UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1 – NEW ENGLAND REGION

SECOND CONSENT DECREE FOR REMEDIAL DESIGN/REMEDIAL ACTION AT THE DOVER MUNICIPAL LANDFILL SUPERFUND SITE DOVER, NEW HAMPSHIRE

SDMS 288649

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

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IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW HAMPSHIRE

UNITED STATES OF AMERICA and STATE OF NEW HAMPSHIRE, Plaintiffs, v. CITY OF DOVER, et al., Defendants.	)	CIVIL ACTION NO. 1:92-CV-406-M

SECOND CONSENT DECREE

This Second Consent Decree, upon entry by the Court, modifies and supersedes the Consent Decree that was entered by this Court on July 23, 1993 (the "1993 Consent Decree").

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 in this matter pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. §§ 9606, 9607 and Section 7003 of the Resource Conservation and Recovery Act, as amended ("RCRA"), 42 U.S.C. § 6973.

B. The United States in its complaint seeks, inter alia: (1) reimbursement of costs incurred by EPA and the Department of Justice for response actions at the Dover Municipal Landfill Superfund Site in Dover, New Hampshire (the "Site"), together with

accrued interest; and (2) performance of studies and response work by the Defendants at the Site consistent with the National Contingency Plan, 40 C.F.R. Part 300 (as amended) ("NCP").

C. In accordance with the NCP and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified the State of New Hampshire (the "State") on September 12, 1991 and January 3, 2007 of negotiations with potentially responsible parties regarding the Remedial Design and Remedial Action for the Site, and EPA has provided the State with an opportunity to participate in such negotiations and be a party to the 1993 Consent Decree and this Amended Consent Decree.

D. The State also filed a complaint against the Defendants in this Court alleging that the Defendants are liable to the State under Section 107 of CERCLA, 42 U.S.C. § 9607, Section 7003 of RCRA, 42 U.S.C. § 6973, New Hampshire RSA 147-B, and New Hampshire common law of nuisance for (1) reimbursement of costs incurred or to be incurred by the State in connection with the Site; (2) performance of response work at the Site, including post remedial monitoring and operation and maintenance; (3) declaration of Defendants' liability for Future Response Costs and Oversight Costs; and (4) such other relief as the Court finds appropriate.

E. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the Federal natural resource trustees on December 20, 1991, December 5, 2006, and December 7, 2006 of negotiations with potentially responsible parties regarding the release of hazardous substances that may have resulted in injury to the natural resources under Federal trusteeship and encouraged the trustees to participate in the negotiation of the 1993 Consent Decree and this Amended Consent Decree.

F. The Defendants that have entered into this Amended Consent Decree ("Settling Defendants") do not admit any liability to the Plaintiffs arising out of the transactions or occurrences alleged in the complaints.

G. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on September 8, 1983, 48 Fed. Reg. 40666.

H. In response to a release or a substantial threat of a release of a hazardous substance(s) at or from the Site, in 1984, the State, under a cooperative agreement with EPA, commenced a Remedial Investigation ("RI") for the Site pursuant to 40 C.F.R. § 300.430.

I. The State issued a Remedial Investigation Report on November 10, 1988.

J. A group of Potentially Responsible Parties ("PRPs") commenced a Feasibility Study ("FS") and a Field Elements Study ("FES") in July 1988 pursuant to an Administrative Order by Consent with EPA and the State.

K. The FS and the FES were completed by this group of PRPs in February 1991.

L. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the issuance of the FS Report and of the Proposed Plan for remedial action in March 1991, in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the proposed plan for remedial action. A copy of the transcript of the public meeting is available to the public as part of the administrative record upon which the Regional Administrator based the selection of the response action.

M. On September 10, 1991, EPA issued a Record of Decision (the "1991 ROD") for the Site calling for, inter alia, source control (through consolidation of contaminated sediment and capping of the landfill, and construction and operation of a groundwater leachate diversion/interceptor trench) and management of migration (through extraction and treatment of groundwater contamination in the Southern Plume and natural attenuation of groundwater contamination in the Eastern Plume).

N. On July 23, 1993, the Court entered the 1993 Consent Decree that was lodged by the United States and the State to address the cleanup of the Site by implementing certain provisions of the 1991 ROD.

O. The 1993 Consent Decree, which attached the 1993 Statement of Work ("the 1993 SOW") as an appendix, called for, inter alia, consolidating sediments from the drainage swale, recontouring and capping of the landfill, and treating the contaminated leachate/groundwater. The 1993 Consent Decree and the 1993 SOW did not address the remediation of the contaminated groundwater in the Southern or Eastern Plumes, as selected in the 1991 ROD. Instead, the United States and the State reserved their rights with respect to such groundwater contamination, and the 1993 Consent Decree required the Work Settling Defendants to establish an environmental monitoring plan for the Eastern and Southern Plumes, as set out in the 1993 SOW, and to meet all Performance Standards, including cleanup levels, at the Point of Compliance (as that term was defined in the 1993 SOW).

P. Under the 1993 Consent Decree, the Cash-Out Settling Defendants paid to the United States $288,500 and to the State $13,000 in reimbursement of response costs incurred by the United States and the State, respectively, with regard to the Site. In

addition, the Cash-Out Settling Defendants paid $1,148,000 to the Dover Landfill Remedial Action Trust Fund ("Trust Fund"), established by a trust agreement (the "Trust Agreement") executed by the Settling Defendants pursuant to the 1993 Consent Decree, to finance their obligations under the 1993 Consent Decree. Notwithstanding these payments, the Cash-Out Settling Defendants did not settle their liability with respect to the remediation of the contaminated groundwater in the Southern and Eastern Plumes, which was not addressed in the 1993 Consent Decree.

Q. In accordance with the 1993 Consent Decree, the Work Settling Defendants paid to the United States $370,000 and to the State $75,000 in reimbursement of response costs (up to the limits set forth in the 1993 Consent Decree) incurred in overseeing the Work Settling Defendants' performance of work pursuant to the 1993 Consent Decree.

R. As part of this obligation under the 1993 Consent Decree, the Work Settling Defendants submitted a Source Control Pre-Design Investigation ("SC-PDI") in 1995 regarding the capping component of the 1991 ROD.

S. The SC-PDI served as a basis of the remedial design for the cap and the groundwater interceptor/diversion trench, as required by the 1991 ROD. A 100% remedial design was submitted by the Work Settling Defendants in December 1996; however, it was not approved pending consideration of a new approach to the source control remediation.

T. A number of subsequent studies, performed independently by the Work Settling Defendants, followed the SC-PDI and were issued in 1996. These reports further described the hydrogeology of the Site and discussed treatability studies to address

groundwater contamination using *in situ* bioremediation and air stripping. Based on communication between EPA and the Work Settling Defendants, a new, *in situ* bioremediation approach was developed for consideration as an alternative to the source control component of the 1991 ROD.

U. On November 21, 1997, EPA, the State and a group of the Work Settling Defendants entered into an Administrative Order by Consent and Agreement ("1997 AOC") to implement a bioremediation field study project, to evaluate and remediate a portion of the Site known as the perimeter drainage ditch and swale, and to pay certain EPA and State reimbursable costs for the Site. To allow the group of Work Settling Defendants to perform these tasks, EPA, the State and a group of the Work Settling Defendants entered into a Modification of the Work Schedule under the 1993 Consent Decree ("1997 Modification") suspending certain work obligations under the 1993 Consent Decree.

V. The bioremediation field study project began in 1997. The project sought to mineralize or immobilize Site contaminants by injecting amendments into the groundwater. The bioremediation field study project concluded in 2001. EPA and the State did not concur with the opinions, findings, or conclusions offered in the Draft Final Bioremediation Pilot Assessment, dated December 28, 2001.

W. On January 30, 2004, the Work Settling Defendants submitted a Revised Focused Feasibility Study ("RFFS") proposing, among other things, to change the source control component of the 1991 ROD from capping and leachate diversion/interception to construction and operation of an air sparging trench.

X. EPA, in consultation with the State, issued a Focused Feasibility Study Addendum (a.k.a. Addendum to the RFFS) to serve as the Agencies' interpretation of the data provided in the RFFS. In June 2004, EPA prepared an Amended Proposed Plan, which proposed the construction and operation of an air sparging trench as a source control remedy, with a contingency to implement the 1991 source control remedy in the event the air sparging trench fails. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published a notice of availability for public review of the Amended Proposed Plan providing for amending the source control portion of the selected remedy as outlined in the 1991 ROD. EPA provided an opportunity for written and oral comments from the public as part of the administrative record upon which the Director of the Office of Site Remediation and Restoration based the selection of an amended source control portion of the remedial action.

Y. On September 30, 2004, EPA, with State concurrence, issued an Amended Record of Decision (the "2004 AROD") for the Site that amends the source control portion of the selected remedy as outlined in the 1991 ROD. The 2004 AROD provides for, inter alia, construction and operation of an air sparging trench with a contingency for implementation of the 1991 ROD's source control remedy. The 2004 AROD also incorporates additional requirements to address sediments and air remediation but does not change the remedy for management of migration of groundwater in the Eastern or Southern Plumes. The 2004 AROD includes a responsiveness summary to the public comments. Notice of the final plan was published in accordance with Section 117(b) of CERCLA.

Z. Both the 1991 ROD and the 2004 AROD provide for the protection of human health and the environment by providing for source control and management of migration of groundwater through remedial action, long-term monitoring, and institutional controls. The 2004 AROD and the 1991 ROD are attached to this Amended Consent Decree as Appendices A and A-1, respectively.

AA. EPA, the State and the Settling Defendants (collectively "the Parties") now desire to enter this Amended Consent Decree to establish the Work Settling Defendants' obligations to implement the selected remedy as set forth in the 2004 AROD, in accordance with the Statement of Work (the "2007 SOW"), which is attached to this Amended Consent Decree as Appendix B.

BB. The Parties have agreed to enter into this Amended Consent Decree and 2007 SOW to modify the obligations of the Settling Defendants to perform certain response actions and to reimburse certain costs to the United States and the State. The Parties agree that this is a material modification to the 1993 Consent Decree and the 1993 SOW, and that this Amended Consent Decree shall supersede the 1993 Consent Decree. The Parties also agree that Paragraph 35 of the 1997 AOC shall no longer be effective upon the entry of this Amended Consent Decree.

CC. Since the entry of the 1993 Consent Decree, one of the Work Settling Defendants, Davidson Interior Trim/Textron ("Davidson"), at the time a division of a subsidiary of Textron Inc., was sold to Collins & Aikman Corporation and its subsidiary. Subsequently, Collins & Aikman Corporation and Davidson's successor, Collins & Aikman Automotive Interiors, Inc. (hereinafter collectively referred to as "C&A"), filed a Chapter 11 bankruptcy petition with the United States Bankruptcy Court for the Eastern

District of Michigan, Southern Division, on May 17, 2005. The bankruptcy court issued a final confirmation order authorizing a joint plan of Collins & Aikman Corporation and its debtor subsidiaries on July 18, 2007 (Case No. 05-55927 (SWR); Docket No. 7827). Accordingly, the Parties recognize that C&A is not a party to this Second Consent Decree. Following C&A's bankruptcy filing, certain Work Settling Defendants made a demand on Textron Inc. pursuant to a guaranty it signed in 1992 ("Guaranty") in consideration of the execution and delivery to EPA of the 1993 Consent Decree on behalf of its then subsidiary, Davidson. As part of this settlement, the Work Settling Defendants have agreed to assign to EPA any and all rights they may have under the Guaranty in the event of a Work Takeover pursuant to Paragraph 93, and Textron Inc. has consented to such assignment.

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

EE. Solely for the purposes of Section 113(j) of CERCLA, the Remedial Action selected by the 2004 AROD and, if applicable, the 1991 ROD, and the Work to be performed by the Work Settling Defendants shall constitute a response action taken or ordered by the President.

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

Parties, and that this Amended Consent Decree is fair, reasonable, and consistent with the purposes of CERCLA.

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

II. JURISDICTION

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1345, and 42 U.S.C. §§ 9606, 9607, and 9613(b), and pendent jurisdiction over the claims asserted by the State arising under the laws of New Hampshire. This Court also has personal jurisdiction over the Settling Defendants. For the purposes of this Amended Consent Decree and the underlying complaints, Settling Defendants waive all objections and defenses that they may have to jurisdiction of the Court or to venue in this District. Settling Defendants shall not challenge the terms of this Amended Consent Decree or this Court's jurisdiction to enter and enforce this Amended Consent Decree. The Complaint states claims against Settling Defendants upon which relief may be granted.

III. PARTIES BOUND

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

3. Work Settling Defendants shall provide a copy of this Amended Consent Decree to each contractor hired to perform the Work (as defined below) required by this Amended Consent Decree and to each person representing any Settling Defendant with

respect to the Site or the Work and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Amended Consent Decree. Work Settling Defendants or their contractors shall provide written notice of the Amended Consent Decree to all subcontractors hired to perform any portion of the Work required by this Amended Consent Decree. Work Settling Defendants shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work contemplated herein in accordance with this Amended Consent Decree. With regard to the activities undertaken pursuant to this Amended Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with the Work Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

IV. DEFINITIONS

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

"1991 ROD" or "Record of Decision" shall mean the EPA Record of Decision relating to the Site, signed on September 10, 1991 by the Regional Administrator, EPA Region 1 – New England Region, and all attachments thereto. The 1991 ROD is attached to this Amended Consent Decree as Appendix A-1.

"1993 Consent Decree" shall mean the Consent Decree that was entered by the Court on July 23, 1993 in this civil action, Civil Action No. 1:92-CV-406-M.

"1993 SOW" or "1993 Statement of Work" shall mean the Statement of Work attached as Appendix B to the 1993 Consent Decree. The 1993 SOW is attached to this Amended Consent Decree as Appendix B-1.

"2004 AROD" or "Amended Record of Decision" shall mean the Amended Record of Decision signed on September 30, 2004 by the Director, Office of Site Remediation and Restoration, EPA Region 1 – New England Region, and all attachments thereto. The 2004 AROD amends the 1991 ROD while referencing portions of the 1991 ROD. The 2004 AROD is attached to this Amended Consent Decree as Appendix A. If a conflict arises between the 1991 ROD and the 2004 AROD, the 2004 AROD shall control.

"2007 SOW" or "2007 Statement of Work" shall mean the Statement of Work for the Remedial Design, Remedial Action, and Operation and Maintenance at the Site to implement the remedy selected in the 2004 AROD. The 2007 SOW is attached to this Amended Consent Decree as Appendix B. If a conflict arises between the 2007 SOW and the 1993 SOW, the 2007 SOW shall control.

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

"Best Efforts" for purposes of Section IX shall include payment of reasonable sums of money.

"Cash-Out Settling Defendants" shall mean the Settling Defendants listed in Appendix F.

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

"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 Amended Consent Decree, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

"Dover Municipal Landfill Superfund Site Special Account" shall mean the special account established for the Site by EPA pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3).

"Dover Municipal Landfill" or "Landfill" shall mean the current areal extent of the Dover Municipal Landfill, encompassing approximately 55 acres and located near the intersection of Toland and Glen Hill Roads in Dover, Strafford County, New Hampshire; the Landfill shall also include the drainage ditch surrounding that approximately 55 acre area. The Landfill is depicted generally on the map attached as Appendix C.

"Eastern Plume" shall mean the contaminated groundwater which has migrated from the landfill in an easterly direction towards the Cocheco River in that area generally depicted on a map attached as Appendix C.

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

"Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States and the State incur in reviewing or developing plans, reports and other items pursuant to this Amended Consent Decree, verifying the Work, or otherwise implementing, overseeing, or enforcing this Amended Consent Decree, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs of the risk assessment performed by EPA as set out in the SOW and the ROD following attainment of cleanup levels, the costs incurred pursuant to Sections VI, VII, IX (including, but not limited to, attorneys fees and the amount of just compensation), XIV, XV, and Paragraph 93 of Section XXI (Covenants Not to Sue by Plaintiffs). Future Response Costs shall also mean all costs, including, but not limited to, direct and indirect costs, that the United States and the State incur in: overseeing any other work conducted by the Work Settling Defendants in connection to the Site; preparing and issuing any new or amended remedy decision document(s) including, but not limited to, any Action Memorandum, Explanation of Significant Difference, or Record of Decision Amendment; and negotiating, preparing and filing of any subsequent amendments to this Amended Consent Decree or modifications to the 2007 SOW. Future Response Costs shall also include all costs, including direct and indirect costs, paid by the United States and the State in connection with the Site between May 27, 2007 and the effective date of this Amended Consent Decree and all Interest on the Past Response Costs from May 27, 2007 to the date of payment of the Past Response Costs.

"Institutional Controls" shall mean deed restrictions or other requirements and controls developed for one or more of the following purposes: 1) to restrict the use of groundwater at the Site prior to the attainment of Performance Standards; 2) to limit

exposure to Waste Material at the Site; 3) to ensure non-interference with the performance of the Work; and 4) to ensure the integrity and effectiveness of the Work.

"Interest" shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

"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, but not limited to, any amendments thereto.

"NHDES" shall mean the New Hampshire Department of Environmental Services and any successor departments or agencies of the State.

"Operation and Maintenance" or "O&M" shall mean all activities required to maintain the effectiveness of the Remedial Action as required under the Operation and Maintenance Plans approved or developed by EPA pursuant to this Amended Consent Decree and the 2007 SOW.

"Owner Work Settling Defendants" shall mean the Settling Defendants listed in Appendix E.

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

"Parties" shall mean the United States, the State of New Hampshire, and the Settling Defendants.

"Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs and Interest, that the United States and the State incurred and paid with regard to the Site from May 1, 2007 to May 26, 2007, including, but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, and the costs related to the negotiation, preparation, and filing of this Amended Consent Decree.

"Performance Standards" shall mean those cleanup standards, standards of control, cleanup levels, treatment standards, Institutional Controls, and other substantive requirements, criteria or limitations set forth in the 2007 SOW and the 2004 AROD.

"Plaintiffs" shall mean the United States and the State of New Hampshire.

"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).

"Remedial Action" shall mean those activities, excluding Operation and Maintenance, to be undertaken by the Work Settling Defendants to implement the 2004 AROD, in accordance with the 2007 SOW and the final Remedial Design and Remedial Action Work Plans and other plans approved by EPA.

"Remedial Action Work Plans" shall mean the documents, including accompanying Project Operations Plans, developed pursuant to Paragraphs 13(d) and 13(e) of this Amended Consent Decree and approved by EPA, and any amendments thereto.

"Remedial Design" shall mean those activities, including Pre-Design Investigations, to be undertaken by the Work Settling Defendants to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design Work Plans and other plans approved by EPA.

"Remedial Design Work Plans" shall mean the documents, including accompanying Project Operations Plans, developed pursuant to Paragraphs 13(a) and 13(b) this Amended Consent Decree and approved by EPA, and any amendments thereto.

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

"Settling Defendants" shall mean those parties identified in Appendices D (Non-Owner Work Settling Defendants), E (Owner Work Settling Defendants), and F (Cash-Out Settling Defendants).

"Site" shall mean the Dover Municipal Landfill Superfund Site, including the Dover Municipal Landfill as defined above, the drainage swale extending from the Landfill to the Cocheco River, all areas adjacent to the Landfill where contamination has migrated or been deposited, and all areas in very close proximity to the contamination necessary for implementation of the Work. The Site is depicted generally on the map attached as Appendix C.

"State" shall mean the State of New Hampshire.

"Southern Plume" shall mean the contaminated groundwater which has migrated from the Landfill in a southerly direction, towards the Bellamy Reservoir in that area generally depicted on a map attached as Appendix C.

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

"Trust Fund" shall mean the trust established by a trust agreement (the "Trust Agreement") and created by the Settling Defendants pursuant to the 1993 Consent Decree

to finance their obligations under the 1993 Consent Decree, as amended by this Amended Consent Decree, to be called the Dover Landfill Remedial Action Trust Fund.

"United States" shall mean the United States of America.

"Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33), 42 U.S.C. § 9601(33); (3) any "hazardous waste" or "hazardous materials" under New Hampshire RSA 147-B:2, VII or VIII; and (4) any "hazardous material" under New Hampshire RSA 147-A:2, VIII.

"Work" shall mean all activities Settling Defendants are required to perform under this Amended Consent Decree, the 2004 AROD and the 2007 SOW.

"Work Settling Defendants" shall include all those Settling Defendants listed in Appendix D (Non-Owner Work Settling Defendants) and Appendix E (Owner Work Settling Defendants).

V. GENERAL PROVISIONS

5. Objectives of the Parties

The objectives of the Parties in entering into this Amended Consent Decree are to protect public health or welfare or the environment at the Site by the design and implementation of response actions at the Site by the Settling Defendants and to reimburse Past and Future Response Costs of the Plaintiffs.

6. Commitments by Settling Defendants

a. Work Settling Defendants shall finance and perform the Work in accordance with this Amended Consent Decree and all plans, standards, specifications, and schedules set forth in or developed and approved by EPA pursuant to this Amended

Consent Decree. Work Settling Defendants shall also reimburse the United States and the State for Past Response Costs and certain Future Response Costs as provided in this Amended Consent Decree. Cash-Out Settling Defendants agree to the terms of this Amended Consent Decree.

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

7. Compliance With Applicable Law

All activities undertaken by Work Settling Defendants pursuant to this Amended Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Work Settling Defendants must also comply with all applicable or relevant and appropriate requirements of all Federal and state environmental laws as set forth in the 2004 AROD and the 2007 SOW. The activities conducted pursuant to this Amended Consent Decree, if approved by EPA, shall be considered to be consistent with the NCP.

8. Permits

a. As provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e) and Section 300.400(e) of the NCP, 40 C.F.R. § 300.400(e), no permit shall be required

for any portion of the Work conducted entirely on-site. This Paragraph shall not be interpreted to relieve the Work Settling Defendants of their agreement to obtain a Groundwater Management Permit from the State pursuant to the 2007 SOW. Where any portion of the Work that is conducted off-site requires a federal, state, or local permit or approval, Work Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

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

c. All hazardous waste, as defined under Section 1004(5) of RCRA, 42 U.S.C. § 6904(5), which Work Settling Defendants generate in performance of the Work shall be managed by the Work Settling Defendants in accordance with the NCP, including but not limited to the RCRA requirements relating to the use and signing of manifests. Neither the United States, EPA, the State nor their representatives shall be listed as the generator on manifested shipments of hazardous waste generated during performance of the Work.

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

9. Notice of Obligations to Successors-in-Title

a. Within fifteen (15) days after the entry of this Amended Consent Decree, the Owner Work Settling Defendant(s) shall record a certified copy of this Amended Consent Decree with the Registry of Deeds or other appropriate office,

Strafford County, State of New Hampshire. Thereafter, each deed, title, or other instrument conveying an interest in the owned property included in the Site shall contain a notice stating that the property is subject to this Amended Consent Decree and any lien retained by the United States and shall reference the recorded location of the Amended Consent Decree and any restrictions applicable to the property under this Amended Consent Decree.

b. The obligations of each Owner Work Settling Defendant with respect to the provision of access and institutional controls under Section IX (Access and Institutional Controls) shall be binding upon any and all such Settling Defendants and any and all persons who subsequently acquire any such interest or portion thereof (hereinafter "Successors-in-Title"). Within fifteen (15) days after the entry of this Amended Consent Decree, each Owner Work Settling Defendant shall record at the Registry of Deeds or other appropriate office where land ownership and transfer records are maintained for the property a notice of obligation to provide access under Section IX (Access and Institutional Controls) and related covenants. Each subsequent instrument conveying an interest to any such property included in the Site shall reference the recorded location of such notice and covenants applicable to the property.

c. Any Owner Work Settling Defendant and any Successor-in-Title shall, at least thirty (30) days prior to the conveyance of any such interest, give written notice of this Amended Consent Decree to the grantee and written notice to EPA and the State of the proposed conveyance, including the name and address of the grantee, and the date on which notice of the Amended Consent Decree was given to the grantee. In the event of any such conveyance, the Settling Defendants' obligations under this Amended

Consent Decree, including their obligations to provide or secure access pursuant to Section IX, shall continue to be met by the Settling Defendants. In addition, if the United States and the State approve, the grantee may perform some or all of the Work under this Amended Consent Decree. In no event shall the conveyance of an interest in property that includes, or is a portion of, the Site release or otherwise affect the liability of the Settling Defendants to comply with the Amended Consent Decree.

d. Work Settling Defendants shall not use any portion of the Site in any manner that EPA determines would adversely affect the integrity of any containment system, treatment system, or monitoring system installed pursuant to this Amended Consent Decree.

VI. PERFORMANCE OF THE WORK BY WORK SETTLING DEFENDANTS

10. In order to expedite the design of the Remedial Action at the Site, Work Settling Defendants agree to commence upon lodging of the Amended Consent Decree with the Court the Remedial Design activities as described herein and in the 2007 SOW. In the event that Work Settling Defendants complete such Remedial Design activities prior to entry of the Amended Consent Decree by the Court, nothing herein shall obligate Work Settling Defendants to commence Remedial Action activities prior to entry of this Amended Consent Decree by the Court. All Future Response Costs incurred prior to the entry of the Amended Consent Decree shall be reimbursed after entry in accordance with Section XVI.

11. All Remedial Design activities to be performed by Work Settling Defendants pursuant to this Amended Consent Decree shall be under the direction and supervision of a qualified contractor. Within thirty (30) days after receipt of notice of the

lodging of this Amended Consent Decree, the Work Settling Defendants shall notify EPA and the State, in writing, of the name, title, and qualifications of the Supervising Contractor to be used in carrying out the Remedial Design activities to be performed pursuant to this Amended Consent Decree. Work Settling Defendants shall notify the EPA and the State of the names of any other contractors and/or subcontractor proposed within sixty (60) days from the receipt of notice of lodging of this Amended Consent Decree. Selection of any such contractor shall be subject to disapproval by EPA, after consultation with the State. If EPA disapproves of the selection of any contractor, the Work Settling Defendants shall submit a list of contractors, including their qualifications, to EPA and the State within twenty-one (21) days of receipt of the disapproval of the contractor previously selected. Upon EPA's response, the Work Settling Defendants may at their election select any one not disapproved on the list. After selection of a contractor, Work Settling Defendants shall notify EPA and the State of the name of the contractor within fourteen (14) days following receipt of EPA's response.

12. All Remedial Action and Operation and Maintenance activities to be performed by the Work Settling Defendants pursuant to this Amended Consent Decree shall be under the direction and supervision of a qualified contractor. Consistent with the time periods and procedures established in the 2007 SOW, the Work Settling Defendants shall notify EPA and the State in writing of the name, title and qualifications of the Supervising Contractor and the names of contractors and/or subcontractors proposed to be used in carrying out the Remedial Action activities and/or the Operation and Maintenance activities to be performed pursuant to this Amended Consent Decree.

Selection of any such contractor and/or subcontractor shall be subject to disapproval by EPA in accordance with the provisions of Paragraph 11.

13. The following Work shall be performed by Work Settling Defendants:

a. In accordance with the time periods specified in the 2007 SOW, the Work Settling Defendants shall submit for review, modification, and/or approval by EPA, after opportunity for review and comment by the State, Remedial Design Work Plans. The Remedial Design Work Plans shall be developed in conformance with the 2004 AROD, the 2007 SOW and EPA Superfund Remedial Design and Remedial Action Guidance (OSWER Dir. # 9355.0-4A, June 1986), EPA Remedial Design/Remedial Action Handbook (OSWER Dir. # 9355.0-4B, June 1995), and any additional guidance documents provided by EPA to Settling Defendants prior to approval of the Remedial Design Work Plans.

b. The Remedial Design Work Plans shall include the documents specified in the 2007 SOW, and shall contain schedules in accordance with the time limits specified in the 2007 SOW for design of the Remedial Action.

c. Work Settling Defendants shall implement the Work detailed in the Remedial Design Work Plans upon their approval or modification by EPA pursuant to the procedures in Section XI. Unless otherwise directed by EPA, the Work Settling Defendants shall not commence field activities until approval by EPA of these Remedial Design Work Plans. Upon such approval, these Remedial Design Work Plans and any submissions required thereunder or under this Amended Consent Decree shall be enforceable under this Amended Consent Decree. All Remedial Design activities shall be conducted in accordance with the National Contingency Plan, the EPA Superfund

Remedial Design and Remedial Action Guidance, the EPA Remedial Design/Remedial Action Handbook, any additional guidance provided by EPA prior to the initiation of those activities, and the requirements of this Amended Consent Decree, including the standards, specifications, and schedule contained in the 2007 SOW and these Remedial Design Work Plans.

d. In accordance with the time periods specified in the 2007 SOW, Work Settling Defendants shall submit for review, modification and/or approval by EPA, after opportunity for review and comment by the State, work plans for the Remedial Action and Operation and Maintenance at the Site ("Remedial Action Work Plans" and "O&M Plans," respectively). These Work Plans shall be developed in conformance with the 2004 AROD, the 2007 SOW and the EPA Superfund Remedial Design and Remedial Action guidance, the EPA Remedial Design/Remedial Action Handbook, and any additional guidance documents provided by EPA prior to approval of the Work Plans.

e. The Remedial Action Work Plans and O&M Plans shall include the documents specified in the 2007 SOW, and shall contain schedules in accordance with the time limits identified in the 2007 SOW for implementation of the Remedial Action and Operation and Maintenance.

f. Work Settling Defendants shall implement the Work detailed in the Remedial Action Work Plans upon approval or modification of the Remedial Action Work Plans by EPA pursuant to the procedures in Section XI. Upon approval by EPA, the Remedial Action Work Plans and any submissions required thereunder or this Amended Consent Decree shall be enforceable under this Amended Consent Decree. All Remedial Action activities shall be conducted in accordance with the National

Contingency Plan, the EPA Superfund Remedial Design and Remedial Action Guidance, the EPA Remedial Design/Remedial Action Handbook, and any additional guidance provided by EPA prior to the initiation of those activities, and the requirements of this Amended Consent Decree, including the standards, specifications and schedules contained in the 2007 SOW and the Remedial Action Work Plans. Work Settling Defendants shall implement the Work detailed in the O&M Plans upon approval or modification of the O&M Plans by EPA pursuant to the procedures in Section XI. Upon approval by EPA, the O&M Plans and any submissions required thereunder or under this Amended Consent Decree shall be enforceable under this Amended Consent Decree. All Operation and Maintenance activities shall be conducted in accordance with the National Contingency Plan, the EPA Superfund Remedial Design and Remedial Action Guidance, the EPA Remedial Design/Remedial Action Handbook, any additional guidance provided by EPA, and the requirements of this Amended Consent Decree, including the standards, specifications and schedules contained in the 2007 SOW and the O&M Plans.

g. Upon entry of this Amended Consent Decree, all obligations concerning Remedial Design are subject to enforcement pursuant to this Amended Consent Decree, including but not limited to stipulated penalties, retroactive to the date of the lodging of this Amended Consent Decree.

14. The Work performed by the Work Settling Defendants pursuant to this Amended Consent Decree shall include the obligation to achieve the Performance Standards.

15. Modification of the 2007 SOW or Related Work Plans

a. If EPA determines that modification to the work specified in the 2007 SOW and/or in work plans developed pursuant to the 2007 SOW is appropriate to achieve and maintain the Performance Standards or to carry out and maintain the effectiveness of the remedy set forth in the 2004 AROD or subsequent remedy selection document(s) reflecting significant (but not fundamental) changes(s) to the selected remedy, EPA may require that such modification be incorporated in the 2007 SOW and/or such work plans, provided, however, that a modification may only be required pursuant to this Paragraph to the extent that it is consistent with the scope of the remedy selected in the 2004 AROD or subsequent remedy selection document(s) reflecting significant (but not fundamental) change(s) to the selected remedy.

b. For purposes of Paragraphs 15, 53, and 54 only, the "scope of the remedy selected in the 2004 AROD" is composed of: the effort to prevent direct contact with and ingestion of contaminated solid waste materials present in the landfill; the effort to eliminate or minimize the potential human exposure to, and environmental impact from, contaminated sediments; and three primary efforts to address the objectives of stopping the migration of contaminants towards the Bellamy Reservoir and Cocheco River and restoring all groundwater at the Site to cleanup levels: (1) Contaminants in or in close proximity to the landfill that contribute to groundwater contamination are to be excavated and removed or intercepted and treated (the contingent remedy being capping the landfill with a RCRA C cap and intercepting contaminated groundwater at the landfill boundary); (2) Contaminants in groundwater migrating towards the Bellamy Reservoir will be intercepted and removed or treated to the extent necessary to achieve Performance

Standards; and (3) Contaminants in groundwater migrating towards the Cocheco River will be treated through natural processes in the aquifer to Performance Standards within a reasonable time (the contingent remedy being a pump-and-treat remedy).

c. If Work Settling Defendants object to any modification determined by EPA to be necessary pursuant to this Paragraph, they may seek dispute resolution pursuant to Section XIX (Dispute Resolution), Paragraph 73 (record review). The 2007 SOW and/or related work plans shall be modified in accordance with final resolution of the dispute.

d. Work Settling Defendants shall implement any work required by any modifications incorporated in the 2007 SOW and/or in work plans developed pursuant to the 2007 SOW in accordance with this Paragraph.

e. Nothing in this Paragraph shall be construed to limit EPA's authority to require performance of further response actions as otherwise provided in this Amended Consent Decree.

16. Settling Defendants acknowledge and agree that nothing in this Amended Consent Decree, the 2007 SOW, Remedial Design Work Plans, Remedial Action Work Plans, or the O&M Plans constitutes a warranty or representation of any kind by Plaintiffs that compliance with the Work requirements set forth in the 2007 SOW and the Work Plans will achieve the Performance Standards. Work Settling Defendants' compliance with the Work requirements shall not foreclose Plaintiffs from seeking compliance with all terms and conditions of this Amended Consent Decree, including, but not limited to, the applicable Performance Standards.

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

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

b. The identity of the receiving facility and state will be determined by the Work Settling Defendants following the award of the contract for Remedial Action construction. The Work Settling Defendants shall provide the information required by Paragraph 17(a) as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

VII. REMEDY REVIEW

18. Periodic Review. Work Settling Defendants shall conduct any studies and investigations as requested by EPA, in order to permit EPA to conduct reviews of whether the Remedial Action is protective of human health and the environment at least

every five (5) years as required by Section 121(c) of CERCLA and any applicable regulations.

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

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

21. Work Settling Defendants' Obligations to Perform Further Response Actions. If EPA selects further response actions for the Site, the Work Settling Defendants shall undertake such further response actions to the extent that the reopener conditions in Paragraph 89 or Paragraph 90 (United States' reservations of liability based on unknown conditions or new information) are satisfied. Work Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution) to dispute (1) EPA's determination that the reopener conditions of Paragraph 89 or Paragraph 90 of Section XXI (Covenants Not to Sue By Plaintiffs) are satisfied, (2) EPA's determination that the Remedial Action is not protective of human health and the environment, or (3) EPA's selection of the further response actions. Disputes pertaining to whether the Remedial Action is protective or to EPA's selection of further response actions shall be resolved pursuant to Paragraph 73 (record review).

22. Submission of Plans. If Work Settling Defendants are required to perform the further response actions pursuant to Paragraph 21, they shall submit a plan for such work to EPA for approval in accordance with the procedures set forth in Section VI (Performance of the Work by Work Settling Defendants) and shall implement the plan approved by EPA in accordance with the provisions of this Amended Decree.

VIII. QUALITY ASSURANCE. SAMPLING, and DATA ANALYSIS

23. Work Settling Defendants shall use quality assurance, quality control, and chain of custody procedures throughout the performance of the Work in accordance with "EPA Requirements for Quality Assurance Project Plans (QA/R5)" (EPA/240/B-01/003, March 2001, reissued May 31, 2006), "Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/240/R-02/009, December 2002), and subsequent amendments to such guidelines and guidances upon notification by EPA to Work Settling Defendants of such amendment. Amended guidelines shall apply only to procedures conducted after such notification. Prior to the commencement of any monitoring project under this Amended Consent Decree, Work Settling Defendants shall submit to EPA for approval, after a reasonable opportunity for review and comment by the State, a Quality Assurance Project Plan ("QAPP") that is consistent with the 2007 SOW, the NCP and applicable guidance documents listed above. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QAPP and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Amended Consent Decree. Work Settling Defendants shall ensure that EPA and State personnel and their authorized representatives are allowed access at reasonable times to all laboratories utilized by Work Settling Defendants in implementing this Amended

Consent Decree. In addition, Work Settling Defendants shall ensure that such laboratories shall analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring. Work Settling Defendants shall ensure that the laboratories they utilize for the analysis of samples taken pursuant to this Amended Consent Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods which are documented in the "Contract Lab Program Statement of Work for Inorganic Analysis" (currently ILM05.3/ILM05.4), the "Contract Lab Program Statement of Work for Organic Analysis" (currently OLM04.3), and any amendments made thereto during the course of the implementation of this Amended Consent Decree; however, upon approval by EPA, after opportunity for review and comment by the State, the Work Settling Defendants may use other analytical methods which are as stringent as or more stringent than the CLP- approved methods. Work Settling Defendants shall ensure that all laboratories they use for analysis of samples taken pursuant to this Amended Consent Decree participate in an EPA or EPA equivalent QA/QC program. Work Settling Defendants shall only use laboratories that have a documented Quality System which complies with ANSI/ASQC E4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01/002, March 2001, reissued May 31, 2006), or equivalent documentation as determined by EPA and identified in advance of the QAPP preparation. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements. Work Settling Defendants

shall ensure that all field methodologies utilized in collecting samples for subsequent analysis pursuant to this Amended Consent Decree will be conducted in accordance with the procedures set forth in the QAPP approved by EPA.

24. Upon request of EPA or the State, the Work Settling Defendants shall allow split or duplicate samples to be taken by EPA and the State or their authorized representatives. Work Settling Defendants shall notify EPA and the State not less than twenty-eight (28) days in advance of any sample collection activity unless shorter notice is agreed to by EPA. In addition, EPA and the State shall have the right to take any additional samples that EPA or the State deem necessary. Upon request, EPA and the State shall allow the Work Settling Defendants to take split or duplicate samples of any samples EPA or the State takes as part of the Plaintiffs' oversight of the Work Settling Defendants' implementation of the Work.

25. Work Settling Defendants shall submit to EPA and the State three (3) copies of the results of all sampling and/or tests or other data obtained or generated by or on behalf of Work Settling Defendants with respect to the Site and/or the implementation of this Amended Consent Decree unless EPA agrees otherwise.

26. Notwithstanding any provision of this Amended Consent Decree, the United States and the State hereby retain all of their information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA and any other applicable statutes or regulations.

IX. ACCESS AND INSTITUTIONAL CONTROLS

27. If the Site, or any other property where access and/or institutional controls are needed to implement this Amended Consent Decree, is owned or controlled by any of the Work Settling Defendants, such Work Settling Defendants shall:

a. commencing on the date of lodging of this Amended Consent Decree, provide the United States, the State, and their representatives, including, but not limited to, EPA and its contractors, with access at all reasonable times to the Site, and any other property, for the purpose of conducting any activity related to this Amended Consent Decree including, but not limited to, the following activities:

(1) Monitoring the Work;

(2) Verifying any data or information submitted to the United States or the State;

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

(4) Obtaining samples;

(5) Assessing the need for, planning, or implementing additional response actions at or near the Site;

(6) Assessing implementation of quality assurance and quality control practices as defined in the approved Quality Assurance Project Plans;

(7) Implementing the Work pursuant to the conditions set forth in Paragraph 93 of this Amended Consent Decree;

(8) Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents, consistent with Section XXIV (Access to Information);

(9) Assessing Settling Defendants' compliance with this Amended Consent Decree;

(10) Determining whether the Site or other property is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted, by or pursuant to this Amended Consent Decree; and

(11) Performing the Work.

b. commencing on the date of lodging of this Amended Consent Decree, refrain from using the Site, or such other property, in any manner that would interfere with or adversely affect the implementation, integrity, or protectiveness of the remedial measures to be performed pursuant to this Amended Consent Decree. Such restrictions include, but are not limited to:

(1) the prevention of the use of the groundwater at the Site;

(2) a Groundwater Management Zone ("GMZ"), as defined by the State of New Hampshire (Env-Or 602.13), to prevent the installation of new groundwater supply wells by placing restrictions or notifications on the deeds of properties located within the contaminated groundwater plume areas originating from the Site until groundwater has been remediated to meet Interim Groundwater Cleanup Levels outlined in the 2004 AROD; and

(3) the unauthorized modifications of the surface or subsurface at or surrounding the Site that alters either the physical or chemical character of groundwater or surface water.

c. if EPA requests pursuant to Section 4.7 of the 2007 SOW, execute and record in the Registry of Deeds of Strafford County, State of New Hampshire, an easement, running with the land, that (i) grants a right of access for the purpose of conducting any activity related to this Amended Consent Decree including, but not limited to, those activities listed in Paragraph 27(a) of this Amended Consent Decree, and (ii) grants the right to enforce the land/water use restrictions listed in Paragraph 27(b) of this Amended Consent Decree, or other restrictions that EPA determines are necessary to implement, ensure non-interference with, or ensure the protectiveness of the remedial measures to be performed pursuant to this Amended Consent Decree. Such Work Settling Defendants shall grant the access rights and the rights to enforce the land/water use restrictions to (i) the United States, on behalf of EPA, and its representatives, (ii) the State and its representatives, (iii) the other Work Settling Defendants and their representatives, and/or (iv) other appropriate grantees. Such Work Settling Defendants shall, if EPA so requests, submit to EPA for review and approval with respect to such property:

(1) A draft easement, in substantially the form attached hereto as Appendix G, that is enforceable under the laws of the State of New Hampshire, and

(2) a current title insurance commitment or some other evidence of title acceptable to EPA, which shows title to the land described in the easement to be free and clear of all prior liens and encumbrances (except when those

liens or encumbrances are approved by EPA or when, despite best efforts, Work Settling Defendants are unable to obtain release or subordination of such prior liens or encumbrances).

Within fifteen (15) days of EPA's approval and acceptance of the easement and the title evidence, such Work Settling Defendants shall update the title search and, if it is determined that nothing has occurred since the effective date of the commitment to affect the title adversely, record the easement with the Registry of Deeds of Strafford County. Within thirty (30) days of recording the easement, such Work Settling Defendants shall provide EPA with a final title insurance policy, or other final evidence of title acceptable to EPA, and a certified copy of the original recorded easement showing the clerk's recording stamps. If the easement is to be conveyed to the United States, the easement and title evidence (including final title evidence) shall be prepared in accordance with the U.S. Department of Justice Title Standards 2001, and approval of the sufficiency of title must be obtained as required by 40 U.S.C. § 3111.

28. If the Site, or any other property where access and/or institutional controls are needed to implement this Amended Consent Decree, is owned or controlled by persons other than any of the Work Settling Defendants, Work Settling Defendants shall use best efforts to secure from such persons:

a. an agreement to provide access thereto for Work Settling Defendants, as well as for the United States on behalf of EPA, and the State, as well as their representatives (including contractors), for the purpose of conducting any activity related to this Amended Consent Decree including, but not limited to, those activities listed in Paragraph 27(a) of this Amended Consent Decree;

b. an agreement, enforceable by the Work Settling Defendants and the United States, to refrain from using the Site, or such other property, in any manner that would interfere with or adversely affect the implementation, integrity, or protectiveness of the remedial measures to be performed pursuant to this Amended Consent Decree. Such restrictions include, but are not limited to those listed in Paragraph 27(b); and

c. if EPA requests pursuant to Section 4.7 of the 2007 SOW, the execution and recordation in the Registry of Deeds of Strafford County, State of New Hampshire, of an easement, running with the land, that (i) grants a right of access for the purpose of conducting any activity related to this Amended Consent Decree including, but not limited to, those activities listed in Paragraph 27(a) of this Amended Consent Decree, and (ii) grants the right to enforce the land/water use restrictions listed in Paragraph 27(b) of this Amended Consent Decree, or other restrictions that EPA determines are necessary to implement, ensure non-interference with, or ensure the protectiveness of the remedial measures to be performed pursuant to this Amended Consent Decree. The access rights and/or rights to enforce institutional controls shall be granted to (i) the United States, on behalf of EPA, and its representatives, (ii) the State and its representatives, (iii) the Work Settling Defendants and their representatives, and/or (iv) other appropriate grantees. If EPA so requests, Work Settling Defendants shall submit to EPA for review and approval with respect to such property:

(1) A draft easement, in substantially the form attached hereto as Appendix G, that is enforceable under the laws of the State of New Hampshire, and

(2) a current title insurance commitment or some other evidence of title acceptable to EPA, which shows title to the land described in the easement to be free and clear of all prior liens and encumbrances (except when those liens or encumbrances are approved by EPA or when, despite best efforts, Settling Defendants are unable to obtain release or subordination of such prior liens or encumbrances).

Within fifteen (15) days of EPA's approval and acceptance of the easement and the title evidence, Work Settling Defendants shall update the title search and, if it is determined that nothing has occurred since the effective date of the commitment to affect the title adversely, the easement shall be recorded with the Registry of Deeds of Strafford County. Within thirty (30) days of the recording of the easement, Work Settling Defendants shall provide EPA with a final title insurance policy, or other final evidence of title acceptable to EPA, and a certified copy of the original recorded easement showing the clerk's recording stamps. If easement is to be conveyed to the United States, the easement and title evidence (including final title evidence) shall be prepared in accordance with the U.S. Department of Justice Title Standards 2001, and approval of the sufficiency of title must be obtained as required by 40 U.S.C. § 3111.

29. For purposes of Paragraphs 27 and 28 of this Amended Consent Decree, "best efforts" includes the payment of reasonable sums of money in consideration of access, access easements, institutional controls, land/water use restrictions, restrictive easements, and/or an agreement to release or subordinate a prior lien or encumbrance. If (a) any access or land/water use restriction agreements required by Paragraphs 28(a) or 28(b) of this Amended Consent Decree are not obtained within forty-five (45) days of the

date of entry of this Amended Consent Decree, (b) any access easements or restrictive easements required by Paragraph 28(c) of this Amended Consent Decree are not submitted to EPA in draft form within forty-five (45) days of the date of entry of this Amended Consent Decree, or (c) Work Settling Defendants are unable to obtain an agreement pursuant to Paragraph 27(c)(1) or Paragraph 28(c)(1) from the holder of a prior lien or encumbrance to release or subordinate such lien or encumbrance to the easement being created pursuant to this Amended Consent Decree within forty-five (45) days of the date of entry of this Amended Consent Decree, Work Settling Defendants shall promptly notify the United States, EPA, and the State in writing, and shall include in that notification a summary of the steps that Work Settling Defendants have taken to attempt to comply with Paragraph 27 or 28 of this Amended Consent Decree. The United States or the State may, as they deem appropriate, assist Work Settling Defendants in obtaining access or institutional controls, either in the form of contractual agreements or in the form of easements running with the land, or in obtaining the release or subordination of a prior lien or encumbrance. Work Settling Defendants shall reimburse the United States and the State in accordance with the procedures in Section XVI (Reimbursement of Response Costs), for all costs incurred, direct or indirect, by the United States and the State in obtaining such access, institutional controls, land/water use restrictions, and/or the release/subordination of prior liens or encumbrances including, but not limited to, the cost of attorney time and the amount of monetary consideration paid or just compensation.

30. If EPA determines that institutional controls in the form of state or local laws, regulations, ordinances or other governmental controls are needed to implement the

remedy selected in the 2004 AROD, ensure the integrity and protectiveness thereof, or ensure non-interference therewith, Work Settling Defendants shall cooperate with EPA's and the State's efforts to secure such governmental controls.

31. Notwithstanding any provision of this Amended Consent Decree, the United States and the State retain all of its access authorities and rights, as well as all of their rights to require institutional controls, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable statute or regulations.

X. REPORTING REQUIREMENTS

32. In addition to any other requirement of this Amended Consent Decree, Work Settling Defendants shall submit to the United States, EPA, and the State three (3) copies of written quarterly progress reports that: (a) describe the actions which have been taken toward achieving compliance with this Amended Consent Decree during the previous quarter; (b) include a summary of all results of sampling and tests and all other data received or generated by Work Settling Defendants or their contractors or agents in the previous quarter; (c) identify all work plans, plans and other deliverables required by this Amended Consent Decree that were completed and submitted during the previous quarter; (d) describe all actions, including, but not limited to, data collection and implementation of work plans, which are scheduled for the next four months and provide other information relating to the progress of construction, including, but not limited to, critical path diagrams, Gantt charts and Pert charts; (e) include information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays; (f) include any modifications to the work

plans or other schedules that Work Settling Defendants have proposed to EPA or that have been approved by EPA; and (g) describe all activities undertaken in support of the Community Relations Plan during the previous quarter and those to be undertaken in the next four months. Work Settling Defendants shall submit these progress reports to the United States, EPA, and the State by the tenth day of every quarter following the lodging of this Amended Consent Decree until EPA notifies the Work Settling Defendants pursuant to Paragraph 54(b) of Section XIV (Certification of Completion). If requested by EPA or the State, Work Settling Defendants shall also provide briefings for EPA and the State to discuss the progress of the Work.

33. The Work Settling Defendants shall notify the United States, EPA, and the State of any change in the schedule described in the monthly progress report for the performance of any activity, including, but not limited to, data collection and implementation of work plans, no later than seven (7) days prior to the performance of the activity.

34. Upon the occurrence of any event during performance of the Work that Work Settling Defendants are required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, and/or Section 304 of the Emergency Planning and Community Right-to-Know Act ("EPCRA"), 42 U.S.C. § 11004, Work Settling Defendants shall immediately upon discovery of the onset of such event orally notify the EPA Project Coordinator or the Alternate EPA Project Coordinator designated pursuant to Section XII (in the event of the unavailability of the EPA Project Coordinator), or, in the event that neither the EPA Project Coordinator nor Alternate EPA Project Coordinator is available, the Emergency Planning & Response Branch, Region 1 – New England Region, United States

Environmental Protection Agency, and the State Project Coordinator. These reporting requirements are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.

35. Within twenty (20) days of discovery of the onset of such an event, as described in the preceding Paragraph, Work Settling Defendants shall furnish to Plaintiffs a written report, signed by the Work Settling Defendants' Project Coordinator, setting forth the events which occurred and the measures taken, and to be taken, in response thereto. Within thirty (30) days of the conclusion of such an event, Work Settling Defendants shall submit a report setting forth all actions taken in response thereto.

36. Work Settling Defendants shall submit four (4) copies of all plans, reports, and data required by the 2007 SOW, the Remedial Design Work Plan, the Remedial Action Work Plan, or any other approved plans to EPA in accordance with the schedules set forth in such plans, unless otherwise specified by EPA. Work Settling Defendants shall simultaneously submit three (3) copies of all such plans, reports and data to the State.

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

XI. SUBMISSIONS REQUIRING AGENCY APPROVAL

38. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Amended Consent Decree, EPA, after reasonable

opportunity for review and comment by the State, shall in writing: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that the Work Settling Defendants modify the submission; or (e) any combination of the above. However, EPA shall not modify a submission without first providing Work Settling Defendants at least one notice of deficiency and an opportunity to cure within thirty (30) days, except where to do so would cause serious disruption to the Work or where previous submission(s) have been disapproved due to material defects and the deficiencies in the submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

39. In the event of approval, approval upon conditions, or modification by EPA, pursuant to Paragraph 38(a), (b), or (c),Work Settling Defendants shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA subject only to their right to invoke the Dispute Resolution procedures set forth in Section XIX (Dispute Resolution) with respect to the modifications or conditions made by EPA. In the event that EPA modifies the submission to cure the deficiencies pursuant to Paragraph 38(c) and the submission has a material defect, EPA retains its right to seek stipulated penalties, as provided in Section XX.

40. a. Upon receipt of a written notice of disapproval pursuant to Paragraph 38(d), Work Settling Defendants shall, within thirty (30) days or such other time as specified by EPA in such notice, correct the deficiencies and resubmit the plan, report, or other item for approval. Any stipulated penalties applicable to the submission, as provided in Section XX, shall accrue during the 30-day period or otherwise specified

period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in Paragraphs 41 and 42.

b. Notwithstanding the receipt of a written notice of disapproval pursuant to Paragraph 38(d) or (e), Work Settling Defendants shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not relieve Work Settling Defendants of any liability for stipulated penalties under Section XX (Stipulated Penalties).

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

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

shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XX.

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

XII. PROJECT COORDINATORS

44. Within twenty (20) days of lodging this Amended Consent Decree, Work Settling Defendants, the State, and EPA will notify each other, in writing, of the name, address, and telephone number of their respective designated Project Coordinators and Alternate Project Coordinators. If a Project Coordinator or Alternate Project Coordinator initially designated is changed, the identity of the successor will be given to the other Parties at least five (5) working days before the changes occur, unless impracticable, but in no event later than the actual day the change is made. The Work Settling Defendants' Project Coordinator shall be subject to disapproval by EPA and shall have the technical expertise sufficient to adequately oversee all aspects of the Work. The Work Settling Defendants' Project Coordinator shall not be an attorney for any of the Settling Defendants in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during remedial activities.

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

46. EPA's Project Coordinator and the Work Settling Defendants' Project Coordinator will meet, at a minimum, on a quarterly basis, unless EPA determines that such a quarterly meeting is not necessary.

XIII. ASSURANCE OF ABILITY TO COMPLETE WORK

47. Within thirty (30) days of entry of this Amended Consent Decree, Work Settling Defendants shall establish and maintain financial security in the amount of $20,700,000 (hereinafter "Estimated Cost of the Work") in one or a combination of the following forms:

a. A surety bond unconditionally guaranteeing payment and/or performance of the Work that is issued by a surety company among those listed as

acceptable sureties on Federal bonds as set forth in Circular 570 of the U.S. Department of the Treasury;

b. One or more irrevocable letters of credit, payable to or at the direction of EPA, that is issued by one or more financial institution(s) (i) that has the authority to issue letters of credit and (ii) whose letter-of-credit operations are regulated and examined by a U.S. Federal or State agency;

c. A trust fund established for the benefit of EPA that is administered by a trustee (i) that has the authority to act as a trustee and (ii) whose trust operations are regulated and examined by a U.S. Federal or State agency;

d. A policy of insurance that (i) provides EPA with acceptable rights as a beneficiary thereof; and (ii) is issued by an insurance carrier (a) that has the authority to issue insurance policies in the applicable jurisdiction(s) and (b) whose insurance operations are regulated and examined by a State agency;

e. A demonstration that one or more Work Settling Defendants, individually or collectively meets the financial test criteria of 40 C.F.R. § 264.143(f), provided that all other requirements of 40 C.F.R. § 264.143(f) are satisfied;

f. A written guarantee to fund or perform the Work executed in favor of EPA by one or more of the following: (i) a direct or indirect parent company of a Work Settling Defendant, or (ii) a company that has a "substantial business relationship" (as defined in 40 C.F.R. § 264.141(h)) with at least one Work Settling Defendant; provided, however, that any company providing such a guarantee must demonstrate to the satisfaction of EPA that it satisfies the financial test requirements of 40 C.F.R. §

264.143(f) with respect to the Estimated Cost of the Work that it proposes to guarantee hereunder; or

g. For those Work Settling Defendants that are municipalities, annually a duly executed resolution by the municipal legislative body for a sum certain equal to funds expected to be expended in the current fiscal year.

48. Work Settling Defendants have selected, and EPA has approved, as an initial financial security a surety bond, an irrevocable letter of credit, a parent company written guarantee, and a duly executed resolution by a municipal legislative body pursuant to the preceding Paragraph. Within thirty (30) days after entry of this Amended Consent Decree, Work Settling Defendants shall execute or otherwise finalize all instruments or other documents required in order to make the selected financial security legally binding, and such financial security shall thereupon be fully effective. Within thirty (30) days of entry of this Amended Consent Decree, Work Settling Defendants shall submit all executed and/or otherwise finalized instruments or other documents required in order to make the selected financial security legally binding to the EPA Regional Financial Management Officer in accordance with Section XXVI (Notices and Submissions) of this Amended Consent Decree, with a copy to the United States, EPA, and the State as specified in Section XXVI.

49. If at any time during the effective period of this Amended Consent Decree, the Work Settling Defendant(s) provide a financial security for completion of the Work by means of a demonstration or guarantee pursuant to Paragraph 47(e) or Paragraph 47(f) above, such Work Settling Defendant shall also comply with the other relevant requirements of 40 C.F.R. § 264.143(f), 40 C.F.R. § 264.151(f), and 40 C.F.R. §

264.151(h)(1) relating to these methods unless otherwise provided in this Amended Consent Decree, including but not limited to (i) the initial submission of required financial reports and statements from the relevant entity's chief financial officer and independent certified public accountant; (ii) the annual re-submission of such reports and statements within ninety days after the close of each such entity's fiscal year; and (iii) the notification of EPA within ninety days after the close of any fiscal year in which such entity no longer satisfies the financial test requirements set forth at 40 C.F.R. § 264.143(f)(1). For purposes of the financial security methods specified in this Section XIII, references in 40 C.F.R. Part 264, Subpart H, to "closure," "post-closure," and "plugging and abandonment" shall be deemed to refer to the Work required under this Amended Consent Decree, and the terms "current closure cost estimate" "current post-closure cost estimate," and "current plugging and abandonment cost estimate" shall be deemed to refer to the Estimated Cost of the Work. If Work Settling Defendants seek to demonstrate their ability to complete the Work, or portion of it, by means of municipal authorization pursuant to Paragraph 47(g), the authorizing municipality shall submit to EPA each year annual budgets and annual financial reports; in addition, the municipality shall submit the current bond rating and bond rating package for the most recent bond issuance and for each bond issuance during the performance of the Work.

50. In the event that EPA determines at any time that a financial security provided by any Work Settling Defendant pursuant to this Section is inadequate or otherwise no longer satisfies the requirements set forth in this Section, whether due to an increase in the estimated cost of completing the Work or for any other reason, or in the event that any Work Settling Defendant becomes aware of information indicating that a

financial security provided pursuant to this Section is inadequate or otherwise no longer satisfies the requirements set forth in this Section, whether due to an increase in the estimated cost of completing the Work or for any other reason, Work Settling Defendant(s), within thirty (30) days of receipt of notice of EPA's determination or, as the case may be, within thirty days of any Work Settling Defendant becoming aware of such information, shall obtain and present to EPA for approval, after opportunity for review and comment by the State, a proposal for a revised or alternative form of financial security listed in Paragraph 47 of this Amended Consent Decree that satisfies all requirements set forth in this Section XIII. In seeking approval for a revised or alternative form of financial security, Work Settling Defendants shall follow the procedures set forth in Paragraph 52(b)(2) of this Amended Consent Decree. Work Settling Defendants' inability to post financial security for completion of the Work shall in no way excuse performance of any other requirements of this Amended Consent Decree, including, without limitation, the obligation of Work Settling Defendant(s) to complete the Work in strict accordance with the terms hereof.

51. The commencement of any Work Takeover pursuant to Paragraph 93 of this Amended Consent Decree shall trigger EPA's right to receive the benefit of any financial security provided pursuant to Paragraph 47(a), (b), (c), (d), (e), (f), or (g) and at such time EPA shall have immediate access to resources guaranteed under any such financial security, whether in cash or in kind, as needed to continue and complete the Work assumed by EPA under the Work Takeover. If for any reason EPA is unable to promptly secure the resources guaranteed under any such financial security, whether in cash or in kind, necessary to continue and complete the Work assumed by EPA under the

Work Takeover, Work Settling Defendants shall immediately upon written demand from EPA deposit into the Dover Municipal Landfill Superfund Site Work Takeover Special Account within the EPA Hazardous Substance Superfund (to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund), in immediately available funds and without setoff, counterclaim, or condition of any kind, a cash amount up to but not exceeding the estimated cost of the remaining Work to be performed as of such date, as determined by EPA. In the event that EPA's implementation of a Work Takeover is later determined through dispute resolution to require termination, or in the event that EPA otherwise ceases the implementation of a Work Takeover, EPA shall return to the pertinent party or parties any unused funds deposited pursuant to the preceding sentence.

52. Modification of Amount and/or Form of Financial Security.

a. Reduction of Amount of Financial Security. After the earlier of (i) the Certification of Completion of the Remedial Action pursuant to Paragraph 53 or (ii) a decision by EPA to require implementation of the source control contingent remedy pursuant to Sections 6.5 and 9.1 of the 2007 SOW, if Work Settling Defendants believe that the estimated cost to complete the remaining Work has diminished below the amount set forth in Paragraph 47 above, Work Settling Defendants may, on any anniversary date of entry of this Amended Consent Decree, or at any other time agreed to by the Parties, petition EPA in writing to request a reduction in the amount of the financial security provided pursuant to this Section so that the amount of the financial security is equal to the estimated cost of the remaining Work to be performed. Work Settling Defendants shall submit a written proposal for such reduction to EPA that shall specify, at a

minimum, the cost of the remaining Work to be performed and the basis upon which such cost was calculated. In seeking approval for a revised or alternative form of financial security, Work Settling Defendants shall follow the procedures set forth in Paragraph 52(b)(2) of this Amended Consent Decree. If EPA decides to accept such a proposal, EPA shall notify the petitioning Work Settling Defendants of such decision in writing. After receiving EPA's written acceptance, Work Settling Defendants may reduce the amount of the financial security in accordance with and to the extent permitted by such written acceptance. In the event of a dispute, Work Settling Defendants may reduce the amount of the financial security required hereunder only in accordance with a final administrative or judicial decision resolving such dispute. No change to the form or terms of any financial security provided under this Section, other than a reduction in amount, is authorized except as provided in Paragraphs 47 or 52(b) of this Amended Consent Decree.

b. Change of Form of Financial Security.

(1) If, after entry of this Amended Consent Decree, Work Settling Defendants desire to change the form or terms of any financial security provided pursuant to this Section, Work Settling Defendants may, on any anniversary date of entry of this Amended Consent Decree, or at any other time agreed to by the Parties, petition EPA in writing to request a change in the form of the financial security provided hereunder. The submission of such proposed revised or alternative form of financial security shall be as provided in Paragraph 52(b)(2) of this Amended Consent Decree. Any decision made by EPA on a petition submitted under this subparagraph (b)(1) shall be made in EPA's sole and unreviewable discretion, and such decision shall not be

subject to challenge by Work Settling Defendants pursuant to the dispute resolution provisions of this Amended Consent Decree or in any other forum.

(2) Work Settling Defendants shall submit a written proposal for a revised or alternative form of financial security to EPA which shall specify, at a minimum, the estimated cost of the remaining Work to be performed, the basis upon which such cost was calculated, and the proposed revised form of financial security, including all proposed instruments or other documents required in order to make the proposed financial security legally binding. The proposed revised or alternative form of financial security must satisfy all requirements set forth or incorporated by reference in this Section. Work Settling Defendants shall submit such proposed revised or alternative form of financial security to the EPA Regional Financial Management Officer in accordance with Section XXVI (Notices and Submissions) of this Amended Consent Decree, with a copy to United States, EPA, and the State as specified in Section XXVI. EPA shall notify Work Settling Defendants in writing of its decision to accept or reject a revised or alternative financial security submitted pursuant to this subparagraph. Within ten (10) days after receiving a written decision approving the proposed revised or alternative financial security, Work Settling Defendants shall execute and/or otherwise finalize all instruments or other documents required in order to make the selected financial security legally binding in a form substantially identical to the documents submitted to EPA as part of the proposal, and such financial security shall thereupon be fully effective. Work Settling Defendants shall submit all executed and/or otherwise finalized instruments or other documents required in order to make the selected financial security legally binding to the EPA Regional Financial Management Officer within thirty

(30) days of receiving a written decision approving the proposed revised or alternative financial security in accordance with Section XXVI (Notices and Submissions) of this Amended Consent Decree with a copy to the United States, EPA, and the State as specified in Section XXVI.

c. Release of Financial Security. If Work Settling Defendants receive written notice from EPA in accordance with Paragraph 54 hereof that the Work has been fully and finally completed in accordance with the terms of this Amended Consent Decree, or if EPA otherwise so notifies Work Settling Defendants in writing, Work Settling Defendants may thereafter release, cancel, or discontinue the financial security provided pursuant to this Section. Work Settling Defendants shall not release, cancel, or discontinue any financial security provided pursuant to this Section except as provided in this subparagraph. In the event of a dispute, Work Settling Defendants may release, cancel, or discontinue the financial security required hereunder only in accordance with a final administrative or judicial decision resolving such dispute.

XIV. CERTIFICATION OF COMPLETION

53. Completion of the Remedial Action

a. Within ninety (90) days after Work Settling Defendants conclude that the Remedial Action has been fully performed and the Performance Standards have been attained, Work Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Work Settling Defendants, EPA, and the State. If, after the pre-certification inspection, the Work Settling Defendants still believe that the Remedial Action has been fully performed and the Performance Standards have been attained, they shall submit a written report requesting certification to EPA for approval, with a copy to

the State, pursuant to Section XI (Submissions Requiring Agency Approval) within thirty (30) days of the inspection. In the report, a registered professional engineer and the Work Settling Defendants' Project Coordinator shall state that the Remedial Action has been completed in full satisfaction of the requirements of this Amended Consent Decree. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of a Work Settling Defendant or the Work Settling Defendants' Project Coordinator:

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

If, after completion of the pre-certification inspection and receipt and review of the written report, EPA, after reasonable opportunity for review and comment by the State, determines that the Remedial Action or any portion thereof has not been completed in accordance with this Amended Consent Decree or that the Performance Standards have not been achieved, EPA will notify Work Settling Defendants in writing of the activities that must be undertaken by the Work Settling Defendants pursuant to this Amended Consent Decree to complete the Remedial Action and achieve the Performance Standards, provided, however, that EPA may only require Work Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy selected in the 2004 AROD," as that term is defined in Paragraph 15(b). EPA will set forth in the notice a schedule for performance of such activities consistent with the Amended Consent Decree and the 2007 SOW or

require the Work Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (Submissions Requiring Agency Approval). Work Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established pursuant to this Paragraph, subject to their right to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent report requesting Certification of Completion of the Remedial Action and after a reasonable opportunity for review and comment by the State, that the Remedial Action has been fully performed in accordance with this Amended Consent Decree and that the Performance Standards have been achieved, EPA will so certify in writing to Work Settling Defendants. This certification shall constitute the Certification of Completion of the Remedial Action for purposes of this Amended Consent Decree. Certification of Completion of the Remedial Action shall not affect Work Settling Defendants' obligations under this Amended Consent Decree unless otherwise specified in this Amended Consent Decree.

54. Completion of the Work

a. Within ninety (90) days after Work Settling Defendants conclude that all phases of the Work (including O&M), have been fully performed, Work Settling Defendants shall schedule and conduct a pre-certification inspection to be attended by Work Settling Defendants, EPA, and the State. If, after the pre-certification inspection, the Work Settling Defendants still believe that the Work has been fully performed, Work Settling Defendants shall submit a written report by a registered professional engineer stating that the Work has been completed in full satisfaction of the requirements of this

Amended Consent Decree. The report shall contain the following statement, signed by a responsible corporate official of a Work Settling Defendant or the Work Settling Defendants' Project Coordinator:

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

If, after review of the written report, EPA, after reasonable opportunity for review and comment by the State, determines that any portion of the Work has not been completed in accordance with this Amended Consent Decree, EPA will notify Work Settling Defendants in writing of the activities that must be undertaken to complete the Work, provided, however, that EPA may only require Work Settling Defendants to perform such activities pursuant to this Paragraph to the extent that such activities are consistent with the "scope of the remedy selected in the 2004 AROD," as that term is defined in Paragraph 15(b). EPA will set forth in the notice a schedule for performance of such activities consistent with the Amended Consent Decree and the 2007 SOW or require the Work Settling Defendants to submit a schedule to EPA for approval pursuant to Section XI (Submissions Requiring Agency Approval). Work Settling Defendants shall perform all activities described in the notice in accordance with the specifications and schedules established therein, subject to their right to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution).

b. If EPA concludes, based on the initial or any subsequent request for Certification of Completion of the Work by the Work Settling Defendants and after a reasonable opportunity for review and comment by the State, that the Work has been

fully performed in accordance with this Amended Consent Decree, EPA will so notify the Work Settling Defendants in writing.

XV. EMERGENCY RESPONSE

55. In the event of any action or occurrence during the performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Work Settling Defendants shall, subject to Paragraph 56, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify the EPA's Project Coordinator, or, if the Project Coordinator is unavailable, EPA's Alternate Project Coordinator. If neither of these persons is available, the Work Settling Defendants shall immediately notify the EPA Emergency Planning & Response Branch, Region 1 – New England Region. Work Settling Defendants shall take such actions in consultation with EPA's Project Coordinator or other available authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plans, the other Project Operations Plans, and any other applicable plans or documents developed pursuant to the 2007 SOW and approved by EPA. In the event that Work Settling Defendants fail to take appropriate response action as required by this Section, and EPA or, as appropriate, the State takes such action instead, Work Settling Defendants shall reimburse EPA and the State all costs of the response action not inconsistent with the NCP pursuant to Section XVI (Reimbursement of Response Costs).

56. Nothing in the preceding Paragraph or in this Amended Consent Decree shall be deemed to limit any authority of the United States, or the State, to take, direct, or

order all appropriate action or to seek an order from the Court to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site.

XVI. REIMBURSEMENT OF RESPONSE COSTS

57. Within thirty (30) days of the effective date of this Amended Consent Decree, Work Settling Defendants shall pay to the United States $21,584.13 in reimbursement of Past Response Costs. Payment shall be made by FedWire Electronic Funds Transfer ("EFT") to the U.S. Department of Justice account in accordance with EFT instructions provided to the Work Settling Defendants by the Financial Litigation Unit of the U.S. Attorney's Office in the District of New Hampshire. These instructions shall be provided following lodging of the Amended Consent Decree. Any payments received by the U.S. Department of Justice after 4:00 p.m. (Eastern Time) will be credited on the next business day. At the time of payment required to be made under this Section, the Work Settling Defendants shall also send written notice of the EFT to the United States, to EPA, and to the EPA Cincinnati Financial Management Officer, as specified in Section XXVI (Notices and Submissions). Such notice shall reference EPA Region 1 – New England Region, Site/Spill Identification Number 0123, DOJ case number 90-11-2-735, USAO File No. 2007V00142, and Civil Action No. 1:92-CV-406-M. The total amount to be paid by the Work Settling Defendants pursuant to this subparagraph shall be deposited in the Dover Municipal Landfill Superfund Site Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund.

58. Work Settling Defendants shall reimburse the United States and the State for all Future Response Costs, except the first $100,000 in Future Response Costs incurred by the United States, and except an additional $25,000 in Future Response Costs incurred by the United States if the Eastern Plume Management of Migration Contingent Remedy is performed by the Work Settling Defendants as required by EPA pursuant to Section 9.2 of the 2007 SOW, not inconsistent with the National Contingency Plan incurred by the United States and the State.

a. On a periodic basis, the United States will send Work Settling Defendants a bill requiring payment that consists of a Region 1 standard cost summary, which is a line-item summary of costs in dollars by category of costs (including but not limited to payroll, travel, indirect costs, and contracts) incurred by EPA, DOJ, and their contractors. Work Settling Defendants shall make all payments within thirty (30) days of Work Settling Defendants' receipt of each bill requiring payment, except as otherwise provided in Paragraph 59. The Work Settling Defendants shall make all payments required by this subparagraph in the form of a certified check or checks made payable to "EPA Hazardous Substance Superfund," and referencing EPA Region 1 – New England Region, Dover Municipal Landfill Superfund Site, Site/Spill Identification No. 0123, DOJ Case Number 90-11-2-735, USAO File No. 2007V00142, and Civil Action No. 1:92-CV-406-M. The Work Settling Defendants shall forward the certified check(s) to

U.S. Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
P.O. Box 979076
St. Louis, MO 63197-9000

and shall send copies of the check and transmittal letter to the United States, to EPA and to the EPA Cincinnati Financial Management Officer in accordance with Section XXVI (Notices and Submissions). The total amount to be paid by Work Settling Defendants pursuant to this subparagraph shall be deposited in the Dover Municipal Landfill Superfund Site Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund.

b. On a periodic basis, the State will send Work Settling Defendants a bill requiring payment that consists of a standard State cost summary, which is a line-item summary of costs in dollars by category of costs (including but not limited to payroll, travel, indirect costs, and contracts) incurred by the State and its contractors. With respect to costs of contractors, the summary shall break down costs by task. Work Settling Defendants shall make all payments within thirty (30) days of Work Settling Defendants' receipt of each bill requiring payment, except as otherwise provided in Paragraph 59. The Work Settling Defendants shall make all payments required by this subparagraph to the State Hazardous Waste Cleanup Fund in the form of a certified check or checks made payable to "Treasurer, State of New Hampshire" and referencing the Dover Municipal Landfill Superfund Site. The Work Settling Defendants shall forward the certified check(s) to

Peter C.L. Roth
Senior Assistant Attorney General
State of New Hampshire
Office of the Attorney General
33 Capitol Street
Concord, NH 03301.

59. Work Settling Defendants may contest payment of any Future Response Costs under the preceding Paragraph if they determine that the United States or the State has made an accounting error or if they allege that a cost item that is included represents costs that are inconsistent with the NCP, provided such objection is made in writing within thirty (30) days of receipt of the bill and is sent to the United States (if the United States' accounting is being disputed) or the State (if the State's accounting is being disputed) pursuant to Section XXVI (Notices and Submissions). Any such objection shall specifically identify the contested Future Response Costs and the basis for objection. In the event of an objection, the Work Settling Defendants shall within the 30-day period pay all uncontested Future Response Costs to the United States or the State in the manner described in the preceding Paragraph. Simultaneously, within thirty (30) days of receipt of the bill, the Work Settling Defendants shall establish an interest bearing escrow account in a federally-insured bank duly chartered in the State of New Hampshire and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. The Work Settling Defendants shall send to the United States, as provided in Section XXVI (Notices and Submissions), and the State a copy of the transmittal letter and check paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account, the Work Settling Defendants shall initiate the Dispute Resolution procedures in Section XIX. If the United States or the State prevails in the dispute, within five (5) days of the

resolution of the dispute, the Work Settling Defendants shall pay the sums due (with accrued interest) to the United States or the State, if State costs are disputed, in the manner described in the preceding Paragraph. If the Work Settling Defendants prevail concerning any portion of the contested costs, the Work Settling Defendants shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to the United States or the State, if State costs are disputed, in the manner described in the preceding Paragraph; Work Settling Defendants shall be disbursed any balance of the escrow account. Unless a determination is made under this Paragraph in conjunction with the Dispute Resolution procedures of Section XIX that the Work Settling Defendants are not obligated to pay contested portions of the bill, the time for payment of the contested portions of the bill shall remain the original payment due date and interest shall accrue on any unpaid portions of the bill from the original payment due date. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XIX (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding the Work Settling Defendants' obligation to reimburse the United States and the State for their Future Response Costs.

60. In the event that the payments required by Paragraph 57 are not made within thirty (30) days of the effective date of this Amended Consent Decree or the payments required by Paragraph 58 are not made within thirty (30) days of the Work Settling Defendants' receipt of the bill, Work Settling Defendants shall pay Interest on the unpaid balance. The Interest to be paid on Past Response Costs shall begin to accrue on the effective date of the Amended Consent Decree. The Interest on Future Response Costs shall begin to accrue on the date of the Work Settling Defendants' receipt of the

bill. Interest shall accrue through the date of the Work Settling Defendant's payment. The Work Settling Defendants shall pay a one-percent handling charge and a six percent penalty charge, if the Work Settling Defendants have not paid to the United States and the State the full amount required by Paragraph 57 within ninety (90) days of the effective date of the Amended Consent Decree. The Work Settling Defendants shall pay a one-percent handling charge and a six percent penalty charge, if the Work Settling Defendants have not paid the full amount required by Paragraph 58 within ninety (90) days of Work Settling Defendants' receipt of the bill. Payments made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiffs by virtue of Work Settling Defendants' failure to make timely payments under this Section. Handling charge payments and penalty charge payments shall be made out to: Treasurer, United States of America, and sent to:

U.S. Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
P.O. Box 979076
St. Louis, MO 63197-9000
RE: Dover Superfund Site RD/RA Second Consent Decree

XVII. INDEMNIFICATION AND INSURANCE

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

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

b. The United States and the State shall give the Work Settling Defendants notice of any claim for which the United States or the State plans to seek indemnification pursuant to Paragraph 61, and shall consult with the Work Settling Defendants prior to settling such claim.

62. Work Settling Defendants waive all claims against the United States and the State and their officials, agents, employees, contractors, subcontractors, and representatives for damages or reimbursement or for set-off of any payments made or to

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

63. No later than fifteen (15) days before commencing any on-site Work, Work Settling Defendants shall secure, and shall maintain for the duration of this Amended Consent Decree comprehensive general liability insurance with limits of $5 million dollars, combined single limit, and automobile insurance with limits of $2 million, combined single limit, naming as additional insured the United States and the State. In addition, for the duration of this Amended Consent Decree, Work Settling Defendants shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Work Settling Defendants in furtherance of this Amended Consent Decree. No later than fifteen (15) days before commencing any on-Site Work, Work Settling Defendants shall provide to EPA and the State certificates of such insurance and a copy of each insurance policy. Work Settling Defendants shall resubmit such certificates and copies of policies each year on the anniversary of the effective date of this Amended Consent Decree. If Work Settling

Defendants demonstrate by evidence satisfactory to EPA, in consultation with the State, 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, Work Settling Defendants need provide only that insurance portion which is not maintained by the contractor or subcontractor.

XVIII. FORCE MAJEURE

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

65. If any event occurs or has occurred that may delay the performance of any obligation under this Amended Consent Decree, whether or not caused by a force majeure event, the Work Settling Defendants shall notify orally EPA's Project Coordinator or, in his or her absence, EPA's Alternate Project Coordinator or, in the event both of EPA's designated representatives are unavailable, the Director, Office of

Site Remediation and Restoration, EPA Region 1 – New England Region, within 48 hours or one working day, whichever is longer, of when Work Settling Defendants first knew that the event might cause a delay. Within five (5) days thereafter, Work Settling Defendants shall provide in writing to EPA and the State: an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; the Work Settling Defendants' rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of the Work Settling Defendants, such event may cause or contribute to an endangerment to public health, welfare, or the environment. The Work Settling Defendants shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude Work Settling Defendants from asserting any claim of force majeure for that event. Work Settling Defendants shall be deemed to have notice of any circumstance of which Work Settling Defendants or any entity controlled by Work Settling Defendants, including, but not limited to, their contractors or subcontractors, had or should have had notice.

66. If EPA, after a reasonable opportunity for review and comment by the State, agrees that the delay or anticipated delay is attributable to a force majeure event, the time(s) for performance of the obligations under this Amended Consent Decree that are affected by the force majeure event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the

obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If EPA, after a reasonable opportunity for review and comment by the State, does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify the Work Settling Defendants in writing of its decision. If EPA, after a reasonable opportunity for review and comment by the State, agrees that the delay is attributable to a force majeure event, EPA will notify the Work Settling Defendants in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

67. If the Work Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XIX (Dispute Resolution), they shall do so no later than fifteen (15) days after receipt of EPA's notice. In any such proceeding, Work Settling Defendants shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Work Settling Defendants complied with the requirements of Paragraphs 64 and 65, above. If Work Settling Defendants carry this burden, the delay at issue shall be deemed not to be a violation by Work Settling Defendants of the affected obligation of this Amended Consent Decree identified to EPA and the Court.

XIX. DISPUTE RESOLUTION

68. Unless otherwise expressly provided for in this Amended Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes between EPA and Work Settling Defendants or between the State and

Work Settling Defendants arising under or with respect to this Amended Consent Decree or the 2007 SOW. However, the procedures set forth in this Section shall not apply to actions by the United States to enforce obligations of the Work Settling Defendants that have not been disputed in accordance with this Section.

69. Any dispute which arises under or with respect to this Amended Consent Decree or the 2007 SOW 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 written agreement of the parties to the dispute. The dispute shall be considered to have arisen when one party sends the other parties a written Notice of Dispute.

70. 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 ten (10) working days after the conclusion of the informal negotiation period, Work Settling Defendants invoke the formal dispute resolution procedures of this Section by serving on the United States and the State a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis, or opinion supporting that position and any supporting documentation relied upon by the Work Settling Defendants. The Statement of Position shall specify the Work Settling Defendants' position as to whether formal dispute resolution should proceed under Paragraph 73 or 74.

71. Within fourteen (14) days after receipt of Work Settling Defendants' Statement of Position, EPA will serve on Work Settling Defendants, with a copy to the State, its Statement of Position, including, but not limited to, any factual data, analysis, or

opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph 73 or 74. The State may, if it so chooses, submit to EPA and the Work Settling Defendants a Statement of Position within ten (10) days after receipt of Work Settling Defendants' Statement of Position.

72. If there is disagreement between EPA and the Work Settling Defendants as to whether dispute resolution should proceed under Paragraph 73 or 74, the parties to the dispute shall follow the procedures set forth in the paragraph determined by EPA to be applicable. However, if the Work Settling Defendants ultimately appeal to the Court to resolve the dispute, the Court shall determine which paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 73 and 74.

73. 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 Amended Consent Decree or the 2007 SOW; and (2) the adequacy of the performance of response actions taken pursuant to this Consent Decree or the 2007 SOW. Nothing in this Amended Consent Decree shall be construed to allow any dispute by Work Settling Defendants regarding the validity of the 2004 AROD's provisions.

a. An administrative record of the dispute shall be maintained by EPA and shall contain all statements of position, including supporting documentation, submitted pursuant to this Paragraph. Upon reasonable and timely request, EPA shall allow submission of a supplemental statement of position by each party to the dispute.

b. The Director, Office of Site Remediation and Restoration, EPA Region 1 – New England Region, will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph 73(a). This decision shall be binding upon the Work Settling Defendants, subject only to the right to seek judicial review pursuant to Paragraph 73(c) and (d).

c. Any administrative decision made by EPA pursuant to Paragraph 73(b) shall be reviewable by this Court, provided that a notice of judicial appeal is filed by the Work Settling Defendants with the Court and served on all Parties within twenty (20) 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 Amended Consent Decree. The United States may file a response to Work Settling Defendants' notice of judicial appeal.

d. In proceedings on any dispute governed by this Paragraph, Work Settling Defendants shall have the burden of demonstrating that the decision of the Director of the Office of Site Remediation and Restoration is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Paragraph 73(a).

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

a. Following receipt of Work Settling Defendants' Statement of Position submitted pursuant to Paragraph 70, the Director, Office of Site Remediation and Restoration, EPA Region 1 – New England Region, will issue a final decision resolving the dispute. The Director's decision shall be binding on the Settling Defendants unless, within twenty (20) days of receipt of the decision, the Work Settling Defendants file with the Court and serve on the 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 Amended Consent Decree. The United States may file a response to Work Settling Defendants' notice of judicial appeal.

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

75. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone, or affect in any way any obligation of the Work Settling Defendants under this Amended Consent Decree not directly in dispute, unless EPA or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 85. Notwithstanding the stay of payment, stipulated penalties shall

accrue from the first day of noncompliance with any applicable provision of this Amended Consent Decree. In the event that the Work Settling Defendants do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XX (Stipulated Penalties).

76. Disputes solely between the State and the Work Settling Defendants. Disputes arising under this Amended Consent Decree or the 2007 SOW between the State and the Work Settling Defendants that relate to Future Response Costs owed to the State, or assessment of stipulated penalties by the State, shall be governed in the following manner. The procedures for resolving the disputes mention in this Paragraph shall be same as provided for in Paragraphs 68 to 75, except that each reference to EPA shall read as a reference to NHDES, each reference to Director, Office of Site Remediation and Restoration, EPA Region 1 – New England Region, shall be read as a reference to the Director of the Waste Management Division, NHDES, and each reference to the United States shall be read as a reference to the State.

XX. STIPULATED PENALTIES

77. Work Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraphs 78 and 79 to the United States and the State for failure to comply with the requirements of this Amended Consent Decree specified below, unless excused under Section XVIII (Force Majeure). "Compliance" by Work Settling Defendants shall include completion of the activities under this Amended Consent Decree or any work plan or other plan approved under this Amended Consent Decree identified below in accordance with all applicable requirements of law, this Amended Consent Decree, the 2007 SOW, and any plans or other documents approved by EPA

pursuant to this Amended Consent Decree and within the specified time schedules established by and approved under this Amended Consent Decree.

78. The following stipulated penalties shall accrue per violation per day to the United States and the State for any noncompliance with the terms of this Amended Consent Decree and the 2007 SOW not identified in Paragraph 79:

Penalty Per Violation Per Day	**Period of Noncompliance**
$1,000	1st through 7th day
$2,000	8th through 14th day
$4,000	15th through 30th day
$6,000	31st through 60th day
$15,000	61st day and beyond

79. The following stipulated penalties shall accrue per violation per day to the United States and the State for failure to submit timely or adequate reports or other written documents pursuant to Sections X (Reporting Requirements), XII (Project Coordinators), XIV (Certification of Completion), XXIV (Access to Information), and XXV (Retention of Records):

Penalty Per Violation Per Day	**Period of Noncompliance**
$500	1st through 7th day
$1,000	8th through 30th day
$3,000	31st through 60th day
$7,500	61st day and beyond

80. In the event that pursuant to Paragraph 93 of Section XXI (Covenants Not to Sue by Plaintiffs), EPA assumes performance of all of the Work or a portion of the Work, Work Settling Defendants shall be liable for a stipulated penalty in the amount of $500,000.

81. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (1) with respect to a deficient submission under Section XI (Submissions Requiring Agency Approval), during the period, if any, beginning on the 31st day after EPA's receipt of such submission until the date that EPA notifies Work Settling Defendants of any deficiency ; (2) with respect to a decision by the Director, Office of Site Remediation and Restoration, EPA Region 1 – New England Region, under Paragraph 73(b) or 74(a) of Section XIX (Dispute Resolution), during the period, if any, beginning on the 21st day after the date that Work Settling Defendants' reply to EPA's Statement of Position is received until the date that the Director issues a final decision regarding such dispute; or (3) with respect to judicial review by this Court of any dispute under Section XIX (Dispute Resolution), during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Amended Consent Decree.

82. Following EPA's determination that Work Settling Defendants have failed to comply with a requirement of this Amended Consent Decree, EPA may give the Work Settling Defendants written notification of the same and describe the noncompliance. EPA and the State may send the Work Settling Defendants a written demand for the payment of the penalties. However, penalties shall accrue as provided in the preceding

Paragraph regardless of whether EPA or the State has notified the Work Settling Defendants of a violation.

83. All penalties accruing under this Section shall be due and payable to the United States and the State within thirty (30) days of the Work Settling Defendants' receipt from EPA of a demand for payment of the penalties, unless Work Settling Defendants invoke the Dispute Resolution procedures under Section XIX (Dispute Resolution). All payments under this Section shall be paid by certified check made payable to "EPA Hazardous Substances Superfund," and shall be mailed to:

U.S. Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
P.O. Box 979076
St. Louis, MO 63197-9000

and shall reference Site/Spill Number 0123, DOJ Case Number 90-11-2-735, USAO File No. 2007V00142, and Civil Action No. 1:92-CV-406-M. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to the United States as provided in Section XXVI (Notices and Submissions).

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

85. Penalties shall continue to accrue as provided in Paragraph 81 during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to this Court, accrued penalties determined to be owing shall be paid

to EPA and the State within thirty (30) days of the agreement or the receipt of EPA's decision or order;

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

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

86. a. If Work Settling Defendants fail to pay stipulated penalties when due, the United States or the State may institute proceedings to collect the penalties, as well as interest. Work Settling Defendants shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 83.

b. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States or the State to seek any other remedies or sanctions available by virtue of Work Settling Defendants' violation of this Amended Consent Decree or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(1) of CERCLA, provided,

however, that the United States shall not seek civil penalties pursuant to Section 122(1) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of the Consent Decree.

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

87. No payments made under this Section shall be tax deductible for Federal or State tax purposes.

XXI. COVENANTS NOT TO SUE BY PLAINTIFFS

88. a. In consideration of the Cash-Out Defendants' agreement to this Amended Consent Decree and the actions that will be performed and the payments that will be made by the Work Settling Defendants under the terms of the Amended Consent Decree, and except as specifically provided in Paragraphs 89, 90, and 92 of this Section, the United States covenants not to sue or to take administrative action against Settling Defendants pursuant to Sections 106 and 107(a) of CERCLA and Section 7003 of RCRA for performance of the Work and for recovery of Past Response Costs and Future Response Costs. For the Work Settling Defendants, these covenants not to sue are conditioned upon the complete and satisfactory performance by Work Settling Defendants of their obligations under this Amended Consent Decree. These covenants not to sue extend only to the Settling Defendants and do not extend to any other person.

b. In consideration of the Cash-Out Defendants' agreement to this Amended Consent Decree and the actions that will be performed and the payments that will be made by the Work Settling Defendants under the terms of the Amended Consent

Decree, and except as specifically provided in Paragraphs 89, 90, and 92 of this Section, the State of New Hampshire covenants not to sue or to take administrative action against Settling Defendants pursuant to Section 107(a) of CERCLA, Section 7003 of RCRA, New Hampshire Revised Statutes Annotated 147-A:9 or 147-B:10, or New Hampshire common law of nuisance for performance of the Work and for recovery of Past Response Costs and Future Response Costs. For the Work Settling Defendants, these covenants not to sue are conditioned upon the complete and satisfactory performance by Work Settling Defendants of their obligations under this Consent Decree. These covenants not to sue extend only to the Settling Defendants and do not extend to any other person.

c. In consideration of the excavation and restoration of the drainage swale at the Site, including attaining Performance Standards for arsenic, to be performed by the Work Settling Defendants and the attainment of Performance Standards for arsenic in the drainage ditch, the State of New Hampshire covenants not to sue or take administrative action against Settling Defendants for any and all civil liability for injury to, destruction of, or loss of natural resources belonging to or appertaining to the State of New Hampshire. For the Work Settling Defendants, this covenant shall take effect upon the State's determination of the attainment of the Performance Standards in the drainage swale and ditch and of the restoration of affected wetlands and floodplains. This covenant is conditioned upon the State's determination of the complete and satisfactory performance by the Work Settling Defendants of their obligations under this Amended Consent Decree. This covenant not to sue extends only to the Settling Defendants and does not extend to any other person.

89. United States' Pre-Certification Reservations. Notwithstanding any other provision of this Amended Consent Decree, the United States reserves, and, this Amended Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants

a. to perform further response actions relating to the Site, or

b. to reimburse the United States for additional costs of response if, prior to Certification of Completion of the Remedial Action:

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

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

and EPA determines, based on these previously unknown conditions or information together with any other relevant information, that the Remedial Action is not protective of human health or the environment.

90. United States' Post-Certification Reservations. Notwithstanding any other provision of this Amended Consent Decree, the United States reserves, and this Amended Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, or to issue an administrative order seeking to compel Settling Defendants

a. to perform further response actions relating to the Site, or

b. to reimburse the United States for additional costs of response if, subsequent to Certification of Completion of the Remedial Action:

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

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

and EPA determines, based on these previously unknown conditions or this information together with other relevant information, that the Remedial Action is not protective of human health or the environment.

91. For purposes of Paragraph 89, the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date the 2004 AROD was signed and set forth in the 2004 AROD and the administrative record supporting the 2004 AROD. For purposes of Paragraph 90, the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date of Certification of Completion of the Remedial Action and set forth in the 2004 AROD, the post-2004 AROD administrative record or any information received by EPA pursuant to the requirements of this Amended Consent Decree prior to Certification of Completion of the Remedial Action.

92. General reservations of rights. The covenants not to sue set forth above do not pertain to any matters other than those expressly specified in Paragraph 88. The United States and the State reserve, and this Amended Consent Decree is without prejudice to, all rights against Settling Defendants with respect to all other matters, including but not limited to, the following:

a. claims based on a failure by Settling Defendants to meet a requirement of this Amended Consent Decree;

b. liability arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the Site;

c. liability based upon the Work Settling Defendants' ownership or operation of the Site, or upon the Work Settling Defendants' transportation, treatment, storage, or disposal, or the arrangement for the transportation, treatment, storage, or disposal of Waste Material at or in connection with the Site, other than as provided in the 2004 AROD, the Work, or otherwise ordered by EPA, after signature of this Amended Consent Decree by the Work Settling Defendants;

d. liability to the United States for damages for injury to, destruction of, or loss of natural resources;

e. liability for response costs that have been or may be incurred by the Department of Interior and the National Oceanic and Atmospheric Administration;

f. criminal liability;

g. liability for violations of federal or state law which occur during or after implementation of the Remedial Action;

h. liability for costs that the United States and the State will incur related to the Site but are not within the definition of Future Response Costs; and

i. liability, prior to Certification of Completion of the Remedial Action, for additional response actions that EPA determines are necessary to achieve Performance Standards, but that cannot be required pursuant to Paragraph 15 (Modification of the 2007 SOW or Related Work Plans).

93. Work Takeover.

a. In the event EPA determines that Work Settling Defendants have (i) ceased implementation of any portion of the Work, or (ii) are seriously or repeatedly deficient or late in their performance of the Work, or (iii) are implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may issue a written notice ("Work Takeover Notice") to the Work Settling Defendants. Any Work Takeover Notice issued by EPA will specify the grounds upon which such notice was issued and will provide Work Settling Defendants a period of ten (10) days within which to remedy the circumstances giving rise to EPA's issuance of such notice.

b. If, after expiration of the 10-day notice period specified in the preceding subparagraph, Work Settling Defendants have not remedied to EPA's satisfaction the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, EPA may at any time thereafter assume the performance of all or any portions of the Work as EPA deems necessary ("Work Takeover"). EPA shall notify Work Settling Defendants in writing (which writing may be electronic) if EPA determines that implementation of a Work Takeover is warranted under this subparagraph.

c. Work Settling Defendants may invoke the procedures set forth in Section XIX (Dispute Resolution) to dispute EPA's implementation of a Work Takeover under the preceding subparagraph. However, notwithstanding Work Settling Defendants' invocation of such dispute resolution procedures, and during the pendency of any such dispute, EPA may in its sole discretion commence and continue a Work Takeover under the preceding subparagraph until the earlier of (i) the date that Work Settling Defendants

remedy, to EPA's satisfaction, the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice or (ii) the date that a final decision is rendered in accordance with Section XIX (Dispute Resolution), Paragraph 73, requiring EPA to terminate such Work Takeover.

d. After commencement and for the duration of any Work Takeover, EPA shall have immediate access to and benefit of any performance guarantee(s) provided pursuant to Section XIII of this Amended Consent Decree, in accordance with the provisions of Paragraph 51 of that Section. If and to the extent that EPA is unable to secure the resources guaranteed under any such performance guarantee(s) and the Work Settling Defendants fail to remit a cash amount up to but not exceeding the estimated cost of the remaining Work to be performed, all in accordance with the provisions of Paragraph 51, any unreimbursed costs incurred by the EPA in performing the Work under the Work Takeover shall be considered Future Response Costs that Work Settling Defendants shall pay pursuant to Section XVI (Reimbursement of Response Costs).

94. Notwithstanding any other provision of this Amended Consent Decree, the United States and the State retain all authority and reserve all rights to take any and all response actions authorized by law.

XXII. COVENANTS BY SETTLING DEFENDANTS

95. Settling Defendants hereby covenant not to sue and agree not to assert any claims or causes of action against the United States or the State with respect to the Site or this Consent Decree, including, but not limited to: any direct or indirect claim for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b) (2), 111,

112, 113 or otherwise any other provision of law; any claim against the United States, including any department, agency or instrumentality of the United States under CERCLA Sections 107 or 113 related to the Site; any claims arising out of response activities at or in connection with the Site, including any claim under the United States Constitution, the State Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or any claims against the State, or any department or agency, or instrumentality thereof , including but not limited to any direct or indirect claim for reimbursement from the Oil Discharge and Disposal Fund established under NH RSA 146-D, the Fuel Oil Discharge Cleanup Fund established under NH RSA 146-E, the Motor Oil Discharge Cleanup Fund established under NH RSA 146-F, or the Gasoline Remediation and Elimination of Ethers Fund established under NH RSA 146-G, or any other provision of law. These covenants not to sue shall not apply in the event that the United States or the State brings a cause of action or issues an order pursuant to the reservations set forth in Paragraphs 89, 90, 92 (b) - (e) or 92 (h) - (i), but only to the extent that Settling Defendants' claims arise from the same response action, response costs, or damages that the United States or the State is seeking pursuant to the applicable reservation.

96. The Work Settling Defendants reserve, and this Amended Consent Decree is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States while acting within the scope of his office or employment under circumstances where the United States, if a private person, would

be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, any such claim shall not include a claim for any damages caused, in whole or in part, by the act or omission of any person, including any contractor, who is not a federal employee as that term is defined in 28 U.S.C. § 2671; nor shall any such claim include a claim based on EPA's selection of response actions, or the oversight or approval of the Work Settling Defendants' plans or activities. The foregoing applies only to claims which are brought pursuant to any statute other than CERCLA and for which the waiver of sovereign immunity is found in a statute other than CERCLA.

