be used shall be specified. Acceptance/Rejection criteria and plans for implementing corrective measures shall be addressed.

- d. A schedule for managing submittals, testing, inspections, and any other QA function (including those of contractors, subcontractors, fabricators, suppliers, purchasing agents, etc.) that involves assuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives. Inspections shall also verify compliance with all environmental requirements and include, but not limited to, air quality and emissions monitoring records and waste disposal records, etc.
- e. Reporting procedures and reporting format for QA/QC activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.
- f. A list of definable features of the work to be performed. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements.

5. Construction Health and Safety Plan/Contingency Plan

A Construction Health and Safety Plan/Contingency Plan shall be prepared in conformance with Settling Defendants' health and safety program, and in compliance with OSHA regulations and protocols. The Construction Health and Safety Plan shall include a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. Note that EPA does not "approve" Settling Defendants' Construction Health and Safety Plan/Contingency Plan, but rather EPA reviews it to ensure that all necessary elements are included, and that the plan provides for the protection of human health and the environment. This plan shall include a Contingency Plan and incorporate Air Monitoring and Spill Control and Countermeasures Plans, if applicable for the site. Air monitoring will be necessary at any site when the site specific risk assessment specifies a risk via the inhalation/air transport pathway. The Contingency Plan is to be written for the onsite construction workers and the local affected population. It shall include the following items:

- a. Name of Person who will be responsible in the event of an emergency incident.

- b. Plan for initial safety indoctrination and training for all employees, name of the person who will give the training and the topics to be covered.
- c. Plan and date for meeting with the local community, including local, state and federal agencies involved in the remediation, as well as the local emergency squads and the local hospitals.
- d. A list of the first aid and medical facilities including: location of first aid kits, names of personnel trained in first aid, a clearly marked map with the route to the nearest medical facility, all necessary emergency phone numbers conspicuously posted at the job site (i.e., fire, rescue, local hazardous material teams, National Emergency Response Team, etc.)
- e. Plans for protection of public and visitors to the job site.
- f. Air Monitoring Plan which addresses the following factors:
 - 1) Air monitoring shall be conducted both on site and at the perimeter of the site. The chemical constituents that were identified at the site as part of the Risk Assessment shall serve as a basis of the sampling for and measurement of pollutants in the atmosphere.
 - 2) Air monitoring shall include personnel monitoring, onsite area monitoring, and perimeter monitoring.
 - a) Personnel Monitoring shall be conducted according to OSHA and NIOSH regulations and guidance.
 - b) Onsite Area Monitoring shall consist of continuous real-time monitoring performed immediately adjacent to any waste excavation areas, treatment areas, and any other applicable areas when work is occurring. Measurements shall be taken in the breathing zones of personnel and immediately upwind and downwind to the work areas. Equipment shall include the following, at a minimum: Organic Vapor Meter, Explosion Meter, Particulate Monitoring Equipment, and Onsite Windssock.

c) Perimeter Monitoring shall consist of monitoring airborne contaminants at the perimeter of the site to determine whether harmful concentrations of toxic constituents are migrating off-site. EPA approved methods shall be used for sampling and analysis of air at the site perimeter. Perimeter samples shall be sampled and analyzed for the constituents of concern identified in the risk assessment. The results of the perimeter air monitoring and the onsite meteorological station shall be used to assess the potential for off-site population exposure to toxic materials. The air monitoring program shall include provisions for notifying nearby residents, local, state and federal agencies in the event that an emission of detectable concentrations of airborne toxic constituents are migrating off-site.

- g. A Spill Control and Countermeasures Plan which shall include the following:
- 1) Contingency measures for potential spills and discharges from materials handling and/or transportation.
 - 2) A description of the methods, means, and facilities required to prevent contamination of soil, water, atmosphere, uncontaminated structures, equipment, or material by the discharge of wastes from spills due to operations.
 - 3) A description of the equipment and personnel necessary to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. This collected spill material must be properly disposed of.
 - 4) A description of the equipment and personnel to perform decontamination measures that may be required to remove spillage from previously uncontaminated structures, equipment, or material.

B. Preconstruction Conference

A Preconstruction Conference shall be held after selection of the construction contractor but before initiation of construction. This conference shall include Settling Defendants and federal, state and local government agencies and shall:

1. Define the roles, relationships, and responsibilities of all parties;
2. Review methods for documenting and reporting inspection data;
3. Review methods for distributing and storing documents and reports;
4. Review work area security and safety protocols;
5. Review the Construction Schedule.
6. Conduct a site reconnaissance to verify that the design criteria and the plans and specifications are understood and to review material and equipment storage locations.