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

XXIII. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION

98. Except as provided in Paragraph 103, nothing in this Amended Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Amended Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this Amended Consent Decree may have under applicable law. Except as provided in Paragraph 103, each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto.

99. With regard to claims for contribution against Settling Defendants for matters addressed in this Amended Consent Decree, the Parties hereto agree, and by

entering this Amended Consent Decree the Court finds, that the Settling Defendants are entitled to such protection from contribution actions or claims as is provided by CERCLA Section 113(f)(2), 42 U.S.C. § 9613(f)(2). The "matters addressed" in this Amended Consent Decree are the work previously performed pursuant to the 1993 Consent Decree, performed pursuant to Administrative Orders by Consent relating to the Southern Plume and the bio-remediation studies, performed during any interim periods at the request of EPA or NHDES, and to be performed in the future under this Amended Consent Decree, and all Past and Future Response Costs reimbursed to EPA and the State pursuant to this Amended Consent Decree. The Work Settling Defendants have entered into a separate agreement that addresses the allocation among themselves of financial responsibility for the matters addressed in this Amended Consent Decree.

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

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

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

103. The Settling Defendants acknowledge that the previous contributions made by United Tanners, Inc., under the 1993 Consent Decree satisfy its obligations under this Amended Consent Decree, and that United Tanners, Inc., shall be entitled to the benefits received by Settling Defendants who are signatories to this Amended CD, including but not limited to those benefits pursuant to Section XXI (Covenants Not to Sue by Plaintiffs) and this Section.

XXIV. ACCESS TO INFORMATION

104. Work Settling Defendants shall provide to EPA and the State, upon request, copies of all documents and information within their possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Amended Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Work Settling Defendants shall also make available to EPA and the State, for purposes of investigation,

information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

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

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

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

XXV. RETENTION OF RECORDS

107. Until 10 years after the Work Settling Defendants' receipt of EPA's notification pursuant to Paragraph 54(b) of Section XIV (Certification of Completion), each Work Settling Defendant shall preserve and retain all records and documents now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or liability of any person for response actions conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary. Until 10 years after the Work Settling Defendants' receipt of EPA's notification pursuant to Paragraph 54(b) of Section XIV (Certification of Completion), Work Settling Defendants shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature, or description relating to the performance of the Work.

108. At the conclusion of this document retention period, Work Settling Defendants shall notify the United States and the State at least ninety (90) days prior to the destruction of any such records or documents, and, upon request by the United States or the State, Work Settling Defendants shall deliver any such records or documents to EPA or the State. The Work Settling Defendants may assert that certain documents, records, and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Work Settling Defendants assert such a

privilege, they shall provide the Plaintiffs with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by Work Settling Defendants. However, no documents, reports or other information created or generated pursuant to the requirements of this Amended Consent Decree shall be withheld on the grounds that they are privileged.

109. Each Work Settling Defendant hereby certifies, individually, that it has not altered, mutilated, discarded, destroyed, or otherwise disposed of any records, documents, or other information relating to its potential liability regarding the Site since notification of potential liability by the United States or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA and Section 3007 of RCRA.

XXVI. NOTICES AND SUBMISSIONS

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

respect to the United States, EPA, the EPA Cincinnati Financial Management Officer, the EPA Regional Financial Management Officer, the State, and the Work Settling Defendants, respectively.

As to the United States:

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, DC 20044
Re: DJ # 90-11-2-735

and

Director, Office of Site Remediation and Restoration
United States Environmental Protection Agency
EPA Region 1 – New England Region
One Congress Street
Suite 1100 (HIO)
Boston, MA 02114

As to EPA:

Darryl Luce
EPA Remedial Project Manager
United States Environmental Protection Agency
EPA Region 1 – New England Region
One Congress Street, Suite 1100 (HBO)
Boston, MA 02114

As to the EPA Cincinnati Financial Management Officer:

EPA Cincinnati Financial Office
26 Martin Luther Drive
Cincinnati, OH 45268

As to the EPA Regional Financial Management Officer:

David Tornstrom
Regional Financial Management Officer

United States Environmental Protection Agency
EPA Region 1 – New England Region
One Congress Street, Suite 1100 (MCO)
Boston, MA 02114

As to the State:

Andrew Hoffman
State Project Coordinator
Dover Municipal Superfund Site
Department of Environmental Services Waste Management Division
P.O. Box 95, 29 Hazen Drive
Concord, NH 03301-6509

As to the Work Settling Defendants:

Dean Peschel
Environmental Projects Manager
City of Dover
288 Central Ave.
Dover, NH 03820

XXVII. EFFECTIVE DATE

111. The effective date of this Amended Consent Decree shall be the date that this Amended Consent Decree is entered by the U.S. District Court for the District of New Hampshire, except as otherwise provided herein.

XXVIII. RETENTION OF JURISDICTION

112. This Court retains jurisdiction over both the subject matter of this Amended Consent Decree and the Settling Defendants for the duration of the performance of the terms and provisions of this Amended Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Amended Consent Decree, or to effectuate or enforce compliance

with its terms, or to resolve disputes in accordance with Section XIX (Dispute Resolution) hereof.

XXIX. APPENDICES

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

"Appendix A" is the 2004 AROD.
"Appendix A-1" is the 1991 ROD
"Appendix B" is the 2007 SOW.
"Appendix B-1" is the 1993 SOW.
"Appendix C" is the description and/or map of the Site.
"Appendix D" is the complete list of the Non-Owner Work Settling Defendants.
"Appendix E" is the complete list of the Owner Work Settling Defendants.
"Appendix F" is the complete list of Cash-Out Settling Defendants.
"Appendix G" is a draft easement.

XXX. COMMUNITY RELATIONS

114. Work Settling Defendants shall propose to EPA and the State their participation in the community relations plan to be developed by EPA. EPA will determine the appropriate role for the Work Settling Defendants under the Plan. Work Settling Defendants shall also cooperate with EPA and the State in providing information regarding the Work to the public. As requested by EPA or the State, Work Settling Defendants shall participate in the preparation of such information for dissemination to the public and in public meetings which may be held or sponsored by EPA or the State to explain activities at or relating to the Site.

XXXI. MODIFICATION

115. Schedules specified in this Amended Consent Decree for completion of the Work may be modified by agreement of EPA and the Work Settling Defendants after review and comment by the State. All such modifications shall be made in writing.

116. No material modification shall be made to the 2007 SOW without written notification to and written approval of the United States, the State, the Work Settling Defendants, and the Court, if such modifications fundamentally alter the basic features of the selected remedy within the meaning of 40 C.F.R. § 300.435(c)(2)(ii). Except as provided in Paragraph 15 (Modification of the 2007 SOW or Related Work Plans), modifications to the 2007 SOW that do not materially alter that document, or material modifications to the 2007 SOW that do not fundamentally alter the basic features of the selected remedy within the meaning of 40 C.F.R. § 300.435(c)(2)(ii), may be made by written agreement between EPA, after providing the State with a reasonable opportunity to review and comment on the proposed modification, and the Work Settling Defendants. Modifications to schedules specified in this Amended Consent Decree and 2007 SOW for completion of the Work shall not be considered material modifications.

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

XXXII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT

118. This Amended 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 Amended Consent Decree disclose facts or considerations which indicate that the Amended Consent Decree is inappropriate, improper, or inadequate. Settling Defendants consent to the entry of this Amended Consent Decree without further notice.

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

XXXIII. SIGNATORIES/SERVICE

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

121. Each Settling Defendant hereby agrees not to oppose entry of this Amended Consent Decree by this Court or to challenge any provision of this Amended Consent Decree unless the United States has notified the Settling Defendants in writing that it no longer supports entry of the Amended Consent Decree.

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

XXXIV. FINAL JUDGMENT

123. This Amended Consent Decree and its appendices constitute the final, complete, and exclusive agreement and understanding among the Parties with respect to the settlement embodied in the Amended Consent Decree. The Parties acknowledge that there are no representations, agreements, or understandings relating to the settlement other than those expressly contained or referenced in this Amended Consent Decree.

124. Upon approval and entry of this Amended Consent Decree by the Court, this Amended Consent Decree shall constitute a final judgment between and among the United States, the State, and the Settling Defendants. The Court finds that there is no just reason for delay and therefore enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

SO ORDERED THIS _____ DAY OF _____, 2008.

_____
United States District Judge

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED PARTY enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR THE UNITED STATES OF AMERICA

Date: 13 May 2008

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

LAURA ROWLEY
Trial Attorney
Environment and Natural Resources Division
U.S. Department of Justice
P.O. BOX 7611
Washington, D.C. 20044-7611
(202) 616-8763

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED PARTY enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

ROBERT W. VARNEY
Regional Administrator
New England Region
One Congress Street, Suite 1100
Boston, MA 02114-2023

MAN CHAK NG
Senior Enforcement Counsel
New England Region
One Congress Street, Suite 1100 (SES)
Boston, MA 02114-2023
(617) 918-1785

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

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FOR THE STATE OF NEW HAMPSHIRE

Date: 10/19/07

Peter C.L. Roth

PETER C.L. ROTH
Senior Assistant Attorney General
State of New Hampshire
Office of the Attorney General
33 Capitol Street
Concord, NH 03301

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR BFI Waste Systems of North America, LLC
[Settling Defendant Name] as successor to Browning-Ferris Industries of New Hampshire, Inc.

Date: Jan. 4, 2008

JoLynn White

Name (Print): JoLynn White
Title: Secretary
Address: 18500 N. Allied Way
Phoenix, AZ 85054

Telephone: (480) 627-2700

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print): Curtis J. Shipley
Title: Counsel
Address: Ellis & Winters LLP
100 North Greene Street, Suite 102
Greensboro, NC 27401
Telephone: (336) 217-4084

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR CVS Pharmacy, Inc. Successor by Merger to CVS New York, Inc. formerly known as Melville Corporation
[Settling Defendant Name]

Date: _____ by: _____

Name (Print): Zenon P. Lankowsky
Title: Vice President & Secretary
Address: c/o Michael B. Nulman, Esq.
CVS Pharmacy, Inc.
1 CVS Drive, Woonsocket, RI 02895
Telephone: 401-765-1500

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print): Michael B. Nulman
Title: Senior Legal Counsel
Address: CVS Pharmacy, Inc.
1 CVS Drive
Woonsocket, RI 02895
Telephone: 401-270-2533

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR ElectroCraft New Hampshire, Inc.
Formerly known as Eastern Air Devices, Inc.
[Settling Defendant Name]

Date: December 26, 2007

Name: James Elsner
Title: President
Address: ElectroCraft New Hampshire, Inc.
One Progress Drive
Dover, NH 03820
Telephone: 603-742-3330
E-mail: jelsner@electrocraft.com

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name: Michael J. Donahue, Esquire
Title: Donahue, Tucker & Ciandella, PLLC
Address: 104 Congress Street
Portsmouth, NH 03801
Telephone: 603-766-1686
E-mail: mdonahue@dtclawyers.com

S:\EA-EL\Eastern Air Devices\PRILP 2007 REFINANCE\amended consent decree sign pg.doc

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Town of Madbury
[Settling Defendant Name]

Date: 10/1/07

Name (Print): Bruce E Hodsdon
Title: Selectman Chair
Address: 13 Town Hall Rd
Madbury NH 03823

Telephone: (603) 742-7713

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print): _____
Title: _____
Address: _____
_____
_____

Telephone: _____

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Moore Business Forms, Inc.
[Settling Defendant Name]

Date: 11-5-07 S. Bettman

Name (Print): Suzanne S. Bettman
Title: EVP, General Counsel, Corporate Secretary
Address: RR Donnelley
111 S. Wacker Drive
Chicago, IL 60606
Telephone: 312-326-8233

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print): Monica Roth Evans
Title: VP + Associate General Counsel
Address: 111 S. Wacker Drive
Chicago IL 60606

Telephone: 312-326-7064

email: monica.evans@RRD.com

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Leonard Rosen
[Settling Defendant Name]

Date: 9/25/2007 Leonard Rosen

Name (Print): LEONARD ROSEN
Title:
Address: 9231 N.W. 9TH PLACE
PLANTATION FL 33324

Telephone: 954-472-6924

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print):
Title:
Address:

Telephone:

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Siebe Inc on behalf of Chavostat Manufacturing Inc.
[Settling Defendant Name]

Date: 12/12/07

Name (Print): Lynn Cordaro
Title: VP Treas and Corp Controller
Address: 33 Commercial Street
Foxboro MA 02035

Telephone: 5085496120

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print):
Title:
Address:

Telephone:

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR WENTWORTH-DOUGLASS HOSPITAL
[Settling Defendant Name]

Date: 09/14/2007 Peter E. Walcek

Name (Print): PETER E. WALCEK
Title: VP FINANCE / CFO
Address: WENTWORTH-DOUGLASS HOSPITAL
789 CENTRAL AVENUE
DOVER, NH 03820
Telephone: 603-740-2804

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print): _____
Title: _____
Address: _____
_____
_____
Telephone: _____

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR City of Dover
[Settling Defendant Name]

Date: 9/27/07

Name (Print): J. Michael Joyal Jr.
Title: City Manager
Address: 288 Central Avenue
Dover NH 03820

Telephone: 603-516-6023

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print):
Title:
Address:

Telephone:

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Bayhead Products Corp.
[Settling Defendant Name]

Date: 9-26-07

E Moore

Name (Print): Elissa Moore
Title: President
Address: 173 Crosby Rd.
Dover, NH 03820

Telephone: 603-742-3000

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print): _____
Title: _____
Address: _____

Telephone: _____

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Cleary Cleaners
[Settling Defendant Name]

Date: 11-5-07

Name (Print): Lawrence J. Cleary
Title: Pres.
Address: 67 Allen St.
Rochester, NH 03867

Telephone: 603-332-2374

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print): _____
Title: _____
Address: _____
_____
_____

Telephone: _____

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

CASH-OUT SETTLING DEFENDANT ONLY

FOR DOVER TECHNOLOGIES INTERNATIONAL, INC.
[Settling Defendant Name]

Date: 10/12/07

Name (Print): PETER J. MARSHALL
Title: SECRETARY
Address: 17542 E. 17TH STREET
SUITE 470
TUSTIN CA 92780
Telephone: (714) 415-4110

Agent Authorized to Accept Service on Behalf of Above-Signed Party:

Name (Print): KENNETH F. GRAY, ESQ.
Title: PIERCE ATWOOD LLP
Address: ONE MONUMENT SQUARE
PORTLAND, ME 04101
Telephone: (207) 791-1212

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

Executed 9/19/07

FOR Sara B. Lapointe, Executrix, Beneficiary, Estate of Jeffrey Lapointe; Sole Shareholder of Electric Motor Service Center, Inc.
[Settling Defendant Name]

Date: 10/2/07
Mailed

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DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

CASH-OUT SETTLING DEFENDANT ONLY

FOR General Electric Company
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Date: 10/16/2007

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DOVE MUNICIPAL LANDFILL SUPERFU. SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Geo. J. Foster & Co., Inc.
[Settling Defendant Name]

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DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR J&E Specialty, Inc. f/k/a Franklin ElectroPlating Company, Inc.
[Settling Defendant Name]

Date: 9/18/07

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DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Northeast Container Corporation
[Settling Defendant Name]

Date: September 24, 2007

Attorney-in-Fact for Rand-Whitney Container Northeast LLC *

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*successor by merger to Northeast Container Corporation

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR PORTLAND GLASS
[Settling Defendant Name]

Date: October 18, 2007 By: [signature]

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DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Public Service Company of New Hampshire
[Settling Defendant Name]

Date: 09/27/07

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Title:
Address:

Telephone:

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR UNITED PARCEL SERVICE, INC.
[Settling Defendant Name]

Date: 9/20/07 Kristin Holloway Jones

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DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Varney's Cleaners and Laundercenter
[Settling Defendant Name]

Date: 09/18/07

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DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Verizon New England Inc.
[Settling Defendant Name]

Date: 9/18/07

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Title:
Address:

Telephone:

DOVER MUNICIPAL LANDFILL SUPERFUND SITE
AMENDED CONSENT DECREE FOR RD/RA

THE UNDERSIGNED SETTLING DEFENDANT enters into this Amended Consent Decree in the matter of *United States v. City of Dover, et al.* (Civil Action No. 1:92-CV-406-M), relating to the Dover Municipal Landfill Superfund Site.

FOR Waste Management of New Hampshire, Inc.
Waste Management of Maine, Inc.
[Settling Defendant Name]

Date: 01/08/2008

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U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 1

AMENDED RECORD OF DECISION

DOVER MUNICIPAL LANDFILL
DOVER, NEW HAMPSHIRE

September 30, 2004

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September 30, 2004

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PART 1: DECLARATION FOR THE AMENDED RECORD OF DECISION

A. SITE NAME AND LOCATION

Dover Municipal Landfill.
Dover, New Hampshire.
NHD980520191
Operable Unit #1, Entire Site.

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents an amendment to the selected remedial action for the Dover Municipal Landfill (the Site), in Dover, New Hampshire, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC § 9601 *et seq.*, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as amended, 40 CFR Part 300. The Director of the Office of Site Remediation and Restoration (OSRR) has been delegated the authority to approve this Amended Record of Decision.

This decision was based on the Administrative Record, which has been developed in accordance with Section 113 (k) of CERCLA, and which is available for review at the Dover Public Library and at the United States Environmental Protection Agency (EPA), Region 1, Office of Site Remediation and Restoration (OSRR) Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix B to this Amended ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The State of New Hampshire concurs with the selected remedy.

C. RATIONALE FOR AMENDMENT

In 1991 the EPA and the New Hampshire Department of Environmental Services (NHDES) chose a remedy described in a Record of Decision (ROD)(the 1991 ROD) for the Dover Municipal Landfill Superfund Site. The 1991 ROD had two components, Source Control and Management of Migration. The Source Control component consisted of capping the approximately 50-acre landfill with a RCRA C cap, installing a diversion/interceptor trench to capture contaminated leachate emanating from the landfill to prevent it from migrating into the surrounding ground water and addressing arsenic contaminated sediment in a drainage trench and drainage swale. The Management of Migration component addressed two extended ground water contaminant plumes migrating from the landfill that are contaminating a drinking water aquifer and threatening a drinking water reservoir. This component consisted of pumping and treating contaminated ground water from the portion of the aquifer migrating towards the Bellamy Reservoir (the Southern Plume) while allowing the ground water flowing towards the Cocheco River (the Eastern Plume) to naturally degrade.

The landfill cap reached 100% design but neither component of the 1991 ROD was built because, at the request of the responsible parties, a pilot study was performed to determine if an alternative, innovative cleanup approach could replace the Source Control component of the 1991 ROD. Following more than ten-years of additional study at the Site the responsible parties offered an alternative Source Control component for the 1991 ROD that would be less expensive, and would offer greater flexibility in addressing contamination at the Site. The alternative uses an air-sparging trench to act as the Source Control component to halt migration of contamination from the landfill.

The EPA and NHDES believe that the proposed air-sparging trench has the potential to be as protective as the Source Control component of the 1991 ROD and is less expensive. Most significantly, the air-sparging trench has the potential to accelerate the cleanup by decades through its flushing action rather than entombing wastes beneath an impermeable cap that requires perpetual maintenance and operation of wells to lower ground water out of the contaminant mass. Air-sparging will allow the landfill to reach clean closure at which time the aquifer will be restored to drinking water quality and re-use of the site will be allowed without further institutional controls. However, considerable uncertainty remains over the ability of the air-sparging trench to be implemented and to function as designed. Therefore, as an additional measure of protectiveness, the Source Control component of the 1991 ROD will be retained as a contingent remedy.

In addition to changing the Source Control portion of the 1991 ROD, the responsible parties also requested that EPA evaluate a change to the Management of Migration alternative for that portion of the ground water migrating towards the Bellamy Reservoir, the Southern Plume. The 1991 ROD addresses contaminated ground water in the Southern Plume through pump-and-treat. The responsible parties requested that EPA consider amending the 1991 ROD remedy to Monitored Natural Attenuation (MNA). Because present data indicates that MNA is not appropriate for the Southern Plume, active measures proposed in the 1991 ROD are retained to address this portion of the aquifer. Therefore, EPA and NHDES have elected to change only the Source Control component of the 1991 ROD and retain the 1991 Management of Migration component, with some additional assessment and monitoring requirements.

D. ASSESSMENT OF THE SITE

The response action selected in this ROD Amendment is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

E. DESCRIPTION OF THE ROD AS AMENDED

The original, 1991 ROD Source Control component at the landfill consisted of capping the wastes with a RCRA C cap and capturing leachate flowing from the landfill. This ROD Amendment

changes the Source Control component and adds some assessment and monitoring requirements to the 1991 Management of Migration component. The major portions of the complete remedy, as amended, include:

- Maintain the existing vegetative cover over the entire landfill. Infiltrating water will mobilize contaminants in the landfill and convey them to an air-sparging trench at the perimeter of the landfill for treatment.

- Identify additional source areas. Areas of high contamination within and adjacent to the landfill will be located and addressed by either excavation or other *ex situ* technology, as appropriate.

- Construction and operation of air-sparging trench. The air-sparging trench will be installed in phases or segments and will follow the perimeter of the landfill. It will capture arsenic, recover volatile organic compounds, and create an environment that will biodegrade tetrahydrofuran. Where contaminant concentrations may exceed the capacity of the trench, the ground water source areas will be addressed through either direct removal or pumping and treating, as appropriate. Extracted ground water will be treated to remove metals through flocculation and organic compounds by carbon treatment.

- Sediment monitoring in Cocheco River for human health and ecological risks, followed by excavation if appropriate.

- If the air-sparging trench is not performing sufficiently to remove the contaminants flowing from the landfill, the original 1991 ROD Source Control component is the contingent remedy which requires capping the landfill with a RCRA C cap. To avoid delay in the event that the contingency is invoked, the original 100% design of the cap will be upgraded simultaneously with the design of the air-sparging trench.

- Removal of arsenic-contaminated sediment from drainage trenches and the drainage swale using cleanup criteria described in the 1991 ROD which is 50 parts per million (ppm).

- Expand on and conduct additional pre-design studies to, among other objectives, define the lateral extent, depth, and mass of the contaminated groundwater in the Southern Plume as well as the location and pumping rates of the proposed extraction wells. Pre-design studies are not to exceed one-year after the beginning of design, as determined by EPA, for the Source Control component.

- Monitored Natural Attenuation (MNA) for contaminated ground water in the Eastern Plume moving toward the Cocheco River, a class B waterway. Five years

after implementation of the Source Control component EPA will assess the cleanup progress. If EPA determines that contaminant levels are not declining at an acceptable rate, an active pump and treat system will be implemented to restore ground water in the Eastern Plume.

- Additional wells will be installed to assess and extract contaminated ground water in the Southern Plume moving toward the Bellamy Reservoir, a class A drinking water source. The extracted water will be treated and discharged. The Southern Plume will be restored to drinking water quality as quickly as possible.

- Long-term monitoring of the source area, ground water beneath and surrounding the site, indoor and outdoor air, surface water in the Cocheco River, Bellamy Reservoir and their tributaries as well as wetlands in and around the Site, and sediments in the drainage swale and in the Cocheco River, Bellamy Reservoir and their tributaries.

- Indoor air monitoring for buildings near the Eastern Plume.

- Institutional controls will consist of restrictions prohibiting ground water use both on the site and where any use may affect the migration of the ground water contaminant plumes. Additional controls will be established, as appropriate, to restrict the use of the landfill surface to those activities that do not create a risk to human health or the environment or that interfere with the integrity of the remedy. In addition, a New Hampshire Groundwater Management Zone will be established and will remain in place until the cleanup is complete.

This Amended ROD will provide a comprehensive approach for this Site that addresses all current and potential future risks caused by the landfill wastes, ground water contamination, and sediment. Principal threat wastes present at the Site include materials in the landfill such as organic compounds and arsenic that migrate into aquifers surrounding the Site and volatile organic compounds in the ground water that may infiltrate existing homes overlying the contaminated aquifers. The remedial measures will prevent further flow of contaminants from the Site in ground water and will restore ground water in the surrounding aquifers to concentrations at or below the drinking water standards through natural processes and active remediation. Once cleanup levels have been attained within the landfill, ground water will have been restored to drinking water standards and the standards of clean closure will apply to the landfill.

F. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Section 404 of the Clean Water Act and Executive Order 11990 (Protection of Wetlands) require a determination that federal actions involving dredging and filling activities or activities in wetlands have the least adverse effects on the environment compared to other alternatives and that mitigation be carried out to the extent practicable. EPA has determined that there is no practicable alternative to the selected Amended ROD remedy which would have less adverse impacts on wetlands. Each of the alternatives had some adverse impact on wetlands, either through excavation or degradation by hazardous materials. Further, these areas have already been adversely impacted by prior activities at the Site. Mitigation activities, such as erosion control, will be performed to minimize necessary impacts and the wetlands will be restored to the extent practicable.

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of materials comprising principal threats through treatment). Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure (ground water and land use restrictions are necessary until cleanup levels are met), a review will be conducted within five years after initiation of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

G. AMENDED ROD DATA CERTIFICATION CHECKLIST

The following information and relevant updates are included in the Decision Summary section of the Amended ROD. Additional information can be found in the Administrative Record for this Site.

1. Chemicals of concern (COCs) and their respective concentrations.

2. Baseline risk represented by the COCs.

3. Cleanup levels established for COCs and the basis for the levels.

4. Current and reasonably anticipated future land and ground water use assumptions used in the baseline risk assessment and the ROD Amendment.

5. Potential land and ground water use that will be available at the Site as a result of the selected remedy.

6. Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected.

7. Decisive factors that led to amending the original 1991 ROD.

7. Decisive factors that led to amending the original 1991 ROD.

H. AUTHORIZING SIGNATURES

This ROD Amendment documents the selected remedy for the Dover Municipal Landfill Superfund Site, Operable Unit #1. This remedy was selected by USEPA with concurrence of the New Hampshire Department of Environmental Services.

U.S. Environmental Protection Agency

By: Susan Studlien Date: 09/30/04

Susan Studlien, Director
Office of Site Remediation and Restoration
Region 1

PART 2: THE AMENDED RECORD OF DECISION - DECISION SUMMARY

A. SITE NAME, LOCATION, DESCRIPTION, AND RATIONALE FOR AMENDMENT

SITE NAME: The Dover Municipal Landfill, Dover, New Hampshire. CERCLIS ID # NHD980520191.

SITE LOCATION: The Dover Municipal Landfill is situated in southeastern New Hampshire, Strafford County, Dover, New Hampshire. The property lies to the south of Tolend Road where it joins Glen Hill Road. Other landmarks include the Cocheco River that lies less than 1000 feet to the north and east, the Bellamy Reservoir that lies less than 2000 feet to the south, and the Calderwood Municipal Well that lies approximately ½ mile to the north. Although the landfill occupies approximately 50 acres, ground water contamination extends well beyond the landfill boundaries, north and eastward to the Cocheco River and south towards the Bellamy Reservoir. Figure 1 is a locus map of the Site provided on page 3. Public drinking water has been supplied to current area residences along Tolend and Glen Hill Road.

SITE DESCRIPTION: The landfill covers approximately 50 acres and although wastes average 20 feet in thickness, the landfill appears to be a relatively flat area. The landfill is vegetated mostly with meadow grasses; however, poplar and other pioneer tree species are established on the older sections of the landfill. The Site is surrounded by trenches that intercept near-surface leachate emanating from the wastes. The trenches convey leachate, and other runoff, to a drainage swale on the north side of the landfill and, ultimately, to the Cocheco River. The immediate area surrounding the landfill on the east, south, and west appears to be forested with mixed hardwoods, hemlock and other pines. The north side of the landfill is light, rural, residential use with a few homes along Tolend Road and Glen Hill Road. There are a total of 23 houses within a one-quarter mile radius of the Site with an estimated population of 50. All these homes are on Glen Hill Road or Tolend Road.

The landfill consists of mostly municipal waste and received unknown amounts of liquid hazardous wastes consisting of volatile organic compounds (VOCs) as well as other organic and inorganic, hazardous wastes. This has resulted in contaminated ground water underlying and flowing away from the landfill in two plumes of contaminated ground water. One plume flows to the east and discharges to the Cocheco River, the "Eastern Plume." The second plume flows to the south, towards the Bellamy Reservoir, the "Southern Plume." The Cocheco River is a class "B" waterway used for recreational purposes. The Bellamy Reservoir is a class "A" waterway that provides much of the municipal drinking water for Portsmouth, New Hampshire and many smaller communities in southeastern New Hampshire.

The Site is shown in greater detail in Figure 2 on page 4. A more complete description of the Site can be found in Section I of the Revised Focused Feasibility Study Addendum (the EPA Addendum) prepared by the EPA, issued on June 18, 2004, and in Section I of the Revised Focused Feasibility Study (the RFFS) prepared by the Executive Committee of the Group of Work Settling Defendants, Dover Municipal Landfill (the Group), dated January 30, 2004.

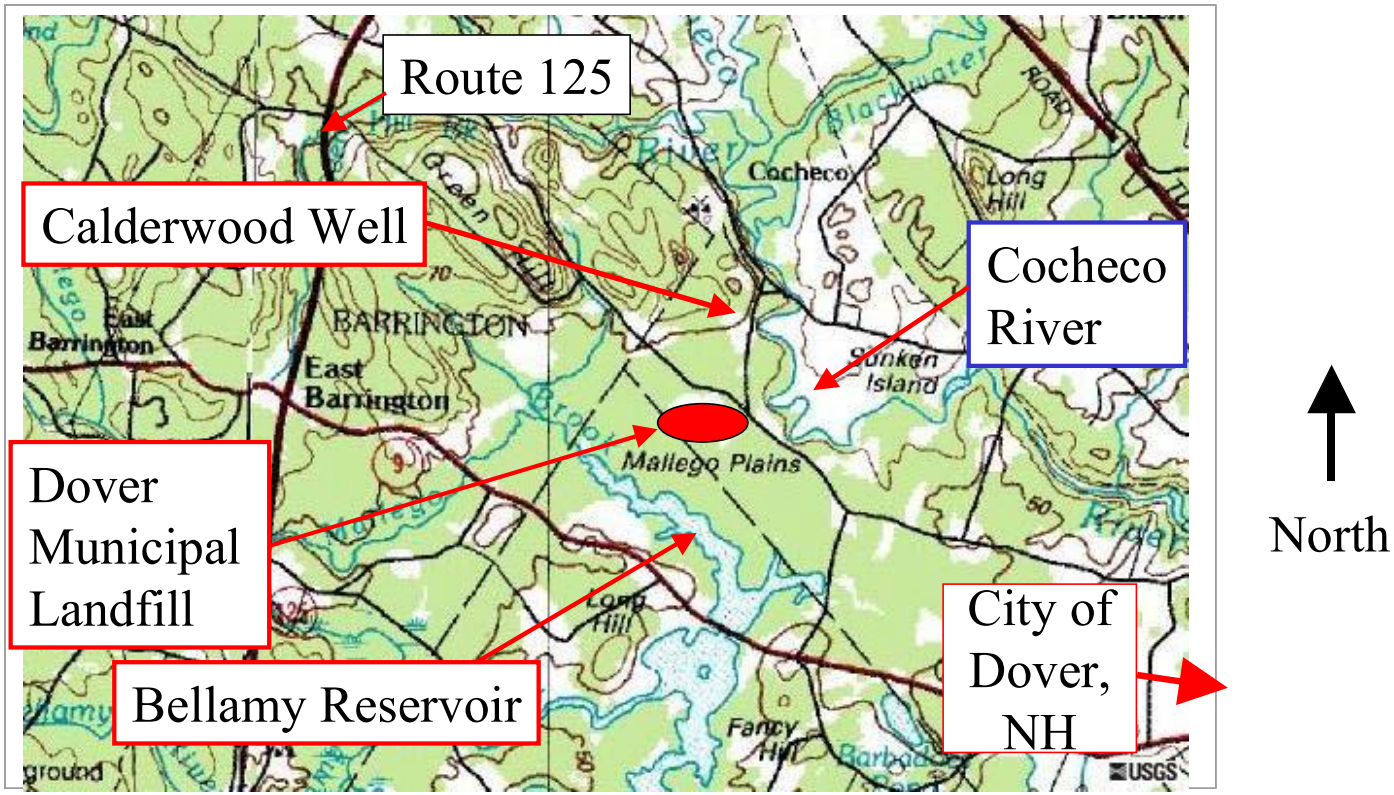

Image courtesy of the U.S. Geological Survey

Figure 1: Locus Map of area surrounding the site.

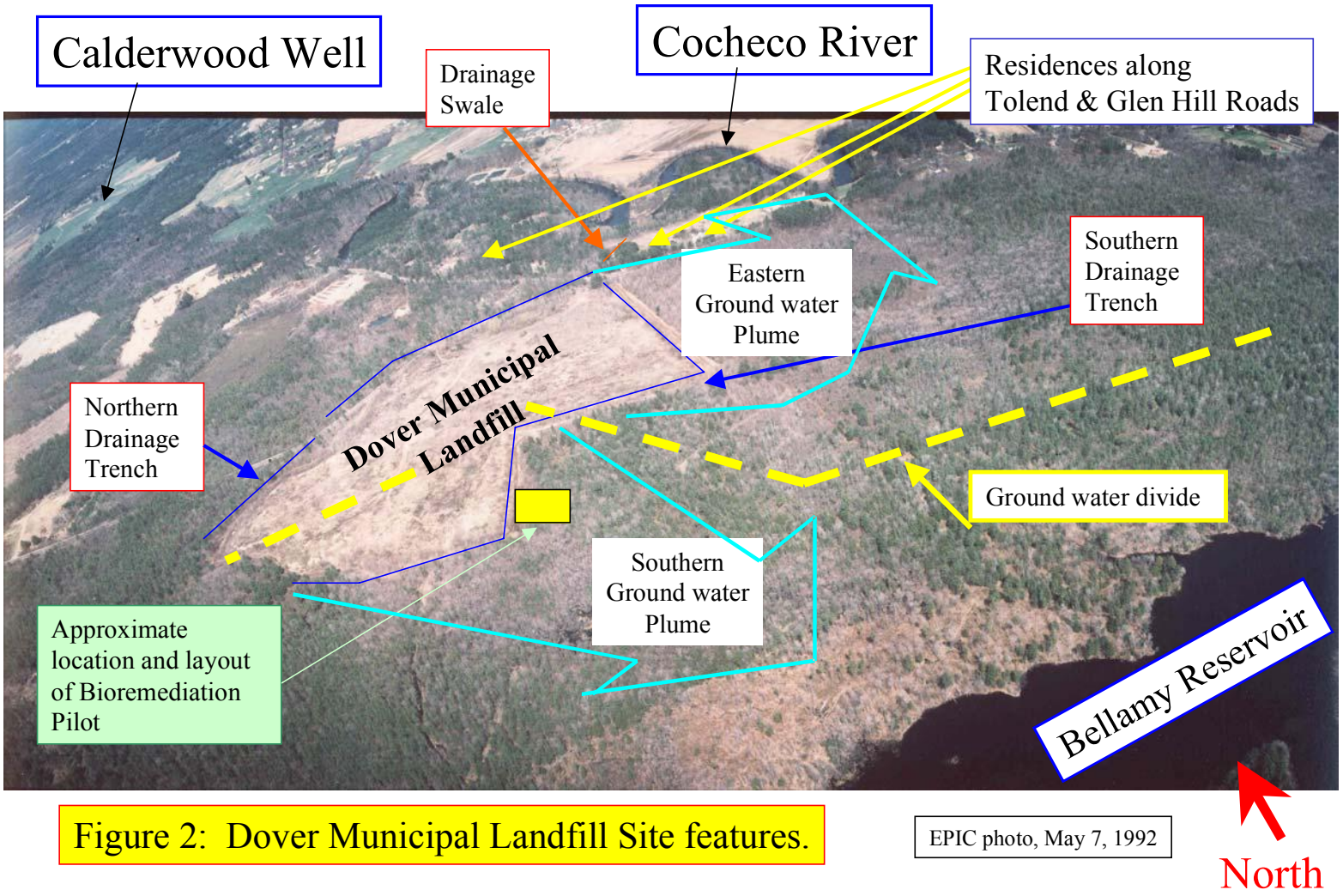

Figure 2: Dover Municipal Landfill Site features.

EPIC photo, May 7, 1992

RATIONALE FOR AMENDMENT: On September 10, 1991 EPA, with the concurrence of NHDES, and in accordance with CERCLA issued the 1991 ROD for the Dover Municipal Landfill Site. The 1991 ROD selected the final remedial action for the Site and established target cleanup goals for sediments and ground water. Specifically, the 1991 ROD required the remediation of the landfill and ground water through Source Control and Management of Migration components, respectively. The Source Control component of the remedy would halt the migration of contaminants from the landfill into the ground water. The Management of Migration component would restore the contaminated ground water in the two plumes.

The Amended ROD uses an air-sparging trench to act as the Source Control component to halt migration of contamination from the landfill.

The decision to amend the Source Control component was based on a number of factors including the following:

With respect to hazardous wastes in the landfill:

- The Source Control component of the 1991 ROD addressed this by covering the wastes, effectively entombing them permanently. Contaminants will very slowly flow out of the wastes and into the surrounding aquifer. The cap needed to accomplish this will require perpetual maintenance.

- The Amended Source Control component will address this by allowing infiltrating water to wash the contaminants out of the landfill and move them towards an air-sparging trench that will either capture or destroy the Site contaminants. The contaminants will be captured and treated more quickly than in the 1991 ROD.

- The Amended Source Control component will potentially meet cleanup levels in ground water decades before, and at less cost than the 1991 ROD Source Control component.

- The Amended Source Control component will allow the landfill to reach clean closure with an appropriate cover in place, allowing reuse of the Site to occur more quickly.

- The Amended Source Control component offers greater flexibility in addressing Site contamination by installing an air-sparging trench that will be segmented to allow differential treatment of contaminated ground water, and, in the event of a contingent remedy, that can be used to extract contaminated ground water.

With respect to contaminants migrating from the landfill and into the surrounding aquifer:

- The Source Control component of the 1991 ROD addressed this by constructing a 25 foot deep ground water interceptor/diversion trench that would intercept contaminants. However, this trench may miss some of the deeper contaminants. These contaminants would be addressed by individual wells, but the low-dispersivity at the Site may allow deeper contaminants to escape untreated.

- The Amended Source Control component will address this by installing an air-sparging trench that will span the entire transmissive portion of the aquifer, keying into the marine clay. No contaminants will be able to go beneath the trench.

With respect to contaminated sediments in the Cocheco River:

- The Source Control component of the 1991 ROD had no provision for contaminated sediments in the Cocheco River.

- The Amended Source Control component will address this by monitoring, testing, and excavating any sediments that show a risk to human health or the environment.

For these reasons, EPA believes the Amended Source Control component to be at least, if not more protective and more cost-effective than the 1991 ROD Source Control component.

The Group also offered an alternative for the Management of Migration component. Following a review of that proposal, EPA declined to consider a change to the 1991 ROD for addressing Site ground water. Therefore, the Management of Migration components from the 1991 ROD were retained and additional assessment and monitoring requirements were added to that component. Only the Source Control component is changed in this Amended ROD. Table 1 summarizes the components of the 1991 ROD remedy and identifies the components that have changed.

Table 1: Amended Remedy Summary and Comparison	
1991 ROD Remedy	**Amended Remedy**
Source Control	
RCRA C cap over 50-acre landfill.	★ Existing vegetation will be maintained. The 1991 ROD 100% remedial design cap for landfill will be updated.
25-foot deep ground water interception trench will intercept contaminated ground water for treatment.	★ Up to 100 foot deep air-sparging trench will trap and recover contaminants within the trench.
Investigations of the landfill surface to detect high concentrations and remove them.	No change. Directly address areas of contamination that the air-sparging trench will not be able to address.
Arsenic-contaminated sediment greater than 50 ppm in drainage trenches surrounding the Site and the drainage swale will be removed. Drainage trenches will be filled. Swale will remain uncovered.	No change.
Management of Migration	
Eastern ground water contaminant plume addressed through monitored natural attenuation to be assessed at 5-Year Review.	No change.
Not assessed in 1991 ROD.	★ Arsenic contaminated sediment in Cocheco River to be removed if further sampling shows threat to human health or the environment.
Southern ground water contaminant plume addressed through pumping and treating.	No change.
Institutional controls will prevent the use of ground water for drinking water or purposes contrary to the remedy.	No change.
Long-term monitoring of ground water, surface water, and sediments will be conducted to ensure that the remedy does not pose a threat to human health or the environment.	★ No change. Indoor air assessments will be conducted pursuant to the new EPA policy. Corrective action will be taken if necessary.
★ Items that are changed from the 1991 ROD.	

This Amended ROD and the documents which form the basis for the Amendment are available at the following Information Repositories:

EPA Records Center
1 Congress Street, Suite 1100
Boston, MA 02114-2023
(617) 918-1453
Hours: 10am - noon and 2pm - 5pm.

New Hampshire Department of Environmental Services
29 Hazen Drive
Concord, NH
1-603-271-3644

Dover Public Library
72 Locust Street
Dover, NH
1-603-743-6050

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. HISTORY OF SITE ACTIVITIES

The landfill began operations in 1961 and closed in 1979. The landfill accepted household wastes as well as wastes from local industries that included liquid hazardous wastes. These liquid hazardous wastes consisted of solvents and tanning solutions that included chlorinated solvents. Although disposal practices varied over the operational life of the landfill, in the later years of operation, the liquid hazardous wastes were disposed by pouring them into surface impoundments located in the watertable on the landfill surface.[1,2] In the early 1980's ground water and surface water contamination were found in wells and surface water bodies located both on and off the landfill.

The Site was placed on the National Priorities List on September 8, 1983. Remedial Investigations begun by EPA and completed by a number of the parties that formed the *Executive Committee of the Group of Work Settling Defendants, Dover Municipal Landfill* (the Group) in the late 1980's found pervasive ground water, surface water and air contamination. The Remedial Investigations led to the 1991 ROD. The 1991 ROD selected capping of the landfill, ground water migration mitigation measures (a 25-foot deep ground water interception/diversion trench), natural attenuation of the ground water contamination in the Eastern Plume, and pump-and-treat of the ground water contamination in the Southern Plume. At around the time the 1991 ROD was signed, institutional controls in the form of local ordinances were put in place to prevent the use of ground water and to prevent disturbance of the aquifer marine clay layer. Figure 2 on page 4 shows the current, approximate location of the ground water contaminant plumes and a summary of the Site stratigraphy. After the 1991 ROD was issued, the Group agreed in a 1992 Amended Administrative Order on Consent (AOC) to further characterize the horizontal and vertical extent of the Southern Plume contamination and determine whether the contamination had reached, or would reach, the Bellamy Reservoir.

A Consent Decree to implement the provisions of the 1991 ROD was signed in 1992. However, since the Southern Plume was relatively undefined, rather than move forward with that portion of the remedy, it was agreed that the cleanup of the Southern Plume would be suspended while the Southern Plume Pre-Design Investigation (SP-PDI) was proceeding. Therefore, the Consent Decree demurred on implementing the pump-and-treat remedy in the Southern Plume. The SP-PDI was completed in 1994.

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[1] GeoInsight, Revised Focused Feasibilty Study, January 30, 2004.

[2] USEPA, Environmental Monitoring Systems Laboratory, Site Analysis Dover Landfill, TS-PIC-85010, Las Vegas, NV, March 1985.

The 1994 SP-PDI found a ground water divide that split the Southern Plume into eastern and western components. The eastern component was found to ultimately discharge to the Cocheco River while the western component flowed towards the Bellamy Reservoir. The SP-PDI also found that as the plane of ground water flow deepened, the ground water flow divide moved further westward towards the Bellamy Reservoir. Modeling found that, depending on whether the landfill was capped or not capped, the ground water flow divide shifted 300 feet in a westerly direction causing most of the Southern Plume to flow eastward, away from the Bellamy and towards the Cocheco River.[3]

The 1994 SP-PDI also found that the leading edge of the Southern Plume in the most contaminated portion of the aquifer, the interbedded zone, had not significantly changed from the 1991 Remedial Investigation and was not pervasive. The SP-PDI concluded that discharge is primarily towards the Cocheco River in the interbedded layer and that the contaminated ground water plume in the interbedded aquifer of the Southern Plume would not pose a threat to the Bellamy Reservoir <u>if the landfill were capped</u>. The MODPATH modeling analysis found that even in the no-cap scenario the contaminants in the interbedded zone migrate very slowly and will have only migrated 350 feet beyond the landfill toe at the end of forty years. Also, using modest, but untested assumptions, preliminary analysis of natural attenuation found that concentrations of contaminants in the Southern Plume would be reduced below cleanup levels prior to arriving at the Bellamy Reservoir. Lastly, the installation of a cap would divert additional ground water flow away from the Bellamy and towards the Cocheco River. Based on these findings, the SP-PDI concluded that the Bellamy Reservoir would not be impacted by the Southern Plume and that groundwater extraction and treatment in the Southern Plume was not necessary.[4] EPA did not, however, accept these findings or amend the 1991 ROD to change the remedy for the Southern Plume.

In February 1995 the Group submitted a second Pre-Design Investigation report regarding the capping component of the 1991 ROD, the Source Control Pre-Design Investigation (SC-PDI), as required by the 1992 Consent Decree Scope of Work. The SC-PDI examined the consolidation of the sediments, detailed the elements of capping the landfill, described the details of installing and operating the ground water interceptor/diversion trench, characterized the wetlands, and determined a background concentration for arsenic in ground water at the Site of less than 10

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[3] Pre-Design Study, Southern Plume, Dover Municipal Landfill Site, Dover, New Hampshire. Prepared by SEA Consultants Inc., Cambridge, MA, July 1994.

[4] Pre-Design Study, Southern Plume, Executive Summary, page ix.

parts per billion.[5]

A number of subsequent studies, performed independently by the Group, followed the SC-PDI and were issued in May 1996. These reports further described the hydrogeology of the Site and discussed treatability studies to address ground water contamination using *in situ* bioremediation and air stripping. The results of these studies were offered by the Group as a proposal to seek an alternate remedy to the 1991 ROD remedy for the Southern Plume.[6] EPA reviewed these documents and found several deficiencies in the proposed approaches to *in situ* bioremediation and air-stripping.[7]

The SC-PDI served as the basis of the remedial design for the cap and the ground water interceptor/diversion trench. A 100% remedial design was submitted by the Group in December 1996; however, it was not approved pending consideration of a new approach to Source Control remediation. In 1996, based on communication between the Agencies and the Group, a new, *in situ* bioremediation approach was developed for consideration as an alternative to the Source Control component of the 1991 ROD.

The Group conducted a pilot test of this new, *in situ* bioremediation approach under a 1997 Administrative Order on Consent (1997 AOC). The 1997 AOC held the approval and implementation of the 1996 remedial design of the landfill cap and the 1992 Consent Decree in abeyance until the conclusion of the Bioremediation Pilot Project. Accompanying the 1997 AOC was a Memorandum of Understanding establishing NHDES as the lead agency for oversight of the Bioremediation Pilot Project.

The Bioremediation Pilot Project began in 1997. The project sought to mineralize or immobilize Site contaminants by injecting amendments into the ground water. The Pilot Project concluded in 2001 with the NHDES and EPA determining that this alternative approach had failed to prove superior to the 1991 ROD for the Source Control component. The Pilot Project failed primarily because low values of dispersion in the aquifer prevented the homogeneous and

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[5] Pre-Design Investigation Report, Dover Municipal Landfill, Dover, New Hampshire, Prepared by Golder Associates, Inc., Manchester, New Hampshire, February 1995.

[6] Attachment A, Updated Hydrogeologic Information; Attachment B, Treatability Study Report; Attachment C, Limited Field Sparging Test Summary Report; Attachment D, Treatability Study Work Plan; Attachment E, Focused Feasibility Study; Attachment F, Field Demonstration Work Plan. GeoInsight, Londonderry, New Hampshire, May 17, 1996.

[7] Comment letter from A. F. Beliveau, EPA QA office, to EPA Project Manager Cheryl Sprague, February 13, 1996. Comment letter from Don Draper, EPA Ada Lab, to EPA Project Manager Cheryl Sprague, October 7, 1996.

predictable distribution of amendments needed to ensure the destruction or immobilization of contaminants.[8] The Agencies's analysis of the Bioremediation Pilot Project is contained in Appendix A of the EPA Addendum.

The Agencies believed, however, that the remedy proposed by the Group would be viable if the delivery of the amendments was by a continuous source, such as a porous media trench. The Group proposed using a trench that spanned the aquifer to distribute the amendments which could ensure complete mixing, the primary defect of the original Bioremediation Pilot Project. The Group then prepared a Revised Focused Feasibility Study (RFFS), completed on January 30, 2004. EPA responded to that document not by approving it, but rather by issuing EPA's Addendum on June 18, 2004.

A more detailed description of the Site history can be found in Section 1 of the EPA Addendum and the RFFS.

2. HISTORY OF CERCLA ENFORCEMENT ACTIVITIES

A number of parties formed the *Executive Committee of the Group of Work Settling Defendants, Dover Municipal Landfill* (the Group) and are primarily responsible for investigation and cleanup activities at the Site. A more detailed history of enforcement actions at the Site can be found in Section II.B. of the 1991 ROD.

C. COMMUNITY PARTICIPATION

This Amended ROD meets the criteria for community involvement specified in Sections 300.435(c)(2)(ii)(A) through (H) of the NCP.

Throughout the Site's history, community concern and involvement has varied. In 1991 public comments on EPA's Proposed Plan for Site cleanup were dominated by concerns regarding the cost of the remedy. Most citizens and officials commented that monitoring and institutional controls were sufficient for the Site. Some members of the public and the Water Department of the City of Portsmouth supported the remedy proposed at that time and expressed concern for their surrounding environment and the drinking water reservoir.[9]

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[8] Agency Response to the Draft Final Bioremediation Pilot Assessment, Dover Municipal Landfill. Comment letter from Andrew Hoffman, NHDES to Dean Peschel, City of Dover, April 23, 2002.

[9] Record of Decision, Dover Municipal Landfill, U.S. EPA, September 1991. Page 6 of the Responsiveness Summary.

Because of the low population density in the area of the Site, most participation has been by City officials for Dover and Portsmouth, New Hampshire, non-governmental organizations interested in the Cocheco River, and a few residents. Recently, one non-governmental organization, the New Hampshire TAG Force, received a TAG grant from EPA. Below is a brief chronology of recent public outreach efforts:

- In early June 2004 NHDES met at the Site with concerned parties including several local residents and officials of the Cities of Dover and Portsmouth, New Hampshire to discuss EPA's Amended Proposed Plan that was issued on June 18, 2004.

- In mid-June 2004, EPA placed a press release in the local newspaper, *The Foster Daily Democrat*, outlining EPA's intention to amend the 1991 ROD and announcing the date, time and place of a public meeting and public hearing and the availability of supporting documentation and the Amended Proposed Plan.

- Shortly after the press release, EPA sent notice of the public meeting and public hearing and a copy of the Amended Proposed Plan to parties on the mailing list. EPA also sent electronic copies of the Amended Proposed Plan and supporting documentation to City officials, representatives of the New Hampshire TAG Force, and several other interested parties.

- On June 21, 2004, EPA and NHDES held a public informational meeting in the Dover Town Hall to describe the Amended Proposed Plan and EPA's preferred remedy.

- On June 21, 2004, EPA made the administrative record available for public review at EPA's offices in Boston and at the Dover Public Library.

- From June 22nd to July 21st the Agency held a 30 day public comment period to accept written comments on the alternatives presented in the RFFS, EPA's Addendum and the Amended Proposed Plan and on any other documents previously released to the public. Upon request, the public comment period was extended to August 11, 2004.

- On July 19th the Agency held a formal public hearing to discuss the Amended Proposed Plan and to accept any oral comments. A transcript of this meeting and the Agency's response to formal oral and written comments are included in the Responsiveness Summary, which is part of this Record of Decision Amendment.

- Local residents, primarily from the Cocheco River Watershed Association, formed the New Hampshire TAG Force to monitor Site activities, and review the proposal for this Amended ROD. They applied for and have been awarded a TAG grant and have retained a TAG consultant.

Overall, the EPA has kept the community and other interested parties aware of Site activities through press releases, public meetings and informal contacts. Pursuant to Section 300.825(c) of the NCP, EPA updated the Administrative Record in June 2004 to add the documents which EPA relied on to form the basis for the decision to amend the response action for OU#1 at the Dover Site. See Appendix B for the Administrative Record Index.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The Dover Municipal Landfill consists of a single operable unit, OU#1, consisting of Source Control and Management of Migration components. This ROD Amendment pertains only to the Source Control component of the remedy with some additional assessment and monitoring requirements for the Management of Migration component.

The Source Control component consists of controlling the source of contamination at the Site, the landfill. The approximately 50-acre landfill contains contaminated materials in both liquid and solid form. The landfill surface has a permeable, vegetated soil cover that prevents contact with the wastes. There are also two drainage trenches dug along the lateral limits of the landfill that are intended to intercept leachate flowing from the landfill. One drainage trench, the southern drainage trench, begins on the western edge of the Site, flows eastward along the southern boundary of the landfill before turning north and eventually flowing into a drainage swale north of Tolend Road. A northern drainage trench also originates on the western side of the landfill; however, flows northward before turning east and eventually discharging into the same drainage swale as the southern drainage trench. The drainage swale flows northward and discharges into the Cocheco River. Actions in the drainage trenches and drainage swale are considered to be a Source Control component.

The Management of Migration component consists of restoring contaminated ground water that is flowing in the aquifers below and surrounding the landfill. It includes contamination that is sorbed to the aquifer materials. Ground water is divided into two plumes of contamination, an Eastern Plume and a Southern Plume. The Eastern Plume has migrated such that sediments in the Cocheco River have been contaminated. Actions taken to address these sediments are considered to be a Management of Migration component.

E. DESCRIPTION OF CHANGES TO THE 1991 ROD

1. DESCRIPTION OF THE 1991 ROD REMEDY

The 1991 ROD remedy consisted of Source Control and Management of Migration components. The Source Control component of the 1991 ROD (SC-7/7A) consisted of:

- Use of on-site material from the perimeter of the landfill to recontour the existing landfill surface to achieve the necessary slope for drainage.
- Construction of a multi-layer RCRA C cap over the re-contoured landfill.
- Construction of a leachate/ground water extraction system and clean ground water diversion system provided by a landfill perimeter interceptor/diversion trench, extraction wells or a combination of the two.
- Operation of an on-site ground water/leachate treatment system with discharge to the Cocheco River (SC-7) or discharge to a POTW (SC-7A).
- Methane gas collection and passive venting.
- Construction of a surface run-on/run-off diversion system with sedimentation and detention basins.
- Limited drainage trench and drainage swale sediment removal and consolidation under the landfill cap.
- Institutional controls to limit Site access and Site use.
- Environmental monitoring.

Further details of the Source Control component are available beginning on page 51 of the 1991 ROD.

The 1991 ROD Management of Migration components (MM-2 and MM-4) included the following elements:

- The use of institutional controls to prohibit the use of ground water and prohibit disturbance of the marine clay layer between the upper and lower aquifers at the

Site (MM-2 and MM-4).

- Implementation of a long-term ground water sampling/monitoring program (MM-2 and MM-4).

- Pre-design studies which include the installation of additional monitoring wells to further define the lateral extent, depth and mass of the contaminated ground water (MM-4).

- One or more pump tests to determine the ability and rate that contaminated ground water can be extracted from the aquifer (MM-4).

- Use of natural attenuation processes to attain ground water cleanup levels in the Eastern Plume (MM-2).

- Installation of several off-site ground water extraction wells in the Southern Plume, connection to an on-site treatment system, extraction and treatment of the ground water and recharge of the treated ground water to the wetlands or discharge to the Cocheco River (MM-4).

Details of the Management of Migration component begin on page 57 of the 1991 ROD.

Cleanup levels were established for contaminated sediments in the drainage trenches that surround the Site and for contaminated groundwater based on ARARs and health-based calculations. The ground water cleanup levels established in the 1991 ROD are shown in Table 11 on page 73.

2. COMPONENTS OF 1991 ROD REMEDY COMPLETED TO DATE

With respect to the Source Control component the City of Dover enacted an ordinance that created a hazardous waste district that prohibits development and use of ground water in the area of the landfill until the cleanup is completed. The Town of Madbury similarly enacted an ordinance creating an overlay district that prohibits the use of ground water. In addition, the capping component of the remedy reached 100% design in 1996 and arsenic-contaminated sediments in the drainage trench and drainage swale were removed in 1997. A ground water / surface water sampling program has been in place for more than ten years and limited pre-design activities in the Southern Plume have been conducted.

3. CHANGES TO THE 1991 ROD REMEDY

This Amendment changes only the Source Control component of the 1991 ROD remedy. In addition, the 1991 Management of Migration component is now expanded to include the assessment of contaminated sediments in the Cocheco River and excavation if necessary. Also, air monitoring of buildings near the Eastern Plume will occur with remedial measures taken if it is shown that vapors from contaminated ground water cause a human health risk.

This ROD Amendment elects to address the source of contamination, the landfill, by leaving the landfill uncapped and installing an air-sparging trench that surrounds the waste area. This replaces the original Source Control component of a RCRA C landfill cap and ground water diversion/interceptor trench. EPA recognizes that the air-sparging trench is innovative and will pose technical challenges; however, the remedy provides for engineering alternatives to address these challenges as well as the contingency that the Source Control component will revert back to the original RCRA C capping requirement in the event that the innovative technology is unsuccessful. To that end, the ROD Amendment requires that the original 100% cap design be updated simultaneously with the design of the air-sparging trench. To better define the technical challenges, the air-sparging trench will be installed in phases to ensure it performs as expected.

To summarize the change to the Source Control component:

- The landfill remains uncapped to allow infiltrating rainwater to travel through the landfill wastes, absorbing contaminants, and then be conveyed to the air-sparging trench.

- Areas of high contamination within and adjacent to the landfill will be located and addressed by either excavation or other *ex situ* technology, as appropriate.

- An air-sparging trench, approximately 3000 feet long by up to 100 feet deep by 3 feet thick will capture arsenic by precipitation, volatile organic compounds (VOCs) by volatization, and aerobically degrade tetrahydrofuran (THF).

- Arsenic precipitate will be removed by excavation at the conclusion of the remedy or if fouling occurs. Other methods of removal may be investigated and used if appropriate.

- VOCs and other volatile gases will be recovered for treatment if emissions exceed regulatory levels and discharged to the atmosphere.

- Down-gradient monitoring will ensure that ground water exiting the air-sparging

trench meets cleanup levels and that the remedy is performing as expected.

If it is found during the phased construction or later, that the air-sparging trench is not performing sufficiently to remove the contaminants flowing from the landfill, the Source Control component of the 1991 ROD, SC-7/7A (i.e., capping the landfill), will be the contingency remedy that will be implemented at the Site.

There are also two changes to the Management of Migration component of the 1991 ROD:

1. Sediment in the Cocheco River will be monitored to ensure concentrations of arsenic do not pose a risk to human health and a Tier 2 ecological risk assessment will be performed, followed by a Tier 3 evaluation, if warranted, and removal if necessary.

2. Indoor air vapors will be evaluated in buildings near the Eastern Plume. Corrective action will be taken if necessary.

Also of note is the use of EPA's Monitored Natural Attenuation protocol for the Eastern Plume, the application of EPA's Indoor Air Evaluation Protocol, and the revised arsenic MCL of 10 ppb that will apply to Site ground water.

F. SUMMARY OF SITE CONDITIONS AND CONTAMINATION

Section 1 of the EPA Addendum and Revised Focused Feasibility Study contain a more detailed overview of the previous investigations conducted at the Site. The significant findings of those investigations are summarized below.

1. GENERAL SURFICIAL CHARACTERISTICS

The Site is situated in an area with a low residential density. Figure 2, on page 4, shows that only a few houses line Tolend Road and Glen Hill Road where they run along the Cocheco River. There are a total of 23 houses within a one-quarter mile radius of the Site with an estimated population of 50. All these homes are on Glen Hill Road or Tolend Road. Several of the homes appear to overlie the Eastern Plume. All 23 homes, formerly served by private ground water wells, have been supplied with municipal water since 1981.

The landfill footprint covers approximately 50 acres. The original area of the landfill consisted of woodlands and wetlands that were filled during the operation of the landfill. Perimeter drainage trenches were dug along the landfill boundary during closure activities in 1979 to intercept the flow of leachate from the landfill. Although the perimeter drainage trenches drain to the drainage

swale and eventually the Cocheco River, the wetlands surrounding the southern portion of the Site drain to the Bellamy Reservoir. The wetlands to the north of the landfill drain to the northern drainage trench and the Cocheco River. The floodplains of the Cocheco River and the Bellamy Reservoir do not include the landfill.

The landfill surface appears to be a large meadow, covered with grasses and low shrubs such as sumac. In older sections of the landfill, poplar and birch trees have grown. The only structures on top of the landfill consist of a small building approximately 20 by 20 feet that housed portions of the bioremediation pilot project that operated from 1997 to 2001. There are no areas of archaeological or historical importance.

2. CONTAMINATION CHARACTERISTICS

Soils, sediments, air, surface water and ground water were sampled during the remedial investigation performed prior to the 1991 ROD. Subsequent to the 1991 ROD, and based on the previous sampling results, sampling efforts focused on ground water and were later expanded to sediments in the Cocheco River. In ground water, the principal contaminants are VOCs and arsenic. Ground water has been sampled at least twice per year since 1991. In sediment, arsenic is the principal contaminant.

Site conditions have generally remained constant since EPA issued the 1991 ROD with some increasing concentrations of contaminants in the Southern Plume. The contaminated media include the wastes in the landfill, ground water below and surrounding the landfill, and sediments in water bodies that receive contaminated ground water. Below is a discussion of each of the areas of concern at the Site describing the conditions and contamination.

<u>The Landfill</u>

The geology beneath the landfill consists of 100 feet of sedimentary deposits on top of bedrock. Ground water flow from the landfill appears to be confined to the upper forty to fifty feet of those sedimentary deposits. Summarizing the surficial topography, the landfill is approximately twenty-feet thick; however, near Tolend Road the landfill has little topographic expression. The southern edge of the landfill surface falls rapidly ten to twenty feet to an adjacent woodland and wetland. In this area it is apparent that much of the former ground surface beneath the landfill was either wetland or low-lying forested area.

The underlying geology at the Site is comprised of glacio-fluvial deposits. A chronological record of the geology would begin with the bedrock surface, the deepest portion of the described geology, which was lain bare by the glaciers 10,000 years ago. When the glaciers retreated, they left behind outwash deposits. Because of the great weight of the glaciers, the ground surface was

depressed below sea level allowing the deposition of a marine clay layer on top of the initial glacial deposits. This was followed by the deposition of additional glacial outwash deposits on top of the marine clay. The original, detailed cross-sections of the Site geology are in the EPA Addendum and in the 1988 Remedial Investigation as Figures 5-6, 5-7 and 5-8.[10]

Although the landfill is covered with a thin veneer of sand and organic matter, contaminants are mobilized by rainwater that infiltrates the landfill and then enters the ground water. Contaminants are then conveyed from the landfill by leachate, contaminating ground water, that then migrates beyond the Site either into the drainage trenches that surround the landfill or into the aquifers that underlie the Site. Contaminated ground water migrating in the aquifers may either discharge to surface water or be extracted by a well.

Contamination in the landfill consists of VOCs such as trichloroethylene (TCE), tetrachloroethylene (PCE), *cis*-1,2 dichloroethylene (1,2 DCE) and vinyl chloride; hydrocarbon compounds present at the Site include benzene and toluene; other organic compounds at the Site include tetrahydrofuran (THF) and ketones. The landfill appears to contain at least two known source areas. The first area is in the northern portion of the Site where ground water with high concentrations of VOCs discharges to the northern drainage trench when the local water table is high. The second area is in the southwestern portion of the Site and consists of high concentrations of THF. Table 2, beginning on page 23, describes the general contaminant concentrations and location in the ground water beneath the landfill and in the surrounding aquifer.

Ground Water

As previously noted, the Site is situated on a ground water divide. The northern and eastern portions of the Site drain to the east and the Cocheco River (the Eastern Plume). The western and southern portions of the Site drain to the south and the Bellamy Reservoir (the Southern Plume). The RFFS used MODFLOW-96 to assess conditions at the site in conjunction with solute transport models Version 2 of the Reactive Transport Model in 3-Dimensions (RT3D) and Version 3.5 of the Modular Three-Dimensional Transport Model (MT3D). The model used Site-specific information and assumptions listed in Appendix N of the RFFS.

Because the ground water gradients are fairly flat to the south, ground water flowing towards the Bellamy travels more slowly than that to the east and the Cocheco River. Contaminant flow in each of the respective aquifers is also restrained by retardation. Inside the landfill, ground water

[10] *Remedial Investigation, Dover Municipal Landfill, Dover, New Hampshire, Volume II, Tables and Figures.* Prepared for: New Hampshire Department of Environmental Services, Waste Management Division. Prepared by: Goldberg-Zoino & Associates, Inc. and Wehran Engineers. November 1988.

flow is very slow due to the low hydraulic gradient. Contaminants in the Southern Plume travel quite slowly and have travel times of twenty to sixty years to the Bellamy Reservoir. However, in the Eastern Plume, where the gradients are steeper, contaminants take less than ten years to travel from the edge of the landfill to the Cocheco River.[11] Figure 2 on page 4 shows the location of the ground water divide and Eastern and Southern Plumes. The general concentrations in the Eastern and Southern Plumes are shown on Figure 3 on page 28. Ground water flow and contamination is discussed in greater detail in Section 1 of the RFFS and in the EPA Addendum.

Ground water in the area underlying the landfill is labeled as GB, a background aquifer. The landfill is located in the Well Head Protection Area for the Calderwood Well as designated by NHDES.[12] The policy of the State of New Hampshire is that all ground waters are potential drinking water aquifers. Use of the ground water surrounding the landfill is subject to municipal ordinances prohibiting the installation of wells for domestic uses.[13]

Ground water - The Southern Plume

Contaminants in the Southern Plume consist of benzene, vinyl chloride, 1,2 DCE, arsenic and THF, with concentrations of arsenic increasing at the southern toe of the landfill, indicating worsening conditions. Benzene, vinyl chloride, THF and arsenic levels are above the Safe Drinking Water Act MCLs in well SB-B2, located approximately halfway between the toe of the landfill and Bellamy Reservoir - a Class "A" drinking water body. THF exceeds the interim cleanup level (ICL) established in the 1991 ROD and has increased steadily in concentration in well SB-B2 since that time. The landfill lies partially within the Reservoir's watershed. Rising concentrations of these contaminants indicate that a significant potential exists for the discharge of contaminated ground water into the Bellamy Reservoir. This Reservoir serves much of southeastern New Hampshire's drinking water needs. The City of Portsmouth draws 60% of its drinking water from this Reservoir. The City of Dover draws 43% of its drinking water from wells in the Bellamy Reservoir watershed.[14] Within the Reservoir's watershed there are also many municipal drinking water wells that draw from it through induced recharge. The Bellamy Reservoir is discussed further in Appendix B of the EPA Addendum. Contaminant concentrations

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[11] *Revised Focused Feasibility Study, Dover Landfill*, Appendix N, Attachment H. GeoInsight, January 30, 2004.

[12] Dover Source Water Protection Areas, NHDES, Scale 1:36000 & centered on Calderwood Well, map prepared January 21, 2004.

[13] RFFS, Appendix A, January 30, 2004.

[14] Quantifying the Bellamy River Watershed Hydrologic Budget, prepared for the Town of Madbury by Thomas Fargo, C.G., January 2002.

in the Southern Plume are summarized in Table 2 beginning on page 23 and on Figure 3 on page 28.

Ground water - The Eastern Plume

Contaminants in the Eastern Plume consist primarily of arsenic, benzene and vinyl chloride with minor amounts of TCE, PCE, and THF. While the landfill source has remained unaddressed since the 1991 ROD, there has been no discernable decreasing trend for most of these contaminants, particularly arsenic. The Eastern Plume continues to discharge to the Cocheco River which is a Class "B" water body. The Cocheco River is used for recreation, primarily fishing and boating, it flows through the City of Dover and discharges into Great Bay approximately 7 miles downstream. The Cocheco River is discussed further in Section 2 of the EPA Addendum.

The Calderwood Well lies approximately 1/2 mile north of the landfill. The area of ground water contribution to the Well extends southward to, and beneath, the landfill.[15] However, the Calderwood Well is insulated from the Site by virtue of the geology in that a layer of impervious marine clay, approximately 20 to 40 feet thick, is found between ground water influenced by the landfill and ground water used by the well. Approximately 24% of the City of Dover's drinking water comes from this well.[16]

Contaminant concentrations in the Eastern Plume are summarized in Table 2 beginning on page 23 and on Figure 3 on page 28. The original, detailed cross-sections of the Site geology are in the EPA Addendum and in the 1988 Remedial Investigation as Figures 5-6, 5-7, and 5-8.

[15] Dover Source Water Protection Areas, NHDES, Scale 1:36000 & centered on Calderwood Well, map prepared January 21, 2004.

[16] William Boulanger, Utilities Supervisor, City of Dover Water Supply, personal communication January 6, 2004.

Table 2: The Characteristics of Aquifers at Dover Municipal Landfill
Stratigraphic units are arranged from upper-most to lowest

Stratigraphic Unit	Plume	Contaminant concentrations and characteristics in 2002				Stratigraphic thickness (feet above mean sea level) and general description
		Contaminant (ICL)	Average Concentration (ppb)* ± 1 std. dev.	Maximum Concentration (ppb)*	#wells >ICL** / #wells	
Landfill	Only a few wells inside the landfill; however, all show contaminants with constant concentrations above the ICLs and few downward trends.					165 - 145 feet above mean sea level (msl). Waste appears very flat.
Upper Sand	Eastern	Benzene (5) Vinyl chloride (2) THF (154) Arsenic (50)	26 ± 28 4 ± 7 65 ± 130 209 ± 82	68 14 260 320	4/4 2/4 1/4 4/4	145 - 135 msl. Sand pinches out to the north and thickens to the east. Sand unit is approximately 30 to 40 feet thick at the Cocheco River.
	Southern	Benzene Vinyl chloride THF Arsenic	24 ± 15 7 ± 11 399 ± 414 117 ± 131	44 25 970 327	4/5 2/5 3/5 3/5	Dips to the south; however, thickness remains about 15 to 20 feet. The upper sand directly contacts the Bellamy Reservoir. The water level in the Reservoir is approximately 135 feet msl.
Upper-Upper Interbedded	Eastern	Benzene Vinyl chloride THF Arsenic	49 ± 18 11 ± 9 88 ± 179 207 ± 233	79 26 540 634	9/9 8/9 2/9 6/9	135 to 115 feet msl under the landfill, pinches out to the north. Dips and thickens to the east. Ground water from the interbedded zone flows into the Cocheco River which is at an elevation of approximately 110 feet msl.
	Southern	Benzene Vinyl chloride THF Arsenic	30 ± 12 1 ± 1 933 ± 827 174 ± 147	44 4 2400 376	7/7 1/7 6/7 5/7	Thickens to the south, lies about 20 feet beneath the surface of the Bellamy Reservoir and discharges through the upper sand into the Reservoir.

Table 2: The Characteristics of Aquifers at Dover Municipal Landfill
Stratigraphic units are arranged from upper-most to lowest

Stratigraphic Unit	Plume	Contaminant concentrations and characteristics in 2002				Stratigraphic thickness (feet above mean sea level) and general description
		Contaminant (ICL)	Average Concentration (ppb)* ± 1 std. dev.	Maximum Concentration (ppb)*	#wells >ICL** / #wells	
Lower-Upper Interbedded	Eastern	Migration limited by vertical conductivity, low amounts of contamination if any. Arsenic is the only contaminant in concentrations over the ICL of 50. 3 wells out of 5 are over 50 ppb.				The thickness of this unit was included in the upper interbedded strata described above. The reason why no differentiation is that the boundary is very gradational and therefore separating the two units is arbitrary in some locations.
	Southern	Same as Eastern Plume; however 3 of 4 wells are over 50 ppb.				
Marine Clay	115 to 100 feet above msl beneath the landfill. The marine clay strata dips to the southeast where it lies more than 100 feet below the surface. The marine clay actually surfaces to the north of the landfill. Although few wells monitor this interval, this unit is considered to be uncontaminated as it is impermeable to ground water and contaminant flow. Therefore, it is assumed that this unit insulates the underlying aquifers.					
Clay & Silt	100 to 95 feet above msl beneath the landfill.					
Sand & Gravel	95 to 90 feet above msl beneath the landfill. This unit thickens considerable to the north and ultimately is the main aquifer that the Calderwood well draws from ½ mile to the north of the Site. Based on monitoring at the Calderwood well, this aquifer is not contaminated.					
Bedrock	Surface is 90 feet above msl.					

* This data is taken from the May 2002 sampling round.

** The Interim Clean up Level (ICL) is used in this column to indicate the number of wells contaminated above the ICL against the number monitored. For instance, in the first case, the Eastern Plume has benzene that has an average concentration of 26 ppb and a standard deviation of 28, indicating a wide spread of data. The maximum concentration of benzene in the Eastern Plume is 68 ppb. The next column, “>ICL/#wells,” is listed as “4/4," which means that of the four wells monitored in the Eastern Plume, all four exceeded the ICL for benzene of 5 ppb.

*** Note that the ICL for arsenic used in this table (50 ppb) is from the 1991 ROD. The arsenic ICL will be changed to 10 ppb as a part of this ROD Amendment.

Air

Indoor air in houses along Tolend Road, which are located directly above the Eastern Plume, may be impacted by VOCs in this ground water plume. Past monitoring has indicated that no indoor air risk was present. However, EPA has issued new guidance containing new risk assessment methodology regarding indoor air which requires that the Site be re-evaluated.

Surface Water and Sediments

The primary receptors of Site contaminants are the surface water bodies surrounding the landfill shown on Figures 1 and 2. Surface water at the Site may be divided into two watersheds, the Cocheco River and Bellamy Reservoir watersheds. The Cocheco River watershed includes the drainage trenches that lie on the perimeter of the landfill, the drainage swale that the drainage trenches flow to, and the Cocheco River. The Bellamy Reservoir watershed includes the wetlands that lie south of the landfill and flow gradually to the Bellamy Reservoir. Surface water is not impacted by Site contaminants in either watershed. No violation of Surface Water Quality Criteria (SWQC) for any VOC, other organic contaminant, or arsenic was found. Sediments in the Cocheco River watershed are contaminated with arsenic. Sediments in the Bellamy Reservoir watershed do not appear to be contaminated.

Surface Water and Sediments - Cocheco River Watershed

Two drainage trenches encircle the landfill to intercept leachate emanating from the landfill (Figure 2 on page 4). On the northwest side of the landfill is the northern drainage trench, a small, shallow ditch that flows first northward, is piped under Tolend Road, and then flows eastward to discharge to the drainage swale and ultimately the Cocheco River. The northern drainage trench is an intermittent stream, flowing during the spring and runoff events. The southern drainage trench originates on the southwest side of the landfill, flows along the southern and eastern perimeter of the landfill and is piped under Tolend Road. The southern drainage trench has a larger flow than the northern drainage trench and contains flow at all times of the year except during extended dry periods. Sediment in the southern drainage trench is orange-red and contains primarily iron with arsenic. The southern drainage trench flows eastward and then north before discharging to the drainage swale.

The drainage swale, also shown on Figure 2, combines the flow of the northern drainage trench with that from the southern drainage trench. The drainage swale, lying north of the landfill and Tolend Road, quickly drops 15 feet, picks up the flow of the northern and southern drainage trenches, and then drops 40 feet over a distance of 400 feet to the Cocheco River in a narrow valley. There is also evidence that contaminated ground water discharges directly to the drainage swale.

The Cocheco River receives sediment from the swale and ground water from the landfill. Ground water has arsenic concentrations that exceed the SWQC of 340 ppb (acute) and 150 ppb

(chronic); however, the ground water discharges into the surface waters of the drainage trench, swale, and Cocheco River in concentrations well below the SWQC acute and chronic concentrations. This occurs because iron is also present in the ground water. The iron combines with oxygen upon discharge to these surface water bodies to form a solid residue that quickly binds the arsenic as well. Therefore, arsenic is contained in the sediments and not present above natural, background concentrations in the surface water. The sediments accumulate in the River bottom at concentrations ranging from 3 to 1500 parts per million (ppm) of arsenic.

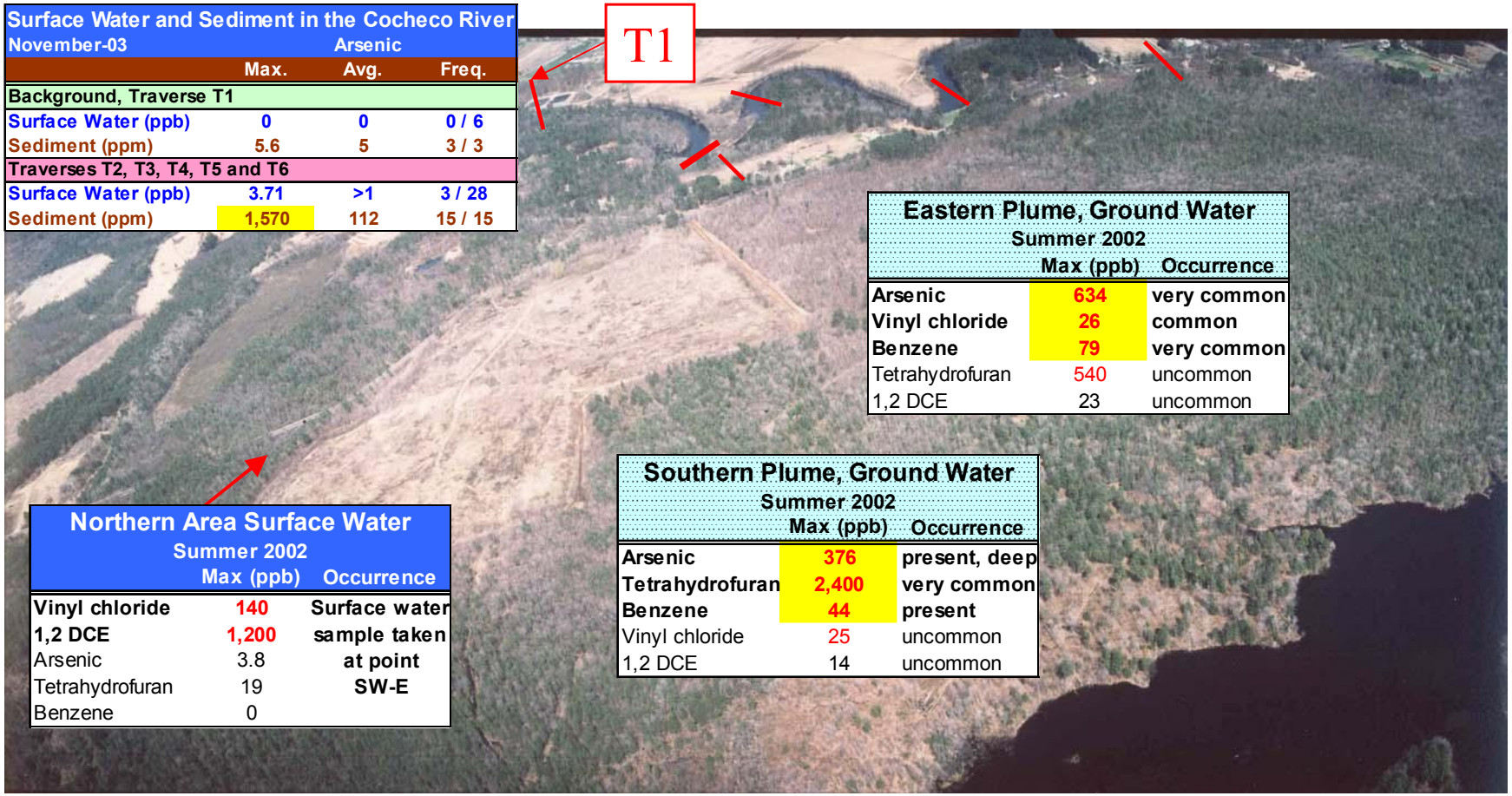
Sediment was sampled in the drainage trenches and drainage swale for the 1991 ROD and again beginning in 2000. Sediments were sampled in six transects across the Cocheco River in 2002, with each transect consisting of three sampling stations. The sampling stations were on the bank adjacent to the Site, at mid-stream in the river, and on the far bank of the river. The results of this sampling indicated that there are a few locations of high arsenic concentration. These locations are near where the drainage swale flows into the Cocheco River and along the Cocheco River, in a linear area approximately 50 feet long, where ground water discharges to the river. The areas of high arsenic concentration coincide with high iron concentration and therefore are easily spotted as areas of red-stained sediment. The general concentrations of arsenic-contaminated sediments are shown on Figure 3 on page 28 and more particularly on Table 5 on page 36.

Surface Water and Sediments - Bellamy Reservoir

Surface water in the Bellamy Reservoir watershed was sampled in December 2003. Neither sample contained any VOCs or arsenic above detection limits. No sediments were sampled; however, no areas of orange-red staining were noted that indicated contaminated sediments. A large forested wetland area lies between the landfill and the Reservoir. Ground water sampling in the upper-sand, indicative of conditions in surface water in the wetland areas, does not indicate any contamination. Contaminated ground water in the Southern Plume lies approximately 20 to 40 feet beneath the land surface and is slowly flowing towards the Bellamy Reservoir without impacting intervening wetlands or streams.

Figure 3: Generalized depiction of contamination at the Dover Municipal Landfill. The maximum concentration of contaminants in ground water, surface water, and sediments. The sediment and surface water concentrations in the Cocheco River are listed beginning at transect T1. Subsequent transects, T2 to T6 proceed to the right (eastward) from T1. More information is contained in Section 2 of the EPA Addendum.

North



Surface Water and Sediment in the Cocheco River
November-03 — Arsenic

	Max.	Avg.	Freq.
Background, Traverse T1			
Surface Water (ppb)	0	0	0 / 6
Sediment (ppm)	5.6	5	3 / 3
Traverses T2, T3, T4, T5 and T6			
Surface Water (ppb)	3.71	>1	3 / 28
Sediment (ppm)	1,570	112	15 / 15

Eastern Plume, Ground Water
Summer 2002

	Max (ppb)	Occurrence
Arsenic	**634**	**very common**
Vinyl chloride	**26**	**common**
Benzene	**79**	**very common**
Tetrahydrofuran	540	uncommon
1,2 DCE	23	uncommon

Northern Area Surface Water
Summer 2002

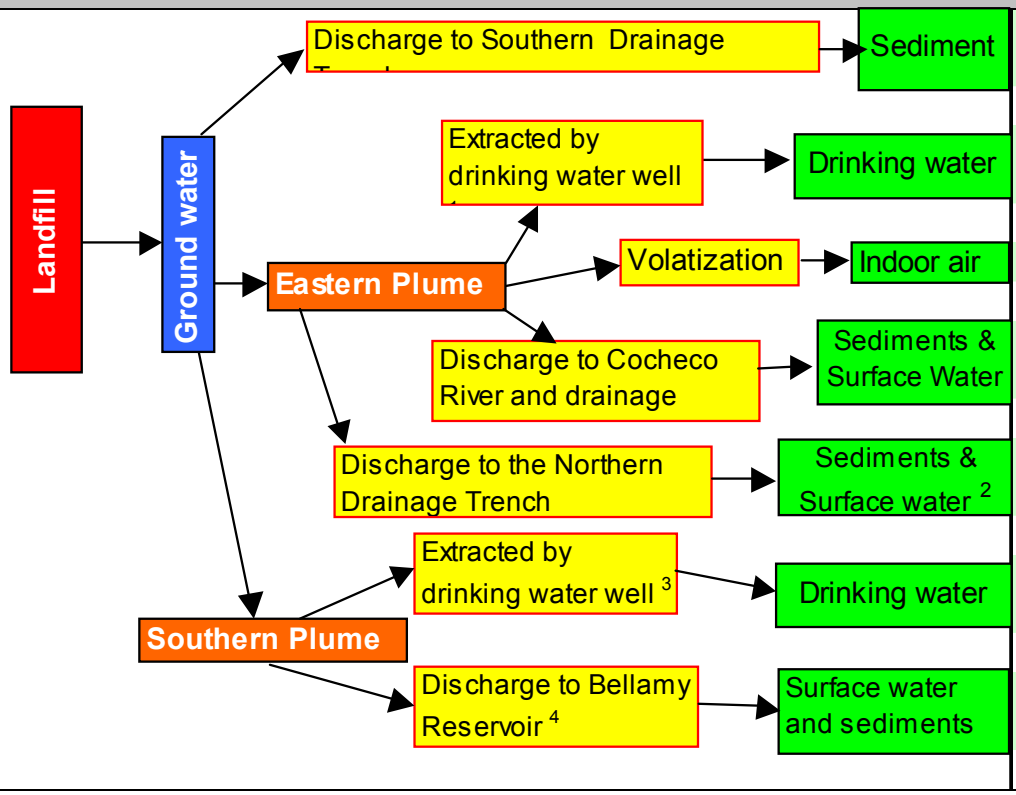
	Max (ppb)	Occurrence
Vinyl chloride	**140**	**Surface water sample taken at point SW-E**
1,2 DCE	**1,200**	
Arsenic	3.8	
Tetrahydrofuran	19	
Benzene	0	

Southern Plume, Ground Water
Summer 2002

	Max (ppb)	Occurrence
Arsenic	**376**	**present, deep**
Tetrahydrofuran	**2,400**	**very common**
Benzene	**44**	**present**
Vinyl chloride	25	uncommon
1,2 DCE	14	uncommon

Table 3 provides a Conceptual Site Model (the "CSM") for the Dover Municipal Landfill that summarizes sources, release mechanisms, pathways and receptors. The CSM is a linear depiction of Site conditions that illustrates what is known about human and environmental exposure through contaminant release and migration to potential receptors. Table 3 shows that contamination emanates from the landfill and is conveyed outward by ground water forming the Eastern Plume and the Southern Plume. There are two minor pathways shown as well, containing leachate that contaminates the sediment in the perimeter drainage trench and at least two known source areas.

TABLE 3: CONCEPTUAL SITE MODEL - DOVER MUNICIPAL LANDFILL



Exposure Route	RECEPTOR: HUMAN – Area Residents	HUMAN – Site Trespass	BIOTA – Terrestrial	BIOTA – Aquatic
Discharge to Southern Drainage → Sediment: Ingestion		CURRENT	CURRENT	
Discharge to Southern Drainage → Sediment: Dermal contact		CURRENT	CURRENT	
Extracted by drinking water well → Drinking water: Ingestion	FUTURE			
Extracted by drinking water well → Drinking water: Dermal contact	FUTURE			
Volatization → Indoor air: Inhalation	CURRENT			
Discharge to Cocheco River and drainage → Sediments & Surface Water: Ingestion	CURRENT	CURRENT	CURRENT	CURRENT
Discharge to Cocheco River and drainage → Sediments & Surface Water: Dermal contact	CURRENT	CURRENT	CURRENT	CURRENT
Discharge to the Northern Drainage Trench → Sediments & Surface water 2: Ingestion		CURRENT	CURRENT	CURRENT
Discharge to the Northern Drainage Trench → Sediments & Surface water 2: Dermal contact		CURRENT	CURRENT	CURRENT
Extracted by drinking water well 3 → Drinking water: Ingestion	FUTURE			
Extracted by drinking water well 3 → Drinking water: Dermal contact	FUTURE			
Discharge to Bellamy Reservoir 4 → Surface water and sediments: Ingestion	FUTURE		FUTURE	FUTURE
Discharge to Bellamy Reservoir 4 → Surface water and sediments: Dermal contact	FUTURE		FUTURE	FUTURE

Footnotes:
#1 and 3 - Public drinking water supply has been in place since 1983. No ground water uses are allowed by municipal restriction.
#2 - Surface water concentrations do not pose a risk; however, indicate the presence of discrete areas of ground water contamination.
#4 - Contaminated ground water is not currently discharging to the Bellamy Reservoir.

Key: Primary Source | Secondary Source | Release Mechanism | Pathway

Ground water is the means by which contaminants are conveyed from the site. No other transport pathway is known.

3. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The area surrounding the Site is sparsely populated residential use. The only residences are along the northeastern side of Tolend Road, overlooking the Cocheco River. The land to the east, south, west and north of the Site consists of hemlock forest with several wetland areas draining away from the landfill. The Bellamy Reservoir lies to the south of the landfill and much of the watershed area either contributes to the Bellamy Reservoir, a Class-A drinking water supply that serves much of southeastern New Hampshire, or is within a well-head protection area for the Calderwood Well that lies ½ mile to the north of the landfill. Much of the land surrounding the landfill is owned by the City of Dover. Activities on top the landfill are restricted by fences and signs posted along Tolend Road.

Current use of the Site and area ground water is restricted by local ordinances which prevent development and the use of ground water while remedial activities are ongoing until the cleanup is completed. Once cleanup is complete, the landfill itself will be covered with an appropriate cap. In the past the City of Dover has expressed an interest in using the landfill surface for recreational facilities or a golf course. Recently there has been some discussion between the City and the State concerning reuse of the landfill as a disposal area. Future development will be limited by the presence of a cap and its location in a well head protection area and proximity to nearby wetlands.

G. SUMMARY OF SITE RISKS

The human health risk assessment was first performed for the 1991 ROD and updated in the 2004 RFFS. See Section 8 of Volume I (a separate document) of the 1989 Remedial Investigation, Section 2.2.2 of the 1991 Feasibility Study,[17] and Section 2 of the 2004 RFFS. A limited ecological risk assessment was performed in 2002 for the RFFS. A summary of those aspects of the human health risk assessment which support the need for remedial action is discussed below followed by a summary of the environmental risk assessment.

1. HUMAN HEALTH RISK ASSESSMENT

The human health risk assessment followed a four step process: 1) hazard identification, which identified those hazardous substances that, given the specifics of the Site, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates.

[17] Dover Municipal Landfill Feasibility Study, HMM Associates, February 28, 1991.

The 1991 ROD identified a future risk to human health associated with drinking ground water contaminated with arsenic and to a much lesser extent, vinyl chloride. Current exposure to ground water was not a complete pathway in that all property owners are provided with public water. Contact with landfill soil was evaluated but also found to be an incomplete pathway since a soil cover is in place on the landfill and access is partially prevented by fencing. The soil cover prevents only dermal contact with contaminants in the soil but continues to allow precipitation to leach contaminants into the underlying ground water. Exposures to sediment in the Cocheco River and swale were evaluated and found to be within an acceptable risk range for human health via ingestion and dermal absorption, although the risk was borderline (8×10^{-5}). Exposure to surface water in the Cocheco River, Bellamy Reservoir and surrounding waters were within EPA's risk range and did not pose an unacceptable risk. Outdoor air emissions at the landfill were also within normal limits. Indoor air in buildings in areas of the Eastern Plume were previously evaluated using criteria supplied by NHDES and found not to pose a threat.

Carcinogenic Risk

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g. 1×10^{-6} for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 30 years as a result of Site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an "excess lifetime cancer risk" - or the additional cancer risk on top of that which we all face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-Site related) causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for Site related exposure is 10^{-4} to 10^{-6} (i.e., 1/10,000 to 1/1,000,000). Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances. A summary of the cancer toxicity data relevant to the chemicals of concern is presented in Section 2 of the RFFS.

Non-Carcinogenic Risk

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). A HQ<1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to

which a given individual may reasonably be exposed. A HI<1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. A HI>1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-cancer HQ = CDI ÷ RfD

where CDI = Chronic Daily Intake and RfD = Reference Dose. CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Human Health Risk Uncertainty

The non-carcinogenic and carcinogenic risk estimates are subject to numerous uncertainties that may overestimate or underestimate risk. Overall, risks are more likely to be overestimated rather than underestimated. The following bullets summarize the major areas of uncertainty. Please refer to Section 2 of the 2004 RFFS for additional detail.

- Data Quality Issues - no data quality issues have been identified with respect to analysis performed on Site samples.
- RfDs and Cancer potency factors- Several uncertainty factors could be incorporated to address uncertainty resulting from differences between animals and humans, variability among individuals, and other sources.
- Exposure - EPA estimated that exposure to sediment contaminants in the Cocheco River would be limited to 20 days per year due to the steep terrain and difficult access. There are other exposure assumptions that apply to the calculations as well.

Site risks were re-assessed during the preparation of the RFFS using updated toxicity information and exposure assessments. The results of that assessment are presented below.

a. Ground Water

Data from monitoring in summer 2001, fall 2001, and spring 2002 were used to update the ground water risk analysis performed in the RFFS. The risk assumptions used in the 1991 Risk Assessment were changed to conform to present standards and practices. Updated toxicity information was used in these analyses. Table 4, below, summarizes the risk from future ingestion of ground water at the Site.

The primary risk at the Site continues to be future ingestion of ground water. The ground water

aquifer is classified as a drinking water aquifer and could be used for drinking water should future development occur in the area. No current risk has existed since the installation of a municipal drinking water system in 1981 and the ordinances were enacted by the City of Dover and the adjoining Town of Madbury in the early 1990's. The primary contaminants in ground water include arsenic and vinyl chloride, which pose 98% and 1% of the total incidental lifetime cancer risk, respectively. Ground water at the Site also contains tetrahydrofuran, benzene and a number of other chlorinated compounds.

Arsenic and THF concentrations have been increasing along the southern edge of the landfill, primarily wells SB-4D and SB-B2, located at the landfill toe and between the landfill and Bellamy Reservoir, respectively. These results indicate contamination in the Southern Plume is increasing and moving towards the Bellamy Reservoir. Further details regarding the increase in contamination in the Southern Plume are contained in Appendix B of the EPA Addendum.

Table 4 below lists both the carcinogenic and non-carcinogenic risks from the relevant contaminants at the Site. Further details are provided in the RFFS and the EPA Addendum to the RFFS.

Table 4: Future Drinking Water Risks in Ground Water at Site[18]

Compound	Scenario	Concentration (ug/l)	Hazard Index	Cancer Risk
Arsenic	Average	180.82	**16.5**	**2.97×10^{-3}**
	Worst-case	654	**59.7**	**1.08×10^{-2}**
Vinyl chloride	Average	4.62	0.0422	7.59×10^{-5}
	Worst-case	26	0.237	**4.27×10^{-4}**
Total, all other Site contaminants	Average	---	0.2428	2.33×10^{-5}
	Worst-case	---	2.633	**1.29×10^{-4}**
Total Drinking Water Risk	Average	---	**16.8**	**3.07×10^{-3}**
	Worst-case	---	**62.6**	**1.13×10^{-2}**

* The bold values are considered by EPA to pose a threat to public health. EPA's acceptable carcinogenic risk range is between 10^{-4} and 10^{-6} and acceptable non-carcinogenic risk is a Hazard Index of 1 or less.

[18] RFFS, Appendix I, Tables 3 & 4.

b. Sediments

The contaminants associated with the Site sediments consist of iron and arsenic. These contaminants originated from the landfill leachate by entering ground water in dissolved form, then discharging to a surface water body and precipitating in solid form. Arsenic contaminated sediments were removed from the southern drainage trench as outlined in the 1991 ROD during the 1997 trench and swale restoration (here the term "trench" refers only to the southern drainage trench).[19] Since the removal of contaminated sediments, however, additional arsenic-contaminated sediment has been deposited in these areas from the breakout of leachate from the landfill. Sediments were sampled in November 2002 from the Cocheco River in six traverses.[20] Sediments were sampled from the landfill drainage trenches and drainage swale in an earlier investigation.[21]

The maximum arsenic concentration found in Cocheco River sediment was 1,520 mg/kg on the bank closest to the landfill at transect T3. With respect to human health, this translated into a human health risk of 5.5×10^{-5}, which although within EPA's acceptable risk range of 10^{-4} and 10^{-6}, is still above EPA's point of departure in considering risk (10^{-6}).[22] The non-cancer Hazard Index was calculated as 0.9, just below EPA's acceptable value of 1.

c. Surface Water

The primary surface water impacts are in the drainage trenches, drainage swale, and Cocheco River. The original human health risk assessments by Wehran and HMM in the 1988 and 1990 Remedial Investigations found no excess carcinogenic or non-carcinogenic risk to the public.[23, 24] In the RFFS, the potential surface water risk was re-calculated using current, approved methods and data gathered during the May 2002 Site sampling round. This re-calculation found that the surface water at, and surrounding the Site, still did not pose a risk to human health.[25] Sampling

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[19] Remedial Action Summary Report for the Trench and Swale (Close-Out Report), GeoInsight, April, 2002.

[20] Ecological Risk Assessment, attached to the RFFS as Appendix I, Attachment I-3.

[21] Trench and Swale Investigation, GeoInsight, 1997.

[22] National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. § 300.430(e)(2)(i)(A)(2).

[23] Field Elements Studyfor the Municipal Landfill, Dover, New Hampshire, HMM Associates, Inc., January 8, 1990.

[24] Remedial Investigation Dover Municipal Landfill, Volume 1. Prepared for New Hampshire Department of Environmental Services by Goldberg-Zoino & Assoc. and Wehran Engineers, November 1988.

[25] RFFS, Section 2, page 2-16 through 17, January 30, 2004.

results performed in streams that are tributaries to the Bellamy Reservoir in December 2003 did not find VOCs or arsenic in surface water.[26]

d. Soil

The landfill cover is visually inspected at least annually. Much of it is now vegetated with grassland plants and appears to be a meadow with various tree species appearing in the northeast corner. The cover remains intact and continues to provide a barrier to dermal contact with contaminated soils. A chainlink fence parallels Tolend Road; however, this fence is not continuous and is only designed to restrict vehicular traffic, not pedestrian access. Although the landfill is easily accessed on foot, there are no exposures to the waste materials at the surface to human or ecological receptors. However, the current soil cover allows precipitation to enter and leach through the waste beneath the cover, contaminating the groundwater.

e. Air

Outside air emissions at the landfill have not exceeded regulatory levels to date. Indoor air exposure to VOCs in buildings in the area of the Eastern Plume have been assessed using criteria developed by NHDES to assess the potential for indoor air impacts from contaminant plumes. There did not appear to be a risk based on those criteria.

2. ECOLOGICAL RISK ASSESSMENT

The 1991 ROD did not have an ecological risk assessment performed to determine the risk to the environment. However, the 1991 ROD did develop criteria, using the National Oceanographic and Atmospheric Administration (NOAA) standards, to identify sediments that may affect aquatic life. The 1991 ROD specified that contaminated sediments containing more than 50 ppm of arsenic would likely affect aquatic life and therefore must be removed.[27]

EPA's protocol for assessing ecological risk is a tiered approach, the first tier, performed as part of the RFFS, consisted of obtaining the whole-sediment contaminant concentrations. Arsenic is the only contaminant at the Site that is present in the appropriate media and in concentrations sufficient to pose a potential ecological risk. For ecological risks, numerical criteria for protective contaminant concentrations in sediments are based on screening levels established by the NOAA for estuarine and marine biota and the Ontario Lowest Effect Levels for freshwater biota, both of which are accepted by EPA and NHDES for use as screening guidance.[28]

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[26] Pers. comm. by fax, Michael Webster to Darryl Luce, February 11, 2004.

[27] 1991 ROD, page 50.

[28] Screening Quick Reference Tables, Version 2, http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html, NOAA. Ontario Lowest Effect Levels 1993, 1994.

Elevated levels of arsenic were found above threshhold sediment levels (and the terrestrial wildlife benchmarks for soil) in the southern drainage trench as well as in three locations on the Cocheco River, with the highest levels at the south central toe of the landfill and in sediments on the eastern bank of the Cocheco River. These levels indicate there is a potential for ecological risk. Because the arsenic concentrations in sediment exceeded the Ontario threshold level of 8.2 micrograms per kilogram (parts per million), the testing will move to the second stage to determine if the arsenic is bio-available for organisms to absorb, as part of the pre-design investigations for the Amended ROD. The results of the ecological sediment sampling in the Cocheco River are presented below:

Table 5: Cocheco River Sediment Arsenic Concentrations

Transect	Position in Transect Concentration in mg/kg or parts per million Far (north) bank	mid-river	Near (south) bank	Average	Standard Deviation
1 - (background)	5.6	4.8	4.6	5.0	0.5
2 - (mouth of swale)	3.2	3.6	**42.9**	16.6	22.8
3 (seep 300 feet downstream of swale)	3.8	7.6	**1520**	511	874
4 (800 feet downstream of swale)	3.7	5.1	4.9	4.6	0.8
5 (seep 2,600 feet downstream of swale)	3.2	**11.8**	**51.7**	22.2	25.9
6 (4000 feet downstream of swale)	3.3	7.3	5.1	5.2	2.0
Average of all Transects	3.8	6.7	**271.5**		
sd of all	0.9	2.9	612		
Average (T2 - T6)	3.4	7.1	**324.9**		
sd (T2 - T6)	0.3	3.1	668.4		

sd = sample standard deviation. Bold values exceed the first tier threshold value of 8.2 ppm.

These are the sediment concentrations in the Cocheco River. Transect 1 is the upstream background value. Succeeding transects are impacted by discharges from ground water and surface water contaminated with arsenic from the site. See Figure 1 in Appendix I of the RFFS or Figure 3 on page 28 for the location of the transects.

The results shown on Table 5 indicate that arsenic is elevated on the landfill side of the River. Arsenic decreases to nearly background concentrations in the middle of the River and are at

background concentrations on the far side of the River. The highest concentrations on the landfill (south) side of the River are at points where ground water seeps into the River and decreases within a short distance downstream. The overall concentrations drop further out in the stream and downstream primarily because arsenic is diluted by the sediment load of the River which dwarfs the sediment generated by the discharge from the Site. Concentrations on the north side of the stream are below the first-tier NOAA guidelines.

H. REMEDIATION OBJECTIVES

The 1991 ROD remedy was designed to satisfy remedial action objectives (RAOs) that were developed in the 1991 Feasibility Study based on the results of the risk assessment.[29] This process was summarized and its conclusions begin on page 23 of the 1991 ROD. The change to the Source Control component of the 1991 ROD remedy necessitated revising the RAO's associated with hazardous waste in the landfill. Further, because remedial action has not begun at the site, all RAO's were reviewed in light of the updated risk assessment performed in conjunction with the RFFS and were updated as necessary to ensure all Site risks would be addressed by the amended remedy.

With two exceptions, since issuing the 1991 ROD, Site risks have not significantly changed. These exceptions are:

1. Sampling in the Cocheco River indicates the potential for human health and ecological risk from arsenic in sediment along the banks of the Cocheco River.

2. New guidance indicates the need to re-assess a potential indoor air risk from VOCs volatilizing from the Eastern Plume.

These potential risks were not identified in the original FS and actions to address them were not included in the 1991 ROD. New ecological assessment criteria and new indoor air guidance dictate that these exposures be examined more thoroughly, and RAOs have been added to address these risks. A full list of RAOs for each media is presented below, comparing the RAOs in the 1991 ROD to those in this Amended ROD:

<u>RAOs for Hazardous Wastes in the Landfill</u>

In order to consider a change to the Source Control component of the 1991 ROD remedy, the RAOs for hazardous wastes in the landfill need to be revised to accommodate this change. Additionally, since remedial measures for localized areas of high contaminant concentrations in the landfill are needed to address potential exposure to any wastes just beneath the soil cap, a new RAO for the landfill is required. The 1991 revised RAO's are shown below:

[29] Dover Municipal Landfill Feasibility Study, Section 2, HMM Associates, Inc., February 28, 1991.

RAOs Identified in the 1991 Feasibility Study

(a) Eliminate or minimize the continued infiltration of surface waters through the contaminated solid waste and into the ground water.

(b) Prevent direct contact with and ingestion of contaminated solid waste materials present in the landfill.

(c) Comply with federal and State ARARs.

For this Amended ROD, the RAOs for the landfill are adjusted as follows:

(a) Facilitate the treatment of contaminants in the landfill and their transport to ground water and subsequent destruction or capture.

(b) Prevent direct contact with and ingestion of contaminated solid waste materials present in the landfill.

(c) Evaluate additional remedial measures for contaminant source areas that may <u>not</u> be adequately or efficiently conveyed to ground water for destruction or capture.

(d) Implement measures to meet clean closure requirements.

(e) Comply with federal and State ARARs.

If the contingent remedy of capping the landfill is necessary, the RAO's from the 1991 Feasibility Study will be retained.

<u>RAOs for Sediments - On-Site.</u>

Although arsenic contaminated sediments were removed from the southern drainage trench and drainage swale in the 1997,[30] any additional arsenic-contaminated sediment that has subsequently been deposited in these areas from the breakout of leachate from the landfill must be removed.

Therefore, the RAOs developed for sediments in the 1991 Feasibility Study are retained:

(a) Eliminate or minimize the potential human exposure to, and environmental impact from, the contaminated sediments located in the landfill drainage trench and at the outlet of the trench discharging to the drainage swale to the Cocheco River.

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[30] Remedial Action Summary Report for the Trench and Swale (Close-Out Report), GeoInsight, April, 2002.

(b) Eliminate or minimize the migration of contaminated sediments from the landfill drainage swale into the Cocheco River and along the banks of the Cocheco River.

(c) Contain or remove contaminated sediments in a manner protective of human health and the environment.

(d) Comply with federal and State ARARs.

RAOs for Ground Water/Surface Water/Leachate - On-Site

These RAOs are retained from the 1991 Feasibility Study:

(a) Contain and control the generation and migration of impacted ground water and leachate on-Site serving as a source of off-Site ground water and potential surface water contamination and impact to the drainage trenches.

(b) Reduce the total mass of contaminants present in ground water and leachate to MCLs or levels protective of human health and the environment prior to discharge.

(c) Comply with federal and State ARARs.

RAOs for Air

The potential exists for the landfill to pose some risk due to VOC or fugitive dust emissions. Although USEPA concluded in 1991 that the carcinogenic and non-carcinogenic risks from outdoor air exposures were within USEPA's acceptable carcinogenic risk range, remedial action objectives were developed to respond to any potential risk. These RAOs have been modified to include indoor air concerns for this ROD Amendment as follows:

(a) Eliminate or minimize risk to human health due to off-gassing of VOCs contained in the surface water currently flowing through the landfill drainage trenches.

(b) Eliminate fugitive dust emissions from the landfill.

(c) Eliminate or minimize the potential risk to human health from migration of VOC vapors from the ground water into the basements of existing homes or future structures should additional development occur in the area.

(d) Comply with federal and State ARARs.

RAOs for Ground Water/Surface Water - Off-Site

Contaminated ground water has migrated in two separate plumes from the Site posing a risk to future drinking water use and potential surface water impacts. The Eastern Plume discharges contaminants to the Cocheco River which, although it does not pose a risk to human health from exposure to the surface water, may pose a risk to human health and ecological receptors through exposure to sediment contamination resulting from Site ground water discharges. The Southern Plume migrates towards the Bellamy Reservoir and may ultimately discharge contaminants to the Reservoir. Therefore, remedial action objectives were developed in the 1991 ROD to respond to these potential threats. These RAOs will be retained for this ROD Amendment, and are as follows:

(a) Eliminate or minimize the levels of contaminants in the ground water and leachate emanating from and down-gradient of the landfill. The off-Site contaminated ground water will be compared to MCLs. If no MCL or non-zero MCLG exist, a target level for treatment of that contaminant will be used. This target level will be established at a level which is protective of human health and the environment.

(b) Eliminate or minimize the threat posed to the public health and surrounding environment by the current extent of the contaminated ground water, including potential indoor air exposures.

(c) Prevent the discharge of impacted ground water from the Site from entering surface water bodies above concentrations that are protective of human health and the environment.

(d) Comply with federal and State ARARs.

Sediments - Off-Site (Cocheco River)

The 1991 Feasibility Study did not identify remedial action objectives for off-Site sediment. However, recent sampling in areas impacted by ground water migrating from the landfill has indicated that human health and ecological impacts are possible. Therefore, new RAOs for sediments in the Cocheco River were established for this ROD Amendment and area as follows:

(a) Eliminate or minimize any impact from arsenic-contaminated sediments in the Cocheco River to human health or ecological receptors.

(b) Comply with federal and State ARARs.

I. DESCRIPTION OF REMEDIAL ALTERNATIVES EVALUATED

Within this section are the four remedial alternatives that were evaluated for this Amended ROD to address the Site contamination. Details of the development of these alternatives are provided in the RFFS and the EPA Addendum.

1. SUMMARY

The outline below summarizes the components of each of the four alternatives considered. A more detailed explanation follows the summary. Since the No-Action Alternative was evaluated in the 1991 ROD and found to fail the threshold criteria, it is only provided in this summary for informational purposes and will not be carried through the rest of the analysis. See pages 26 and 32 of the 1991 ROD.

1. No Action Alternative
    1. SC-1: Source Control, no action with respect to the landfill or leachate generated by it.
    2. MM-1: Management of Migration, no action with respect to the contaminant plumes or their ultimate discharge points, the drainage trenches, drainage swale, Cocheco River, and Bellamy Reservoir.

2. 1991 ROD
    1. SC-7/7A: Source Control, capping of the landfill and interception and treatment of the ground water leachate.
    2. MM-2/4: Management of Migration, has two components: MM-2 is Natural Attenuation of contaminated ground water in the Eastern Plume with a contingency for active treatment. MM-4 consists of pumping and treating the contaminated ground water in the Southern Plume that is migrating towards the Bellamy Reservoir.

3. Proposed Alternative
    1. SC-A: Source Control, the landfill remains uncapped with a soil cover in place and an air-sparging trench captures or degrades all contaminants with a contingency for capping and dewatering.
    2. MM-2: Management of Migration, Monitored Natural Attenuation of the Southern and Eastern Plumes.

4. Proposed Mixed Alternative
    1. SC-A: Source Control, as in the Proposed Alternative, the landfill remains uncapped with a soil cover in place and an air-sparging trench captures or degrades all contaminants with a contingency for capping and dewatering.
    2. MM-2/4: Management of Migration, same as the 1991 ROD Management of Migration.

2. COMMON ACTIVITIES

Several actions are common to all alternatives except the No Action alternative and are therefore not listed in the following summary. These common activities are listed below:

Institutional Controls

Institutional controls preventing the use of groundwater and prohibiting activities that will disturb the marine clay layer beneath the landfill are in place. Additional institutional controls will be required that prohibit altering the landfill such that it creates a risk or interferes with the cleanup.

Pre-Design Investigations

Several Pre-Design Investigations (PDI) are necessary prior to implementation of any of the remedy components. These investigations are needed to ensure that all risks at the Site are addressed in the most efficient and effective manner. The RFFS and the EPA Addendum indicate that there are several data gaps that require further investigation. A description of the PDIs and work needed to implement the amended remedy at the Site and ensure protectiveness are presented in Section K of this Amended ROD.

Monitored Natural Attenuation

The 1991 ROD selected Natural Attenuation (NA) to address the Eastern Plume with a contingency that, assuming source control is implemented and functioning, an active restoration system would be evaluated and implemented if ground water cleanup levels were not attained in 5 to 7 years or if levels significantly increased in that time frame.[31] Two alternatives evaluated for this Amended ROD use Monitored Natural Attenuation (MNA) as a treatment for one or both of the ground water plumes. Since the 1991 ROD, EPA has issued a guidance document formalizing NA as a remedy and also renaming it MNA.[32] The MNA remedy now contains specific protocols to verify and monitor cleanup progress. This guidance has been included in the ARARs section of this Amended ROD; therefore, the Management of Migration portion of the remedy for the Eastern Plume, previously referred to as NA will now be known as MNA and will be implemented consistent with the MNA guidance.

Contingent Remedies

Contingent remedies are developed and proposed to provide a back-up remedy in the event that an innovative remedy or MNA remedy fails. A contingent remedy is an accepted, dependable remedy with proven results and is easily implemented. Contingent remedies are identified within

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[31] Record of Decision, 1991, USEPA, page 57.

[32] *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites.* OSWER Directive 9200.4-17P, April 21, 1999

this Amended ROD, the RFFS, and the EPA Addendum to facilitate rapid implementation of a contingent remedy if any innovative technology fails. All Alternatives proposed in the RFFS and the EPA Addendum have contingent remedies for the components that are outlined below. A more detailed description of the contingencies in the amended remedy are presented in Section K. 2. of this ROD Amendment. An outline of the media and remedial technologies for which contingency remedies are proposed include:

(1) MNA in the Eastern Plume with a contingency for active restoration through ground water pump and treat;

(2) Air-Sparging Trench for Source Control with a contingency for a RCRA C cap and ground water interceptor/diversion trench;

(3) Sediment in the Cocheco River with a contingency for excavation; and

(4) Indoor Air in residences along Tolend Road with a contingency for corrective action.

3. THE 1991 ROD REMEDY

The 1991 ROD consisted of a Source Control component, SC-7/7A, and a Management of Migration remedy for each contaminant plume (MM-2 and MM-4, for the Eastern and Southern Plumes, respectively). The components of the 1991 ROD are summarized in Table 6 and a complete discussion is contained in the 1991 ROD beginning on page 46.

<table>
<tr><th colspan="5">Table 6: 1991 ROD Remedy</th></tr>
<tr><th colspan="5">Source Control Component</th></tr>
<tr><th></th><th>Landfilled Waste</th><th>Leachate from Landfill</th><th>Recovered ground water</th><th>Treated water</th></tr>
<tr><td>SC-7</td><td rowspan="2">Recontour & cap landfill with impermeable liner</td><td rowspan="2">Captured in interceptor / diversion trench</td><td>Treatment on-Site</td><td rowspan="2">Both discharge to the Cocheco River</td></tr>
<tr><td>SC-7A</td><td>Discharged to POTW</td></tr>
<tr><th colspan="5">Management of Migration Component</th></tr>
<tr><td>MM-2</td><td colspan="4">Monitored natural attenuation in the Eastern Plume, to be assessed five years after implementation.</td></tr>
<tr><td>MM-4</td><td colspan="4">Pump-and-treat of Southern Plume.</td></tr>
</table>

Figure 4 on the following page shows the 1991 ROD Remedy schematically. The area of capping and the ground water remediation areas are generally marked. Figures 11 and 12 of the 1991 ROD show the general construction of the cap and interceptor/diversion trench.

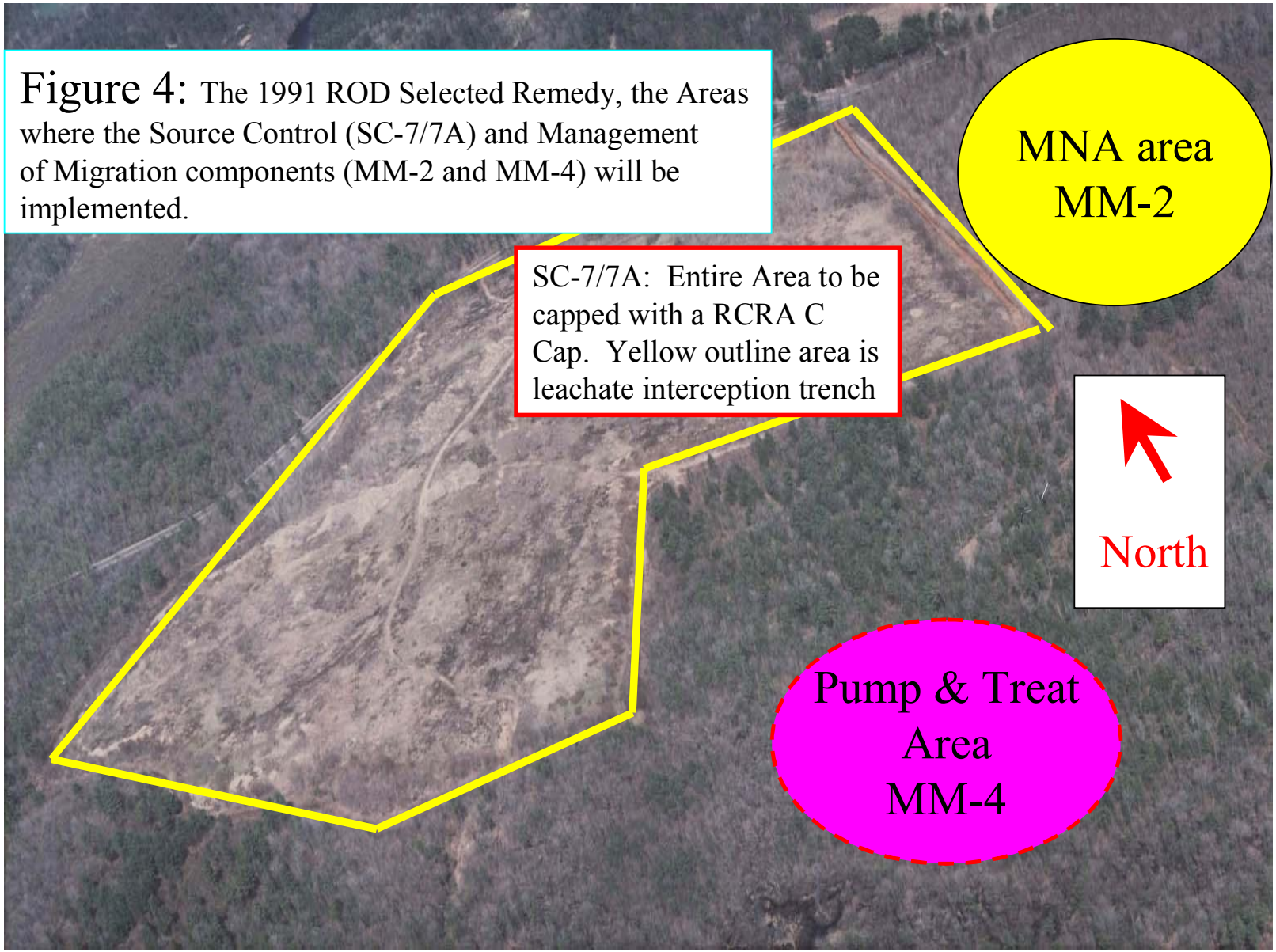

Figure 4: The 1991 ROD Selected Remedy, the Areas where the Source Control (SC-7/7A) and Management of Migration components (MM-2 and MM-4) will be implemented.

4. THE PROPOSED ALTERNATIVE AND THE MIXED ALTERNATIVE

The RFFS presented two alternatives to the 1991 ROD remedy. Both alternatives proposed to change the Source Control component from installing a cap and ground water interceptor/diversion trench (SC-7/7A) to an air-sparging trench. The difference between the two alternatives was in the Management of Migration component for the Southern Plume. The Alternative Remedy proposed to change the 1991 ROD pump-and-treat component for the Southern Plume to MNA. The Mixed Alternative only proposed changes the Source Control component and retains the Management of Migration components of the 1991 ROD. To clarify the changes, Table 7 is offered.

Table 7: Comparison of Alternatives

Media	1991 ROD Remedy	Mixed Alternative Remedy	Alternative Remedy
Landfill	Cap (SC-7/7A) and ground water interceptor trench.	Air-sparging trench (SC-A) with contingency for capping (SC-7/7A).	
Eastern Ground Water Plume	Monitored natural attenuation (MM-2) with contingency for active treatment.		
Southern Ground Water Plume	Pump-and-treat (MM-4)		Monitored natural attenuation (MM-2)

Below is a discussion of each component of the Alternative and Mixed Alternative.

Source Control

The Alternative and the Mixed Alternative incorporate the same change to the Source Control component of the 1991 ROD. Rather than capping the landfill and installing a ground water interceptor/diversion trench, the Alternative and Mixed Alternative leave the landfill uncapped, but install an air-sparging trench around the perimeter of the landfill. Areas of high concentrations of contaminants on and around the landfill will be identified and removed. The drainage trenches along the perimeter of the landfill would be filled. The air-sparging trench would be operated and maintained until leachate contaminated above cleanup levels ceases to flow from the landfill and does not contaminate ground water beneath the landfill above levels that pose an unacceptable risk to human health or the environment. The modeled estimate for the cessation of all contaminants, including arsenic, flowing from the landfill is greater than 100 years. The cleanup time of 100 years or more is based on a number of unsupported assumptions that will be verified during pre-design investigations. It is likely that as the air-sparging trench is operated, a more reliable estimate will become available. Excluding arsenic, the time estimated to cleanup

the ground water flowing from the landfill is approximately 30 years.[33] See Section K. 2. *Description of Remedial Components* and Section K. 4. *Expected Outcomes* for further discussion of the components of the Source Control component of the Alternative and Mixed Alternative, and the contingent remedy in the event of failure, respectively.

Management of Migration - Site-wide

The Management of Migration components for both the Alternative and Mixed Alternative contain elements not considered in the 1991 ROD. More specifically, sediments in the Cocheco River will be sampled and evaluated to determine if arsenic in those sediments pose a risk to human health or the environment. If it is determined that an unacceptable risk exists, those sediments will be excavated and disposed off-site. Indoor air was also not considered in the 1991 ROD. EPA will assess whether an unacceptable risk exists in buildings near the Eastern Plume using EPA's recent indoor air guidance.

Management of Migration – Southern Plume

The Alternative proposes to change the Management of Migration component for the Southern Plume from pump-and-treat to MNA. However, EPA did not consider this proposal because it was unsupported by Site data. This conclusion is further discussed in the EPA Addendum. A summary of the most significant problems in considering this change are noted below:

- No demonstration was offered showing that the migration of arsenic would stop.
- Arsenic concentrations in several wells on the southern toe of the landfill exceed the ICL and are increasing.
- Contaminants are above levels protective of human health, and rising, in a well half-way between the landfill and the Bellamy Reservoir, a Class A drinking water reservoir that serves much of southeastern New Hampshire.
- No Site-specific evidence has demonstrated conclusively that ground water contaminants in the Southern Plume would attain drinking water quality before discharging to the Bellamy Reservoir.

For these reasons, a change to the Management of Migration portion of the remedy was not considered for this Amended ROD. Therefore, the Mixed Alternative which retains both Management of Migration components selected in the 1991 ROD, is carried forward to the Comparative Analysis in Section J. 2.

Figure 5, on page 48, depicts a schematic layout of the alternative Source Control component of

[33] RFFS, January 30, 2004. Cleanup times in Section 1.

the Alternative and Mixed Alternative. A schematic representation of the air-sparging trench is offered in Figure 6, which directly follows Figure 5.

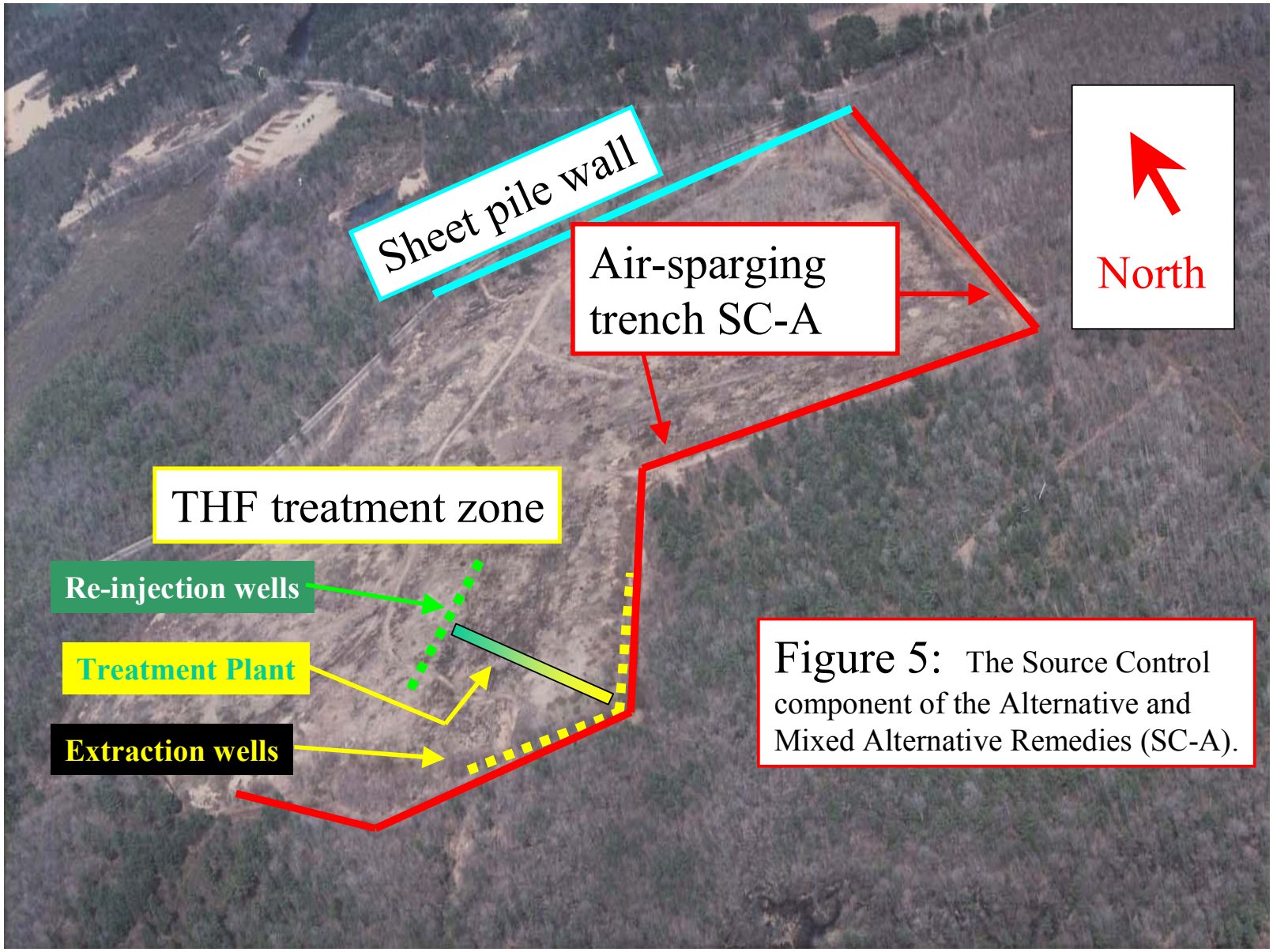

Figure 5: The Source Control component of the Alternative and Mixed Alternative Remedies (SC-A).

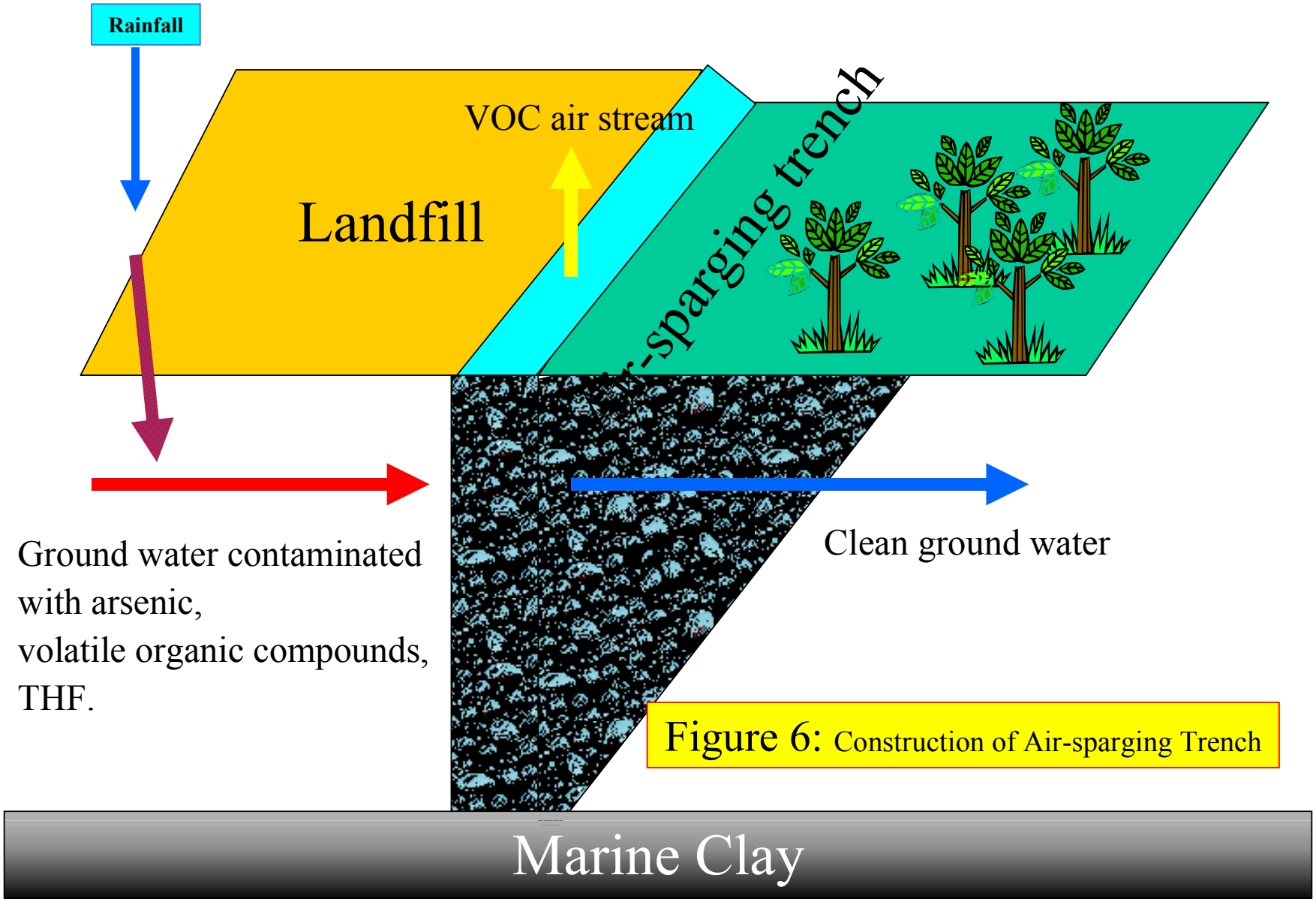

Figure 6: Construction of Air-sparging Trench

J. COMPARATIVE ANALYSIS OF THE 1991 ROD REMEDY AND THE MIXED ALTERNATIVE REMEDY

1. INTRODUCTION

Section l2l(b)(1) of CERCLA presents several factors that, at a minimum, EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

a. STATUTORY FRAMEWORK

The nine criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all federal environmental and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the Site.

5. **Short term effectiveness** addresses the period of time needed to achieve

protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and operation & maintenance (O&M) costs on a net present-worth basis.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan, RFFS, and the EPA Addendum to the RFFS.

b. AMENDED RECORD OF DECISION COMPONENT DESCRIPTION

Because this is an Amended ROD to the 1991 ROD, only that component which is proposed for change (i.e., the Source Control component) will be carried through the comparison in this section. The Source Control components compared are that of the 1991 ROD, capping, and the Mixed Alternative, an air-sparging trench. Migration of contaminated ground water will only be discussed where those issues reinforce an understanding of the Site cleanup effort.

RAO's for the Source Control component at this Site were developed to address wastes in the landfill as well as the leachate that is migrating from the landfill. Source control also includes the contaminated sediments and impacted surface water in the drainage trenches that surround the landfill as well as any outdoor air impacts. The degree to which the risk posed by each of these characteristics is addressed determines the effectiveness and protectiveness of the Mixed Alternative compared to that of the 1991 ROD.

2. COMPARATIVE ANALYSIS

In the following sections each criterion will be explained and then the 1991 ROD remedy Source Control component will be compared to the Source Control component of the Mixed Alternative to determine which best addresses each criterion and to balance the pros and cons of each as it relates to that criterion. The evaluation will examine the components individually and then pull

them together in a synopsis of how the components compare to each other under that criterion. Also, in the discussions, the Management of Migration components will be included, not for evaluation, but rather to fully portray the protectiveness of the entire remedy.

THRESHOLD CRITERIA

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This criterion addresses whether or not an alternative provides adequate protection and describes how Site risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering or institutional controls. This criterion draws on the assessments conducted under other criteria especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. This criterion also considers whether the alternatives pose any unacceptable short-term or cross-media impacts.

ANALYSIS OF SOURCE CONTROL ALTERNATIVES

The 1991 ROD remedy would place an impermeable, RCRA C cap on the landfill. Sediment containing arsenic in concentrations greater than 50 ppm in the drainage trenches and in the drainage swale would be excavated and consolidated under the cap. Any additional hazardous material excavated during remedial activities would also be contained under the cap. The cap prevents dermal contact and nearly eliminates precipitation from leaching more contaminants from the waste into the ground water and migrating off-site. In addition, an interceptor/diversion trench would be installed around the landfill to capture migrating, contaminated ground water that would be treated before discharge. Cap installation, re-contouring and trench installation involves excavation and trucking in an estimated 165,000 cubic yards of fill that will result in short-term exposures to fugitive emissions as well as increased truck traffic. Engineering controls such as dust suppression would control harmful vapors; and truck routes would be arranged to have the least impact on surrounding areas.

The Mixed Alternative would leave the existing natural cover and wastes undisturbed and would allow precipitation to leach through the landfill waste. However, unlike the No-Action alternative, this alternative consists of an air-sparging trench to treat or capture contaminated ground water migrating from the landfill. The effectiveness of the air-sparging trench in addressing organic VOCs is viable and the basic technology has been used successfully at many sites; however, using this technology to address inorganics such as arsenic remains a concern. Specifically, concerns center around adequate mixing of ground water in the air-sparging trench with respect to stripping and mineral precipitation, and the effect of air flow on the backfill material and hydraulic conductivity. There may also be fouling of the backfill material that would require high maintenance activities and/or contingent measures, some of which are also a concern (i.e. acid washing). There are additional concerns about installation of the air-sparging trench at depths greater than 60 feet as proposed in the RFFS and described in the EPA Addendum. Some portions of the air-sparging trench may need to be installed down to 90 feet. In recognition of these uncertainties, the viability of the technology must be demonstrated through effective

operation of a portion of the air-sparging trench in an area where depths approach 90 feet before full-scale installation and operation would be allowed. Assuming success, this alternative would act as a treatment mechanism to control contaminated ground water from migrating off-Site to surface waters thereby preventing continued contamination of off-Site ground water. Clean closure would eventually be attained which would effectively eliminate hazardous contaminants from leaching into ground water at levels that pose a threat to human health and the environment. If unsuccessful, the contingent remedy of the 1991 ROD Source Control component will be implemented.

Truck traffic will increase for a short period of time under the air-sparging alternative to remove the approximately 20,000 cubic yards of excavated material and to bring in an equal amount of porous material for the air-sparging trench backfill as well as general construction equipment.

SYNOPSIS OF OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The 1991 ROD Source Control Component combined with active ground water treatment in the Southern Plume would halt the flow of contaminants to the Bellamy Reservoir. The cap prevents precipitation from carrying contaminants off-Site in the ground water while the diversion trench works to lower the water table out of the waste. An active extraction and treatment system in the Southern Plume prevents contaminated ground water from further degrading the aquifer, speeds restoration of the Southern Plume, and protects the Bellamy Reservoir.

The Mixed Alternative, appears to offer a higher level of protection than the 1991 ROD remedy. The air-sparging trench, if properly functioning, will allow flushing and treatment of hazardous substances in the landfill so that ultimately, residual levels of contaminants left in the landfill will no longer pose a risk to human health or the environment. Clean closure, combined with active pump-and-treat in the Southern Plume permanently eliminates Site risks and restores the aquifer.

Both options include institutional controls to prevent the use of ground water, prohibit the disturbance of the marine clay layer, and prevent the alteration of the landfill surface in such a way as to create human health or ecological risk or to impair the cleanup effort. Both must also include a monitoring and assessment, and if necessary, remediation plans for indoor air exposures and for sediment in the Cocheco River to ensure that levels do not exceed acceptable concentration limits for human health or the environment.

Both the 1991 ROD remedy and the Mixed Alternative also have similar short-term impacts to air and the surrounding community from traffic with air stripping having slightly less impact given the lesser volume of material and equipment needed to implement the remedy. Contaminated air would emit from both the capped landfill in the 1991 ROD remedy and from the air-sparging trench in the Mixed Alternative; however, emissions of contaminated air from both structures can be controlled if necessary. Because there is no present risk posed by either of the Source Control components, nor are there any risks that cannot be controlled by engineering techniques, both the Source Control component of the 1991 ROD and the air-sparging of the Mixed Alternative would be protective of human health and the environment.

COMPLIANCE WITH ARARS

Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked under CERCLA §121(d)(4). Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain ARARs, unless they are waived.

If an ARAR is not met, the basis for justifying one of the six CERCLA §121 waivers should be discussed. Throughout the RFFS the necessity of considering a waiver for arsenic in ground water is cited several times. The cleanup times for arsenic appear to be, and may very well be, on the order of many decades. However, the modeled cleanup times for arsenic in ground water are subject to a number of assumptions that have not been thoroughly tested and verified. Moreover, the Ground Water and Fate and Transport model provided in Appendix N of the RFFS has not received final approval from the Agencies. Therefore, the estimate of cleanup times made in the RFFS only serve to show the range of cleanup times that may occur with each remedy to better compare the alternatives and are not absolute predictions.

ANALYSIS OF SOURCE CONTROL ALTERNATIVES

The Source Control components are primarily controlled by the New Hampshire Hazardous Waste Regulations which are relevant and appropriate to landfill closure and ground water monitoring. The 1991 ROD incorporates a RCRA C cap, lowering of ground water out of the waste mass and ground water monitoring to ensure the cap is effective in preventing leaching of contamination into the ground water beneath the landfill and preventing off-Site migration. The Mixed Alternative would eventually meet clean closure provisions of the hazardous waste regulations assuming the air-sparging trench is successful in treating contaminated ground water as it leaves the landfill and passes through the trench. As with the 1991 ROD Source Control component, associated ground water monitoring would ensure that the contaminant levels down-gradient of the air-sparging trench are not exceeding ground water cleanup standards. After air-sparging is complete, an appropriate cap in accordance with clean closure regulations will be put in place.

Both alternatives will use best practices to cause the least adverse impacts on wetlands and to restore those areas affected to the extent practicable. Construction of the air-sparging trench may have slightly less impacts on wetlands than the 1991 ROD remedy in that it will temporarily disrupt 2.8 acres and permanently impact 2.2 acres. Also, without a cap, natural water levels are maintained whereas the capping remedy intentionally and permanently lowers the water table out of the waste and in wetlands surrounding the Site. Both the 1991 ROD Source Control component and the Mixed Alternative mitigate wetland damage through re-injection of treated ground water into the landfill (air-sparging) or, in the case of SC-7, discharge to surrounding wetlands (capping or air-sparging). Off-Site discharge to the Dover POTW would negatively impact local wetlands by diverting a significant flow of water out of the watershed of the Bellamy Reservoir. Both options will meet ARARs relating to noise, dust suppression and other potential

air emissions through engineering controls.

SYNOPSIS OF COMPLIANCE WITH ARARS

Both the capping and air-sparging remedy would act to eliminate the source of contaminants to ground water in the area. Combining either alternative with MNA in the Eastern Plume is expected to meet ground water ARARs within an acceptable time frame. Although modeling implies that the Eastern Plume will not attain cleanup levels for a significant amount of time, EPA believes that the rate of flow of ground water, coupled with the shift in the ground water environment due to shutting off the landfill source with either the 1991 ROD Source Control component or the Mixed Alternative will yield protective levels in a reasonable time. If it is apparent that cleanup levels will not be attained in a reasonable time in the Eastern Plume, an active Management of Migration remedy will be conducted. The Southern Plume will be addressed through pump-and-treat to bring contaminant concentrations in compliance with ARARs.

Both options meet appropriate discharge or re-injection ARARs through treatment before discharge. Wetlands appear to be disrupted with either choice but both include measures to minimize impacts through the use of best practices and will institute mitigation to the extent practicable through restoration. All air emissions will be monitored Site-wide to ensure air ARARs are not exceeded.

Further, for each alternative, indoor air levels will be monitored consistent with EPA's recently issued indoor air guidance and sediment monitoring will be carried out consistently with NOAA sediment guidance. Both options incorporate action to address any risk found at the site through the monitoring/assessment actions.

Table 1 of Appendix I identifies the ARARs for all alternatives and explains the action to be taken to meet the ARAR.

PRIMARY BALANCING CRITERIA

LONG-TERM EFFECTIVENESS AND PERMANENCE

Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain following remediation and the adequacy and reliability of controls.

ANALYSIS OF SOURCE CONTROL ALTERNATIVES

The 1991 ROD Source Control component would entomb hazardous wastes beneath an impermeable cap, with no bottom liner or leachate collection system, that would be protective as long as it was properly maintained. Waste containment coupled with the ground water

interceptor/diversion trench prevents further migration of contaminated ground water off-site to the aquifer and to surface water bodies. There will be permanent impacts on surrounding wetlands; however, these impacts will be mitigated through wetland replication.

Air-sparging in the Mixed Alternative would flush contaminants from the landfill, eventually reducing leachate emanating from the waste to concentration levels in ground water that will not pose a risk to human health or the environment. An appropriate cap would be installed at the completion of the remedy. Implementation of this alternative also results in permanent impacts to the wetlands that can be mitigated.

Both options generate hazardous waste treatment residuals that may require off-site disposal at a hazardous waste facility. Capping would continually generate sludge containing arsenic and organic contaminants in the ground water interceptor/diversion trench. Air-sparging would also generate residual materials in the air-sparging trench consisting primarily of iron with minor amounts of arsenic and could potentially generate substantially more residual waste than the capping should the backfill for the air-sparging trench become fouled with arsenic sludge and excavation and off-Site disposal be required.

The Mixed Alternative appears to offer a higher level of long-term effectiveness than capping in that once air-sparging is complete, the entire 50-acre landfill will achieve clean closure and no hazardous contaminants will be left within the landfill that could pose a risk. While air-sparging may take decades to attain this condition**,** capping, although potentially constructed in two years, would contain hazardous waste beneath its low-permeability cap for a century or perhaps longer. Additionally, capping requires that the interceptor/diversion trench system be operated for that same extremely long period of time to keep the waste out of the water table.

SYNOPSIS OF LONG-TERM EFFECTIVENESS AND PERMANENCE

The 1991 ROD remedy would retain hazardous materials under the cap for a longer period than the air-sparging alternative and would require continual pumping in the diversion trench to keep the water table out of the waste mass. In addition, the cap will require perpetual maintenance. The Mixed Alternative provides a greater degree of long-term protection in that the landfill will eventually reach clean closure, permanently eliminating the need for cap maintenance or for continuous operation of the ground water interceptor/diversion trench. Alternatively, the air-sparging technology is somewhat speculative when applied to the three processes necessary to address Site contamination. Implementing either alternative will greatly assist the Management of Migration component of the remedy with air-sparging being more beneficial and conducive to movement of the contaminants from the source through its flushing action.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies and addresses the degree to which alternatives employ recycling or treatment, including how treatment is used to address the principal threats posed by the Site. This

criterion focuses on the following factors:

- Treatment processes and what they will treat.
- Amount of hazardous materials treated or destroyed and how the principle threat is addressed.
- Degree of expected reduction in toxicity, mobility, or volume (as a percentage).
- The degree to which treatment will be irreversible.
- The type and quantity of residuals that will remain following treatment.
- Does the remedy satisfy the statutory preference for treatment as a principle element.

ANALYSIS OF SOURCE CONTROL ALTERNATIVES

The 1991 ROD Source Control component will reduce mobility by greatly reducing infiltration into the landfill wastes through the impermeable cap. However, contaminants will still reside in the landfill under the cap at the same toxicity and may still migrate, albeit much more slowly, either downward to the marine clay or laterally to the ground water diversion/interception trench where they are slowly captured and treated. Treatment residuals consist of sludge from the leachate collection and treatment system which will be disposed off-site.

The Mixed Alternative will continue to allow contaminants in the landfill to become mobile until they come into contact with the air-sparging trench where these contaminants will be captured and destroyed. Assuming success, air-sparging will permanently reduce the toxicity, mobility and volume of the organic contaminants once the landfill reaches clean closure. The time to achieve this reduction depends on the rate the contaminants are flushed through the landfill and then captured and treated by the air-sparging trench. Removal of arsenic is not as certain in this alternative since the air-sparging trench is an innovative approach for inorganics. The air-sparging trench should reduce the mobility and toxicity of arsenic; however, if fouled, it may require removal of the backfill to clean out the arsenic sludge which must be disposed of off-Site. Alternatively, additional treatment to stabilize the arsenic may be necessary.

SYNOPSIS OF THE REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT

Air-sparging will, if successful, permanently reduce the toxicity, mobility and volume of landfill contaminants once the remedy is complete unlike the 1991 ROD Source Control component which encapsulates and contains the wastes thereby reducing its mobility, but not the toxicity or volume of waste in the landfill. Both options produce treatment residuals with occasional larger volumes from the air-sparging option should the trench foul and excavation be required. Coupling either Source Control component with active ground water treatment, additionally

reduces mobility, toxicity and volume of hazardous substances from the ground water in the Southern Plume.

SHORT-TERM EFFECTIVENESS

Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup levels are achieved. The following factors are important:

- Protection of community from exposure to dust, poor air-quality, and transportation impacts.
- Protection of workers during remedial actions.
- Environmental impacts that result from construction and what mitigative measures may be taken.
- Time until the remedial response objectives are met - an estimate, and it may be segmented, i.e. separating the Eastern Plume from the Southern Plume and landfill.

ANALYSIS OF SOURCE CONTROL ALTERNATIVES

The 1991 ROD Source Control component would generate the greatest short-term risk in that fugitive vapors and odors would need to be controlled during the re-contouring of the landfill wastes. Additional risks would be generated by the truck traffic required for the approximately 165,000 cubic yards of material needed to attain sufficient grades for the landfill cap. However, the cap should have an immediate effect in that the waste beneath it would begin to dry out as soon as the pumps in the diversion trench began operating to lower the ground water table out of the waste. Construction would take approximately 2 years.

The Mixed Alternative would leave the landfill surface as is with the existing vegetated soil cover, although periodic maintenance work would be performed to ensure that no wastes were exposed at the surface. Construction of the air-sparging trench would generate far less truck traffic to bring in the estimated 20,000 to 30,000 yards of material needed for the air-sparging trench. Because the air-sparging trench relies principally on natural processes to treat and convey the contaminants to the air-sparging trench, achieving immediate risk reduction would be longer in this alternative than for the capping alternative. Construction time is estimated to be 1.5 to 2.5 years for installation of the air-sparging trench.

Both Source Control remedies pose environmental impacts with capping having slightly more short-term impacts in that 11 acres of wetlands are temporarily disturbed; the air-sparging alternative temporarily disturbs only 2.8 acres. For mitigation, the 1991 ROD remedy would create a wetland area from the re-contoured wastes, whereas, for the air-sparging option would

mitigate to the extent practicable. The capping alternative involving discharge of treated water to the City of Dover POTW would have the greatest short-term impact in that a sewer line must be installed, thereby temporarily disrupting wetlands and local roadways. Both capping and air-sparging require that the existing, southern drainage trench be filled in.

SYNOPSIS OF SHORT-TERM EFFECTIVENESS

On balance, the Mixed Alternative has less short-term impacts than the 1991 ROD Source Control component in that the former would involve an order-of-magnitude less truck traffic and less temporary disruption of surrounding wetlands.

IMPLEMENTABILITY

Implementability addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option. This criterion involves the following factors:

- Construction, operation, and the technical difficulties and unknowns associated with a technology.
- Reliability of technology focuses on the technical problems associated with implementation that will lead to schedule delay.
- Ease of undertaking additional remedial action.
- Monitoring considers the ability to monitor the effectiveness of the remedy and evaluates the risks of exposure should monitoring be insufficient to detect a failure of the remedy.
- Administrative feasibility are the activities that are necessary to coordinate with other offices and agencies.
- Availability of services and materials such as storage capacity.

ANALYSIS OF SOURCE CONTROL ALTERNATIVES

The 1991 ROD Source Control component is a proven technology that is implementable and reliable in terms of maintaining the cap and the ground water diversion/interception trench. Equipment and materials are readily available.

The air-sparging technology, although a proven technology, has several uncertainties related to the processes occurring in the trench and Site conditions. Therefore, air-sparging is not yet a proven technology with respect to its application at the Dover Landfill. Problems may be encountered during construction, particularly with excavation up to 100 feet into the aquifer and

with installing pipes and other material at that depth. Additionally, the trench will be capturing VOCs, will be biodegrading tetrahydrofuran to the extent practicable, and will be capturing arsenic through precipitation with iron. All three processes have never been done simultaneously at any site. Monitoring will therefore be more aggressive for this alternative given the need to ensure that no breakthrough occurs and due to its innovative nature. In the event that air-sparging is unsuccessful, the 1991 ROD Source Control component is included as a contingent remedy. One of the primary components of the 1991 ROD contingency, the ground water interceptor/diversion trench, can be easily converted from the air-sparging trench if needed.

SYNOPSIS OF IMPLEMENTABILITY

Both Source Control alternatives are implementable with the 1991 ROD remedy having a distinct advantage over the Mixed Alternative since it is a proven technology and services, equipment, and installation techniques have been available for many years. Air-sparging will require specialized equipment and services for installing the air-sparging trench to depths of close to 100 feet and the combination of the individual elements of the Mixed Alternative have never been used in similar circumstances to those presented at the landfill. For Management of Migration, there are no issues with implementing MNA or its monitoring component; ground water pump-and-treat is a proven technology and can be readily implemented and adapted. Extraction, treatment and discharge of treated ground water has been performed at many sites without problems.

COST

Cost includes estimated capital and Operation and Maintenance (O&M) costs, as well as present-worth costs. Direct capital costs include those for construction, equipment, land and site development, buildings and services, relocation expenses, and disposal. Indirect costs include those for engineering, licences and permits, startup/shakedown costs, and contingencies. Annual O&M costs include operating labor costs, maintenance materials and labor, auxiliary materials and energy, disposal of treatment residuals, purchased services, administrative costs, insurance, taxes, licensing, maintenance reserve and contingency funds, rehabilitation costs, and periodic Site Reviews.

The details of the costs of the remedial alternatives under consideration have been outlined in Section 5 of the RFFS. A summary of the cost of the Source Control components (as well as the costs for MM-2/4) in 2004 dollars are summarized in the table below:

Table 8: Comparison of Costs of Remedial Alternatives Considered

Remedy	Capital Costs	O&M Costs (annual cost)	Present Worth (30 years @ 7%)
No Action	$0	$123,065	$1,527,119
1991 ROD			

Source Control (SC-7)	$25,907,453	$252,000	$29,034,531
Management of Migration (MM-2/4)	$1,010,431	$368,065	$5,577,765
Total for 1991 ROD	$26,917,884	$620,065	$34,612,296
Mixed Alternative			
Source Control (SC-A)	$12,352,909	$283,500	$15,870,872
Management of Migration (MM-2/4)	$475,761	$245,565	$3,522,987
Total for Proposed Mixed Alternative	$12,828,670	$529,065	$19,393,859

STATE ACCEPTANCE

The New Hampshire Department of Environmental Services has reviewed the alternatives under consideration and concurs with the proposed change from the 1991 ROD to the Mixed Alternative described in this Amendment. A copy of the State concurrence letter is attached as Appendix C.

COMMUNITY ACCEPTANCE

The community expressed many concerns regarding the effectiveness of air-sparging as a Source Control remedy, the delay in implementing a remedy at the Site, and the continued flow of contamination in the Eastern Plume. These concerns and any others are addressed in the Responsiveness Summary, provided as Appendix D, and all comments are included in the Administrative Record for the Site.

3. SUMMARY OF COMPARATIVE ANALYSIS

The Site presents a future risk from consuming contaminated ground water for drinking water and a potential risk to human health and the environment from arsenic-contaminated sediment. Potential indoor air risks have yet to be evaluated in accordance with recent EPA guidance. Contaminated ground water is currently flowing toward the Bellamy Reservoir which could degrade the water body and threaten a drinking water resource that serves much of southeastern New Hampshire. Both ground water plumes continue to degrade the drinking water aquifer at the Site. The origin of the contaminated ground water is leachate flowing from the landfill area. Implementation of a Source Control remedy at the landfill will enable ground water to be restored.

The Source Control component of the 1991 ROD remedy would effectively meet the remedial response objectives. However, the Mixed Alternative will capture and treat or destroy Site contaminants, perhaps decades before the 1991 ROD Source Control component and cost half as much. While the Mixed Alternative is an innovative remedy which raises concerns relative to the

implementability of this remedy, EPA believes that air-sparging has the potential to succeed at the Site. Moreover, the Mixed Alternative will be phased during construction to ensure that it operates correctly. If the Mixed Alternative fails to fully treat or destroy contaminants migrating from the landfill, the 1991 ROD selected remedy will be the contingent remedy.

A summary of how each Source Control component compares with the NCP nine evaluation criteria follows on Table 9. This Table is extracted from the Proposed Plan.

Table 9: Comparison of Cleanup Alternatives for the Dover Municipal Landfill

Nine Criteria	Source Control, Landfill Area Only		
	SC-1 No-Action	SC-7/7A 1991 Selected Remedy	*SC-A Air-sparging Trench
Overall Protection of Human Health and the Environment			
Compliance with Applicable or Relevant and Appropriate Requirements	No further evaluation		
Long-term Effectiveness and Permanence			
Reduces Toxicity, Mobility, or Volume through Treatment			
Short-term Effectiveness			
Implementability			(some uncertainty)
Cost (only Source Control Component)	$0	$29 million	$15.8 million
State agency acceptance	State concurs with selection of SC-A		
Community acceptance	Discussed in the Responsiveness Summary.		

* This is an innovative remedy which will require that a contingent remedy is identified.

Key		
	Meets or exceeds criterion	
	Partially meets criterion	
	Does not meet criterion	

K. THE SELECTED REMEDY

EPA has selected the Mixed Alternative as providing the best balance between the nine criteria. The selected remedy combines the new Source Control components (SC-A) with the existing Management of Migration components (MM-2/4) into a comprehensive remedy that ensures protectiveness of human health and the environment, attains all federal and state regulations, provides long-term and short-term effectiveness, is implementable, and reduces toxicity, volume, and mobility through treatment.

1. DESCRIPTION OF THE REMEDIAL COMPONENTS

The selected remedy consists of the following components:

Landfill Cover

The present landfill cover consists of a layer of sand and soil over the existing wastes. This natural cover has been in place for over twenty years. In some of the areas the cover has been in place longer, such as the northeast corner. Over the past twenty years the landfill cover has been naturally vegetated with meadow grasses in the central and western portions of the landfill. In the eastern area of the landfill poplars, beeches, birches and sumac have grown up and established wooded areas. This natural cover will be periodically inspected, maintained and augmented where necessary to isolate wastes from trespassers. Areas of erosion or where a lack of organic material prevents vegetative growth will be patched with soil and seeded with annual grass seeds or erosion control matting sufficient to allow native grasses and other forbs to cover the landfill surface. Invasive species will be controlled and not allowed to propagate.

Eliminating Source Areas in and Near the Landfill

The landfill contains areas of high contaminant concentrations (localized sources) that may not be captured or addressed by the air-sparging trench and therefore cause an excess risk to human health or the environment, or violate ARARs. There are currently two known areas of high concentration in or near the landfill that act as localized sources of contamination to ground water and surface water. The first area of high concentration to be addressed is located in the northwest corner of the landfill and manifests itself as high surface water concentrations of volatile organic contaminants such as *cis*-1,2 dichloroethylene and vinyl chloride in an intermittent stream (the northern drainage trench) sampled as SW-E. This contaminated source area will be delineated and removed either through excavation or other *ex situ* techniques.

The second area of high concentration is located in ground water in the southwestern corner of the landfill. The ground water in this area is contaminated principally by THF with concentrations that may overwhelm the treatment capacity of the air-sparing trench . This area will be defined and addressed through a ground water extraction and treatment system designed to attain cleanup levels. Treated ground water will be re-injected into the landfill at an up-gradient location.

During the pre-design investigation for the air-sparging trench, the surface and subsurface area of the landfill will be examined to identify additional areas of high concentrations that may be removed more effectively through localized action or that may breakthrough the air-sparging trench. These areas will either be excavated or addressed by other *ex situ* techniques or, if in ground water, pumped and treated prior to re-injection into an up-gradient portion of the landfill.

Air-Sparging Trench

The air-sparging trench would be installed from the northeast area of the landfill, heading south along the landfill's eastern edge, then turning and following the limit of waste on the southern side of the landfill to the western side of the landfill, a distance of approximately 3,000 to 4,000 linear feet. The depth of the air-sparging trench would be determined by the depth to the marine clay layer where the trench would key into. In some places the trench may be up to 90 feet deep, or more. The objective of the trench is to intercept contaminated ground water from the up-gradient, landfill side of the trench, allow that contaminated ground water to pass though the trench material for treatment, then exit the down-gradient side of the trench at concentrations that do not exceed cleanup levels.

Following the path shown on Figure 5 on page 48, the volume of soil excavation, assuming a three-foot wide treatment zone that spans the upper sand and upper-interbedded aquifers, is approximately 19,000 cubic yards. The air-sparging trench will intercept, capture or destroy contaminants in leachate emanating from the landfill. Although this is similar in nature to the interceptor/diversion trench described on page 54 of the 1991 ROD, its construction, operation, and goals are very different. The air-sparging trench will not serve to extract water for *ex situ* treatment as in the 1991 ROD. Instead, water will be treated in the air-sparging trench to immobilize arsenic, capture VOCs in the air stream and extract them, and to aerobically degrade THF. Air emitted from the air-sparging trench is not expected to require treatment; however, the stacks may be retro-fitted with treatment devices if necessary.[34] For cost purposes, it is estimated that this air-sparging trench will operate for at least 30 years; however, the air-sparging trench must remain operating until the landfill has reached clean closure. There are a number of sub-components to this portion of the remedy:

1. Construction of a hydraulic barrier along the northeast half of the landfill to direct leachate emanating from the landfill through the air-sparging trench. This will divert ground water through the eastern portion of the air-sparging trench that would otherwise flow off-site to the north.

2. The air-sparging trench will be constructed in phases or segments that may be operated independently. As a part of pre-design investigations, EPA and NHDES will select the segment(s) to be constructed first. Although air-sparging will be the primary mode of operation, design flexibility may enable portions of the air-sparging trench to be operated

[34] RFFS, January 30, 2004, page 4-27.

as a ground water extraction trench or, if appropriate, a re-injection trench. Monitoring and maintenance of the air-sparging trench will be required during operation to ensure that potential fouling is identified and corrected quickly. The path of the air-sparging trench will follow the edge of waste at the landfill. The air-sparging trench will be operated as described below:

- As groundwater passes through the trench, air-sparging will capture VOCs such as vinyl chloride, and 1,2 DCE, as well as hydrocarbons such as benzene in the ground water. Captured VOCs and hydrocarbons will be discharged to the atmosphere if they are below regulatory criteria. If not, they will be captured on activated carbon filters for destruction and offsite disposal. Concentrations of contaminants in the ground water exiting the down-gradient side of the air-sparging trench are expected to be at cleanup levels.

- The aerobic environment created by the air-sparging trench will allow micro-organisms to degrade THF. This aerobic environment will also precipitate iron which then combines with arsenic so that arsenic concentrations in ground water should reach cleanup levels before it exits the down-gradient side of the air-sparging trench.

- Should arsenic cause fouling in the trench, it will be removed by excavating the air-sparging trench from the aquifer or removed by other, proven technologies. Arsenic will similarly be removed from the trench at the conclusion of the Source Control component.

See Section K. 4., *Expected Outcomes* for further discussion regarding the air-sparging trench contingency in the event of failure. A schematic representation of the air-sparing trench is offered in Figure 6 on page 49.

Monitoring and Removing Contaminated Sediments

Arsenic-contaminated sediments are located in the landfill drainage trenches and drainage swale as well as in the Cocheco River. Sediments in the drainage trenches and swale above the 50 ppm arsenic cleanup level will be excavated and disposed of at an approved off-site facility. The trench surrounding the landfill will be eventually backfilled, therefore no future monitoring is required. However, the drainage swale may still accumulate arsenic-contaminated sediments; therefore, annual monitoring of the sediments will be required. Should sediment with concentrations exceeding cleanup levels become redeposited, it shall be excavated and disposed of at an approved offsite facility.

Cocheco River sediments will be assessed annually to determine whether or not they pose a risk to human health and the environment. Currently these sediments fall within EPA's risk range for human health but the concentrations were beyond EPA's point of departure for carcinogenic risks and near EPA's threshold for non-carcinogenic risks. For ecological risk, the sampling results did

not pass the first tier of the ecological risk assessment making it necessary to move to the next tier, toxicity testing. Therefore, it is appropriate to establish and maintain a sediment sampling program both within the pre-design investigations and in future site environmental monitoring.

MNA in the Eastern Plume

This component of the remedy is retained from the 1991 ROD and the reader is referred to page 56 of the 1991 ROD for a fuller description. However, through this Amended ROD, attenuation of contaminants in this plume will be monitored and otherwise addressed in accordance with EPA's guidance for MNA remedies. Further, should EPA determine that MNA for this plume is unsuccessful, a contingent remedy of pump-and-treat shall be implemented. See Section K. 4. b. (2) of this document for more details of the contingent remedy.

Pump and Treat in the Southern Plume

As with the Eastern Plume, the remedy for the Southern Plume is retained from the 1991 ROD and the reader is referred to page 55 of the 1991 ROD for a fuller description. Pre-design investigations associated with this component are outlined above in this section. Treated ground water will be discharged to area wetlands or the Dover POTW.

Indoor Air

EPA's recent guidance regarding indoor air requires that buildings located in areas near the Eastern Plume be evaluated for VOCs that may pose a risk to human health. This evaluation shall be conducted within 9 months after signing this Amended ROD. A regular monitoring program for indoor air vapors shall be part of a Site-wide monitoring program. Should concentrations exceed protective levels, a contingency for corrective action is outlined in Section K. 4. b. (4) of this document.

Site-wide monitoring program

As part of this component, a Site-wide monitoring program shall be implemented to monitor indoor and outdoor air, soil, sediment, ground water and surface water. There will be two sections of monitoring. First, the existing Environmental Monitoring Plan shall be modified to demonstrate the state of contamination throughout the Site and to detect migration of contaminants. The second section is Remedy Performance Monitoring which will be conducted to assess the performance of the air-sparging trench, natural attenuation in the Eastern Plume, flushing of the landfill, and pump-and-treat in the Southern Plume.

Institutional Controls

To protect the integrity of the remedy and prevent the use of contaminated ground water, institutional controls that prevent the use of ground water, that prevent disturbance of the marine clay layer beneath the aquifer, and that prohibit activities on the landfill surface that may create a

human health or environmental risk or that may negatively affect the cleanup, until the cleanup is complete, are necessary. Current local ordinances that prohibit these activities should remain in place until the remedy is completed. A state groundwater management zone should also be put in place at the Site.

2. SUMMARY OF THE ESTIMATED REMEDY COSTS

The selected remedy has a total cost estimate of $19.4 million. This cost may be broken down further into the Source Control and Management of Migration components. Additionally, there is the added component for 30 years of operation and maintenance costs. Thirty years is used as a standard because projections past that point become very speculative. Not factored into the cost shown in Table 10 is that the project will be phased to ensure that the remedy is viable. Phasing the remedy may incur additional costs; however, it is more likely to save money since design issues will be addressed using data based on field conditions. Table 10, below outlines the estimated cost of the selected remedy:

Table 10: Estimated Cost of the Selected Remedy			
Component	**Capital Costs**	**O&M Costs (annual cost)**	**Present Worth (30 years @7%)**
Source Control[a]			
Details of Air Sparging	Preparation: $1,048,000 Trench: $6,477,000 Barrier: $2,005,000 Sediment Tox testing:$50,000 Start up: $145,600	Maintenance: $185,000 Utilities: $55,000 Operator & misc.: $43,500	
Source Control (SC-A)	$12.4 million[b]	$283,500	$15.9 million
Management of Migration[c]			
Details of MNA and Pump and Treat	Institutional Controls: $10,000 Southern Plume pump & treat construction $364,615 Long-term monitoring - to be determined after predesign investigations.	Institutional Controls: $20,000 Long-term monitoring: $123,065 Operation and maintenance: $102,500	
Management of Migration (MM-2/4)	$475,761	$245,565	$3.5 million
Total for Selected Remedy	$12.8 million[d]	$529,065	$19.4 million

[a] The detailed costs are shown on Table 5-18, Page 5-111 of the RFFS.
[b] This cost also includes 10% contingency, 5% project managment, 6% remedial design, and 6% for construction management.
[c] The detailed costs are shown on Table 5-18, Page 5-113 of the RFFS.
[d] Costs for pre-design investigations outlined in Section K. 3. are not included in this estimate.
[e] Costs are +50/-30 as set forth in EPA's Feasibility Study guidance.

3. PRE-DESIGN INVESTIGATIONS

Several Pre-Design Investigations (PDI) are needed to fill data gaps identified in the RFFS and the EPA Addendum. Conducting these investigations will ensure that all risks at the Site are addressed in the most efficient and effective manner.

Ground Water Model and Fate and Transport Model PDI: The RFFS contained a Ground Water Model and a Fate and Transport Model which the Agencies have not yet approved and that require modification. Tasks associated with this PDI include collecting

field data to determine and verify many of the parameters identified in the models. Because several of the subsequent PDIs listed below require input from these two models, past Agencies' comments deferred for the RFFS as well as any additional Agencies' comments must be addressed prior to conducting additional field investigations associated with the PDIs listed below. The Ground Water and Fate and Transport models will be of maximum importance in designing the air-sparging trench. This PDI will be completed 12 months after this Amended ROD is signed.

Air-Sparging Trench Pre-Construction PDI: This PDI will determine the depth, location and construction methods for the air-sparging trench. A drilling program will determine the structure of the subsurface, the depths to which the trench will need to go, and the nature of the contamination encountered. Based on this and other information, EPA and NHDES will select the number and order of segment(s) to be constructed to demonstrate the viability of the technology. In determining viability, EPA and NHDES will consider factors such as the effectiveness of the trench to immobilize arsenic at its highest concentrations and its effectiveness in attaining cleanup levels of all contaminants emanating from the landfill. This PDI will be completed within 18 months after this Amended ROD is signed.

Southern Plume Pump-and-Treat PDI: Incorporating information from the 1994 PDI for pump and treat in the Southern Plume, this PDI will gather additional field data that will be used to determine, among other things, the placement of extraction wells, the rate at which those wells should operate, and the treatment and discharge of groundwater. This PDI will be completed within 12 months after this Amended ROD is signed.

Northwest Landfill PDI: This investigation will determine the source of high concentrations to surface water sampling point SW-E. It will be completed within 12 months after signing this Amended ROD.

Sediment Assessment PDI: This investigation involves performing the second and, if necessary, third tier of the ecological assessment protocol to determine if arsenic in sediments at the Site are harmful to aquatic life. Subsequent sampling will be performed to ensure that the arsenic and other inorganic contaminants in the sediment do not pose a hazard to human health or the environment. Additional sampling will be conducted for additional elements including mercury, lead and cadmium. This PDI will be completed within 9 months after signing this Amended ROD.

Indoor air assessment PDI: This PDI will be conducted in the area of those residences that overlie or are in close proximity to the Eastern Plume, following EPA's indoor air guidance.[35] This indoor air monitoring will be expanded and included in the Site-wide

[35] Draft *Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (Subsurface Vapor Intrusion Guidance), USEPA, November 26, 2002.

EMP. The first assessment for this PDI will be completed within 9 months after signing this Amended ROD.

Eastern Plume MNA PDI: This PDI will be conducted to determine the rates at which natural attenuation of the contaminants is occurring in order to formulate a long-term monitoring program in accordance with EPA's guidance for monitored natural attenuation.[36] This PDI will be completed within 18 months after signing this Amended ROD.

Outdoor air assessment PDI: This investigation requires sampling outdoor air during and following construction activities to ensure that implementation and operation of the Source Control remedy does not pose a risk to human health from outdoor air. Areas to be sampled include near SW-E (in the northern drainage trench), near the head of the drainage swale and at the bottom of the drainage swale. This PDI must begin at the start of remedial action and must be completed upon EPA's determination that construction is complete.

4. EXPECTED OUTCOMES OF THE SELECTED REMEDY

The selected remedy has several unknowns driven principally by the behavior of inorganic elements and the hydrogeology surrounding the site. The implementation of the Source Control component will alter the geochemistry and hydrogeology of the surrounding aquifer. The geochemistry will be altered by injecting oxygen into an oxygen depleted ground water environment. The primary effect will be the precipitation of iron which will absorb other inorganic elements including arsenic. The intention of the air-sparging trench is to precipitate the iron and other inorganic compounds inside the trench. Precipitating these compounds in the trench is necessary so that they may be removed when either the remedy is complete or if the precipitate compromises the function of the remedy. Precipitation outside the trench is not allowable because once the air-sparging trench ceases operation, the anaerobic environment in the aquifer will cause the precipitate to re-dissolve, potentially generating a high-concentration arsenic plume.

a. CLEANUP LEVELS

(1) INTERIM GROUND WATER CLEANUP LEVELS

Interim ground water cleanup levels were established in the 1991 ROD based on SDWA MCLs, non-zero MCLGs if an MCL does not exist, and more stringent state drinking water standards. Currently, the State of New Hampshire AGQSs are the same as or less stringent than federal drinking water standards; however, if those standards are revised to more stringent levels, the selected remedy would be reviewed for protectiveness in light of any new standard. Because the

[36] *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites.* OSWER Directive 9200.4-17P, April 21, 1999, page 24.

Amended ROD addresses ground water that is in a drinking water aquifer, these interim cleanup levels (ICLs) have been identified as chemical specific ARARs. Reviewing the1991 ground water ICLs in light of the more current applicable or relevant and appropriate standards finds that only arsenic will change. Therefore, the cleanup level for arsenic will change from 50 ug/l to 10 ug/l for ground water cleanup in the selected remedy. Table 11, on the following page, sets out the interim ground water cleanup levels as established for the Amended ROD. As explained on pages 47 and 50 of the 1991 ROD, interim cleanup levels remain in place for the duration of the cleanup. Once the cleanup is complete, final ground water cleanup levels will be established.

Table 11: Ground Water Cleanup Levels and comparison to May 2002 results **(bold values indicate change from 1991 ROD)**				
		May 2002[37]		
Constituent	**1991 ICL (ug/l)**	**# wells > ICL out of 58 wells**	**Maximum (ug/l)**	**Proposed ICL (ug/l)**
Arsenic	50	27 / 45*	634	**10**
Vinyl chloride	2	13	26	2
Benzene	5	29	79	5
Trichloroethene	5	4	17	5
Tetrachloroethene	5	0	5	5
Methylene chloride	5	2	8	5
1,1 DCE	7	0	0.9	7
1,2 DCA	5	0	3	5
cis-1,2 DCE	70	0	14	70
Chloroethane	14000	0	10	14000
Tetrahydrofuran	154	12	2,400	154
Acetone	700	0	88	700
MEK	200	0	8	200
MIBK	350	0	17	350
Toluene	1000	0	310	1000

* 27 of the 58 wells exceed the old cleanup level of 50 ppb, 45 of 58 exceed the new cleanup level of 10 ppb. These data are extracted from the May 2002 sampling round, the latest data at the time of the initial RFFS submittal.

(2) SEDIMENT RESPONSE AND CLEANUP LEVELS

Sediment cleanup levels are derived from NOAA benchmark standards and health-based risk calculations for environmental and human health standards, respectively. Arsenic- contaminated sediments exist in the drainage trenches, drainage swale, and the Cocheco River. The drainage trenches will be covered (following removal of sediment containing arsenic greater than 50 ppm)

[37] Summary of Summer 2002 EMP Event, Dover Municipal Landfill, GeoInsight, Westford, MA, November 15, 2002.

with soil under the Amended ROD. The swale will remain uncovered although it may have further alterations based on an existing Operations and Maintenance Plan. The Cocheco River is used for boating and fishing. Based on these considerations, sediments in the Cocheco River have different cleanup standards than those for the drainage trenches or drainage swale.

In the drainage trenches and drainage swale, the 1991 ROD set sediment cleanup levels for arsenic-contaminated sediment based on standards that NOAA had selected at that time (50 ppm) for ecological receptors. This level was reviewed during the preparation of EPA's Addendum and was reconfirmed to be protective of ecological receptors. Therefore, this Amended ROD retains the 50 ppm arsenic cleanup level for the sediments in the drainage trenches and drainage swale. This cleanup level is retained in the drainage trenches because of the continuing presence of burrowing animals that may access deeper sediments as well as to protect other ecological receptors. In addition, leaving sediments 50 ppm or greater in the drainage trenches may result in arsenic becoming dissolved and re-mobilized, thus acting as a continuing source of arsenic to the ground water. The drainage swale will not be covered, leaving sediments available to animals and other ecological receptors as well as acting as a continuing source to ground water. Any sediment in the drainage trenches or the drainage swale that exceed 50 ppm will be excavated and disposed off-Site. With regard to human health risks,the drainage trench no longer provides an exposure pathway; sediments in the drainage swale fall within EPA's acceptable risk range, but continued monitoring will occur to ensure protectiveness.

In the Cocheco River, arsenic-contaminated sediments that exceed either the three-tier environmental protocol or exceed human health based criteria, shall be removed from the stream and disposed off-Site. With regard to ecological risk, sediments in the Cocheco River will be assessed through two methods: whole sediment analysis and toxicity testing. If sediments are shown to have concentrations that exceed human health risk standards through whole sediment analysis, those sediments will be removed. Those same sediments will be tested through toxicity testing for ecological risk using organisms found in the river (Tier 2 testing). If unacceptable impacts are found, the assessment will move to the third tier of testing, ecosystem assessment. If that assessment is unsatisfactory, those sediments will be removed and disposed off-site in accordance with the State of New Hampshire regulations.

b. CONTINGENT REMEDIES

Contingent remedies have been selected for a number of components of the selected remedy. More specifically, contingent remedies are offered for each of the following components:

(1) AIR-SPARGING TRENCH

EPA recognizes that the air-sparging trench is an innovative approach that, although it poses an opportunity to clean up the landfill quicker, also poses some risks of failure. Concern is generated by the depth of the air-sparging trench, up to 100 feet in places, and the complexity of the processes that will occur within it. The air-sparging trench will recover VOCs, degrade THF, and precipitate arsenic for later recovery. No system has previously attempted all three

simultaneously. Therefore, the air-sparging trench will require a contingency remedy. The contingency remedy will be that presented in the 1991 ROD for Source Control which consists of capping the landfill with a RCRA C cap and intercepting contaminated ground water at the landfill boundary (i.e., the 1991 ROD alternative SC-7/7A). The following criteria, at a minimum, have been established to evaluate and implement a contingent remedy for the air-sparging trench:

- One year after completing the construction of any phase or segment of the air-sparging trench, should that portion of the air-sparging trench or any other portion of the air-sparging trench fail to immobilize, capture or destroy site contaminants and these contaminants exit the down-gradient side of the air-sparging trench at concentrations that exceed cleanup criteria, regardless of form (dissolved or particulate), the 1991 ROD Source Control component (SC-7/7A) will be implemented.

- If, at any time, operation of the air-sparging trench creates conditions that EPA believes will increase, or not decrease risk at the site, and those conditions are not corrected in what EPA believes to be a reasonable time, the 1991 ROD Source Control component (SC-7/7A) will be implemented. These conditions may include either unfavorable alterations of site hydrogeology or geochemistry, the production of recalcitrant daughter products that generate higher risk, or the creation of any physical hazards.

Monitoring of the air-sparging trench will include clustered wells that for each segment span the treatment zone vertically and are spaced at intervals that EPA believes are sufficient to determine the effective operation of the air-sparging trench. These clusters of wells will be positioned from inside the landfill to the air-sparging trench and to the down-gradient side of the air-sparging trench along the flow path of contaminated ground water. Monitoring will be performed at periodic intervals that EPA believes will provide performance data for each segment and will include both ground water and solid media samples from the air-sparging trench and aquifer. A separate monitoring program will be required to determine if clean-closure requirements have been met at the completion of cleanup.

(2) GROUND WATER CONTAMINATION - EASTERN PLUME

Although this contingent remedy was included as a component of the 1991 ROD, it is repeated and provided further definition here. Because MNA is a component of the Amended ROD, it requires an evaluation five years after construction complete to determine its effectiveness in reducing contaminant concentrations. In addition, a contingent remedy is identified in the event concentration levels are not declining as anticipated.[38] Such a contingent remedy is necessary for the Eastern Plume. The following criteria, at a minimum, have been established to evaluate and implement a contingent remedy for MNA (MM-2):

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[38] *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites.* OSWER Directive 9200.4-17P, April 21, 1999, page 24.

- Five years after EPA determines that construction of the Source Control component is complete, the MNA component for the Eastern Plume, will be assessed by EPA to determine if ground water cleanup has progressed sufficiently to indicate that ground water cleanup levels will be attained in a reasonable time-frame.[39]

- Every five years, thereafter, the MNA remedy for the Eastern Plume will be assessed by EPA to determine if ground water cleanup has progressed sufficiently to indicate that ground water cleanup levels will be attained in a reasonable time-frame.

- If EPA determines at any time that cleanup levels will not be attained in a reasonable time-frame and that a waiver is not justified, a pump-and-treat remedy (MM-4) will be implemented.

The contingent pump-and-treat remedy in the Eastern Plume will extract contaminated ground water, treat it to clean up levels, and discharge it to the Cocheco River. As part of the ground water monitoring program, the monitoring well network surrounding the landfill will be augmented and optimized to determine the extent, laterally and vertically, of ground water contamination. This will include the use of the existing monitoring network as well as the establishment of additional monitoring wells both on the landfill and in the area surrounding the landfill.

(3) COCHECO RIVER SEDIMENT

If further sampling, performed under either the pre-design investigations or future environmental monitoring, demonstrates that sediment in the drainage swale or Cocheco River generates a risk to either human health or the environment, that sediment must be excavated from the drainage swale or Cocheco River and disposed off-site in accordance with State of New Hampshire regulations.

(4) INDOOR AIR

If further sampling, consistent with EPA's Indoor Air Guidance, demonstrates that an indoor air risk exists from contaminants at the Site, appropriate actions will be taken to eliminate that risk.[40]

c. CLEAN CLOSURE OF THE LANDFILL

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[39] *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites.* OSWER Directive 9200.4-17P, April 21, 1999.

[40] Draft *Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (Subsurface Vapor Intrusion Guidance), USEPA, November 26, 2002.

At the conclusion of the remedy it is expected that hazardous waste in the landfill will no longer leach contaminants into the ground water surrounding and beneath the landfill that pose a risk to either human health or the environment and that no further cleanup actions with respect to the Site will be required.[41] Further activities at the landfill at that time will be subject to State of New Hampshire regulations.

L. STATUTORY DETERMINATIONS

The remedial action selected herein for implementation at the Dover Municipal Landfill is consistent with CERCLA and, to the extent practicable, the NCP.

1. THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy will be protective of human health and the environment. Current exposure to contaminated ground water will be prevented through institutional controls. Long-term monitoring of the ground water will allow EPA to track the concentrations present in the Eastern and Southern Plumes. Water quality data will be used by EPA to demonstrate that the plumes are not expanding and that concentrations are declining. Excavating contaminated sediment and then filling in the existing northern and southern drainage trenches prevents direct contact with the contaminated leachate and sediment. Any short-term risks to human health or the environment during implementation of the selected remedy are controllable through engineering techniques. The potential exposure to Site workers and area residents to air emissions during the installation of new monitoring wells, extraction wells, or the air-sparging trench will be monitored to ensure ambient air levels are not exceeded.

Air-sparging of ground water is expected to reduce (and eventually eliminate) the concentration of contaminants from ground water flowing into the surrounding aquifers. Operation of a pump-and-treat ground water system, in conjunction with the Source Control component, will eventually restore the aquifer south of the landfill to drinking water quality and also protect the Bellamy Reservoir from becoming impacted by the landfill contamination. Similarly, the use of monitored natural attenuation, in concert with the other Source Control components, will eventually restore the aquifer to the east of the Site to drinking water quality.

2. THE SELECTED REMEDY ATTAINS OR APPROPRIATELY WAIVES ARARs

ARARs for the Site were identified during the development of the 1991 ROD. As part of the evaluation of alternatives for this Amended ROD, not only were new ARARs associated with the proposed alternatives identified, but a review of the previous ARARs was conducted. A complete

[41] Risk-Based Clean Closure. USEPA, Elizabeth Cotsworth, Acting Director, Office of Solid Waste, March 16, 1998.

list of ARARs is presented in Appendix A of this Amended ROD.

Section 300.430 (e) of the National Contingency Plan (NCP) requires that on-site remedial actions at CERCLA sites must meet ARARs under federal or state environmental or facility siting laws unless there are grounds for invoking a waiver. A waiver is required if ARARs cannot be achieved. Other federal and state advisories, criteria, or guidance, as appropriate (to be considered "TBCs"), should be considered in formulating the remedial action.

ARARs are promulgated, enforceable federal and state environmental or public health requirements. There are two categories of requirements: "applicable" or "relevant and appropriate". CERCLA does not allow a regulation to be considered as both "applicable" and "relevant and appropriate." These categories are defined below:

Applicable Requirements - Section 300.5 of the NCP defines applicable requirements as "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site".

Relevant and Appropriate Requirements - Section 300.5 of the NCP defines relevant and appropriate requirements as "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the particular site."

To be considered (TBCs) are non-promulgated criteria, advisories, and guidance issued by the federal or state governments. Along with ARARs, TBCs may be used to develop interim action limits necessary to protect human health and the environment.

ARARs and TBCs are divided into three categories: chemical-specific, location-specific, and action-specific. This section briefly summarizes the most significant chemical, location and action specific ARARs for the remedy.

a. CHEMICAL-SPECIFIC ARARs

Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the determination of numerical values that establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. In general, chemical-specific requirements are set for a single chemical or a closely related group of chemicals. These requirements do not consider the mixture of chemicals. A summary of chemical specific ARARs is presented in Table 1B of Appendix A.

The Safe Drinking Water Act Maximum Contaminant Levels (MCLs) are chemical-specific ARARs that govern the quality of drinking water provided by a public water supply. Because the aquifer at the Site is classified as a potential drinking water source, MCLs are relevant and appropriate requirements in establishing interim ground water levels. In addition, if New Hampshire Drinking Water Quality Standards or New Hampshire Groundwater Protection Standards include a more stringent standard for a site contaminant than the federal MCL, it would become the interim cleanup level for groundwater. As explained above, interim cleanup levels remain in place for the duration of the cleanup. Once the cleanup is complete, final groundwater cleanup levels will be established.

b. LOCATION-SPECIFIC ARARs

Location-specific ARARs are restrictions placed on the concentrations of hazardous substances, or the conduct of activities solely because they are in specific areas. The general types of location-specific ARARs that may be applied to the Dover Municipal Landfill Site are briefly described below and are presented in Table 1C of Appendix A.

Several federal and state ARARs regulate activities that may be conducted in wetlands. These regulations and requirements are applicable to the cleanup because wetlands surround the Site to the west, south and east. The Wetlands Executive Order (E.O. 11990) incorporated into 40 CFR Part 6, Appendix A, require that wetlands be protected and preserved, and that adverse impacts be minimized. In accordance with this Order, EPA specifically solicited public comments on the expected adverse impacts to area wetlands and the proposed mitigation measures. After considering those comments, EPA has determined that no practicable alternative exists that would not disturb the area wetlands since contamination has migrated there and that the selected remedy provides the least amount of disruption to the wetlands. Measures to mitigate impacts include the use of silt fences and hay bales during construction activities and discharge of treated water back into wetlands to maintain water levels. Disturbed wetlands will be restored. Section 404 of the Clean Water Act and State wetland protection regulations are also applicable requirements which restrict activities that adversely affect wetlands and waterways.

Additional location-specific ARARs include the Fish and Wildlife Coordination Act, which requires that any federal agency proposing to modify a wetland or body of water must consult with the U.S. Fish and Wildlife Service.

c. ACTION-SPECIFIC ARARs

Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are generally focused on actions taken to remediate, handle, treat, transport, or dispose of hazardous wastes. These action-specific requirements do not in themselves determine the remedial alternative; rather, they indicate how a selected alternative must be implemented. The general types of action-specific ARARs that may be applied to the Site are briefly described below and are presented in Table 1A of Appendix A.

Because the Site contains hazardous waste, RCRA Hazardous Waste regulations apply to certain actions taken onsite. The base RCRA program has been delegated to New Hampshire; therefore, the state and any more stringent federal hazardous regulations governing such activities as waste identification, generator and owner/operator standards, landfill closure, groundwater monitoring, air emissions from process vents, equipment, tanks, and containers apply to the Site.

In particular, the selected remedy must meet the clean closure requirements of RCRA. This means that at the completion of the air-sparging treatment, contaminants remaining in the landfill will not leach concentrations into the groundwater (including groundwater beneath the landfill) that pose a risk to human health or the environment. An appropriate cap must then be placed on the landfill. Should the capping contingency be implemented, hazardous waste landfill closure regulations will apply to the site. During remediation, State groundwater regulations require that a groundwater management zone be delineated and remain in place until cleanup levels are attained.

The New Hampshire Department of Environmental Services has classified the Cocheco River as a Class B river and the Bellamy Reservoir as a Class A, drinking water reservoir. While cleaning up surface water is not a remedial action objective, the New Hampshire Surface Water Quality Criteria (SWQC), although not identified as chemical specific cleanup standards, will be relevant and appropriate when measuring the performance and effectiveness of the air-sparging trench as well as other activities affecting surface waters.

Additionally, other guidelines that need to be considered when conducting the selected remedy are set out in EPA's Monitored Natural Attenuation guidance and Indoor Air Vapor guidance.

3. THE SELECTED REMEDIAL ACTION IS COST-EFFECTIVE

The selected remedy is cost-effective since it provides overall effectiveness proportional to its cost. The selected remedy, the Mixed Alternative, which is estimated to cost $19.4 million, as compared to the original, 1991 ROD at $34.6 million, will treat or remove contamination from the ground water as effectively, if not more so, than the 1991 ROD. The selected remedy will further ensure that the Bellamy Reservoir is protected and will restore ground water more quickly than estimated in the 1991 ROD.

4. THE SELECTED REMEDY DOES UTILIZE PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedy provides a permanent solution and alternative treatment and resource recovery technologies to the maximum extent practicable for the ground water plume and Source Control component. Protection is also provided through institutional controls and long-term monitoring. Extrapolations of ground water monitoring data indicate that the Eastern Plume will continue to reduce in size and concentration toward drinking water quality after the Source Control component has been implemented. Interpretation existing data indicates that the aquifer

in the Southern Plume will be prevented from discharging into the Bellamy Reservoir and will achieve drinking water standards for many of the contaminants except arsenic in about twenty years. However, arsenic concentrations will need to be monitored carefully over this period.

5. THE SELECTED REMEDY SATISFIES THE PREFERENCE FOR TREATMENT AS A PRINCIPLE ELEMENT

The selected remedy treats contaminated ground water flowing from the landfill into the surrounding aquifers to concentrations protective of human health and the environment. Contaminated ground water in the Southern Plume will be pumped-and-treated to restore the aquifer to drinking water standards. Contaminated ground water in the Eastern Plume will be restored by monitored natural attenuation to drinking water standards. If, after five years, EPA determines that MNA has failed in the Eastern Plume, an active ground water remedy will be employed to restore this portion of the aquifer.

6. FIVE YEAR REVIEWS

Because this Amended ROD will result in contaminants remaining on-site until clean closure is achieved and the aquifer restored, EPA will review the Site at least once every five years after construction is complete at the Site to assure that the remedial action continues to be protective of human health and the environment.

M. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Proposed Plan to Amend the 1991 ROD was released for public comment in June 2004. The proposed change called for attaining protectiveness of human health through institutional controls, long-term monitoring, construction of an air-sparging trench (with a contingency for capping), and restoration of ground water through both monitored natural attenuation and pump-and-treat. The Amended Proposed Plan also included excavating contaminated sediment from, and then covering, the existing landfill drainage trenches. It also requires an environmental monitoring program, a contingency remedy of pump-and-treat for the Eastern Plume, and five-year reviews.

EPA has determined that, based on comments received during the public comment period which concluded on August 11, 2004, no significant change is needed to the Amended Proposed Plan. EPA has prepared a Responsiveness Summary to address the comments received during the public comment period. The Responsiveness Summary is attached as Appendix D.

N. STATE ROLE

The New Hampshire Department of Environmental Services has reviewed the proposed remedy change for the Site and concurs with the selected remedy described in Section K of this Amended ROD. A copy of the State concurrence letter is attached as Appendix C.

O. REFERENCES

SEA Consultants Inc., July 1994. Pre-Design Study, Southern Plume, Dover Municipal Landfill

Site, Dover, New Hampshire.

Golder Associates, Inc., February 1995. Pre-Design Investigation Report, Dover Municipal Landfill, Dover, New Hampshire, Manchester, New Hampshire.

USEPA, November 21, 1997. Administrative Order by Consent and Agreement, U.S. EPA Docket No: CERCLA-I-97-1043.

GeoInsight, May 17, 1996. Focused Feasibility Study: Attachment A, Updated Hydrogeologic Information; Attachment B, Treatability Study Report; Attachment C, Limited Field Sparging Test Summary Report; Attachment D, Treatability Study Work Plan; Attachment E, Focused Feasibility Study; Attachment F, Field Demonstration Work Plan.

A. F. Beliveau, EPA QA office, February 13, 1996. Comment letter to Project Manager Cheryl Sprague, EPA.

Don Draper, EPA Ada Lab, October 7, 1996. Comment letter to Project Manager Cheryl Sprague, EPA.

New Hampshire Department of Environmental Services, April 23, 2002. Agency Response to the Draft Final Bioremediation Pilot Assessment, Dover Municipal Landfill, Comment letter from Andrew Hoffman, NHDES to Dean Peschel, City of Dover.

USEPA, September 1991. Record of Decision, Dover Municipal Landfill.

New Hampshire Department of Environmental Services, January 21, 2004. Dover Source Water Protection Areas, Scale 1:36000.

Thomas Fargo, C.G., January 2002. Quantifying the Bellamy River Watershed Hydrologic Budget, prepared for the Town of Madbury.

GeoInsight, January 30, 2004. Revised Focused Feasibility Study, Dover Landfill.

Goldberg-Zoino & Associates, Inc. and Wehran Engineers. November 1988. Remedial Investigation, Dover Municipal Landfill, Dover, New Hampshire. Prepared for: New Hampshire Department of Environmental Services, Waste Management Division.

GeoInsight, 1997. Trench and Drainage Swale Investigation.

U.S. Government, 1988. National Oil and Hazardous Substances Pollution Contingency Plan.

HMM Associates, Inc., January 8, 1990. Field Elements Study for the Municipal Landfill, Dover, New Hampshire.

NOAA. 1993, 1994. Ontario Lowest Effect Levels - Screening Quick Reference Tables, Version 2, http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html,

GeoInsight, April, 2002. Remedial Action Summary Report for the Trench and Swale (Close-Out Report).

USEPA, November 26, 2002. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance).

USEPA, April 21, 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. OSWER Directive 9200.4-17P.

Golder Associates, December 1996. Dover Landfill Final (100%) Design Report.

GeoInsight, November 15, 2002. Summary of Summer 2002 EMP Event, Dover Municipal Landfill.

USEPA, March 16, 1998. Risk-Based Clean Closure memorandum from Elizabeth Cotsworth, Acting Director, Office of Solid Waste.

USEPA, Environmental Monitoring Systems Laboratory, Las Vegas, NV., March 1985, Site Analysis Dover Landfill, TS-PIC-85010.

Attachment 1: ARARs as they apply to Site Conditions

<u>The Attached Tables, in Order:</u>

Table 1A: Action-Specific ARARs
Table 1B: Chemical-Specific ARARs
Table 1C: Location-Specific ARARs

Table 1A: Potential Action-Specific ARARs

Requirement	Authority	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
FEDERAL - 40 CFR Part 261 RCRA Standards for identification and listing of hazardous waste	Federal Regulatory Requirement	AR for treatment processes RAR to material in landfill	New Hampshire has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions of the federal regulations have been adopted by the State.	Excavated material and material generated by treatment processes will be analyzed by appropriate test methods. If found to be hazardous wastes, then they will be managed in accordance with the substantive requirements of the State hazardous waste regulations.
FEDERAL - 40 CFR Part 262 RCRA Standards Applicable to Generators of Hazardous Wastes	Federal Regulatory Requirement	AR	New Hampshire has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions of the federal regulation have been adopted by the State.	If remedial treatment or excavation generates hazardous wastes, then they will be managed in accordance with the substantive requirements of the State hazardous waste regulations.
FEDERAL - 40 CFR Part 264 RCRA Standards for Owners and Operators of Hazardous Waste TSDF Facilities	Federal Regulatory Requirement	RAR for landfill and RAR for treatment processes	New Hampshire has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. The relevant and appropriate provisions of 40 CFR Part 264 are incorporated by reference.	The specific portions of the State regulations that are relevant and appropriate to the remedial alternatives for the landfill such as closure and groundwater monitoring requirements and applicable for the treatment processes will be identified in Section 5 tables.
FEDERAL - 40 CFR Part 264 Subpart AA RCRA - Air Emission Standards for Process Vents	Federal Regulatory Requirement	AR	Establishes air emission standards for process vents, closed-vent systems, and control devices at hazardous waste facilities; and apply to distillation, fractionation, thin-film evaporation, solvent extraction, and air or steam stripping operations that "manage hazardous wastes with organic concentrations of at least 10 ppmv."[1]	If process vents are used in remedial action, air emission controls will be implemented if the applicability threshold is met.
FEDERAL - 40 CFR Part 264 Subpart BB RCRA - Air Emission Standards for Equipment Leaks	Federal Regulatory Requirement	AR	Establishes air emission standards for equipment leaks at hazardous waste facilities where equipment "contains or contacts hazardous wastes with organic concentrations of at least 10 percent by weight."[1]	If equipment covered by this standard is used in the remedial action and handles hazardous substance at concentrations that meet this rule's threshold, then air emission controls will be implemented.
FEDERAL - 40 CFR Part 264 Subpart CC RCRA - Air Emission Standards for Tanks, Surface Impoundments and Containers	Federal Regulatory Requirement	AR	Establishes air emission standards for facilities that treat store or dispose hazardous wastes in tanks, surface impoundments, or containers.[1]	If tanks, containers, or surface impoundments are used in the remedial action and meet the applicability threshold, then air emission controls will be implemented

~~1.~~[1]Because New Hampshire has not yet adopted regulations incorporating 40 CFR 264, subparts AA - CC, the Federal regulations are the source for these ARARs.