The Preconstruction Conference must be documented, including names of people in attendance, issues discussed, clarifications made, special instructions issued, etc.

C. Prefinal Inspection

Upon preliminary project completion Settling Defendants shall notify EPA for the purpose of conducting a Prefinal Inspection. Participants shall include the Project Coordinators, Supervising Contractor, Construction Contractor, and other federal, state, and local agencies with a jurisdictional interest. The Prefinal Inspection shall consist of walk through inspection of the entire project site. The objective of the inspection is to determine whether the project is complete and consistent with the Order. Any outstanding construction items discovered during the inspection shall be identified and noted on a punch list. Additionally, treatment equipment shall be operationally tested by Settling Defendants. Settling Defendants shall certify that the equipment has performed to effectively meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. A Prefinal Inspection Report shall be submitted which outlines the outstanding construction items, actions required to resolve the items, completion date for the items, and an anticipated date for the Final Inspection.

D. Final Inspection

Upon completion of all outstanding construction items, Settling Defendants shall notify EPA for the purposes of conducting a Final Inspection. The Final Inspection shall consist of a walk-through inspection of the entire project site. The Prefinal Inspection Report shall be used as a check list with the Final Inspection focusing on the outstanding construction items identified in the Prefinal Inspection. All tests that were originally unsatisfactory shall be conducted again. Confirmation shall be made during the Final Inspection that all outstanding items have been resolved. Any outstanding construction items discovered during the inspection still requiring correction shall be identified and noted on a punch list. If any items are still unresolved, the inspection shall be considered to be a Prefinal Inspection requiring another Prefinal Inspection Report and subsequent Final Inspection.

E. Remedial Action Report

Within thirty days after the Final Inspection, Settling Defendants shall prepare and submit a Remedial Action Report which certifies that all items contained in the Order, including the ROD and this SOW and all incorporated documents (i.e., work plans, reports, plans and specifications, etc.) have been completed and that the remedy is functional and operating and has met the specifications. Such report shall be certified by a Professional Engineer registered in the State of South Carolina. The RA Report shall include the following items:

1. Brief description of how outstanding items noted in the Prefinal Inspection were resolved;
2. Synopsis of the work defined in the SOW and certification that this work was performed;
3. Explanation of modifications made during the RA to the original RD and RA Work Plans and why these changes were made;
4. As-built and Record Drawings; and,
5. Documentation of how the Settling Defendants are implementing the EPA-approved Operation and Maintenance Plan and Cleanup Goal Verification Plan.

After EPA review, Settling Defendants shall address any comments and submit a revised report. The Remedial Action shall not be considered complete until EPA approves the RA Report.

TASK IV - OPERATION AND MAINTENANCE

Operation and Maintenance (O&M) shall be performed for projects that produce facilities requiring operation and maintenance to support the response actions selected in the ROD. Operation and Maintenance shall be considered to begin on the date of the RA Report and shall be conducted until the Site Objectives are achieved in accordance with the ROD and Order.

A. Operation and Maintenance Plan

At the 50 percent remedial action stage, Settling Defendants shall submit an Operation and Maintenance Plan for review. The Operation and Maintenance Plan must be reviewed and approved by EPA prior to completion of the Remedial Action and initiation of Operation and Maintenance activities. The plan shall be revised during the Remedial Action after identification of the specific equipment to be installed by the construction contractor and submitted for review by EPA prior to 50 percent completion of the Remedial Action and initiation of Operation and Maintenance activities.

Upon approval of the Operation and Maintenance Plan, Settling Defendants shall implement the Operation and Maintenance Plan in accordance with the schedule contained therein. This plan shall describe start-up procedures, operation, troubleshooting, training, and evaluation activities that shall be carried out by Settling Defendants. This plan shall also include all necessary O&M information for the operating personnel for the anticipated life of the project. The plan shall address the following elements:

1. Equipment start-up and operator training;
 - a. Technical specifications governing treatment systems;
 - b. Requirements for providing appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of the systems; and,
 - c. Schedule for training personnel on appropriate operational procedures once start-up has been successfully completed.
2. Description of normal operation and maintenance;
 - a. Description of tasks required for system operation;
 - b. Description of tasks required for system maintenance;

- c. Description of prescribed treatment or operating conditions; and,
 - d. Schedule showing the required frequency for each O&M task.
- 3. Description of potential operating problems;
 - a. Description and analysis of potential operating problems;
 - b. Sources of information regarding problems; and,
 - c. Common remedies or anticipated corrective actions.
- 4. Description of routine monitoring and laboratory testing;
 - a. Description of monitoring tasks;
 - b. Description of required laboratory tests and their interpretation;
 - c. Required QA/QC; and,
 - d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.
- 5. Description of alternate O&M;
 - a. Should systems fail, alternate procedures to prevent undue hazard, and
 - b. Analysis of vulnerability and additional resource requirements should a failure occur.
- 6. Safety Plan;
 - a. Description of precautions to be taken and required health and safety equipment, etc., for site personnel protection, and
 - b. Safety tasks required in the event of systems failure.
- 7. Description of equipment;
 - a. Equipment identification;
 - b. Installation of monitoring components;

- c. Maintenance of site equipment; and,
 - d. Replacement schedule for equipment and installation components.
8. Records and reporting mechanisms required;
- a. Daily operating logs;
 - b. Laboratory records;
 - c. Records of operating cost;
 - d. Mechanism for reporting emergencies;
 - e. Personnel and Maintenance Records; and,
 - f. Monthly reports to State/Federal Agencies.

TASK V - PERFORMANCE MONITORING

Performance monitoring shall be conducted to ensure that the site objectives for the remedy are met.

A. Cleanup Goal Verification Plan

The purpose of the Cleanup Goal Verification Plan is to provide a mechanism to ensure that both short-term and long-term performance standards for the Remedial Action are being met. Guidances used in developing the Sampling and Analysis Plan during the Remedial Design phase shall be used. The Cleanup Goal Verification Plan shall be submitted with the Intermediate Design. Once approved, the Cleanup Goal Verification Plan shall be implemented on the approved schedule. The Cleanup Goal Verification Plan consists of two parts:

1. The Cleanup Goal Verification Field Sampling and Analysis Plan that provides guidance for all fieldwork by defining in detail the sampling and data gathering methods to be used on a project. The Verification Field Sampling and Analysis Plan shall be written so that a field sampling team unfamiliar with the site would be able to gather the samples and field information required.
2. The Cleanup Goal Verification Quality Assurance/Quality Control plan that describes the policy, organization, functional activities, and quality assurance and quality control protocols necessary to achieve the Performance Standards set forth in the Record of Decision and the Remedial Design plans and specifications.

B. Five Year Review

Until the remedy is fully implemented and deemed successful by EPA, the soil and groundwater will be contaminated above health-based levels. Because of this fact and the lengthy projection for the groundwater remediation at this site, EPA shall conduct five year review during the implementation of the remedy to ensure that the remedy remains operational and functional and to ensure that the remedy meets the goal of being protective of human health and the environment. The time period for the five year review shall start on the day of the Preconstruction Meeting.

REFERENCES

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RD/RA process:

1. "National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule", Federal Register 40 CFR Part 300, March 8, 1990.
2. "Superfund Remedial Design and Remedial Action Guidance", U.S. EPA, Office of Emergency and Remedial Response, June 1986, OSWER Directive No. 9355.0-4A.
3. "Interim Final Guidance on Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties", U.S. EPA, Office of Emergency and Remedial Response, February 14, 1990, OSWER Directive No. 9355.5-01.
4. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final", U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01.
5. "A Compendium of Superfund Field Operations Methods", Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/P-87/001a, August 1987, OSWER Directive No. 9355.0-14.
6. "EPA NEIC Policies and Procedures Manual", EPA-330/9-78-001-R, May 1978, revised November 1984.
7. "Data Quality Objectives for Remedial Response Activities", U.S. EPA, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987, OSWER Directive No. 9335.0-7B.
8. "Guidelines and Specifications for Preparing Quality Assurance Project Plans", U.S. EPA, Office of Research and Development, Cincinnati, OH, QAMS-004/80, December 29, 1980.
9. "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans", U.S. EPA, Office of Emergency and Remedial Response, QAMS-005/80, December 1980.
10. "Users Guide to the EPA Contract Laboratory Program", U.S. EPA, Sample Management Office, August 1982.