Table 1A: Potential Action-Specific ARARs

Requirement	Authority	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
STATE - Env-Wm 403.6 Identification and Listing of Hazardous Wastes; Toxicity Characteristic	State Regulatory Requirement	AR	These requirements list particular hazardous waste and identify the maximum concentrations of contaminants for which the waste would be a RCRA characteristic waste because of its toxicity. The analytical test set out in Appendix II of 40 CFR Part 261 is referred to as the Toxicity Characteristic Leaching Procedure (TCLP).	Excavated materials from the Site and material generated by treatment processes will be analyzed to determine whether they are listed or characteristic hazardous waste under RCRA. Materials that are listed waste or exceed TCLP hazardous waste thresholds will be disposed off-site in a RCRA Subtitle C TSDF. Non-hazardous materials will be used as backfill or disposed appropriately.
STATE - Env-Wm 500 Requirements for Hazardous Waste Generators [formerly He-P Ch. 1905.06]	State Regulatory Requirement	AR	Requires determination as to whether waste materials are hazardous and, if so, requirements for managing such materials on site prior to shipment off site.	If remedial treatment or excavation generates hazardous waste that must be shipped off-site, then it will be managed on-site in accordance with the substantive provisions of these regulations prior to off-site shipment.
STATE - Env-Wm 700 Requirements for Owners and Operators of Hazardous Waste Facilities /Hazardous Waste Transfer Facilities [formerly He-P Ch. 1905.08]	State Regulatory Requirement	RAR	Establishes requirements for owners or operators of hazardous waste sites or treatment facilities (federal requirements 40 CFR Parts 264 are incorporated by reference).	The specific portions of these regulations that are relevant to the remedial alternative(s) will be identified and addressed in Section 5 tables.
STATE - Env-Wm 702.10 – 702.13 Groundwater Monitoring [formerly He-P Ch. 1905.08(d)(6)a,b]	State Regulatory Requirement	RAR	Establishes requirements for installation and operation of ground water monitoring network capable of detecting potential migration of hazardous waste or constituents and requires corrective action when necessary. Relevant and appropriate for COCs in ground water.	Remedial alternatives will include ground water monitoring systems that meet the substantive elements of this relevant and appropriate requirement and detect and correct contaminant groundwater releases.
STATE - Env-Wm 708.02(a)(12) Closure and Post-Closure Disposal Units	State Regulatory Requirement	RAR	Incorporates by reference 40 CFR 264.110 - .120 (subpart G). Landfill must be closed in a manner that controls, minimizes or eliminates the potential for land filled COCs to threaten human health and the environment. Closure design must also minimize maintenance of the Site. After the Landfill is closed and waste is left in place, regular monitoring and maintenance must be performed for at least 30 years.	Source control remedy will comply with the substantive requirements of these regulations for landfills with waste left in place or for clean closure.
STATE - Env-Wm 708.03 (d)(1) Use and Management of Containers	State Regulatory Requirement	AR	Establishes requirements for the condition of containers, compatibility of hazardous waste stored in containers, and the management, inspection, and closure of containers. Incorporates by reference 40 CFR 264.170-.179 (Subpart I).	If excavated materials or any other materials generated from the remedy are hazardous waste and are managed in containers, then the containers will be managed to meet the substantive portion of this requirement.

Table 1A: Potential Action-Specific ARARs

Requirement	Authority	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
STATE - Env-Wm 708.03(d)(2) Tanks	State Regulatory Requirement	AR	Tanks or tank systems used to temporarily store hazardous liquids or as part of a treatment system for hazardous liquids or sludges must be designed, installed and operated in accordance with the RCRA Standards. Incorporates by reference 40 CFR 264.140 - .198 (subpart J).	If a tank or tank system is used for storing or treating hazardous wastes as part of Site remediation, it must be constructed with secondary containment and a leak detection system, and comply with monitoring and inspection requirements.
STATE – Env-Wm 708.03(d)(4) Waste Piles [formerly He-P Ch. 1905.08(f)(l)(d)]	State Regulatory Requirement	AR	General design and operation requirements for temporary storage of hazardous soils and/or sludges. Locations must have an impermeable liner and materials stored in piles must be free of standing liquid. Incorporates by reference 264.250-259 (subpart L).	If hazardous waste piles are included in the remedial alternative selected for the Landfill, then these requirements must be met.
STATE - Env-Wm 1403 Ground Water Management and Ground Water Release Detection Permits	State Regulatory Requirement	AR	Prohibits discharge of hazardous waste to ground water, or any discharge of ground water that would result in a violation of surface water quality in adjacent surface waters. Also, ground water cannot be altered so as to make it unsuitable for drinking. Establishes groundwater management zones (GMZ).	Ground water monitoring and treatment will be required to attain State AGQSs. Any ground water discharges from treatment systems, including the treatment trench, must meet the applicable standards. A GMZ will be established at the site and will remain in place until cleanup goals have been attained throughout the GMZ.
STATE – RSA 485-A:17 and NH Admin. Code Env-Ws 415 Terrain Alteration	State Regulatory Requirement	AR	Establishes criteria to control erosion and run-off for any activity that significantly alters the terrain.	Any action taken at the Site that will disturb an area of more than 100,000 contiguous square feet must comply with these criteria.
STATE – NH Admin. Code Env-A Part 1002 Fugitive Dust Control	State Regulatory Requirement	AR	Requires precautions to prevent, abate and control fugitive dust during specified activities, including excavation, construction and bulk hauling.	Precautions to control fugitive dust emissions will be required both during and after Site remediation.
STATE - Env-Ws 1500 New Hampshire Ground Water Discharge Permit and Registration Rules	State Regulatory Requirement	AR	These regulations established substantive requirements for discharges to ground water, including prohibited discharges (Env-Ws 1503.04), compliance criteria (Env-Ws 1504.03), water quality sampling (Env-Ws 1507.01).	If water is discharged into the Landfill, into the surrounding area, or to ground water, then such discharges will receive appropriate treatment to comply with the substantive requirements of this ARAR.

Table 1A: Potential Action-Specific ARARs

Requirement	Authority	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
STATE - Env-A300 Ambient Air Quality Standards	State Regulatory Requirement	AR	Establishes primary and secondary level for eight air contaminants: • particulate matter • sulfur dioxide • carbon dioxide • nitrogen dioxide • ozone • hydrocarbons • fluorides • lead Seven of the primary and secondary standards established under this State standard are adopted from the federal NAAQS.	These air contaminant levels will be used to establish target levels for air releases from the Site and site remediation activities.
STATE - Env-A 1300 Toxic Air Pollutants	State Regulatory Requirement	AR	Establishes ambient air limits for 74 chemicals. These ambient air limits (AALs) are levels at, or below, which ambient air concentrations of respective air contaminant will not adversely affect human health.	Releases of contaminants to the air from any source on Site will not exceed applicable AALs. Air emission controls will be implemented if needed to prevent any detected exceedences.
STATE - Env-Ws 904 Pretreatment Standards	State Regulatory Requirement	AR	Provides standards for indirect discharge of pollutants to POTWs.	SC-7A will comply with the substantive requirements of this regulation. If levels of contaminant concentrations in groundwater to be discharged to the POTW interfere with the performance of the system, or would cause the POTW to violate water quality standards, or adversely impacts the sludge produced, the groundwater shall be pretreated either on site or at the POTW before entering the system.
STATE – Chapter We 600 Standards for construction, maintenance and abandonment of wells	State Regulatory Requirement	AR	These regulations apply to the construction, maintenance and abandonment of wells.	Wells will be constructed, maintained, relocated and/ or abandoned according to these regulations.
FEDERAL - OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, 67 Federal Register 71169 (Nov. 29, 2002), http;//www.epa.gov/correctiveation/cis/vapor.htm	Federal guidance	TBC	This draft guidance establishes a methodology for assessing indoor air risks to human health.	Potential risks associated with indoor air at residences near the Site will be evaluated and monitored consistent with this guidance.
FEDERAL – EPA Guidance: Risk-Based Clean Closure, March 16, 1998	Federal Guidance	TBC	This guidance describes risk-based clean closure at RCRA hazardous waste units.	Remedial alternatives involving clean closure will be closed consistent with this guidance.

Table 1A: Potential Action-Specific ARARs

Requirement	Authority	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
FEDERAL – Technical Guidance for Final Covers on Hazardous Waste Landfills and Surface Impoundments: EPA/530-SW-047; July, 1989	Federal Guidance	TBC	This guidance sets out criteria for hazardous waste landfill covers	Remedial alternatives involving RCRA C caps will be implemented consistent with this guidance.
FEDERAL– Technical Memorandum – EPA Region 1 from Dennis Gagne and Yoon-Jean Choi to Office of Site Remediation and Restoration (February 5, 2001) http://www.epa.gov/region1/superfund/resource/C524.pdf	Federal Guidance	TBC	This guidance sets out criteria for alternative hazardous waste landfill covers.	Remedial alternatives involving RCRA C caps may consider this guidance.
FEDERAL – Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. OSWER Directive 9200.4-17P, April 21, 1999.	Federal Guidance	TBC	This guidance sets criteria for evaluating monitored natural attenuation as a remedy at, among others, Superfund sites.	Remedial alternatives that incorporate monitored natural attenuation for groundwater will demonstrate the effectiveness of this alternative for addressing groundwater in an acceptable amount of time consistent with this guidance.
State – Surface Water Quality Standards, Env-Ws 1708	State Regulatory Requirement	Relevant and Appropriate	Standards for protection against degradation of surface water (check this). Standards and criteria based on federal ambient water quality criteria for protection of human health and aquatic life.	Standards will be used to measure the performance and effectiveness of remedial alternatives in preventing contaminated groundwater and surface runoff and discharges from degrading nearby surface waters.
Federal – CWA Section 402, National Pollutant Discharge Elimination System (NPDES)	Federal Regulatory Requirement	AR	Contains discharge limitations, monitoring requirements, and best management practices. Substantive requirements under NPDES are written such that state and federal ambient water quality criteria (AWQC) are met.	On-site discharges shall meet the substantive discharge standards.

Table 1B: Potential Chemical Specific ARARs

Media	Requirement	Authority	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Ground Water	STATE – Env–Wm 1400 Ground Water Protection Standards	State Regulatory Requirement	AR	New Hampshire AGQSs are standards that apply to all ground water in the State, consistent with the Legislature's designation of all ground water as a potential water supply.	Groundwater will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards, whichever is more stringent, at the completion of the remedy.
Ground Water	Safe Drinking Water Act (SDWA) - Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.14). Revised MCLs (40 CFR 141.61-141.62) and non-zero Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50-141.51)	Federal Regulatory Requirement	RAR (MCLs and non-zero MCLGs); TBC (MCLGs)	MCLs have been promulgated for a number of common organic and inorganic contaminants to regulate the concentration of contaminants in public drinking water supply systems. MCLs are relevant and appropriate for Site ground water because ground water in the Site vicinity may be used for drinking water. MCLGs are non-enforceable health goals for public water systems.	Ground water will attain State AGQSs , MCLs, non-zero MCLGs when there is no MCL or State drinking water standards, whichever is more stringent at the completion of the remedy.
Ground Water	New Hampshire Drinking Water Quality Standards (Env-Ws 316, 317, 319)	State Regulatory Requirement	RAR (MCLs and non-zero); TBC (MCLGs)	State MCLs and MCLGs establish maximum contaminant levels permitted in public water supplies and are the basis of State AGQSs that are applicable to site ground water. Secondary Maximum Contaminant Levels (MCLs) apply to contaminants that primarily affect the aesthetic quality of drinking water. The regulations are generally equivalent to the Federal SDWA. State drinking water quality standards are relevant and appropriate for Site ground water because ground water in the Site vicinity may be used for drinking water.	Ground water will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards, whichever is more stringent, at completion of the remedy.
Ground Water Surface Water Indoor Air	FEDERAL – USEPA Risk RfDs	Federal Regulatory Requirement	TBC	RfDs are dose levels developed by the USEPA for non-carcinogenic effects.	USEPA RfDs will be used to characterize risks due to exposure to contaminants in ground water and other media.
Ground Water Surface Water Indoor Air	FEDERAL – USEPA Carcinogen Group Potency Factors	Federal Regulatory Requirement	TBC	Potency Factors are developed by the USEPA from Health Assessments or evaluation by the Carcinogen Effects Assessments Group.	USEPA Carcinogenic Potency Factors will be used to compute the individual incremental cancer risk resulting from exposure to site contaminants.
Sediment	Ontario Lowest Effect Levels 1993, 1994	Guidance	TBC	Establishes lowest effect levels for freshwater biota for various contaminants	Used to provide a spectrum of individual incremental cancer risk resulting from exposure to site contaminants for use in ecological risk assessment.

Table 1B: Potential Chemical Specific ARARs

Media	Requirement	Authority	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Sediment	FEDERAL – NOAA Technical Memorandum NOS OMA 52	Federal Guidance	TBC	Ecotoxicity thresholds for various contaminants in sediments and their potential biological effects on biota exposed to the contaminants.	Thresholds for soil and sediments concentrations may be used in an ecological risk assessment.

Table 1C: Potential Location-Specific ARARs

Media	Requirement	Authority	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Wetlands	FEDERAL – CWA Section 404; 40 CFR Part 230:33 CFR Parts 320-330	Federal Regulatory Requirement	AR	These codes establish requirements for the discharge of dredged or fill material into water bodies or wetlands. The regulations prohibit the discharge of dredged or fill material "if there is a practicable alternative…which would issue less impact on the aquatic ecosystem."	Remedial actions that will result in filling of water bodies or wetlands around the Site must comply with the substantive portions of these requirements. Filling the perimeter ditch is the least environmentally damaging, practicable activity because it will minimize contact with contaminated sediments, prevent sediment re-contamination, and allow ground water to migrate to collection and treatment systems for permanent treatment.
Wetlands	Federal Executive Orders 11990 Protection of Wetlands FEDERAL – 40 CFR Part 6 Appendix A	Federal Regulatory Requirement	AR	Federal agencies are required to avoid the destruction or modification of wetlands, and direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Where avoidance of wetlands cannot be achieved, the proposed action includes all practicable means to limit impact to wetlands that may result from such activity.	Remedial actions will use all practicable means to avoid destruction or modification of wetlands surrounding Site. Remedial alternatives represent the best practicable approach to remediation with the least environmentally damaging impacts.
Land	FEDERAL – RCRA General Facility Standards 40 CFR 264.18(a) Seismic Standards	Federal Regulatory Requirement	AR	Construction of new hazardous waste treatment, storage or disposal facilities is prohibited within 200 feet of a fault that has had a displacement in Holocene time.	Construction of any on-site treatment facility will consider this location standard in design.
Wetlands	FEDERAL – 16 USC 661 et. seq., Fish and Wildlife Coordination Act	Federal Regulatory Requirement	AR	Requires actions to be taken to avoid adverse effects, minimize potential harm to fish or wildlife, and to preserve natural and beneficial uses of the land.	Relevant federal agencies must be contacted to help analyze impacts of remedial action on wildlife in wetlands and river.
Wetlands	STATE – RSA 482-A and Env–Wt 300 New Hampshire Criteria and Conditions for Fill and Dredging in Wetlands	State Regulatory Requirement	AR	Any activity in or adjacent to wetlands, including filling and dredging, must meet these criteria for wetlands protection.	Any remedial activities affecting the wetlands will meet the substantive requirements of this State statute and its regulations. Filling perimeter ditches is the least environmentally damaging activity because it will minimize contact with contaminated sediments, prevent sediment recontamination, and allow groundwater to migrate to collection and treatment systems for permanent treatment.
Ground Water	STATE – Wellhead Protection Program	State Guidance	TBC	Provides criteria for wellhead protection area delineation and identification of contamination sources to be excluded from this area.	These provisions will be considered relative to protection of the Calderwood Well.

Attachment 2: ARARs as they apply to Each Alternative

The Attached Tables, in Order:

Table 2A: Action-Specific ARARs
Table 2B: Chemical-Specific ARARs
Table 2C: Location-Specific ARARs

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
FEDERAL - 40 CFR Part 261 RCRA Standards for identification and listing of hazardous waste	Applicable Used to evaluate site risk	Applicable to excavated material and material generated by treatment processes Relevant and appropriate to material in landfill Materials excavated during remedy implementation and materials generated by treatment processes will be analyzed by appropriate test methods and, if applicable, managed in accordance with the substantive requirements of the State hazardous waste regulations.	Applicable to excavated material and material generated by treatment processes Relevant and appropriate to material in landfill Materials excavated during remedy implementation, including treatment trench and vertical hydraulic barrier installation and materials generated by treatment processes will be analyzed by appropriate test methods and, if applicable, managed in accordance with the substantive requirements of the State hazardous waste regulations.	Applicable to excavated material and material generated by treatment processes Relevant and appropriate to material in landfill Materials excavated during remedy implementation, including treatment trench and vertical hydraulic barrier installation and materials generated by treatment processes will be analyzed by appropriate test methods and, if applicable, managed in accordance with the substantive requirements of the State hazardous waste regulations.
FEDERAL - 40 CFR Part 262 RCRA Standards Applicable to Generators of Hazardous Wastes	Not an ARAR	Applicable Material generated during well and interceptor trench installation, excavation activities and treatment residuals will be tested and, if hazardous, either consolidated under the RCRA C cap or sent offsite for disposal.	Applicable Material generated during well, treatment trench and barrier excavation activities and treatment residuals will be tested and, if hazardous, sent offsite for disposal at a licensed facility.	Applicable Material generated during well, treatment trench, and barrier excavation activities and treatment residuals will be tested and, if hazardous, sent offsite for disposal at a licensed facility.

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
FEDERAL - 40 CFR Part 264 RCRA Standards for Owners and Operators of Hazardous Waste TSDF Facilities (See state action specific ARARs for specific sections)	Not an ARAR	Applicable for treatment processes Relevant and appropriate for landfill The specific portions of the State regulations that are ARARs for this alternative are identified in the state action-specific section.	Applicable for treatment processes Relevant and appropriate for landfill The specific portions of the state regulations that are ARARs for this alternative are identified in the state action-specific section. .	Applicable for treatment processes Relevant and appropriate for landfill The specific portions of the state regulations that are ARARs for this alternative are identified in the state action-specific section..
FEDERAL - 40 CFR Part 264 Subpart AA RCRA - Air Emission Standards for Process Vents	Not an ARAR.	Applicable If process vents are used in connection with groundwater extraction recovery wells or other treatment processes, air emission controls will be implemented if the applicability threshold is met.	Applicable If process vents are used in connection with the treatment trench, groundwater extraction recovery wells or other treatment processes, air emission controls will be implemented if the applicability threshold is met.	Applicable If process vents are used in connection with the treatment trench, groundwater extraction recovery wells or other treatment processes, air emission controls will be implemented if the applicability threshold is met.
FEDERAL - 40 CFR Part 264 Subpart BB RCRA - Air Emission Standards for Equipment Leaks	Not an ARAR.	Applicable If equipment covered by this standard is used in the remedial action, and handles hazardous substances at concentrations that meet this rule's threshold, then air emission controls will be implemented.	Applicable If equipment covered by this standard is used in the remedial action, and handles hazardous substances at concentrations that meet this rule's threshold, then air emission controls will be implemented.	Applicable If equipment covered by this standard is used in the remedial action, and handles hazardous substances at concentrations that meet this rule's threshold, then air emission controls will be implemented.

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
FEDERAL - 40 CFR Part 265 Subpart CC RCRA - Air Emission Standards for Tanks, Surface Impoundments and Containers	Not an ARAR.	Applicable If tanks, surface impoundments or containers are used in the remedial action and meet the applicability threshold, then air emission controls will be implemented.	Applicable If tanks, surface impoundments or containers are used in the remedial action and meet the applicability threshold, then air emission controls will be implemented.	Applicable If tanks, surface impoundments or containers are used in the remedial action and meet the applicability threshold, then air emission controls will be implemented.
FEDERAL – CWA Section 402, National Pollutant Discharge Elimination System (NPDES)	Not an ARAR	Applicable On-site discharges shall meet the substantive discharge standards	Applicable If re-injection of treated ground water to landfill becomes infeasible, any onsite discharges shall meet the substantive requirements of these standards.	Applicable On-site discharges shall meet the substantive discharge standards

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
STATE - Env-Wm 403.6 Identification and Listing of Hazardous Wastes; Toxicity Characteristic	Applicable Used to evaluate site risk.	Applicable to excavated material and material generated by treatment processes Relevant and Appropriate to material in landfill Excavated material and material generated by treatment processes will be analyzed by appropriate test methods. If found to be hazardous wastes, then they will be managed in accordance with substantive requirements of state hazardous waste regulations.	Applicable to excavated material and material generated by treatment processes Relevant and Appropriate to material in landfill Material excavated during remedy implementation including treatment trench and vertical hydraulic barrier installation and material generated by treatment processes will be analyzed by appropriate test methods and, if applicable, managed in accordance with the substantive requirements of the state hazardous waste regulations.	Applicable to excavated material and material generated by treatment processes Relevant and appropriate to material in landfill Material excavated during remedy implementation including treatment trench and vertical hydraulic barrier installation and material generated by treatment processes will be analyzed by appropriate test methods and, if applicable, managed in accordance with the substantive requirements of the state hazardous waste regulations.

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
STATE - Env-Wm 500 Requirements for Hazardous Waste Generators [formerly He-P Ch 1905.06]	Not an ARAR	Applicable Excavated hazardous material will be consolidated under the RCRA C cap or stockpiled in accordance with these regulations and disposed of offsite at RCRA C facility. Residual hazardous waste from treatment processes, such as spent carbon filters will be disposed of offsite at an appropriate facility.	Applicable Material generated during well, trench and barrier installation activities and treatment residuals will be tested and if hazardous sent offsite for disposal at a licensed facility. Stockpiled material will comply with the substantive standards of this regulation.	Applicable Material generated during well, trench and barrier installation activities and treatment residuals will be tested and if hazardous sent offsite for disposal at a licensed facility. Stockpiled material will comply with the substantive standards of the regulation.
STATE – Env-Wm 700 Requirements for Owners and Operators of Hazardous Waste Facilities /Hazardous Waste Transfer Facilities [formerly He-P Ch 1905.08]	Not an ARAR	Applicable for treatment processes Relevant and Appropriate for landfill This regulation establishes requirements for owners and operators of hazardous waste sites or treatment facilities. Specific sections are ARARs as described below	Applicable for treatment processes Relevant and Appropriate for landfill This regulation establishes requirements for owners and operators of hazardous waste sites or treatment facilities. Specific sections are ARARs as described below.	Applicable for treatment processes Relevant and Appropriate for landfill This regulation establishes requirements for owners and operators of hazardous waste sites or treatment facilities. Specific sections are ARARs as described below.

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
STATE – Env-Wm 702.10 – 702.13 Groundwater Monitoring [formerly He-P Ch. 1905.08(d)(6) a,b]	Not an ARAR .	Relevant and Appropriate A groundwater monitoring system will be installed and operated that is capable of detecting potential migration of hazardous waste and constituents from the landfill and in offsite plumes and requires corrective action when necessary.	Relevant and Appropriate A groundwater monitoring system will be installed and operated that is capable of detecting potential migration of hazardous waste and constituents from the landfill and in offsite plumes and requires corrective action when necessary.	Relevant and Appropriate A groundwater monitoring system will be installed and operated that is capable of detecting potential migration of hazardous waste and constituents from the landfill and in offsite plumes and requires corrective action when necessary.
STATE - Env-Wm 708.)02(a)(12) Closure and Post-Closure Disposal Units	Not an ARAR .	Relevant and Appropriate The landfill will be covered with a RCRA C cap that meets the requirements of this regulation for closure with hazardous waste left in place.	Relevant and Appropriate Landfill must meet clean closure standards at the completion of the remedy.	Relevant and Appropriate Landfill must meet clean closure standards at the completion of the remedy.
STATE - Env-Wm 708.03 (d)(1) Use and Management of Containers	Not an ARAR	Applicable If re-grading materials or any other materials generated from implementing the remedy are hazardous waste and are managed in containers, then the containers will be managed to meet the substantive portion of this requirement.	Applicable If excavated materials or any other materials generated from implementing the remedy are hazardous waste and are managed in containers, then the containers will be managed to meet the substantive portion of this requirement.	Applicable If excavated materials or any other materials generated from implementing the remedy are hazardous waste and are managed in containers, then the containers will be managed to meet the substantive portion of this requirement.

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
STATE - Env-Wm 708.03(d)(2) Tanks	Not an ARAR.	Applicable If a tank or tank system is used for storing or treating hazardous wastes as part of Site remediation, it will be constructed with secondary containment and a leak detection system and comply with all other substantive requirements including monitoring and inspection requirements.	Applicable If a tank or tank system is used for storing or treating hazardous wastes as part of Site remediation, it will be constructed with secondary containment and a leak detection system and comply with all other substantive requirements including monitoring and inspection requirements.	Applicable If a tank or tank system is used for storing or treating hazardous wastes as part of Site remediation, it will be constructed with secondary containment and a leak detection system and comply with all other substantive requirements including monitoring and inspection requirements.
STATE – Env-Wm 708.03(d)(4) Waste Piles [formerly He-P Ch. 1905.08 (f)(1)(d)]	Not an ARAR	Applicable If during sediment or soil excavation or re-contouring of the Landfill boundaries, COC-impacted soils or debris or dewatered sediment is uncovered and must be temporarily stored on-site as a waste pile, it must be erected, operated, and closed in substantive compliance with the section.	Applicable If temporary on-site storage of hazardous soils or materials is required, a structure will be designed, built, and operated in accordance with the specific requirements of this section.	Applicable If temporary on-site storage of hazardous soils or materials is required, a structure will be designed, built, and operated in accordance with the specific requirements of this section.

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
STATE – Env-Wm 1403 Ground Water Management and Ground Water Release Detection Permits	Not an ARAR	Applicable Extracted ground water in and around landfill and from plumes will be treated to meet AGQC before discharge to wetlands or Cocheco River to avoid degrading surface water. A ground water management zone (GMZ) and monitoring program will be established at the site and will remain in place until cleanup goals have been attained throughout the GMZ.	Applicable Ground water re-injected into landfill and ground water discharged to wetlands or that ultimately discharges to surface water shall be treated to meet AGWC and shall not degrade surface water. A GMZ and a monitoring program will be established at the site and will remain in place until cleanup goals have been attained throughout the GMZ.	Applicable Ground water re-injected into landfill and ground water discharged to wetlands or that ultimately discharges to surface water shall be treated to meet AGQC and shall not degrade surface water. A GMZ and a monitoring program will be established at the site and will remain in place until cleanup goals have been attained throughout the GMZ.
STATE – RSA 485-A:17 and NH Admin. Code Env-Ws 415 Terrain Alteration	Not an ARAR	Applicable Erosion and surface water runoff controls will be used during re-contouring and capping of the Landfill and during any on-site construction and/or remediation activities.	Applicable Erosion and surface water runoff controls will be used during sediment excavation and ditch backfilling and during any other remedial activities	Applicable Erosion and surface water runoff controls will be used during sediment excavation and ditch backfilling and during any other remedial activities

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
STATE – NH Admin. Code Env-A Part 1002 Fugitive Dust Control	Not an ARAR.	Applicable Measure to prevent, abate and control fugitive dust will be used during periods of re-contouring of the Landfill and cap construction and during any other activities which produce fugitive dust	Applicable The regulation will be met by maintenance of the soil protective cover and the use of dust suppressants during excavation activities.	Applicable The regulation will be met by maintenance of the soil protective cover and the use of dust suppressants during excavation activities.
STATE - Env-Ws 1500 New Hampshire Ground Water Discharge Permit and Registration Rules	Not an ARAR.	Applicable Any ground water re-injected into the landfill or discharged onsite or into surrounding wetlands will receive appropriate treatment to comply with the substantive requirements of this ARAR.	Applicable Ground water re-injected into the Landfill, or discharged onsite or into surrounding wetlands will receive appropriate treatment to comply with the substantive requirements of this ARAR.	Applicable Ground water re-injected into the Landfill or discharged onsite or into surrounding wetlands will receive appropriate treatment to comply with the substantive requirements of this ARAR.
STATE – Surface Water Quality Standards, Env-WS 1708	Not an ARAR	Relevant and Appropriate Standards will be used to measure the performance and effectiveness of the cap, the ground water extraction and treatment processes and discharges, erosion control and surface runoff measures from degrading nearby surface waters.	Relevant and Appropriate Standards will be used to measure the performance and effectiveness of the treatment trench and source ground water containment systems and discharges, erosion control and surface runoff measures from degrading nearby surface waters.	Relevant and Appropriate Standards will be used to measure the performance and effectiveness of the treatment trench and source ground water containment systems and discharges, erosion control and surface runoff measures from degrading nearby surface waters

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
STATE - Env-A300 Ambient Air Quality Standards	Not an ARAR.	Applicable Air contaminants, especially particulate matter emissions generated during on-site activities will be controlled, to ensure that the appropriate regulatory standards are met.	Applicable Air contaminants, especially particulate matter emissions generated during on-site activities will be controlled, to ensure that the appropriate regulatory standards are met.	Applicable Air contaminants, especially particulate matter emissions generated during on-site activities will be controlled, to ensure that the appropriate regulatory standards are met.
STATE - Env-A 1300 Toxic Air Pollutants	Not an ARAR	Applicable Releases of contaminants to the air from any source on Site will be monitored to ensure levels do not exceed ambient air levels.	Applicable Releases of contaminants to the air from any source on Site will be monitored to ensure levels do not exceed the respective AAL.	Applicable Releases of contaminants to the air from any source on Site will be monitored to ensure levels do not exceed the respective AAL.

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
STATE – Env-Ws 904 Pretreatment Standards	Not an ARAR	Applicable SC-7A will comply with the substantive requirements of this regulation. If levels of contaminant concentrations in groundwater to be discharged to the POTW interfere with the performance of the system, or would cause the POTW to violate water quality standards, or adversely impact the sludge produced, the groundwater shall be pretreated either on site or at the POTW before entering the system.	Not an ARAR	Not an ARAR
STATE – Chapter We 600 Standards for construction, maintenance and abandonment of wells	Not an ARAR	Applicable All wells will be constructed, maintained, relocated and/or abandoned according to these regulations	Applicable All wells will be constructed, maintained, relocated and/or abandoned according to these regulations.	Applicable All wells will be constructed, maintained, relocated and/or abandoned according to these regulations.
FEDERAL - OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, 67 Federal Register 71169 (Nov. 29, 2002), http;//www.epa.gov/correctiveation/cis/vapor.htm	TBC Used to evaluate potential l risks associated with indoor air at residences near the	TBC Potential risks associated with indoor air at residences near the Site will be evaluated, monitored and corrected, consistent with this guidance.	TBC Potential risks associated with indoor air at residences near the Site will be evaluated, monitored and corrected, consistent with this guidance.	TBC Potential risks associated with indoor air at residences near the Site will be evaluated, monitored and corrected, consistent with this guidance.

Table 2A. Action-Specific ARARs

Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
FEDERAL – Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. OSWER Directive 9200.4-17P, April 21, 1999.	No an ARAR	TBC Contaminant levels in Eastern Plume shall be monitored consistent with this guidance.	TBC MNA evaluations for the Eastern and Southern Plumes shall be performed consistent with this guidance as well as monitoring.	TBC Contaminant levels in Eastern Plume shall be monitored consistent with this guidance.
FEDERAL – EPA Guidance: Risk-Based Clean Closure, March 16, 1998	Not an ARAR	Not an ARAR	TBC Landfill will be closed consistent with this guidance at the completion of the remedy.	TBC Landfill will be closed consistent with this guidance at the completion of the remedy.
FEDERAL – EPA Guidance: Technical Guidance for Final Covers on Haz. Waste Landfills and Surface Impoundments: EPA/530-SW-047; July, 1989.	Not an ARAR	TBC RCRA C cap shall be constructed consistent with this guidance	TBC An appropriate cover will be placed on the landfill once clean closure is achieved.	TBC An appropriate cover will be placed on the landfill once clean closure is achieved.
FEDERAL – Technical Memorandum – EPA Region 1 from Dennis Gagne and Yoon-Jean Choi to Office of Site Remediation and Restoration (February 5, 2001) http://www.epa.gov/region1/superfund/resource/C524.pdf	Not an ARAR	TBC This guidance may be considered when construcing the RCRA C cap.	TBC An appropriate cover will be placed on the landfill once clean closure is achieved.	TBC An appropriate cover will be placed on the landfill once clean closure is achieved.

Table 2B. Chemical-Specific ARARs

Media	Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
Ground Water	STATE – Env–Wm1400 Ground Water Protection Standards	Applicable AGQSs used to calculate site groundwater risk.	Applicable On-and off-site ground water will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards, whichever is more stringent, at the completion of the remedy. In addition, any treatment system which discharges into surface waters and any activities conducted in the wetlands will be consistent with the maintenance or improvement of ground water quality.	Applicable On- and off-site ground water will attain State AGWSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards whichever is more stringent, at the completion of the remedy. If the remedy is unsuccessful, ground water will meet cleanup levels through contingent actions. In addition, any treatment system which discharges into surface waters and any activities conducted in the wetlands will be consistent with the maintenance or improvement of ground water quality.	Applicable On- and off-site ground water will attain State AGWSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards whichever is more stringent, at the completion of the remedy. If the remedy is unsuccessful, ground water will meet cleanup levels through contingent actions. In addition, any treatment system which discharges into surface waters and any activities conducted in the wetlands will be consistent with the maintenance or improvement of ground water quality.
Ground Water	FEDERAL - Safe Drinking Water Act (SDWA) - Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.14). Revised MCLs (40 CFR 141.61-141.62) and non-zero Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50-141.51)	Relevant and Appropriate MCL/MCLGs used to calculate site risk.	Relevant and Appropriate On-and off-site ground water will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards, whichever is more stringent at the completion of the remedy through capping, lowering of groundwater table under the landfill and through extraction and treatment of groundwater in southern plume. Groundwater in eastern plume expected to meet levels through natural attenuation.	Relevant and Appropriate - On- and off-site ground water will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards, whichever is more stringent at the completion of the remedy through successful operation of the treatment trench, addressing localized sources in the landfill and potentially through natural attenuation in the plumes. Otherwise, the contingencies of capping the landfill and active treatment of groundwater will meet cleanup levels in groundwater at the completion of the remedy.	Relevant and Appropriate On and off-site ground water will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards, whichever is more stringent at the completion of the remedy through successful operation of the treatment trench, addressing localized sources in the landfill and potentially through extraction and treatment of groundwater in the southern plume and natural attenuation in the eastern plume. Otherwise, the contingencies of capping the landfill and active treatment of groundwater in the eastern plume will meet cleanup levels in groundwater.

Table 2B. Chemical-Specific ARARs

Media	Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
Ground Water	New Hampshire Drinking Water Quality Standards (Env-Ws 316, 317, 319)	Relevant and Appropriate MCLs/MCLGs used to calculate site risk. AGQSs are the same as these standards.	Relevant and Appropriate On- and off-site ground water will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards, whichever is more stringent at the completion of the remedy through capping, lowering of groundwater table under the landfill and extraction and treatment of groundwater in southern plume. Groundwater in eastern plume expected to meet levels through natural attenuation.	Relevant and Appropriate On- and off-site ground water will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards whichever is more stringent at the completion of the remedy. If the remedy is unsuccessful, groundwater will meet cleanup levels through contingent actions.	Relevant and Appropriate On and off-site ground water will attain State AGQSs, MCLs, non-zero MCLGs when there is no MCL or State drinking water standards whichever is more stringent at the completion of the remedy. If the remedy is unsuccessful, groundwater will meet cleanup levels through contingent actions.,
Ground Water Surface Water Indoor Air	FEDERAL – USEPA Risk Reference Doses (RfDs)	TBC RfDs will be used to characterize risks associated with residual COC concentrations.	TBC RfDs will be used to characterize risks associated with residual COC concentrations.	TBC RfDs will be used to characterize risks associated with residual COC concentrations.	TBC RfDs will be used to characterize risks associated with residual contaminant concentrations.
Ground Water Surface Water Indoor Air	FEDERAL – USEPA Carcinogen Group Potency Factors	TBC CPFs will be used to characterize risks associated with residual COC concentrations.	TBC CPFs will be used to characterize risks associated with residual COC concentrations.	TBC CPFs will be used to characterize risks associated with residual COC concentrations.	TBC CPFs will be used to characterize risks associated with residual contaminant concentrations.

Table 2B. Chemical-Specific ARARs

Media	Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
Sediment Soil	FEDERAL – NOAA Technical Memorandum NOS OMA 52	TBC Potential ecological risks evaluated using these thresholds.	TBC Potential ecological risks will be evaluated using these thresholds and sediments in swale and ditch that contain arsenic in excess of 10 ppm will be removed and consolidated under cap or disposed of offsite. Measures will be taken to prevent contaminated sediment from washing into the Cocheco River during excavation.	TBC Potential ecological risks will be evaluated using these thresholds and sediments in swale and ditch that contain arsenic in excess of 10 ppm will be removed and disposed of offsite. Measures will be taken to prevent contaminated sediment from washing into the Cocheco River during excavation.	TBC Potential ecological risks will be evaluated using these thresholds and sediments in swale and ditch that contain arsenic in excess of 10 ppm will be removed and disposed of offsite. Measures will be taken to prevent contaminated sediment from washing into the Cocheco River during excavation.
Sediment	Ontario Lowest Effect Levels 1993, 1994	TBC Used to provide a spectrum of individual incremental cancer risk resulting from exposure to site contaminants for use in ecological risk assessment.	TBC Used to provide a spectrum of individual incremental cancer risk resulting from exposure to site contaminants for use in ecological risk assessment.	TBC Used to provide a spectrum of individual incremental cancer risk resulting from exposure to site contaminants for use in ecological risk assessment.	TBC Used to provide a spectrum of individual incremental cancer risk resulting from exposure to site contaminants for use in ecological risk assessment.

Table 2C. Location Specific ARARs

Media	Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
Wetlands	FEDERAL – CWA Section 404; 40 CFR Part 230:33 CFR Parts 320-330	Not an ARAR .	Applicable Material excavated from wetlands and water bodies during re-contouring of the Landfill, during construction of the on-site treatment system and interceptor trench from addressing the swale and from the activity of filling the perimeter ditch will be performed using the least environmentally damaging, practicable activities. Measures to mitigate damages will be used at all times during construction and operation of the remedy. Wetlands will be restored to the extent practicable.	Applicable Material excavated from wetlands and water bodies during construction of the aerobic treatment trench , the vertical hydraulic barrier , from addressing the swale and from the activity of filling the perimeter ditch will be performed using the least environmentally damaging practicable activities. Measures to mitigate damages will be used at all times during construction and operation of the remedy. Wetlands will be restored to the extent practicable.	Applicable Material excavated from wetlands and water bodies during construction of the aerobic treatment trench , the vertical hydraulic barrier, the groundwater collection and treatment system, from addressing the swale and from the activity of filling the perimeter ditch will be performed using the least environmentally damaging practicable activities. Measures to mitigate damages will be used at all times during construction and operation of the remedy. Wetlands will be restored to the extent practicable.
Wetlands	Federal Executive Orders 11990 Protection of Wetlands FEDERAL – 40 CFR Part 6 Appendix A	Not an ARAR .	Applicable Impacts to wetlands bordering the Site incurred from the installation of the ground water treatment system, interceptor trench, the re-contouring of the landfill and filling of the perimeter ditch will be minimized by including mitigating measures such as silt fences and hay bales during on-site construction activities. Other necessary engineering controls will be used to represent the best practicable approach to remediation with the least environmentally damaging impacts. Impacted wetlands will be restored to the extent practicable.	Applicable Impacts to wetlands bordering the Site from installation of the treatment trench, the vertical hydraulic barrier, the groundwater collection and treatment system, from addressing the swale and from the activity of backfilling the perimeter ditch will be minimized by including mitigating measures such as silt fences and hay bales during on-site construction activities. Other necessary engineering controls will be used to represent the best practicable approach to remediation with the least environmentally damaging impacts. Impacted wetlands will be restored to the extent practicable.	Applicable Impacts to wetlands bordering the Site from installation of the treatment trench, the vertical hydraulic barrier, the groundwater collection and treatment system, from addressing the swale and from the activity of backfilling the perimeter ditch will be minimized by including mitigating measures such as silt fences and hay bales during on-site construction activities. Other necessary engineering controls will be used to represent the best practicable approach to remediation with the least environmentally damaging impacts. Impacted wetlands will be restored to the extent practicable.

Table 2C. Location Specific ARARs

Media	Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
Land	FEDERAL – RCRA General Facility Standards 40 CFR 264.18(a) Seismic Standards	Not an ARAR	Applicable Construction of any on-site treatment facility will not be located within 200 feet of a fault that has had a displacement in Holocene time.	Applicable Construction of any on-site treatment facility will not be located within 200 feet of a fault that has had a displacement in Holocene time.	Applicable Construction of any on-site treatment facility will not be located within 200 feet of a fault that has had a displacement in Holocene time.
Wetlands	FEDERAL – 16 USC 661 et. seq., Fish and Wildlife Coordination Act	Not an ARAR.	Applicable Specified federal agencies will be contacted to help analyze impacts of capping the landfill, filling the perimeter trench and installing and operating the groundwater collection and treatment systems on wildlife in wetlands and the river.	Applicable Specified federal agencies will be contacted to help analyze impacts of installing and operating the treatment trench, localized source control actions and any other remedial activities on wildlife in wetlands and the river.	Applicable Specified federal agencies will be contacted to help analyze impacts of installing and operating the treatment trench, localized source control actions, the groundwater collection and treatment systems and any other remedial activities on wildlife in wetlands and the river.
Wetlands	STATE – RSA 482-A and Env–Wt 300 - 400, 600, New Hampshire Criteria and Conditions for Fill and Dredging in Wetlands	Not an ARAR	Applicable Material excavated from wetlands and water bodies during re-contouring of the Landfill, during construction of the groundwater treatment system and interceptor trench from addressing the swale and from the activity of filling the perimeter ditch will be performed using the least environmentally damaging, practicable activities. Measures to mitigate damages will be used at all times during construction and operation of the remedy. Wetlands will be restored to the extent practicable.	Applicable Material excavated from wetlands and water bodies during construction of the aerobic treatment trench , the vertical hydraulic barrier , from addressing the swale and from the activity of filling the perimeter ditch will be performed using the least environmentally damaging practicable activities. Measures to mitigate damages will be used at all times during construction and operation of the remedy. Wetlands will be restored to the extent practicable. .	Applicable Material excavated from wetlands and water bodies during construction of the aerobic treatment trench,, the vertical hydraulic barrier, the groundwater treatment system, from addressing the swale and from the activity of filling the perimeter ditch will be performed using the least environmentally damaging practicable activities. Measures to mitigate damages will be used at all times during construction and operation of the remedy. Wetlands will be restored to the extent practicable.

Table 2C. Location Specific ARARs

Media	Requirement	No Action Alternative	1991 ROD Remedy	Alternative Remedy	Mixed Alternative Remedy
Ground Water	STATE – Wellhead Protection Program	TBC The No Action Alternative does not comply with State Plan	TBC Criteria for wellhead protection area and any State Plan promulgated pursuant to this regulation will be considered to protect the Calderwood well during implementation of this remedy.	TBC Criteria for wellhead protection area and any State Plan promulgated pursuant to this regulation will be considered to protect the Calderwood well during implementation of this remedy.	TBC Criteria for wellhead protection area and any State Plan promulgated pursuant to this regulation will be considered to protect the Calderwood well during implementation of this remedy

Appendix B: Administrative Record Index

DOVER MUNICIPAL LANDFILL
ENTIRE SITE
ADMINISTRATIVE RECORD FILE
DOVER ROD AMENDMENT

3. REMEDIAL INVESTIGATION (RI)

1. LETTER: COMMENTS ON THE RFFS RISK ASSESSMENT
   TO: DARRYL LUCE, US EPA REGION 1
   AUTHOR: ANDREW J HOFFMAN, NH DEPT OF ENVIRONMENTAL SERVICES
   DOC ID: 214515 05/21/2004

2. LETTER: RESPONSE TO COMMENTS ON THE RFFS RISK ASSESSMENT
   TO: ANDREW J HOFFMAN, NH DEPT OF ENVIRONMENTAL SERVICES
   AUTHOR: DARRYL LUCE, US EPA REGION 1
   DOC ID: 214516 06/18/2004

4. FEASIBILITY STUDY (FS)

1. REPORT: REVISED FOCUSED FEASIBILITY STUDY (FS) REPORT
   AUTHOR: GEOINSIGHT INC
   US EPA REGION 1
   DOC ID: 204932 01/30/2004

2. MEMO : DOVER SEDIMENT NUMBERS
   TO: CYNTHIA CATRI, US EPA REGION 1
   AUTHOR: DARRYL LUCE, US EPA REGION 1
   DOC ID: 214514 05/18/2004

3. FACT SHEET: AMENDED PROPOSED PLAN
   AUTHOR: US EPA REGION 1
   DOC ID: 209846 06/01/2004

4. REPORT: FOCUSED FEASIBILITY STUDY (FS) ADDENDUM
   AUTHOR: US EPA REGION 1
   DOC ID: 210486 06/18/2004

5. RECORD OF DECISION (ROD)

1. RECORD OF DECISION: RECORD OF DECISION (ROD) AMENDMENT
   AUTHOR: US EPA REGION 1
   DOC ID: 214517 09/30/2004

DOVER MUNICIPAL LANDFILL
ENTIRE SITE
ADMINISTRATIVE RECORD FILE
DOVER ROD AMENDMENT

13. COMMUNITY RELATIONS

1. FACT SHEET: INVITATION TO PUBLIC INFORMATION MEETING AND PUBLIC HEARING ON THE PROPOSED CLEANUP PLAN
AUTHOR: US EPA REGION 1
DOC ID: 210473 06/21/2004

Appendix C: State Concurrence Letter

The State of New Hampshire
Department of Environmental Services

Michael P. Nolin
Commissioner

September 29, 2004

Susan Studlien, Director
Office of Site Remediation and Restoration
EPA - New England, Region I
1 Congress Street, Suite 1100
Boston, MA 02114-2023

RE: Amended Record of Decision for the Dover Municipal Landfill Superfund Site

SUBJECT: Declaration of Concurrence

Dear Ms. Studlien:

The New Hampshire Department of Environmental Services (Department) has reviewed the Amended Record of Decision (AROD), dated September 30, 2004, for the Dover Municipal Landfill Superfund Site (Site) in Dover, New Hampshire. The United States Environmental Protection Agency (EPA) prepared the AROD in accordance with the provisions of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986. The AROD addresses the remedial actions necessary under CERCLA, as amended, to manage potential threats to human health and the environment at the Site.

Rational for the Amendment

On September 10, 1991, EPA issued the original ROD (1991 ROD) for the Site. The 1991 ROD called for the remediation of the landfill and groundwater through source control and management of migration. Neither component of the 1991 ROD remedy, were built because, at the request of the potentially responsible parties (PRPs), a pilot study was performed to determine if an alternative remedy (enhanced bioremediation) could replace the source control component of the 1991 ROD remedy. Following years of additional study at the site, the PRPs have offered an alternative remedy which appears to be as protective as the 1991 ROD remedy.

Overview of the Record of Decision

In the 1991 ROD, EPA selected SC-7/7A as the source control component of the remedy and MM-2 and MM-4 as the management of migration component of the remedy for the Eastern and Southern Plumes, respectively.

The SC-7/7A component includes construction of: (1) a multi-layered cap including limited drainage swale sediment removal with consolidation under the cap; (2) groundwater extraction

system and clean groundwater diversion system; (3) on-site groundwater treatment system with discharge to the Cocheco River for SC-7 or discharge to a POTW for SC-7A; (4) methane gas collection with passive venting; and (5) construction of a surface run-on/run-off diversion system with sedimentation and detention basins.

The management of migration component of the remedy includes: (1) MM-2 Monitored Natural Attenuation for the Eastern Plume, which discharges to the Cocheco River; and (2) MM-4 pump-and-treat of the Southern Plume, which migrates toward the Bellamy Reservoir.

Cleanup levels for the 1991 ROD were established for sediments and groundwater.

Overview of the Amended Record of Decision

The Amended ROD will change the source control remedy of the 1991 ROD from a RCRA-C landfill cap with groundwater diversion and capture to a remedy that instead will leave the landfill uncapped and install an air-sparging trench that parallels the downgradient landfill toe. Although the air-sparging trench is innovative and poses many technical challenges, the air-sparging remedy also offers the opportunity to accelerate cleanup of the wastes contained in the landfill, rather than entombing the wastes as in the 1991 ROD, potentially resulting in substantial cost savings.

The management of migration remedy remains as listed in the 1991 ROD, with one exception: arsenic-contaminated sediments that have collected in the Cocheco River, as a result of ongoing surface water and groundwater discharges, will be assessed and removed if necessary.

There are a number of technical challenges that will be posed during the design, construction and the verification phase of the amended source control remedy. To better define the technical challenges, the remedy will be installed in phases to provide opportunities for design alterations and to ensure it meets performance criteria prior to being implemented full-scale.

The air-sparging trench will capture arsenic by precipitation, volatile organic compounds (VOCs) by volatilization, and aerobically degrade tetrahydrofuran (THF) that is not volatilized. Arsenic precipitate will be removed by excavation, acid washing, or other appropriate method. VOCs and other volatile gases will be recovered for treatment, if appropriate, or discharged to the atmosphere. Stringent down-gradient monitoring will ensure that the remedy is performing as expected.

If it is found, during the phased construction of the air-sparge trench or later, that the remedy is not performing sufficiently to remove and contain the contaminants flowing from the landfill, the 1991 ROD remedy will be implemented as the contingent remedy. The 1996 Remedial Design will be followed in constructing the contingency remedy with modifications as directed by, or approved by, EPA and the State.

The Department has several concerns with the technical challenges of implementing the selected remedy. However, the Department believes that these issues may be resolved through the phased implementation (pilot study) of the selected remedy.

Given the delay in executing a full-scale source control remedy was a primary public concern identified during the public comment period for the amended remedy, EPA should be thorough and precise when establishing performance criteria, contingent remedy triggers and schedule for implementation of the phased remedy.

Justification for the Selected Remedy

The Department believes that the proposed source control alternative has the potential to be as protective as the 1991 ROD remedy, may offer greater flexibility in addressing contamination at the site, and could be less expensive. However, considering the uncertainty in the ability of the alternative to be implemented and to function as designed, execution of the remedy will be phased and the source control component of the 1991 ROD will be retained as the contingent remedy. The selected remedy has the potential to reduce human health risk levels such that they do not exceed EPA's acceptable risk range of 10^{-4} to 10^{-6}, or New Hampshire's target risk goal of 10^{-5}, for incremental carcinogenic risk and such that the non-carcinogenic hazard is below a level of concern and will not exceed a hazard index of one. Furthermore, it will reduce contaminant concentrations to levels that are consistent with Applicable or Relevant and Appropriate Requirements and To Be Considered criteria.

The estimated net present worth of the selected remedy and the contingent 1991 ROD remedy is $19.3 million and $32.5 million, respectively. The cleanup will be performed under a negotiated consent decree with the PRPs.

State Concurrence

The Department, in reviewing the AROD, has determined that the selected remedy is consistent with the Department's requirements for a remedial action plan and meets all of the criteria for remedial action plan approval. The selected remedy establishes a remedial action that, as proposed, will remove, treat or contain the contamination source to prevent the additional release of contaminants to groundwater, surface water and soil and manages the health hazard associated with direct exposure to the contaminant source. The selected remedy will also contain contaminated groundwater within the limits of a Groundwater Management Zone and restore groundwater quality to meet the State's Ambient Groundwater Quality Standards. Ultimately, the proposed remedial action will provide protection of human health and the environment. Therefore, the Department, acting on behalf of the State of New Hampshire, concurs with the selected remedy, as described in the Amended ROD.

In striving to maximize the effectiveness of limited public and private resources, the Department continues to seek reasonable and practical solutions to the complex challenges associated with contaminated site cleanups. The partnership and dedication of EPA and the Department will speed up the achievement of our mutual environmental goals at this Site. As always, the Department stands ready to provide the guidance and assistance that EPA may require to take the actions necessary to fully protect human health and the environment in a cost-effective manner.

Sincerely,

Anthony P. Giunta, P.G.
Director
Waste Management Division

cc: Darryl Luce, USEPA
Jennifer Patterson, Esq., NHDOJ
Frederick J. McGarry, P.E., DEE, NHDES
Carl W. Baxter, P.E., NHDES
Richard Pease, P.E., NHDES
Andrew Hoffman, P.E., NHDES

Appendix D: Responsiveness Summary

Attachment 1: Response to comments
Attachment 2: Transcript of Public Hearing on July 19, 2004
Attachment 3: Comment Letters

Attachment 1: Response to comments

United States
Environmental Protection Agency
Region I

Appendix D
Responsiveness Summary
Dover Municipal Landfill Site
Dover, New Hampshire

September 30, 2004

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ATTACHMENTS
1. Transcript of the July 19, 2004 Public Hearing
2. Comment letters submitted to EPA

INTRODUCTION

EPA is proposing to change the remedy for the Dover Municipal Landfill selected in 1991. Following almost ten years of additional study, EPA has selected a remedy to replace a portion of the 1991 Record of Decision (ROD). EPA presented this remedy in a Proposed Plan during a Public Information Meeting at Dover City Hall on the evening of June 21, 2004. EPA then held a Public Hearing on July 19, 2004 to take public comment on the Proposed Plan. In addition, the EPA held a 50-day public comment period on the Proposed Plan from June 22, 2004 to August 11, 2004.

The basis of the Proposed Plan was the January 30, 2004 Revised Focused Feasibility Study (RFFS) prepared by the consultants for the Potentially Responsible Parties (PRPs). EPA provided a review and interpretation of the RFFS in EPA's June 18, 2004 Addendum (the "EPA Addendum"). EPA considered all of the previous documents provided to support the 1991 ROD and the documents produced by the PRPs prior to the RFFS. All documents EPA considered in the deliberative process have been placed in the Administrative Record for review. The Administrative Record, which is a collection of all the documents considered by EPA to choose the remedy for the Site, is available at the EPA on 1 Congress Street in Boston, MA, at the Dover Public Library on 72 Locust Street in Dover, NH, and at the New Hampshire Department of Environmental Services (NHDES) on 29 Hazen Drive in Concord, NH.

The purpose of this Responsiveness Summary is to document EPA responses to the questions and comments raised during the public comment period. EPA considered all of the comments in this document before selecting a final remedial alternative to address contamination at the Site.

Although much of the site history is provided in the Amended ROD and other site documents, a short description is provided below.

SITE HISTORY

The 50-acre landfill began operations in 1960 on the western outskirts of the City of Dover near the Town lines of Madbury and Barrington. The landfill accepted municipal and industrial wastes, some of which was hazardous. In 1977 the Cities of Dover and Portsmouth, along with the precursor agency of NHDES, began to investigate the area surrounding the landfill due to the proximity of the Bellamy Reservoir as well as other public and private water supplies. Based on those investigations a public water supply line was extended to residences on Tolend and Glen Hill Roads. In 1983 the landfill was designated a Superfund site. NHDES under a cooperative agreement with EPA, began a Remedial Investigation (RI) and Feasibility Study (FS) in 1984. A number of potentially responsible parties formed the *Executive Committee of the Group of Work Settling Defendants, Dover Municipal Landfill* (the "Group") to take over investigations at the site. In 1988 the Group agreed to perform a Field Elements Study (FES) that would fill data gaps

in the RI and FS.

Based on the RI/FS and the FES, EPA selected a remedy for the site in a 1991 Record of Decision (1991 ROD). The Group signed a Consent Decree to perform a significant portion of that remedy in 1992 and began pre-design studies to complete the design of the remedy called for in the 1991 ROD. In 1996 the 100% Remedial Design for the landfill cap was submitted to the Agencies for review. During this time period the Group also conducted additional investigations regarding alternative remedies to the 1991 ROD and presented the results of these investigations to EPA and NHDES. Based on this information, the Group, EPA and the State signed an Administrative Order on Consent (AOC) in 1997 allowing a pilot test of one of the alternatives, *in situ* bioremediation. Concurrent with the AOC, EPA and the NHDES signed a Memorandum of Understanding (MOU) allowing NHDES to be the lead Agency in overseeing the conduct of the bioremediation pilot.

Following four years of conducting the bioremediation pilot, NHDES, with EPA's concurrence, issued a letter to the Group stating that the bioremediation pilot would not be considered for implementation at the site except under certain constraints. Specifically, the the letter stated that the proposed system could only move forward if the amendments necessary for *in situ* bioremediation's operation were delivered throughout the entire formation, that is through a treatment trench (air-sparging). After considering this requirement, the Group proposed an air-sparging trench that, although different from the original bioremediation proposal, was still sufficiently similar in concept to allow consideration by EPA.

EPA, with NHDES' concurrence, examined the air-sparging trench proposal and found that it should be evaluated against the 1991 Source Control component of the 1991 ROD. EPA, along with NHDES, evaluated that Source Control component and outlined its findings in the Proposed Plan. EPA ultimately selected the air-sparging trench proposal for Source Control in this ROD Amendment.

HISTORY OF COMMUNITY INVOLVEMENT

In 1983 EPA began engaging the public on first the investigation and then, later, the cleanup plan for the Site. The meetings culminated in a April 16, 1991 Public Hearing. The summation of the public's involvement and reaction to the 1991 ROD are contained in Appendix G to the 1991 ROD. Overall, the predominant sentiment was one of concern over the cost of the remedy. The Water Department of the City of Portsmouth supported the 1991 ROD.

Since 1991 EPA has met with various municipal representatives in managing the Site. In addition, EPA and NHDES have met informally with members of the public and the Cocheco River Watershed Association. EPA and NHDES personnel along with members of the public canoed the Cocheco River and viewed portions of it affected by the site in Summer 2002. Also,

EPA helped the Cocheco River Watershed Association obtain a Technical Assistance Grant (TAG) from EPA to allow an independent review of the data. When it became apparent in 2003 that the 1991 ROD may be amended, EPA began planning and then held the Public Meeting in June 2004. The Public Meeting was followed by a Public Hearing in Dover City Hall on July 19, 2004 soliciting the comments that are discussed further in this document.

OVERVIEW OF REMEDIAL ALTERNATIVES CONSIDERED FOR THE DOVER MUNICIPAL LANDFILL

In considering alternatives to amend an existing ROD, EPA typically compares the original selected remedy against only the No-Action Remedy and the proposed alternative(s). In this instance, EPA did examine the Source Control component of the 1991 ROD (SC-7/7A) against that of the No-Action Remedy (SC-1) and found the No-Action Remedy to be unprotective. EPA then evaluated the 1991 ROD against two other alternatives.

The remedy for the Dover Municipal Landfill is divided into two components, a Source Control component and a Management of Migration component. The purpose of the Source Control Component is to halt the migration of contaminants away from the landfill, the source. The purpose of the Management of Migration component is to cleanup contaminants that have migrated away from the source, principally the contaminated ground water.

The first alternative, called the Mixed Alternative Remedy, combines the proposed Source Control alternative of an air sparging trench, (SC-A), and retains the Management of Migration remedy, monitored natural attenuation (MM-2) for the Eastern Plume and pump and treat (MM-4) for the Southern Plume that was presented in the 1991 ROD. In this alternative, the most critical change is in the Source Control. Where the 1991 Remedy sought to **immobilize** contaminants in the landfill via capping, this alternative seeks to **mobilize** contaminants in the landfill so they may be conveyed to a treatment trench.

The second alternative, called the Alternative Remedy, proposed to amend both the Source Control component and the Management of Migration component in the Southern Plume which addresses contaminated ground water migrating towards the Bellamy Reservoir. While the 1991 Remedy called for pumping-and-treating the ground water in the Southern Plume, this alternative proposed to change the remedy to Monitored Natural Attenuation in the Southern Plume. This change was to be coupled with the changed Source Control Alternative. Only Monitored Natural Attenuation in the Eastern Plume was to be retained from the 1991 ROD.

EPA evaluated the alternatives to the 1991 ROD remedy and selected the Source Control component change from capping the landfill to treating the source contaminants through an air sparging trench as described in the Mixed Alternative Remedy. EPA also considered the proposed Management of Migration change in the Southern Plume and decided that the lack of

information, coupled with the proximity of a significant regional drinking water resource, the Bellamy Reservoir, reinforced the reasons to proceed with a pump-and-treat remedy. Therefore, the Management of Migration component in the 1991 ROD for the Southern Plume, remains the same with Monitored Natural Attenuation in the Eastern Plume.

EPA's PREFERRED ALTERNATIVE

The only portion of the 1991 ROD that is changing is the Source Control component of the remedy. The ground water remedy in the Southern and Eastern Plumes is not changing. The change in the Source Control component is that instead of an impermeable cap and a 25-foot deep ground water diversion/interceptor trench surrounding the site, an air-sparging trench will surround the Site. Whereas in the 1991 ROD the 25-foot deep trench only served to recover and treat contaminated ground water, the air-sparging trench (SC-A) will remove, capture or destroy contaminants in the trench, allowing ground water to recharge back into area wetlands. Moreover, instead of being 25-feet deep, the air-sparging trench will span the aquifer to key into a low-permeability marine clay that underlies the site at depths up to 100 feet. An element not in the 1991 ROD that is included in the ROD Amendment is a provision to remove sediments from the Cocheco River that pose a threat to human health or the environment and evaluate indoor air vapors in buildings near the Eastern Plume.

In summary, there were three key elements to the 1991 ROD Remedy:

1. An impermeable cap over the entire landfill with a trench surrounding the waste to capture leachate flowing from the wastes and de-water the landfill (SC-7/7A).
2. Monitored Natural Attenuation of the contaminants in the ground water contaminant plume flowing to the Cocheco River (MM-2).
3. Pump-and-treat the contaminants in the ground water contaminant plume flowing to the Bellamy Reservoir (MM-4).

In this ROD amendment, EPA proposes to only change the Source Control component SC-7/7A. The other two components (MM-2 & 4) of the 1991 ROD will be implemented.

SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

Comments received at the Public Hearing and contained in letters from the public, non-governmental organizations, public officials, and the Group are summarized below. EPA recognizes that the discussion at the Public Meeting was limited due to time constraints and the necessity of covering a number of items. This Responsiveness Summary is intended to further respond to the issues raised.

As the comments received from private citizens, non-governmental organizations and the

Portsmouth Water Supply were similar, they have been presented together in the section "Comments Provided by the Pubic, Non-Governmental Organizations and the City of Portsmouth Water Supply and EPA's Responses." Each party that commented on the Proposed Plan is listed below. In parentheses next to each name are the comment numbers where a response to their comments can be reviewed. The transcript of the public hearing and individual comment letters are included as Attachments 1 and 2 to this Responsiveness Summary, respectively.

The Group, coordinated by the City of Dover, submitted comments through their consultant GeoInsight. These comments are included under "Summary of Potentially Responsible Party Comments and EPA's Responses" beginning on page 15. The comments submitted by the PRP Group are included in Attachment 2.

Comments Provided by Private Citizens

Private Citizens that provided comments at the Public Hearing on July 19, 2004 include:

Brian Stern for Loretta B. Chase, Dover resident (1, 41)
Tom Fargo, Dover resident (1, 3, 4, 5, 32, 52)
Doug Bogen, Portsmouth resident, Clean Water Action (1, 11, 23, 24, 33, 39, 41, 46)
Katherine Duncan, Dover resident (29)
Brian Stern, Dover resident (1, 3, 4, 6, 8, 9, 10, 18, 20, 22, 24, 39, 40, 41, 44, 46, 47, 50)
Mike Hodgens, Portsmouth resident (1, 29)

Private Citizens that provided written comments include:

Robert Engel (1)
Caryn Duncan (1)
Katherine Ann Duncan (22,41)
Thomas Fargo (3, 4, 5, 6, 16, 32, 37, 52)
Brian & Nancy Limberger (1, 23, 38)
Mary Parker (1, 14, 23, 38)
David Hayes (1, 23, 38)
K. Ian Daniel (1, 23, 38)
Allen G. Barbi (1, 23, 38)
Richard Auclair (1, 14, 23, 38)
Kathryn Daniel (1, 23, 38)
Joan Landry (1, 23, 38)
Carol Straton (1, 28)
Mandy Bowden (1)
Ernest Bowden (1)
Catherine Pease (1, 28)
Laurrie Malizia (1, 23, 38)
Mario Malizia (1, 23, 38)
Keith A. Foley (1, 14)
Anonymous (1, 23, 38)
Mark Gemas (1, 14, 24, 38)
Lorie Gemas (1, 14, 24, 38)
Elizabeth Barbi (1, 23, 38)
Katherine Frick-Wold (1, 23, 38)
John Wold (1, 23, 38)
Linda Grivori (1, 23, 38)
Vicki A. Lueeht (1, 23, 38)
David Forbes (1, 23, 38)
Paula Forbes (1, 23, 38)
Heather Cronin (1, 23, 38)
David Cronin (1, 23, 38)
William McCann (1, 14, 23, 38)
Rebekah Brooks (1, 23, 38)
Henry Cronin (1, 23, 38)
Marie Trindade (25)
Art Corte (1, 14)
Audrey Covert (1, 14, 23, 38)
Dorothy Buell (1, 23)
Richard Minnon (41)
Loretta B. Chase (1, 38, 41)

Comments Provided by Non-Governmental Organizations

The non-governmental organizations that provided comments included:
Clean Water Action (1, 2, 14, 22, 37, 41, 46)
New Hampshire TAG Force (1, 2, 3, 7, 8, 9, 11, 12, 14, 15, 16, 17, 18, 19, 20, 22, 26, 27, 30, 34, 37, 40, 41, 42, 46, 48, 49, 50, 51, 52)

Summary of Comments Provided by the Public, Non-Governmental Organizations and the City of Portsmouth Water Supply:

Generally, the public expressed doubts about EPA's selected remedy. A few citizens expressed support for the proposed amendment, but issued the caveat: 'only if the remedy is implemented in a timely manner.' By far the public's largest concern was that in all this time, nothing has happened at the site to abate contamination. This concern and others are conveyed below. The comments have been summarized and collected into appropriate categories. The main categories are:

- Implementability.
- Time.
- Cost.
- Public Safety.
- Contingency Remedy.
- Public Notice.
- Contamination.
    - Ground Water Contamination
    - Surface Water Contamination
    - Sediment Contamination
    - Indoor Air Contamination
- Nuisances

Comments and EPA's Responses

Implementability

These comments address the public's concern that the amended remedy may fail to address contamination at the site.

Comment 1: Air sparging is an un-proven technology and very complicated. If it fails it may worsen the situation with respect to contamination. Because there is a drinking water reservoir nearby, this site should not be used to test innovative remedies.

EPA's Response: Air-sparging has been proven in many applications for removing the majority of contaminants found at the site. However, these comments are correct in that the air-sparging technology has not been applied to a municipal landfill setting to perform all the functions proposed (e.g., sparging of volatile organic compounds (VOCs), iron and arsenic precipitation, and enhanced bioremediation). A discussion of air-sparging is provided in Appendix L in the RFFS.

Acknowledging the uncertainty of employing a full-scale version of the air-sparging trench, EPA required that the project be phased to ensure its efficiency, and that monitoring of the performance be quite rigorous. If the air-sparging technology proves ineffective, EPA will require that the landfill be capped, as described in the Source Control component of the 1991 ROD Remedy.

In the event that the air-sparging trench fails, the pump-and-treat remedy in the Southern Plume would control any further escaping contaminants that are migrating in the Southern Plume toward the Bellamy Reservoir. However, a successful air-sparging remedy is expected to be less expensive, yet has the potential to clean the landfill faster than capping and decrease the potential for contaminants to escape capture or treatment.

Comment 2: Air-sparging needs extensive testing.

EPA's Response: EPA agrees but also recognizes that air-sparging is not a completely unknown technology. It has been used at many sites to remediate ground water as outlined in Appendix L of the RFFS.

However, given the combination of contaminants to be treated by the air-sparging technology at this site, EPA is requiring that the air-sparging trench be implemented in segments. EPA will also select the locations where the segments will be placed, factoring contaminant concentrations and depth to the marine clay layer in order to test the constructability and implementation of the trench. In addition, rigorous monitoring will evaluate the merits of air-sparging with respect to

site-specific characteristics (e.g., inorganic precipitation and success of its removal, impacts of oxygen demand on hydraulic parameters in the trench and surrounding aquifer).

Comment 3: The function of the air-sparging trench can be compromised by the iron precipitate that will form in the air-sparging wall causing its ultimate failure. Removal of the iron precipitate will be necessary and potentially very difficult. Also, under some conditions, the arsenic could be mobilized in one large "slug." Therefore, the conditions in the air-sparging trench will need to be closely monitored and arsenic should not be left in place. How frequently will the iron and arsenic need to be cleaned from the trench?

EPA's Response: EPA was also very concerned with these issues when this remedy was proposed. Consequently, EPA requested that the Group collect additional information concerning arsenic fouling in the wall, various technologies to address fouling, and to model the results. The results of the modeling are presented in Appendix K of the RFFS. In addition to this modeling, the remedy will include extensive monitoring of both the treated water and the solid matrix (both the native aquifer materials and the porous material in the air-sparging trench). Currently, the method for removing arsenic from the trench is to excavate the trench. The modeling in Appendix K indicates that excavating arsenic from the trench will need to be done only one time. However, monitoring and further field investigations may indicate that either additional excavation is necessary or that alternative cleaning methods, such as acid-washing, may be used. Operation and monitoring of the air-sparging trench will ensure that arsenic is captured only inside the air-sparging trench and is not re-released to the surrounding aquifer. If it is shown that arsenic is not captured and retained in the trench, the contingency remedy will be implemented.

Comment 4: Converting the air-sparging trench into a ground water extraction trench may be confounded by variable gradients along the length of the trench. The result could be hydrologic short-circuiting allowing contaminants to be conveyed and to break-out into areas that were previously uncontaminated. Not capping the landfill and converting the trench to a ground water extraction system will recover much more water.

EPA's Response: If the air-sparging trench is converted to recover ground water, the landfill will also be capped. Hydrologic short-circuiting is a valid concern in both a vertical and horizontal sense. The current proposal is to segment the trenches to prevent this. In the RFFS the segments shown are schematic and dependent upon the results of the pre-design investigation and the preliminary phases of construction. The construction and operation of the air-sparging trench will be phased so that any problems can be identified and resolved prior to the full construction of the trench. In a manner similar to concerns regarding clogging of the trench with iron-arsenic precipitate, the problem of hydrologic short-circuiting underscores the need to conduct careful monitoring of the implementation and operation of the air-sparging trench.

Comment 5: The air-sparging trench should be re-located to a position along Tolend Road. Re-positioning the trench into this location would better address the eastern ground water contaminant plume and eliminate contaminant discharges to the Cocheco River, would improve the constructability and maintenance of the air-sparging trench and shorten the length of the trench.

EPA's Response: EPA recognizes the utility of this idea; however, RCRA Source Control remedies must be conducted at the limit of waste, in this case the edge of the landfill. In addition, the selected remedy, as outlined in the Amended ROD, better protects ground water. Moving the trench away from the edge of the landfill unnecessarily increases the distance the contaminants must migrate to arrive at the air-sparging wall.

Comment 6: The EPA admits that there are many unknowns and many Pre-design investigations that need to be done. Rather than go forward with a plan based on guesswork and relying on a contingent remedy, why not move forward with the 1991 ROD?

EPA's Response: The 1991 ROD Source Control remedy has its share of unknowns and guesswork as well and EPA believes that the proposed remedy has several advantages over the 1991 ROD. Key among these advantages is the fact that wastes are actively removed from the landfill as opposed to interring them in the landfill over many years. Another advantage is that the air-sparging trench will span the entire aquifer and treat all of the contaminants, rather than only the upper 25 feet of the aquifer. Air-sparging will decrease the amount of time contaminants are allowed to remain in the landfill, providing fewer opportunities for contaminants to migrate through the marine clay. Lastly, it will cost less in the long-run.

Comment 7: The trench may create hydrologic short-circuiting. How will the trench be abandoned to ensure that short-circuiting does not occur? Will the trench create unexpected hydraulic conditions that will cause ground water to migrate in a direction not desired?

EPA's Response: At the conclusion of the remedy the ground water will not contain contaminants above concentrations that pose a risk to human health or the environment. The arsenic-contaminated media in the trench will be removed, disposed of appropriately, and the trench will be backfilled with a material similar to the surrounding aquifer or allowed to collapse in on itself. The end result should create a ground water environment similar to that which existed before the landfill. This response does not answer the question about whether or not the trench will create unexpected hydraulic conditions.

Comment 8: How will EPA and NHDES determine if the trench is performing as expected? What will be the layout of sensors and monitoring wells? How will "failure" be determined?

EPA's Response: The specific details of the monitoring network and technique will be decided after conferring with national experts, including those at EPA's Ada Oklahoma lab and at the University of New Hampshire and after evaluating the results of the pre-design investigation. In general, a monitoring outline will include both ground water and solid phase monitoring of the treatment trench and the aquifer both up-gradient and down-gradient of the air-sparing trench. Likewise, the specific determination of "failure" will be arrived at after additional study and consultation with experts on this technology. However, a general definition of failure means that the treatment trench does not reduce all site contaminants to cleanup levels within the treatment wall such that ground water on the down-gradient side of the trench meets cleanup levels during and after operation of the air-sparging trench and the landfill does not reach clean closure.

Comment 9: Monitored Natural Attenuation (MNA) is not an appropriate remedy for the eastern ground water contaminant plume. MNA was determined to be an inappropriate remedy for the Southern Plume based on the lack of information showing that it had a probability that it would be successful. Conditions have not been cited to indicate that MNA will be a successful remedy in the Eastern Plume. The cost to implement a pump-and-treat remedy in this area is incremental compared to an MNA remedy.

EPA's Response: EPA does consider Monitored Natural Attenuation (MNA) to be an appropriate remedy for the Eastern Plume. In the Eastern Plume the Source Control portion of the remedy is expected to stop contaminants from entering the ground water, the geochemical changes expected in the aquifer coupled with the relatively fast ground water flow rates are expected to reduce contaminant concentrations rapidly. The contaminant mass in the Eastern Plume is also relatively small, the Cocheco River, the eastern boundary of the plume, lies less than 800 feet away. Modeling in 1991 found that MNA would attain cleanup levels in approximately the same time-frame as pump-and-treat. To confirm the relatively fast reduction in contaminants, five years after the Source Control Remedy has been implemented, EPA will evaluate such factors as decreasing contaminant trends and geochemical conditions in the aquifer matrix to ensure the restoration of ground water in the Eastern Plume. If these findings demonstrate that MNA is not working effectively to restore the aquifer in a reasonable amount of time, the contingent remedy of pump-and-treat may be implemented. These five-year reviews will continue as long as contamination exists at the Site above levels that are protective of human health and the environment.

Pump-and-treat was selected to address the Southern Plume because ground water flows relatively slowly in this aquifer, and it is expected that anaerobic conditions will prevail through much of the aquifer despite the operation of the air-sparging trench. Anaerobic conditions in the

southern portion of the aquifer do not lend themselves to degradation of the contaminants present (arsenic, benzene, tetrahydrofuran, and vinyl chloride) in that plume. Given that, along with the fact that Site contaminant concentrations appear to be increasing in the Southern Plume for arsenic and tetrahydrofuran, and the proximity of the Bellamy Reservoir, a Class "A" Reservoir that serves the drinking water needs of a good portion of southeastern New Hampshire, a pump-and-treat remedy was retained.

Implement the 1991 ROD remedy now and cap the landfill

Comment 10: The Proposed Plan represents in its assessment of short term risks that the amount of material excavated for the trench is minimal compared to the fill necessary for the cap. Yet the amount of fill necessary for the trench will be double, approximately 40,000 cubic yards, rather than what was stated in the Proposed Plan (19,000 cubic yards). Therefore, the true comparison should be 40,000 cubic yards for SC-A instead of 19,000 cubic yards. When compared to SC-7/7A this becomes a more comparable number next to the necessary 165,000 cubic yards.

EPA's Response: While EPA still stands by its estimate of 19,000 cubic yards, even accepting the double amount of 40,000 cubic yards, that volume represents only about one-quarter of the amount of fill necessary to implement the 1991 ROD remedy. That results in 75% more truck traffic and worker exposure to dust, equipment accidents and exposure to some amount of contamination during handling.

Comment 11: Clean closure of the landfill will require just as much fill to attain grades and therefore, the cost savings will disappear. An additional problem is that short-term risks may be greater in that when clean closure is performed the truck traffic and dust issues will be the same as now, yet the population in the area will likely have increased. Therefore, it is better to build the cap now.

EPA's Response: Once the landfill reaches clean closure, that is the hazardous wastes in the landfill are no longer leaching concentrations of contaminants to ground water that pose a risk to human health or the environment, state regulations for solid waste landfill closure will dictate the type and grade of cap necessary for the landfill.

Comment 12: EPA forments misconceptions regarding SC-A such as:

- **SC-7/7A would cost more due to recontouring, 150,000 yards of fill, and construction of a RCRA type "C" cap. Yet, closing the landfill will still require bringing in fill to attain similar grades.**
- **SC-7/7A will entomb the waste so that it never "goes away." This is inaccurate in that biodegradation and other mechanisms will gradually reduce concentrations.**

- **SC-A will wash all of the contaminants out of the waste leaving a benign pile of rubble. This too is inaccurate as flushing over a very long time would be required to do this.**

Based on the preceding, SC-A offers no advantage over SC-7/7A. Therefore, why did the PRPs and the Agencies abandon the SC-7/7A remedy? EPA should construct SC-7/7A as proposed in the 1991 ROD.

EPA's Response: See Comments 10 and 11 for a response to the issue raised in the first bullet.

With regard to capping the landfill, although it is true that biodegradation will occur under the cap, not all site contaminants are amenable to this process. Benzene is unlikely to degrade under the cap and arsenic will not degrade. Volatile organic compounds found in the landfill will degrade but the bio-degraded endpoint for most VOCs is typically vinyl chloride which is a known human carcinogen. EPA finds this to be an unacceptable result, nor would the remedy be protective.

EPA agrees that a long period of flushing will be required to clean the landfill; however, capping will leave wastes in-place over a greater length of time.

Comment 13: There will be fewer challenges by implementing the 1991 ROD rather than moving forward with the proposed amendment.

EPA's Response: While the Alternative Source Control component does pose challenges, a side-by-side evaluation of the Alternative Source Control component and the 1991 Source Control component against the criteria set out in the National Contingency Plan (NCP) reveals that the challenges are comparable to those presented in the 1991 ROD. A detailed evaluation can be found in the Comparative Analysis of the ROD Amendment, the RFFS, and the EPA Addendum. In addition, if the alternative Source Control remedy works as proposed, the cost benefits will be greater than those offered by the 1991 ROD remedy.

Time

Comment 14: Implementing a remedy at the site has been delayed too long.

EPA's Response: EPA agrees and expects the Amended remedy to be implemented quickly. In fact, EPA believes that the past 10 years of ground water sampling and previous pre-design investigations provide an excellent baseline of data from which to launch the required future pre-design studies and hasten the remedial design and construction. While there are still some data gaps to fill in, it is not anticipated that the necessary pre-design studies will be completed within one year of issuing this ROD Amendment.

Comment 15: Extensive testing of air-sparging will add more delay and cost to a project that has been long-delayed.

EPA's Response: Although testing the air-sparging technology will take additional time and resources, EPA believes that this investment will ensure that a functional remedy is deployed and that it works effectively and efficiently. See also Comment 14.

Comment 16: There appears to be a conflict regarding the cleanup times with various documents citing 20 or 30 years and 75 or 100 years.

EPA's Response: A detailed discussion of cleanup times is provided in Appendix N of the RFFS and is summarized in the Addendum. There are three areas of cleanup: the area within the landfill, the Eastern Plume, and the Southern Plume. With respect to this Amended Record of Decision, the important element is the time-frame for the cleanup of the landfill area. A comparison of just SC-7/7A and SC-A follows:

[illegible]	[illegible]	[illegible]
Contaminant	[illegible] (SC-7/7A)	[illegible]
Arsenic	> 100	92 to > 100
Vinyl chloride	19 to >100	23 to 28
Benzene	10 to 19	24 to 65
1,2 c-DCE	9 to 11	9 to 13
Tetrahydrofuran	10 to 11	9 to 13

While it appears that cleanup times are similar for all compounds, this similarity is due to the assumptions inherent in the model. The data in the above table only consider the time to cleanup the ground water in the aquifer under the landfill. For example, the chart depicts that it is quicker to clean up benzene in the aquifer with the 1991 ROD than the Amended ROD. However, this is artificial, the model assumed that the loading rate (the amount of benzene that leaks from the landfill wastes) is lower under the 1991 ROD than the Amended ROD. This is true only if the ground water impact of the long-term contribution of the contaminants under the cap are discounted. But this long-term impact cannot be discounted as a continuing source to ground water as long as contaminants remain in the landfill. In fact, the flushing action of the ROD Amendment remedy will cause all of the contaminants to move into the ground water and through the treatment wall much more quickly than the 1991 ROD would send the contaminants for treatment in the leachate diversion/interceptor trench via gravity drainage.

It should be noted that these time-frames are derived from a model and that the assumptions in the model drive much of the results. EPA believes that assumptions and data for this model will be greatly improved through pre-design investigations, preliminary results of the first phases of the Source Control remedy, and the implementation of pump-and-treat in the Southern Plume.

Comment 17: The EPA and NHDES should accelerate the testing and implementation of the Management of Migration remedy MM-4 in the Southern Plume to have it operating as soon as possible.

EPA's Response: EPA agrees and will work with the Group to ensure that this is done as quickly as possible and that pre-design investigations are conducted quickly, efficiently and are completed within one year of issuing this ROD Amendment.

Comment 18: The time to get a remedy going will be considerable. Work may not begin at the site until 2008 and won't be completed until at least 2010. If MNA in the Eastern Plume is determined to not be working, active remediation would not begin until 2017, 34 years after the site was listed on the NPL. Please consider the speed that the remedies can be implemented.

EPA's Response: EPA is cognizant of the considerable time-frame of this project but does not agree that active remediation would not begin until 2017. Instead, EPA expects portions of the air-sparging trench to be constructed by late 2006. See Comments 14, 15 and 17 for further discussion of time frames.

Comment 34: Why is 75 years cleanup time for arsenic in the Eastern Plume acceptable to EPA? Historically, "reasonable time frames" have been twenty to thirty years. Should not something be done to expedite the removal of arsenic from ground water?

EPA's Response: There is no specific number of years that can be defined as acceptable for Superfund cleanups. Reasonable time frames vary from site to site depending on the specific site conditions. For the Dover Landfill site, factors to be considered include the rate of contaminant decrease over the first five to seven years after the source control component is operating, levels of sediment contaminant concentrations in the Cocheco River, and restoraton rate of the ground water aquifer. Should this evaluation or any successive evaluation by EPA find that MNA is not successfully addressing ground water contamination, the pump-and-treat contingency will be implemented.

Comment 20: The present plan presents contingencies that open the door for further delay through appeals. The triggering mechanisms for the contingent remedies are not well-defined.

EPA's Response: The Proposed Plan functions as an overview for the remedy and does not contain the level of detail the comment is seeking regarding triggering mechanisms for the contingent remedies. Some details appear in the RFFS, EPA's Addendum and the Amended ROD that incorporate significantly more detail concerning these triggers. In addition, EPA will also write a very specific scope of work that will further direct when the contingencies will be implemented.

EPA must also point out that CERCLA does not allow appeals of EPA's decisions documents. Moreover, this remedy will be conducted by the Group through a Consent Decree (with the attached scope of work).

Comment 21: The proposed remedy, SC-A + MM-2/4, should not be delayed by any pre-design activities.

EPA's Response: Pre-design investigations are required to effectively design and employ a remedy and to identify the means to monitor its future performance. Because there has been substantial sampling and monitoring of this Site for the past ten years, EPA does not anticipate that these pre-design studies will require more than a year to complete once the Amended ROD is issued. EPA will endeavor to move these items forward as fast as possible.

Cost

Comment 22: The proposed remedy has a long time-frame for cleanup. The time-frame exceeds that for the cost estimate by more than double and such a long operation will pose an undue burden on future populations.

EPA's Response: EPA agrees that any remedy for this Site will continue into the future for some time, but believes that the selected remedy offers some time-saving advantage over the 1991 ROD. The nature of remedial activities at large, uncontrolled landfills inherently requires a considerable time-frame to attain cleanup goals but, unlike the amended remedy, the original 1991 ROD remedy also has significant long-term costs that will be incurred over a potentially greater time-frame If the selected remedy is successful, all future maintenance and monitoring costs may be eliminated or greatly reduced over that of the 1991 ROD.

Comment 23: The proposed remedy considers financial impact above public health and environmental impacts.

EPA's Response: Any remedy considered by EPA must first meet the baseline requirement of protecting human health and the environment. Although cost must be considered by EPA, it is a modifying criteria which is evaluated only after the baseline criteria are met. Based on EPA's analysis, SC-A, the amended ROD's Source Control component, is equally if not more protective of human health and the environment as SC-7/7A, the 1991 ROD Source Control component. In accordance with the NCP, when several remedial alternatives are equally protective, cost considerations can be used as a balancing criteria in the selection of a remedial alternative.

Comment 24: If the air-sparging trench is unsuccessful, the landfill will still need to be capped and any cost savings from the trench will be gone. Carefully examine the costs against the benefits and drawbacks.

EPA's Response: EPA is quite aware of this possibility and has incorporated the phased implementation of trench segments as a way to not only minimize the cost risk but also ensure protectiveness along the way.

Comment 25: Superfund monies should be spent on this site to complete it.

EPA's Response: Superfund monies can only be spent on the site if there are no PRPs or if the PRPs refuse to do the work. Even in those cases, there is no guarantee that Superfund monies will be available in any given year to fund a site cleanup. At this site there is a PRP Group that signed a Consent Decree with EPA to implement and finance a significant portion of the 1991 remedy. While that Consent Decree must be revised to include this Amended ROD, EPA believes that this Group will also sign the revised Consent Decree to implement and finance the amended remedy.

Comment 26: Are the costs of clean closure, the proposed pre-design activities, the design, and agency oversight included in the costs? Is the cost of operating the blower for potentially 75 years also factored into the costs?

EPA's Response: The short answer to this question is yes. However, these costs are not absolutes, but intended to compare the estimates known for each alternative. The costs estimated include remedial design, remedial action, oversight and 30 years of operation and maintenance of the selected remedy. Because all the tasks involved of each of these phases of the remedy are known only in general terms at the writing of the ROD, a percentage factor is applied to the overall capital cost of the remedial action to determine design, oversight (and O&M) costs. Operation and maintenance costs are only carried out to 30 years based on the speculative value

of time and performance beyond 30 years.

Comment 27: EPA should implement pump-and-treat in this area as soon as possible using Superfund resources.

EPA's Response: See response to Comment No. 25.

Public Safety

Comment 28: Any new clean up action should not cause further environmental damage or have an adverse effect on public health.

EPA's Response: Agreed. As part of its evaluation of the alternatives, EPA is required, as a threshold matter to determine that the selected remedy is protective of human health and the environment.

Comment 29: When will it be safe to swim in the Cocheco River? What is the risk for people who swim in the Bellamy Reservoir?

EPA's Response: Currently, there are no restrictions on swimming in the Cocheco River because of contamination from the Landfill. However, there are a limited number of isolated areas along the south bank of the River that have elevated arsenic concentrations in the sediment, posing a border-line long-term risk to potential waders and/or swimmers who come in contact with the sediment in that area.

EPA calculates risk based on the exposure of the most sensitive populations using the maximum concentrations found at the site. In the case of the Cocheco River, the contaminant that poses nearly all the risk is arsenic which is found in both surface water and sediment. In the surface water, concentrations are at approximately the same normal concentrations found in any stream in New Hampshire. Therefore, surface water in the River (and in surface water adjacent to, and down-stream of the Site) poses no greater risk from arsenic or other Site contaminants and is safe for swimming. For sediments, however, arsenic concentrations are significantly elevated in areas adjacent to the River and in other parts of the Site.

EPA performed a risk calculation that determined that if a child were to climb down the steep hill and swim in the river, get sediment (mud) over portions of their body and accidentally eat 100 mg of mud in the area with the highest concentrations of arsenic during every exposure period, that over their lifetime they would not be at an excess risk of cancer or non-cancer problems that EPA believes is significant. However, EPA did note that the risks were borderline (just under) results that could be significant, therefore EPA believes that it is appropriate to continue

monitoring in this area. The Amended ROD includes a requirement that sediments in the Cocheco River be periodically monitored to ensure these risks do not increase, and, should that happen, the Amended ROD requires that the sediment be removed.

The Bellamy Reservoir is a Class A water body used as a drinking water source for the greater seacoast area. Consequently, there is a swimming ban in this water body. However, it must be stated that there is currently no evidence of impacts to the Reservoir from landfill contaminants and, therefore, would pose no additional risk to a swimmer.

Comment 30: Indoor air samples should be collected to evaluate potential impacts to homes above the Eastern Plume. The air-sparging trench will concentrate VOC vapors and potentially create an indoor air risk.

EPA's Response: Previous sampling, which followed guidelines that NHDES developed, indicated that there were no impacts from the Site on indoor air in homes along Tolend Road. EPA recently issued draft indoor air vapor guidance and will be re-assessing those homes near the Eastern Plume in the near future. With respect to the air-sparging trench the comment is correct that VOCs will be concentrated; however, emissions from the trench will be monitored and managed to ensure that indoor or outdoor air action levels are not exceeded.

Contingency Remedy

Comment 31: The Source Control Component of the 1991 ROD remedy should be continually updated to facilitate timely implementation as a contingency alternative.

EPA's Response: EPA fully agrees with this comment and has incorporated into the Amended remedy a requirement that the 100% cap design completed in 1996 for the 1991 ROD remedy be updated simultaneously with the design of the air-sparging trench. Should the capping contingency become a reality, the updated design will allow implementation with little delay.

Public Notice

Comment 32: If contaminated sediments are going to be excavated in the Cocheco River the local Conservation Commission should be allowed to review and comment on the plan.

EPA's Response: While CERCLA gives only the State a review and comment role in implementing Superfund remedies, it is EPA's practice to periodically meet with local Conservation Commissions within the affected areas to keep the Commission aware of the remedial activities. EPA fully anticipates this practice will continue at the Dover Landfill Site.

Comment 33: Consider a separate public meeting for Portsmouth residents. Also, summer is a difficult time to schedule these meetings.

EPA's Response: Although summer may be a difficult time for all interested parties to attend a public meeting, the 50-day public comment period provided another avenue for submitting comments. Typically, EPA holds public meetings in the community where a site is situated, however, EPA is willing to consider holding any future public hearings in both communities.

Comment 34: The public should be appraised of the anticipated impacts to wetlands caused by the remedial alternatives. The public should be informed of, and provided an opportunity to review and comment on pre-design studies.

EPA's Response: EPA and NHDES will work with the local Conservation Commission to keep the public informed of potential wetland alterations. EPA also periodically issues fact sheets and holds occasional public informational meetings to keep area residents aware of site cleanup activities.

Comment 35: The Department of Public Works, City of Portsmouth, should be kept informed of water quality data and project schedules regarding the Southern Plume and Bellamy Reservoir.

EPA's Response: EPA is more than willing to share confirmed data concerning water quality and upcoming work with the City. In fact, EPA believes the City may routinely gather information that may be useful to the monitoring work envisioned for the remedy and looks forward to discussing this mutual information sharing.

Comment 36: Provisions should be made with respect to notifying the City of Portsmouth and general public if contamination is found in the Bellamy Reservoir or if contamination appears likely. A program should be devised that educates the public about risk and safety from potential contamination of the Bellamy Reservoir.

EPA's Response: EPA informs the community about activities at the site via the updates to the site mailing list and periodic press releases. Regarding imminent threats, a Health and Safety Plan will be developed for the Site that will notify hospitals and public water supplies if contamination threatens a drinking water resource or other exposure route.

Contamination

Ground Water Contamination

General

Comment 37: Contaminants will continue to flow to both the Cocheco River and the Bellamy Reservoir under this plan.

EPA's Response: The Source Control Remedy will halt the flow of contaminants from the landfill and into the Eastern and Southern Plumes. Therefore, only those contaminants remaining in the extended plumes when the Source Control construction is complete will continue migrating. Remaining contaminants in the Eastern Plume will continue to discharge to the Cocheco River. However, the Eastern Plume has been modeled to attain cleanup levels in approximately 5 to 7 years and if not, the need to implement the contingent active remediation system will be assessed. Contaminants flowing towards the Bellamy Reservoir (Southern Plume) will be intercepted with the pump and treat system component of the remedy for this plume

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Comment 38: No contaminants from the landfill should discharge into either the Cocheco River or the Bellamy Reservoir. Ground water in contaminant plumes should be restored to end the contamination.

EPA's Response: See response to Comments 9, 16, and 37.

Comment 39: TCE has been linked to increased incidences of non-Hodgkins lymphompa in the area surrounding the Pease Air Force Base. Pease is also a Superfund site with many operable units. TCE is also found at the Dover site. Arsenic, although naturally found in New Hampshire, has a standard that, although low, (10 ug/kg), is a compromise and may not be found to be protective of human health in the future and the standard decreased further. Regardless, these contaminants are not wanted in increased concentrations in the watershed.

EPA's Response: Arsenic is a principal contaminant of concern in ground water at the Dover Site. Because the ground water aquifer is a potential drinking water aquifer Safe Drinking Water Act Maximum Contaminant Levels (MCLs) have been identified as relevant and appropriate chemical specific standards. The MCL for arsenic in drinking water is 10 ug/kg. Through past studies at the Site naturally occurring levels of arsenic, or background levels, have been determined to also be 10 ug/kg. Since future ingestion of ground water is the primary risk at the Site, the interim ground water cleanup level for arsenic is set at 10 ug/kg.

Comment 40: The Agencies must be careful that the ground-work for a technical impracticability waiver is not being lain by the PRPs with respect to arsenic in ground water.

EPA's Response: EPA has a very specific protocol for establishing a technical impracticability waiver under CERCLA §121(d)(4)(C). EPA's "Guidance for Evaluating the Technical Impracticability of Groundwater Restoration", dated September, 1993, points out that restoration of contaminated ground water is one of the primary objectives of the Superfund program. In general a party must demonstrate and document a complex assessment of site specific characterizations of the technical impracticability of restoring groundwater before EPA will even consider suspending remediation. EPA has not reviewed any data from this site to date that would justify a technical impracticability waiver.

Eastern Plume

Comment 41: Contamination of the Cocheco River is being allowed to proceed under this remedy. The Cocheco River is a recreational resource that should not be allowed to be further polluted. EPA already knows that arsenic is leaching into the Cocheco River, so why is there only a contingency plan and no action?

EPA's Response: EPA disagrees that there is only a contingency plan and no action planned for the Eastern Plume which discharges to the Cocheco River. Monitored Natural Attenuation is a viable remedy that was selected in the 1991 ROD for this area and is retained in the Amended ROD.

The product of the current discharge is an iron-rich sediment that contains a small amount of arsenic (maximum concentration is 1,520 mg arsenic / kg of sediment). This does not pose a human health risk based on EPA's risk assessment. See Comment No. 29 regarding risk calculations and considerations. State regulations included as an ARAR for the Site require remedial action should a ground water discharge cause a violation of surface water quality standards. Currently, the discharge of ground water to the Cocheco River is not causing a violation of surface water quality standards.

Once the Source Control component of the selected remedy is implemented, it is expected to immediately halt the flow of additional contaminants from the landfill to the Cocheco River and profoundly change the geochemistry of the Eastern Plume. A ground water model has shown that once the Eastern Plume is cut-off from the source, it will be restored within 5 to 7 years. EPA's contingent remedy is based on this 5 to 7 year period.

Southern Plume

Comment 42: With respect to the Southern Plume the following is needed:

- **Additional monitoring wells are needed to provide a complete vertical profile.**
- **Additional analysis is required.**
- **The nature of the marine clay must be determined.**
- **Sediments in the Bellamy Reservoir should also be sampled in at least two locations annually.**
- **Well cluster MW-102 should be sampled.**
- **Ground water flow and geology in the Southern Plume needs to be better characterized.**

EPA's Response: EPA agrees and notes that these are all part of the pre-design investigations that EPA is requiring of the Group. Although sediment sampling in the Bellamy Reservoir was not considered; it may be valid and will be evaluated for inclusion in these studies.

Comment 43: The City of Portsmouth is interested in reviewing and commenting on monitoring in the Southern Plume.

EPA's Response: See response to Comment No. 35.

Surface Water Contamination

Comment 44: The Cocheco River is a regional resource that Dover and neighboring communities have spent much money and effort to restore for aesthetic benefits among other reasons. The Cocheco River is a TMDL listed river with dissolved oxygen demand as the reason. The Cocheco River receives the lion's share of contaminants from the site and this will increase the dissolved oxygen demand, further down-grading the conditions in the river.

EPA's Response: The oxygen demand of the ground water and surface water has not been measured in the vicinity of the Cocheco River impacted by the landfill. This measurement may be a valid measurement to collect along with nutrient values, when evaluating arsenic-contaminated sediments. The operation of the air-sparging trench may provide sufficient oxygen to reduce the oxygen demand of the ground water entering the River. Although EPA cannot respond to a low dissolved oxygen issue in the Cocheco, the State has independent authority under State water laws to address this issue.

Comment 45: In the event the Bellamy Reservoir becomes contaminated with Site contaminants, provisions should be made to either treat affected water or provide for an alternative source, including reserving financial resources for the City of Portsmouth to ensure water quality.

EPA's Response: CERCLA does not provide for or authorize separate funding to ensure an alternative source of water is available in the event of contamination. What CERCLA does provide for is the ability of EPA to take emergency action in the event of a situation that presents an imminent and substantial endangerment to the public health or welfare. These situations are evaluated when they arise and the decision whether or not to take action is made at that time.

Sediment Contamination

Comment 46: Arsenic concentrations in the Cocheco River are unacceptable.

EPA's Response: See response to Comment No. 41.

Comment 47: Why doesn't EPA analyze for other sediment contaminants at the site such as lead, mercury or cadmium?

EPA's Response: EPA based the Environmental Monitoring Plan on previous results that showed low levels of other metals, including lead, mercury, cadmium, and chromium, in sediments surrounding the site. These results are discussed in Section 7 of the Wehran Remedial Investigation done for NHDES. EPA acknowledges that more recent sampling has revealed additional data concerning site characteristics and contaminants that the Environmental Monitoring Plan does not address. As part of Remedial Design and Remedial Action this Plan will be updated to include new information.

Comment 48: There are many locations of testing that exceed the first tier for sediment sampling, yet have not been sampled under the second tier protocol.

EPA's Response: This type of sampling is expensive and can provide confounding results if not set up correctly. EPA is waiting to conduct this sampling after the Group prepares and EPA approves a work plan, which will occur during the pre-design activities.

Comment 49: Arsenic contaminated sediments on the "...landfill side of the Cocheco River exceed the threshold cancer risk of 10^{-4} and NOAA freshwater screening levels. Human health risks posed by arsenic concentrations in Cocheco River sediment are already bordering acceptable risk ranges established by EPA." Therefore, it is likely that a second or third level of ecological assessment must be completed. The ultimate result will be that

EPA will require the removal of impacted sediments. Rather than remove the sediments, why not eliminate the source and instead conduct air-sparging adjacent to Tolend Road?

EPA's Response: EPA believes the commentor is confused and possibly misread the available information. Based on a review of the data, the human health risk posed by arsenic-contaminated sediments is lower than the threshold value of 10^{-4}, in fact it is at 10^{-5} which is within EPA's cancer risk range; albeit borderline. The commentor correctly stated that a second tier ecological assessment must be completed; however, neither of these findings lead to the hard conclusion that removal of arsenic-contaminated sediment is inevitable. Continued monitoring and further ecological assessment are required before any removal can occur.

With regard to removing the source, the air-sparging trench technology was selected to do just that. The location of the air-sparging trench at the edge of the waste area will address the contamination close to the source. One reason for this is to minimize the length of travel a contaminant must traverse before being captured or destroyed. In addition, in accordance with wetland ARARs, impacts to surrounding wetlands must be as minimal as possible. The area along Tolend Road is identified on map 8-1 of Appendix A of the RFFS as being a "Palustrine Forested Wetland." Moving the air-sparging trench further away, towards Tolend Road, is at odds with wetlands regulations that favor remedies with the least adverse impacts on wetlands and allows contaminants to migrate further through the aquifer.

Comment 50: Sediments have been accumulating in the river and washing downstream. Is there any plan to identify downstream sediment collection areas and sample them now and in the future? What will be the ultimate concentrations we can expect in sediments in the Cocheco River? What will be the ultimate fate of the arsenic-contaminated sediments?

EPA's Response: The sediments generated by the site are minuscule when compared to the overall load of sediments in the Cocheco River. The ultimate concentrations of sediments down stream will be close to, or at, the natural, regional background values for arsenic. For instance, consider sampling transect T6 which is less than 400 feet down stream of where arsenic discharges to the stream and is entrained into the sediment. There were three sampling points at T6, the far (north) bank, the middle of the channel, and the near bank (closest to the site). The concentrations were, 3.3 ppm (parts per million), 7.3 ppm, and 5.1 ppm for the far, middle and near banks respectively. This compares well with the T1 transect which is upstream of the site and unaffected by the site. The concentration of arsenic in sediments at T1 are 5.6 ppm, 4.8 ppm and 4.6 ppm, for the far, middle and near channel respectively. The natural sediment load of the river is far greater than what is contributed by the site.

Indoor Air Contamination

Comment 51: The Agencies admit the impacts to indoor air are unknown and "The potential impact to indoor air pollution from the volatile organic compounds has not been assessed."

EPA's Response: Indoor air impacts have been assessed under State protocols for evaluating in door air in the absence of a federal protocol. That evaluation found no unacceptable concentrations of indoor air vapors due to site contaminants. EPA found no fault with this protocol; however, has recently developed its own protocol and will assess indoor air under that strategy during pre-design activities.

Nuisance

Comment 52: The proposed remedy does not collect and treat gases recovered during air-sparging. This poses the potential for odor problems.

EPA's Response: This is a valid concern. As part of the pre-design, EPA will evaluate collecting and treating gases recovered during air-sparging.

Comment 53: Noise from the pumps doing air-sparging and other operations may pose a nuisance to surrounding residences.

EPA's Response: EPA will endeavor to ensure that remedial pumping stations are sited away from residences and that excess sound is muffled to the best extent possible.

SUMMARY OF POTENTIALLY RESPONSIBLE PARTY COMMENTS

Implementability

Comment 54: The layout of the air-sparging trench, as depicted by EPA, is flawed in that it does not account for distinct properties in the aquifer underlying the landfill and the differing hydraulic properties of the aquifer. The layout of the trench should be subject to the findings of pre-design studies and flexible to site conditions. For instance, one option that may have several advantages would be to re-position the air-sparging trench treating the Eastern Plume to a line along Tolend Road. The layout of the air-sparging wall should be designed with all site conditions considered.

EPA's Response: The position of the air-sparging trench shown on the figures in the RFFS and Addendum are schematic in nature and do not represent even the approximate final design. The

final design will be based on site conditions, the analysis of EPA and State experts, and in consideration of applicable laws and regulations. CERCLA typically requires compliance boundaries to be set at the edge of waste management areas, here the landfill. At Dover, because the goal is clean closure and complete aquifer restoration even beneath the landfill, a compliance boundary does not exist; however, it is EPA's policy to control contamination as close to the source as possible. See the response to comment No. 49.

Contingent Remedy

Comment 55: Although a contingent remedy is necessary with respect to the operation of the air-sparging trench, the need to cap the landfill with a RCRA type "C" cap in the event of a failure of the trench is not apparent. Consider, as a contingency in the event of the failure of the sparging trench, simply converting the trench into a leachate recovery device.

EPA's Response: The capping contingency was presented in the Proposed Plan and fully vetted by the public; to reformulate the contingent remedy would require issuing another decision document by the Agency. EPA received considerable public comment concerning the long delay in implementing a remedy at this Site and is not inclined at this time to entertain any further changes to the remedy.

Comment 56: Currently, the landfill surface is being examined by the City of Dover as an area for future disposal of dredge spoils, lightly contaminated soil or possibly municipal solid waste. This reuse would be consistent with the 1991 ROD in that it would serve as the fill to attain the necessary grades for the cap. The City of Dover would like to examine this concept during considerations of the ROD amendment.

EPA's Response: EPA believes that re-use of the landfill for additional landfill operations would be inconsistent with the ROD Amendment's goal of attaining clean closure and aquifer restoration within a reasonable amount of time. The Agency is always available to discuss possible future uses of the Site with any party.

Source Control at the Landfill

Comment 57: In investigating localized source areas it is suggested that specific methods not be limited to those cited in the Addendum.

EPA's Response: EPA is receptive to proven methods that will efficiently and effectively identify and remediate the localized source areas. Proven methods, different than those suggested in EPA's Addendum, must be offered in a timely manner for evaluation and inclusion in the amended Consent Decree and Scope of Work (SOW) and to be detailed in Work Plans.

Ground Water Contamination

General

Comment 58: Arsenic in ground water at the site is most likely natural arsenic released from the aquifer matrix by the conditions in the ground water and therefore may never attain ICLs. Additional study is required to determine the origin and behavior of arsenic in ground water surrounding the landfill.

EPA's Response: See response to Comment No. 16, 19, and 39. EPA recognizes that there are background levels of arsenic at the Site that have been determined to be at 10 ug/kg. It is also noted that there have been no investigations to determine the origin or behavior of arsenic at the site and while that information may be of interest, EPA is not convinced it is a necessary investigation for this remedial action. What is clear is that arsenic is a site related contaminant that poses a risk to human health and the environment and it must be addressed.

Comment 59: EPA's Addendum that supports the Proposed Plan refers to dispersivity at the site being low. The Agencies have drawn conclusions from this assumption regarding the geometry and behavior of ground water contaminant plumes at the site. Specifically, this has led to the paradigm that plumes in this area are narrow and highly concentrated. The EPA's justification for low dispersivity values was not provided in the Addendum or in any previous correspondence. It is recommended that further evaluation of dispersion be included in further work at the site.

EPA's Response: EPA disagrees and notes that on July 13, 2001 in Portsmouth, New Hampshire, NHDES provided a spreadsheet to the Group and its consultants demonstrating that dispersivity at the site may be quite low. An additional copy of that spreadsheet is available. In addition, there were several conversations during the monthly meetings regarding "hockey puck" plumes of contamination. The concept of a narrow contaminant plume was the basis of the April 23, 2002 NHDES letter that advanced the necessity of a treatment trench rather than discreet injection points to address such plumes. Since that time, the Group has not demonstrated that this concept was invalid. EPA is always willing to evaluate further evidence; however, further investigations on this issue will not be entertained if they result in delays to implementation of the remedial action.

Southern Plume

Comment 60: The information that EPA based its decision on to not consider MNA (MM-2) in the Southern Plume was flawed from two standpoints. First, EPA considered wells that were not in the Southern Plume. Considering the data in Table 1 of Appendix B of the Addendum, as revised, "...underscores the need for additional information regarding

conditions in the Southern Plume...." Second, EPA does not fully understand the potential anaerobic degradation pathways for vinyl chloride, benzene and tetrahydrofuran. The scientific literature contains several instances of anaerobic biodegradation; however, the rates at the site need to be investigated.

EPA's Response: EPA based its decision not to consider a MNA remedy on the lack of solid, site-specific, scientific support that natural processes are functioning effectively in the Southern Plume to reduce all contaminants to concentrations protective of human health and the environment. Due to the lack of field data, and the scarcity of monitoring points, EPA elected to retain the remedy selected in 1991. EPA fully understands contaminant degradation pathways; however, the Group has failed to demonstrate their effectiveness at this site in attaining cleanup levels.

Comment 61: EPA should retain the flexibility to utilize MNA in the Southern Plume with pump-and-treat as a contingent remedy. If pre-design investigations indicate that pump-and-treat is required, EPA should retain flexibility in how any remedy is employed. One consideration is that any water extracted and treated from the Southern Plume be combined with the ground water extracted in the southwest corner of the landfill and piped to the City of Dover publicly owned treatment works.

EPA's Response: As previously stated, EPA has fully vetted the alternatives publicly and has selected the current remedy. Any significant change would require a further decision document. While EPA will remain flexible in considering all options contained in the 1991 ROD with respect to how the contaminated ground water from the Southern Plume is treated and discharged, EPA will not allow any further investigations to delay the implementation of either the Source Control or Management of Migration components at the Site. The Group has had the opportunity to demonstrate MNA in the Southern Plume using field data. Since the 1991 ROD, EPA and NHDES have allowed the Group great latitude in investigating alternative cleanup technologies. Since the 1997 AOC, EPA and NHDES have had nationally recognized experts in MNA available to evaluate any such data that the Group might present, however no formal investigation has been offered in the past seven years.

Comment 62: EPA did not apply a correct understanding of the ground water modeling to the Southern Plume. The end result was the Agencies predicted an impact on the Bellamy Reservoir that is not consistent with the results of the model. Using the model and literature degradation rates, there were no simulated impacts on the Bellamy Reservoir from either vinyl chloride, benzene, *cis*-1,2 dichloroethylene, or tetrahydrofuran during the 100-year modeled time-frame. Therefore, impacts to the reservoir are unlikely.

EPA's Response: EPA based its decision to retain the 1991 Management of Migration component for the Southern Plume on contaminant data trends observed in ground water.

Models provide good estimates of probability; however this modeling with its use of literature values and inherent assumptions, did not convince EPA that MNA was a more effective remedy than pump-and-treat. Despite more than ten years of field work at the site, no field evidence demonstrated that MNA in the Southern Plume would be an effective remedy.

Sediment Contamination

Comment 63: Sediment monitoring need not be included in the Environmental Monitoring Plan as an annual event over the duration of the remedy. Further assessment of sediment in the Cocheco is required under the tiered ecological assessment. The second tier of testing should be followed, if warranted by field data, in conjunction with the five-year reviews of remedy performance.

EPA's Response: Environmental monitoring is currently performed semi-annually to ensure that the remedy is protective of human health and the environment. Based on the results of current and future risk analysis and the length of time that no action has been taken to control contaminants, EPA anticipates updating the Environmental Monitoring Plan (EMP). The 2002 sediment sampling results demonstrated that although sediment concentrations did not exceed human health standards, there were concentrations above EPA's point of departure in considering risk. Therefore, a reassessment of the risks to human health posed by elevated arsenic in sediment, possibly in conjunction with exposure to other contaminants of concern, will be performed during pre-design activities and will become a part of the EMP. Ground water, surface water, and sediments will be sampled under the new EMP at least annually for the first five years after the Amended ROD is issued. After five years, it may be appropriate to lessen the frequency of sampling. For ecological risks, the second tier testing will be performed during pre-design studies as well and will move to a third tier assessment if necessary. Sediment testing for ecological risks shall also occur annually for the five years at which time the frequency can be reevaluated. Accordingly, the EMP will be modified to ensure protectiveness.

Soil and Sediment Disposal

Comment 64: Soil and sediment excavated from the landfill during the construction of the amended remedy, SC-A & MM-2/4 should be managed according to the provisions of the NHDES Risk Characterization and Management Policy and the contaminated soil reuse provisions of the State's Solid Waste Rules (Env-Wm 2603.05). The Proposed Plan indicates that the more than 19,000 cubic yards of soil excavated from the trench will be disposed off-site. Following the Solid Waste Rules reuse of contaminated soil and allowing disposal on-site, consistent with those rules, will diminish short-term risks and lower costs.

EPA's Response: Given the landfill is not currently active, nor does it exist under the State's Rules, applicability of the RCMP and Env-Wm 2603.05 may prove problematic. Pre-design

investigations will make a final determination on this issue. If determined applicable, a goal of the pre-design investigation will be to evaluate representative soil samples from the proposed alignment cross-section and assess the results under the State's Solid Waste Rules and RCMP criteria.

ATTACHMENT 1

Appendix D: Responsiveness Summary

Transcript of the July 19, 2004 Public Hearing

UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

BOSTON REGION

In the Matter of:

PUBLIC HEARING:

RE: AMENDED PROPOSED PLAN
DOVER MUNICIPAL LANDFILL SUPERFUND SITE
DOVER, NEW HAMPSHIRE

Dover City Hall Auditorium
228 Central Avenue
Dover, New Hampshire

Monday
July 19, 2004

The above entitled matter came on for hearing, pursuant to Notice at 7:00 p.m.

BEFORE:

MIKE JASINSKI, Chief, NH/RI Superfund Section
DARRYL LUCE, Remedial Project Manager
U.S. Environmental Protection Agency
Region 1, New England
Office of Site Remediation & Restoration
One Congress St., Suite 1100
Boston, MA 02114-2023

ANDREA HOFFMAN, Project Manager
New Hampshire Department of Environmental Services

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I N D E X

SPEAKERS:	PAGE
Brian Stern for Loretta B. Chase	3
Tom Fargo	4
Doug Bogen	8
Katie Duncan	13
Brian Stern	14
Mike Hodgens	24

1 P R O C E E D I N G S

2 (7:00 p.m.)

3 MR. JASINSKI: I have some white cards here. I am
4 going to start the public comments now. I'm going to go
5 through these one by one, and then we'll, if someone wants
6 to come up later, please, raise your hand, and I'll call
7 your name, and we can go from there.
8 Again, please, state your name and your
9 relationship to the Dover Landfill Superfund Site. The
10 first card I have is from a Loretta Chase, if she could come
11 up and --
12 MR. STERN: Ms. Chase is not able to come up to
13 the stage. She's, it's very short, and she asked me to
14 present it.
15 MR. JASINSKI: If you could, Brian, if you could
16 for her--
17 MR. STERN: Okay--
18 MR. JASINSKI: --state your name and who you're
19 speaking for and then the comment.
20 MR. STERN: Okay. My name is Brian Stern, and I'm
21 speaking for Loretta B. Chase, and she wrote these comments:
22 "Brian Stern has my permission to present these comments.
23 They are my personal comments. I am particularly concerned
24 with the Eastern Plume and its effect on the Cocheco River.
25 "Until a biological assessment is completed,

appropriate decision for a remedy cannot be made. The health of the river is important, and the New Hampshire Department of Environmental Services has laws to protect it. DES should be given full support. Major efforts to improve the river upstream and downstream in the Cocheco are underway. This is another way to add to that effort."

Those are the comments, and she asks a question: "How well is sparging understood?"

So, she had written those. I'd like to submit those written comments.

MR. JASINSKI: Thank you, Brian.

The next card I have is from a Tom Fargo, a Dover resident. Mr. Fargo?

MR. FARGO: Good evening. My name is Tom Fargo. I'm a Dover resident. I'm also Chairman of the Conversation Commission, and back in the early nineties, I was associated professionally with the predesign investigation at the Dover Municipal Landfill, so I'm quite familiar with the issues out there regarding source control and management of migration.

I've gone to the presentation. I've read through the, the last presentation. I've read through the proposed revised remedy, and I'm very concerned about the ability of the air-sparging trench to work over a period of time.

I'm concerned that there'd be a significant amount

1 of precipitation of iron and arsenic co-precipitate in there
2 that would actually cause clogging in the interstices of the
3 backfill material causing it to not operate over the period
4 of time that it's desired to operate.
5 I'm concerned because once these precipitates
6 form, the only way that I see to really get them out is
7 either to use some sort of acid, which would remobilize,
8 potentially remobilize, these materials, or excavate them
9 out, which could have serious cost implications associated
10 with it.
11 I'm also -- Darryl, can you go back to the red
12 line that shows the air-sparging trench on the map? Okay.
13 The air-sparging trench is shown on the map here. I'm quite
14 familiar with the ground water flow patterns out there, and
15 I recognize that the air-sparging system is primarily geared
16 toward controlling the contaminants as opposed to
17 controlling the hydrology or the hydraulics of the site. In
18 other words, if you stop all the contaminants at the waste
19 boundary, then you don't have to worry about where the water
20 flows past that boundary area.
21 I'm familiar with the hydraulic controls which
22 were proposed previously. In fact, I did a lot of the
23 design work associated with the ground water extraction
24 system, and I know that the downgrading area is here, and
25 here are the primary sources for contaminants --

1 The hydraulic control remedy was primarily to
2 control in this area here and, also, in this area here.
3 This leg of the trench is actually along the hydraulic
4 gradient. The ground water flow path goes in this
5 direction.
6 What I'm concerned about primarily is that there
7 is a difference in the hydraulics along this section of the
8 trench versus this section of this trench. In this area
9 here, hydraulic gradients are upward, in other words, from
10 the lower units in the upper interbedded and upper sand
11 units, from the lower -- from interbedded sand layers here
12 upward in the upward sands, and in this area, the hydraulic
13 gradients are downward.
14 What I'm concerned about is that there'd be short
15 circuiting here because of the issues, in terms of the
16 hydraulics anyway, because these trench segments, if they're
17 all connected, would allow flow to go in places where it
18 wouldn't necessarily want, where you wouldn't necessarily
19 want to have it there.
20 So I suggest that, if the air-sparging is going to
21 take place, that these are segmented in a way that there
22 can't be short circuiting from one place to another.
23 I'm also concerned about air-sparging from more
24 planning related issues. You say that you'd only be
25 collecting up the air that's coming up through the trench if

it has concerns, if you have concerns regarding the VOC levels in it. I know, from personal experience, that the leachate out here has an awful odor to it and that the neighbors are not going to be happy if this odor is emanating from your air-sparging system here. In fact, many neighbors are very concerned about odors associated with an operating landfill not too far away from here, and this would be a double whammy for them that I don't think they'd really appreciate.

The other aspect of this is I'm not sure how loud these blowers are going to be or how loud the system is going to be because it's operating, you know, you're blowing air, and you have these things, and I'm not sure whether the noise factor will be taken into consideration as well.

I'd like to repeat a comment I made back at the last meeting, and that is that if these Eastern Plume is going to have associated with it some of the excavation in the Cocheco River area to address some of the remnant arsenic contamination that might be there, that this be done through the normal DES permit process which would allow the Conservation Commission to have input on how to manage the excavation process that would be taking place to address those contaminants over there.

I think that the local watershed community, watershed protection community, would like to make sure that

any work that's done within the river is done in a way that addresses mobilization of the materials and restoration of the areas that are being addressed.

Thank you.

MR. JASINSKI: Thanks, Tom.

The next person I have is Doug Bogen. I hope I said that right. Clean Water Action, Portsmouth.

MR. BOGEN: Right. My name is Doug Bogen. I'm the New Hampshire Program Director for Clean Water Action, which is a national organization with regional offices in Portsmouth, and I'm also a Portsmouth resident, and we have over 3,000 members in the state.

I'm speaking in their behalf, and we have, in fact, almost 1,000 members that are in the communities that are potentially affected by this situation with the Dover Landfill, the potential for contamination to the water supply in the Bellamy Reservoir, so I really want to speak for those people, and I want to provide a little bit of background to this issue beyond what has been presented in the last couple of meetings.

You know, from the perspective of Portsmouth, we're really surrounded by a number of Superfund sites. To the west of us, we have the Coakley Landfill, which is fairly similar situation. It was the City Municipal Landfill, became a Superfund Site around the same time. It

1 is further along in the cleanup. They are putting a cap on
2 it. It has been consolidated, but it did also threaten the
3 Portsmouth water supply. We have a number of wells that are
4 down gradient of it in Greenland.
5 To the east of us, there's the Portsmouth Naval
6 Shipyard, which is also a Superfund Site, although we are
7 divided by the Piscataqua River, but, again, another major
8 toxic waste site in the area, and then just immediately to
9 the north of us is the Pease Air Base Superfund Site, which
10 is actually a couple dozen different sites, and I wanted to
11 focus on that one a little bit more because there was a
12 public health assessment done for that site a number of
13 years back, back in 1999, in fact, and I provided some
14 comments to that assessment.
15 They did determine that there was an increase in
16 elevation of two types of cancer. The one relevant to this
17 situation here is non-Hodgkins lymphoma, which is associated
18 with exposure to volatile organic chemicals like
19 trichloroethylene or TCE, which is also found at the Dover
20 Landfill site.
21 Pease Air Base did contaminate their water supply,
22 which is also a portion of the City of Portsmouth's water
23 supply, back in the 1970s. This assessment did determine
24 that even though there was a two and a half times more
25 non-Hodgkins lymphomas in the local population, that that

1 they could study, it did not constitute an increased risk.
2 They didn't think it was statistically significant.
3 Interestingly, they didn't actually sample or look for data
4 from the people that lived on the base that were drinking
5 most of the water.
6 But I probably mention all this because of the
7 fact that we're talking about Portsmouth's water supply
8 here, and we don't want to have, 20 years from now, to be
9 doing an assessment of what happened, you know, due to
10 another insult to our water supply.
11 We also already have arsenic in our water supply.
12 It is naturally found in New Hampshire. I'm sure most
13 people don't realize that, at one point before, I guess, New
14 Hampshire was called the Granite State, it was actually
15 called the Arsenic State. They used to mine arsenic. You
16 know, it's good rat poison. And we do naturally have
17 arsenic in our water supply.
18 I believe up to, last report I saw was somewhere
19 in the order of four parts per billion, the higher levels
20 that have been measured in Portsmouth's tap water. We don't
21 need any more. The fact is, there's really no safe level of
22 arsenic. Folks should know that the current standard, the
23 one going into effect in 2006, was a compromise, ten parts
24 per billion, does not correspond to what EPA normally takes
25 as an acceptable risk to public health for cancer effects.

1 There are other effects from arsenic as well that
2 are still becoming understood, so this is a serious issue,
3 and we really don't want to see any more arsenic going into
4 our water supply.
5 In this regard, with folks in Portsmouth, I think
6 it is of concern that I don't think people in Portsmouth are
7 as aware of this issue as perhaps folks in Dover, and I
8 realize we're kind of late in the process here, but I would
9 like to ask, at least, that you consider holding a separate
10 hearing in Portsmouth, given that the City of Portsmouth and
11 surrounding communities are potentially affected with their
12 water supply, that it's not just Dover residents that need
13 to be concerned, and there ought to be a greater opportunity
14 for Portsmouth residents to be informed and comment on this.
15 I do appreciate that you've extended the time
16 frame for comments on this a few more weeks, but given that
17 we are still in mid summer, I think it is pretty tough for a
18 lot of folks to focus on if they even happen to be in town
19 this month.
20 I do want to mention a few specific concerns over
21 the proposed plan. The Clean Water Action, we're all for
22 innovation, new technologies, but there are, as has been
23 said before, there are many uncertainties with this sparging
24 technology. It needs to be watched very carefully. It
25 really, you know, opens a lot of questions as to whether

1 this will serve as a substitute for doing the, you know, the
2 old remedy, the cap, and we are really concerned about that
3 issue of trying to supplant that previous plan.
4 The issue of building a cap or not is of most
5 concern to us. It's not clear whether the site will ever
6 really be clean. We understand it's certain a benefit to
7 try to reduce the contaminants in the ground water, reduce
8 the contaminants in the soil as much as possible, but it
9 still needs to be recognized that we're unlikely to get all
10 of the pollution out of there, and I think you say in your
11 proposal that you will need to have some sort of cap. I
12 recognize it probably won't be the full RCRA cap, but still,
13 you're going to have to do something with the site when you
14 get down with the ground water treatment.
15 This plan appears to put cost concerns above human
16 health and environmental concerns, and that concerns us.
17 Really, human health concerns have to be foremost, and we
18 recognize that, you know, City of Dover is very concerned
19 about what it will eventually cost them and the other
20 parties, but we really need to be considering the number of
21 people that are potentially at risk here. We need to be
22 taking their concerns foremost.
23 We shouldn't give people really a false sense of
24 confidence that they can avoid, in the case of the City of
25 Dover, that they can avoid these costs. It may just turn

1 out that ten years from now, we'll have to spend more. I
2 mean, I notice back in 1990, it was, I think, $24,000,000,
3 or something in that order, for the cap, and now it's
4 $32,000,000. I wonder, in 2010, if it's going to be
5 $40,000,000 or $50,000,000 for the cap, which may eventually
6 need to be done anyway, so we shouldn't just assume that
7 we're going to avoid that cost.
8 Lastly, I'd just like to mention the Cocheco River
9 contamination appears to be problematic. It's a great
10 concern. There's these questions raised about how much we
11 know about it and what needs to be done about it, and it
12 hasn't really been fully investigated, and that, even though
13 it isn't, you know, somebody's drinking water supply, it's
14 certainly environmentally, in terms of recreational
15 exposure, it's a great concern that we are seeing arsenic
16 ending up in the river there, and it does appear that that
17 needs to warrant further attention.
18 I will be submitting written comments before the
19 deadline, but I appreciate your time tonight. Thank you.
20 MR. JASINSKI: Thank you, Doug.
21 Next comment, I have Katie Duncan.
22 MS. DUNCAN: I am Katie Duncan. I live in Dover.
23 I'm a student from Woodman Park School. Here's my question.
24 At the last meeting, I asked the question: When will it be
25 safe to swim in the river?

1 It seems you did not know, and I don't feel that
2 you have given me a clear answer. I would like to know the
3 answer to my question.
4 MR. JASINSKI: Thank you, Katie. You'll have to
5 wait for that answer. Sorry.
6 Next one I have, last white card I do have this
7 evening is from Brian Stern, personally.
8 MR. STERN: Thank you. My name is Brian Stern.
9 I'm from Dover. I am also an incorporator of a group called
10 the New Hampshire Tag Force, a nonprofit organization that
11 has been incorporated to obtain a tag grant from the EPA,
12 and we have obtained that grant. We've not yet done our
13 study so that my comments, personally, do not reflect the
14 comments of the New Hampshire Tag force. We will be
15 separately providing written comments before the comment
16 period.
17 I'd like to thank the EPA for extending the
18 comment period, and I'd like to thank them for the tag
19 grant. It's a great program that allows citizens the
20 resources to be able to hire experts to be able to provide
21 thought out comments, which they otherwise could not do. It
22 recognizes that citizens just do not have the wherewithal to
23 address these complicated issues.
24 I have a lot of issues to address, and I think I
25 want to somewhat do it backwards and address the cost issue

first. I almost feel as if I'm in a position of saving the PRPs from themselves, and I think that the State and the EPA should not also be feeling a need to satisfy the PRP's request for a less cost technology when there are so many questions about it and then to cover it, put in a contingency backup plan that states, in the event of failure, the contingency plan will kick in. It will be a very expensive experiment, one that the citizens of Dover, who is the primary PRP, could not afford.

So I think that the low cost, the lower cost plan that's being proposed is not necessarily the lowest cost plan, and cost is a factor that the EPA and the State considers in choosing a technology so I think I have a concern for the cost of this plan because that cost includes the contingency.

I also have a concern that the contingency will create an enormous amount of delay and additional cost over litigation and determinations of when that contingency kicks in and what is the wording to trigger those contingencies. There is wording in the documents such as "if it fails," and how is that determined or "if there is a risk," and how is that determined or "if it does not meet the safety standard that are required," is one of the, I've seen those sort of words at some point.

I'm uncomfortable if the air-sparging trench works

1 to an extent where it brings it down below the threshold
2 level of risk, but it still allows for contaminants to the
3 environment, whether it be the Bellamy River, the air or the
4 Cocheco River.
5 So your trigger point for that contingency is, I
6 don't think, very well thought out, and it certainly is not
7 air tight, and it's going to be subject to a lengthy process
8 to determine when that contingency will kick in. It will
9 cause additional delay, a lot of expense to the
10 participating parties and the government in determining when
11 that contingency kicks in, and I think that it's set for
12 failure of that contingency is, if it's still above
13 acceptable levels, and it just reduces them below those
14 levels, but is still not a risk that we would want to
15 accept.
16 I echo Doug Bogen's and the Clean Water Action's
17 comments that ten parts per billion of arsenic is a
18 compromise today that may not be the compromise later. I
19 don't recognize that as an acceptable level for arsenic,
20 particularly, with the high background level which that
21 national standard does not recognize and is not
22 individualized to New Hampshire so I'm concerned about that.
23 I have concern about the list of additional
24 studies to be completed, and there is a large list of those.
25 The plan and the addendum recognize a whole host of unknowns

1 about this site, and I have concern that the remedy is being
2 picked without adequate knowledge of that site.
3 We can look in hindsight and point blame, but,
4 certainly, it is a shame that, after so much time, we have
5 inadequate information about the site, but that inadequate
6 information goes to that there has not been an assessment of
7 the risk to human health from multiple pathways of exposure,
8 whether it's individually or combined. That risk to human
9 health has not yet been assessed from this site, and we're
10 choosing a remedy.
11 The risk to the environment has not been assessed.
12 The government and the PRPs do not even know what the level
13 of contaminants are that's heading to the Bellamy Reservoir
14 or to the Cocheco River, and these are, this is the
15 government's own words, in their own document: "The
16 potential impact to indoor air pollution from the volatile
17 organic compounds has not been assessed." That's, again, by
18 the government's own admission.
19 The nature and the source of the contamination has
20 not been studied. There's a question whether the arsenic is
21 native or whether it's been a contamination to the site, and
22 that has not been studied. That's also with some other
23 contaminants, and I've not seen the documents, but I'm not
24 very comfortable yet with the way it's been addressed for
25 lead and mercury and cadmium and whatever other metals are

1 there.

2 There is criticism in the addendum that there is

3 only one well, I believe, between the site boundary and the

4 Bellamy Reservoir, and there's 800 feet between that well

5 and the Bellamy, which has not been tested for the

6 contamination of the Bellamy Reservoir.

7 The documents say that the government does not

8 know the extent of the Southern Plume and what it will take

9 to intercept it; yet, we're proposing a plan, and the plan

10 has all these predesign studies to be done.

11 The Cocheco River has many locations of testing

12 that are exceeding the first tier of criteria; yet, they

13 have not, the government has not proceeded to study those,

14 the next level of criteria. Yet, the plan says we'll just

15 monitor and naturally attenuate at the same time that these

16 studies already show that the contamination is there.

17 There are more issues in terms of the studies that

18 still need to be done, which is recognizing the document

19 before a plan is done, so I have a concern with that.

20 Oh, let me, let me add a couple more in terms of

21 the studies that have been done. There's no study as to

22 what the level of arsenic will achieve in the sediments.

23 There's been no study of that. There's been no study of how

24 the sediment in the Cocheco River watershed have been

25 dispersed, how level the, how far widely dispersed the

1 contaminants have been.

2 I was thinking about this since the last meeting,
3 that the comment is that the level of arsenic at the
4 boundary, near the boundary of the landfill where it leaches
5 into the river are at low levels. Well, so we don't have to
6 address them. They're going to constantly be at low levels
7 and, by that logic, will never be addressed. The
8 contaminants come in, in a slow drip and wash away, and they
9 constantly stay at a low level.

10 I was thinking about that. Where are they going
11 to go? Where are they going? There is a question to what
12 extent they'll be suspended in the water even on a temporary
13 basis, what amount is going to wash over the dam and go
14 downstream into the Piscataqua watershed, but, most
15 certainly, they'll be accumulating behind the dam, the first
16 dam, at Watson Road, and there's been no study of the
17 sediments at the Watson Road.

18 There's a ready made study to see what has been
19 accumulated. I'm not sure how much it's going to tell us
20 because we don't even know at this point how long the
21 sediments have been leaching into the Cocheco River or at
22 what rate, nor do we know at this point the volume of
23 contaminants between the boundary of the landfill and the
24 river.

25 How much has moved off site that still is in that

1 area, and how long that will take for a constant low-level
2 washing into the river? And where will they go? How will
3 they be distributed? How will they accumulate? And what
4 will happen in a 100 year flood to those contaminants that
5 accumulate in high level behind the dam, if that is where
6 they go, in fact?
7 MR. JASINSKI: If you would summarize your
8 concerns right now, I'd appreciate it.
9 MR. STERN: Well, I have quite a number--
10 MR. JASINSKI: Maybe we can give somebody else--
11 MR. STERN: --of points that I would not be able
12 to summarize those points. That's the end of the list of
13 the studies. I'd like to move on to some other areas that I
14 have.
15 MR. JASINSKI: If you could, quickly.
16 MR. STERN: I'll try to move through each of them.
17 MR. JASINSKI: Yes.
18 MR. STERN: It was decided for the Southern Plume
19 going to the Bellamy that monitored natural attenuation
20 would not work, that the conditions for monitored natural
21 attenuation don't exist at the site, so I am concerned that
22 how that remedy then works for the Eastern Plume. When it's
23 been determined that it does not work and the conditions are
24 not right for monitoring natural attenuation for the Bellamy
25 area, why does it work for the Cocheco?

1 I have a concern that the PRPs have raised and
2 will raise a challenge to this remedy that there isn't
3 practicability to achieve it, that there is natural arsenic
4 and that they cannot clean it up because it will just be a
5 continual flow of arsenic. As much as there's water getting
6 in because there's no cap, there will forever be arsenic.
7 If that argument is the case, and that is
8 potentially the case, and that's recognized in the EPA
9 documents that the source of the arsenic may be natural, it
10 may be added, it may be the combination of them, if that's
11 the case, and there is some practicability potentially
12 recognized by the government that the, this plan doesn't
13 work because it needs to be capped, if that argument of
14 practicability is a concern.
15 I understand there's going to be some
16 experimentation with this sparge wall in terms of it being
17 built in sections and seeing how it works, and I'm concerned
18 about the time frame that that is going to take. I have
19 concern about whether the sparge trench will work at all. I
20 don't understand the system to have been so widely used as
21 has been represented. I have concern about that. I also
22 have concern that it is novel in addressing, both, arsenic
23 and tetrahydrofuran, and it is novel in that regard, as
24 well as the removal of the arsenic. That's an issue.
25 I think the recapturing of the precipitate is

1 going to be a problematic issue that, even if the acid wash
2 to remobilize the precipitate works, in general, I believe
3 you're going to have a very high concentration of arsenic,
4 and not all of that remobilized precipitate will be
5 captured, and you'll be sending high concentration shots
6 downstream.
7 So even if it pretty much well works, I think
8 you're going to have very highly concentrated arsenic in the
9 precipitate that, in the removal process, if the removal
10 process works as expected, is still not going to be perfect,
11 and that will create a problem, but I also have a concern
12 that, to remobilize and remove it, itself, is going to be a
13 problem.
14 I have a concern with the clogging, as Tom Fargo
15 mentioned. I also have problems or concerns with channeling
16 of air and channeling of water and how those are going to be
17 monitored to see that they are working.
18 I also have a concern about the long-term
19 operation of the sparging trench, and I have concerns that
20 it is referenced in the plan as a, both, 20 year and a
21 30 year operation; yet, the addendum states that it will
22 take 75 to 100 years, depending on the Cocheco River and the
23 Bellamy, 75 to 100 years of cleanup before the contaminant
24 is addressed.
25 So I'm concerned between the conflict in the

1 documents between 20 or 30 versus 75 or 100, and I am
2 concerned with the socioeconomic time frame as to what is
3 going to be a socioeconomic environment, whether it's
4 30 years or 100 years from now. Are we going to be asking
5 some body or some entity or something to continue the
6 operation of this for such a long period of time?
7 It's too far out to say that we'll be able to
8 continue to do this at that time frame. Who knows what the
9 social, political and economic environment is going to be
10 that far out for this type of technology? It should be
11 addressed at this point.
12 MR. JASINSKI: Brian--
13 MR. STERN: Yes--
14 MR. JASINSKI: --let me stop you right there.
15 Hold on.
16 Is there anybody else who wants to make a
17 statement? Because I'll, I want to defer to others, too.
18 You can come back.
19 MR. STERN: Thank you. I appreciate that.
20 MR. JASINSKI: But does anybody else want to make
21 --
22 No, Brian, if you've got more to say, that's fine.
23 But does anyone else want to make a statement?
24 Because I want to give everybody an opportunity to night.
25 So, sir?

1 And then, Brian, you can come back.
2 MR.. HODGENS: I'll be very brief.
3 MR. JASINSKI: I'm just going to give everybody
4 else a chance.
5 MR. HODGENS: My name is Mike Hodgens, and I'm a
6 Portsmouth resident, but I'm a commercial diver, and I've
7 dived in these waters for like the last 15 years, and my
8 season's from April, mid April, until mid November, and I'm
9 in the water pretty much every day, and my concerns are, you
10 know, what's leaching out there? What am I swimming in?
11 And how is it affecting me and people in the business that
12 I'm in?
13 And my concern, my other concerns, are the
14 drinking water in Portsmouth, and it just seems like it's
15 very risky to take these steps not knowing how the results
16 are going to be when you have another method of capping that
17 could, you know, makes more sense to me than these
18 suggestions.
19 MR. JASINSKI: Thank you very much.
20 Anybody else before Brian continues?
21 (No response.)
22 MR. JASINSKI: Brian?
23 MR. STERN: Thank you. I'm sorry. I didn't know
24 you wanted to just take a break.
25 MR. JASINSKI: No. I want to give everybody--

1 MR. STERN: Sure--

2 MR. JASINSKI: --an opportunity. That's all I'm

3 trying to do.

4 MR. STERN: Sure. Yeah. I try not to--

5 MR. JASINSKI: I didn't want to hold somebody up.

6 MR. STERN: I try not to repeat myself and--

7 MR. JASINSKI: Okay--

8 MR. STERN: --and go through these, and thank you

9 for the opportunity.

10 The trench, I believe, is estimated to have about

11 20,000 cubic yards of material to be excavated, and I assume

12 that much to replace it, and I don't know if all the

13 excavated material would be trucked off site, but if it's

14 the amount of excavation, the amount of replacement being

15 40,000 yards, I believe the cap is 165,000 yards so that the

16 order of magnitude between them may not be as much as is

17 represented as a concern.

18 Certainly, there is more. There's a big

19 difference between 40,000 and 165,000 yards, but it's not

20 like 10,000 yards to 165,000 yards.

21 Darryl Luce, of the EPA, was kind enough to

22 respond to me in writing to a question that I posed at the

23 last meeting which was: How much would it cost to pump and

24 treat the Eastern Plume to the Cocheco River?

25 And the EPA can characterize that, their response,

1 better than I can, but I believe the bottom line on it was
2 2,000,000 to 3,500,000. If it's at the lower end, it's not
3 that much more than the monitoring and natural attenuation,
4 which is, if I remember right, close to $2,000,000 in
5 itself, so we're not talking about that much of a premium of
6 cost to also pump and treat the Eastern Plume to the Cocheco
7 River because it is recognized that there already will be in
8 place the pumping technology for the Bellamy Reservoir, so
9 there's only an incremental cost of adding additional
10 pumping and treating, and there is a large cost to
11 monitoring a natural attenuation. It's not a cheap,
12 inexpensive item.
13 So I think that needs to be considered. I don't
14 think it really has been considered by evidence that the EPA
15 needed to do the look into that, and I do appreciate that
16 they did look into those costs, but I think that is
17 something to consider for this plan.
18 The last comment I'd like to make is about the
19 Cocheco River, and I have said some of these, and this is
20 one area where I may overlap on it, but I'd like to
21 consolidate them in this area.
22 My concern is that there will be a constant low-
23 level drip of contaminants into the river, and that's not
24 acceptable. We're talking about a major watershed to this
25 area, major contributory to the Great Bay. There are

1 enormous amounts of efforts being made regionally to clean
2 up the Great Bay and the Piscataqua River basin.
3 The local communities have been hit really hard
4 with the bills for sewage treatment plants, Dover,
5 Rochester, Farmington, Somersworth. We're spending millions
6 of dollars to dredge the Cocheco River in Downtown Dover.
7 We're dealing with contaminants at the Portsmouth Naval
8 Shipyard. We're looking to develop the waterfront. We're
9 asking people to use it and model it and create an economic
10 viability depending upon the river; yet, we'd overlook this
11 aspect of it.
12 Loretta Chase's comments were appropriate that
13 this is an opportunity to join in that effort, not to avoid
14 it. It's inappropriate to be looking at a short term
15 horizon for the cleanup of this river and use of this river
16 and then allow constant low-level drip for the next 50 to
17 100 years.
18 The river, I believe, is what's called TMDL
19 listed, which says that the river's biologically challenged
20 based on oxygen demand. This is oxygen challenged river,
21 and when these contaminants come out from under the ground,
22 they will demand all of the oxygen of that river and will
23 further degrade it, and I believe that the listing of that
24 river should not allow that to occur. I know that sounds
25 very technical, but this is a large part. The health of the

1 river is dependent upon the oxygen in that river.
2 The greatest level, the greatest volume of
3 contaminants and the steepest gradient go towards the
4 Cocheco River. That's where they're heading. There is a
5 smaller portion going to the Bellamy. I don't say that to
6 ignore the Bellamy. They need to both be addressed, but it
7 is recognized that that is where the greatest volume is,
8 going to the Cocheco River. That should not be ignored.
9 I understand that the arsenic moves slower than
10 the ground water, that it moves from grain to grain, and it
11 takes many flushings of the ground water through the area to
12 leach out the contaminants, so if it takes ten years to
13 flush through, and we believe it takes longer than that, it
14 takes ten flushings, that's 100 years, so we're easily
15 looking at 100 years plus for this. Those studies have not
16 been done about it except to the extent that we do know that
17 the contaminants are there.
18 I would just like to close with a couple of
19 quotes, and that is the concern for further sampling of the
20 Cocheco River if it's determined that it generates a risk to
21 either human health or the environment, the contingency plan
22 will kick in.
23 You already know that arsenic is leaching into the
24 river. You already know that, so why is there a contingency
25 plan?

1 I just flipped to another page that says that the
2 air-sparging trench should be built with design flexibility
3 to enable portions of the trench to be operated either as an
4 extraction trench or a reinjection trench or, as the design
5 trench as it is, for the sparging.
6 I don't know that that can be done either. Can a
7 sparging trench be built that's going to also act as an
8 extraction trench? I don't see that. I haven't seen, I
9 haven't read everything yet, but I haven't seen that
10 addressed. I see it as an imposed requirement, but I don't
11 hear the technological or haven't seen the technological
12 feasibility of that being done yet.
13 I'm going to submit written comments so I'll leave
14 it at that, and I really do thank you. Katie had written a
15 letter to you, Mr. Luce, that we did not get to mail. It
16 echoes some of her comments following the last meeting that
17 she didn't feel she got such a good answer to when she could
18 swim in the river, and I'd like to submit Katie's letter to
19 you for the record.
20 MR. JASINSKI: Thanks.
21 MR. STERN: Thank you. She even drew you a
22 picture. Thank you.
23 MR. JASINSKI: Okay. Before I close the hearing,
24 I want to make sure there are no other individual or
25 otherwise comments.

1 Sir, again?

2 UNKNOWN: Back for extra innings, I thought I

3 might as well.

4 MR. JASINSKI: It's not a requirement.

5 UNKNOWN: Okay. Sorry. I've been listening to a

6 lot of comments regarding the Eastern Plume and management

7 of the migration over there, and one concept I'd like to

8 bring up is, I know it's been battered around before, but if

9 the concern is for the contaminants which have already left

10 beyond the solid waste boundary here that are now sort of

11 lurking in this area that an active remedial system could be

12 in place, say, along the southern boundary of Tolend Road in

13 this area here, sort of a cutoff, essentially, what I'm

14 suggesting is, or asking a question.

15 Has it been fully assessed whether you could,

16 basically, establish a ground water management zone in this

17 area, continue to watch your natural attenuation, but

18 address the contaminants which are going to the river by

19 placing an air-sparging trench along this section of the

20 site which would allow much easier access to that area.

21 I also know that the top of the clay is much

22 closer to the surface here than it is down in this area so

23 that the actual saturated thickness that you'd have to

24 address is much, much less in that area. This would allow

25 more rapid cleaning up of this continuing source of

1 contaminant which would potentially go to the river. It
2 would sort of leave it behind, but it would address the
3 river contamination at a much more expedient manner. It
4 potentially is less costly and easier to get in there and
5 address these issues related to precipitate forming within
6 the air-sparging trench.
7 So I'm asking the question, Can this be more fully
8 assessed addressing the contamination at this location as
9 opposed to along the solid waste boundary?
10 I know it means writing off and leaving material
11 in this area, but that area is owned by the City of Dover.
12 It can be controlled administratively, so I'm throwing that
13 out.
14 Thank you.
15 MR. JASINSKI: Thank you.
16 MR. STERN: May I take about 15 seconds?
17 MR. JASINSKI: Fifteen seconds.
18 MR. STERN: Yes. You know, I just want to say
19 that I like the concept of removing contaminants and dealing
20 with them rather than leaving them in place, and I think
21 that's a good idea in a broad scope of things, but I think
22 it's just that the problem with knowing the effectiveness of
23 it, whether that's really going to work, is my concern, but
24 I don't want to go with that being unsaid.
25 The idea of addressing them is a great idea,

1 although it doesn't address them where they've already moved
2 off site to the Cocheco, but I do think that's a good idea.
3 I'm just not sure that it's working or that we know it's
4 going to work.
5 Thank you.
6 MR. JASINSKI: I guess, as they say, last call?
7 (No response.)
8 MR. JASINSKI: Anybody else?
9 (No response.)
10 MR. JASINSKI: I guess that will close the formal
11 hearing for this evening. We appreciate all your comments,
12 thorough, detailed, personal or otherwise. We'll get back
13 to you as far as a request to have a hearing in Portsmouth.
14 I will remind you the public comment period will
15 end on August 11th, not three days from today. Your
16 comments are accepted to Darryl's attention either at
17 luce.darryl@epa.gov by e-mail or send them directly to him,
18 and I think his address and such are in the Proposed Plan.
19 Thank you very much for enduring the lack of air
20 conditioning and the stifled room, and thank you very much
21 again. We'll be here for a while. Thank you.
22 (Whereupon, at 8:20 p.m., July 19, 2004, the above
23 matter was concluded.)

CERTIFICATE OF REPORTER AND TRANSCRIBER

This is to certify that the attached proceedings in the Matter of:

RE: AMENDED PROPOSED PLAN

DOVER MUNICIPAL LANDFILL SUPERFUND SITE

DOVER, NEW HAMPSHIRE

Place: Dover, New Hampshire

Date: July 19, 2004

were held as herein appears, and that this is the true, accurate and complete transcript prepared from the notes and/or recordings taken of the above entitled proceeding.

Suzanne French	July 19, 2004
Reporter	Date
Susan Hayes	August 2, 2004
Transcriber	Date

ATTACHMENT 2

Appendix D: Responsiveness Summary

Comment Letters Received

7 Tideview Dr
Dover, NH 03820
(603) 749-0833
bob@engel.com

August 6, 2004

Darryl Luce
United States Environmental Protection Agency
1 Congress St, Suite 1100 (HBO)
Boston, MA 02114

Dear Mr. Luce:

Please reconsider your plan to cap the Tolend Road Superfund site in Dover, New Hampshire and intercept migrating contaminants through use of a sparging trench. I feel that this is an unproven remedy that would have catastrophic consequences if it fails to perform as anticipated.

The Dover municipal landfill is located in close proximity to reservoirs and aquifers serving several communities. Failure of abatement procedures would create costly problems, both in terms of human suffering and financial damage. The solution chosen must be completely proven or must have a very high degree of success.

The plan ultimately chosen by the EPA must utilize technology and engineering practices that have been successful in other similar situations. Please do not use Dover to test new abatement processes; the risks are much too great.

Sincerely,

Robert R. Engel

CARYN DUNCAN
<CDUNCAN_CARYN@msn.com>

08/11/2004 12:36 PM

To: Darryl Luce/R1/USEPA/US@EPA
cc:
Subject: comment on plan for Dover, NH landfill

<?xml:namespace prefix="v" /><?xml:namespace prefix="o" />
Mr. Luce,

I would like to comment on the proposed EPA action plan for the Dover Municipal Landfill Superfund site on Tolend Road. I am concerned about the contaminated ground water that is flows toward the Cocheco River and the Bellamy Reservoir. I agree that there needs to be action taken to control this. However I feel that the action plan of the air-sparging trench system should not be used because of unknown fact of its effectiveness until it is completed and the reliability over a long term time span. I feel a plan needs to be implemented that will be effective upon completion without having to rely on a back up plan. I feel that this situation needs to be addressed immediately so that the flow of contaminants are stopped from leaching into the water.

Caryn Duncan
39 St. Thomas St.
Dover, NH 03820

Dear, Mr. ~~Government~~ Luce,

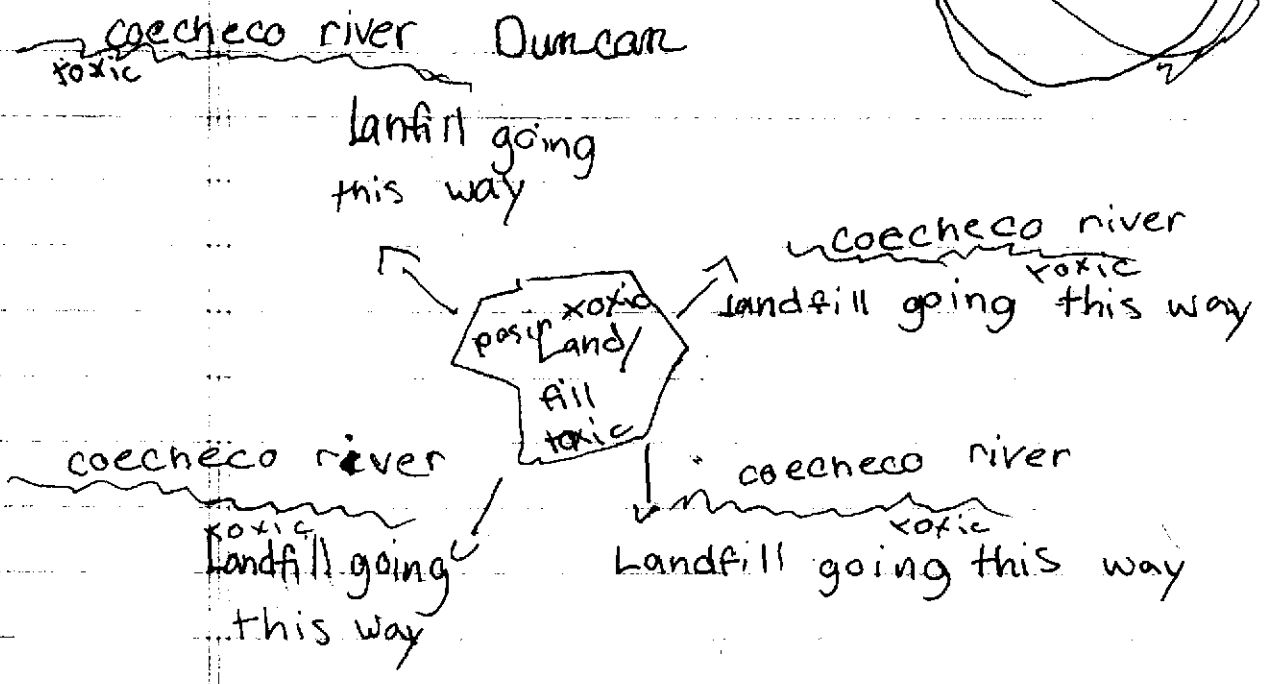
You didn't give ~~quite~~ such a good answer to my question. I didn't get it. why are changes 100 years. it can be a huge risk.

From

Katherine

Ann

Duncan



P.S. land fill is spaced around the coecheco river. toxic is going in to ground and leading to coecheco river!

Tom Fargo
<tomfargo@ttlc.net>
08/10/2004 04:12 PM

To: Darryl Luce/R1/USEPA/US@EPA
cc: "Peschel, Dean" <dean.peschel@ci.dover.nh.us>, Lorie Chase <lorie.chase@unh.edu>
Subject: Dover Municipal Landfill

Darryl,

The letter attached below has also been sent through the mail. It is postmarked today, August 10, 2004. Please include my comments in the record regarding the Amended Proposed Plan for the Dover Municipal Landfill.

August 10, 2004

Mr. Darryl Luce
U.S. Environmental Protection Agency
1 Congress Street, Suite 1100 (HBO)
Boston, MA 02114

RE: Comments to the Amended Proposed Plan, Dover Municipal Landfill

Dear Mr. Luce:
The purpose of this letter is to document the questions and comments I provided regarding the above-referenced project, during the public hearing held on July 19, 2004 in the Dover City Hall Auditorium.
As I stated at the public hearing, I am a resident of Dover. I am also the Chairman of the Dover Conservation Commission; although the comments I provide herein do not reflect positions endorsed by the Commission. I have also participated in the Pre-Design Investigations of the Dover Municipal Landfill, during the early 1990's, as a Senior Staff Hydrogeologist for the consulting firm Caswell, Eichler & Hill, Inc. My familiarity with the landfill site stems from my involvement with field investigations (geophysical surveys, subsurface boring inspections, monitoring well installations and hydrologic testing) and data analysis (including the development and testing of the EPA-approved groundwater flow and contaminant transport numerical model).
Comment 1; RE: Efficacy and Maintenance of the Proposed Treatment Trench
My first comment on the amended proposed plan regards the long-term efficacy of the proposed treatment trench. The proposed air injection system will cause the formation of an iron precipitate, that will also contain arsenic, within the trench backfill. My concern is that this solid precipitate material will rapidly clog the interstitial spaces within the trench backfill. This could then lead to formation of air escape passageways within the treatment trench that would "pipe" the sparging air to the surface. Such piping of the sparging air would reduce the effectiveness of the groundwater treatment system. In order to maintain the capacity of the system to treat of the contaminated groundwater, the iron-arsenic precipitate in the trench will need to be removed periodically. Re-excavation of the trench to remove the precipitate and replace the backfill would be very costly and would also produce a large amount of potential RCRA hazardous waste. Acid flushing might be used to remove the precipitate in-situ, but the acid could mobilize a slug of

dissolved arsenic into the downgradient groundwater. At the June 21st public information meeting, I asked if bench scale tests have been performed to evaluate the rate of iron-arsenic precipitate formation relative to the available interstitial volume in the treatment trench and the effective life of the system. I suggest that even if the results of this analysis are favorable, the proposed treatment trench will essentially be filled with the iron-arsenic precipitate at the end of the remediation period. Once the artificial oxidizing conditions revert to ambient anoxic conditions, the arsenic in the trench will start to be remobilized and will provide a continuing source of contamination to downgradient groundwater and the Cochecho River, unless it is removed by re-excavation or acid flushing. The use of air sparging technology to remove arsenic from the contaminated groundwater is not like the removal and enhanced bioremediation of chlorinated and non-chlorinated organic compounds in the groundwater. The arsenic will remain in the ground, concentrated within the treatment trench backfill. It shouldn't be simply left in place.

Comment 2; RE: Convertibility of the Treatment Trench to a Groundwater Extraction System

The amended proposed plan, as described at the June 21st public information meeting, includes an alternative to convert the treatment trench to a groundwater extraction system, should the proposed air sparging system fail to meet treatment expectations. At the July 19th public hearing I cautioned that such a conversion might not be easily accomplished. The use of treatment trench technology is based on the remedial approach that the system will remove or enhance the destruction of specific contaminants of concern below their respective clean up level concentrations. The use of groundwater extraction technology (so-called pump and treat methods) is based on a remedial approach that is intended to hydraulically capture all groundwater flowing past the solid waste boundary. The Pre-Design Investigations, that I participated in, designed a landfill cap and groundwater extraction system that followed the hydraulic control approach as required by the 1991 Record of Decision (ROD).

My specific concerns, as expressed at the July 19th public hearing, regarded the variable vertical hydraulic gradients along the alignment proposed for the treatment trench. Based on data in the Pre-Design Investigation report, I know that along the southern boundary of the landfill the ambient hydraulic gradients are upward from the various levels of the upper interbedded zone to the upper sand zone. In fact in places the hydraulic head within the semi-confined upper interbedded zone is above the land surface. (This may influence the constructability of the treatment trench in this area.) Conversely, where the treatment trench is proposed along the northeastern boundary of the landfill, the vertical hydraulic gradients are downward. Unless the treatment trench is segmented, or separations are installed to limit the vertical and horizontal movement of groundwater within the trench, the system might not be converted to an effective groundwater extraction system. There may be areas along the solid waste boundary where hydraulic control can not be achieved. There might also be areas where preferential groundwater flow paths may develop within the trench allowing contaminated groundwater to "break out" into previously uncontaminated areas. The proposed treatment trench includes portions of the landfill perimeter where groundwater flow is parallel to the alignment of the trench. This might not be a significant problem in a contaminant-removal remedial approach, but it could compromise the alternative hydraulic control remedy.

The possibility of changing the remedial approach back to hydraulic control (pump and treat as required by the original 1991 ROD) also presents potential problems with the amount of pumping potentially necessary to control the source at the solid waste boundary. Without a cap to

limit precipitation recharge through the landfill, the converted treatment trench-groundwater extraction system would need to capture several times the approximate 26 gallons per minute of contaminated groundwater estimated in the design the 1991 ROD remedy. This could present problems regarding the treatment and discharge of the extracted groundwater. (One possible treatment option that didn't exist when the Pre-Design Investigation was completed in 1995 is the recently upgraded City of Rochester wastewater treatment plant. This plant currently accepts up to 70,000 gallons per day of pre-treated leachate from the nearby Waste Management landfill facility on Rochester Neck Road.)

Comment 3; RE: Odor and Noise Control Associated With the Amended Proposed Plan

The amended proposed plan, as described at the July 19th public hearing, does not include the collection and treatment of the air discharged from the treatment trench, unless contaminants of concern are present at concentrations above air discharge limits. If provisions are not made to collect and treat the gas emissions, I am concerned that nuisance odors will become a problem. I know from personal experience that the leachate from the Dover Municipal Landfill can produce offensive odors. The neighboring residential area already suffers with odor problems emanating from the nearby Waste Management, Inc. facility. Waste Management has recently promised the Rochester Planning Board that it is pursuing an aggressive program to address its odor problems. It would not be fair to the nearby residents to subject them to another source of offensive odors that could last for at least 30 years, as outlined in the amended proposed plan.

In addition to the odor issues, I also noted a potential problem with noise from the air pumps. The pumps are likely to operate 24 – 7 – 365. If the blowers are not properly insulated for sound, their noise (even if it's below hazardous levels) could be considered a public nuisance.

Comment 4; RE: Potential Excavation of Contaminated Sediment from the Cochecho River

Page 5 of the EPA's handout from the June 21st public information meeting states that:

"Groundwater discharge to the Cocheco River does cause sediment concentration levels to exceed screening levels for an ecologic risk; therefore, further assessment and monitoring will be performed to clearly characterize any risk and, if necessary, **sediment will be excavated**."

At the June 21st meeting, and again at the July 19th public hearing, I requested that if such excavation of the river bed sediment is to take place, that the NHDES permit process will be followed; and that in accordance with NHDES administrative rules, the Dover Conservation Commission will be allowed to review and comment on the dredging and restoration plan.

Comment 5; RE: Alternative Placement of Treatment Trench

During the July 19th public hearing, several people expressed their concern regarding the time that it will take to limit the current discharge of contaminants from the Eastern Plume to the Cochecho River. In a follow-up question I asked if an alternative placement of the treatment trench had been fully evaluated. I suggested that the proposed treatment trench could be repositioned to an alignment parallel to and along the southern side Tolend Road. This configuration would be a more pragmatic and effective approach to the issues of concern raised during the hearing. In this location, contaminants already present beyond the solid waste boundary in the Eastern Plume area would be intercepted before they discharge to the Cochecho River. Administrative protections, such as a groundwater management zone, could be established to limit land uses within the Eastern Plume area, located between the solid waste boundary and the repositioned treatment trench location. This area, for the most part, is currently owned by the City of Dover and is designated as the Hazardous Waste Landfill District by Dover Zoning Ordinance 170-28.5 that was: "*designed to alert the public and prohibit development activities in*

areas potentially affected by the storage of hazardous waste until such time as a final cleanup and proper closure of the site can be completed".

The relocation of the treatment trench could also improve the constructability and maintenance of the proposed amended remedy. As currently proposed, the total length of the treatment trench along the southern and eastern boundaries of the landfill will be on the order of 3,000 linear feet. The relocation of the treatment trench to an alignment parallel to Tolend Road could shorten its total length to perhaps 1,500 feet. At the Tolend Road alignment, the saturated thickness (the vertical distance between the top of the water table and the top of the marine clay layer) is much less, ranging from approximately 60 feet at the northeast corner of the landfill to less than 30 feet at the B-9 monitoring well cluster location. The shorter and shallower excavation required for the treatment trench would greatly decrease the volume of waste generated during its construction. Periodic maintenance of the treatment trench would cost less if the acid washing isn't appropriate and the trench needed to be re-excavated (see Comment 1, above). Along the Tolend Road alignment the vertical hydraulic gradients are all downward and none of the hydraulic head levels above the land surface.

The Cochecho River would benefit as the groundwater seeps from the Eastern Plume that currently discharge to the river would be cleaned more quickly. The EPA's and DES's concerns regarding indoor air quality in residences north of Tolend Road would be permanently addressed as the groundwater beneath these residences would also be cleaned sooner.

I look forward to receiving an explanation as to why the alternative remedy for the Eastern Plume area, suggested above, has apparently not been fully evaluated.

If you have any questions about my comments, please feel free to contact me at: (603) 743-4290; or by e-mail: tomfargo@ttlc.net

Sincerely,

Thomas R. Fargo

cc: Dean Peschel, Dover Environmental Program Director
Lorie Chase, Cocheco River Watershed Coalition

Brian & Nancy Limberger <limberger@comcast.net>

08/06/2004 08:42 PM

To: Darryl Luce/R1/USEPA/US@EPA
cc:
Subject: NH TAG Force Contributor

I was canvassed tonight by Sarah of the Clean Water Action of New England. I live in Dover, New Hampshire, and she informed me of the ongoing contamination of our reservoir and river here in Dover which accommodates several towns in the area with drinking water.
I was appalled. I donated $120. What is going on here??? I blame it on this administration and the lack of awareness and concern for the environment to line the pockets of their friends. Don't get me started.

I was asked to write to the EPA to:

Consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

Do not use local residents as guinea pigs for untested clean-up technologies without adequate safeguards.

Fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Parker
99 Belknap St
Dover, NH 03820

To: Darryl Luce, US EPA

Dear Mr Luce,

I am a Dover resident and thus very concerned about the cleanup of the Dover Municipal Landfill.

I urge you to put public health impacts above financial concerns in choosing a cleanup plan for the site.

I urge you not to use local residents as guinea pigs for untested clean-up technologies without adequate safeguards.

I urge you to fully address limitations of contamination to the Cocheco River, as well as the reservoir.

Hopefully the clean-up remedy chosen will expedite to cease pollutants to the residents in the area. It was put on the EPA's Superfund list in 1983. This problem has been going on too long.

Sincerely, Mary Parker

David Hayes
202 Central Ave.
Dover, NH 03820

8/5/04

Dear Mr. Darryl Luce,

I Am writing you to express my concern about the hazardous waste site in Dover, NH. As a Resident of Dover I am Asking that you consider the following:

- public health and environmental impacts above financial concerns in choosing a cleanup Remedy for the site.

- Don't use Local residents as guinea pig for untested clean up technologies without adequate safeguards

- Fully address limitations of Contaminations to the Cocheco River, as well as the Reservoir.

thank you for your consideration;
David Hayes

Darryl Luce, US EPA
1 Congress St., Suite 1100 (HBQ)
Boston, MA
02114

Please consider public health and environment impact above financial concerns in choosing a cleanup remedy for the site. Please do not use local residents guinea pigs for untested clean up technologies without adequate safeguards. Please fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Thank You,
Sincerely,

K. Ian Daniel

6 August 2004

13 Arbor Drive
Dover NH 03820-4501

Darryl Luce, US EPA
1 Congress St. Suite 1100 (HBO)
Boston MA 02114

Dear Mr. Luce:

PLEASE!

~Consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

~Do NOT use local residents as guinea pigs for untested clean up technologies without adequate safeguards!

~Fully address limitation of contamination to the Cocheco River as well as the reservoir.

I Thank You....and your children's children will think you are a hero!

Sincerely,

Allen G. Barbi
Taxpayer and active Voter

To: Darryl Luce
US EPA
1 Congress St.
Suite 1100 (HBO)
Boston, MA 02114

Dear Mr. Luce,

I am writing out of deep concern regarding the Tolend Road Landfill, also known as the Dover Municipal Landfill, located in Dover, New Hampshire This site has been on the EPA's Superfund list for far too long causing great known and unknown risks to the surrounding towns that rely on the bodies of water located near the site.

I understand that a new "experimental" technique, called a "Sparging Trench" has been proposed for remediation of the site. According to the EPA there is a high degree of uncertainty that this technique will work and the alternate plan is to cap the site, a plan that was originally proposed over 12 years ago. Not only is there a high degree of uncertainty that this technique will even work, but it also fails to address the contaminants that have already migrated off site into the Cocheco River and Bellamy Resevoir which supplies a minimum of eight surrounding communities with their drinking water.

How many times will experimental projects be conducted and fail before action is taken to correctly adjust the site? How many lives will it take and what long term damage will continue to take place while we experiment? Experimental projects have failed in the past and once again, the EPA is skirting it's responsibilities to protect the public in an attempt to save short term money.

The EPA has been aware of this site since 1981 and this site has been on the Superfund list since 1983. I would suggest that after twenty years something should have been done to permanently address this situation. Now is the time to take the steps that will be effective in removing the threat to the surrounding communities. Do not allow the residents of Dover and the surrounding communities to continue being used as "test agents" in order to save money. I urge you to place the environmental impacts and the health of the citizens of Dover above financial concerns. Your responsibility is to correct the contaminations which have taken place on this particular Superfund site and nothing less than known, proven and effective methods in removing the contaminants is acceptable. The Sparging Trench is another band-aide thrown on a deep wound that requires surgery. I urge you to take the effective steps to address this issue once and for all.

Sincerely,

Richard Auclair
99 Belknap St.
Dover, NH 03820
(603) 749-3166

Darryl Luce, US EPA
1 Congress St., Suite 1100 (HBQ)
Boston, MA
02114

Please consider public health and environment impact above financial concerns in choosing a cleanup remedy for the site. Please do not use local residents guinea pigs for untested clean up technologies without adequate safeguards. Please fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Thank You,
Sincerely,

Kathryn Ann Bedrosian Daniel

Mr. & Mrs. Adrien Landry
184 Locust St
Dover NH 03820

TO THE EPA,

WHEN CHOOSING A CLEANUP REMEDY, FOR THE HAZARDOUS WASTE SITE IN DOVER, N.H., PLEASE CONSIDER PUBLIC HEALTH & ENVIRONMENTAL IMPACTS ABOVE FINANCIAL CONCERNS.

DO NOT USE LOCAL RESIDENTS AS GUINEA PIGS FOR UNTESTED CLEAN UP TECHNOLOGIES WITHOUT USING ADEQUATE SAFEGUARDS.

DO NOT FAIL TO FULLY ADDRESS LIMITATION OF CONTAMINATION TO THE COCHECO RIVER, AS WELL AS TO THE RESERVOIR.

THANK YOU,
Joan M. Landry

8-5-04

Dear Mr. Luce,

Please take the people of Dover into account before accepting a new techique for which there is uncertainty as to whether it will work to clean up the contamination of the Tolend Road "Superfund Site".

Please ask for the use of technology that will clean up this hazard without further environmental damage.

Thank you.

Sincerely,

Carol Straton
Dover, N.H.

Dear Mr. Darryl Luce:

I am writing this letter to you on behalf of myself, my husband and most importantly, my children. We are long time residents of Dover, NH and we are extremely concerned with the future of the landfill here and what long-term effects it could have on our family if it were to go improperly treated. It is my understanding that a decision was made in 1991 by the EPA requiring that the site be capped and the ground water be pumped and treated. It is also my understanding that this decision was amended in 1996 to try a novel bioremediation pilot project that was unsuccessful and tossed aside. It has now come time once again for the EPA to make a decision on how to protect the water that is pumped into my home, which my children drink.

I am asking you to do the responsible thing and protect our water with the solution that works and not with one that might work, because we are the ones who will have to pay the ultimate price. Ask yourselves this question: If your child were extremely ill and there was an operation that could be performed that would bring him or her back to normal health and a slightly less expensive procedure that might bring him or her back to normal health. Which would you choose?

We are reaching out to you because you are our voice. Please hear our cries.

Respectfully Yours,
Mandy Bowden

Mandy Bowden
8/3/04

Dear Mr. Darryl Luce:

I am writing this letter to you on behalf of myself, my wife and most importantly, my children. We are long time residents of Dover, NH and we are extremely concerned with the future of the landfill here and what long-term effects it could have on our family if it were to go improperly treated. It is my understanding that a decision was made in 1991 by the EPA requiring that the site be capped and the ground water be pumped and treated. It is also my understanding that this decision was amended in 1996 to try a novel bioremediation pilot project that was unsuccessful and tossed aside. It has now come time once again for the EPA to make a decision on how to protect the water that is pumped into my home, which my children drink.

I am asking you to do the responsible thing and protect our water with the solution that works and not with one that might work, because we are the ones who will have to pay the ultimate price. Ask yourselves this question: If your child were extremely ill and there was an operation that could be performed that would bring him or her back to normal health and a slightly less expensive procedure that might bring him or her back to normal health. Which would you choose?

We are reaching out to you because you are our voice. Please hear our cries.

Respectfully Yours,
Ernest Bowden

Ernest Bowden
8/5/04

Cathy Pease
2 Hemlock Circle
Dover, NH 03820

August 6, 2004

Public Comments

Dear Mr. Luce,

I have some concerns about the proposed plan for a Superfund site in Dover. I am in favor of keeping costs down, but I also value safety, public health, common sense and good judgment. Please take the necessary time to evaluate the effectiveness of these proposals (i.e. - will this technique work? has it been tried?) Also, please consider and determine that whatever is built will not have an adverse effect on our community, especially with regard to public health. Thank you.

Cathy Pease

Darryl Luce, US EPA
1 Congress St., Ste. 1100 (HBO)
Boston, MA 02114

August 6, 2004

Dear Mr. Luce:

Please consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the hazardous waste site in Dover, NH.

Don't use local residents and guests as guinea pigs for untested clean up technologies without adequate safeguards.

Fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Think about taking a swim in the Cocheco River with your loved ones and pets.

Please protect us.

Thank you.

Laurrie Malizia, AS

lam

Darryl Luce, US EPA
1 Congress St., Ste. 1100 (HBO)
Boston, MA 02114

August 6, 2004

Dear Mr. Luce:

Please consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the hazardous waste site in Dover, NH.

Don't use local residents and guests as guinea pigs for untested clean up technologies without adequate safeguards.

Fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Think about taking a swim in the Cocheco River with your loved ones and pets.

Please protect us.

Thank you.

Mario Malizia, DBA

lam

To whomever gives a shit,

I wouldnt want your job, seeing as nobody obviously works there. I got a great Idea!! Clean up the mess!!! Wow!!! everyone get off their high salary asses and grab a frikin mop, or are you all just waiting another 23 years for us to drink the problem away, look, Im coming down hard on you cause I do care about the water my family drinks, as you should as well.

And forget all that "experiment" crap its too costly, do that on your own dollar., Or.... create your own mess and see if it works, or give me your job, I'll make some waves, and all of the weenies who push pencils would be pushining shovels.

seriously its not hard to figure out, noone wants to work, and after 23 years it is painfully obvious.

No hard feelings,

Kurt A. Foley

Darryl Luce, USEPA

Please:

1) consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

2) Don't use local residents as guinea pigs for untested clean up technologies without adequate safeguards

3) Fully address limitations of contamination to the Cocheco River, as well as the resivoir.

Thank You.

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August 6, 2004

Mark Gemas
3 Shadow Drive
Dover, NH 03820

Mr. Darryl Luce, US EPA
1 Congress Street Suite 1100 (HBO)
Boston, MA

Dear Mr. Luce,

It has recently come to my attention that the Tolend Road Superfund Site in my community has still not been cleaned up, after contaminants were found in adjacent drinking water wells in 1981. This site was placed on the Superfund List over 20 years and has gone through at least one pilot project that was unsuccessful, and is being considered for another proposed plan that the EPA itself has declared to be uncertain of the outcome of this particular technique. As a resident of this rapidly growing community, I am asking you not to use local residents as guinea pigs for untested clean up technologies without adequate safeguards.

Before any more projects are started to clean up this area that affects the drinking water of at least eight surrounding towns, please consider the public health and environmental impacts above financial concerns in choosing a cleanup remedy for this site. I realize the estimated cost of the proposed trench is $15.8 million compared to the $29 million it would cost to cap the site. The capping of was originally proposed over ten years ago, but if the trench doesn't work, the $29 million will still have to be paid (plus how much more it would cost in the future by the time the trench is completed).

I also understand that a large volume of the contaminants has already migrated off site and there is no way to control or capture this with the proposed trench. As a concerned citizen, taxpayer and resident of this community, I expect the EPA to fully address the limitation of contamination to the Cocheco River, as well as the Bellamy Reservoir.

I still cannot fathom why it has taken over 20 years to get this area cleaned up!! Please restore my faith that those placed in the position to do what is right and just for the community, the environment, and its citizens will do just that, and not base their decisions solely on the cost of an experimental treatment versus what has been proven to work.

Sincerely,

August 6, 2004

Lorie Gemas
3 Shadow Drive
Dover, NH 03820

Mr. Darryl Luce, US EPA
1 Congress Street Suite 1100 (HBO)
Boston, MA

Dear Mr. Luce,

It has recently come to my attention that the Tolend Road Superfund Site in my community has still not been cleaned up, after contaminants were found in adjacent drinking water wells in 1981. This site was placed on the Superfund List over 20 years and has gone through at least one pilot project that was unsuccessful, and is being considered for another proposed plan that the EPA itself has declared to be uncertain of the outcome of this particular technique. As a resident of this rapidly growing community, I am asking you not to use local residents as guinea pigs for untested clean up technologies without adequate safeguards.

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Sincerely,

Lorie Gemas

6 August 2004

13 Arbor Drive
Dover NH 03820-4501

Darryl Luce, US EPA
1 Congress St. Suite 1100 (HBO)
Boston MA 02114

Dear Mr. Luce:

PLEASE!

~Consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

~Do NOT use local residents as guinea pigs for untested clean up technologies without adequate safeguards!

~Fully address limitation of contamination to the Cocheco River as well as the reservoir.

I Thank You….and your children's children will think you are a hero!

Sincerely,

Elizabeth Ann Barbi

Elizabeth Ann Barbi

August 6th, 2004

Darryl Luce, US EPA
1 Congress St. Suite 1100 (HBO)
Boston, MA 02114

Tell EPA to:

1. Consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.
2. Don't use local residents as guinea pigs for untested cleanup technologies without adequate safeguards.
3. Fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Sincerely,

Katherine Frick-Wold

Katherine Frick-Wold
34 Tideview Drive
Dover, NH 03820

August 6th, 2004

Darryl Luce, US EPA
1 Congress St. Suite 1100 (HBO)
Boston, MA 02114

Tell EPA to:

1. Consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.
2. Don't use local residents as guinea pigs for untested cleanup technologies without adequate safeguards.
3. Fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Sincerely,

John Wold
34 Tideview Drive
Dover, NH 03820

Darryl Luce, USEPA
1 Congress St. Suite 1100 (HBO)
Boston, MA 02114

Mr Luce,

Please consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

Don't use the local residents as Guinea pigs for untested clean up technologies without adequate safeguards.

Fully address limitation of contamination to the Cochico River, as well as the reservoirs.

Respectfully

Linda J. Grivois
24 Tidewater Dr.
Dover, NH 03820

August 5, 2004

Darryl Luce, US EPA
1 Congress Street
Suite 1100 (HBO)
Boston, MA 02114

Dear Mr. Luce:

I support Clean Water Action. Please consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the Dover Superfund site. Don't us local residents a guinea pigs for untested clean up technologies without adequate safeguards. EPA must fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Sincerely,

Vicki A. Lynch

August 5, 2004

Mr. Luce:

In regards to the Tolend Rd. Superfund site in Dover, NH, please:

Consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

Don't use local residents as guinea pigs for untested clean up technologies without adequate safeguards.

Fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Sincerely,

David Forbes 38 Locust St Dover NH

David Forbes

August 5, 2004

Mr. Luce:

In regards to the Tolend Rd. Superfund site in Dover, NH, please:

Consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

Don't use local residents as guinea pigs for untested clean up technologies without adequate safeguards.

Fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Sincerely,

Paula Forbes 188 Locust St Dover NH

Paula Forbes

Darryl Luce, US EPA
1 Congress Street, Suite 1100 (HBO)
Boston, MA 02114

Dear Sir;

I am writing as a citizen of Dover, New Hampshire and I feel like I need to make my opinion heard on the matter of the Bellamy Reservoir in Dover.

I would hope that the EPA would consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for this site. This site should not be used for untested clean up technologies especially without adequate safeguards in place. It's also very important that contamination of the Cocheco River, as well as the reservoir, is limited.

The city of Dover has been working for a long and hard time to recover from the financial and environmental impact of being an industrial center. Mills have been refurbished to be used as office space, the downtown has been revitalized and a plan to dredge the river to open it to pleasure crafts has just gotten funding.

Sincerely,
Heather Cronin

Darryl Luce, US EPA
1 Congress Street, Suite 1100 (HBO)
Boston, MA 02114

Dear Sir;

I am writing as a citizen of Dover, New Hampshire and I feel like I need to make my opinion heard on the matter of the Bellamy Reservoir in Dover.

I would hope that the EPA would consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for this site. This site should not be used for untested clean up technologies especially without adequate safequards in place. It's also very important that contamination of the Cocheco River, as well as the reservoir, is limited.

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Sincerely,
David Cronin

August 5, 2004

Darryl Luce
US EPA
1 Congress St., Suite 1100
Boston, MA 02114

Dover Municipal Landfill, Superfund Site

Dear Mr. Luce:

I have been reading about the EPA proposal to dig trenches at the Tolend Road Superfund Site. The apparent "selling point" is that it will cost the City less money. However, will it protect the Bellamy River Reservoir and the Cocheco River from contaminants? From what I have seen I am afraid the answer is no.

We need a plan that protects the public health and environmental concerns this site has generated. As a taxpayer I am concerned about the impact of these trenches. Apparently the cost of this untested process is in excess of $15 million, I would urge you to rethink this a good with a proven tested process, even if it does cost more. We need to know that the contaminates will be effectively contained. Don't make Dover resident's guinea pigs for this untested process. This process has been going on for over twenty years, it time to take decisive action, not experiment with untested theories without adequate safeguards.

I would urge that you not make the Tolend Road Superfund Site an experiment. I urge that EPA use proven tested methods to clean up the plume of contaminates headed toward the Bellamy and Cocheco Rivers.

Sincerely,

Bill McCann
20 Fisher Street
Dover, NH 03820-3943

Darryl Luce, US EPA
1 Congress St; Suite 1100 (HBO)
Boston, MA 02114

Dear Mr. Darryl Luce:

We are concerned Dover citizens who want to remind you of the importance of cleaning up the contamination in the Cocheco River. I ask you to please consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

In the process of the clean up, do not use residents as guinea pigs for untested clean up technologies without adequate safeguards.

We also want you to fully address limitation of contamination to the Cocheco River, as well as the reservoir.

Thank you for your time.

Sincerely,

Rebekah Brooks
Matthew Lister
93 Henry Law Ave
Apt 72
Dover NH 03820

Darryl Luce, US EPA
1 Congress Street, Suite 1100 (HBO)
Boston, MA 02114

Dear Sir;

I am writing as a citizen of Dover, New Hampshire and I feel like I need to make my opinion heard on the matter of the Bellamy Reservoir in Dover.

I would hope that the EPA would consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for this site. This site should not be used for untested clean up technologies especially without adequate safeguards in place. It's also very important that contamination of the Cocheco River, as well as the reservoir, is limited.

The city of Dover has been working for a long and hard time to recover from the financial and environmental impact of being an industrial center. Mills have been refurbished to be used as office space, the downtown has been revitalized and a plan to dredge the river to open it to pleasure crafts has just gotten funding.

Sincerely,
Henry Cronin

I feel that the super fund money for projects like Toland landfill should have been included in the annual fund. This is typical Bush cut the money in projects that are needed but spend it elsewhere. Instead of going it alone in the middle east he should have waited longer and get more help from major countries. But he's proud of what he done and spend billions. It's about time he concentrates on domestic problems. He spent the surplus and has us in a deficit. Hundreds of men are dying and being wounded to secure the oil for the oil barons of this nation including Bush and his father.

The money for this project should be allocated. Our congressional representatives should be fighting for us but they just go along with the administration.

I personally am disgusted with the way this administration is operating.

Marie Trindade
3 Arbor Dr.
Dover, NH 03820

Action alert:

I am extremely desappointed in the fact that it has taken so long for appropriate action to be taken on hazard waste in N.H. Dover especially for I live here. There must be a workable way to clean up the contaminants. People are depending on your help. (EPA) We are not guinea pigs. Clean up the site now in the Cocheco River + Bellamy River.

Audrey L Covert

06 August 2004

19 Birch Drive
Dover, NH 03820
March 3, 2003

Darryl Luce, US EPA
1 Congress St., Suite 1100 (HBO)
Boston, MA 02114

Dear Mr. Luce,

I am writing to express concern over the EPA plan to spend $15.8 million dollars on an experimental fix, "sparging", on the Dover Municipal Landfill, also known as as the Tolend Road Superfund Site. The Dover Municipal Landfill was closed in 1980 and has been Superfund site since 1983. The fact that the landfill qualified as a Superfund site indicates that it is serious enough to warrant a tried and true remedy. The citizens of surrounding communities have lived with this hazard far too long.

Please consider the health and environmental issues surrounding this issue above financial concerns when choosing a course of action for the Tolend Road Superfund Site. I understand that you have a responsibility to your agency but please do not forget that your first responsibility should be the safety of the people who depend on you to act in our best interest. We are entitled to safe drinking water and clean rivers. As an agent of the EPA, you have the power to ensure that we are not used as a test site. I trust that when deciding this issue, your first concern will be what is best for the residents of surrounding communities and the environment we live in not the budget.

Sincerely,

Dorothy Buell

Dorothy Buell

Send us Your Comments

You may provide EPA with your written comments about the Amended Proposed Plan for the Dover Municipal Landfill Site. You can use the form below to send written comments. Please mail this form and any additional written comments, postmarked no later than July 22, 2004 to:

Darryl Luce

U.S. EPA

1 Congress St., Suite 1100 (HBO)

Boston MA 02114-2023

fax: 617-918-1291

e-mail: luce.darryl@epa.gov

Brian Stern has my permission to present these comments. They are my personal comments. I am particularly concerned with the Eastern Plume and its effect on the Cocheco River. Until a biological assessment is completed appropriate decisions for a remedy cannot be made. The health of the river is important and the NH DES has law to protect it. DES should be given full support. Major efforts to improve the river upstream & downstream in the Cocheco are underway. This is another way to add to that effort.

How well is sparging understood?

Comments Submitted by: Loretta B. Chase (attach additional sheets as needed)

July 19, 2004

Art Corte
<acorte@comcast.net
>

06/22/2004 08:48 AM

To: Darryl Luce/R1/USEPA/US@EPA
cc:
Subject: Dover landfill remediation

I support the amended proposed plan presented last night (SC-A and MM-4)on condition that the entire project not be undertaken at once. As the sparging wall technique proposed has not been proven effective for Dover's particular conditions, its efficacy should be confirmed by building a section of the proposed wall and monitoring its effectiveness before committing to building the entire wall.

As the owner of two houses located in the middle of the Eastern plume, I am anxious that some remedial action get taken, this remediation study has been going on for years, the time has come to see some action

Arthur B. Corte
81 Glenhill Road
Dover NH 03820
603 749 4366

CLEAN WATER ACTION

NATIONAL OFFICE
4455 Connecticut Avenue,
Washington, DC 20008-2328
(202) 895-0420

NEW HAMPSHIRE OFFICE
163 Court Street
Portsmouth, NH 03801
Phone (603) 430-9565, Fax (603) 430-9708
e-mail: portcwa@cleanwater.org

Darryl Luce,
US EPA, Region 1
1 Congress St., Suite 1100 (HBO)
Boston, MA 02114

Re: Dover Municipal Landfill Superfund Site – Amended proposed Plan

Dear Mr. Luce,

On behalf of Clean Water Action's 3,000 New Hampshire members, including over 1000 in communities where drinking water could be potentially impacted by contaminants by this site, I would like to submit the following comments on your proposed plan.

In general, we are very concerned about the uncertainties inherent in the unorthodox proposal for this site to forgo capping the landfill and relying on unproven technology to capture most of the groundwater pollutants leaching from the site. We have already seen a decade of delay in fully addressing this site due to previous experimentation. Given the uncertain movement of the southern plume threatening drinking water supplies, it does not appear that we can afford to wait another decade or more to find out if the current proposed alternative is working or not.

While Clean Water Action supports in principle the use of technological innovations to actually clean up toxic sites, there remain too many uncertainties associated with this plan and with the use of a sparging trench in particular. It appears that more research needs to be conducted prior to adopting this remedy to really determine its likelihood of success. The long timeframe assumed for this alternative is also troubling, given the difficulties of projecting responsibility for the process, maintenance and thoroughness of results so far into the future.

We are also very concerned with the lesser amount of attention given to addressing the eastern plume impacting the Cocheco River. While drinking water protection is of course a higher priority with this site, it appears that effort to reduce and clean up the pollutants impacting the river are getting short shrift in this plan. It is simply unacceptable to allow continued arsenic contamination given the levels already measured in sediments and groundwater in the vicinity. Like many of our local waterways, the Cocheco River has received increased attention in recent

years toward cleaning up past pollution as well as making it more accessible for recreation. It is a vital resource for the community that must not be allowed to be further polluted.

While I am not able to provide a further detailed critique of your proposed plan, I would like to add our support to the comments submitted by the NH TAG Force/Brian Stern. In closing, I would ask that you fully consider public health and environmental impacts above financial concerns in choosing a cleanup remedy for the site.

Thank you for your attention to these comments.

Respectfully Submitted,

Doug Bogen
NH Program Director
Clean Water Action

Brian Stern
<Brian@sternlawoffice.com>

08/11/2004 04:56 PM

To: ahoffman@des.state.nh.us, Darryl Luce/R1/USEPA/US@EPA
cc:
Subject: Tolend Road, Dover, NH, Municipal Landfill Superfund Site

Mr. Andrew Hoffman
NH Dept. of Environmental Services
6 Hazen Drive
Concord, NH 03302-0095

Darryl Luce, Regional Project Director
U.S. EPA Region 1(MBO)
One Congress St.
Boston, MA 02114-2023

Dear Messrs. Hoffman and Luce:

Attached are the final comments of the NH TAG Force with reference to the Dover, NH, Municipal Landfill.

Sincerely yours,

Brian T. Stern

Comments on FSSA - final revision Aug 11 (2).doc

COMMENTS ON THE FOCUSED FEASIBILITY STUDY ADDENDUM
DOVER LANDFILL NPL SITE
DOVER, NH

Submitted by:
NH TAG Force Group
August 11, 2004

INTRODUCTION

The City of Dover Municipal Landfill was closed in 1979 because it was known at that time that industrial waste and other noxious materials were emanating from the fill. Two and one half decades later, the debate on the most effective and cost-effective method of remediation and closure continues. This debate continues even though a remedy was approved by the Agencies (NHDES and USEPA) in 1991 and a 100-percent design was completed in 1996.

Upon review of the recently completed Focussed Feasibility Study (FFS), prepared by the Work Settling Defendants or PRPs, as well as the Focussed Feasibility Study Addendum (FFSA), prepared by the EPA, salient questions for both parties remain. These questions are presented below.

Governmental agencies have imposed enormous costs on surrounding communities to improve the water quality of the Cocheco River. This has affected sewage treatment plants and other point and non-point sources. Dover in particular is actively pursuing and promoting the Cocheco River as a focal point for downtown revitalization and recreational activity. Millions are being spent on dredging the Cocheco River, justified by the removal of contaminants. There is a large population base moving into the Seacoast area and populating areas along the River. The river is widely used for fishing and, potentially, for swimming.

It appears that NHDEP and EPA are prematurely proposing a remedy in the FFSA. The Agencies admit in the document that there are numerous remaining unknowns regarding site conditions and potential future impacts, and that a host of pre-design studies will be needed to determine if the proposed remedy (Mixed Alternative) will achieve its objectives. Accordingly, we suggest that a plan be implemented based upon what is known, proven, and reliable. We object to a plan that is based on guesswork and conjecture and requires a substantial contingency plan in event of failure. The proposed plan has a combination of unproven technologies, further delays, inattention to the Cocheco River, and the potential for greatly increased costs if a contingency plan is triggered. The combination of these shortcomings must be considered in the final remedy selection.

Following is a discussion of issues raised by the NH TAG Force, by topic, related to the proposed remedy. Also included are questions to which we would like a response from the NHDEP and EPA.

SOURCE CONTROL

The currently proposed source control remedy, SC-A, proposes an earthen (permeable) cover and a deep (up to 100 foot) perimeter sparge trench. The use of the sparge trench for the combined purpose of recovery of VOCs, the attenuation of THF, and precipitation of arsenic has never been proven. The previous remedy put forth in the 1991 ROD (as described in the 1996 100% Design Report), included installation of a RCRA "C" cap, the installation of interception trenches (to only 25 feet) and extraction wells (into the interbedded zone), and either on-site treatment and disposal (preferred) or off-site treatment and disposal. This was identified as source control remedy SC-7/7A.

In the Agencies' comparison of SC-A and SC-7/7A, the following issues were raised as the most critical:

- SC-7/7A would cost more due to waste recontouring (minimal) and 150,000 (+/-) CY of imported fill, and the construction of a RCRA "C" cap.
- SC-7/7A will entomb the waste so that it never "goes away".
- SC-A will "wash" all of the contaminants out of the waste, leaving a benign pile of rubble.

The NHDES and RCRA will require, at the conclusion of the currently proposed remediation at the site (SC-A), that a clean landfill closure be completed. This will, in all likelihood, be a RCRA "D" cap, which will have the same fill requirements as the "C" cap to get to appropriate grades. The problem with capping the Dover landfill is not due to its size; it is its flatness. Caps are required to maintain minimum slopes regardless of whether they are "C" or "D". The same amount of fill (150,000 CY) will be required to close out the SC-A remedy (albeit far in the future) with the same noise, dust and safety issues as today, but with more people and homes in the area. **Are these costs and risks included in the assessment of SC-A?**

The full costs of the sparge trench in comparison to costs of a cap appear not to be considered. SC-7/7A was completely designed in 1996 and had a schedule for completion in late 1998. **Are the costs associated with intervening activities (1996-2004); proposed pre-design activities: 30, 60, 90, and 100-percent design activities; legal work; and related agency oversight included in the cost for SC-A? Are the full design costs for the trench included in comparison to the cost for a cap design that has already been paid for and completed?**

Regarding the entombment of waste, this is not an altogether unheard-of approach to waste management. Natural degradation of the waste will continue to occur. As the decay progresses, waste fluids will be squeezed out of the refuse and collected by the remediation system. The agencies should consider a combination of the best parts of each remedy is applied.

Under the currently proposed remedy (SC-A) the site will not be available for re-use. If the site is capped, there is potential for re-use of the land.

When the concept of the bioremediation approach supplanted the SC-7/7A approach in 1996, the engineers and the Agencies were discussing the possibility of developing a "leaky" cap for use with the SC-7/7A groundwater collection and treatment system. In this way, the waste would be

rinsed (as touted in the SC-A remedy) and the groundwater will be collected and treated in a proven (and currently mostly designed) manner. The entombment issue goes away, as does the fear of the failure of the untried treatment remedy. As noted earlier, the cost and nuisance of landfill closure (cover) is required regardless of the approach. The only significant difference in cost is the geomembrane. **Why did the PRPs and the Agencies abandon the SC-7/7A remedy?**

What is the expected frequency on which the precipated iron and arsenic will be cleaned from the sparge trench? What technology will be used and what are the potential concerns with it? There is a long list of trench problems: clogging, channeling of water and air, ability to recapture precipitate, acid washing and mobilizing a highly concentrated arsenic wastes. Blowers will be required for estimated 75 years. The noise will be unabated 24 hours a day for 365 days per year for 75 years. **Is the cost of running, maintaining, and replacing the blowers calculated?**

There is concern that the trench will have to be maintained for at least 75 years, and probably longer. We object to plan that relies upon uncertain social, economic and political factors to complete the clean up.

The cost for the trench seems to be based on twenty 20 years of operation, while contaminants are expected to persist at levels above clean-up criteria for 75 to one hundred years.

If sparging trench is installed and later found to be ineffective in achieving cleanup criteria, what is the anticipated cost to implement the contingent source control remedy, that being conversion of the sparging trench to a ground water collection trench and capping of the landfill? **If not and SC-A fails, how will it be abandoned?**

The existing deep trench (not part of the 7/7A remedy) will create potentially problematic short circuits between the soil stratigraphic layers. **Will the trench be backfilled with materials attempting to mimic the glacial deposition?** This might be very difficult, especially after extracting the existing matrix from within the trench. The shallow collection trench and wells of the 7/7A remedy were proposed for the same footprint as the sparge trench. **Will the replacement system be placed in-board or out-board of the abandoned trench?** There maybe hydraulic influences associated with the abandoned trench.