11. "Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual", U.S. EPA Region IV, Environmental Services Division, April 1, 1986, (revised periodically).
12. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis", U.S. EPA, Office of Emergency and Remedial Response, February 1988.
13. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis", U.S. EPA, Office of Emergency and Remedial Response, July 1988.
14. "Quality in the Constructed Project: A Guideline for Owners, Designers, and Constructors, Volume 1, Preliminary Edition for Trial Use and Comment", American Society of Civil Engineers, May 1988.
15. "Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements", U.S. EPA, Office of Emergency and Remedial Response, July 9, 1987, OSWER Directive No. 9234.0-05.
16. "CERCLA Compliance with Other Laws Manual", Two Volumes, U.S. EPA, Office of Emergency and Remedial Response, August 1988 (Draft), OSWER Directive No. 9234.1-01 and -02.
17. "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites", U.S. EPA, Office of Emergency and Remedial Response, (Draft), OSWER Directive No. 9283.1-2.
18. "Guide for Conducting Treatability Studies Under CERCLA", U.S. EPA, Office of Emergency and Remedial Response, Pre-publication Version
19. "Health and Safety Requirements of Employees Employed in Field Activities", U.S. EPA, Office of Emergency and Remedial Response, July 12, 1981, EPA Order No. 1440.2.
20. "Standard Operating Safety Guides", U.S. EPA, Office of Emergency and Remedial Response, November 1984.
21. "Standards for General Industry", Federal Register 29 CFR Part 1910, Occupational Health and Safety Administration.
22. "Standards for the Construction Industry", Federal Register 29 CFR 1926, Occupational Health and Safety Administration.
23. "NIOSH Manual of Analytical Methods, 2d edition. Volumes I-VII, or the 3rd edition, Volumes I and II, National Institute of Occupational Safety and Health.

24. "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", National Institute of Occupational Safety and Health/Occupational Health and Safety Administration/United States Coast Guard/Environmental Protection Agency, October 1985.
25. "TLVs - Threshold Limit Values and Biological Exposure Indices for 1987-88", American Conference of Governmental Industrial Hygienists.
26. "American National Standards Practices for Respiratory Protection", American National Standards Institute Z88.2-1980, March 11, 1981.

SUMMARY OF THE MAJOR DELIVERABLES FOR THE
REMEDIAL DESIGN AND REMEDIAL ACTION AT
THE SCRDI BLUFF ROAD SUPERFUND SITE

<u>DELIVERABLE</u>	<u>EPA RESPONSE</u>	
<u>TASK I</u>	<u>SCOPING</u>	
Technical Memorandum Documenting Any Revised Site Objectives (10)	Review and Approve	
<u>TASK II</u>	<u>REMEDIAL DESIGN</u>	
RD Work Plan (10)	Review and Approve	Major
Sampling and Analysis Plan (10)	Review and Approve	Major
Health and Safety Plan (5)	Review and Comment	
Treatability Study Work Plan (10)	Review and Approve	Major
Treatability Study Sampling and Analysis Plan (10)	Review and Approve	Major
Treatability Study Health and Safety Plan (5)	Review and Comment	
Preliminary Design		Major
Results of Data Acquisition Activities (10)	Review and Approve	Major
Design Criteria Report (10)	Review and Approve	Major
Preliminary Plans and Specifications (10)	Review and Approve	Major
Plan for Satisfying Permit Requirements (10)	Review and Approve	Major
Treatability Study Evaluation Report (10)	Review and Approve	Major

Intermediate Design

Draft Design Analyses (10)	Review and Comment
Draft Plans and Specifications (10)	Review and Comment
Draft Construction Schedule (10)	Review and Comment

Prefinal/Final Design

Complete Design Analyses (10)	Review and Approve	Major
Complete Plans and Specifications (10)	Review and Approve	Major
Final Construction Schedule (10)	Review and Approve	Major
Construction Cost Estimate (5)	Review and Comment	Major

TASK III REMEDIAL ACTION

RA Work Plan (10)	Review and Approve	Major
Project Delivery Strategy (10)	Review and Approve	
Construction Management Plan (10)	Review and Approve	Major
Construction Quality Assurance Plan (10)	Review and Approve	Major
Construction Health and Safety Plan/Contingency Plan (5)	Review and Comment	
Prefinal Inspection Report (5)	Review and Comment	Major
Remedial Action Report (10)	Review and Approve	Major

TASK IV OPERATION AND MAINTENANCE

Operation and Maintenance Plan (10)	Review and Approve	Major
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TASK V MONITORING

Cleanup Goal Verification Plan (15)	Review and Approve
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Note: The number in parenthesis indicates the number of copies to be submitted by Settling Defendants. One copy shall be unbound, with all pages, including maps, reduced to 8 1/2 x 11 for ease of reproduction. The remainder shall be bound.