How are you going to set up sensors and monitor whether the trench works? What will be considered effective?

There are two distinct plumes of underground water, with different pressures. Their flows are not fully understood and may change over time. Concern exists that the trench for the sparge wall will alter ground water flow patterns, including "short-circuiting". As a result of the trench, the flow can shift in a greater amount to the Bellamy Reservoir, toward the Cocheco, or in a third direction not yet considered in the clean up plan.

The wall can be moved eastward to capture contaminants that have already migrated off site toward the Cocheco. This will address a problem currently ignored (the Eastern Plume – see below).

SOUTHERN PLUME

Page 12 of the FFSA indicates that the Agencies are concerned that the "current nature and extent of contamination in the Southern Plume is generally unknown and appears to be worsening."

The well reportedly most down gradient of the landfill in the Southern Plume, well SB-B2, is highly contaminated with benzene, THF and vinyl chloride, and concentrations are rising. Well SB-B2 is located roughly 500 feet from the landfill and 1000 feet from the Bellamy Reservoir. Further downgradient wells do exist (the SB-D cluster, the SB-GW-3 cluster, and OW-1), but, according to the EPA do not fall along the same flowline or monitor the same horizon as SB-B2 (located in the upper portion of the upper interbedded zone). The observed localized variability of groundwater quality data and the elevated levels at the SB-B2 location suggest that a more detailed understanding of the hydraulics and water quality of the Southern plume should be considered.

The Agencies should direct the PRPs to proceed with appropriate pre-design studies as soon as possible and implement the extraction and treatment system. **Is it possible to accelerate the testing and implementation of Management of Migration remedy MM-4, regardless of action on other issues at the site?**

Once new wells are installed, the hydraulic and water quality data gleaned from the studies can be used to properly design and monitor an appropriate remedy, if subsequently deemed necessary.

Immediate implementation of source control of the Southern Plume is necessary. If there is any challenge or delay anticipated in the PRPs implementing source control cleanup of the Southern Plume (pump and treat), then Superfund resources should be expended to implement it. If the intent to use Superfund money is considered, the PRPs may reconsider advancing remediation of the Plume in order to retain control. The Agencies should utilize whatever measures available to force the PRP group to aggressively implement the Southern Plume remedy.

EASTERN PLUME

Failing to cut off the source of arsenic (or arsenic-mobilizing characteristics) from the Eastern Plume has allowed arsenic in groundwater to remain at high levels (generally 10 to 50 times the standard) within the Eastern Plume. As no drinking water supplies are currently allowed within the plume area, the primary exposure to the risks associated with arsenic are upon discharge to

the Cocheco River and the so-called "swale". Once in the river or swale, the arsenic immediately precipitates into solid form and becomes a sediment issue.

Page 12 of the FFSA indicates that the Agencies believe that " there is no discernable, decreasing trend for arsenic in the Eastern Plume that shows cleanup levels being approached in a reasonable timeframe. The entire mass of arsenic currently in this plume will discharge to the Cochecho River. Additional arsenic that migrates offsite between now and implementation of the Source Control remedy will also leach into the river.

Samples have been collected and analyzed and have revealed that sediments on the landfill side of the Cocheco already exceed the threshold cancer risk of 10^{-4} and NOAA freshwater screening levels. Human health risks posed by arsenic concentrations in Cochecho River sediment are already bordering acceptable risk ranges established by EPA. This has already been characterized sufficiently to know it must be addressed. It is certain that there will be future accretion of arsenic in sediment over the next 50 to 100 years

Based on these observations, a second, and perhaps third, level of ecological assessment will be completed, based on the failure to "pass" the first tier assessment. We feel that the discharge of arsenic into the Cocheco River creates unacceptable ecological and human health risks.
We believe that the future studies that are being required will determine that the contaminants represent a risk to human health and the environment (as measured during PDIs or routine future monitoring). We believe the Agencies will require the PRPs to remove the impacted sediments.

Sediments in the Cocheco will have to be removed. Under the current plan periodic removals will be necessary. It appears much better to eliminate the source of continue contaminants rather than have to periodically track and remove sediments, particularly when they may not be able to be tracked.

Sediments will continually discharge into the river. However, contaminants can be resuspended in the water and distributed to areas of greater risk. Most certainly, the sediment in the river can be expected to wash downstream. This is certain to have already occurred. Accordingly, the level of contaminants in the sediment adjacent to the site will continue to be near the threshold levels, yet it is inappropriate to consider just the local sediment. The Agencies must consider that a constant flow of contaminants is entering the ecosystem and mobilizing over a wider area. These contaminants may concentrate in areas such as behind the first dam. However, this is not certain. During flood stages every year, silt is deposited on adjacent farmlands, such as the County Farm, that was recently put in to a conservation easement. This is the first county land to have been put into a conservation easement. Wherever contaminants are deposited they may be easily redistributed with flood stages and distributed to areas of higher risk. **Is there any plan to identify such downstream sediment collection areas and sample them now and in the future?**

Monitored natural attenuation is not an appropriate selection for the Eastern Plume management of migration remedy. MNA is determined as inappropriate for the Southern Plume. Conditions do not exist as the site for MNA. Yet, MNA is proposed for the Eastern Plume. The proposed plan for the Cocheco River is more akin to no action.

In the 1996 100-percent design documents, a form of MNA was recommended for the Eastern Plume. This was likely based on the assumption that a proven methodology for arsenic and VOC collection and treatment was to be installed as early as 1998. Under the current plan, if not successful in the implementation of the SC-A remedy, it may be another ten years before a proven remedy is installed. By then, arsenic concentrations in Cocheco sediments may far exceed standards and require remediation. It is possible to cost effectively implement a pump-and-treat system within the Eastern Plume in the near term that could reduce the concentrations of arsenic seeping into the Cocheco. The EPA in an e-mail dated June 29, 2004 to the NH TAG Force opined that it would cost little more to pump and treat the Eastern Plume than the cost of MNS. **Would then Agencies consider a plan to further characterize the hydraulics and water quality of the Eastern Plume and develop a contingency plan to ameliorate potential impacts to the Cocheco sediments and to enhance cleanup of the groundwater within the plume? We request that the discharges into the Cochecho River be addressed now, as part of this plan. We request that pump and treat be implemented now, without delay, using superfund resources, for the Eastern Plume.**

There seems to be no concern for the aesthetic impacts and noxious odors from the seeps into the river. It should be noted that the river is being promoted as a recreational resource.

AIR QUALITY

Indoor air samples should be collected to evaluate potential impacts to homes above the Eastern Plume. Will the continued migration of the plume potentially create conditions for VOCs in groundwater worse that presently exist? There should be no further delay in assessing indoor air quality in residences above the Eastern Plume, if there is any possibility of impacts. MNA cannot be selected for the Eastern Plume so long as the potential for indoor air impacts have not been assessed.

The sparge trench is also likely to concentrate VOC vapors and pose and additional risk of indoor air pollution, or an additional cost to capture and remove the off-gases. The sparge trench will also create odors. The agencies must also consider the existing background odors from the nearby Turnkey landfill operated by Waste Management.

What is the likelihood of the sparging trench mobilizing noxious odors from beneath the landfill cover and being discharged to ambient air?

OTHER ISSUES

The area of localized groundwater contamination in the NW corner of the landfill should be investigated not as part of pre-design studies, but as part of the overall characterization of the landfill impacts.

The public should be presented with detailed information on anticipated impacts to wetlands caused by the remedial alternatives, as well as conceptual mitigation measures.

If a plan is selected that requires additional pre-design study, the public requests an opportunity for review and comment in the future.

TIMING

The Work Settling Defendants (the PRPs) will be allowed one year to complete their PDIs (fall 2005). It will then take the Agencies the better part of a year to make comments (summer 2006). The PRPs will then take at least a year preparing design documents (summer 2007), which will take a minimum of six months to approve (winter 2007/2008). Work will begin in the spring (spring 2008) and will take (according to the FFSA) 2.5 years (fall 2010). After three years, the system will be evaluated for efficacy (fall 2013). If the proposed system does not work, implementation of SC-7/7A will be required. This will take (according to the Agencies) two years (fall 2015). This is 17 years after the design start-up date of the original SC-7/7A. We ask the EPA and DES to consider the relative speed by which the alternative remedies can be implemented. The speed of implementation impacts both risk factors from contaminants and the present value of dollars as opposed to anticipated inflated costs.

The FFSA indicates that clean-up levels will not be met for arsenic in the Eastern Plume for 75 years, based on current modeling. See page 36 of Addendum. Why is this timeframe acceptable to the Agencies? Historically, "reasonable time frames" have been twenty or thirty years. Should not something be done to accelerate the removal of arsenic from groundwater in this area?

The agencies must avoid anticipated challenges to the Plan. The Agencies have not approved modeling results done by the PRP, which modeling indicates that arsenic may not be remediated to acceptable levels in ground water under the Proposed and Proposed Mixed Alternatives, and therefore opens the door for a potential request for a "**technical impracticability waiver**". We object to this plan that anticipates an objection/appeal based upon technical impracticability waiver. We object to this plan that presents contingencies to which the agencies can anticipate an objection or appeal by the PRP's. **Why would the Agencies propose a plan to which they can anticipate objections/appeals and further delay the process?** The original ROD went through the entire process with full comment period. The PRP's were given an opportunity with an alternative bio-remediation plan, which has failed. There would be fewer challenges to re-implementing the original ROD.

The trigger mechanism for the contingency is not well defined and simply posturing this case for further litigation, delays and additional costs.

CONCLUSIONS

Arsenic results in Cocheco River sediments exceed first tier ecological risk characterization criteria at four sampling locations. The potential for human health and ecological risks from arsenic in sediments along the banks of the Cocheco River has been identified. **Therefore, we**

strongly urge the Agencies to now without further delay to abate the ongoing discharges of contaminants to the Cocheco.

Page 29 of the FFSA states " the RFFS does not contain or reference an MNA analysis, either with or without the air-sparging trench, that properly demonstrates that the toxicity, mobility, or volume of all site ground water contaminants have been or will be sufficiently reduced to levels that are protective of human health or the environment in a reasonable amount of time". Natural attenuation did not even work with the assistance of biodemediation. That effort failed. There is no decreasing trend in the pollution. **It is therefore unreasonable to propose MNA for the Eastern Plume!**

MNA is determined as inappropriate for the Southern Plume. Conditions do not exist as the site for MNA. Yet, MNA is proposed for the Eastern Plume. The proposed plan for the Cocheco River is more akin to no action.

There is significant concern over the Agencies level of certainty regarding performance of the sparging trench. It is a very costly endeavor and the technology has not been proven at the proposed depths and in providing three types of treatment simultaneously: VOC removal, arsenic precipitation, and enhancement of natural degradation of THF. We are concerned that for the proposed remedy there is no basis for experience or proven success. The proposed plan needs extensive pre-design work, long delays before implementation, will have to be phased in to see how it works, requires a contingency back up plan, and is likely subject to challenges by the PRP. **Accordingly, we strongly suggest a cap or leaky cap with groundwater extraction and treatment, with a high probability of success (regardless of shifting site characteristics) and that is already designed.**

The cap with a collection trench will eliminate uncertainty, eliminate a contingency plan, speed up the cleanup, reduce likelihood of challenges, and cost less if a closure cap is needed anyway, and cost less if a contingency is triggered.

The Agencies should proceed with all possible speed to characterize the Southern Plume and develop an appropriate remedy. It may not be necessary to delay in the implementation of this while the source control remedy is being finalized.

In summary, the Agencies should abandon the proposed SC-A source control remedy and implement the SC-7/7A remedy proposed in the 1991 ROD. Further, active remediation of the Eastern Plume should be implemented to abate contaminant discharges to the Cocheco River and reduce the potential for adverse indoor impacts. Lastly, the Agencies should expedite the characterization and remediation of the Southern Plume as a valuable water resource is in significant danger.

PUBLIC WORKS DEPARTMENT

CITY OF PORTSMOUTH
680 Peverly Hill Road
Portsmouth N.H. 03801
(603) 427-1530 FAX (603) 427-1539

August 10, 2004

Mr. Darryl Luce
Remedial Project Manager
United States Environmental Protection Agency
Region 1, Office of Site Remediation and Restoration
One Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Re: **Draft Revised Focused Feasibility Study**
Dover Municipal Landfill Superfund Site
Tolend Road – Dover, New Hampshire
Review Comments

Dear Mr. Luce:

The City of Portsmouth is pleased to offer the attached comments to the Draft Revised Focused Feasibility Study (RFFS), prepared by GeoInsight, Inc., dated January 30, 2004, for the Dover Municipal Landfill Superfund Site (landfill). These comments were prepared with the assistance of our consulting engineer Weston and Sampson. The City of Portsmouth owns and operates the Portsmouth Water System. The Bellamy Reservoir, located to the south of the landfill, supplies over 50% of the drinking water to that system. The Portsmouth Water System is a regional water system that serves customers in Madbury, Durham, Dover, Newington, Portsmouth, Greenland, New Castle, and Rye, New Hampshire. The presence of contamination in close proximity to this drinking water source is of serious concern to the City of Portsmouth.

If you have any questions or require additional information please call me at 766-1416.

Respectfully submitted,
City of Portsmouth

Peter Rice, P.E.
City Engineer, Water/Sewer Divisions

PHR/phr

cc: Steve Parkinson, P.E., Director of Public Works
David Allen, P.E., Deputy Director of Public Works
John J. Boisvert, P.E., Weston and Sampson Engineers

Weston & Sampson
ENGINEERS, INC.

MEMORANDUM

TO: David S. Allen, P.E., Deputy Public Works Director

FROM: John J. Boisvert, P.E.

DATE: August 10, 2004

SUBJECT: Tolend Road Landfill – Revised Focused Feasibility Study Comments

CC: Peter Rice, P.E. City Engineer, Water and Sewer Divisions
George D. Naslas, P.G., LSP, Weston & Sampson

Background

The RFFS provides a history and background of the Tolend Road Landfill. The landfill lies geographically between the Cocheco River and the Bellamy Reservoir. The landfill lies on the watershed divide and over the groundwater flow divide identified in the RFFS. Contamination at the landfill consists of chlorinated solvents, petroleum based compounds and dissolved contaminants (e.g. minerals). Based on the RFFS, and previous efforts, two groundwater contamination plumes emanate from the landfill. One plume is migrating north and east towards the Cocheco River and the other is migrating south in the direction of the Bellamy Reservoir. The southern plume is of primary concern to the Portsmouth Water System and is the focus of our review of the RFFS as it may threaten a regional drinking water source. New Hampshire groundwater quality criteria/standards as cited in Env-Wm 1403.03(a) state "groundwater shall be suitable for use as drinking water without treatment.

Geologic and Southern Plume Characterization

At this time we believe the southern plume has not been adequately characterized. A significant data gap exists in the monitoring well network used to characterize the hydrogeology south of the landfill. The aerial and vertical extent of the plume and its migration towards the Bellamy Reservoir are not fully understood. To close these data gaps and that the treat posed by the southern plume to the Bellamy Reservoir, the City of Portsmouth requests that the following be required at a minimum:

- Additional monitoring wells are required to evaluate contaminant migration (horizontal) information gaps and additional clustered monitoring wells are required to provide a more complete vertical profile of water quality between the landfill and the Bellamy Reservoir. This same concern has been identified in the RFFS on page 1-25.
- The placement of well screens should intersect the interfaces of the identified geologic strata. Of particular importance would be the clay/sand boundary and the bedrock overburden boundary.

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- There seems to have been a reliance on previous investigations to characterize the presence and extent of the clay layer, additional site specific work is necessary based on the limited information provided.
- The structural condition of the clay must be evaluated and reported in order to determine whether or not it is "impermeable" or could it contain desecration cracks, fissures, or interbedded sand/silt lenses, rendering it less than impermeable. These structural features, if present could present a mechanism for contaminant migration.
- The response (sampling/monitoring/reporting) protocols when contamination is identified in monitoring wells or surface water must be clearly defined in a standard monitoring plan or standard operating procedure. The plan should identify the following:
  - The resample protocol when contamination is discovered.
  - If contamination appears in a shallow well, deeper wells adjacent to the discovery should be sampled at the time of resample.
  - The down gradient monitoring wells to be sampled, and when.
  - The laboratory turn around time for reporting and the notification requirements to the Portsmouth Water System and the public.
- It does not appear that Bellamy Reservoir sediments have been sampled and analyzed in recent history (e.g. not within the last 10 years). We recommend that this be an annual requirement at two locations along the northern shore of the reservoir.
- Well cluster MW-102 is on the shore of the Bellamy Reservoir and could act as the final sentry well, yet sampling (e.g. seasonal) is not performed in the well cluster next to this important drinking water source. Regardless of its distance from detected contamination this well cluster should be sampled biannually at a minimum.
- Along the Bellamy Reservoir, there has been a less than adequate characterization and discussion of groundwater flow into the reservoir. Additional piezometers and monitoring wells are needed along the reservoir to monitor potential contaminant migration into the reservoir. This assessment would help ensure that groundwater flow to the reservoir is adequately characterized and monitored.

Air Sparging Trench Technology

The application of air sparging technology in a deep and relatively long trench is a new application for this technology and not well documented in the literature under similar site conditions. The pursuit of this technology would not be advisable without a contingency plan in place should it be determined that the technology is not appropriate and fails to achieve the predicted performance. It is our understanding that the 1991 ROD remedy is 100 % designed and ready for implementation if the proposed solution is determined to be inappropriate for this application.

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Contingency Planning and Communication

Given the sensitivity of the Bellamy Reservoir and the necessity to ensure that public health is protected, open communication with the Portsmouth Water System managers is required. We understand a passive drain will be installed in the trench as a contingency however, the effectiveness could be significantly reduced if the trench is fouled by mineral deposition and bacterial growth. As the water system operator, the City of Portsmouth in order to make decisions to protect human health, must be provided information as it becomes available regarding the south plume including:

- Water quality data especially when preliminary laboratory data suggest an imminent risk to the Bellamy Reservoir or when it is detected where it previously was not.
- Project schedule updates.
- Notification of project changes including but not limited to alterations of monitoring frequency, changes in project management (contacts), technical changes and schedule changes.
- We recommend that a backup contingency plan is in place assuming the failure of the proposed system or its abandonment during the predesign/design phase of the project.

In addition the City of Portsmouth should recommend that a public notification and education plan be developed as part of a contingency plan should contamination pose a threat to the Bellamy Reservoir or be detected in the Bellamy Reservoir. The plan should include the following:

- Clear notification requirements and procedures with respect to the Portsmouth Water System and the general public.
- A program to address public concerns over their drinking water quality and safety.
- A plan to implement additional treatment at the Portsmouth Water System's Madbury Water Treatment Facility if necessary or provisions for an alternative source of water to the Portsmouth Water System.
- Reserved financial resources to assist the Portsmouth Water System in ensuring drinking water quality should the Bellamy Reservoir be impacted.

Summary Comments

- The installation of additional monitoring wells should be initiated immediately to fill data gaps and adequately characterize the geology south of the Landfill and the southern plume.
- Existing wells, recently gone unsampled, in the southern plume should be sampled immediately or during the next scheduled sampling period. It is our understanding that this has recently taken place. The Portsmouth Water System should request that the monitoring results be provided and that monitoring continues until additional wells, necessary to fill data gaps, are installed.

Weston & Sampson
ENGINEERS, INC.

- The City of Portsmouth should request the opportunity to review and comment on the proposed additional monitoring program in conjunction with the recent data.
- As additional data is collected and evaluated, delay of the remediation may be an unintended consequence. The Portsmouth Water System should be very concerned that for each day, month, or year that a remedial solution is not in place, the risk to one of the most important regional drinking water sources increases.
- There may be a tendency to delay implementation, reassess the remedial technology, or not consider alternative more flexible technologies, during the period when new information and monitoring data is being collected. We do not believe that the need to further characterize the geology south of the Landfill and the southern plume should cause any delay in moving forward with the pre-design and design of Alternative Remedy (SC-A + MM-2/4) at this time.
- However, based on the concerns raised above regarding the air sparging trench technology, we feel the 1991 ROD remedy should continue to be updated to facilitate timely implementation as a contingency alternative.

If you have any questions regarding our comments please feel free to call George Naslas or me at (603) 431-3937. Thank you for this opportunity.

"Peschel, Dean"
<dean.peschel@ci.dover.nh.us>

08/11/2004 12:23 PM

To: Darryl Luce/R1/USEPA/US@EPA
cc:
Subject: comments on EPA Proposed Closure Plan and Addendum for Tolend Lan dfill

Hi Darryl,
Attached are the comments from the Dover PRP Group to the EPA Proposed Closure Plan and Addendum for Tolend Landfill. I will send a hard copy by mail as well.
Thanks. Look forward to begin working on the project again.

Dean Peschel

Environmental Projects Manager

288 Central Avenue

Dover, NH 03820-4169

t: 603.516.6094 f: 603.516.6463 mailto:dean.peschel@ci.dover.nh.us http://www.ci.dover.nh.us

Dover: First in New Hampshire, First with you! PRP comments to proposed plan.doc

"Peschel, Dean"
<dean.peschel@ci.dover.nh.us>

08/18/2004 10:25 AM

To: Darryl Luce/R1/USEPA/US@EPA
cc: "Andrew Hoffman (ahoffman@des.state.nh.us)" <ahoffman@des.state.nh.us>
Subject: final-md

Hi Darryl,
I sent you comments from the group that were not the final version. One of our consultants pointed this out to me this morning. I inadvertantly sent the next to last version as our comments. I have attached the final version that I should have sent to you. My apologies for this error.

Dean Peschel

Environmental Projects Manager

288 Central Avenue

Dover, NH 03820-4169

t: 603.516.6094 f: 603.516.6463 mailto:dean.peschel@ci.dover.nh.us http://www.ci.dover.nh.us

Dover: First in New Hampshire, First with you! final-md.doc

COMMENTS ON THE PROPOSED PLAN FOR REMEDIATION OF THE DOVER MUNICIPAL LANDFILL SUPERFUND SITE DOVER, NEW HAMPSHIRE

INTRODUCTION

The Executive Committee of the Group of Work Settling Defendants (the Group)[1] for the Dover Municipal Landfill Superfund Site (the Site) appreciates the consideration by the U.S. Environmental Protection Agency (USEPA) and New Hampshire Department of Environmental Services (NHDES) of the Revised Focus Feasibility Study (RFFS) and the Proposed Plan for an amended Record of Decision (ROD) for the Site. The remedy described in the Proposed Plan is clearly protective of human health and the environment, which the Group agrees is a necessary predicate to proceeding with the amendment of the ROD. Moreover, the Proposed Plan will provide a more permanent and efficient remedy for Site conditions than the remedy called for by the 1991 ROD. The Proposed Plan will facilitate the *treatment* and *destruction* of contaminants of concern, rather than allowing for those contaminates to remain untreated beneath an impermeable cap for decades if not centuries.

The Proposed Plan employs an innovative application of a combination of technologies that are well-proven at the field scale. Accordingly, any design issues specific to this project can be resolved based upon analytical methods that are commonly used in the application of the technologies involved.

While fully supporting the determination by EPA and DES to amend a portion of the ROD, the Group offers these comments on the Proposed Plan in an effort to clarify certain of its elements and to suggest refinement of the approach to its implementation.

ARSENIC ISSUES

The Group believes that 'background' or natural arsenic released from the formation due to anaerobic ground water contributes substantially to the arsenic measured at the Site. In this case, ICLs will likely never be achieved upgradient of the treatment trench despite the remediation of the disposed waste. Therefore, an understanding of naturally occurring arsenic concentrations is key to setting remedial goals.

As discussed in the RFFS and USEPA's addendum, arsenic poses the majority of the risk at the Site (typically 95 percent or more, depending upon the exposure scenario considered). Analyses presented in the RFFS suggest that arsenic is likely to remain

[1] City of Dover, Davidson/Textron now Collins & Aikman, Clarostat Mfg, Wentworth Douglass Hospital, BFI now Allied Waste, Eastern Air Devices, Moore Business Forms, Melville Corp.

above Interim Cleanup Levels (ICLs) for a very long time (75 or more years, depending upon the remedial scenario considered). In light of these considerations, the Group recommends that the evaluation of background arsenic concentrations in ground water documented in the Golder Pre-Design Investigation (PDI) be expanded to address conditions in the individual strata identified at the Site. Conceptually, the Group suggests an approach that will identify monitoring wells screened in each stratum in the areas of the Southern and Eastern Plumes that are not impacted by leachate or other contaminants associated with the Landfill and analyze COC concentrations (including arsenic) and geochemical conditions in ground water samples collected from these wells to identify background arsenic concentrations. Geochemical and contaminant data obtained in conjunction with the Environmental Monitoring Program (EMP) can be used in this evaluation, along with suitable statistical techniques. If warranted, supplementary geochemical and contaminant data can be obtained during pre-design of the remedy. As mentioned in the RFFS and acknowledged in USEPA's addendum, the Group performed an initial analysis along these lines, which has not been approved by USEPA, but that may provide a suitable starting point for an augmented assessment of background arsenic concentrations in ground water, subject to review and approval by USEPA of the methodology to be employed (see TZD Technical Memorandum-Issues Summary titled "Dissolved Arsenic Background Conditions in Ground Water" dated September 11, 2001 developed and submitted to the Agencies for the September 21, 2001 TZD meeting).

EMP Sediment Monitoring

The Group does not concur with the Agencies that sediment monitoring in the Cocheco River should be part of the EMP monitoring. As reported in Section 2.0 of the RFFS, concentrations of arsenic in sediment exceeded a screening threshold concentration at which adverse effects on benthic organisms are theoretically possible. Based upon this finding and consistent with a tiered approach to evaluating potential ecological risks, the Proposed Plan requires testing of the bioavailability of the arsenic in Cocheco River sediment to confirm whether adverse impacts on benthic organisms are, in fact, occurring. In addition, however, the Proposed Plan seems to require continued monitoring of sediment quality over the duration of the remedy. The Group recommends that the second tier testing approach be followed, if warranted by field data, in conjunction with the five-year reviews of remedy performance.

SOUTHERN PLUME REMEDY

The Proposed Plan, as described in the RFFS Addendum, employs a pump and treat remedy for the Southern Plume. The Group is dedicated to protecting the water supply in the Bellamy Reservoir. At this time, however, the incomplete characterization of the Southern Plume severely limits the ability to analyze the remedy selected for this portion of the Site. Augmentation of the monitoring network in this area is warranted to better define the boundaries of the Southern Plume. Also, analyses are required to confirm proposed ground water extraction rates for this area and to assess the potential

effectiveness of extracting ground water in terms of capturing ground water flow and influencing COC distribution and migration.

The Group offers several clarifications to Table 1 in Appendix B of the RFFS Addendum (Table 1 of the RFFS Addendum was a summary of the results of statistical analyses of historical ground water quality data for wells located within the Southern Plume). Based upon the ground water flow divide between the Southern and Eastern Plumes (see, for example, Figure 1-2 and Table 1-11 of the RFFS), wells SB-C2, SC-8US, SC-8UUI, SC-8LUI, SC-9US, and MW-101U are not located in the Southern Plume. Therefore, these wells were removed from the table. The concentrations of benzene at wells SB-B1 and SC-11US have never been above the ICL; therefore, these data should have been shaded in blue, consistent with USEPA's color key. In addition, Table 1 in Appendix B of the RFFS Addendum used November 2001 data for arsenic, VC and THF at well SB-4D; these numbers were revised to reflect the May 2002 data, which was used for the rest of the table. Also, VC was not detected at well SC-11US in May 2002, and therefore, that datum was changed to 0. Table 1R below incorporates these corrections. As revised, Table 1R underscores the need for additional information regarding conditions in the Southern Plume to facilitate remedy decision making.

Table 1R
Southern Plume

red= increasing trend, yellow = no trend, green = decreasing trend, blue = always below ICLs

Contaminated Ground water Location	Well	Screened Interval (bgs, feet)	Strata Location	concentration (ug/L) in May '02 As	VC	Ben	THF
Landfill Wells	SC12US	34 to 39	US	**162**	**0.9**	**31**	**690**
	SC12UUI	44 to 49	UUI	**198**			**1400**
Landfill Toe Wells	SC-11US	4.5 to 4.9	US				
	SC18US	14 to 19	US	**53**			
	SC10US	5 to 20	US				
	SC-11UUI	16 to 21	UUI				
	SC18UUI	24 to 29	UUI	**66**			
	SC10UUI	24 to 29	UUI	**43**			
	SB4D	34 to 44	UUI			**30**	
	SC10LUI	43 to 48	LUI				**37**
Southern Plume Wells	B8WT	1 to 10.5	US		**6**	**4**	**250**
	SB-B1	5 to 15	US				
	SB-B2	34 to 44	UUI				

Source: RFFS, April 30, 2003.

Another factor that apparently has influenced the Agencies proposal for a pump and treat remedy for the Southern Plume is a misunderstanding of the potential degradation pathways for several of the key contaminants of concern:

1. Vinyl chloride (VC) degradation under anaerobic conditions is very well documented in the scientific literature (see literature references and pathway in Figure 1-7 in the RFFS), and is a common pathway in the subsurface at the Site as evidenced by the coincidence of vinyl chloride and ethene. Ethene is the anaerobic daughter product of vinyl chloride degradation and as illustrated in the tables in Appendix G of the RFFS, ethene was detected at all locations where significant concentrations of vinyl chloride were measured. This anaerobic pathway for degradation of vinyl chloride at the Site was also confirmed in microcosm studies cited in the RFFS (Envirogen, 1995).

2. Benzene also degrades under anaerobic conditions in subsurface aquifers (Grbić-Galić and T.M. Vogel, 1987; Edwards and Grbić-Galić, 1992; Lovley et al; 1995; Harwood and Gibson, 1997; Weiner and Lovley, 1998; Rooney-Varga et al., 1999; Burland and Edwards, 1999; Anderson and Lovley, 2000). However, the daughter products of anaerobic benzene degradation are not as distinct as that of vinyl chloride and cannot be distinguished from other components of landfill leachate.

3. Tetrahydrofuran is also known to degrade anaerobically (discussion and citations in Section 4.3 of the RFFS), and the anaerobic sequestration of arsenic is also well documented in the scientific literature (as discussed with citations in Section 4.5.1 of the RFFS).

Therefore, the scientific literature supports the RFFS conclusion that there are attenuation mechanisms for these contaminants of concern under the anaerobic conditions encountered in the Eastern and Southern Plumes. However, the rate at which degradation is occurring in these plumes needs to be investigated. The planned investigation of natural attenuation is discussed below.

The Group recommends that the Agencies retain the flexibility to analyze the potential utility of monitored natural attenuation (MNA) for the Southern Plume based upon the results of pre-design characterization and analyses. A MNA remedy allows for the retention of a pump and treat remedy as a contingent measure.

An outline of a Southern Plume Characterization Workplan submitted by the Group was revised to address comments received in a January 13, 2004 letter from Mr. Darryl Luce of USEPA. The Group recommends that the general approach outlined in this workplan be used as a basis for identifying pre-design activities and methods. In addition, the first draft of the Southern Plume Characterization Workplan submitted to the Agencies incorporated a plan for assessing MNA concurrently with the assessment of the lateral extent, depth and mass of the contaminated ground water in the Southern Plume. In his comments, Mr. Luce requested that the Group submit a separate workplan

for the MNA investigation. In accordance with Mr. Luce's comments, this workplan will be prepared based upon comments provided and references cited in Appendix G of the RFFS.

If pre-design investigations indicate that a pump and treat remedy is warranted for remediation in the Southern Plume, the Group recommends that the Agencies retain flexibility in the design process to allow value engineering analyses of the most efficient combination of remedial approaches and technologies for ground water extracted from the Southern Plume, and, possibly, from within the western-most lobe of the Landfill to address a possible THF hotspot. For example, one of the variations on the proposed remedy that the Group would like to investigate during pre-design would be to deliver the water pumped from the Southern Plume, combine it with the ground water extracted in the southwest corner of the Landfill and pipe this ground water to the City of Dover publicly-owned treatment works (POTW).

MODELING ISSUES

One of the assertions in the RFFS Addendum was that the modeling completed for the RFFS was inaccurate because contaminants measured at SB-B2 in the Southern Plume since 1993 were not predicted by the model. This misunderstanding has led the Agencies to predict impact on the Bellamy by Site COCs not predicted by the modeling. This section will clarify this issue for the Agencies so that the model can be used to reasonably compare alternatives and aid in the remedy design.

The Group acknowledges that USEPA and NHDES elected to defer resolution of certain issues involving modeling of ground water flow and contaminant fate and transport in the final draft of the RFFS, and that resolution of these issues and acceptance of the model by the agencies will be a key aspect of remedial design. Nevertheless, the model simulations presented in the RFFS provided a suitable initial approximation of Site conditions for comparison of remedial alternatives at a feasibility study level. In this context, the Group offers comments regarding certain model-related issues raised in the RFFS Addendum that it believes are important in consideration of the Proposed Plan at this stage in the Superfund remedial process.

Hydraulic modeling completed during the RFFS (and described in detail in Appendix N of the RFFS) included particle track evaluations to identify expected ground water flow paths and to estimate travel times for ground water in the area of the Southern Plume. The RFFS Addendum concluded that contaminant migration in the area of the Southern Plume is much faster than simulated, or that contaminants were released within the Landfill well before 1979 (Page 13, Section 2.0 of the RFFS Addendum). This conclusion was reportedly based upon review of historical ground water quality data associated with well SB-B2 and Figure H-15 of the RFFS (Attachment H of Appendix N; a model-simulated particle track that originated from the southern tip of the western lobe of the Landfill, designated particle track "D"). In plan view, particle track "D" traverses the general vicinity of well SB-B2. In cross section, particle track "D" travels within the

lower portion of model layer 3, which is monitored by the screened interval for well SB-B2 (34 to 44 feet below ground surface).

The distance from the southwestern toe of the Landfill to the Bellamy Reservoir is approximately 1,500 feet. Well SB-B2 is located approximately 550 feet from the southwestern toe of the Landfill (approximately one-third of the distance from the Landfill to the reservoir). Particle tracking results indicated that the time for Particle D to travel from the Landfill to the Bellamy Reservoir was 54 years (Table 4-3, Appendix N of the RFFS). Therefore, the approximate ground water travel time from the toe of the Landfill to the zone monitored by well SB-B2 is 18 years (i.e., one-third of 54 years).

Volatile organic compounds (VOCs) were detected in ground water samples obtained from well SB-B2 as early as 1993 (i.e., the start of the EMP). Based upon the information obtained from the particle track evaluation, VOCs detected in well SB-B2 in 1993 would have required approximately 18 years to migrate from the Landfill, assuming unretarded migration at the rate of ground water flow, indicating a release in approximately 1975, which was during the Landfill's operating period from 1960 until 1979. It is important to note that the particle track simulations provided an estimate of the approximate travel times associated with advective ground water movement alone. In geologic settings similar to those observed at the Landfill, the migration of VOCs is slowed (i.e., retarded) by physical processes in the subsurface, such as adsorption. To evaluate possible transport times associated with individual dissolved VOCs in ground water, a retardation factor was applied to the particle track estimates. VOCs detected in ground water samples from well SB-B2 at concentrations above ICLs during historical EMP events (1993 through 2002) have included benzene (6 to 33 micrograms per liter (μg/L)), vinyl chloride (<1 to 4 μg/L), and tetrahydrofuran (240 to 2,400 μg/L).

The compounds with the highest and lowest partitioning coefficients (K_d) were selected to estimate retarded travel times from the Landfill to well SB-B2 (benzene - K_d of 0.059 cm^3/g, and vinyl chloride - K_d of 0.019 cm^3/g). Retardation factors of 1.39 and 1.13 were calculated for benzene and vinyl chloride, respectively, using parameters consistent with those applied during the RFFS modeling effort (Table 10A of Appendix N of the RFFS). Based upon these retardation factors, estimated travel times for benzene and vinyl chloride to reach SB-B2 from the Landfill are 25 and 20 years, respectively.

As previously indicated, the Landfill was active from 1960 through 1979. Therefore the maximum time for contaminant migration to the first detection at SB-B2 is approximately 33 years (1960 to 1993). The estimated travel time for benzene from the toe of the Landfill to well SB-B2 (25 years) is less than the maximum possible travel time of 33 years, indicating that the release of benzene to ground water within the Landfill could have occurred as early as 1968. Similarly, the estimated travel time for vinyl chloride from the toe of the Landfill to SB-B2 is 20 years. Therefore, the generation of vinyl chloride by the anaerobic reductive dechlorination of TCE and PCE within the Landfill could have occurred as early as 1973. Based upon these estimates of travel time, simulated VOC migration in the Southern Plume (assuming advective flow and retardation) is reasonably consistent with VOC detections at well SB-B2.

Figure 1 presents a timeline of the operational history of the Landfill and the estimated ranges of travel times for ground water and representative VOCs in the Southern Plume in the vicinity of well SB- B2.

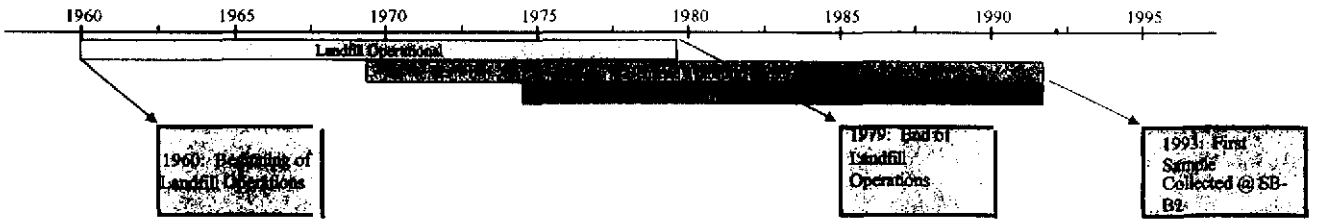

FIGURE 1: Landfill Operation and Contaminant Transport Timeline for Benzene and Vinyl Chloride.

The RFFS Addendum concluded that, under the Alternative Remedy management of migration scenario (i.e., monitored natural attenuation), vinyl chloride, benzene, and tetrahydrofuran will eventually be discharged to the Bellamy Reservoir (page 54, Section 5.5). As acknowledged in a preceding paragraph in the RFFS Addendum, analyses completed during the RFFS do not support this conclusion.

Simulated ground water elevations in the Southern Plume correlated exceptionally well to the average observed ground water elevations (i.e., the model calibration data set). The average difference between observed and modeled average ground water elevations for the portion of the model occupied by the Southern Plume and area to the west and southwest of the Landfill was approximately 0.7 feet (8 inches; based upon data included in Table 3 of the Appendix N of the RFFS). These data indicate that the model provided a very close approximation of hydraulic conditions between the Landfill and the Bellamy Reservoir.

During the RFFS, the model was used to evaluate possible transport of VOCs in the Southern Plume after source control remedial measures were implemented. These simulations assumed that additional VOCs would not migrate past the toe of the Landfill after the source control measures became operational. Recent EMP monitoring results were used to develop VOC contour maps to represent the current shape and concentration distribution of VOCs within the Southern Plume (Attachment J of Appendix N). These "plume maps" were input to the model and simulations were completed to evaluate plume migration over time. Within the Southern Plume, the simulations were focused upon evaluating whether VOCs would travel to and eventually discharge to the Bellamy

Reservoir.

Tables 12a through 12e in Appendix N of the RFFS summarize the results of fate and transport modeling associated with the Southern Plume. These results are shown in plan view in Attachment L of Appendix N of the RFFS.

Tables 12b through 12e present the fate and transport simulations for benzene, tetrahydrofuran, cis-1,2-dichloroethylene, and vinyl chloride. For each of the four organic COCs, a management of migration simulation was conducted for the Alternative Remedy using a minimum literature degradation rate. In all instances, there were no simulated impacts to the Bellamy Reservoir within the 100 year modeled timeframe (i.e., the simulated plumes attenuated to below MCLs before they reached the north banks of the Bellamy Reservoir).

DIPSERSION

The RFFS Addendum included representations that dispersivity at the Site is low. Based upon this assumption, the agencies have made conclusions regarding the expected configuration and geometry of contaminant "plumes," and, in particular, they have conceptualized leachate conditions at the Site to consist of narrow concentrated plumes. As discussed in the RFFS, the fluoride tracer test completed during the TZD was not adequate to provide reliable estimates of Site-specific values of dispersivity. In addition, the Group is not aware of other evaluations or investigations that have been completed for the Site that established or estimated a Site-specific value of dispersivity. The agencies justification for selecting a low dispersivity value for independent evaluations completed for the Site was not included in the RFFS Addendum and was not previously provided in correspondence associated with the TZD Project. There are potentially wide-ranging implications to a conclusion that dispersivity at the Site is low that can affect a number of aspects of remedial design and establishment of practical ground water monitoring networks.

Consideration of dispersion is expected to be a component of technical evaluations completed during remedial design activities, including monitoring requirements, hydraulic considerations, and trench design and configuration. Values of dispersivity for fate and transport/hydraulic evaluations and remedial design are almost always derived from published literature for highly detailed research tests. This approach (i.e., relying upon literature values) was used to complete the fate and transport modeling during the RFFS as is consistent with the approach used at most other Superfund Sites. The Group recommends that further evaluation of dispersion be included in subsequent pre-design activities and that representative values for the Site be evaluated, discussed, and selected prior to the completion of remedial design.

SC-A: EXISTING LANDFILL COVER AND TRENCH TREATMENT SYSTEM

Based upon the Group's review of the RFFS Addendum, it offers several clarifications and recommendations regarding the Proposed Plan for a source remedy. Specifically, the Group's comments on the localized source identification approach, trench configuration; the contingent remedy; excavated soils disposition; and constructability and implementability issues identified by USEPA and NHDES. Also, the Group notes that page 45 of the Addendum states that "[a] ground water diversion trench would also be installed upgradient of the landfill;" however, this element was not part of SC-A as described in the RFFS, although it was a component of the 1991 ROD remedy.

Localized Source Identification Approach

The Group concurs with the Proposed Plan's intent to identify localized sources of contaminants at the northwest corner of the Landfill in the vicinity of surface water station SW-E and at the southwestern lobe of the Landfill where a localized area of relatively elevated THF concentrations has been identified. The RFFS addendum identifies soil gas surveys and test pit investigations as the methods to be used to accomplish these investigations; however, the Group recommends that the agencies defer decisions regarding the specific methods to be used for these investigations until the pre-design stage of the remedial action, allowing consideration of the use of other techniques such as geoprobe sampling and field gas chromatography investigations of shallow ground water.

Constructability and Implementability

In several sections within the RFFS Addendum and during the public meetings on June 21st and July 19th, 2004, concerns were raised regarding the constructability and implementability of the treatment trench. With respect to the constructability of the proposed treatment trench, the Group recommends that the Agencies refer concerned individuals to Appendix L-1 of the RFFS, which contains information on the viability of deep trench construction that was developed based on direct communications with qualified trench construction contractors regarding specific conditions at the Dover Landfill Site. Further, the Agencies may wish to refer to the experiences with successful construction of remedial trenches to depths of approximately 80 feet and 110 feet for the Cardinal Landfill and Savage Well Superfund sites, respectively. In addition, the Somersworth Landfill PRB trench was constructed using the same technology being proposed for Dover Landfill; that trench is 915 feet long and 47 feet in depth.

With respect to implementability, the concerns raised are focused on the ability of the trench to treat the COCs and on the potential of an unacceptable reduction in hydraulic conductivity (termed "clogging" in the Addendum) of the trench media as a result of both mineral precipitation and biomass growth. In completing the RFFS, considerable research was performed on these issues and relevant literature on similar operating systems is presented in Appendix L-2 of the RFFS. In addition, calculations

were performed to evaluate potentially unacceptable reductions in hydraulic conductivity of the trench media (Appendices K-1 through K-4 of the RFFS). A comprehensive analysis of treatment effectiveness was performed using both literature references and calculations based upon experience at other sites (Appendix J of the RFFS on stripping of VOCs and Appendix K-5 of the RFFS on arsenic immobilization). The Group recommends that the Agencies refer individuals to the referenced appendices when considering issues regarding treatment trench implementability.

Trench Configuration

The Group does not concur with the Agencies on the placement of the treatment wall (a.k.a. treatment trench) pictured in Figure 4 of the RFFS Addendum. If the Group will be required to construct a treatment trench at the Landfill toe, then the Group should have flexibility in the RD/RA to optimize the system design. For instance, the Landfill includes an Eastern Lobe and Western Lobe that have different historical use and associated ground water impacts. The Eastern Lobe is the oldest portion of the Landfill, was created during a period when burning of waste material was the primary disposal method, and is located in an area where ground water flow velocities are higher. The Western Lobe is the youngest portion of the Landfill, was created during a period when burning was not predominantly practiced, and is in an area where ground water flow velocities are slower. Because of the differences in conditions associated with these two lobes of the Landfill, these areas can be considered two distinct "solid waste units." Examples of the design optimization may include the use of sheet pile barriers along flow paths that are predominantly parallel to ground water flow (e.g. between monitor wells SC-9 and SC-8), effectively separating the two solid waste units. Not only would this serve to optimize the trench design, performance characteristics and system cost, but also would result in a movement of the ground water divide towards the west with an associated reduction in impacted ground water flow towards the Bellamy Reservoir.

Another option for the source control component of the remedy is construction of the trench along Tolend Road; essentially moving the point of compliance from the toe of the Landfill to the property boundary at Tolend Road. This is an option that has merit for several reasons: 1) It would allay the fears expressed by the public that contaminants that are already past the toe of the Landfill pose a threat to the Cocheco River. The Cocheco is a more valuable resource than the limited use aquifer that lies between the toe of the Landfill and Tolend Road; 2) This area between the Landfill toe and Tolend Road is owned by the City, there is no potential for development, and even if development were desired, the aquifer yield cannot sustain residential wells; 3) From a regulatory standpoint, the point of compliance can be moved to the property line because contaminant mass exists outside the limits of the Landfill, essentially constituting waste management units that are separate from the Landfill; and 4) A conservation easement could be put in place between the toe of the Landfill and the trench at Tolend Road. Instead of the trench at the toe of the Landfill, this option for the source control remedy would require that the Landfill be maintained with the current vegetated permeable cap to allow flushing of the contaminants downgradient to the trench. With this option, any contaminants that might be threatening the Bellamy in the Southern Plume could be

pumped and treated by delivery to injection galleries upgradient of the treatment trench at Tolend Road.

The Group concurs with the Agencies (Appendix C of the RFFS Addendum) that the ground water flow and fate and transport model is an important tool for remedy design and that relevant data collected during the PDI will be used to support final model development.

Excavated Soil Disposition

The RFFS Addendum appears to assume that approximately 19,000 cubic yards of soil excavated from the Site to construct the treatment trench will be removed from the Site (e.g., page 45, 2nd full paragraph). To mitigate potential short-term impacts associated with construction of the remedy (i.e., vehicle traffic on local roads), and to avoid large and unnecessary disposal costs of approximately $1.2 MM (essentially paying another landfill for its daily cover), the Group recommends that soil excavated during construction of the treatment trench be managed consistent with the provisions of the NHDES Risk Characterization and Management Policy and the contaminated soil reuse provisions of the State's Solid Waste Rules (Env-Wm 2603.05). The RCMP establishes cleanup guidelines for soil that consider both potential risk resulting from direct exposure and potential impacts on ground water quality (Section 7.5, RCMP, NHDES, January 1998, as revised). The pertinent sections of the Solid Waste Rules govern reuse of contaminated soil. Under the provisions of the RCMP and these rules, it most probably will be practicable to place the excavated soil on top of the Landfill to provide additional permeable cover.

Contingent Remedy

The Agencies recommend on page 35 of the Addendum that "If air sparging, THF degradation, or arsenic capture fails, or clean closure cannot be achieved at the Landfill, the contingent remedy will be the 1991 ROD remedy". The Group recognizes and concurs with the requirement for a contingent remedy but would recommend that the agencies reconsider the content of the contingent remedy. Both the Group, in the RFFS (Section 5.8), and the Agencies, in the Addendum (Section 5.3), recognize the potential benefits to maintaining the current cover on the Landfill during the active source remedy phase of the project, in particular with respect to expected COC clean-up timeframe and remedy cost. At other landfills, the installation of a RCRA cap has not significantly decreased the amount of leachate generation, and has the added detrimental effect of increasing the amount of time for complete elimination of the contamination by entombing the waste and decreasing the flushing which serves to deliver the contaminants to the treatment system. It is further recognized that the Agencies uncertainties with respect to the proposed remedy exist within the performance of the treatment trench. Based on these recognized benefits and these uncertainties, the Group proposed in the RFFS and the Agencies reiterated in the Addendum (page 34), that the design of the trench would incorporate the flexibility to convert the trench to a leachate collection system. Conversion of the trench to a leachate collection system, without the

addition of a landfill RCRA-C cap, would preserve the treatment features of the remedy as contrasted with containment, and would serve to maintain the advantages of COC treatment time and remedy cost while providing an appropriate contingent remedy for the proposed trench performance.

The Group has informed the USEPA and NHDES that it is investigating reuse of the Landfill as a disposal facility for dredge spoils, lightly contaminated soil or possibly municipal solid waste. The reuse approach would be generally consistent with the 1991 ROD remedy as currently designed. Conceptually, the portion of the Landfill surface that is not reused would be covered with a cap consisting of sub-grade layer, overlain by a gas venting layer, overlain by a low permeability cap layer, overlain by a drainage layer, overlain by a protective layer and a vegetative support layer. The new landfill cell would include a liner system composed of a sub-grade layer, overlain by a low permeability soil liner layer or geocomposite clay layer, a secondary flexible membrane liner and a drainage layer, overlain by the primary flexible membrane liner and drainage layer. These systems would prevent infiltration through the waste mass of the existing Landfill. A downgradient collection system would capture leachate and impacted ground water migrating from beneath the Landfill for off-site treatment at the City of Dover POTW. Importantly, the reuse concept would generate funds for the City to offset the considerable costs of remediation, substantially mitigating the potentially large adverse impact on City finances.

The City has met with NHDES to identify threshold issues to be addressed in pursuing the reuse concept. NHDES issued a letter dated January 12, 2004 in which it identified the key issues to be addressed. The City responded to this letter by identifying its approach to addressing these issues by letter on June 11, 2004, and at this juncture, is seeking a meeting with USEPA to discuss the reuse concept at the Site. The City is available to meet with USEPA at the earliest opportunity so that this concept can be appropriately considered in the ROD amendment process.

REFERENCES CITED

Anderson, R.T. and D.R. Lovley. 2000. Anaerobic bioremediation of benzene under sulfate-reducing conditions in a petroleum-contaminated aquifer. Environ. Sci. Technol. 34: 2261-2266.

Burland, S.M. and E.A. Edwards. 1999. Anaerobic benzene biodegradation linked to nitrate reduction. Appl. Environ. Microbiol. 65: 529-533.

Edwards, E.A. and D. Grbić-Galić. 1992. Complete mineralization of benzene by aquifer microorganisms under strictly anaerobic conditions. Appl. Environ. Microbiol. 58: 2663-2666.

Grbić-Galić, D. and T.M. Vogel. 1987. Transformation of toluene and benzene by mixed methanogenic cultures. Appl. Environ. Microbiol. 53: 254-260.

Harwood, C.S. and J. Gibson. 1997. Shedding light on anaerobic benzene ring degradation: a process unique to prokaryotes? A Minireview. J. Bacteriol. 179: 301-309.

Lovley, D.R., J.D. Coates, J.C. Woodward, and E.J.P. Phillips. 1995. Benzene oxidation coupled to sulfate reduction. Appl. Environ. Microbiol. 61: 953-958.

Rooney-Varga, J.N., R.T. Anderson, J.L. Fraga, D. Ringelberg and D.R. Lovley. 1999. Microbial communities associated with anaerobic benzene degradation in a petroleum-contaminated aquifer. Appl. Environ. Microbiol. 65: 3056-3063.

Weiner, J.M. and D.R. Lovley. 1998. Anaerobic benzene degradation in petroleum-contaminated aquifer sediments after inoculation with a benzene-oxidizing enrichment. Appl. Environ. Microbiol. 64: 775-778.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

DECLARATION FOR THE RECORD OF DECISION

Dover Municipal Landfill
Dover, New Hampshire

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for the Dover Municipal Landfill Site in Dover, New Hampshire, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The Region I Administrator has been delegated the authority to approve this Record Of Decision.

The State of New Hampshire has concurred on the source control and eastern plume management of migration portions of the selected remedy and has reserved a concurrence decision for the southern plume management of migration portion of the selected remedy.

STATEMENT OF BASIS

This decision is based on the Administrative Record which has been developed in accordance with Section 113 (k) of CERCLA and which is available for public review at the Dover Public Library in Dover, New Hampshire and at the Region I Waste Management Division Records Center in Boston, Massachusetts. The Administrative Records Index (Appendix E to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for Dover Municipal Landfill Site, which addresses source control and management of migration to meet cleanup goals. The selected remedy is multi-tasked. The remedial measures will protect the drinking water aquifer by minimizing further migration of contaminants to the

groundwater and surface water, will eliminate threats posed by direct contact with or ingestion of contaminated soils and wastes at the Site and will prevent the ingestion and direct contact with contaminated groundwater and surface water.

The major components of the selected remedy include

- Recontouring of the existing landfill;
- Consolidation of sediments in the perimeter drainage ditch;
- Limited excavation and consolidation of sediments in the drainage swale and at the confluence to the Cocheco River;
- Capping of the landfill;
- Upgradient groundwater diversion;
- Groundwater/leachate collection and treatment;
- Pre-design studies which include the installation of additional monitoring wells;
- Natural attenuation of the "eastern" plume;
- Groundwater Extraction and treatment of the "southern" plume;
- Long-term environmental monitoring;
- Institutional Controls, where possible.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action and is cost-effective. This remedy satisfies the statutory preference for remedies that utilize treatment as a principle element to reduce toxicity, mobility, or volume of hazardous substances. In addition, this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

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

Sept. 10 1991
Date

Julie Belaga
Julie Belaga
Regional Administrator
U.S. EPA, Region I

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 1

RECORD OF DECISION

DOVER MUNICIPAL LANDFILL SITE
DOVER, NEW HAMPSHIRE

ROD DECISION SUMMARY

Dover Municipal Landfill

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DOVER LANDFILL ROD DECISION SUMMARY
SEPTEMBER 10, 1991

I. SITE NAME, LOCATION AND DESCRIPTION

A. General Description

The Dover Municipal Landfill Site (the Site) is a 55-acre inactive landfill in Dover, Strafford County, New Hampshire. The Site is located in the western corner of Dover, at the intersection of the Dover, Barrington and Madbury town lines. A locus map showing the general location of the Site is included in Appendix A as Figure 1.

About one-half mile north of the Site is the Calderwood Well, which supplies roughly 20 percent of the drinking water to the City of Dover. About 2000 feet south of the Site is the Bellamy Reservoir which provides drinking water for Portsmouth, Newcastle, Newington, Durham, Madbury, Greenland and Rye, New Hampshire. The Cocheco River lies 500 feet east of the Site.

The topography to the north, south and southeast of the Landfill is relatively flat. To the east, the topography is more undulating with a sharp drop in elevation toward the Cocheco River. Wetlands predominate northwest, west and southwest of the Landfill. The Landfill is bordered by Tolend Road and Glen Hill Road on the North, by Tolend Road on the east, and by private property on the southeast and the south. The Site is located in a rural area, although land along the east side of Tolend and Glen Hill Roads has been subdivided for residential use. A number of homes are located along these roads. Recreational uses near the Site include fishing in both the Cocheco River and the Bellamy Reservoir.

Additional information regarding the characteristics of Dover, New Hampshire may be found in Section 2, pages 2-1 and 2-2 of the Remedial Investigation (RI) conducted by the State of New Hampshire's contractor; Wehran Engineers and Scientists (Wehran) and in Section 2, page 2-1 of the Field Element Study conducted by HMM Associates, Inc (HMM), the contractor for the Dover Landfill PRP Steering Committee. Site characteristics, analytical results and remedial alternatives have been presented in the following documents prepared by Wehran and HMM:

Remedial Investigation Report, Dover Municipal Landfill, Dover, New Hampshire., Wehran Engineers and Scientists, November 1988.

Field Elements Study and Supplemental Risk Assessment for the Municipal Landfill, Dover, New Hampshire, Hmm Associates, Inc., February, 1991.

Dover Municipal Landfill Feasibility Study, Dover, New Hampshire, HMM Associates, Inc., February, 1991.

B. Geology and Hydrology of the Site

The geology of the Site area is typical of the southeastern New Hampshire region. Unconsolidated overburden deposits, generally of glacial origin, are underlain by consolidated, usually metamorphic, bedrock. Unconsolidated overburden deposits include a wide variety of grain sizes reflecting historic changes in depositional environment. These deposits appear to divide into two generalized aquifer units, an upper and lower, separated by a clay aquitard that appears to have effectively limited groundwater contamination to the upper aquifer.

The upper aquifer unit contains a sand zone and an underlying finer grained, interbedded zone. The sand zone is composed of fine to medium grained sand with occasional silt and organic matter and traces of clay sized material. The sand unit ranges in thickness from 10 feet (at well B-12L) to 33 feet (MW-105U). The interbedded zone above the clay aquitard (the upper interbedded zone) consists of interbedded silt and clay layers. This unit has lateral and vertical hydraulic conductivities less permeable than the overlying sand, and ranges in thickness from 0 feet (MW-106L) to 70 feet (MW-102U).

The clay aquitard consists of a gray marine clay unit with very low permeability. The clay unit thickness ranges from 12 feet (MW-106L) to 42 feet (MW-105U). The upper surface of the unit is at a higher elevation and near land surface north and west of the Landfill at wells B-13, B-14 and MW-106. The upper surface is irregular and depressions or localized lows may occur in the vicinity of wells B-4, B-6, B-8 and B-2. This unit appears to pinch out in the vicinity of B-14; north of this location the lower and upper aquifers are no longer separated by a low permeability unit.

The lower aquifer unit has three distinct zones, none of which are continuous. Just below the clay zone is the lower interbedded zone which exhibits grain sizes and permeabilities

similar to that of the upper interbedded zone. This zone is thickest (up to 50 feet at B-1) north of the Landfill, where it also contains a thick sandy zone. It appears to terminate south and west of the Landfill. Its permeability characteristics appear similar to those of the upper interbedded zone. Beneath the lower interbedded zone is a highly permeable sand and gravel zone. Its thickness is quite variable. At MW-101, next to the Landfill, it is approximately 20 feet thick, while east of this location at B-9 it is approximately 40 feet thick. West or northwest of MW-101 it appears to pinch out (as between B-7 and MW-106). This zone is hydraulically connected to the Calderwood Well, and may provide a significant proportion of the water derived from that well. Beneath the sand and gravel zone is a tightly packed poorly sorted glacial till of low permeability. Where till occurs it lies directly on the bedrock; where till does not occur, the sand and gravel zone lies directly on the bedrock.

The Landfill is underlain by rocks of the Berwick Formation. Rock samples recovered were predominantly unweathered to slightly weathered micaceous quartz-biotite granobels. Sulfides (pyrrholite, massive pyrite) were observed to be common accessory minerals. Other lithologies observed included calc-silicate and carbonaceous phyllitic siltstone.

The bedrock appears to be moderately fractured with occasional highly fractured zones. Fractures generally paralleled bedding and foliation. Orientation of the fractures was generally in a northeast-southwest direction with dip angles moderate to steep toward the north. The depth to bedrock varies from about 23 feet (B-3R) to about 143 feet (B-11R) below land surface. The bedrock high of 130 feet above sea level is at B-3, and it slopes southward and eastward to a known low of about 11 feet below sea level at B-12R.

Groundwater in the upper aquifer moves essentially from an area north of the Landfill south towards the Bellamy Reservoir and east to the Cocheco River. To a lesser degree, groundwater also moves downward through the upper aquifer. Movement of groundwater into the lower aquifer is effectively inhibited by the presence of the marine clay aquitard.

Groundwater movement in the lower aquifer (in the landfill vicinity) moves northeastward under the influence of the pumping of the Calderwood Well. Water levels in the bedrock aquifer suggest upward movement into the lower aquifer and lateral movement towards the Calderwood Well.

Additional information about the Site geology and hydrology can be found in the Remedial Investigation on pages 5-1 through 5-29 and in the Field Element Study on pages 2-26 through 2-28 and pages 3-16 through 3-31.

C. Groundwater Supply

Two public water supplies are located in the vicinity of the landfill, the Calderwood well and the Bellamy Reservoir. The Calderwood well is located one half mile north of the Site. The Calderwood Well is a gravel-pack well approximately 114 feet deep. It is currently pumped at a rate of approximately 400 to 500 gpm or 576,000 to 720,000 gallons per day (GPD).

The Bellamy Reservoir is located approximately 1,700 south-southwest of the landfill and is a drinking water supply for the towns of Portsmouth, Newcastle, Newington, Durham, Madbury, Greenland, and Rye, New Hampshire. The drainage basin for the reservoir comprises approximately 22 square miles. The 420-acre reservoir has an average depth of 6 to 7 feet and an estimated usable storage capacity of 865 million gallons. Two water intakes connected to the City of Portsmouth Water Treatment Facility are located at the reservoir dam on Mill Hill Road, approximately 2 miles to the south of the Site. 2.0 to 2.8 million gallons per day (mgd) of water from the reservoir is treated prior to release into the Portsmouth water supply distribution system.

Residential wells near the Site obtained water from both the lower and upper aquifer. In 1981, contamination was found in the residential wells closest to the Site and situated in the upper aquifer, which also underlies the Landfill. The City of Dover installed a water supply line along Glen Hill and Tolend Roads during 1983, and residents closest to the Site were connected to the main at that time. Additional residential connections, further from the Landfill, continued until the fall of 1989.

A more complete description of the Site can be found in the Remedial Investigation Report on Pages 2-1 through 2-4, 4-3,and 4-4 and in the Field Element Study on pages 2-4 through 2-8.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Land Use and Response History

Operation of the Dover Municipal Landfill reportedly began about 1960 and ceased in 1979. The Dover Municipal Landfill accepted wastes, including liquids and sludges from both domestic and

industrial sources. The waste materials included, among other things, domestic and industrial sludges, shoe and leather tanning waste products, organic solvents, waste oil, and municipal solid waste. Table 1 found in Appendix B of this ROD provides a list of the types of industrial wastes, compiled from an industrial waste survey taken by The State of New Hampshire in 1976, that were disposed of at the Landfill from 1976-1977. Closure operations at the Site, conducted by the City of Dover, included a sandy-loam cover and surface water/leachate drainage channel construction, and site access control.

Landfill disposal practices varied during operation. They evolved from trenching, to burning, to a fill and cover method in 1962. Fill and cover operations were begun at the eastern portion of the present Landfill area and progressed westward until 1977 where it appears the current areal extent of the Landfill was reached. Disposal continued at the Landfill on top of previously deposited material. Drums of industrial waste were accepted at the Landfill until at least 1975. Since detailed records of each load of refuse brought to the Landfill were not kept, a detailed quantification and characterization of the waste buried cannot be calculated.

Liquid wastes were historically brought to the Landfill and reportedly disposed of by being poured onto the surface of existing refuse. If the wastes were flammable, during the early years of the Landfill's operation they were ignited and burned. Empty containers, such as drums, were crushed and disposed of with the municipal refuse. Some chemical wastes were known to have been disposed of at the Landfill while still in drums.

Landfill closure operations, by the City of Dover, consisting of placing clean fill over the existing material, were completed in March, 1980. One or two years later, the Landfill was closed for the interim as a part of a cooperative effort between the State and the City of Dover, and the drainage ditch was re-excavated around the Landfill consistent with its current configuration for the purpose of intercepting leachate and thereby limiting off-site contaminant migration.

Dover City officials along with the New Hampshire Water Supply and Pollution Control Commission (the Commission has since been incorporated as a Division within the New Hampshire Department of Environmental Services and is herein referred to as the NHDES) initiated a groundwater monitoring program at the Landfill in 1977. In 1980, the monitoring program was expanded to include several residential wells. Contamination was first found in a private residential well near the Landfill in February, 1981.

Subsequent samples, collected by the NHDES, were taken to determine whether the Landfill was the source of the contamination detected in the private water supplies. Surface water sampling and analyses were conducted by the NHDES in March and April, 1977, and by the City of Dover and the City of Portsmouth Water Departments in April, May and September, 1981 and in March, 1982.

The Landfill was evaluated as a potential hazardous waste site by the U.S. Environmental Protection Agency (EPA), ranked, and proposed for the EPA's National Priorities List (NPL) on December 30, 1982. The Site was placed on the NPL on September, 8, 1983. In accordance with the requirements of the National Contingency Plan (NCP), a Remedial Action Master Plan (RAMP) was prepared for the site in 1983. The RAMP included a recommended scope of services for remedial action planning activities at the site, and called for completion of a Remedial Investigation/Feasibility Study.

The Remedial Investigation (RI) for the Dover Municipal Landfill was conducted by the NHDES under a cooperative agreement with the EPA. The NHDES contracted with Wehran Engineers and Scientists to conduct the RI. The Field Element Study (FES), which addresses the data gaps of the RI, and the Feasibility Study (FS) were conducted by a group of Potentially Responsible Parties (PRPs) for the Site under an Administrative Order by Consent with EPA. The PRPs contracted with HMM Associates, Inc. to conduct these activities. The RI was completed in March 1989 and the FES and FS were completed in February 1991.

A more detailed description of the Site history can be found in the Remedial Investigation Report on pages 1-5 through 1-9 and in the Field Element Study on pages 2-1 through 2-8.

B. Enforcement History

In the spring of 1987 the City of Dover and several Dover businesses formed a PRP group and expressed to the Agency an interest in undertaking the Feasibility Study (FS) and filling the data gaps left by the RI. Negotiations between EPA and the PRP group were undertaken in the late summer 1987. After extended neogtiations, the City of Dover and eight businesses signed an Administrative Order by Consent (AO) with EPA and the State of New Hampshire in July 1988. In that Order the PRPs agreed to pay some past costs associated with the RI, to conduct a Field Element Study (FES) to fill data gaps left by the RI, and to conduct the FS. The Order also provided that additional parties could sign-on without renegotiating the terms of the

Order; an additional fourteen (14) PRPs have since signed the Order. The PRPs contracted with HMM Associates, Inc. to conduct these activities. The FES and FS were completed in February 1991.

In late January 1988 the City of Dover and four businesses were sent formal notice of their potential liability for the remediation of the Site. In late March and early April 1991, after an extensive PRP search, general notice was sent to 39 potentially responsible parties, including those PRPs already sent notice. Copies of the Proposed Plan were sent to all noticed parties as well as to public representatives and the news media to provide an opportunity to comment on the EPA's preferred Remedial Alternative. On April 15, 1991 EPA met with the PRPs to discuss their potential liability at the Site. At the request of EPA, the PRPs have been active in forming a new steering committee to consider the performance and financing of the Remedial Design and Remedial Action (RD/RA).

The PRPs have been active in the remedy selection process for this Site. Technical comments presented by PRPs during the public comment period and at the Public Hearing were evaluated, summarized in writing, and the summary and written comments are included in the Administrative Record.

III. COMMUNITY PARTICIPATION

Until April 1991, community concern and involvement at the Site had been relatively low. EPA has kept the community and other interested parties apprised of the Site activities through informational meetings, fact sheets, press releases and public meetings.

During December, 1984, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. On August 9, 1983 EPA and the NHDES held a meeting at the Dover City Hall auditorium to discuss the findings and recommendations of the Remedial Action Master Plan (RAMP). On December 13, 1984, NHDES held an informational meeting in the Dover City Hall auditorium to describe the plans for the Remedial Investigation and Feasibility Study. On March 30, 1989 NHDES and the EPA held an informational meeting in the Dover City Hall auditorium to discuss the results of the Remedial Investigation.

On March 16, 1991, EPA made the Administrative Record available for public review at EPA's offices in Boston and at the Dover Public Library in Dover, New Hampshire. EPA published a notice

-Further contamination of groundwater through the leaching of contaminants from the landfill.

-Direct contact with contaminated soils, sludge, sediments and debris found in the Landfill.

-Ingestion of contaminated soils, sludges, sediments and debris found in the Landfill.

-The off-site migration of contaminants in groundwater.

-Ingestion and direct contact with contaminated groundwaters and surface waters.

Remedial activities at the Site are comprehensive and designed to be a final remedy.

V. SUMMARY OF SITE CHARACTERISTICS

Section 1 of the FS contains an overview of the Remedial Investigation and Field Elements Study. Contamination at the Site is a result of the disposal of hazardous substances in the Landfill and the leaching of contaminants into the surrounding groundwater, surface waters, soils and sediments.

Analysis of soil, groundwater, sediment and surface water from areas in and around the Landfill indicate that the contamination at the Site is found primarily in the groundwater, surface water and sediments. The Landfill itself presents a potential threat as it may conceal containers of hazardous substances.

The most prevalent contaminants identified in groundwater at the Site are Volatile Organic Compounds (VOCs) such as 1,1,1-Trichloroethane (TCA) and degradation products of TCA such as 1,1-Dichloroethylene (DCE) and 1,2-Dichloroethane (DCA); acetone, benzene, toluene, and tetrahydrofuran. Also identified in the groundwater are trichloroethylene (TCE), ethylbenzene, xylenes, tetrachloroethylene, chloroethane, methyl ethyl ketone, methyl isobutyl ketone, vinyl chloride and methylene chloride. Arsenic was the prevalent metal found in the groundwater.

The significant findings of the Remedial Investigation and Field Element Study are summarized below.

A. Soil

Soil investigations were conducted at the Dover Landfill during the Remedial Investigation and also during the Field Elements

and brief analysis of the Proposed Plan in Foster's Daily Democrat on March 22, 1991 and made the plan available to the public at the Dover Public Library. The Proposed Plan included notice of a proposed waiver for the Safe Drinking Water Act, Maximum Contaminant Level (SDWA MCL) for arsenic in groundwater.

On March 25, 1991 EPA held an informational meeting at the Horne Street Elementary School to discuss the results of the Remedial Investigation, Field Elements Study and the cleanup alternatives presented in the Feasibility Study, and to present the Agency's Proposed Plan. Also during this meeting, the Agency responded to questions from the public. From March 26, 1991 to May 24, 1991, the Agency held a sixty day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. On April 16, 1991 the Agency held a public meeting to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments from the general public, Dover and Madbury City officials and from representatives of the Dover Landfill Steering Committee along with the Agency's response to comments are included in the attached Responsiveness Summary.

IV. SCOPE AND ROLE OF RESPONSE ACTION

The selected remedy was developed by combining components of different source control and management of migration alternatives to obtain a comprehensive approach for site remediation. In summary, the remedy provides for recontouring the existing landfill surface and construction of a 55-acre multi-layer cap over the landfill to prevent infiltration and promote run-off and the installation of a leachate and contaminated groundwater collection system around the perimeter of the landfill. The contaminated groundwater and leachate would then be treated on-site by a Powdered Activated Carbon Treatment System (PACT™) or equivalent system with discharge to the Cocheco River or pretreatment and discharge to the Dover Publicly Owned Treatment Works (POTW). There will be a limited excavation of the contaminated sediments from the existing drainage swale. These excavated sediments would be placed onto the landfill prior to capping. Natural attenuation processes will be utilized to attain groundwater cleanup levels in the eastern plume while a groundwater extraction and treatment system will be employed to attain cleanup levels in the southern plume.

The remedial action will address the following primary risks and principal threats to human health and the environment posed by the Site:

Study to address specific data gaps. Specifically, Base\Neutral and Acid extractable organic compound (BNA) contamination was detected in the soils between the drainage ditch and well cluster B-13 during the RI. Contamination at these locations was found to be below minimum detection limits during FES investigations.

A limited study of the potential locations of buried drums at the Landfill was conducted as part of the RI using surface geophysics. Test pits (excavations into the waste material) were also conducted. Crushed drums were found in many of the test pits throughout the Landfill. No definable areas of excessively high contamination, highly mobile sludges or large volumes of liquid filled drums (hot spots) were found in any of the test pits in the Landfill. The locations of the test pits can be seen in Figure 2 of Appendix A of this ROD.

Soil samples were obtained from the unsaturated zone within selected test pit excavations on the Landfill during the RI. VOCs were detected in single soil samples obtained from the following test pits:

Test Pit and location at the Landfill	Total VOC Concentration
TP-1 - northern part of the Landfill	475 ug/kg
TP-16- northwestern part of the Landfill	8,410 ug/kg
TP-19- southeastern part of the Landfill	680 ug/kg
TP-20- southwestern part of the Landfill	20,330 ug/kg

Primary VOCs observed, in terms of relative concentration or frequency include:

- ethylbenzene
- toluene
- xylene
- methyl butyl ketone
- acetone
- methyl ethyl ketone

Other soils sampled from the drainage ditch surrounding the Landfill, including the wetlands and the discharge stream, are described in the sediments discussion.

B. Surface Water

The RI included surface water and sediment samples from the perimeter drainage ditch and discharge stream of the wetland areas. Surface water samples did not detect the presence of elevated levels of metals or BNAs. VOC contamination was found

in the surface water samples taken from the drainage ditch from sampling locations SW-2 and SW-5. Samples taken during the RI from SW-2 (from the northern and upgradient side of the Landfill) contained total VOC concentrations as high as 1,819 ppb and the SW-5 sample (from the east side of the Landfill) contained 431 ppb. These data indicate that the drainage ditch is a predominant avenue for contaminant movement, including groundwater discharge, flowing from the Landfill and discharging into the Cocheco River.

The perimeter drainage ditch does not completely freeze over in the winter, indicating that exothermic conditions are present as a result of leachate from the Landfill entering the drainage ditch and affecting water quality and temperatures. This condition may also be a contributing factor with regard to the limited vegetative establishment in and around the ditch.

Surface water samples were collected as part of the Field Elements Study from the Cocheco River (a class B waterway), the Bellamy Reservoir (a class A surface water), and the culvert drainage area just northeast of Glen Hill Road as can be seen in Figure 2. The total concentration of VOCs (BNAs and metals were not analyzed) at SW-1 (taken at intersection of drainage culverts) was 50 ppb and at SW-2 (taken at the point of discharge to the Cocheco River) was 153 ppb. Additionally, EPA split samples indicated the presence of a combined total of 19 ppb of vinyl chloride, 1,2-dichloroethane, 1,1,1-trichloroethane, trichloroethene, benzene, 1,1-dichloroethane and ethyl benzene from station SW-2. VOCs identified in the surface water in the drainage ditch included:

- acetone
- 1,2-dichloroethylene
- methylene chloride
- methyl ethyl ketone
- methyl isobutyl ketone
- tetrachloroethylene
- tetrahydrofuran
- toluene
- xylene

Samples from the Bellamy Reservoir indicated no detectable levels of VOC contamination. The sampling of the Cocheco River indicated VOCs at the intersection of the drainage swale and the river (SW-2) and a trace amount of methylene chloride, further downriver.

Surface water samples were also taken as part of the Treatability Study. Surface water samples were analyzed for various parameters such as BOD, COD, TSS, etc. The complete list of parameters analyzed for can be found on Table 1-5 of the FES. Laboratory results for Treatability Study surface water

parameters are shown on Table 1-15 of the FES.

C. Sediments

Sediment sampling occurred in four general areas during the RI: the perimeter drainage ditch, the Cocheco River, the Bellamy Reservoir and the wetland locations north and west of the landfill. The highest levels of contamination were found within the perimeter drainage ditch and at the discharge point of the drainage swale into the Cocheco River. VOCs were detected in sediment sample S-5, including methyl ethyl ketone and trichloromethane at concentrations of 1700 and 400 ug/kg, respectively. Cadmium and arsenic were detected above anticipated background levels at stations S-5 and S-7. No VOC or BNA contamination was detected in the Bellamy Reservoir.

Results of the sediment sampling episode in the FES indicate some elevated concentrations of metals, principally arsenic and cadmium. The common range for arsenic in soils across the United States is 1 to 50 ppm, and for cadmium it is 0.01 to 0.70 ppm. Exceedances of the common range for arsenic were found at stations SD-1, SD-3, and SD-6 with concentrations of 51, 210 and 99 ppm, respectively. Each of these samples were collected from the drainage ditch around the Landfill or from the area where the drainage ditch culverts discharge to the swale that runs to the Cocheco River. Exceedances for cadmium were found at stations SD-4, SD-9, SD-10 and SD-16 with concentrations of 1.54, 1.16, 1.41 and 3.31 ppm, respectively.

Both lead and mercury concentrations were elevated in off-site station SD-2, and at station SD-9 located just upstream from where the culvert drainage waters enter the Cocheco River. The lead concentration from SD-16 (just south of Minichiello Brothers), and SD-8 (on the floodplain of the Cocheco River), were also relatively high. With the exception of suspected laboratory contaminants that were detected in four BNA samples, no other contamination was detected in the wetland sediments.

Sediment samples were collected for Total Organic Carbon (TOC) and sediment grain size analysis. Results of the TOC laboratory analysis are shown on Table 1-10 and results of the sediment grain size analysis on Table 1-11 of the FES. Actual laboratory reports of the analysis are shown in Appendix III of the FES. The discussion of sediments in the Remedial Investigation can be found on pages 7-4 through 7-7 and in the Field Element Study on pages 3-56 through 3-64.

D. Air

On September 11, 1990, EPA's Environmental Services Division (ESD) from Lexington, Massachusetts, conducted an eight hour air sampling program at five locations on and around the Dover Landfill site. The air sampling program involved collecting eight-hour ambient air samples on prepared Tenax sorbent cartridges and analyzing these sample cartridges with a gas chromatograph/mass spectrometer (GC/MS) at ESD's facility. The five stations were selected by the EPA based on previously obtained site-specific information and the objectives of this air sampling program, and concentrated in areas of high contamination found in the drainage ditch and swale which discharges to the Cocheco River.

The results, presented in Table 1-12 of the FS, showed low levels of VOCs in the air and were incorporated into the risk assessment (Section 2.0 of the Feasibility Study). The risk assessment evaluated potential health effects to humans from exposure to the contaminants at the concentrations detected.

In conjunction with this air sampling program, the EPA collected surface water/leachate samples from three of the five air sampling locations (locations #1, #3 and #4). The results from the analysis of these surface water samples are listed in Table 1-13 of the FS. The results from the surface water sampling program were evaluated to determine if volatilization of contaminants from the discharge stream was impacting the levels of contaminants in the ambient air on and around the site. The analytical results from the air samples collected from locations not impacted by the leachate in the drainage ditch (stations #2 and #5) and the stations impacted by volatilization of contaminants from the leachate in the drainage ditch (stations #1, #3 and #4) indicate that there is no significant impact to the on-site, ambient air quality from volatilization of contaminants from the leachate in the drainage ditch.

E. Wetlands Analysis

Wetland scientists from HMM Associates carried out a limited field investigation on March 27, 1990 of the wetland resource areas identified within and adjacent to the boundaries of the Dover Landfill. Various reference sources were used in the initial Field Elements Study to identify potential wetland resource areas. These sources included:

- Soil Survey of Strafford County, New Hampshire, March 1973

- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the Town of Dover, New Hampshire, Strafford County, Community Panel No. 330145 0005B, Effective Date: April 15, 1980

- National Wetland Inventory, Dover West, New Hampshire, April, 1977

- New Hampshire Department of Transportation (NHDOT) Wetlands Map

Further on-site review and verification of the related information indicated that there are four wetland systems in the vicinity of the Dover Landfill. Three of these wetland systems are described as the Bellamy Reservoir, Cocheco River, and the Hoppers System north of the site. The fourth wetland area includes the man-made drainage ditch which extends around the perimeter of the Landfill which is hydraulically connected with the Bellamy Reservoir wetland system. Delineation of the wetland areas are shown on Figure 3. The drainage ditch is not cross-hatched as are the other three areas on Figure 3.

These wetland systems were reviewed for evidence of physical effects on vegetation that could be attributed to the Dover Landfill. The review was limited in scope due to seasonal constraints in that no herbaceous vegetation could yet be seen. However, the woody vegetation exhibited no observable signs of stress-related conditions. With the exception of the drainage ditch and swale to the Cocheco River, the standing pockets of water throughout the systems were relatively clear and exhibited no signs of foaming or discoloration. Thus, there was no visible evidence that these wetland systems have been impacted by the Dover Landfill. The drainage ditch waters were observed to have foam on the water. In addition, although the temperature was such that area water bodies had ice cover, the drainage channels close to the landfill were not frozen. These factors suggest that leachate from the landfill is affecting the water quality and temperature of these surface waters.

F. Groundwater

Groundwater contamination (VOCs, metals, and BNAs) was found at several locations around the Dover Landfill. All three of these contaminant types were encountered in the upper aquifer just downgradient of or near the Landfill. The lower aquifer was not found to contain consistent or reproducible levels of contaminants in current or RI data. Contamination in well OW-1 was detected during the RI on several occasions possibly due to

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faulty well joints or construction, and therefore the well was abandoned in January 1988. Faulty joint connections were also corrected on well B-2. Figures 4 through 8 show total VOC, BNA and arsenic contaminant concentrations for groundwater for the upper and lower aquifers. "ND" indicates that contaminant levels were below the minimum detection level (MDL) of the instrument performing the analysis.

VOCs - Figure 4 depicts the concentrations of VOC data for groundwater samples collected from the upper aquifer at the Site, and Figure 8 shows the estimated extent of known VOC contamination related to the Landfill from the RI and FES in areas directly influenced by the Landfill. Generally, the November 1989 sampling results suggest that the VOC plume is attributable to hazardous substances in the Landfill and is moving in an east, southeastward direction. Figure 8 presents the estimated limit of contamination in the groundwater. The upper aquifer exhibits semi-radial groundwater flow (see Figure 9) with contamination generated by the Landfill being detected at monitoring well clusters B-2 to the east, toward the Cocheco River; southeast of the Landfill at MW-103, 104, OW-5 and B-6; and along the southern edge of the Landfill at clusters B-8 and B-4. Analytical data collected to date do not indicate that contaminants have migrated as far south as clusters MW-102 or B-10. VOC contamination was found in upper aquifer wells MW-101U, OW-1A, MW-104S, MW-104U, MW-103S, MW-103U, B-2U, B-4U, B-8U and OW-5 during the November, 1989 sampling episode. The highest concentrations of total VOCs for the site were detected at MW-101U (2,174 ppb), B-4U (760 ppb), OW-5 (744 ppb) and OW-1A (733 ppb). These analytical results indicate that the predominant mass of contaminants is migrating to the east/southeast toward the Cocheco River. Contaminants from the northwestern area of the Landfill appear to be flowing toward the Bellamy Reservoir. The estimated location and apparent historical trends for this data are provided on Figure 8. VOCs were found in some private residential wells near the Landfill in 1981. Residents near the Landfill were then connected to the City's water supply. At this time, only two residential wells (RW-3 and RW-21) are still being used for drinking water purposes. Of these two wells, RW-3 is in the lower aquifer, and the depth of RW-21 is unknown.

Residential Wells - Residential wells located in the vicinity of the Dover Landfill were sampled and analyzed for VOCs during numerous sampling episodes of the RI. Results of these analyses are shown on Figure 9. Contaminants were detected in wells RW-8 and RW-9 during the March 1981 sampling episode at 78 ppb and 10 ppb total VOCs respectively; and in wells RW-8, RW-17,

RW-18 and RW-21 at 10, 10, 95, and 62 ppb total VOCs respectively, in the May, 1985 sampling episode. No detectable levels of VOC were observed in the residential wells sampled after 1985.

Metals - Arsenic is the only metal with concentrations that exceed State and Federal drinking water standards of 0.05 parts per million (ppm). Concentrations of unfiltered arsenic from the November, 1989 FES sampling event varied widely across the site from 0.021 to 1.3 ppm in areas adjacent to the Landfill exhibiting VOC contamination and 0.003 to 0.09 ppm in areas where VOC contamination was not detected.

Arsenic occurs naturally in the soil matrix at the site and has been observed in other areas of southern New Hampshire. Other studies of New Hampshire groundwater indicate that, where elevated arsenic levels in water supplies are found it may be the result of natural geologic conditions. Arsenic has been found where no VOC contamination has been detected (including upgradient samples) as well as in samples associated with the VOC plume within the upper aquifer emanating from the Landfill. Figure 6 depicts the concentrations of arsenic found in the groundwater samples from the upper aquifer. Arsenic is also found at measurable concentrations in groundwater samples from the lower aquifer at wells B-6L and OW-3A, where VOC contamination had been detected during the RI but below minimum detection levels during the FES.

Filtered and unfiltered groundwater samples were obtained at various wells in the upper aquifer around the Landfill. Results indicate that arsenic is present in both, suggesting that particulate and dissolved forms of arsenic are present in groundwater in the upper aquifer. The particulate arsenic is that component adsorbed to soils or bound within the soil matrix. The presence of arsenic in the unfiltered groundwater samples and in background groundwater and sediment samples, including upgradient locations, suggests that arsenic is a naturally occurring element of the area's geologic formations.

The higher arsenic concentrations found in close proximity to and downgradient of the landfill relative to concentrations found elsewhere in the study area suggests that they are a result of landfilling activities. The waste materials disposed of at the landfill may be the source of the arsenic, or the leachate from the landfill may produce changes in groundwater geochemistry such that native arsenic is being mobilized.

BNAs - BNA contaminants were found in groundwater samples from the upper aquifer in November, 1989 (wells B-13U, OW-5 and MW-104S). Monitoring well B-13 showed low levels of contamination during the RI, but subsequent sampling did not indicate any sources. The area around B-13 is adjacent to a dirt road and is heavily traveled by recreational vehicles. It is possible that this BNA sampling reflected random spills as opposed to the effects of a leachate seep from the Landfill. Therefore, only the shallow wells MW-104S, OW-5, B-6U and B-2U located in a narrow band directly adjacent to the eastern edge of the Landfill are suspected to have BNA contamination derived from the Landfill.

PCBs/Pesticides - Groundwater from the Landfill was not found to contain any PCBs or pesticides from any of the analytical laboratory sampling results from either the upper or lower aquifers.

A complete discussion of site characteristics can also be found in the Remedial Investigation Report on Pages 7-1 through 7-15 and in the Field Element Study on Pages 5-1 through 5-15.

G. GROUNDWATER CONTAMINANT TRANSPORT

The Cocheco River and the Bellamy Reservoir are considered potential receptors of contaminants migrating from the Landfill. Residential wells have already been impacted by the migration of contaminants in the upper aquifer. The Calderwood well is also considered a potential, though less likely, receptor of the contamination form the Landfill.

Contaminants at the Site may enter the groundwater flow regime via percolation of liquid wastes disposed on the ground surface, infiltration of precipitation through contaminated solids, and direct subsurface discharges from leaking drums.

During the RI, VOC, BNA, and metals contamination in groundwater was observed to be most prevalent in the upper aquifer at monitoring well locations within 400 feet or less from the Landfill. Contamination detected in the lower aquifer monitoring wells is not indicative of transport of contamination from the Landfill through the marine clay layer to the lower aquifer. As was stated earlier, the results of contamination in the lower aquifer in well OW-1 may reflect leakage of contaminated groundwater from the upper aquifer through the PVC well pipe joints. This well has since been decommissioned.

The RI groundwater transport model provides an estimate of contaminant migration from the Landfill source area easterly and southeasterly toward the Cocheco River and private residential wells located along Tolend Road, and southerly toward the Bellamy Reservoir. The concentration isopleths depicting the contaminant plume predicted by each model simulation over time are found in the RI as Figures 25 through 30. Modeling results suggest that contaminated groundwater will reach the east bank of the Bellamy Reservoir, south of the Landfill, between approximately 1990 and 2005. Advective transport times are estimated to be on the order of 100 to several hundred years for the transport of contaminants from the upper aquifer through the marine clay layer. Contaminant transport times to the Calderwood well predicted by the model are on the order of 40 to 80 years after contaminant breakthrough to the lower aquifer.

HMM Associates, the contractor performing the FES for the PRP Steering Committee, also developed and utilized a groundwater contaminant transport model. Data during the FES indicated that the primary direction of groundwater flow was east/southeast towards the Cocheco River and that a small flow was south towards the Bellamy Reservoir. Field data during the FES also indicated that groundwater transport velocities may be slower than the RI had predicted. Additional sampling rounds indicate that the contamination has not migrated beyond the non-detect plume estimated by the RI.

The results from the FES groundwater model predicted that through natural attenuation it would take 5 to 7 years for the contamination in the eastern plume to attain groundwater cleanup levels and 10 to 24 years to attain cleanup levels in the southern plume once source control measures were implemented (including capping and leachate/ groundwater collection). Since monitoring well B-8u was installed with an 80 feet screened interval, it is currently unknown whether the contamination is primarily in the upper, unconsolidated layer, hence the 10 year attenuation time frame, or in the lower interbedded layer, which yields a time frame for attenuation of 24 years. The FES groundwater model also predicted that it is not likely that groundwater contamination will reach the Bellamy Reservoir, but if it did, it would do so below the Safe Drinking Water Act MCLs.

VI. SUMMARY OF SITE RISKS

A Risk Assessment (RA) was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site. The public health risk assessment followed a four step process:

1) contaminant identification, which identified those hazardous substances which, given the specifics of the site, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks. The results of the public health risk assessment for the Dover Municipal Landfill Site are discussed below followed by the conclusions of the environmental risk assessment.

Sixteen contaminants of concern, listed in Table 2 found in Appendix B of this Record of Decision were selected for evaluation in the risk assessment. These contaminants constitute a representative subset of the more than 41 contaminants identified at the Site during the Remedial Investigation and Field Element Study. The sixteen contaminants of concern were selected to represent potential site related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. A summary of the health effects of each of the contaminants of concern can be found in Chapter 4 of the Field Elements Study and Supplemental Risk Assessment (FES).

Potential human health effects associated with exposure to the contaminants of concern were estimated quantitatively through the development of the following four hypothetical exposure pathways:

- Future potential use of groundwater as drinking water
- Future potential use of Bellamy Reservoir as drinking water
- Incidental ingestion and dermal contact with surface water (Cocheco River and perimeter swale) while swimming or wading
- Ingestion and dermal contact with soil/sediment while swimming or wading

These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the Site. The following is a brief summary of the exposure pathways evaluated. A more thorough description can be found in Chapter 4 of the FES. For each pathway evaluated, an average and a reasonable maximum exposure estimate was generated corresponding to exposure to the

average and the maximum concentration detected and estimated exposure in that particular medium.

Groundwater

Groundwater is currently not being used; therefore, only a future use scenario was evaluated. Ingestion of 2 liters per day over a 70-year lifetime was assumed for both average and maximum exposure estimates.

Surface Water - Bellamy Reservoir

This water body, currently used as drinking water supply for seven municipalities, has not yet been contaminated by the Site. Potential future use of the Bellamy Reservoir as a drinking water supply was evaluated. Estimated future contamination concentrations were obtained by predicting, via modeling, the flow of contaminated groundwater. The predicted concentrations were considered to be a reasonable maximum exposure scenario. Ingestion of 2 liters per day over a 70-year lifetime was assumed.

Surface Water - Cocheco River and Landfill Perimeter Swale

Ingestion and dermal contact with surface water while swimming or wading in the Cocheco River and dermal contact while wading in the perimeter swale were evaluated as potential current and future exposure scenarios. The current and future use exposure scenarios were considered to be equivalent. The average exposure estimate for the Cocheco River exposure point was based on the assumption that children aged 6 to 16 swim or wade 12 times per year; the maximum exposure estimate was based on a frequency of 24 times per year. The average and maximum exposure estimate for the perimeter swale exposure point was based on the assumption that the children may wade 12 times per year.

Soil/Sediment Exposure

Ingestion and dermal contact with sediment while wading in the perimeter swale were evaluated as potential current and future use exposure scenarios. The average exposure estimate for both current and future use was based on the assumption that children aged 6 to 16 would wade 30 times per year; the maximum exposure estimate was based on a frequency of 90 times per year.

Lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with the chemical specific cancer potency factor. Cancer potency factors have been

developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is very unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g. 1×10^{-6} for 1/1,000,000) and indicate, that an individual is not likely to have greater than a one in one million chance of developing cancer over 70 years as a result of site-related exposure to the compound at the stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

The hazard index was also calculated for each pathway as EPA's measure of the potential for non-carcinogenic health effects. The hazard index is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects. Reference doses have been developed by EPA to protect sensitive individuals over the course of a lifetime and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The hazard index is often expressed as a single value (e.g. 0.3) indicating the ratio of the stated exposure as defined to the reference dose value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given compound). The hazard index is only considered additive for compounds that have the same or similar toxic endpoints (for example: the hazard index for a compound known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage).

Summary of Baseline Risk Assessment

Tables 3 through 8 of Appendix B of this ROD depict the carcinogenic and non-carcinogenic risk summary for the contaminants of concern in each exposure pathway described above.

Groundwater

The average and reasonable maximum exposure case carcinogenic risks associated with the potential future consumption of groundwater were approximately 2×10^{-2} (2 cancer cases in 100) and 7×10^{-2}, respectively. Arsenic comprised over 90% of the risk for both the average and reasonable maximum worst case scenarios. Vinyl chloride comprised approximately 5% of the risk for both scenarios. Other chemicals which contributed a risk of greater

than one in a million were benzene; chloroethane; 1,1 dichloroethylene; 1,2 dichloroethane; methylene chloride; tetrachloroethylene and trichloroethylene.

For non-carcinogenic effects, the average and reasonable maximum exposure case Hazard Indices exceeded one for the toxic endpoints of keratosis (skin discoloration) and liver effects. Arsenic and tetrahydrofuran were the major contaminants for these toxic endpoints, respectively.

The groundwater contaminant concentrations measured during the FES were used in the Baseline Risk Assessment except for two compounds. Data from the RI was used for tetrahydrofuran which was not analyzed for in the FES and 1,2 dichloroethane which was not detected in the FES.

Surface Water - Bellamy Reservoir

The reasonable maximum exposure case carcinogenic risk associated with the potential future consumption of groundwater was approximately $8x\ 10^{-6}$. Over 95% of this risk was due to arsenic.

For noncarcinogenic effects, the Hazard Index was well below one.

Surface Water - Cocheco River and Landfill Perimeter Swale

The reasonable maximum exposure case carcinogenic risks associated with exposure to both the Cocheco River and landfill perimeter swale were well below EPA's risk range of 10^{-6} to 10^{-4}.

For noncarcinogenic effects, the Hazard Index was well below one.

Soil/Sediment Exposure

The average and reasonable maximum exposure case carcinogenic risks due to arsenic associated with exposure to the landfill perimeter swale sediments via the ingestion pathway were approximately $1x10^{-6}$ and $8x10^{-5}$, respectively.

For noncarcinogenic effects the Hazard Indices for the average and reasonable maximum exposure scenario were below one.

Summary

In summary, predicted average and maximum carcinogenic health risks of $2x10^{-2}$ and $7x10^{-2}$ for the future use of groundwater exceeded EPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$. Arsenic and vinyl chloride were the major contributors to these risks.

A Hazard Index greater than one was predicted for future use of groundwater. Arsenic and tetrahydrofuran were the major contributors to the noncarcinogenic risks with maximum Hazard Indices of 37 and 24, respectively.

Maximum contaminant levels in groundwater exceeded the applicable regulatory standards set or proposed under the Safe Drinking Water Act - Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) for the following compounds: arsenic; benzene; 1,1 dichloroethylene; 1,2 dichloroethane; tetrachloroethylene; trichloroethylene and vinyl chloride.

The maximum predicted carcinogenic risk for sediment of $8x10^{-5}$ is within EPA's acceptable risk range (10^{-4} to 10^{-6}).

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, and the environment. Specifically an imminent and substantial threat to public health could result from the contaminated soils, sediments, sludges and debris in the Landfill and from drinking groundwater in proximity to the Landfill.

VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these statutory mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial action objectives were developed to aid in the development

and screening of alternatives. These remedial action objectives were developed to mitigate existing and future potential threats to public health and the environment. These objectives were:

- Prevent the migration of hazardous substances in the landfill to groundwater and surface water and the migration of the groundwater contamination beyond its current extent;
- Reduce risks to human health by preventing exposure to contaminants in groundwater, soils, surface waters, and sediments; and
- Restore contaminated groundwater at and beyond the compliance boundary to State and Federal applicable or relevant and appropriate requirements (ARARs) including drinking water standards, and to a level that is protective of human health and the environment.

B. Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a ınge of alternatives were developed for the Site.

With respect to source control, the FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long term management. This range also included alternatives that treat the principal threats posed by the site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternative(s) that involve little or no treatment but provide protection through engineering or institutional controls; and a no action alternative.

With respect to ground water response action, the FS developed a limited number of remedial alternatives that attain site specific remediation levels within different time frames using different technologies as well as a no action alternative.

A Treatability Study was conducted by HMM to provide data to evaluate treatment options for the Site, and to reduce cost and performance uncertainties for various treatment options. The study consisted of an additional sampling episode for sediment, surface water and

groundwater. The objective of the sampling round was to determine concentrations of a number of indicator parameters. The parameters analyzed represent an engineering assessment of specific chemical constituents that could affect the implementability or effectiveness of a groundwater remedial technology. Groundwater VOC data was used to determine the high and low ends of VOC loading for a treatment process. Groundwater was sampled to generate filtered arsenic data to help determine the amount of dissolved arsenic in the groundwater. Table 1-3 of the FS lists each parameter or set of analytes sampled as part of the Treatability Study and describes the associated criteria and treatment technologies.

Section 2 of the FS identified, assessed and screened technologies based on implementability, effectiveness, and cost. These technologies were combined into source control (SC) and management of migration (MM) alternatives. Section 3 of the FS presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e)(3) of the NCP. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. A limited number of alternatives were then evaluated in Section 4 of the FS.

In summary, of the approximately 9 source control and 4 management of migration remedial alternatives evaluated and screened in Section 3, 4 source control and 4 management of migration alternatives were retained for detailed analysis in Section 4. Tables 3-1 and 3-2 of Section 3 of the FS identify the 4 source control alternatives and 4 management of migration alternatives that were retained through the screening process, as well as those that were not chosen for detailed analysis.

VIII. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each alternative subject to detailed evaluation. A tabular assessment of each alternative can be found in Tables 3-4 and 3-5 of the Feasibility Study.

A. Source Control (SC) Alternatives Analyzed

Source control alternatives (on-site) were developed for the contaminated soils, sludges, debris and sediments associated with the Landfill as well as the contaminated groundwater located under the Landfill and the contaminated surface water in the perimeter drainage ditch.

The source control alternatives analyzed for the Site include the following alternatives:

SC-1: No-Action with Long-Term Monitoring;

SC-2: Limited Action with Long-Term Monitoring/ Access Restriction/ Institutional Controls;

SC-5/5A: Recontouring of Landfill/ Multi-layer Cap/ Slurry Wall/ Groundwater Recovery System/ Groundwater Treatment/ Discharge to Cocheco River (SC-5) or POTW (SC-5A)/ Geotextile Cover in Drainage Swale/ Erosion Control Blanket; and

SC-7/7A: Recontouring of Landfill/ Multi-layer Cap/ Interceptor Trench with Internal Landfill Extraction Wells/ Groundwater Treatment/ Discharge to Cocheco River (SC-7) or POTW (SC-7A)/ Selected Sediment Excavation with Consolidation in Landfill.

SC-1: No-Action

This alternative is included in the Feasibility Study, as required by CERCLA, to serve as a basis for comparison with the other source control alternatives being considered.

This alternative would require no remedial action except for long-term monitoring of groundwater, sediments, and surface water. No treatment or containment of disposal areas would occur and no effort would be made to restrict potential exposure to site contaminants. It is possible that a reduction of toxicity of contaminants may occur over time due to natural attenuation, but this may take many decades.

A Site inspection including groundwater and sediment monitoring would be performed four times a year, for 30 years. Samples collected would be analyzed for VOCs, BNAs, and metals. Monitoring data would be evaluated every five years.

This alternative does not meet many ARARs, which include the Safe Drinking Water Act groundwater MCLs, and State and Federal requirements that hazardous waste landfills be capped. In addition, the landfill has a potential for future non-compliance with ARARs such as State and Federal laws protecting the wetlands surrounding the Site and those laws protecting the Class A surface waters of the Bellamy Reservoir.

Estimated Time for Design and Construction: None
Estimated Time for Operation: 30 years, groundwater monitoring
Estimated Capital Cost: None
Estimated Operation and Maintenance Cost (net present worth): $169,000
Estimated Total Cost (net present worth for 30 years at 10% interest):$1,593,400

SC-2: Limited Action

This alternative is similar to SC-1, except that this alternative allows for limited measures to control access to and use of the Site. Warning signs and a fence with barbed wire would be installed to limit any further access to the Site. Institutional controls, such as deed restrictions, and municipal by-laws, where possible, would be implemented to prohibit disturbance of the contaminated source areas and use of the contaminated groundwater.

An inspection and long-term monitoring program similar to alternative SC-1 would be instituted. Also air monitoring would be performed at the Site annually at three locations along the southern, eastern, and northern perimeters of the landfill. Surface water monitoring would be performed at several locations along the perimeter drainage ditch.

While this alternative offers limited protection of human health from the hazards posed by the site, this alternative, like SC-1, provides little or no protection to the environment. In addition, many of the ARARs, such as the SDWA, RCRA, and State hazardous waste regulations, are not met by this alternative. Currently, groundwater contains contaminants which significantly exceed MCLs and the threat to the wetlands and the Bellamy Reservoir remain unchecked.

Estimated Time for Design and Construction: 1 month
Estimated Period for Operation: 30 years, air and groundwater monitoring
Estimated Capital Cost: $44,400
Estimated Operation and Maintenance cost (net present worth): $177,600
Estimated Total Cost (net present worth, for 30 years at @ 10% interest): $1,718,300

SC-5/SC-5A: Recontouring of Landfill/Multi-Layer Cap/Slurry Wall/Groundwater Treatment/Discharge to Cocheco River or POTW:

Alternative SC-5/SC-5A would involve recontouring of the landfill, construction of a multi-layer cap and a slurry wall to contain groundwater migration, on-site groundwater treatment (SC-5) or pretreatment (SC-5A), and final discharge to the Cocheco River (SC-5) or the Publicly Owned Treatment Works (POTW) (SC-5A).

Approximately 300,000 cubic yards of soils and debris from the toe of the side slopes and from the sediments in the drainage ditch would be consolidated into the Landfill to contour features of the Landfill prior to capping. Recontouring of the Landfill may reduce the amount of clean soil, necessary to achieve a maximum allowed slope of 5 percent, from 1,200,000 cubic yards to 850,000 cubic yards.

After the Landfill has been recontoured, backfilled and compacted, a multi-layer cap system will be constructed. The multi-layer cap would consist of a vegetative layer including topsoil and common fill, filter fabric, a drainage layer, a flexible membrane liner and a low permeability soil layer, and a gas (methane) vent layer directly over the buried solid wastes. Figure 10 is a cross-section of a typical multi-layer cap. Alternative SC-5/5A proposed the installation of a 12-inch sand layer as the material to be used for the drainage layer of the multi-layer cap, 2-feet of a compacted soil (with a hydraulic permeability of less than or equal to 10^{-7} cm/sec) in the low permeability layer and a 20 mil flexible membrane liner.

A slurry wall and a groundwater recovery system would be constructed around the perimeter of the landfill down to the clay layer. Construction of the slurry wall may be difficult because the bottom of the slurry wall must be keyed into the marine clay layer, which varies widely in depth and thickness. This method also risks puncturing the protective clay "lens" which may allow contaminated groundwater from the upper aquifer to migrate into the uncontaminated lower aquifer. Installation of the cap, slurry wall and groundwater recovery system eliminates the use of the perimeter drainage ditch as an avenue for contaminant migration, thereby limiting exposures to contaminated surface water and sediments.

The groundwater treatment system would consist of a sequencing batch reactor such as the Powdered Activated Carbon Treatment System (PACT™) or an air stripper, pending pre-design pilot study results. The FS chose the PACT™ system to describe and provide a cost analysis for the FS. In the PACT™ System the contaminated groundwater would first enter an aeration tank to remove VOCs; activated carbon present in the tank would remove non-volatile organic chemicals from the water. The water would then pass through a settling tank where flocculation, coagulation and precipitation processes take place to remove metals and suspended solids. The metals and solids settle at the bottom of the tank in the form of a sludge. If it is a RCRA waste, sludge will be disposed of at a permitted RCRA facility. The water would then pass through a multi-media filter and ultimately be discharged into the Cocheco River. A schematic of the proposed groundwater treatment system is shown in Figure 11 of this Record of Decision.

If discharge to the POTW is utilized, the construction of a pretreatment system may be required to meet the intake requirements of the Dover POTW. The pretreatment process would focus primarily on reducing suspended metals and solids. An approximately 2.5 mile piping system would be constructed to transport the pretreated groundwater to the POTW. The Dover POTW currently has the extra capacity to handle pre-treated water from the Landfill, and the capacity is expected to increase further by 1992 with the start-up of a secondary treatment unit, currently under construction.

This Alternative would also involve the installation of cover material over the drainage swale which drains from Glen Hill Road adjacent to the landfill down into the Cocheco River in order to minimize human and wildlife exposure to the contaminated sediments and minimize the potential migration of contaminated sediments in the surface water flow of the swale.

This alternative meets all ARARs.

SC-5 Cost Estimate (discharge to Cocheco River option):
Estimated Time for Design and Construction: 3-4 years
Estimated Period for Operation:30 years
Estimated Capital Cost: $31,266,600
Estimated Operation and Maintenance Cost (net present worth): $221,400
Estimated Total Cost (net present worth for 30 years at 10% interest): $33,353,600

SC-5A Cost Estimate (discharge to POTW option):
Estimated Time for Design and Construction: 3-4 years
Estimated Period for Operation:30 years
Estimated Capital Cost: $31,334,600
Estimated Operation and Maintenance Cost (net present worth): $206,000
Estimated Total Cost (net present worth for 30 years at 10% interest): $33,267,100

SC-7/7A: Recontouring of Landfill/ Multi-Layer Cap/ Interceptor Trench/ Discharge to Cocheco River or POTW:

Alternative SC-7/SC-7A would involve recontouring of the landfill, construction of a multi-layer cap and an interceptor/diversion trench around the perimeter of the landfill to contain and collect contaminated groundwater and divert clean groundwater, an on-site groundwater treatment (SC-7) or pretreatment (SC-7A), and final discharge to the Cocheco River (SC-7) or the Publicly Owned Treatment Works (POTW) (SC-7A).

This alternative would involve recontouring the existing landfill and construction of a multi-layer cap over the recontoured landfill. Recontouring would involve the excavation of up to 300,000 cubic yards of on-site fill material from the perimeter of the landfill and depositing it on the landfill center to achieve the necessary slope for proper drainage. Approximately 250,000 cubic yards of clean fill would also be required for the minimum 3 percent slope allowed.

The 55-acre multi-layer cap would be constructed after the existing landfill had been recontoured, backfilled, and compacted. The cap would consist of a vegetative layer including topsoil and common fill, a geocomposite drainage layer, a flexible membrane liner, a synthetic low permeability layer, and a gas (methane) vent layer directly over the buried solid wastes. Figure 10 is a cross-section of a typical multi-layer cap. Alternative SC-7/7A proposed the use of a geocomposite as the drainage layer material, a 40 mil flexible membrane liner and a low-permeability bentonitic blanket for the low permeability layer (with a hydraulic permeability of less than or equal to 10^{-7} cm/sec).

A groundwater recovery system would consist of an upgradient groundwater diversion trench to intercept clean groundwater before it flows into the landfill system and a downgradient interceptor trench/extraction well system, or combination system, to collect groundwater/leachate, which currently migrates from the site. The interceptor/diversion trench system would extend around the entire existing landfill perimeter. Inside the trench, a one foot diameter perforated pipe, wrapped in filter fabric, and a drainage net would be connected to a series of manholes. Submersible pumps housed in the manholes would extract collected groundwater. This system would be designed to lower the groundwater table beneath the landfill's refuse. Extraction wells will be placed within the landfill boundaries to lower groundwater below the waste material. Collected contaminated groundwater would be conveyed to an on-site groundwater treatment system with discharge to the Cocheco River or the Dover POTW after pre-treatment. Clean groundwater in the upgradient diversion trench would be diverted to either the surrounding wetland system or the Cocheco River without being mixed with contaminated water. The installation of the cap and the interceptor/diversion trench system eliminates the perimeter drainage ditch as an avenue for contaminant migration and limits potential human and wildlife exposure to Site contaminants.

The actual on-site treatment system(s) that will be used at the site will be determined during pre-design studies and will include a sequencing batch reactor such as the Powered Activated Carbon Treatment System or an air stripper. The FS described the Powered Activated Carbon Treatment System (PACT™), summarized above in

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Alternative SC-5/5A.

If the POTW option is utilized, the construction of a pretreatment system which would meet the intake requirements of the Dover POTW, may be required. The pretreatment process would focus primarily on reducing suspended metals and solids. As was described in SC-5/5A, the Dover POTW currently has the extra capacity to handle some pre-treated water from the landfill.

The sediment control component provides for predesign sampling to identify specific areas of sediment deposition along the drainage swale that could contain concentrations of contaminants in excess of the cleanup levels. Based on the physical characteristics of the drainage swale, the extent of contamination is expected to be limited. Contaminated sediments will be removed with little or no heavy equipment; sediments will likely be removed by hand shovel. This method was evaluated because of the difficulties associated with getting heavy equipment into and out of the steep-sloped swale. This approach, will reduce the overall impact to the environment during implementation as compared to using heavy equipment.

This alternative meets all ARARs.

SC-7 Cost Estimate (discharge to Cocheco River option):
Estimated Time for Design and Construction: 3-4 years
Estimated Period for Operation: 30 years
Estimated Capital Cost:$20,014,700
Estimated Operation and Maintenance Cost (net present worth): $239,300
Estimated Total Cost (net present worth for 30 years at 10% interest):$22,273,600

SC-7A Cost Estimate (POTW option):
Estimated Time for Design and Construction: 3-4 years
Estimated Period for Operation: 30 years
Estimated Capital Cost:$20,174,700
Estimated Operation and Maintenance Cost (net present worth): $211,900
Estimated Total Cost (net present worth for 30 years at 10% interest): $22,171,900

B. Management of Migration (MM) Alternatives Analyzed

Management of migration alternatives address contaminants that have migrated beyond the boundaries of the Landfill. At the Dover Site, contaminants have migrated from the Landfill into groundwater east towards the Cocheco River, and also south towards the Bellamy Reservoir. The primary groundwater threat to human health and the

environment is in that portion of the groundwater contaminant plume flowing south towards the Bellamy Reservoir.

The Management of Migration alternatives evaluated for the Site include the following alternatives:

MM-1: No Action with Long-Term Monitoring;

MM-2: Limited Action with Long-Term Monitoring/ Institutional Controls;

MM-3: Groundwater Interceptor Trench/ Groundwater Treatment/ Hydraulic Barrier/ Discharge to Wetlands; and

MM-4: Groundwater Extraction Wells/ Groundwater Treatment/ Discharge to Wetlands and Cocheco River.

MM-1 No-Action

This alternative was evaluated in detail in the FS to serve as a baseline for comparison with the other remedial alternatives under consideration. Under the No Action alternative, there would be no removal, containment, or treatment of off-site contaminated groundwater. However, this alternative would require long-term groundwater monitoring, as is described under Alternative SC-1.

This alternative combined with alternatives SC-5/5A or SC-7/7A, would achieve over time the chemical specific ARARs, through natural attenuation. Natural attenuation times frames for the groundwater to attain cleanup levels are 5 to 7 years in the eastern plume (groundwater contamination flowing in the direction of the Cocheco River) and 10 to 24 years in the southern plume (groundwater contamination flowing in the direction of the Bellamy Reservoir), after the implementation of an active source control alternative. However, during this period of natural attenuation, contaminated groundwater east and south of the site poses a threat to human health and the environment. In addition, contaminants may reach the waters of the Bellamy Reservoir.

Estimated Time for Design and Construction: None
Estimated Period of Operation: 30 years
Estimated Capital Cost: None
Estimated Operation and Maintenance Cost (net present worth): $142,800
Estimated Total Cost (net present worth for 30 years at 10% interest): $1,346,500

MM-2: Limited Action:

Management of Migration Alternative MM-2, Limited Action, provides long-term monitoring of the off-site contaminated groundwater for at least 30 years. In addition, under this alternative institutional controls will be employed where possible, limiting Site access, Site use, and preventing the use of groundwater from the upper aquifer for potable and municipal usage. These institutional controls will be implemented regardless of which management of migration alternative (except for no action, MM-1) is implemented. The City of Dover passed a zoning ordinance in February 1991 that restricts the use of groundwater within 1500 feet of the landfill as a potable water supply.

A long-term groundwater sampling and monitoring program will be developed and implemented. This may include the installation of additional wells, including the area of the plume closest to the Bellamy Reservoir. The monitoring will further define groundwater contaminant concentrations and the extent of migration towards the Bellamy Reservoir.

This alternative, coupled with SC-5/5A or SC-7/7A, would achieve over time the chemical specific ARARs through natural attenuation. Natural attenuation times frames for the groundwater to attain cleanup levels are 5 to 7 years in the eastern plume and 10 to 24 years in the southern plume, after the implementation of an active source control alternative. While this alternative provides more protection to humans from contaminated groundwater during natural attenuation, it does nothing to prevent contaminants from reaching the Bellamy Reservoir.

Estimated Time for Design and Construction: 6 months
Estimated Period of Operation: 30 years
Estimated Capital Cost: None
Estimated Operation and Maintenance Cost (net present worth): $176,541
Estimated Total Cost (net present worth for 30 years at 10% interest): $1,673,593

MM-3: Groundwater Interceptor Trench/Recharge Trench/Hydraulic Barrier:

Management of migration alternative MM-3, includes the construction of a groundwater interceptor trench at the leading edge of the groundwater contaminant plume on the southern and southeastern sides of the landfill. Installation of this trench would passively collect contaminated groundwater, which has migrated into the wetlands adjacent to the Landfill, thereby limiting the further spread of the plume. Contaminated groundwater collected by the trench would be

pumped to a treatment unit on or adjacent to the Landfill. The treated groundwater would then be recharged downgradient of the trench.

The interceptor trench would be located off-site south and southeast of the Dover Landfill extending laterally approximately 2,200 linear feet. An approximately 4-foot wide by 25-foot deep trench would be excavated and dewatered prior to laying the pipe. The bedding inside the trench would include gravel and a perforated pipe wrapped with filter fabric. After placement of the bedding material, the trench would be backfilled to surface grade. The recharge trench would be located downgradient of the interceptor trench and also extend about 2,200 linear feet. An approximately 2-foot wide by 4-foot deep recharge trench would be excavated and HDPE corrugated, perforated pipe would be installed. Gravel would be placed around the pipe to promote drainage. Groundwater collected by the interceptor trench would be pumped from a manhole via a submersible pump to an on-site groundwater treatment facility. A portion of the treated groundwater would be returned to the management of migration area via the recharge trench. This would minimize localized dewatering of the wetlands which would reduce the adverse impact of this activity. Treated groundwater in excess of that which could be recharged would be discharged to the river. Trench installation would adversely impact wetlands along the southern and southeastern portions of the Landfill. However, once the trench and associated piping have been installed any wetland areas impacted by excavation and installation procedures can be restored. Actual design configuration of the interceptor-recharge system would be dependent upon additional data and analysis obtained during predesign activities.

Groundwater treatment technologies previously identified for the source control alternatives apply as well to this alternative.

The cleanup time frames for this alternative are estimated to be 3 to 5 years for the eastern plume area and 10 to 24 years for the southern plume, after the implementation of an active source control alternative.

Implementation of this alternative in conjunction with a source control alternative which involves treatment would allow all ARARs to be met. Construction of the groundwater interceptor trench and a groundwater recharge trench in the wetlands and the associated treatment system would alter portions of the wetlands. All construction activities associated with the implementation of this alternative will be coordinated with federal and state authorities and meet the substantive legal requirements of federal and state wetland protection laws. Key ARARs include the SDWA MCLs; Executive Orders EO 11988 and 11990 and 40 CFR 6 Appendix A (concerning the protection of

wetlands and floodplains); the Clear Water Act; the New Hampshire Criteria and Conditions for Fill and Dredging in Wetlands; and the New Hampshire Rules Relative to Prevention of Pollution from Dredging, Filling, Mining, Transporting and Construction.

Figure 12 presents the conceptual layout for this alternative.

Estimated Period for operation: 10 years
Estimated Capital Cost: $1,452,200
Estimated Operation and Maintenance Cost (net present worth): $78,800
Estimated Total Cost (net present worth for 10 years at 10% interest): $1,936,600

The cost of long-term (semi-annual) monitoring is estimated as follows:

Estimated Period for Operation: 30 years
Estimated Capital Cost: $9,400
Estimated Operation and Maintenance Cost (net present worth): $93,600
Estimated Total Cost (net present worth for 30 years at 10% interest): $892,100

Total cost, MM-3 and long-term monitoring: $ 2,828,700

MM-4: Groundwater Extraction Wells and Treatment System:

Alternative MM-4 is designed to collect and treat contaminated groundwater which has migrated from the landfill in both the southern and eastern directions. It differs from Alternative MM-3 only in that the interceptor trench would be replaced by a series of recovery wells. This alternative would consist of the following: the installation of several groundwater extraction wells at off-site locations on the southern and eastern sides of the site; the on-site treatment of contaminated groundwater; the recharge of the treated water to wetlands downgradient of the wells and/or discharge of the treated water to the Cocheco River. Groundwater collected by the extraction wells would be pumped at a total of approximately 125 gpm to a treatment unit on or adjacent to the Landfill.

The estimated time to achieve cleanup levels is contingent on the aquifer characteristics, retardation, plume mass and areas of extraction. Based on these factors, MM-4 would be located in approximately the same place as MM-3, as shown in Figure 13. The cleanup time frames for this alternative are estimated to be 3 to 5 years for the eastern plume area and less than 10 to 24 years for the southern plume, after the implementation of a source control alternative.

Implementation of this alternative in conjunction with a source control alternative which involves treatment would allow all ARARs to be met. Wetland mitigation measures and restoration efforts would be required in order to comply with the Location Specific ARARs, as discussed for Alternative MM-3. However, this alternative would have less detrimental impact on the wetlands than MM-3. All ARARs will be met.

Estimated Period for Operation: 10 years
Estimated Capital Cost: $1,503,700
Estimated Operation and Maintenance Cost (net present worth): $394,200
Estimated Total Cost (net present worth for 10 years at 10% interest): $3,925,900

The cost of long-term (semi-annual) monitoring is estimated as follows:

Estimated Period for Operation: 30 years
Estimated Capital Cost: $9,400
Estimated Operation and Maintenance Cost (net present worth): $93,600
Estimated Total Cost (net present worth for 30 years at 10% interest): $892,100

Total cost MM-4 and long-term monitoring: $ 4,818,000

IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that EPA must consider in its assessment of alternatives. Building upon these specific statutory mandates, the National Contingency Plan articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a Site remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria and their definitions are as follows:

Threshold Criteria

An alternative must meet the two threshold criteria described below in order to be eligible for selection in accordance with the NCP.

1.**Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2.**Compliance with ARARS** addresses whether or not a remedy will meet all of the ARARs of other Federal and State environmental laws and/or provide grounds for invoking a waiver.

Primary Balancing Criteria

The following five criteria are used to compare and evaluate the elements of alternatives which have met the threshold criteria to each other.

3.**Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4.**Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how reatment is used to address the principal threats posed by the site.

5.**Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup levels are achieved.

6.**Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7.**Cost** includes estimated capital and Operation & Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used on the final evaluation of remedial alternatives generally after EPA has received public comment on the RI/FS and Proposed Plan.

8.**State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the publics general response to the alternatives described in the Proposed Plan and RI/FS report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in Section 4, Tables 4-22 and 4-23 of the Feasibility Study.

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis.

1. **Overall Protection of Human Health and the Environment**
Alternatives SC-7/7A and SC-5/5A would provide overall protection to human health by preventing direct contact, ingestion, and inhalation of site contaminants. These alternatives would provide dermal contact protection from on-site contaminants due to the construction of the multi-layer landfill cap. There were no hot spots found in the landfill that would warrant treatment. Both alternatives minimize the further off-site migration of leachate and contaminated groundwater and provide for treatment of the collected contamination.

Alternatives SC-1 and SC-2, the No Action and Limited Action Alternatives, would not meet this criterion in its entirety. Alternative SC-2 provides for certain protective measures to secure the site from unauthorized entry, and would reduce the potential for direct contact with and possible ingestion of contaminated materials at the site. Inhalation hazards from airborne dust particles or VOC emissions could be a factor if the Landfill were to be disturbed at some point in the future.

Alternatives MM-2, MM-3 and MM-4, would provide overall protection to human health as long as the groundwater is not used as a drinking water source. Off-site groundwater contamination is reduced through natural attenuation as described under MM-1 and MM-2 and by groundwater extraction and treatment as described under alternatives MM-3 and MM-4. MM-3 and MM-4 would provide overall protection to human health and the environment by controlling the migration of contaminated groundwater thereby preventing further contamination of the aquifer and neighboring wetlands. Alternative MM-4 would provide a shorter cleanup time than MM-3, because of increased groundwater extraction rates. Alternative MM-1 (the no action alternative) would provide no protection of human health from groundwater contamination. Neither MM-1 nor MM-2 protect the Class A waters of the Bellamy from contamination during the period of natural attenuation.

2. Compliance with ARARs

Each alternative was evaluated for compliance with ARARs, including chemical-specific, action-specific and location specific ARARs. These alternative specific ARARs are presented in Section 4 of the FS.

With the exception of the no action (SC-1) and the limited action (SC-2) source control alternatives, all of the other source control alternatives would meet all ARARs. SC-1 and SC-2 does not comply with RCRA regulations and the New Hampshire regulations for the design, closure and post closure requirements of the Landfill and General Facility Standards. In addition, SC-1 and SC-2 allow contaminants in excess of MCLs to migrate from the site. Further degradation of the current landfill cover and the leachate trench also poses a threat to the wetlands, the Cocheco River and the Bellamy Reservoir in contravention of Federal and State laws protecting wetlands, flood plains, and Class A drinking water sources. Alternatives SC-7A and SC-5A will have to meet POTW discharge requirements.

All of the management of migration alternatives would over time meet Federal and State ARARs if implemented in conjunction with a preferred source control alternative. However, during the natural attenuation period MM-1 fails to protect human health from groundwater containing contaminants in excess of MCLs south and east of the site. Also, MM-1 fails to protect the Bellamy Reservoir from the migration of the southern plume. Alternative MM-2 includes institutional controls to assist in protecting humans from consumption of contaminated groundwater, yet do nothing in the short term to protect the waters of the Bellamy Reservoir.

Alternative MM-3, and to a lesser extent, alternative MM-4, have significant short-term adverse impacts on the wetlands to the south and east of the Site as a result of construction and monitoring to take place in them. However, they meet the NCP's mandate of groundwater cleanup in a reasonable time. Alternatives MM-3 and MM-4 would have to comply with additional action specific ARARs such as state and federal groundwater discharge limits and other applicable groundwater anti-degradation regulations.

The management of migration alternatives would meet few if any ARARs if implemented without an active source control portion of the remedy. The time frame to attain cleanup levels would increase significantly due to the continued release of contaminants into the groundwater from the Landfill.

In the long term all of the management of migration alternatives achieve compliance with chemical specific ARARs; however, the alternatives differ in the time it takes to achieve compliance.

3. Long-term Effectiveness and Permanence

The No Action (SC-1) and Limited Action (SC-2) alternatives would not be effective or permanent in reducing long-term risk; all of the contaminants will remain at the Site and continue to leach into the groundwater.

Alternative SC-7/7A and alternative SC-5/5A provide effective, long-term reduction in leachate generation, control of landfill gases, and eliminate the potential for dermal contact with untreated wastes. Both alternatives require the construction of a multi-layer (composite) cap on the Landfill that provides long-term minimization of precipitation infiltration, resulting in a reduction in the amount of leachate generated. They also require the construction of a leachate collection system - either a slurry wall or an interceptor trench - both of which provide for long term reduction of clean water entering the Landfill and long term collection of contaminated water leaving the Landfill. Both alternatives provide for treatment of the contaminated leachate and groundwater.

All of the Management of Migration Alternatives, provide an equal degree of long-term effectiveness and permanence, when instituted with an active source control alternative. Alternatives MM-3 and MM-4 employ treatment of contaminated groundwater to meet cleanup levels for VOCs and metals. Alternatives MM-1 and MM-2 do not propose any action to remediate the contaminated groundwater but rely on natural attenuation processes, over time, to attain the groundwater cleanup levels. The primary difference in these alternatives are the times they take to meet clean up levels and the protection they afford in the short run. Both MM-3 and MM-4 provide significantly more protection in the short run to the Bellamy Reservoir.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives SC-1 and SC-2 would not provide a reduction in contaminant toxicity, mobility, or volume through treatment because these alternatives do not provide for treatment. Alternatives SC-7/7A and SC-5/5A are similar in their ability to achieve the cleanup levels for groundwater at and beyond the point of compliance by effectively reducing contaminant toxicity, mobility, and volume through collection and treatment of the groundwater/leachate prior to discharge. Alternatives SC-7/7A and SC-5/5A would reduce the mobility of the contaminants in soil and sediments but would not reduce the volume or toxicity because direct treatment of these materials is not practicable.

Alternatives MM-1 and MM-2 would not provide any reduction in toxicity, mobility, or volume of any groundwater contaminants through treatment. Alternatives MM-3 and MM-4 would reduce toxicity, mobility, and volume through treatment since both alternatives would employ collection and treatment of contaminated groundwater prior to discharge.

5. **Short-term Effectiveness**

Alternatives SC-1 and SC-2 would not have any short term impacts from construction and implementation activities. Alternatives SC-5/5A and SC-7/7A have the potential for release of contaminants during construction activities especially during the recontouring of the landfill and the digging of the trench or slurry wall. However, special engineering precautions would be taken to minimize the potential for air releases of contaminants to ensure protection of workers and area residents during cleanup related construction activities. These measures include interim foam covers, enclosed cabs on backhoes and hydraulic excavators, and dust and odor suppression techniques to control fugitive dust emissions. Additionally, since active measures are being taken to control and intercept the migration of contaminated groundwater/leachate, attainment of groundwater cleanup levels at the compliance boundary will occur sooner than with SC-1 and SC-2.

Some increase in traffic and noise pollution would be expected from activities under SC-5/5A and SC-7/7A, especially from the import of off-site fill needed to construct the cap. Short term effectiveness would be somewhat lower for SC-5A and SC-7A relative to SC-5 and SC-7 due to the construction impacts from the 2.5 mile sewer connecting to the POTW. The total construction periods are estimated to be 3-4 years for SC-5/5A and 2-3 years for SC-7/7A.

Neither MM-1 nor MM-2 poses a threat to human health or the environment as a result of construction or implementation. Alternatives MM-3 and MM-4 would have short-term impacts to adjacent wetlands during construction. Construction of the groundwater recovery wells and recharge system in MM-4, plus associated transmission piping may negatively impact the wetland vegetation in the construction area. An area 10 feet wide and 2,000 feet long would be extensively disturbed in order to install the extraction wells and piping. The construction of the interceptor and recharge trenches under MM-3 require an even larger impact due to construction activities. An access roadway along the perimeter of the trench would be necessary to transport the material for construction as well as providing a staging area for the excavated soils. Both alternatives have the potential to affect the water balance of the wetlands due to pumping and discharge. Recharging of the treated groundwater is

expected to minimize the dewatering of the wetlands.

Alternatives MM-1 and MM-2 employ natural attenuation and are expected to attain cleanup levels in the eastern plume in 5 to 7 years and 10 to 24 years in the southern plume after the implementation of an active source control remedy. In the eastern plume, MM-3 and MM-4 offer an improvement over MM-1 and MM-2: 3 to 5 years vs. 5 to 7 years. In the southern plume, because MM-3 relies on the natural flow of groundwater, the time frame for MM-3 clean up will not be a significant improvement over MM-1 and MM-2. The time frame for MM-4 cleanup of the southern plume will depend largely upon the rate that the contaminated groundwater can be extracted from the aquifer; it is expected to be an improvement over the MM-3 time frame. Alternatives MM-3 and MM-4 offer significantly better protection for the Bellamy Reservoir in the short term; contaminants will be prevented from migrating closer to the reservoir by these two alternatives.

6. **Implementability**

Alternatives SC-5/5A, SC-7/7A, MM-2, MM-3, MM-4 are implementable, are well-developed technologies, and have been used successfully at other sites. The recontouring activities present some potential for encountering hazardous waste. Preliminary studies and special construction procedures would be used to minimize this potential. Hot spots, consisting of highly toxic and/or highly mobile material which present a potential principal threat to human health or the environment, once exposed by recontouring would have to be tested, removed, treated and disposed of in an off-site RCRA TSD facility. The multi-layer cap and PACT™ systems of SC-5/5A and SC-7/7A have been installed on many other sites. Obtaining clay of sufficient volumes for the low permeability layer of the cap may be difficult under alternative SC-5/5A.

Sufficient land is available for operation of the groundwater/leachate treatment system and its supporting facilities for SC-5/5A and SC-7/7A. Preliminary bench-scale and pilot-scale testing would have to be performed prior to implementation of the groundwater treatment system. No major technical problems are anticipated.

The interceptor trench/barrier wall of SC-7/7A would require less technical and support equipment resources to install than the slurry wall of SC-5/5A. The design and construction of the sediment cover (SC-5/5A) in the drainage swale down to the Cocheco River would not pose any unique implementation problems. However, the limited excavation provided for in SC-7/7A would be much easier and quicker to implement. Construction activities would have to be scheduled during seasonal low flows to minimize potential impacts on the Cocheco River. The sediment removal activity under SC-7/7A poses no significant

implementability problems.

An expansion of the Dover POTW is currently under construction and is expected to be in place by 1992. It should be able to provide adequate treatment capacity for the Site's pre-treated groundwater and leachate as an alternative (SC-5A and SC-7A) to discharging to the Cocheco River.

Alternatives SC-1, SC-2, MM-1 and MM-2 can be accomplished with little difficulty and use well established and reliable monitoring and analytical procedures. However, some of the proposed institutional controls may be difficult to implement.

Alternatives MM-3 and MM-4 are both easily implemented. MM-3's trench construction in wetlands is somewhat more difficult than MM-4's extraction wells. Also, MM-4 would be implemented more easily for a deeper zone of contamination than would the trench.

7. **Cost**
The estimated present worth value of each alternative and the options are as follows:

COST COMPARISON OF SOURCE CONTROL ALTERNATIVES

		Capital Costs	O & M	Present Worth
SC-1	No Action	$ 0	169,000	1,593,400
SC-2	Limited Action	44,400	177,600	1,718,300
SC-5	Recontour/Multi-Layer Cap/ Slurry Wall/ Groundwater Treatment/ Discharge to Cocheco River/ Sediments Cover	31,266,600	221,400	33,353,600
SC-5A	Recontour/Multi-Layer Cap/ Slurry Wall/ Groundwater Treatment/ Discharge to POTW/ Sediments Cover	31,334,600	205,000	33,267,100

SC-7	Recontour/Multi-Layer Cap/ Interceptor/ Diversion Trench/ Groundwater Treatment/ Discharge to Cocheco River/ Sediments Excavation	20,014,800	239,300	22,270,600
SC-7A	Recontour/Multi-Layer Cap/ Interceptor/ Diversion Trench/ Groundwater Treatment/ Discharge to Cocheco River/ Sediments Excavation	20,174,700	211,862	22,171,900

COST COMPARISON OF MANAGEMENT OF MIGRATION ALTERNATIVES

	Capital Costs	O&M Costs ($/Yr)	Long-Term Monitoring	Present Worth
MM-1 No Action	$ 0	142,834	*	1,346,482
MM-2 Limited Action	9,356	176,541	*	1,673,593
MM-3 Groundwater Interceptor Trench/Recharge Trench/ Groundwater Treatment	1,452,154	78,840	892,200	2,828,738
MM-4 Groundwater Extraction Wells and Treatment System	1,503,699	394,200	892,200	4,818,047

* Long-term monitoring costs are included in the capital and O & M costs for these remedies.

8. **State Acceptance**

The New Hampshire Department of Environmental Services (NHDES) has been involved in the study and oversight of the Site since the late 1970's, as summarized in Section II of this document. The Remedial Investigation was performed as a state lead through a cooperative agreement between the state and EPA. The NHDES has reviewed this document and concurs with the source control and eastern plume management of migration portions of the selected remedy and has reserved a concurrence decision on the southern plume management of migration portion of the selected remedy until pre-design studies have been completed. A copy of the declaration of concurrence is attached as Appendix D.

9. **Community Acceptance**

The comments received during the public comment period and the and the public hearing on the Proposed Plan and FS are summarized in the attached document entitled "The Responsiveness Summary" (Appendix G). In addition, a summary of the comments appears below.

A large number of comments were submitted by citizens of Dover and Madbury as well as their community leaders and representatives, both at the public hearing and in writing during the public comment period, arguing that the taxpayers of these two towns could not bear the costs of the proposed remedy. Many of these commentors argued that the EPA should take no action other than long term monitoring, while others argued that a less effective cap would suffice. It should be noted that prior to the public comment period, the City of Dover and the Town of Madbury had been issued general notice of potential liability for the cleanup of the Site thus giving rise to the possibility that local taxpayers will bear some portion of the cleanup cost.

One resident from the community wrote that placing a fence around the Site will not protect anyone from possible hazards of the contamination, does not feel residents should be penalized for the PRPs' unwillingness or inability to correct mistakes made in the past, and hopes that EPA takes into consideration the effect of a Limited Action Plan on the people and property values around the Landfill. The Public Works Department of the City of Portsmouth commented on the proposed plan stating it agreed with the EPA's preferred alternative. It also noted that if the Bellamy Reservoir were contaminated, the cost of replacing it would far exceed the cost of the remedial action proposed for the Landfill.

The PRPs submitted seven comments, an alternative to EPA's proposed cleanup plan, and a public health evaluation report. The seven comments are summarized as follows: 1) the PRPs want to see a

conditionally phased approach to cleanup the Site; 2) the PRPs do not feel that remediation of the southern plume through groundwater extraction and treatment is justified; 3) the PRPs state that the Proposed Plan did not clearly define the criteria for termination of active on- and off-site groundwater recovery and treatment operations; 4) the PRPs want the compliance boundary at the edges of the Bellamy Reservoir and the Cocheco River to which Site groundwater discharges; 5) the PRPs comment that the EPA preferred multi-layer cap is excessive and that the NHDES minimum design specifications for solid waste landfill caps should be incorporated; 6) the PRPs want a separation of flows between the contaminated groundwater in the interceptor trench and the clean groundwater in the diversion trench; and 7) the PRPs comment that the remediation of the drainage swale sediments to address risk associated with arsenic present in the sediments is overprotective.

The alternative that the PRPs submitted includes phasing the cleanup at the Site. Phase 1 includes the construction of a NHDES solid waste cap over the Landfill. They commented that if this remedial action was sufficient to achieve Site cleanup objectives, further action would not be needed and would not be implemented, and if further action were judged to be needed, additional phases could be sequentially implemented. Phase 2 includes the installation of a groundwater interception trench upgradient of the Landfill; Phase 3 includes the installation of a groundwater interceptor trench downgradient of the Landfill with collection and treatment of intercepted groundwater and Phase 4 includes the installation and operation of an off-site groundwater extraction and treatment system.

The public health evaluation report submitted by the PRPs commented on the methodologies employed by and the uncertainties associated with the baseline risk assessment of the RI.

X. THE SELECTED REMEDY

The remedy selected for the Dover Municipal Landfill Site, source control alternative SC-7/7A and a combination of the management of migration alternatives MM-2 and MM-4, addresses all contamination at the Site.

A. Interim Groundwater Cleanup Levels

Interim cleanup levels have been established for contaminants of concern identified in the baseline risk assessment found to pose an unacceptable risk to either public health or the environment. Interim cleanup levels have been set based on the appropriate ARARs (e.g. Drinking Water MCLGs and MCLs) if available, or other suitable criteria. Periodic assessments of the protection afforded by remedial

actions will be made as the remedy is being implemented and at the completion of the remedial action. At the time that all the interim cleanup levels described below have been achieved, a risk assessment shall be performed on the residual groundwater contamination. This risk assessment of the residual groundwater contamination shall follow EPA procedures and will assess the cumulative risks for carcinogens and non-carcinogens posed by consumption of groundwater. If the risks are not within EPA's risk levels for carcinogens and non-carcinogens, then the remedial action will continue until protective levels are attained, or the remedy is otherwise deemed protective.

Because the aquifer at and beyond the compliance boundary for the Site is a Class IIB aquifer, which is a potential source of drinking water, MCLs and non-zero MCLGs established under the Safe Drinking Water Act are ARARs.

Interim cleanup levels for known and probable carcinogenic compounds (Class A and B) have been set at the appropriate MCL given that the MCLGs for these compounds are set at zero. In the absence of an MCLG, an MCL, a proposed drinking water standard or other suitable criteria to be considered (i.e. health advisory, state criteria), a cleanup level was derived for carcinogenic effects based on a 10^{-6} excess cancer risk level considering the ingestion of ground water.

Interim cleanup levels for the Class C, D and E compounds (possible carcinogens, not classified, and no evidence of carcinogenicity) have been set at the MCLG. Interim cleanup levels for compounds in ground water exhibiting non-carcinogenic effects have been set at the MCLG. In the absence of a MCLG or other suitable criteria to be considered, interim cleanup levels for non-carcinogenic effects have been set at a level thought to be without appreciable risk of an adverse effect when exposure occurs over a lifetime.

EPA has determined that the Safe Drinking Water Act (SDWA) MCL for arsenic in groundwater is relevant but not appropriate to this site and therefore is not an ARAR. Since naturally occurring levels of arsenic in the groundwater at and around the site are suspected of being greater than the SDWA MCL for this substance, based on field sampling and relevant literature, it may be technically impracticable for any cleanup technology to reduce arsenic levels below background to the SDWA MCL. Given that the Resource Conservation and Recovery Act (RCRA) regulations establish cleanup levels for arsenic in the groundwater at the same point as the SWDA MCL (50 ug/l) or at background levels, whichever is higher, RCRA sets a more appropriate flexible standard for the arsenic cleanup level for this Site.

Though the interim cleanup level for arsenic is based on the RCRA MCL of 50 ug/l, data has indicated that arsenic occurs naturally in

groundwater at the Site. It is the intent of EPA to establish the background level for arsenic in groundwater prior to or during the remedial design. In accordance with RCRA, cleanup levels for arsenic will be set at 50 ug/l or background, whichever is higher. Until background levels for arsenic in groundwater is determined, the interim cleanup level will be set at 50 ug/l.

Table 1 below summarizes the Interim cleanup levels for carcinogenic and non-carcinogenic contaminants of concern identified in ground water.

TABLE 1: INTERIM GROUND WATER CLEANUP LEVELS

Carcinogenic Contaminants of Concern (Class)	Interim Cleanup Level (ppb)	Basis	Level of Risk
Arsenic (A)	50#	MCL[a]	$2.0x^{-04}$[b]
Benzene (A)	5	MCL[c]	$4.1x^{-06}$
1,1 Dichloro-ethylene (C)	7	MCLG	$1.2x^{-04}$
1,2 Dichloro-ethane (B)	5	MCL	$1.3x^{-05}$
Methylene chloride (B)	5	pMCL[d]	$1.1x^{-06}$
Tetrachloro-ethylene (B)	5	MCL	$7.3x^{-06}$
Trichloro-ethylene (B)	5	MCL	$1.6x^{-06}$
Vinyl Chloride (A)	2	MCL	$1.3x^{-04}$
		SUM	$4.8x10^{-4}$

Non-carcinogenic Contaminants Concern	Interim Cleanup Level (ppb)	Basis	Target Endpoint of Toxicity	Hazard Index
Arsenic	50#	MCL	keratosis	1.4
Chloroethane	14000	RfD	developmental	1.0
Tetrahydrofuran	700	RfD[e]	liver	10.0
Acetone	700	NHDPHS[f]	liver	0.2
Methyl Ethyl Ketone	200	HA[g]	fetotoxicity	0.1
Methyl Isobutyl Ketone	350	NHDPHS	liver, kidney	0.2
Toluene	1000	MCL	liver, kidney	0.14

Due to the presence of naturally occurring arsenic at and around the Site, the cleanup levels will be 50 ug/l (MCL) or background, whichever is higher, as determined by the EPA and NHDES during predesign and design activities.

a - Maximum Contaminant Level, Resource Conservation and Recovery Act.

b - The cleanup level for arsenic in groundwater has been set at the MCL of 50 ppb. The carcinogenic risk posed by arsenic at 50 ppb in groundwater will approximate 2 in 1,000. However, in light of recent studies indicating that many skin tumors arising from oral exposure to arsenic are non-lethal and in light of the possibility that the dose-response curve for the skin cancers may be sublinear (in which case the cancer potency factor used to generate risk estimates will be overstated), it is Agency policy to manage these risks downward by as much as a factor of ten. As a result, the carcinogenic risks for arsenic at this Site have been managed as if they were 2 in 10,000. (See EPA memorandum, "Recommended Agency Policy on the Carcinogenic Risk Associated with the Ingestion of Inorganic Arsenic" dated June 21, 1988.)

c - Maximum Contaminant Level, Safe Drinking Water Act

d - Proposed Maximum Contaminant Level

e - A Reference Dose of .002 mg/kg/day was used to derive the interim cleanup level and associated Hazard Index. (See memo from P. Hurst to R. Duwart dated May 3, 1990 - Appendix C) An uncertainty factor of 0,000 is associated with this RfD. Because of this very high uncertainty factor, a Hazard Index of 10 is considered acceptable.

f - New Hampshire Department of Public Health Services Drinking Water Criteria

g - EPA Health Advisory

These cleanup levels must be met at the completion of the remedial action at the point of compliance, which in accordance with the NCP, is established at and beyond the edge of the existing waste area. The existing waste area includes the landfill and the leachate trench surrounding it. After construction of the remedy the point of compliance will be the outer wall of the interceptor trench. EPA has estimated that these cleanup levels will be obtained within 5 to 7 years for the eastern plume and in less than 10 to 24 years for attainment in the southern plume after implementation of the source control component.

While these interim cleanup levels are consistent with ARARs (or suitable To Be Considered criteria) for groundwater, a <u>cumulative</u> risk that could be posed by these compounds may exceed EPA's acceptable risk range for remedial action. Consequently, these levels are considered to be <u>interim</u> cleanup levels for groundwater. In addition, once all these levels are achieved for each compound, EPA expects that

due to different rates of attenuation for each compound, levels of most will be below these interim cleanup levels. Thus, when all of the interim cleanup levels have been attained, a risk assessment will be performed on residual groundwater contamination to determine whether the remedial action is protective. Remedial actions shall continue until protective concentrations of residual contamination have been achieved or until the remedy is otherwise deemed protective by EPA. These protective residual levels shall constitute the final cleanup levels for this Record of Decision and shall be considered performance standards for any remedial action.

B. **Sediment Cleanup Levels**

The cleanup level for arsenic, in the sediments of the drainage swale, has been set at a level deemed protective for environmental receptors. The drainage ditch surrounding the Landfill conducts surface water to a drainage swale which empties into the Cocheco River. Arsenic levels in the drainage swale range from 36 ppm at the top of the swale, to 99 ppm at the confluence of the swale with the Cocheco River. Arsenic levels in the sediments of the landfill perimeter drainage ditch were found at 51 and 210 ppm.

The National Oceanic and Atmospheric Administration (NOAA) has analyzed data collected worldwide using a variety of methods to determine the probable levels where adverse biological effects would occur for most contaminants. The chemical concentrations observed or predicted by the different methods to be associated with biological effects were sorted. The lower 10th percentile (Effects Range Low or ER-L) was identified indicating the low end of the range of chemical concentrations at which an adverse effect was observed or predicted. The median concentration (Effects Range Median or ER-M) was identified as representative of the concentration above which adverse effects were frequently or always observed or predicted among most species. These ER-L or ER-M values are not to be construed as NOAA standards or criteria, but as guidelines by which sediment contamination can be evaluated.

The levels of arsenic found in the sediments in the drainage swale exceed both the NOAA ER-L and ER-M for arsenic. The ER-L is 33 ppm, that is, 10 percent of the available data showed some adverse affect occurred at an arsenic level of 33 ppm. The ER-M is 85 ppm, a concentration at which 50 percent of the data demonstrated an adverse response.

The observed concentrations of arsenic at the site were evaluated in conjunction with the associated physical parameters, specifically total organic carbon (TOC), and grain size, which contribute to the bio-availability of the arsenic; and with the NOAA guidelines. The

evaluation indicates that a 33 ppm cleanup level corresponding to the ERL would be conservative cleanup level. A cleanup level of 50 ppm would be justified, and would provide for protection of the environment.

This 50 ppm cleanup level must be met at the completion of the remedial action at and beyond the point of compliance. Thus, the drainage swale east of the Landfill and down to the Cocheco River and the sediments that have accumulated at the convergence of the swale and the river must meet this cleanup level.

C. Description of Remedial Components

The source control portion of the remedy will involve the following key components:

Use of on-site material from the perimeter of the Landfill to recontour the existing Landfill to achieve the necessary slope for drainage;

Construction of a multi-layer cap over the recontoured Landfill;

Construction of a leachate/groundwater extraction system and clean groundwater diversion system provided by a perimeter interceptor trench, extraction wells or a combination of the two;

Installation and operation of an on-site groundwater/leachate treatment system with discharge to the Cocheco River for SC-7 and discharge to POTW for SC-7A;

Methane gas collection and passive venting;

Construction of a surface run-on/run-off diversion system with sedimentation/ detention basins; and

Limited drainage swale sediment removal and consolidation under the Landfill cap.

Recontouring involves the moving of the existing Landfill perimeter soils and debris from the toe of the Landfill side slopes, as well as the perimeter drainage ditch sediment, on top of the Landfill to contour features of the Landfill prior to capping. Recontouring will be done to provide adequate slopes to allow for proper surface water drainage from the waste pile area. Recontouring will also reduce the amount of imported clean fill required to obtain these slopes. Approximately 1,200,000 cubic yards of imported soil will be necessary to cover the 55-acre Landfill if the maximum allowed 5% slope is used. This volume is reduced to approximately 850,000 cubic yards if the

Landfill is recontoured. For a minimum 3% slope, the amount of imported soil could be reduced by another 20-30% from the approximately 550,000 cubic yards. Reductions in the amount of imported soil would translate to a proportionate reduction in truck traffic, congestion, roadway damage, noise and dust. It will also significantly reduce the cost of the cap. The ultimate slope will be determined during design.

During recontouring, waste material at the perimeter of the Landfill would be uncovered and hot spots may be encountered. To minimize this possibility, a preliminary assessment would be performed consisting of geophysics and test pit exploration before the commencement of recontouring activities aimed at limiting the excavation to areas containing predominantly soils, debris, and municipal waste. If, however, hot spots are exposed, the material would be tested and removed, treated, and disposed of off-site in accordance with RCRA and state hazardous waste laws.

The multi-layer cap (also referred to as a composite cap) prevents direct infiltration of precipitation into the Landfill to minimize the subsequent generation of leachate. Figure 10 is a cross-section of a typical multi-layer cap. This multi-layer cap consists of the following layers (from top to bottom):

- Top soil
- Common fill
- Geosynthetic fabric
- Drainage layer
- Composite low permeability layer consisting of a flexible membrane liner over a low-permeability material
- Geosynthetic fabric
- Gas vent layer

The top layer of the multi-layer cap consists of two components: (1) a vegetative top soil, selected to minimize erosion and, to the extent possible, promote drainage off the cover and (2) a soil component comprised of common fill, the surface of which slopes uniformly at least 3 percent but not more than 5 percent.

The drainage layer shall have a minimum hydraulic conductivity of 1 X 10^{-2} cm/sec which will effectively minimize water infiltration into the low-permeability layer. This layer will have a final slope of at least 3 percent after settlement and subsidence to allow the infiltrated water to flow along the low-permeability liner and not collect, or "pool", in any one location along the low-permeability liner. The drainage layer also provides a protective bedding for the flexible membrane liner (FML). There are generally two options for the materials used to construct this layer: (1) 12 inches of soil

(coarse sands) or (2) a geocomposite material (geonet between two layers of geotextile) with equivalent performance characteristics. The largest factor in determining the material to be utilized will be the depth of protection needed to prevent the maximum frost penetration of the low-permeability layer. Cycles of freezing and thawing may cause cracking, lessening of density, and loss of strength to the low-permeability layer. If a geocomposite material is utilized as the drainage layer, the thickness of the vegetative layer must be protective such that the maximum depth of frost penetration will not infiltrate the low-permeability layer.

The third layer is the two-component low-permeability layer, lying wholly below the maximum depth of frost penetration, that provides long-term minimization of water infiltration into the underlying wastes. This low-permeability layer consists of a 40-mil (1.0 mm) minimum thickness flexible membrane liner component and a compacted soil component with a minimum thickness of at least 24 inches and a maximum in-place saturated hydraulic conductivity of 1×10^{-7} cm/sec. There are several alternative materials that can be used for the low-permeability layer; clay, a soil/bentonite mixture or a bentonitic blanket. Regardless of which material is used, it must meet the criteria of having a hydraulic conductivity of 1×10^{-7} cm/sec. The criteria for selecting which material to use for the low-permeability layer are availability, implementability, and cost.

A gas vent layer between the Landfill wastes and the low-permeability layer shall be installed. This layer is generally made up of 12 inches of coarse-grained, porous materials (similar those used in the drainage layer) that allow gases emanating from the wastes buried in the landfill to be collected. Vent structures will be installed into this layer, allowing the gases to vent to the atmosphere. These gases shall be tested, and if needed, additional measures, such as, but not limited to, the installation of carbon canisters, will be implemented to reduce odors and VOC emissions.

Filter layers (geotextiles) are likely to be needed above the drainage layer, above the gas vent layer and between any other layers comprised of soils of greatly different particle sizes, to prevent one from migrating into the other. The filters may be constructed of graded soil materials or geosynthetic materials.

This multi-layer cap represents the state-of-the-art in landfill cap design and as such is as a reliable and effective cap as can currently be designed. The cap will be designed to meet or exceed the performance requirements set forth in ARARs including 40 CFR 264.111, 40 CFR 264.310 and the guidance document Final Covers on Hazardous Waste Landfills and Surface Impoundments, July 1989 (EPA/530-SW-89-047) (Technical Guidance) or in a manner to achieve performance

equivalent to that of ARARs.

The purpose of the interceptor trench/extraction well system is to actively lower the groundwater table level beneath the Landfill so that the waste material is no longer in contact with the groundwater that may migrate off-site. Figure 14 shows a typical groundwater depression caused by an interceptor trench. The groundwater/leachate recovery system consists of approximately 2,200 feet of interceptor trench installed to approximately 25-feet of depth on the downgradient side of the Landfill, at the historical boundaries of the Landfill, to collect contaminated groundwater. The length of the interceptor trench vertical barrier (impermeable membrane) will extend the full 6,100 feet around the perimeter of the existing (55-acre) Landfill. The actual depth will depend on the results of hydrogeologic and geotechnical engineering studies conducted during predesign. The 25-foot depth represents the approximate point at which the lower permeability interbedded zone begins. Inside the trench, a perforated pipe wrapped with filter fabric and drainage net would be laid and connected to a series of manholes. Submersible pumps with high/low switches will be housed inside the manholes to extract the collected groundwater and leachate.

The upgradient portion of the trench serves as a diversion system for the upgradient clean groundwater. The upgradient groundwater is diverted to prevent clean groundwater from possible contact with the landfill wastes, thus reducing the volume of contaminated groundwater requiring treatment. The clean groundwater flowing into this trench would be diverted to either the wetlands or the Cocheco River without mixing with contaminated groundwater. The determination as to the ultimate discharge location will be made during design.

Extraction wells, alone or in conjunction with the interceptor trench, may be utilized, especially where contaminated groundwater flows from the Landfill at a depth greater than 25 feet. The extraction wells can be placed at points around the Landfill to optimize the extraction of the more highly contaminated areas of the plume. An example of this would be the installation of an extraction well on the edge of the landfill, closest to the monitoring well B-2U. The extraction well will collect not only leachate emanating from under the Landfill, but through draw down, can also "pull back" and extract the contaminated groundwater currently detected in well B-2U. This will prevent this contaminated groundwater from flowing past B-2U and entering into the Cocheco River, or discharging through seeps in the drainage swale and volatilizing into the atmosphere.

Monitoring wells will be installed in the central portion of the Landfill for the following purposes: to determine groundwater contamination levels directly under the Landfill; to detect

contaminants that may have pooled under the Landfill and on top of the marine clay layer; and to monitor water table declines within and beneath the Landfill. The installation of extraction wells in the landfill will supplement contaminated groundwater and leachate extraction from under the Landfill and further lower the water table beneath the Landfill. The number and location of these wells will be determined during design.

The implementation of the contaminated groundwater and leachate collection system, the upgradient diversion trench and the installation of extraction wells within the Landfill will be optimized so as to minimize redundant functions of each individual component. In addition the components, as a complete system, will be designed to achieve the objectives of lowering the groundwater beneath the waste materials, preventing clean groundwater from contact with the wastes or increasing the amount of contaminated groundwater requiring treatment, and preventing contaminated groundwater and leachate from exceeding SDWA MCLs at and beyond the compliance boundary.

The groundwater/leachate treatment system selected for the Site must be able to address metals, organics, and potentially high chemical and biochemical oxygen demand levels. A powdered activated carbon treatment system, similar to the PACT™ System, has been selected to treat the contaminated groundwater/leachate. However, if during pre-design pilot studies it is determined that this system will not be as effective or efficient as an air stripping system, preceded by metals precipitation, this alternate treatment system may be employed.

The Powered Activated Carbon Treatment System (PACT™) consists of the following steps. Collected groundwater would first enter an aeration tank to remove VOCs; activated carbon present in the tank would remove non-volatile organic chemicals from the water. The water would then pass through a settling tank where flocculation, coagulation, and precipitation processes takes place to remove metals and suspended solids. Precipitation reduces the solubility of iron, nickel, chromium and other metals so that tiny particles of the metals are produced. Once a precipitate forms, the flocculation tank allows the particles to collide and adhere due to flocculating agents. The heavier metals precipitates and solids then settle at the bottom of the tank in the form of sludge. The sludge will tested to determine if it is a RCRA waste and then disposed of off-site in compliance with ARARs. The water then passes through a multi-media filter before being discharged. The effluent from the groundwater treatment process would have to meet the substantive requirements of NPDES for discharge to the Cocheco River and/or discharge to the wetlands. A schematic of this groundwater treatment system is shown in Figure 11. The design flow for the groundwater/leachate treatment systems is approximately 40 gpm.

The two discharge options available are: 1) discharge to the Cocheco River and 2) discharge to the Dover POTW. The POTW option would require the installation of approximately 2.5 miles of sewer line and at least one lift station. Leachate collected from the groundwater/ leachate collection system would be discharged to the local sewer system. Some on-site pretreatment of leachate may be required to meet applicable sewer discharge standards. Table 9 lists the current sewer discharge pretreatment standards for the Dover POTW. At present, the Dover POTW has the extra capacity to handle some pre-treated water from the Landfill, and the capacity is expected to increase further by 1992 with the start-up of the secondary treatment unit, currently under construction. The decision on discharge options will be made during pre-design studies.

The sediment control component provides for predesign sampling to be performed to identify specific areas of sediment deposition along the drainage swale that contain concentrations of contaminants in excess of the arsenic clean-up level. Based on the physical characteristics of the drainage swale, the extent of contamination is expected to be limited. The removal of approximately 300 cubic yards of contaminated sediments is expected to occur through the use of manual labor. However, if the amount of material to be removed is extensive, other mechanical means may have to be employed. The excavated sediments will be deposited back on top of the Landfill prior to the construction of the Landfill cap.

The selected remedy for the management of migration utilizes portions of MM-2 and MM-4 and includes the following elements:

the use of institutional controls, where possible, to prohibit the use of groundwater;

implementation of a long-term groundwater sampling/monitoring program;

pre-design studies which include the installation of additional monitoring wells to further define the lateral extent, depth and mass of the contaminated groundwater;

one or more pump tests to determine the ability and rate that contaminated groundwater can be extracted from the aquifer;

use of natural attenuation processes to attain groundwater clean-up levels in the eastern plume;

installation of several off-site groundwater extraction wells in the southern plume, connection to an on-site treatment system, extraction and treatment of the groundwater and recharge of the

treated groundwater to the wetlands or discharge to the Cocheco River.

Institutional controls, where possible, will limit Site access, Site use, prohibit the use of groundwater from the upper aquifer for potable usage and prohibit the disturbance of the marine clay unit between the upper and lower aquifers. These institutional controls include fencing, warning signs, deed restrictions, zoning changes, and other actions which will prohibit the use of contaminated groundwater. The City of Dover has already passed a zoning ordinance restricting the use of groundwater within 1,500 feet of the Landfill as a potable water supply. The Town of Madbury has proposed to take similar action.

The RI and FES investigations indicate that contaminants exceeding MCLs have migrated from the Landfill into the groundwater to the south and the east of the site. Since ARARs are not met in the groundwater at and beyond the point of compliance and the risk to human health is outside the EPA acceptable risk range in this area, sufficient justification exists for instituting active groundwater treatment in both the southern and eastern plumes. However, groundwater modeling has shown that in the eastern plume, natural attenuation processes such as degradation, adsorption, advection and dispersion will effectively cleanup the groundwater within 5 to 7 years after the implementation of the source control portion of this remedy. This being the case, EPA has determined that the NCP's requirement that groundwater be returned to its beneficial uses within a time frame that is reasonable given the circumstances at this Site, will be met by the use of natural attenuation for cleaning up the eastern plume. This determination is in part based on the groundwater modeling information which indicates that active treatment of the eastern plume groundwaters would shorten cleanup times by only a few years.

If the groundwater cleanup levels in the eastern plume have not been attained within the estimated time frame of 5 to 7 years through natural attenuation processes, or if it becomes apparent that there will be a significant increase in the original estimated time frame, then an active restoration system will be evaluated and implemented for the eastern plume.

An active groundwater treatment remedy is selected for the contaminated groundwater in the southern plume, which extends in the direction of the Bellamy Reservoir. While the RI and FES investigations indicate that the groundwaters around the Site, in both the southern and eastern plume directions are in excess of SDWA MCLs, these levels are of particular concern in the southern plume because of their proximity to the Bellamy Reservoir. From the inception of the RI, a primary concern at the Site has been the protection of this

reservoir which is a drinking water source for seven municipalities. Data indicates groundwater in the southern plume, containing levels of contaminants significantly above MCLs, has migrated from the Landfill to within approximately 900 feet of the reservoir.

In addition, it is estimated that if these contaminants are left to naturally attenuate, it would take from 10 to 24 years to attain cleanup levels after the implementation of the source control alternative. During such a period of natural attenuation, which may be up to 27 years when the years for construction of the source control measures are taken into account, the groundwater contaminants would continue to exceed ARARs. A 27 year period for cleanup does not constitute a reasonable time-frame for cleanup at this site. Also, during this 27 year period contaminants, if left to naturally attenuate, could reach and pollute the waters of the Bellamy Reservoir. Therefore, a groundwater extraction and treatment system will be implemented to return contaminant levels to MCLs as soon as practicable and to manage the plume so as to prevent it from contaminating the Bellamy Reservoir.

The groundwater extraction system includes a low rate collection of contaminated groundwater which has migrated into the wetlands adjacent and in a southern direction from the Landfill. Extraction wells will be installed at off-site locations and will intercept contaminated groundwater in the direction of flow. Groundwater collected by the extraction wells will collectively be pumped at an approximate total of 50 gpm to a treatment unit on or adjacent to the Landfill. Construction in the wetlands will be required to allow drilling equipment access to new well locations, if necessary, and to install the piping system connecting the extraction wells to the treatment system. Once the extraction system is installed (approximately 6 months) the affected area will be restored.

Groundwater treatment would be similar to that described in the previous source control remedy except for the required treatment capacity. The treated groundwater will be recharged to the wetlands to minimize any potential dewatering that may occur due to the extraction system and/or discharged to the Cocheco River. The effluent from the groundwater treatment process would have to meet the substantive requirements of NPDES for discharge to the Cocheco River and/or discharge to the wetlands.

One or more pump tests will be performed during pre-design studies to determine the ability and rate that contaminated groundwater can be extracted from the aquifer. The actual time frame for attaining cleanup levels in this southern area will depend largely upon the data from this pump test(s) and data from the installation of additional monitoring wells to determine the lateral extent and depth of

contamination. However, the time frames are expected to be shorter than the estimated 10 to 24 years expected for natural attenuation.

Periodic review and modification of the design, construction, maintenance and operation of the groundwater extraction and treatment system will be necessary. Performance of the system will be evaluated annually, or more frequently, to determine if EPA's acceptable risk range and standards of the design criteria are being met. If not, adjustment or modification may be necessary. These adjustments or modifications may include relocating or adding extraction wells or alternating pumping rates. Switching from continuous pumping to pulsed pumping may improve the efficiency of contaminant recovery and should be evaluated and necessary modifications undertaken. Should new information regarding the extraction and treatment technology exist, it will be evaluated and applied as appropriate.

After the interim cleanup levels have been met a risk assessment will be performed. If the remedy is determined to be protective, the groundwater extraction and treatment system will be shut down. A groundwater monitoring system will then be utilized to collect information each quarter for three consecutive years to ensure that the cleanup levels have been met and the remedy is protective. If these levels are maintained for three years and the remedy is determined to be protective, a long-term monitoring program for the Site, in accordance with RCRA and New Hampshire Hazardous Waste Rules will be implemented. If the risk assessment indicates that the remedy has not been effective, the performance standards and/or the remedy will be reevaluated.

A long-term groundwater sampling and monitoring program will be initiated during pre-design and continue for three years after attaining groundwater cleanup levels to assess the effectiveness of remediation and to confirm that contaminant concentrations in groundwater attain cleanup levels. If at any time the groundwater monitoring data indicates that the cleanup levels will not be met in the eastern plume within 5 to 7 years after the implementation of the source control remedy then a re-examination will be made of the nature and extent of contamination in this plume and this remedy will be adjusted if appropriate.

The groundwater monitoring program will be developed for the following purposes:

- to evaluate the effectiveness of the source control remediation measures designed to prevent groundwater contaminants in excess of SDWA MCLs to migrate beyond the compliance boundary;

- to monitor the reduction of contaminant concentrations over time in order to insure that groundwater cleanup levels will be achieved in the predicted time frames; and

- to determine the lateral extent of migration of the contaminants in the groundwater in the southern plume.

The details of the groundwater monitoring program will be developed during pre-design and design studies and tailored to the specifics of the Site. Additional groundwater monitoring wells will be installed, as needed, in order to ensure that the objectives of the monitoring program are achieved. Specifically, additional wells will be installed during pre-design to further define the lateral extent and depth of contamination in the southern plume. Selected wells will be monitored quarterly upon initiation of remedial design until completion of the remediation. All samples will be analyzed for Hazardous Substance List VOCs, tetrahydrofuran, and arsenic. Specific wells and analytical parameters may be added or deleted depending on sampling results and observed trends.

Frequent monitoring of treated groundwater recharge to the wetlands or discharge to the Cocheco River shall be implemented, as well as monitoring for the effects of dewatering to limit the impact to the wetlands.

The groundwater modelling employed to determine the relative effectiveness of natural attenuation and extraction/treatment in the southern plume, as well as the models employed to predict the impact of the southern plume on the Bellamy Reservoir relied on a number of assumptions which will be tested during pre-design studies. As noted above, the remedy calls for pre-design studies which include the installation of additional monitoring wells to further define the lateral extent and depth of both contaminant plumes as well as pump tests to confirm assumptions concerning the rate at which contaminated groundwater can be extracted from the upper aquifer. If these studies, and any others determined by EPA to be necessary for further delineation of the nature and extent of the groundwater contaminant plumes, disprove fundamental assumptions employed in the models or produce additional data such that EPA, in consultation with the state, determines that active treatment of the southern plume may not be appropriate and necessary to protect human health and the environment, then EPA, in consultation with the state, and in accordance with the NCP, will re-evaluate the use of active treatment for the southern plume.

These pre-design studies will be initiated as soon as possible and no later than the outset of remedial design/remedial action activities and will take place before or during other remedial design activities

for the source control and management of migration components of the remedial action; these studies will not delay any design or implementation activities. These studies and any proposal to alter the remedy based on the findings of these studies must be completed and submitted within fifteen (15) months of commencement of remedial design activities. In accordance with the NCP, any proposal to alter the remedy based on new data must evaluate the chosen remedy against the proposed remedy on the nine criteria set out at 40 CFR 300.430(e)(9)(iii).

Since hazardous substances, pollutants or contaminants will remain at the Site, EPA will review the Site at least once every five years after the initiation of remedial action at the Site to assure that the remedial action continues to protect human health and the environment. EPA will also evaluate risk posed by the Site at the completion of the remedial action.

XI. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Dover Municipal Landfill Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs or invokes an appropriate waiver and is cost effective. The selected remedy also satisfies the statutory preference for treatment which permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element. Additionally, the selected remedy utilizes alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this Site will permanently reduce the risks posed to human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through removal, treatment, engineering controls, and institutional controls, more specifically, the capping of the Landfill, the limited excavation of contaminated sediments, the collection and treatment of contaminated groundwater and leachate in the Landfill and at the perimeter of the waste management area and the extraction and treatment of off-site contaminated groundwater. The wastes deposited at the Landfill will remain in place. Migration of contaminants to surface water, soils, sediments, and groundwater will be blocked and direct contact with contaminants prevented, thus effectively reducing risks. The pathway for the volatilization of contaminants into the air will be eliminated due to the removal of the perimeter drainage ditch as an avenue for contaminant transport. In addition, the

implementation of the cap and groundwater/leachate collection system should eliminate risk resulting from the ingestion and dermal contact with the contaminated surface water and sediments in the perimeter drainage ditch. Leachate and contaminated groundwater (on-site and off-site in the southern plume) will be extracted, treated and either disposed of at the POTW, discharged to the Cocheco River, or recharged back to the wetlands.

The remedial actions, as proposed, will be protective of human health and the environment. Capping of the source area will eliminate further groundwater contamination resulting from soil leaching. Toxicity will be reduced through groundwater treatment until contaminant concentrations are protective of human health. Treatment will also retard the migration of the contaminated plume and halt further contamination of the aquifer. A long-term monitoring program will ensure the remedy remains protective of human health and the environment. The final groundwater cleanup levels will be determined as the result of a risk assessment performed on residual groundwater contamination after all interim cleanup levels have been met. Unless the resultant cumulative risk is within the 10^{-4} to 10^{-6} incremental risk range and the cumulative hazard index for similar target endpoints is below the specified level of concern, remedial actions shall continue, until protective levels are attained. Finally, implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts since the technologies are proven and will be field tested to reduce operational risks, and special engineering precautions will be used to minimize potential for air releases of contaminants.

B. The Selected Remedy Attains ARARs

This remedy will meet or attain all applicable or relevant and appropriate federal and state requirements that apply to the Site. Substantive portions of environmental laws identified as ARARs and those to be considered for the selected remedial action include, among others:

Chemical Specific

Safe Drinking Water Act - Maximum Contaminant Levels (MCLs)
Resource Conservation and Recovery Act, Groundwater Protection MCLs
National Ambient Air Quality Standards (NAAQS)
Clean Water Act Ambient Water Quality Criteria (AWQC's)
New Hampshire Surface Water Quality Standards
New Hampshire Drinking Water Standards
New Hampshire Ambient Air Quality Standards
New Hampshire Toxic Air Pollutant Regulations

Location Specific

Clean Water Act (CWA) (Protection of Waters & Wetlands)
Executive Order 11990 (Protection of Wetlands)
Executive Order 11988 (Floodplains Restrictions)
40 CFR Part 6 Appendix A
RCRA General Facility Standards for Floodplains/Seismic Areas
Fish and Wildlife Coordination Act
New Hampshire Wetlands Regulations
New Hampshire Hazardous Waste Regulations (Facility siting standards)

Action Specific

Resource Conservation and Recovery Act (RCRA)
HSRA (Land Disposal Restrictions of RCRA)
Clean Air Act (NAAQS and NESHAP)
DOT Rules for Transportation of Hazardous Materials
CWA (NPDES and Pretreatment Standards)
New Hampshire Hazardous Waste Rules
New Hampshire Air Regulations for VOCs
New Hampshire Standards for Pretreatment of Wastes Discharged to a POTW
New Hampshire Rules for Transportation of Hazardous Materials
New Hampshire Regulations for Terrain Alteration
New Hampshire Regulations for Fugitive Dust Control

To Be Considered

New Hampshire Protection of Groundwater New Hampshire Groundwater Quality Criteria
New Hampshire Groundwater Discharge Criteria
New Hampshire Wellhead Protection Program
EPA Risk Reference Doses
EPA Carcinogen Assessment Group Potency Factors
NOAA Technical Memorandum NOSDMA52
Federal Groundwater Protection Strategy & Classification Guidelines

Tables 9, 10, 11 and 12, in Appendix B of this ROD, list all ARARs identified for the Site and whether they are applicable, relevant and appropriate or to be considered. Within each table is also presented a brief synopsis of the requirements and the action to be taken to meet them. Section 2 of the FS, Tables 2-8 through 2-11 lists all ARARs identified for the Site for all the alternatives.

1. Chemical Specific

a. Federal and State Drinking Water Standards

It has been determined by the EPA that the groundwater in the upper aquifer beyond the point of compliance could be a drinking water source were it not contaminated by substances originating from the Dover Landfill. The State of New Hampshire has not yet classified groundwater in the area; however, using the Federal guidelines and classification system, the groundwater adjacent to the Site would be classified as a IIB potential drinking water. While Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) promulgated under the Safe Drinking Water Act are not applicable to groundwater, they are relevant and appropriate to groundwater cleanup because the groundwater may be used as a drinking water source. In addition, the NCP requires that usable groundwaters be restored to their beneficial uses whenever practicable. See 40 CFR 300.430(a)(iii)(F).

In accordance with RCRA, cleanup levels for arsenic in the groundwater will be set at 50 ug/l or background, whichever is higher. (The SDWA MCL for arsenic has been deemed relevant but not appropriate and therefore not an ARAR because naturally occurring levels may be higher than the SDWA MCL.) Prior to or during remedial design, EPA and the state will determine the background level of arsenic at this Site to establish the interim cleanup level.

New Hampshire's Protection of Groundwater regulations (Ws 410) do not establish groundwater quality standards, but do establish groundwater criteria. Included in this criteria is the requirement that no person shall cause the groundwater to contain a substance at a level that the state determines may be potentially harmful to human health or to the environment. Because New Hampshire's regulations do not contain a standard level of control as required by § 121(d)(2)(A)(ii) of CERCLA, they will not be an ARAR. They are, however, to be considered (TBCs) and will be met.

This remedy will attain these ARARs as well as those identified in the tables of Appendix E, and will comply with those regulations which have been identified as TBCs by meeting the groundwater cleanup levels at the Site through the groundwater treatment systems and natural attenuation. Capping of the Landfill will decrease infiltration of precipitation through the Landfill, thus reducing the volume of leachate generated. Treating the leachate and contaminated groundwaters will reduce levels of contamination at the Site to the interim cleanup levels identified in this ROD. Treated groundwater

will also meet federal standards, state criteria for drinking water, and the discharge requirements to the Cocheco River and/or of the POTW. Where natural attenuation is employed, federal and state standards will be met within the time frame specified.

b. Federal Clean Air Act and New Hampshire Air Pollution Regulations

Federal Primary and Secondary National Ambient Air Quality Standards (NAAQS) exist for emissions of sulfur oxides, carbon monoxide, ozone, nitrogen oxides and lead and particulate matter whereas the National Emission Standards for Hazardous Air Pollutants (NESHAPs) address VOC emissions from specific sources. Threshold Limit Values (TLVs) provide an extensive list of control levels for workplace environments and, while they are based on the exposure of a select population and not generally transferable to the general public, they are used to assess site inhalation risks for soil removal operations.

New Hampshire's air quality regulations parallel the federal regulations. The specific sections set forth in the tables in Appendix E, establish specific standards for particulate matter and ambient air limits for a large number of toxic air pollutants. In addition, New Hampshire has established limits on VOC emissions from certain industries. Also, the state has promulgated fugitive dust control regulations which require that measures be taken to limit dust from construction and other activities.

These federal and state air standards will guide mitigation measures designed to control the release of particulate matter during the recontouring and excavation at the Site. In addition, the federal and state regulations which set standards for VOC emissions from certain industries will be relevant and appropriate to set limits on the emissions from any treatment system used at the Site. Finally, the state fugitive dust control regulations will guide recontouring activities so that dust is kept to a minimum. In each case the best demonstrated technology will be employed to meet the federal and state requirements.

2. Location Specific

a. Federal and State Wetland and Floodplain Protection

The Clean Water Act, along with Executive Order 11990 (Protection of Wetlands) and state wetland protection standards are applicable to that portion of the remedy constructed in or affecting the wetlands surrounding the Site. These rules prohibit activity adversely affecting a wetland if there exists a practicable alternative which is less detrimental. Constructing the management of migration

groundwater extraction system in the wetland is necessary because active management and cleanup of the plume is necessary to meet the remediation objectives of the Site and the contaminant plume lies under the wetland.

In the short term, construction will be conducted to avoid or minimize the damage to flora and fauna within the wetland. Additionally, after construction is completed, restoration of the wetlands will occur in two phases. The first phase, implemented at the time of completion of the construction, will consist of restoring the original topography and establishing shallow rooting vegetation. The second phase, initiated at the completion of the remedy, consists of encouraging the original wetland species to reestablish themselves naturally.

After reviewing the Federal Emergency Management Agency, Floodplain Insurance Rate Maps for the City of Dover, EPA has determined that a portion of the Site is located in a 100-year floodplain. Executive Order 11988 (Floodplain Management) is therefore an ARAR for the Site. These regulations govern construction activities which have a negative impact on a floodplain.

The portion of the Site that lies within the 100-year floodplain is the lower portion of the drainage swale, converging with the Cocheco iver. The limited excavation of contaminated sediments in this area is necessary to meet the remedial objectives, and has little or no adverse impact on the floodplain.

EPA's policy on implementing Executive Orders 11990 (wetlands) and 11988 (floodplains) is contained at 40 CFR Part 6 Appendix A. This Appendix sets forth principles and procedures to govern work in wetlands and floodplains so as to minimize the adverse impacts on these valuable natural resources. These orders, as well as EPA's policy, will be implemented in the construction and maintenance of the remedy.

In accordance with 40 CFR Part 6, Appendix A, the EPA has provided an opportunity for public comment on the work to be undertaken in the wetlands and floodplain by issuing a Proposed Plan for remedial action at this Site, holding a public hearing and receiving pubic comments for 60 days prior to this decision. In addition, a Statement of Findings which determine that there are no practicable alternatives to these remedial actions in the wetlands and floodplain is included in Appendix F.

3. Action Specific

a. State and Federal Hazardous Waste Regulations

RCRA regulations and the current State of New Hampshire hazardous waste regulations are relevant and appropriate to the source control and management of migration portions of the remedy. In those limited instances these regulations conflict, the more stringent regulation will be followed.

Prior to January 1991, the State, by promulgating hazardous waste regulations which were as stringent as, or more stringent than, RCRA regulations, had been authorized by EPA to administer and enforce the hazardous waste program in New Hampshire. However, New Hampshire has promulgated an entirely new set of regulations this year. Some of those regulations are less stringent than RCRA regulations. This new state program is still undergoing revisions and has yet to be approved by EPA. As a result, both federal and state hazardous waste regulations existing at the signing of this ROD must be consulted to employ the more stringent requirements.

Since RCRA-type hazardous wastes were disposed of in the Landfill during its operation and it is suspected that full barrels of RCRA-type substances were buried and may still be leaching inside the Landfill, the cap design and construction for this unit will meet both RCRA and New Hampshire hazardous waste standards. In addition, during the recontouring of the Landfill, hot spots may be encountered. The substances in those hot spots must be removed and treated, transported, and disposed of in accordance with RCRA and New Hampshire requirements. Sludge generated by the groundwater treatment unit(s), if determined to be RCRA-type waste, must also be removed from the Site, transported, and disposed of in accordance with RCRA and the state requirements.

The land disposal restrictions of Hazardous and Solid Waste Amendments of RCRA will apply to those RCRA-type hazardous substances removed from the Site, including those hot spot substances and the treatment unit sludges. Land disposal restrictions will not apply to the movement of sediments from the swale to the area of the Landfill to be capped because, among other reasons, this movement does not constitute placement for purposes of the land disposal restrictions. The contaminants in the swale have been caused by and are contiguous to the Landfill, and their movement back to the Landfill constitutes consolidation within the unit.

C. The Selected Remedial Action is Cost-Effective

In the Agency's judgment, the selected remedy, is cost effective:

the remedy affords overall effectiveness proportional to its costs. Once EPA identified alternatives that were protective of human health and the environment and that either attain, or, as appropriate, waive ARARs, EPA evaluated the overall effectiveness of each alternative by assessing the relevant three criteria--long term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short term effectiveness. The relationship of the overall effectiveness of these remedial alternative were determined to be proportional to their costs.

A summary of the costs associated with each of the source control remedies are presented below. All costs are presented in net present costs.

COST COMPARISON OF SOURCE CONTROL ALTERNATIVES

		Capital Costs	O & M	Present Worth
SC-1	No Action	$ 0	169,000	1,593,400
SC-2	Limited Action	44,400	177,600	1,718,300
SC-5	Recontour/Multi-Layer Cap/ Slurry Wall/ Groundwater Treatment/ Discharge to Cocheco River/ Sediments Cover	31,266,600	221,400	33,353,600
SC-5A	Recontour/Multi-Layer Cap/ Slurry Wall/ Groundwater Treatment/ Discharge to POTW/ Sediments Cover	31,334,600	205,000	33,267,100
SC-7	Recontour/Multi-Layer Cap/ Interceptor/ Diversion Trench/ Groundwater Treatment/ Discharge to Cocheco River/ Sediments Excavation	20,014,800	239,300	22,270,600

SC-7A	Recontour/Multi-Layer Cap/ Interceptor/ Diversion Trench/ Groundwater Treatment/ Discharge to Cocheco River/ Sediments Excavation	20,174,700	211,862	22,171,900

Two of the above alternatives are protective and attain ARARs: SC-5/5A and SC-7/7A. Comparing these alternatives, EPA's selected remedy, SC-7/7A, combines the most cost-effective remedial alternative components that were evaluated. The remedy provides a degree of protectiveness proportionate to its costs. Alternative SC-5/5A is 50 percent more costly than SC-7/7A without providing a commensurate increase in protectiveness. Alternative SC-7/7A, like SC-5/5A, involves the construction of a cap over the landfill and the installation of a groundwater/leachate collection system, but without threatening the integrity of the marine clay layer. The less expensive alternatives, SC-1 (no-action) and SC-2 (limited action), did not meet all ARARs nor were sufficiently protective of human health and the environment.

A summary of the costs for each of the elements of the selected source control remedy is presented below. All costs are net present worth.

Total Costs of Selected Source Control Remedy

Component of Remedy	Present Worth ($)
Multi-layer Cap	14,079,100
Groundwater/Leachate Collection System	1,347,600
Groundwater Treatment System (PACT™)	1,692,700
Limited Sediment Excavation	7,900
Miscellaneous*	4,215,000
TOTAL[1]	21,342,300

* Miscellaneous includes the following: facilities, a drum removal and disposal contingency should hot spots or drums be encountered during recontouring activities, contractor allowances, contingency allowances and general administration.

[1] The total presented does not include $928,400 included in the FS for long-term groundwater, surface water and sediment monitoring over 30 years. Long-term monitoring costs for these media are included under the costs for management of migration portion of the selected remedy.

A summary of the costs associated with each of the management of migration remedies are presented below. All costs are presented in net present costs.

COST COMPARISON OF MANAGEMENT OF MIGRATION ALTERNATIVES

	Capital Costs	O&M Costs ($/Yr)	Present Worth
MM-1 No Action	$ 0	142,800	1,346,500
MM-2 Limited Action	9,400	176,500	1,673,600
MM-3 Groundwater Interceptor Trench/Recharge Trench/ Groundwater Treatment	1,452,200	78,800	2,828,700*
MM-4 Groundwater Extraction Wells and Treatment System	1,503,700	394,200	4,818,000*

* Present worth costs for MM-3 and MM-4 include an additional $892,147 for long-term groundwater monitoring (30 years) that is not accounted for in columns headed "Capital Costs" and "O & M Costs".

Three of the management of migration alternatives attain ARARs, MM-2, MM-3 and MM-4. Comparing these alternatives, EPA's selected remedy, portions of MM-2 and MM-4, combines the most cost-effective remedial alternative components while also providing sufficient protection to human health and the environment. This portion of the remedy provides a degree of protectiveness proportionate to its costs.

The least expensive alternative, MM-1, no action, would meet ARARs in the long term through attainment of groundwater cleanup levels by natural attenuation processes. It does not provide protection of public health and the environment in the short term because use of the contaminated groundwater would not be restricted and the cleanup time frame is not reasonable. Alternative MM-2, limited action, allows for natural attenuation processes to attain groundwater cleanup levels and includes institutional controls to prevent short term usage of groundwater.

Both MM-3 and MM-4 take active measures to cleanup groundwater and to prevent short term and long term impacts of the contaminant plume on the Bellamy Reservoir. Alternative MM-3 involves a passive collection that intercepts and treats contaminated groundwater. Alternative MM-4 actively extracts and treats contaminated groundwater from the aquifer.

Alternative MM-4, which is 187 percent more costly than MM-2, and 70 percent more costly than MM-3, is expected to attain groundwater cleanup levels in a somewhat shorter time frame than MM-2 and MM-3, due to active extraction and treatment. The time frames to attain groundwater cleanup levels in the eastern plume are approximately 5 to 7 years for MM-2, and 3-4 years for MM-3 and MM-4. Since the time frames to achieve the cleanup levels are not significantly different, and because during this time frame the eastern plume contamination is not expected to affect a current drinking water receptor, the EPA selection of natural attenuation (MM-2) for the eastern plume is most cost effective while providing adequate protection of human health and the environment.

The time frames to attain groundwater cleanup levels in the southern plume are approximately 10 to 24 years for MM-2, and less than the 10 to 24 years for MM-3 and MM-4. The FS simulations of the time frames to achieve MCLs for the MM-4 alternative did not take into account the increased hydraulic gradients and groundwater velocities resulting from the greater drawdown created by the extraction wells. The increased groundwater velocities near the extraction wells may result in a remediation time frame somewhat less than that for alternative MM-3. The actual effect of the extraction wells under MM-4 on increasing the groundwater velocities will be a function of the pump rate and aquifer drawdown created by the extraction wells.

In addition to shortening the cleanup time, MM-4 provides immediate protection to the Bellamy Reservoir from the southern contaminant plume. The plume has moved to within 900 feet of the reservoir and, if left to naturally attenuate, contaminants could reach the class A waters of the reservoir. Because of the levels of current groundwater contamination in the southern plume, the time frame for allowing natural attenuation to clean up this plume, and the threat to this important drinking water resource, the costs associated with employing an extraction well/treatment system to remediate the southern plume are justified.

A summary of the costs for each of the elements of the selected management of migration remedy are presented below. All costs are net present worth.

TOTAL COSTS OF SELECTED MANAGEMENT OF MIGRATION REMEDY

PORTION OF REMEDY	PRESENT WORTH COST ($)
I. Capital Costs	
a. Fencing, Gates, Signs	63,300
b. Groundwater Extraction Wells	9,000
c. Groundwater Treatment System (PACT™ System, pipe line and discharge)	671,500
d. Miscellaneous*	379,200
II. Annual Operation and Maintenance (@ $157,680 per year, for 10 years)	968,800
III. Long-term Groundwater Monitoring (@ $76,600) per year for 30 years)	721,600
TOTAL	2,813,400

* Miscellaneous includes the following: miscellaneous facilities (Site trailers, etc.), institutional control administration costs, contractor allowances, engineering, contingency allowances, and general administration.

The costs, taken from alternatives SC-2 and MM-2 in the FS, for the fencing, gates and signs were summed to obtain the costs presented in the above table. The long-term monitoring costs associated with the selected remedy were calculated by EPA using the long-term monitoring of groundwater, surface water and sediments as shown in the FS for SC-2 and MM-2. Specifically long-term monitoring costs include the costs for quarterly sampling of 12 wells (as estimated by SC-2 in the FS) for VOCs, metals and tetrahydrofuran as well as the associated labor, data validation, report writing and administration costs. The actual number of wells sampled, which may be greater than twelve, and the location of these wells will be determined during design.

Note that at the request of EPA, HMM Associates, the FS contractor, submitted an analysis of the costs for the extraction and treatment of a) the eastern plume and b) the southern plume. The costs from this analysis, available in the Administrative Record, have been used to compile the cost table above. A detailed accounting of costs for each source control and management of migration alternative is contained in Section 4 of the FS.

While analyzed separately in this document, the source control and management of migration portions of this remedy are interdependent. Source control measures are necessary for, among other things, the prevention of future contaminant migration into the eastern and

southern plumes and the management of migration measures are needed to protect the Bellamy Reservoir from the existing southern plume contaminants and any expansion of that plume during the design and implementation of this remedy.

TOTAL ESTIMATED COST: $24,155,700

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4)implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

The selected source control alternative SC-7/7A, is similar to SC-5/5A in its long-term effectiveness, permanence, short term effectiveness, and reduction of toxicity, mobility and volume of contaminants through treatment. The selected alternative is far superior to SC-5/5A in the areas of implementability and cost. Alternative SC-5/5A costs 50 percent more than SC-7/7A without providing a corresponding increase in protection. Alternative SC-5/5A also requires the securing of the slurry wall into the marine clay layer which separates the upper contaminated aquifer from the lower drinking water aquifer. This would be a difficult procedure and could affect the integrity of the clay layer. SC-7/7A provides for an interceptor trench/extraction well system which will not affect the clay layer. In addition, the limited sediment excavation of SC-7/7A is easier and quicker to implement, less expensive, and provides a more permanent remedy than the swale cover examined in SC-5/5A.

Alternatives SC-1 and SC-2 are far less protective than both SC-5/5A and SC-7/7A for the long-term. Both alternatives SC-1 and SC-2 do not prevent the migration of contaminants into the groundwater nor do they provide for the reduction of mobility, toxicity or volume through

treatment of the contaminants in the groundwater. Natural attenuation processes, acting in the groundwater, may eventually result in the attainment of groundwater cleanup levels, but this would take many decades.

Alternative MM-2 and selected elements of MM-4 were chosen as the management of migration portion of the remedy because of the combined long-term effectiveness and permanence and ability to reduce toxicity, mobility and volume of contaminants through capture and treatment was the most efficient of all alternatives in light of implementability and cost concerns. The principal elements of the remedy consist of extracting groundwater in the southern plume, which has migrated from the Landfill toward the Bellamy Reservoir, and treating the groundwater through the use of a PACT™ process or an air stripper, prior to discharging it to the Cocheco River and/or recharging it back to the wetlands to off-set dewatering. The PACT™ process and the air stripper are proven techniques which provide permanent solutions for contaminated groundwater and have been used successfully at other cleanup sites. Groundwater in the eastern plume is expected to attain groundwater cleanup levels through natural attenuation in a reasonable time frame (5 to 7 years) after implementation of the source control remedy; unlike the southern plume, the eastern plume does not threaten a current drinking water source during the period natural attenuation is to attain groundwater cleanup levels.

Alternative MM-3 is similar to MM-4 in long-term effectiveness and permanence and its ability to reduce toxicity, mobility and volume of contaminants through capture and treatment and also in implementability and costs. However, when short term impacts are considered, MM-4 provides greater protection to the wetlands during installation. In addition, because MM-4 actively extracts the contaminated groundwater, where MM-3 relies on the natural flow of groundwater, cleanup time frames are expected to be faster for MM-4.

Alternative MM-1 is similar to MM-2 in long-term effectiveness, permanence and cost. MM-2 is selected because it provides greater protection of public health and the environment through institutional controls. These controls are especially important to prevent ground water consumption in the short term.

E. The Selected Remedy Satisfies the Preference for Treatment Which Permanently and Significantly reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal element of the selected source control portion of the remedy is the containment of wastes in the Landfill. The principal

element of the selected management of migration portion of the remedy is groundwater extraction and treatment. These elements address the primary threat at the Site, contamination of the groundwater with VOCs, tetrahydrofuran and metals (arsenic). The selected remedy satisfies the statutory preference for treatment as a principal element by minimizing leachate from the Landfill, collecting and treating leachate and the contaminated groundwater migrating from the Landfill, and actively extracting and treating the contaminated groundwater posing a potential threat to the nearby drinking water supply reservoir. Treatment is not used for the cleanup of the Landfill because treatment of this large volume of heterogeneous waste is not practical or cost-effective in comparison with capping the waste in place.

XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

No significant changes from the Proposed Plan have been made to the selected remedies as detailed in the Record of Decision. Minor changes from the Proposed Plan to the Record of Decision include incorporating an arsenic cleanup level for sediments which is protective of the environment rather than simply protective of human health. In addition, accounting errors have been corrected and long-term monitoring full HSL analysis was deemed inappropriate. These corrections reduced the cost of the selected remedy by approximately $1.7 million. Minor changes also include some changes in the ARAR tables to better reflect the actions to be taken at the Site to meet these ARARs and some alterations in the status of the ARARs to accommodate site specific features. Also, EPA has determined that the SDWA MCL for arsenic in the groundwater is not appropriate for this Site and therefore not an ARAR. The RCRA MCL for arsenic will control the setting of this cleanup level.

The selected remedy provides for the limited excavation of contaminated sediments in the drainage swale for the protection of the environment, specifically due to the presence of arsenic in the sediments. An arsenic cleanup level in sediment has been set at 50 ppm, based on Site exceedances of the NOAA Effects Range Low of 33 ppm, and taking into consideration the Effects Range Median of 85 ppm and site-specific data (TOC and grain size). This level is considered protective for fish, waterfowl and other biota inhabiting the Cocheco River. The proposed plan stated a cleanup level for arsenic in sediments for the protection of human health. Since the risks via ingestion and dermal contact with these sediments are within EPA's acceptable risk standards, protection for human health was not justified.

In the Proposed Plan the estimated total cost for the preferred remedy was $25.9 million. The estimated total cost of the remedy in this Record of Decision is $24.2 million. The reduction in costs is in part based on the correction of accounting and overestimated long-term monitoring costs. In combining alternatives to obtain the selected remedy long-term monitoring costs were double counted. Long-term monitoring costs associated with SC-7/7A and MM-4 have been deducted because they are also included in the costs associated with MM-2. In addition, MM-2 included costs for full HSL analysis of groundwater, which has been deemed inappropriate by the EPA because there is no indication that pesticides, poly-chlorinated biphenyls (PCBs) or base-neutral and acid extractable organic compounds (BNAs) are contaminants of concern at this Site.

The SDWA MCL for arsenic in groundwater has been determined to be relevant but not appropriate to this Site and therefore not an ARAR as a result of the possibility of naturally occurring background levels which may exceed the SDWA MCL. The RCRA groundwater cleanup level for arsenic remains both relevant and appropriate because it sets cleanup at 50 ug/l, or background, whichever is higher.

Other minor changes in ARARs may be found in the tables in Appendix E of this ROD Decision Summary.

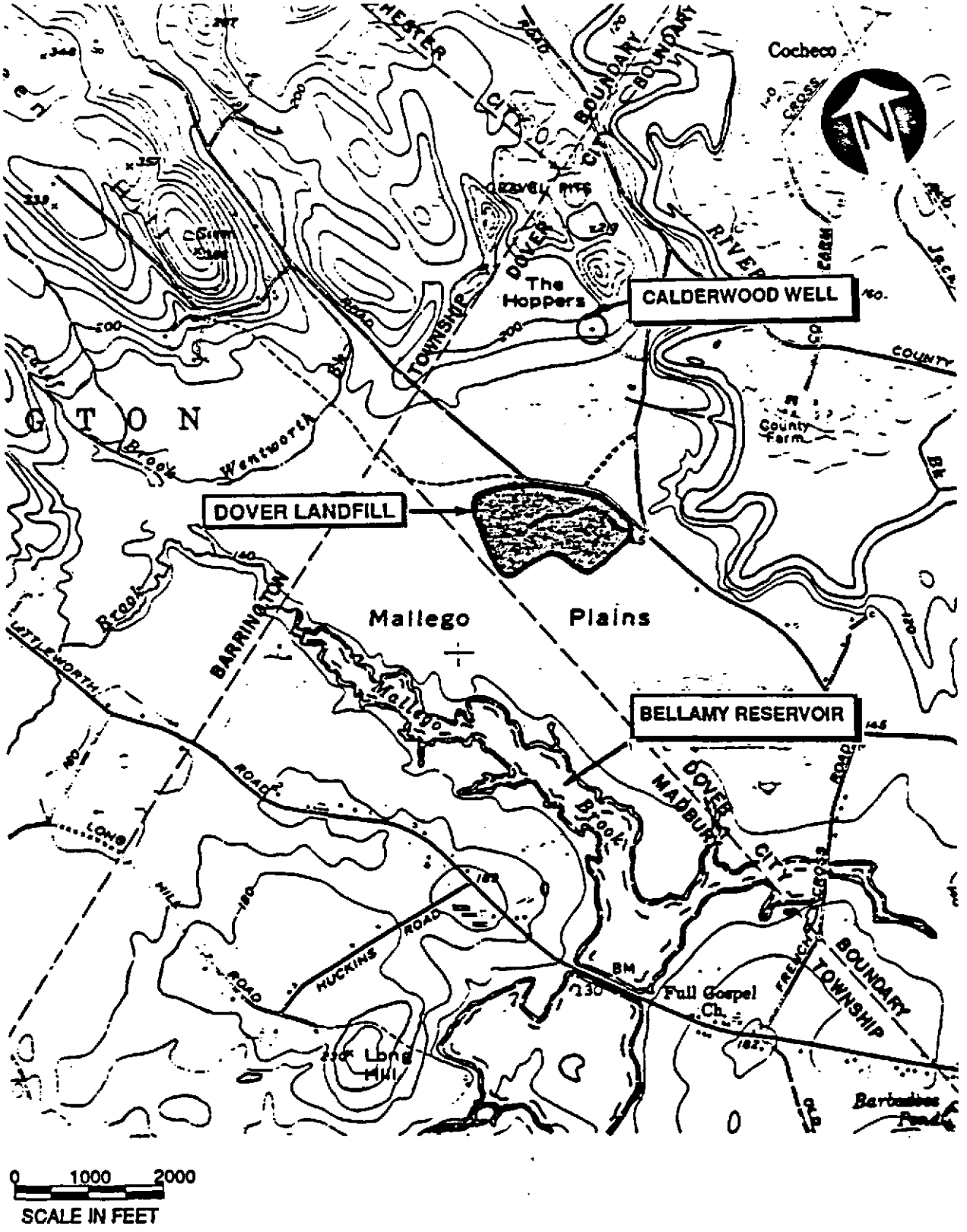
III. STATE ROLE

The New Hampshire Department of Environmental Services has reviewed the various alternatives and has indicated its support for portions of the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessment and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State Environmental laws and regulations. The New Hampshire Department of Environmental Services concurs with the source control and eastern plume management of migration portions of the selected remedy for the Dover Municipal Landfill Site and has reserved a concurrence decision on the southern plume management of migration portion of the selected remedy until pre-design studies have been completed. A copy of the declaration of concurrence is attached as Appendix D.

Appendix A

FIGURES

FIGURE 1 LOCUS MAP
FIGURE 2 SAMPLE LOCATION MAP
FIGURE 3 WETLANDS AND FLOODPLAIN DELINEATION
FIGURE 4 TOTAL VOC & BNA CONCENTRATIONS - UPPER AQUIFER
FIGURE 5 TOTAL VOC & BNA CONCENTRATIONS - LOWER AQUIFER
FIGURE 6 ARSENIC CONCENTRATIONS - UPPER AQUIFER
FIGURE 7 ARSENIC CONCENTRATIONS - LOWER AQUIFER
FIGURE 8 ESTIMATED EXTENT OF DETECTABLE TOTAL VOCS IN UPPER AQUIFER
FIGURE 9 WATER ELEVATION CONTOUR MAP
FIGURE 10 RESIDENTIAL WELL CONTAMINATION
FIGURE 11 TYPICAL MULTI-LAYER CAP CROSS SECTION
FIGURE 12 PROPOSED GROUNDWATER/LEACHATE TREATMENT SCHEMATIC
FIGURE 13 CONCEPTUAL INTERCEPTOR TRENCH LOCATION - MM-3
FIGURE 14 CONCEPTUAL EXTRACTION WELL LOCATION - MM-4
FIGURE 15 CONCEPTUAL GROUNDWATER DEPRESSION



BASE MAP IS A PORTION OF THE U.S.G.S. DOVER WEST, NH QUADRANGLE
7.5 MINUTE SERIES - 1956 (PHOTO REVISED 1973)

FIGURE 1
LOCATION OF DOVER LANDFILL SITE

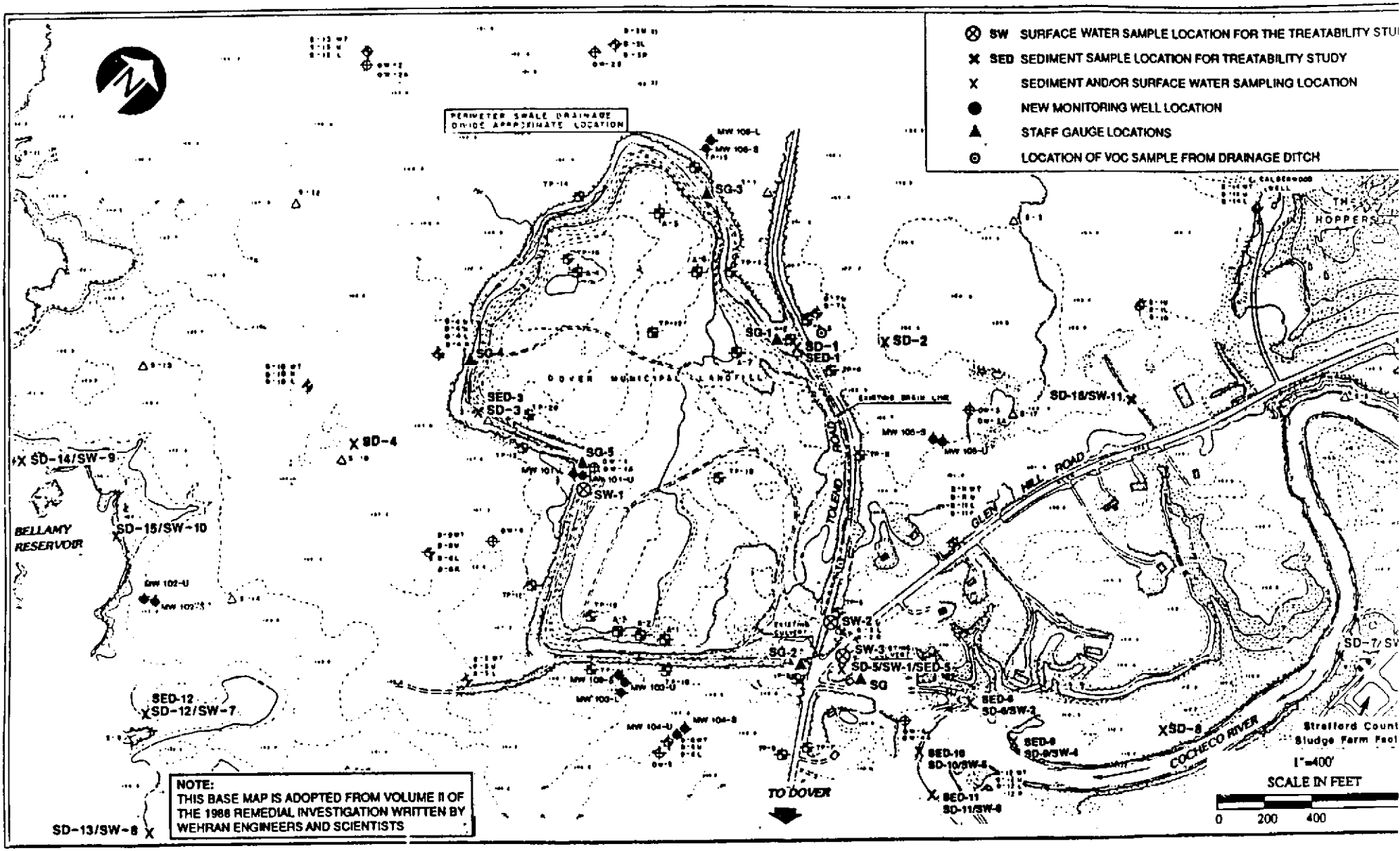
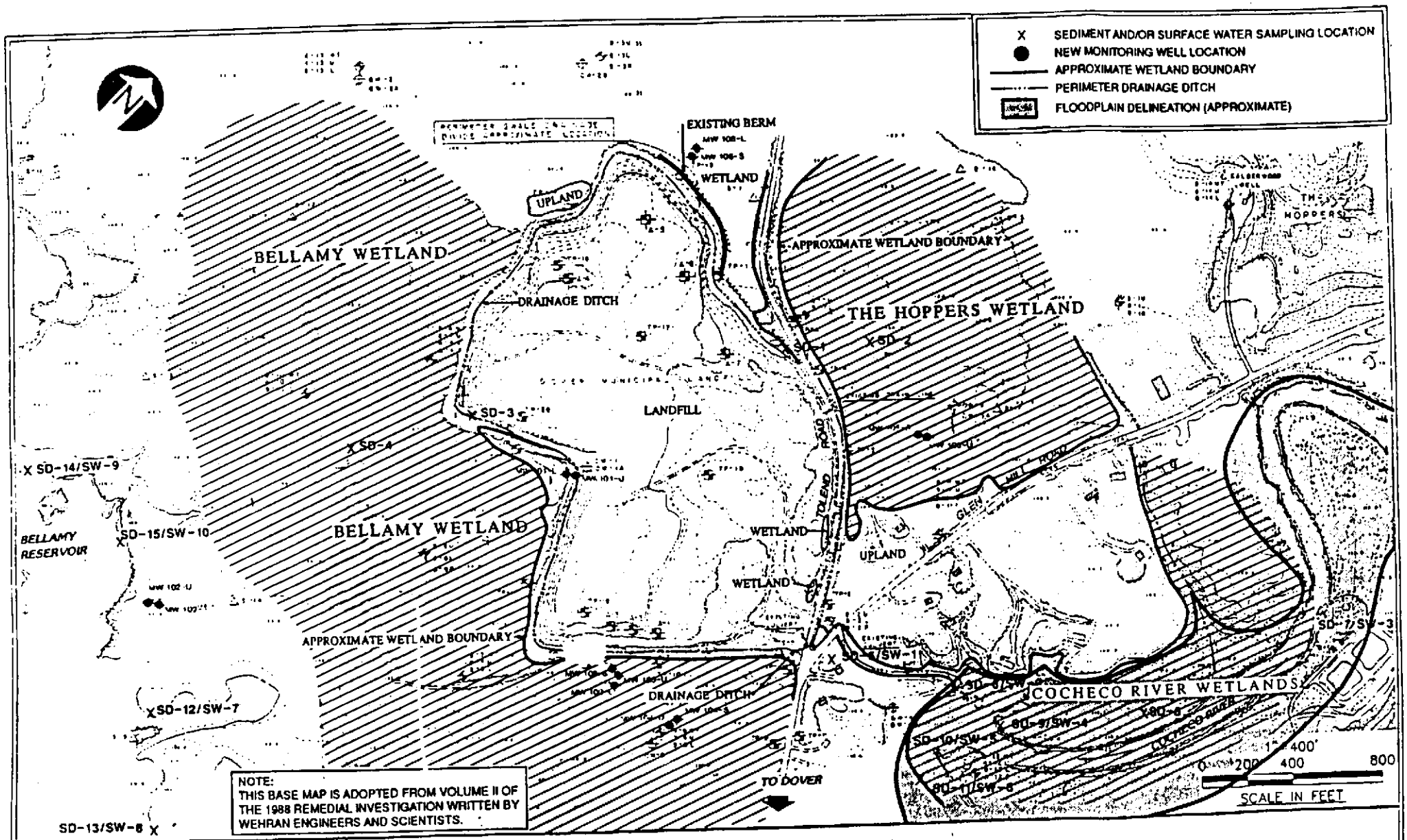


FIGURE 2
WETLANDS STUDY SAMPLING LOCATIONS FOR SEDIMENT AND SURFACE WATER



NOTE:
THIS BASE MAP IS ADOPTED FROM VOLUME II OF THE 1988 REMEDIAL INVESTIGATION WRITTEN BY WEHRAN ENGINEERS AND SCIENTISTS.

FIGURE 3

WETLANDS AND FLOOD PLAIN DELINEATION

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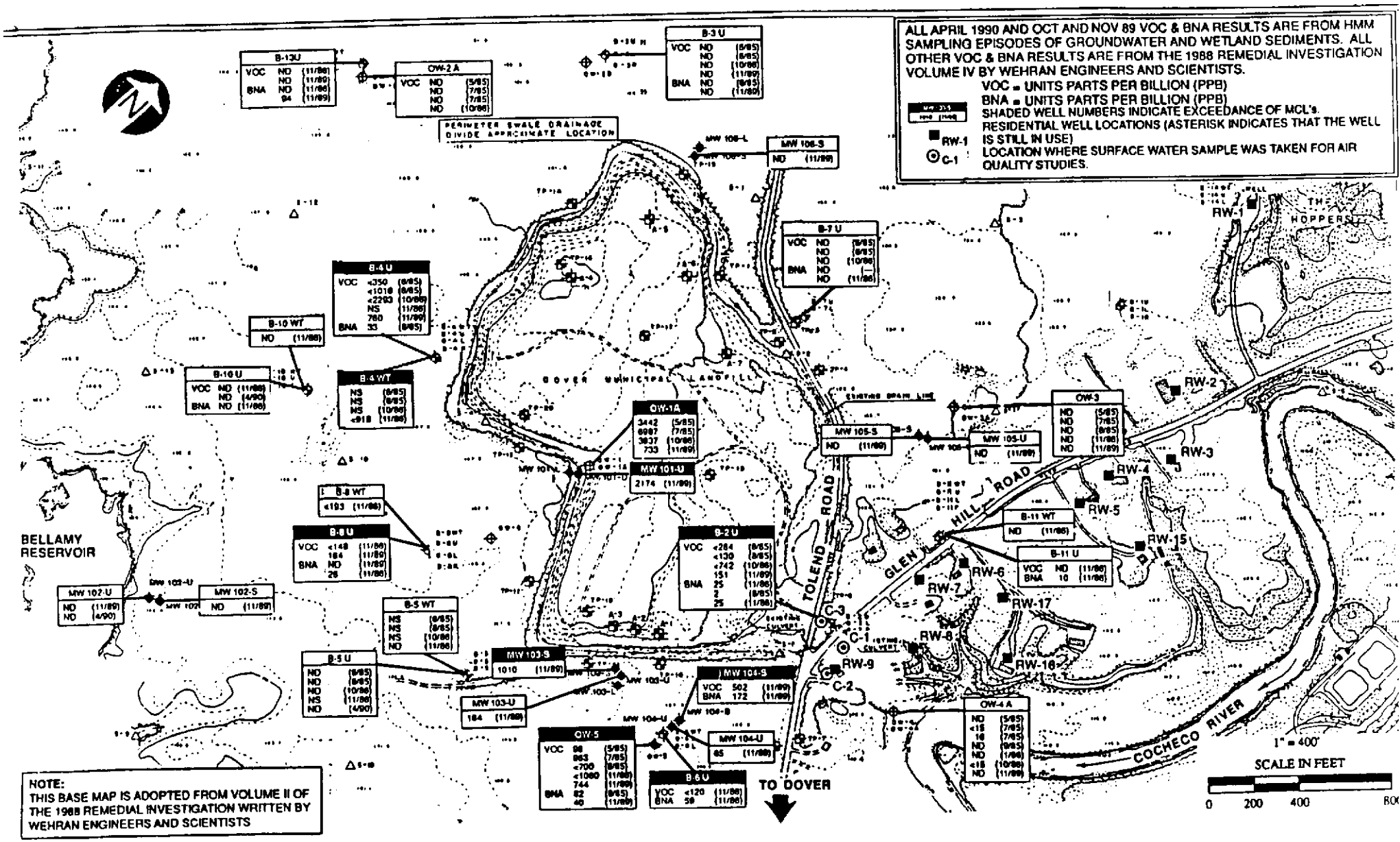

FIGURE 4

TOTAL VOC AND BNA CONCENTRATION
OF THE UPPER AQUIFE

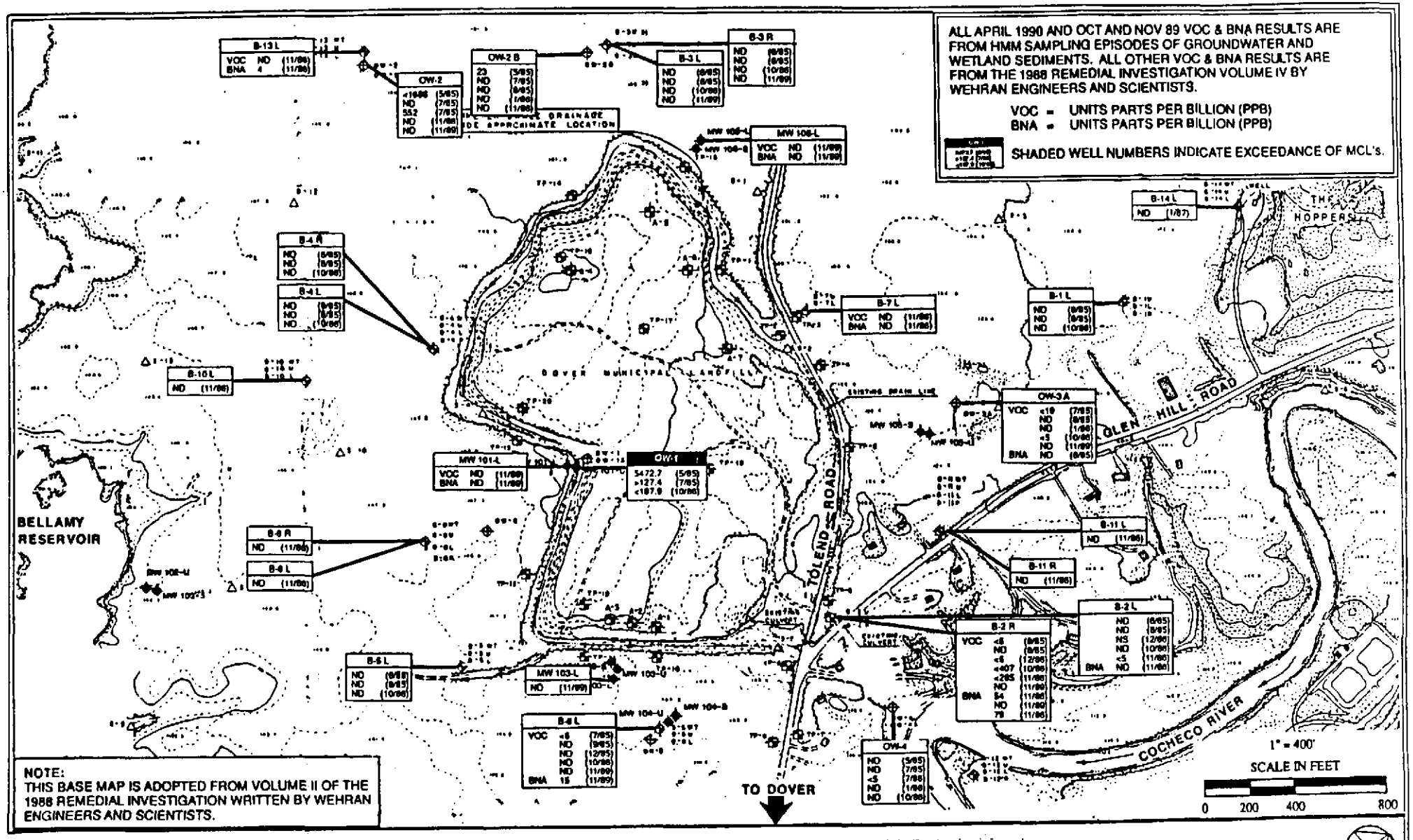

FIGURE 5
TOTAL VOC AND BNA CONCENTRATIONS OF THE LOWER AQUIFER

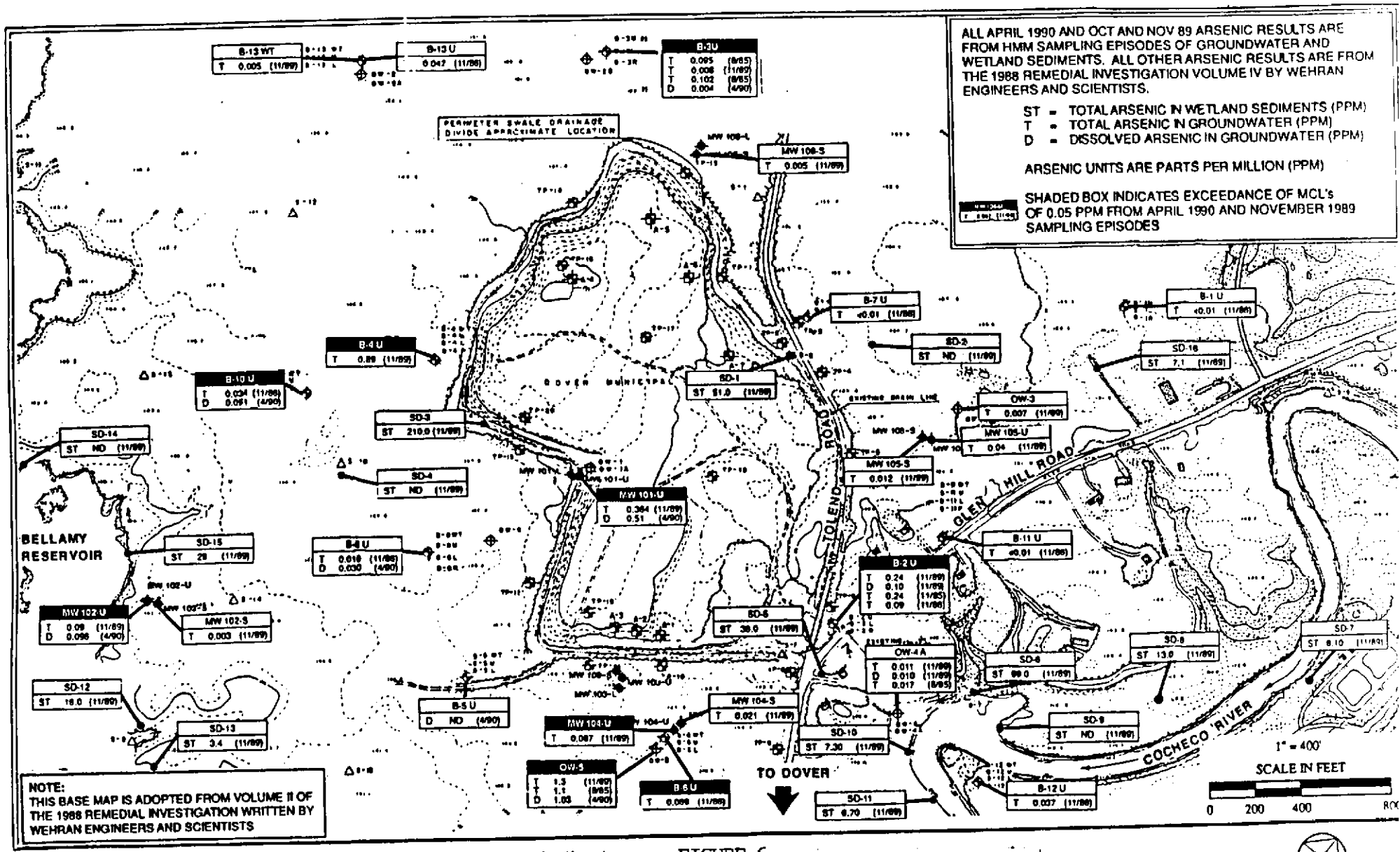

FIGURE 6

ARSENIC CONCENTRATIONS FROM THE UPPER AQUIFER AND WETLAND SEDIMENTS

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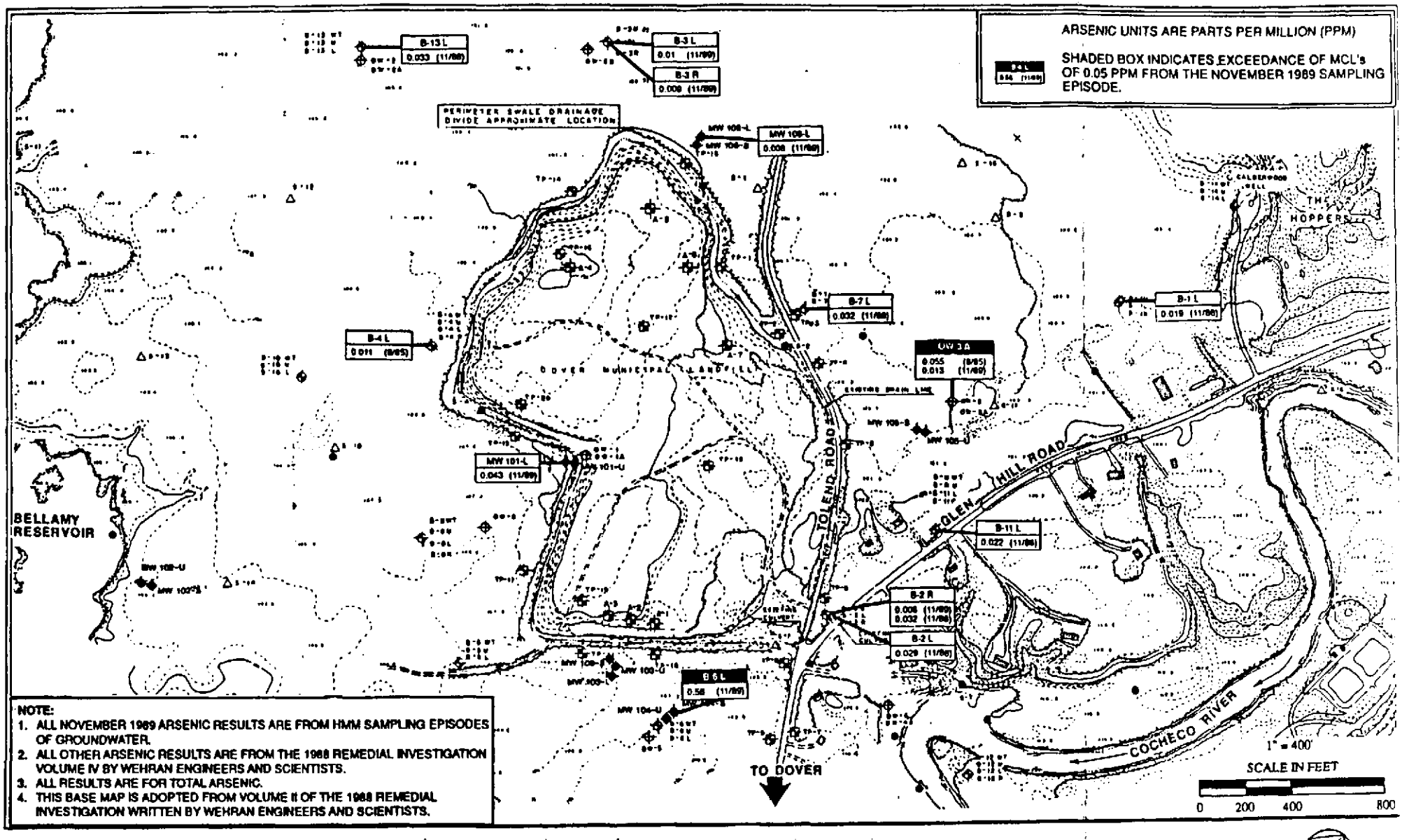


FIGURE 7
ARSENIC CONCENTRATIONS FROM THE LOWER AQUIFER

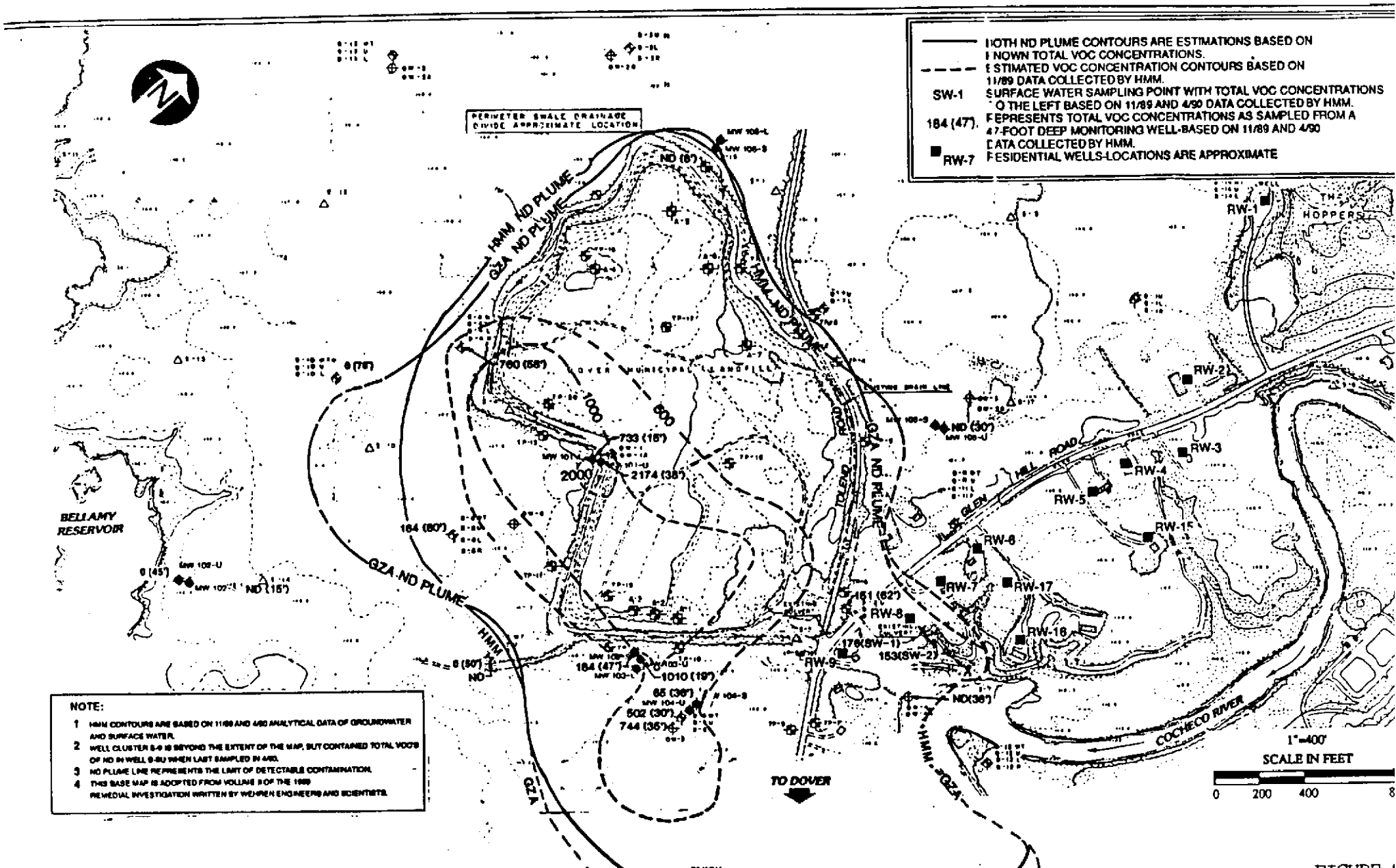


FIGURE 8

ESTIMATED EXTENT OF DETECTABLE TO
VOC CONTAMINATION IN THE UPPER AQUI

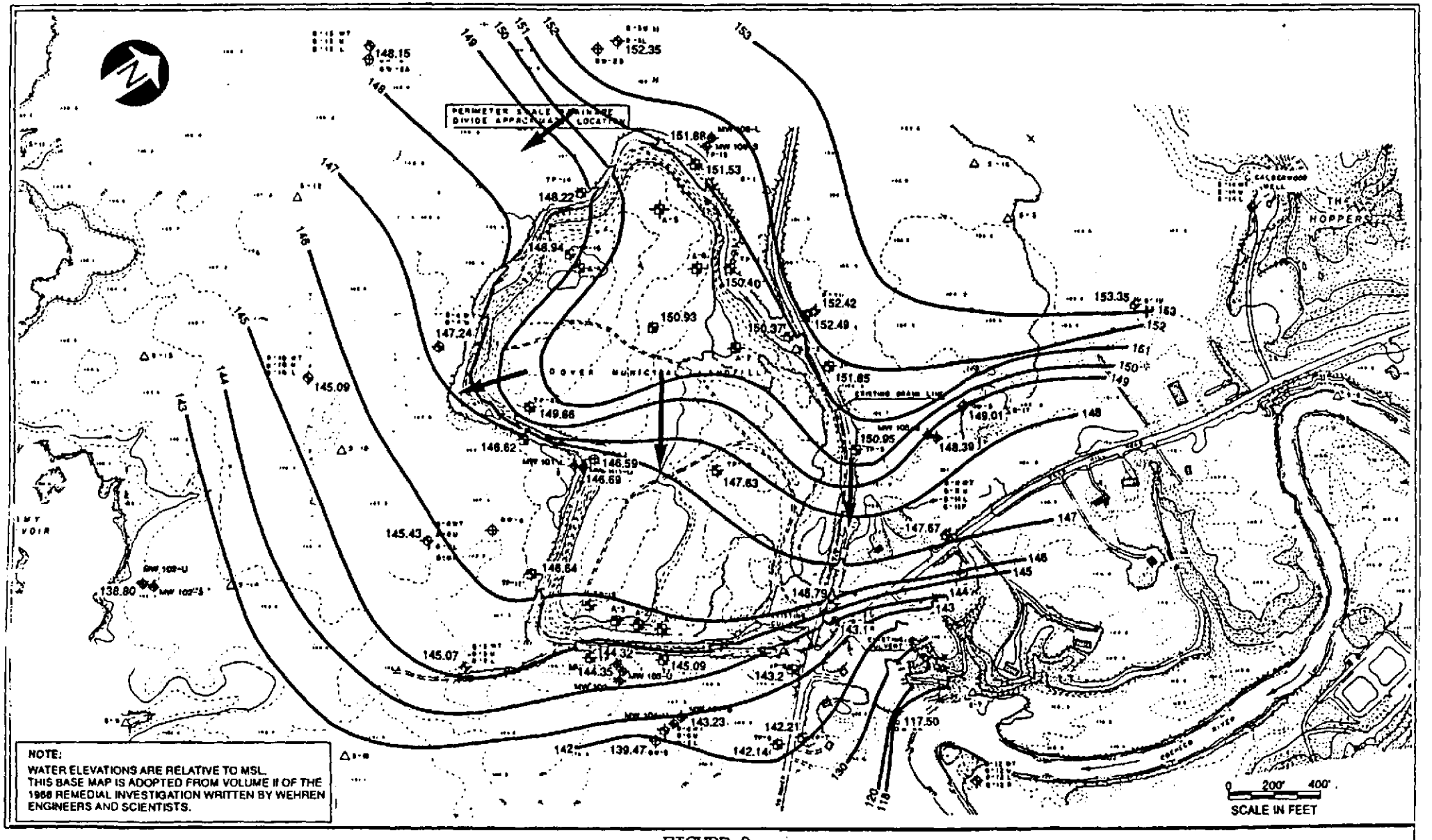


FIGURE 9
WATER ELEVATION CONTOUR MAP
MARCH, 1990 U[illegible]R AQUIFER

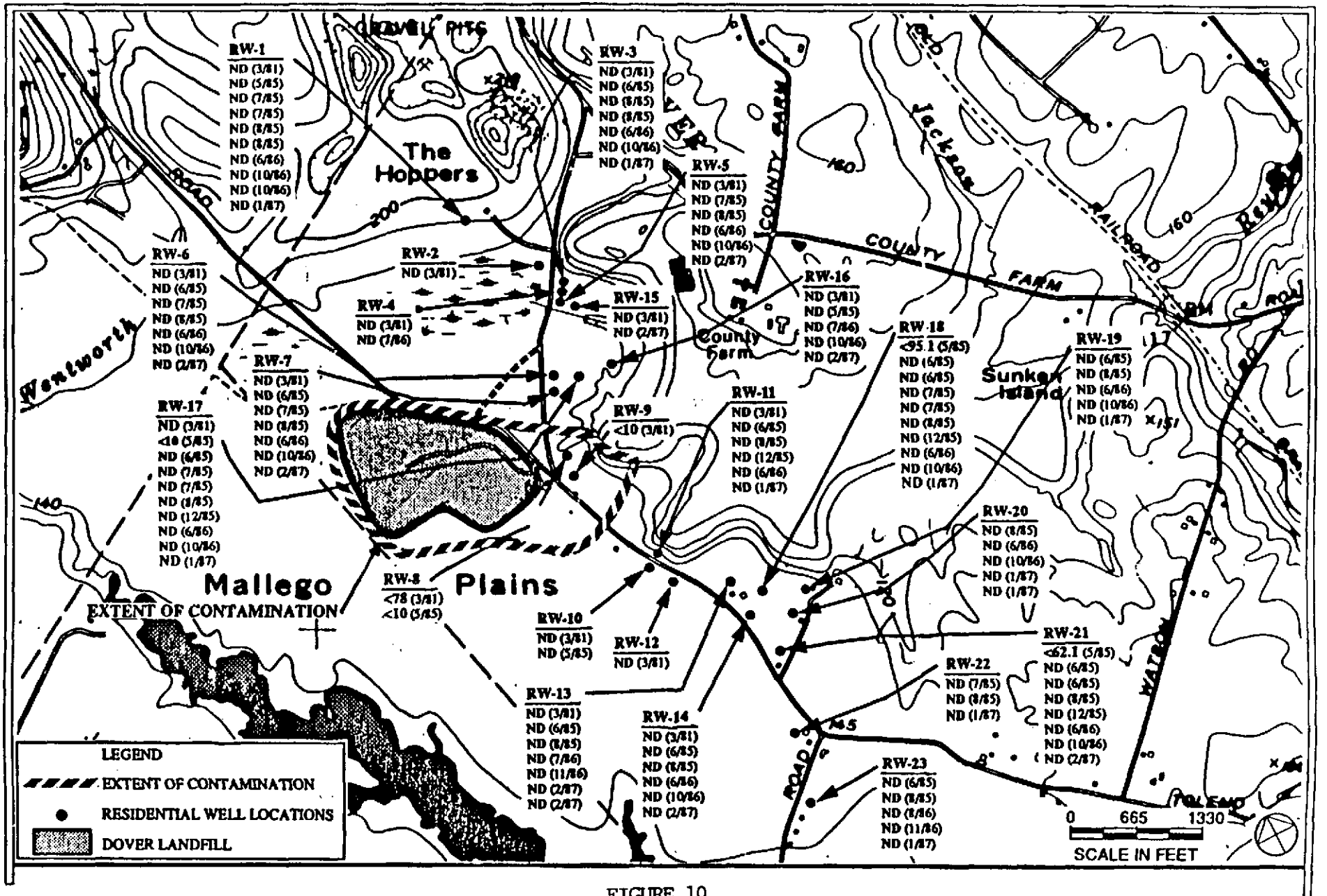
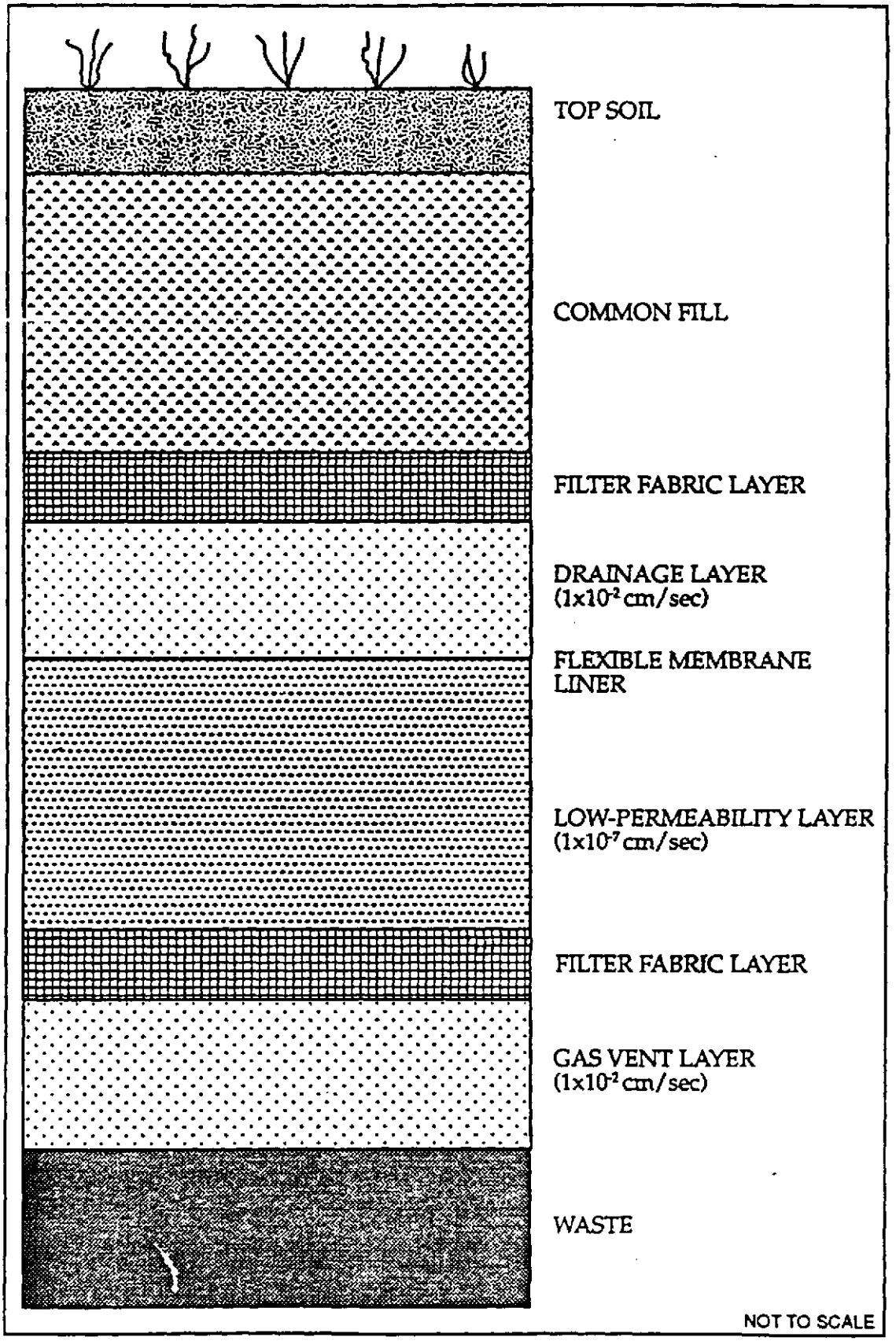


FIGURE 10

EXPANDED EXTENT OF CONTAMINATION PLUME AND RESIDENTIAL WELL WATER QUALITY

FIGURE 11

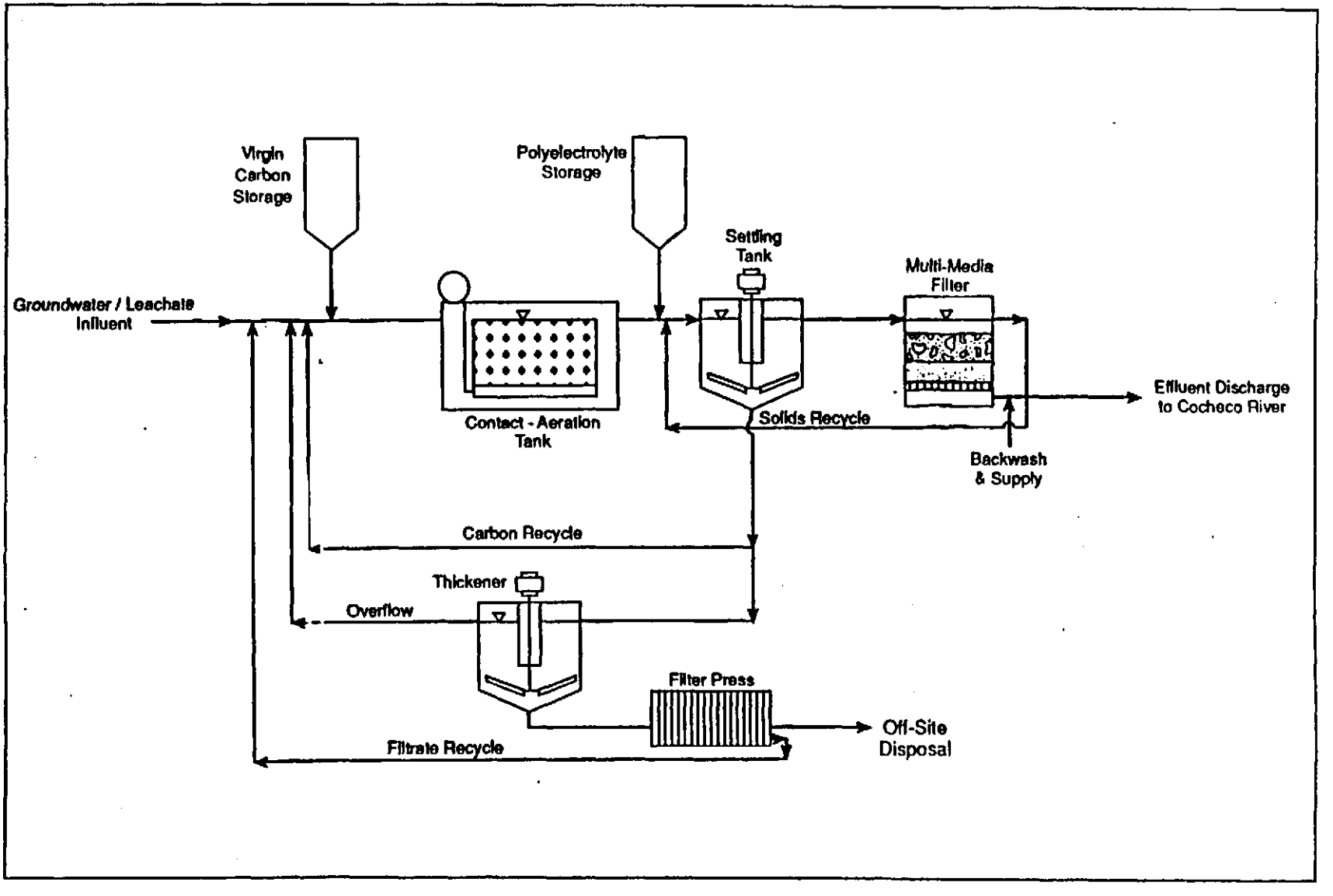
Typical Multi-layer Cap Cross Section



A91-167/C

FIGURE 12

Proposed Groundwater/Leachate Treatment General Process Diagram



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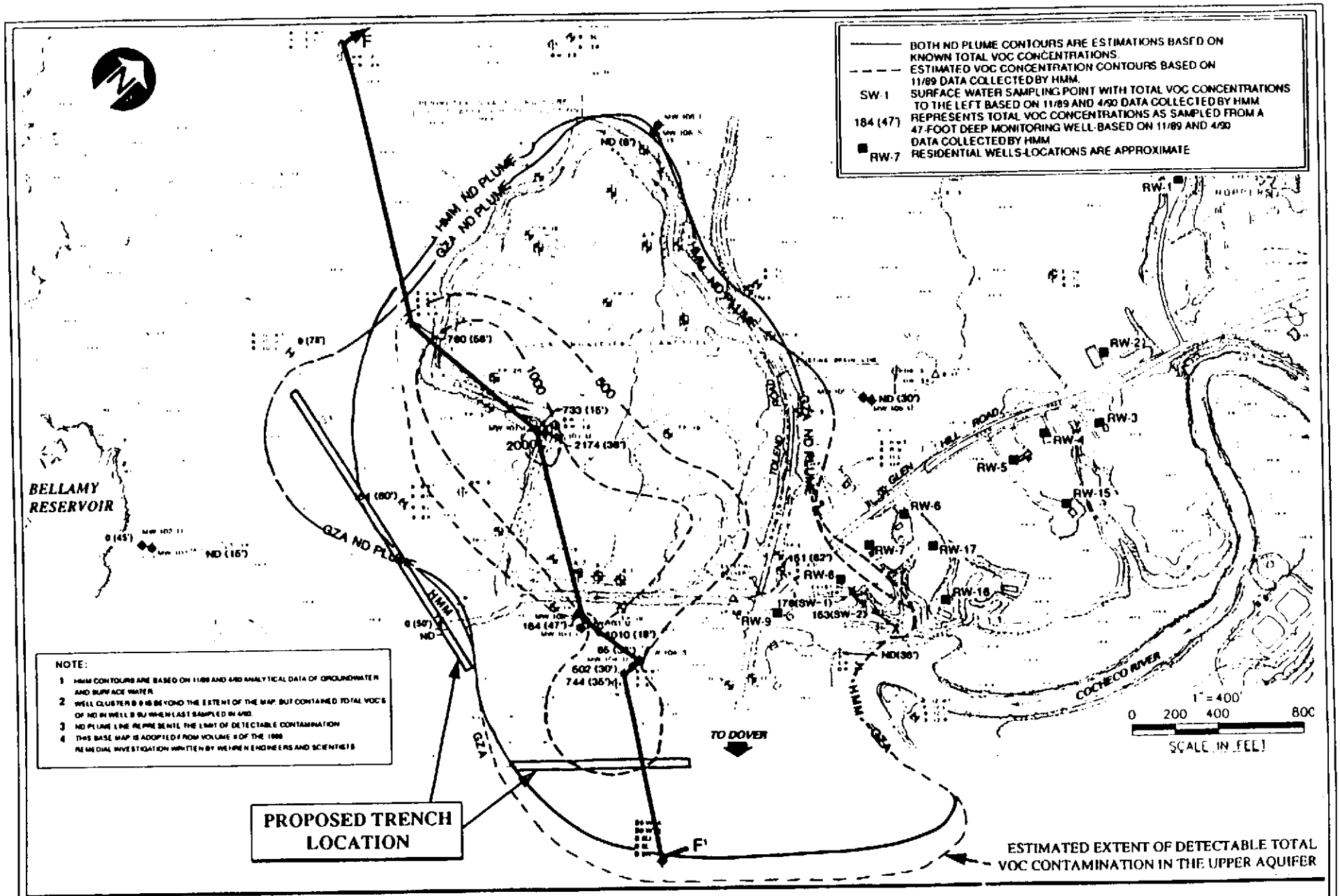

FIGURE 13

MM-3: CONCEPTUAL (OFF-SITE) GROUNDWATER INTERCEPTOR TRENCH LOCATION MAP

m hm

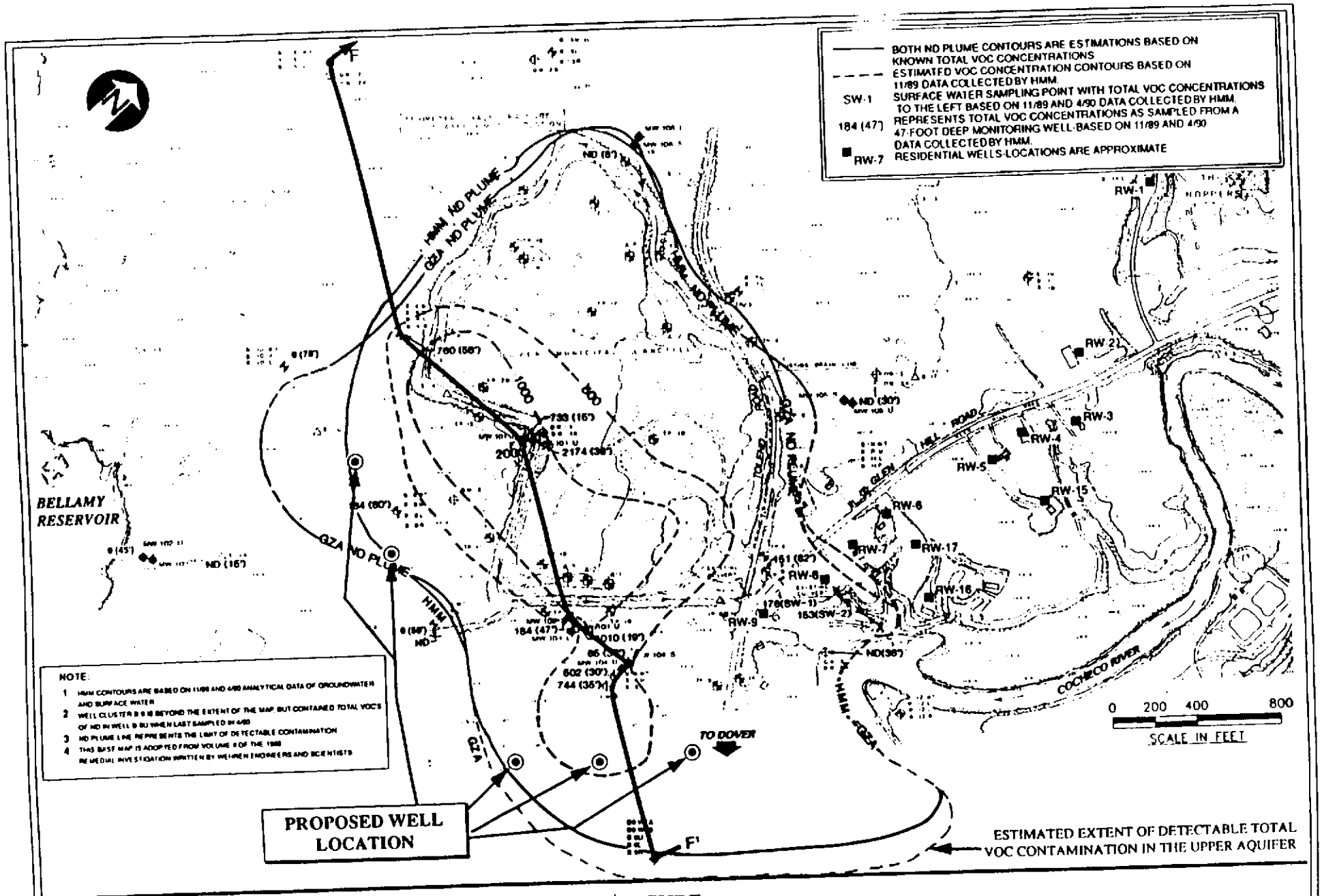

FIGURE 14
MM-4: CONCEPTUAL (OFF-SITE) GROUNDWATER EXTRACTION WELL LOCATION MAP

hm

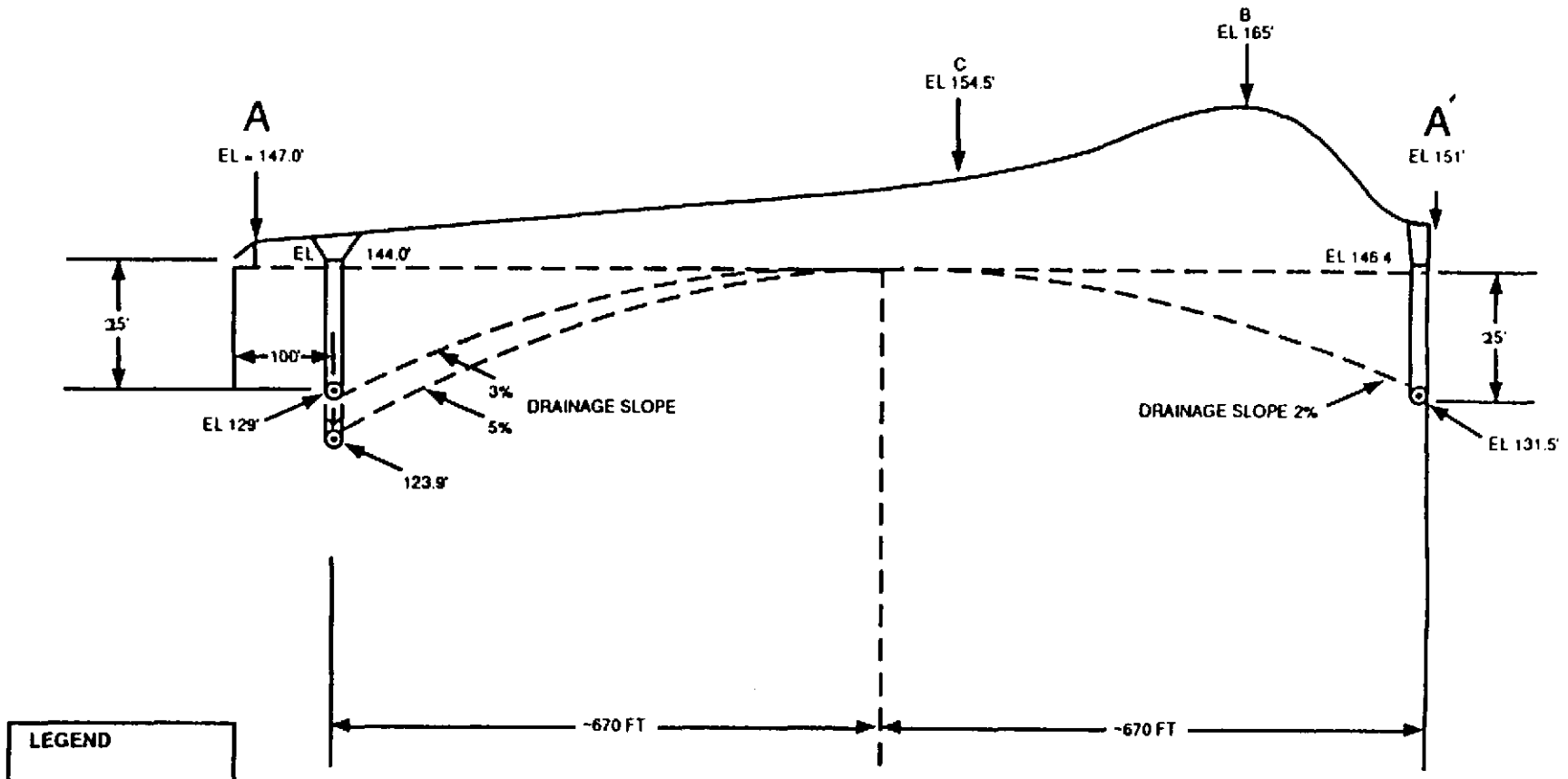

FIGURE 15
CONCEPTUAL GROUNDWATER DEPRESSION
INTERCEPTOR TRENCH

Appendix B

TABLES

TABLE 1 INDUSTRIAL WASTE SURVEY
TABLE 2 CONTAMINANTS OF CONCERN

RISK ESTIMATES:
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TABLE 5 INGESTION OF SURFACE WATER - COCHECO RIVER
TABLE 6 DERMAL CONTACT WITH SURFACE WATER - COCHECO RIVER
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TABLE 9 PRETREATMENT REQUIREMENTS

TABLE 1
INDUSTRIAL WASTE SURVEY (1976-1977)
DOVER MUNICIPAL LANDFILL

Waste Material	Quantity/Year	Waste Material	Quantity/Year
Plastics	144 yd. & 57,200 lb.	Oil	6,260 gal.
Urethane foam	1,860 gal.	Ink	10 lb.
Paper	3,468 yd^3 & 30 tons	Lacquer	12 gal.**
Cardboard	1,548 yd^3 & 18 tons	Film developer	30 gal.**
Varnish	132 gal.	Hypocleaning agent	32.5 gal.**
Hydraulic oil	300 gal.	Glacial acetic acid	2 gal.**
Synthetic plastic	3,120 yd^3	Color stabilizer	15 gal.**
Leather trimmings	4,160 yd^3	Paper developer	6 gal.**
Fiberboard	1,872 yd^3	Kerosene	208 gal.
Wood	5 yd.	Wooden boxes	520 yd^3
Paint sludge	169,380 gal.	"Crepe trimming"	1,040 yd^3
Cement sludge	3 yd^3	Polyurethane foam	104 yd^3
Paint filters	16,432 ft^2	"PVC box filter"	12 yd^3
Plastersol	2,860*	Fabricated plastic	1,560 yd^3
Solvents	1,100 gal.	Galvanized steel	78 yd^3
MEK (Methyl Ethyl Ketone)	Unknown	Polyethylene	130,000 lb.
Triethanolamine	Unknown	Fiberglass	1,200 lb.
Isopropyl Alcohol	Unknown	Sawdust	204 yd^3
Diethylene glycol	Unknown	"Leather trim"	91.25 ton
Anhydrous butadiol	Unknown	"Chrome leather shavings	3,650 yd^3
Urethane elastomer	Unknown	"Chrome trim"	104 yd^3
Cutting Oil	500 gal.	Tanning sludge	78,000*
"Turco Vitroclean"	30 gal.	"Chem tan H"	156 lb.
"Turco 4432"	30 gal.	Leather scraps	5,200 yd^3
"Turco 4368"	30 gal.	Degreaser	600 gal.
"Witch Oil"	Unknown	Toluene	2,860 gal.
"Black Passiwater"	Unknown	Plating rinse	130 gal.
Xylol toluol	Unknown	Plating filter media	780 lb.
Spent hydrochloric acid	540 gal.	Paint thinner	Unknown
Tin	104 yd^3	Spent hydrofluoric acid	180 gal.
Emulsifier sludge	52 yd^3	Spent nitric acid	360 gal.
"Cellular crepee"	416 yd^3	Caustic soda	12,000 lb.
Latex cement sludge	130 yd^3	Mold wax	240 lb.
Leather	180 yd^3	Mold material	862 tons
Rubber	360 yd^3	Dust collection sludge	45,375 gal.

Notes:

1. Table 1 has been compiled from the "Remedial Action Master Plan, Dover Municipal Landfill, Dover, New Hampshire" prepared by NUS Corporation of Pittsburgh, Pennsylvania in September, 1983.

2. A total of 6,468 drums per year were noted in this New

	Hampshire waste survey as being produced by these industries.
*	Unit not given
**	Sent to Dover Wastewater Treatment Plant. Ultimate disposal of wastewater sludge was the Dover Municipal Landfill.
"..."	Waste names obtained directly from New Hampshire survey.
Unknown	Exact composition unknown. Amounts produced per year were not listed in New Hampshire survey.

TABLE 2

Contaminants of Concern	Maximum Concentration ppb (ug/L)	Frequency of Detection RI (Wehran, 1988)	FES (HMM, 1991)
Acetone	130	6/10	3/10
Arsenic	1300	3/4	5/5
Benzene	80	6/10	6/10
Cadmium	0	ND	
Chloroethane	38	ND	2/10
1,1-Dichloroethylene	13	2/10	1/10
1,2-Dichloroethane	76.3	3/10	ND
Mercury	0	ND	1/5
Methylene Chloride	360	ND	1/10
Methyl Ethyl Ketone	230	6/10	2/10
Methyl Isobutyl Ketone	360	8/10	4/10
Tetrachloroethylene	6	1/10	1/10
Tetrahydrofuran	1707.5	9/10	NA
Toluene	470	9/10	9/10
Trichloroethylene	11	1/10	1/10
Vinyl Chloride	62	1/10	3/10

The table lists the maximum value of contamination found in selected monitoring wells during the FES activities except for two compounds. Data from the RI was used for tetrahydrofuran which was not analyzed for in the FES and 1,2-dichloroethane which was not detected in the FES.

TABLE -3

RISK ESTIMATES FOR USE OF GROUNDWATER IN THE AREA OF FUTURE DEVELOPMENT

Groundwater - Future Development
Ingestion of Drinking Water, Most-Probable Case

Compound	CONC MED ppm	2 LIT/ DAY	BODY WT kg	EXP CALC mg/kg/day	RfD VALUES mg/kg/day	CARCIN POTENCY (mg/kg/day)-1	RfD CALC	CARCIN CALC
Acetone	0.0235	2	70	6.71E-04	1.00E-01	NA	0.007	0.00E+00
Arsenic	0.3535	2	70	1.01E-02	1.00E-03	1.75E+00	10.100	1.77E-02
Benzene	0.0233	2	70	6.66E-04	NA	2.90E-02	0.000	1.93E-05
Cadmium	0	2	70	0.00E+00	5.00E-04	NA	0.000	0.00E+00
Chloroethane	0.006	2	70	1.71E-04	NA	1.30E-02	0.000	2.23E-06
1,1-Dichloroethylene	0.0013	2	70	3.71E-05	9.00E-03	6.00E-01	0.004	2.23E-05
1,2-Dichloroethane	0.0157	2	70	4.49E-04	NA	9.10E-02	0.000	4.08E-05
Mercury	0	2	70	0.00E+00	1.40E-03	NA	0.000	0.00E+00
Methylene Chloride	0.036	2	70	1.03E-03	6.00E-02	7.50E-03	0.017	7.71E-06
Methyl Ethyl Ketone	0.035	2	70	1.00E-03	5.00E-02	NA	0.020	0.00E+00
Methyl Isobutyl Ketone	0.0698	2	70	1.99E-03	5.00E-02	NA	0.040	0.00E+00
Tetrachloroethylene	0.0006	2	70	1.71E-05	1.00E-02	5.10E-02	0.002	8.74E-07
Tetrahydrofuran	0.429	2	70	1.23E-02	2.00E-03	NA	6.129	0.00E+00
Toluene	0.1094	2	70	3.13E-03	3.00E-01	NA	0.010	0.00E+00
Trichloroethylene	0.0011	2	70	3.14E-05	NA	1.10E-02	0.000	3.46E-07
Vinyl chloride	0.0131	2	70	3.74E-04	NA	2.30E+00	0.000	8.61E-04
Revised Risk							16.33	1.86E-02

Groundwater - Future Development
Ingestion of Drinking Water, Worst-Case

Compound	CONC MED ppm	2 LIT/ DAY	BODY WT kg	EXP CALC mg/kg/day	RfD VALUES mg/kg/day	CARCIN POTENCY (mg/kg/day)-1	RfD CALC	CARCIN CALC
Acetone	0.13	2	70	3.71E-03	1.00E-01	NA	0.037	0.00E+00
Arsenic	1.3	2	70	3.71E-02	1.00E-03	1.75E+00	37.143	6.50E-02
Benzene	0.08	2	70	2.29E-03	NA	2.90E-02	0.000	6.63E-05
Cadmium	0	2	70	0.00E+00	5.00E-04	NA	0.000	0.00E+00
Chloroethane	0.038	2	70	1.09E-03	NA	1.30E-02	0.000	1.41E-05
1,1-Dichloroethylene	0.013	2	70	3.71E-04	9.00E-03	6.00E-01	0.041	2.23E-04
1,2-Dichloroethane	0.0763	2	70	2.18E-03	NA	9.10E-02	0.000	1.98E-04
Mercury	0	2	70	0.00E+00	1.40E-03	NA	0.000	0.00E+00
Methylene Chloride	0.36	2	70	1.03E-02	6.00E-02	7.50E-03	0.171	7.71E-05
Methyl Ethyl Ketone	0.23	2	70	6.57E-03	5.00E-02	NA	0.131	0.00E+00
Methyl Isobutyl Ketone	0.36	2	70	1.03E-02	5.00E-02	NA	0.206	0.00E+00
Tetrachloroethylene	0.006	2	70	1.71E-04	1.00E-02	5.10E-02	0.017	8.74E-06
Tetrahydrofuran	1.7075	2	70	4.88E-02	2.00E-03	NA	24.393	0.00E+00
Toluene	0.47	2	70	1.34E-02	3.00E-01	NA	0.045	0.00E+00
Trichloroethylene	0.011	2	70	3.14E-04	NA	1.10E-02	0.000	3.46E-06
Vinyl chloride	0.062	2	70	1.77E-03	NA	2.30E+00	0.000	4.07E-03
Revised Risk							62.18	6.97E-02

NOTES:
Most-Probable Case utilizes the average contaminant concentration from all wells exhibiting VOC contamination in the FES .
Worst-Case utilizes the maximum contaminant concentration detected from wells exhibiting VOC contamination in the FES.
Exp Calc = Average Daily Dose of contaminant
RfD Value = Reference Dose for particular contaminant
Carcin Potency = Carcinogenic Potency of the particular contaminant, now known as the slope factor
RfD Calc = Non-Carcinogenic Risk Estimate
Carcin Calc = Carcinogenic Risk Estimate
NA = Not Available

TABLE -4
RISK ESTIMATES FOR FUTURE USE OF BELLAMY RESERVOIR

Surface Water - Bellamy Reservoir
Ingestion of Drinking Water
Most-Probable and Worst-Case

Compound	CONC MED ppm	2 LIT/ DAY	BODY WT kg	EXP CALC mg/kg/day	RfD VALUES mg/kg/day	CARCIN POTENCY (mg/kg/day)-1	RfD CALC	CARCIN CALC
Acetone	1.07E-04	2	70	3.06E-06	1.00E-01	NA	3.06E-05	0.00E+00
Arsenic	1.52E-04	2	70	4.34E-06	1.00E-03	1.75E+00	4.34E-03	7.60E-06
Benzene	8.90E-05	2	70	2.54E-06	NA	2.90E-02	0.00E+00	7.37E-08
Cadmium	0.00E+00	2	70	0.00E+00	5.00E-04	NA	0.00E+00	0.00E+00
Chloroethane	6.46E-05	2	70	1.85E-06	NA	1.30E-02	0.00E+00	2.40E-08
1,1-Dichloroethylene	0.00E+00	2	70	0.00E+00	9.00E-03	6.00E-01	0.00E+00	0.00E+00
1,2-Dichloroethane	8.60E-05	2	70	2.46E-06	NA	9.10E-02	0.00E+00	2.24E-07
Mercury	1.10E-06	2	70	3.14E-08	1.40E-03	NA	2.24E-05	0.00E+00
Methylene Chloride	0.00E+00	2	70	0.00E+00	6.00E-02	7.50E-03	0.00E+00	0.00E+00
Methyl Ethyl Ketone	1.60E-04	2	70	4.57E-06	5.00E-02	NA	9.14E-05	0.00E+00
Methyl Isobutyl Ketone	1.80E-03	2	70	5.14E-05	5.00E-02	NA	1.03E-03	0.00E+00
Tetrachloroethylene	0.00E+00	2	70	0.00E+00	1.00E-02	5.10E-02	0.00E+00	0.00E+00
Tetrahydrofuran	2.94E-03	2	70	8.40E-05	2.00E-03	NA	4.20E-02	0.00E+00
Toluene	3.56E-03	2	70	1.02E-04	3.00E-01	NA	3.39E-04	0.00E+00
ichloroethylene	0.00E+00	2	70	0.00E+00	NA	1.10E-02	0.00E+00	0.00E+00
Vinyl chloride	0.00E+00	2	70	0.00E+00	NA	2.30E+00	0.00E+00	0.00E+00
Revised Risk							4.79E-02	7.92E-06

NOTES:
Most-Probable Case and Worst-Case utilize the same contaminant concentration.
Exp Calc = Average Daily Dose of contaminant
RfD Value = Reference Dose for particular contaminant
Carcin Potency = Carcinogenic Potency of the particular contaminant, now known as the slope factor
RfD Calc = Non-Carcinogenic Risk Estimate
Carcin Calc = Carcinogenic Risk Estimate
NA = Not Available

TABLE -5
RISK ESTIMATES FOR INGESTION OF SURFACE WATER - COCHECO RIVER

urface Water - Cocheco River
ngestion of Surface Water, Most Probable Case

ompound	CONC MED ppm	WATER INGEST L/event	# EVNT/ YEAR	TKF	365 DAYS YEAR	BODY WT kg	EXPOS DAY mg/kg/day	EXPOSE LIFE mg/kg/day	RfD VALUES mg/kg/day	CARCIN POTENCY (mg/kg/day)-1	RfD CALC	CARCIN CALC
cetone	5.99E-05	0.05	12	1	365	40	2.46E-09	3.51E-10	1.00E-01	NA	2.46E-08	0.00E+00
rsenic	6.00E-05	0.05	12	1	365	40	2.47E-09	3.52E-10	1.00E-03	1.75E+00	2.47E-06	6.16E-10
enzene	3.50E-05	0.05	12	1	365	40	1.44E-09	2.05E-10	NA	2.90E-02	0.00E+00	5.96E-12
admium	0	0.05	12	1	365	40	0.00E+00	0.00E+00	5.00E-04	NA	0.00E+00	0.00E+00
hloroethane	3.61E-05	0.05	12	1	365	40	1.48E-09	2.12E-10	NA	1.30E-02	0.00E+00	2.76E-12
,1-Dichloroethylene	0	0.05	12	1	365	40	0.00E+00	0.00E+00	9.00E-03	6.00E-01	0.00E+00	0.00E+00
,2-Dichloroethane	4.80E-05	0.05	12	1	365	40	1.97E-09	2.82E-10	NA	9.10E-02	0.00E+00	2.56E-11
ercury	4.00E-07	0.05	12	1	365	40	1.64E-11	2.35E-12	1.40E-03	NA	1.17E-08	0.00E+00
ethylene Chloride	0	0.05	12	1	365	40	0.00E+00	0.00E+00	6.00E-02	7.50E-03	0.00E+00	0.00E+00
ethyl Ethyl Ketone	9.00E-05	0.05	12	1	365	40	3.70E-09	5.28E-10	5.00E-02	NA	7.40E-08	0.00E+00
hyl Isobutyl Keton	1.01E-03	0.05	12	1	365	40	4.15E-08	5.93E-09	5.00E-02	NA	8.30E-07	0.00E+00
etrachloroethylene	0	0.05	12	1	365	40	0.00E+00	0.00E+00	1.00E-02	5.10E-02	0.00E+00	0.00E+00
Tetrahydrofuran	1.64E-03	0.05	12	1	365	40	6.74E-08	9.63E-09	2.00E-03	NA	3.37E-05	0.00E+00
Toluene	1.40E-03	0.05	12	1	365	40	5.75E-08	8.22E-09	3.00E-01	NA	1.92E-07	0.00E+00
Trichloroethylene	0	0.05	12	1	365	40	0.00E+00	0.00E+00	NA	1.10E-02	0.00E+00	0.00E+00
Vinyl chloride	0	0.05	12	1	365	40	0.00E+00	0.00E+00	NA	2.30E+00	0.00E+00	0.00E+00
Revised Risk											3.73E-05	6.51E-10

Surface Water - Cocheco River
Ingestion of Surface Water, Worst-Case

Compound	CONC MED ppm	WATER INGEST L/event	# EVNT/ YEAR	TKF	365 DAYS YEAR	BODY WT kg	EXPOS DAY mg/kg/day	EXPOSE LIFE mg/kg/day	RfD VALUES mg/kg/day	CARCIN POTENCY (mg/kg/day)-1	RfD CALC	CARCIN CALC
Acetone	5.99E-05	0.1	24	1	365	40	9.84E-09	1.41E-09	1.00E-01	NA	9.84E-08	0.00E+00
Arsenic	6.00E-05	0.1	24	1	365	40	9.86E-09	1.41E-09	1.00E-03	1.75E+00	9.86E-06	2.47E-09
Benzene	3.50E-05	0.1	24	1	365	40	5.75E-09	8.22E-10	NA	2.90E-02	0.00E+00	2.38E-11
Cadmium	0	0.1	24	1	365	40	0.00E+00	0.00E+00	5.00E-04	NA	0.00E+00	0.00E+00
Chloroethane	3.61E-05	0.1	24	1	365	40	5.93E-09	8.48E-10	NA	1.30E-02	0.00E+00	1.10E-11
1,1-Dichloroethylene	0	0.1	24	1	365	40	0.00E+00	0.00E+00	9.00E-03	6.00E-01	0.00E+00	0.00E+00
1,2-Dichloroethane	4.80E-05	0.1	24	1	365	40	7.89E-09	1.13E-09	NA	9.10E-02	0.00E+00	1.02E-10
Mercury	4.00E-07	0.1	24	1	365	40	6.58E-11	9.39E-12	1.40E-03	NA	4.70E-08	0.00E+00
Methylene Chloride	0	0.1	24	1	365	40	0.00E+00	0.00E+00	6.00E-02	7.50E-03	0.00E+00	0.00E+00
Methyl Ethyl Ketone	9.00E-05	0.1	24	1	365	40	1.48E-08	2.11E-09	5.00E-02	NA	2.96E-07	0.00E+00
Methyl Isobutyl Keton	1.01E-03	0.1	24	1	365	40	1.66E-07	2.37E-08	5.00E-02	NA	3.32E-06	0.00E+00
Tetrachloroethylene	0	0.1	24	1	365	40	0.00E+00	0.00E+00	1.00E-02	5.10E-02	0.00E+00	0.00E+00
Tetrahydrofuran	1.64E-03	0.1	24	1	365	40	2.70E-07	3.85E-08	2.00E-03	NA	1.35E-04	0.00E+00
Toluene	1.40E-03	0.1	24	1	365	40	2.30E-07	3.29E-08	3.00E-01	NA	7.67E-07	0.00E+00
Trichloroethylene	0	0.1	24	1	365	40	0.00E+00	0.00E+00	NA	1.10E-02	0.00E+00	0.00E+00
Vinyl chloride	0	0.1	24	1	365	40	0.00E+00	0.00E+00	NA	2.30E+00	0.00E+00	0.00E+00
Revised Risk											1.49E-04	2.60E-09

TABLE -6

RISK ESTIMATES FOR DERMAL CONTACT WITH SURFACE WATER - COCHECO RIVER

Surface Water - Cocheco River
Dermal Contact with Surface Water, Most Probable Case

Compounds	CONC MED ppm	1L/ 1000 cm^3	SKIN AREA cm2	HRS/ EVNT	PERM CONS cm/hr	# EVNT YR	365 DAYS YEAR	BDY WT kg	EXPOS DAY mg/kg/day	EXPOSE LIFE mg/kg/day	RfD VALUES mg/kg/day	CARC POTEN mg/kg/day-1	RfD CALC	CARCIN CALC
Acetone	5.99E-05	0.001	10000	1	8E-04	12	365	40	3.94E-10	5.62E-11	1.00E-01	NA	3.94E-09	0.00E+00
Arsenic	6.00E-05	0.001	10000	1	8E-04	12	365	40	3.95E-10	5.64E-11	1.00E-03	1.75E+00	3.95E-07	9.86E-11
Benzene	3.50E-05	0.001	10000	1	0.041	12	365	40	1.18E-08	1.68E-09	NA	2.90E-02	0.00E+00	4.89E-11
Cadmium	0	0.001	10000	1	8E-04	12	365	40	0.00E+00	0.00E+00	5.00E-04	NA	0.00E+00	0.00E+00
Chloroethane	3.61E-05	0.001	10000	1	8E-04	12	365	40	2.37E-10	3.39E-11	NA	1.30E-02	0.00E+00	4.41E-13
1,1-Dichloroethyle	0	0.001	10000	1	8E-04	12	365	40	0.00E+00	0.00E+00	9.00E-03	6.00E-01	0.00E+00	0.00E+00
1,2-Dichloroethane	4.80E-05	0.001	10000	1	8E-04	12	365	40	3.16E-10	4.51E-11	NA	9.10E-02	0.00E+00	4.10E-12
Mercury	4.00E-07	0.001	10000	1	8E-04	12	365	40	2.63E-12	3.76E-13	1.40E-03	NA	1.88E-09	0.00E+00
Methylene Chloride	0	0.001	10000	1	8E-04	12	365	40	0.00E+00	0.00E+00	6.00E-02	7.50E-03	0.00E+00	0.00E+00
Methyl Ethyl Keton	9.00E-05	0.001	10000	1	8E-04	12	365	40	5.92E-10	8.45E-11	5.00E-02	NA	1.18E-08	0.00E+00
Methyl Isobutyl Ke	1.01E-03	0.001	10000	1	8E-04	12	365	40	6.64E-09	9.49E-10	5.00E-02	NA	1.33E-07	0.00E+00
Tetrachloroethylen	0	0.001	10000	1	8E-04	12	365	40	0.00E+00	0.00E+00	1.00E-02	5.10E-02	0.00E+00	0.00E+00
Tetrahydrofuran	1.64E-03	0.001	10000	1	8E-04	12	365	40	1.08E-08	1.54E-09	2.00E-03	NA	5.39E-06	0.00E+00
Toluene	1.40E-03	0.001	10000	1	9E-04	12	365	40	1.04E-08	1.48E-09	3.00E-01	NA	3.45E-08	0.00E+00
Trichloroethylene	0	0.001	10000	1	8E-04	12	365	40	0.00E+00	0.00E+00	NA	1.10E-02	0.00E+00	0.00E+00
Vinyl chloride	0	0.001	10000	1	8E-04	12	365	40	0.00E+00	0.00E+00	NA	2.30E+00	0.00E+00	0.00E+00
Revised Risk													5.97E-06	1.52E-10

Surface Water - Cocheco River
Dermal Contact with Surface Water, Worst-Case

Compounds	CONC MED ppm	1L/ 1000 cm^3	SKIN AREA cm2	HRS/ EVNT	PERM CONS cm/hr	# EVNT YR	365 DAYS YEAR	BDY WT kg	EXPOS DAY mg/kg/day	EXPOSE LIFE mg/kg/day	RfD VALUES mg/kg/day	CARC POTEN mg/kg/day-1	RfD CALC	CARCIN CALC
Acetone	5.99E-05	0.001	10000	2	8E-04	24	365	40	1.57E-09	2.25E-10	1.00E-01	NA	1.57E-08	0.00E+00
Arsenic	6.00E-05	0.001	10000	2	8E-04	24	365	40	1.58E-09	2.25E-10	1.00E-03	1.75E+00	1.58E-06	3.95E-10
Benzene	3.50E-05	0.001	10000	2	0.041	24	365	40	4.72E-08	6.74E-09	NA	2.90E-02	0.00E+00	1.95E-10
Cadmium	0	0.001	10000	2	8E-04	24	365	40	0.00E+00	0.00E+00	5.00E-04	NA	0.00E+00	0.00E+00
Chloroethane	3.61E-05	0.001	10000	2	8E-04	24	365	40	9.49E-10	1.36E-10	NA	1.30E-02	0.00E+00	1.76E-12
1,1-Dichloroethyle	0	0.001	10000	2	8E-04	24	365	40	0.00E+00	0.00E+00	9.00E-03	6.00E-01	0.00E+00	0.00E+00
1,2-Dichloroethane	4.80E-05	0.001	10000	2	8E-04	24	365	40	1.26E-09	1.80E-10	NA	9.10E-02	0.00E+00	1.64E-11
Mercury	4.00E-07	0.001	10000	2	8E-04	24	365	40	1.05E-11	1.50E-12	1.40E-03	NA	7.51E-09	0.00E+00
Methylene Chloride	0	0.001	10000	2	8E-04	24	365	40	0.00E+00	0.00E+00	6.00E-02	7.50E-03	0.00E+00	0.00E+00
Methyl Ethyl Keton	9.00E-05	0.001	10000	2	8E-04	24	365	40	2.37E-09	3.38E-10	5.00E-02	NA	4.73E-08	0.00E+00
Methyl Isob. Ket.	1.01E-03	0.001	10000	2	8E-04	24	365	40	2.66E-08	3.79E-09	5.00E-02	NA	5.31E-07	0.00E+00
Tetrachloroethylen	0	0.001	10000	2	8E-04	24	365	40	0.00E+00	0.00E+00	1.00E-02	5.10E-02	0.00E+00	0.00E+00
Tetrahydrofuran	1.64E-03	0.001	10000	2	8E-04	24	365	40	4.31E-08	6.16E-09	2.00E-03	NA	2.16E-05	0.00E+00
Toluene	1.40E-03	0.001	10000	2	9E-04	24	365	40	4.14E-08	5.92E-09	3.00E-01	NA	1.38E-07	0.00E+00
Trichloroethylene	0	0.001	10000	2	8E-04	24	365	40	0.00E+00	0.00E+00	NA	1.10E-02	0.00E+00	0.00E+00
Vinyl chloride	0	0.001	10000	2	8E-04	24	365	40	0.00E+00	0.00E+00	NA	2.30E+00	0.00E+00	0.00E+00
Revised Risk													2.39E-05	6.08E-10

TABLE -7

RISK ESTIMATES FOR DERMAL CONTACT WITH SURFACE WATER - SWALE

Surface Water - Swale
Dermal Contact, Most Probable Case

Compounds	CONC MED ppm	1L/ 1000 cm^3	SKIN AREA cm2	HR/ EVT	PERM CONS cm/hr	# EVNT YR	365 DAYS YEAR	BDY WT kg	EXPOS DAY mg/kg/day	EXPOSE LIFE mg/kg/day	RfD VALUES mg/kg/day	CARC POTEN mg/kg/day-1	RfD CALC	CARCIN CALC
Acetone	0.0026	0.001	1800	1	8E-04	12	365	40	3.08E-09	4.40E-10	1.00E-01	NA	3.08E-08	0.00E+00
Arsenic	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	1.00E-03	1.75E+00	0.00E+00	0.00E+00
Benzene	0.0042	0.001	1800	1	0.041	12	365	40	2.55E-07	3.64E-08	NA	2.90E-02	0.00E+00	1.06E-09
Cadmium	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	5.00E-04	NA	0.00E+00	0.00E+00
Chloroethane	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	NA	1.30E-02	0.00E+00	0.00E+00
1,1-Dichloroethyle	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	9.00E-03	6.00E-01	0.00E+00	0.00E+00
1,2-Dichloroethane	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	NA	9.10E-02	0.00E+00	0.00E+00
Mercury	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	1.40E-03	NA	0.00E+00	0.00E+00
Methylene Chloride	0.0031	0.001	1800	1	8E-04	12	365	40	3.67E-09	5.24E-10	6.00E-02	7.50E-03	6.12E-08	3.93E-12
Methyl Ethyl Keton	0.169	0.001	1800	1	8E-04	12	365	40	2.00E-07	2.86E-08	5.00E-02	NA	4.00E-06	0.00E+00
Methyl Iso. Ket.	0.0556	0.001	1800	1	8E-04	12	365	40	6.58E-08	9.40E-09	5.00E-02	NA	1.32E-06	0.00E+00
Tetrachloroethylen	0.001	0.001	1800	1	8E-04	12	365	40	1.18E-09	1.69E-10	1.00E-02	5.10E-02	1.18E-07	8.62E-12
Tetrahydrofuran	0.0273	0.001	1800	1	8E-04	12	365	40	3.23E-08	4.62E-09	2.00E-03	NA	1.62E-05	0.00E+00
Toluene	0.0314	0.001	1800	1	9E-04	12	365	40	4.18E-08	5.97E-09	3.00E-01	NA	1.39E-07	0.00E+00
Trichloroethylene	0.0065	0.001	1800	1	8E-04	12	365	40	7.69E-09	1.10E-09	NA	1.10E-02	0.00E+00	1.21E-11
Vinyl chloride	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	NA	2.30E+00	0.00E+00	0.00E+00
Revised Risk													2.18E-05	1.08E-09

Surface Water - Swale
Dermal Contact, Worst-Case

Compounds	CONC MED ppm	1L/ 1000 cm^3	SKIN AREA cm2	HR/ EVT	PERM CONS cm/hr	# EVNT YR	365 DAYS YEAR	BDY WT kg	EXPOS DAY mg/kg/day	EXPOSE LIFE mg/kg/day	RfD VALUES mg/kg/day	CARC POTEN mg/kg/day-1	RfD CALC	CARCIN CALC
Acetone	0.028	0.001	1800	1	8E-04	12	365	40	3.31E-08	4.73E-09	1.00E-01	NA	3.31E-07	0.00E+00
Arsenic	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	1.00E-03	1.75E+00	0.00E+00	0.00E+00
Benzene	0.013	0.001	1800	1	0.041	12	365	40	7.89E-07	1.13E-07	NA	2.90E-02	0.00E+00	3.27E-09
Cadmium	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	5.00E-04	NA	0.00E+00	0.00E+00
Chloroethane	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	NA	1.30E-02	0.00E+00	0.00E+00
1,1-Dichloroethyle	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	9.00E-03	6.00E-01	0.00E+00	0.00E+00
1,2-Dichloroethane	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	NA	9.10E-02	0.00E+00	0.00E+00
Mercury	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	1.40E-03	NA	0.00E+00	0.00E+00
Methylene Chloride	0.025	0.001	1800	1	8E-04	12	365	40	2.96E-08	4.23E-09	6.00E-02	7.50E-03	4.93E-07	3.17E-11
Methyl Ethyl Keton	0.784	0.001	1800	1	8E-04	12	365	40	9.28E-07	1.33E-07	5.00E-02	NA	1.86E-05	0.00E+00
Methyl Iso. Ket.	0.2138	0.001	1800	1	8E-04	12	365	40	2.53E-07	3.61E-08	5.00E-02	NA	5.06E-06	0.00E+00
Tetrachloroethylen	0.011	0.001	1800	1	8E-04	12	365	40	1.30E-08	1.86E-09	1.00E-02	5.10E-02	1.30E-06	9.49E-11
Tetrahydrofuran	0.074	0.001	1800	1	8E-04	12	365	40	8.76E-08	1.25E-08	2.00E-03	NA	4.38E-05	0.00E+00
Toluene	0.152	0.001	1800	1	9E-04	12	365	40	2.02E-07	2.89E-08	3.00E-01	NA	6.75E-07	0.00E+00
Trichloroethylene	0.0389	0.001	1800	1	8E-04	12	365	40	4.60E-08	6.58E-09	NA	1.10E-02	0.00E+00	7.23E-11
Vinyl chloride	0	0.001	1800	1	8E-04	12	365	40	0.00E+00	0.00E+00	NA	2.30E+00	0.00E+00	0.00E+00
Revised Risk													7.02E-05	3.47E-09

TABLE -8

RISK ESTIMATES FOR INGESTION AND DERMAL CONTACT WITH SEDIMENTS - SWALE

Sediment - Swale
Soil Ingestion and Dermal Contact, Most-Probable Case

Compounds	CONC MED ppm	SOIL INGEST mg/event	SKIN AREA cm2/evnt	EXP events/ year	SOIL CONT mg/cm2	TKF-DA 10%	TKF-DA 100%	1.00E+06 mg/kg	BDY WT kg	365 DAYS YEAR	INGEST CALC mg/kg/day	DERMAL CALC mg/kg/day	LIFE INGEST mg/kg/day	LIFE DERMAL mg/kg/day	RfD VALUES mg/kg/day	CARCIN POTEN mg/kg/day-1
Acetone	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	1.00E-01	NA
Arsenic	79.5	50	1000	30	0.51	0.01	0.5	1.00E+06	40	365	4.08E-06	8.33E-07	5.83E-07	1.19E-07	1.00E-03	1.75E+00
Benzene	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	2.90E-02
Cadmium	7.6	50	1000	30	0.51	0.17	1	1.00E+06	40	365	7.81E-07	1.35E-06	1.12E-07	1.934E-07	5.00E-04	NA
Chloroethane	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	1.30E-02
1,1-Dichloroethylene	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	9.00E-03	6.00E-01
1,2-Dichloroethane	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	9.10E-02
Mercury	0.01	50	1000	30	0.51	0.1	1	1.00E+06	40	365	1.03E-09	1.05E-09	1.47E-10	1.497E-10	1.40E-03	NA
Methylene Chloride	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	6.00E-02	7.50E-03
Methyl Ethyl Ketone	0.283	50	1000	30	0.51	0.25	1	1.00E+06	40	365	2.91E-08	7.41E-08	4.15E-09	1.059E-08	5.00E-02	NA
Methyl Isobutyl Keton	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	5.00E-02	NA
Tetrachloroethylene	0	50	1000	30	0.51	0.[illegible]	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	1.00E-02	5.10E-02
Tetrahydrofuran	0	50	1000	30	0.51	0.[illegible]	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	2.00E-03	NA
Toluene	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	3.00E-01	NA
Trichloroethylene	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	1.10E-02
Vinyl chloride	0	50	1000	30	0.51	0.25	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	2.30E+00

Compounds	INGEST RfD CALC	INGEST CAR CAL	DERMAL RfD CALC	DERMAL CAR CAL
Acetone	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Arsenic	4.08E-03	1.02E-06	8.33E-04	2.08E-07
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium	1.56E-03	0.00E+00	2.71E-03	0.00E+00
Chloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,1-Dichloroethylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,2-Dichloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	7.34E-07	0.00E+00	7.49E-07	0.00E+00
Methylene Chloride	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methyl Ethyl Ketone	5.82E-07	0.00E+00	1.48E-06	0.00E+00
Methyl Isobutyl Keton	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrahydrofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl chloride	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Revised Risk	5.65E-03	1.02E-06	3.54E-03	2.08E-07

TABLE -8 (Cont'd)
RISK ESTIMATES FOR INGESTION AND DERMAL CONTACT WITH SEDIMENTS - SWALE

Sediment - Swale
Soil Ingestion and Dermal Contact, Worst-Case

Compounds	CONC MED ppm	SOIL INGEST mg/event	SKIN AREA cm2/evnt	EXP events/ year	SOIL CONT mg/cm2	TKF-DA 10%	TKF-DA 100%	1.00E+06 mg/kg	BDY WT kg	365 DAYS YEAR	INGEST CALC mg/kg/day	DERMAL CALC mg/kg/day	LIFE INGEST mg/kg/day	LIFE DERMAL mg/kg/day	RfD VALUES mg/kg/day	CARCIN POTEN mg/kg/day-1
Acetone	0	250	4000	90	1.5	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	1.00E-01	NA
Arsenic 210	160	250	4000	90	0.51	0.05	1	1.00E+06	40	365	2.16E-04	8.80E-05	3.08E-05	1.258E-05	1.00E-03	1.75E+00
Benzene	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	2.90E-02
Cadmium	12	250	4000	90	0.51	0.8	1	1.00E+06	40	365	1.85E-05	1.21E-04	2.64E-06	1.725E-05	5.00E-04	NA
Chloroethane	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	1.30E-02
1,1-Dichloroethylene	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	9.00E-03	6.00E-01
1,2-Dichloroethane	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	9.10E-02
Mercury	0.02	250	4000	90	0.51	0.5	1	1.00E+06	40	365	3.08E-02	1.26E-07	4.40E-09	1.796E-08	1.40E-03	NA
Methylene Chloride	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	6.00E-02	7.50E-03
Methyl Ethyl Ketone	1.7	250	4000	90	0.51	0.5	1	1.00E+06	40	365	2.62E-06	1.07E-05	3.74E-07	1.527E-06	5.00E-02	NA
Methyl Isobutyl Keton	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	5.00E-02	NA
Tetrachloroethylene	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	1.00E-02	5.10E-02
Tetrahydrofuran	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	2.00E-03	NA
Toluene	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	3.00E-01	NA
Trichloroethylene	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	1.10E-02
Vinyl chloride	0	250	4000	90	0.51	0.5	1	1.00E+06	40	365	0.00E+00	0.00E+00	0	0	NA	2.30E+00

Compounds	INGEST RfD CALC	INGEST CAR CAL	DERMAL RfD CALC	DERMAL CAR CAL
Acetone	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Arsenic	2.16E-01	5.39E-05	8.80E-02	2.20E-05
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium	3.70E-02	0.00E+00	2.41E-01	0.00E+00
Chloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,1-Dichloroethylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,2-Dichloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	2.20E-05	0.00E+00	8.98E-05	0.00E+00
Methylene Chloride	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methyl Ethyl Ketone	5.24E-05	0.00E+00	2.14E-04	0.00E+00
Methyl Isobutyl Keton	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrahydrofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vinyl chloride	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Revised Risk	2.53E-01	5.39E-05	3.30E-01	2.20E-05

TABLE 9

CURRENT PROPOSED (DRAFT) INDUSTRIAL DISCHARGE PRETREATMENT REQUIREMENTS FOR THE DOVER WASTEWATER TREATMENT FACILITY[1]

Parameter (Units)	Discharge Limit - Industrial Discharge
Physical Parameters	
Flow	Determined on a case-by-case basis, and contingent upon sewer line capacity
pH	6.5 - 11.0
Temperature (°F/°C)	150/65
Color	No deeply staining dyes
Chemical Parameters	
Total Solids (mg/l) - Avg./Max.	1,200/3,000
Total Volatile Solids (% of total)	---
Total Suspended Solids (mg/l) - Avg./Max.	400/847
Total Dissolved Solids (mg/l) - Avg./Max.	600/1,500
Settable Solids (mg/l)	30
Acidity	---
Alkalinity (mg/l as $CaCO_3$)	75
5-Day BOD (mg/l)	300 (BOD - 791 mg/l)
COD	---
Oil and Grease (mg/l)	100
Petroleum Soils in Wastewater (mg/l)	25
Chloride as Cl (mg/l)	500
Sulfate as 904 (mg/l)	250
Sulfites (mg/l)	2.0
Sulfide as 9 (mg/l)	0.1
Arsenic (mg/l)	.400
Beryllium (mg/l)	2.0
Boron (mg/l)	0.1
Cadmium (mg/l)	0.020
Chromium (Total) (mg/l)	4.03
Chromium (Hexavalent) (mg/l)	1.75
Copper (mg/l)	0.2
Lead (mg/l)	.606
Mercury (mg/l)	0.004
Nickel (mg/l)	1.07
Selenium (mg/l)	8.55
Silver (mg/l)	.713
Chlorides (mg/l)	500
Cyanides (mg/l)	.363
Phenols (mg/l)	182
Total Toxic Organics (mg/l)	5.0
Zinc (mg/l)	4.33

1. Proposed Pretreatment Standards are draft as of April, 1990, (updated based on new operating permits as of November, 1991).

APPENDIX C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL CRITERIA AND ASSESSMENT OFFICE
CINCINNATI, OHIO 45268

May 3, 1990

SUBJECT: Provisional RfD for Tetrahydrofuran (THF)

FROM: Pei-Fung Hurst
Biologist
Chemical Mixtures Assessment Branch

TO: Rodger Duart
U.S EPA
Region I

THRU: W. Bruce Peirano
Acting Chief
Chemical Mixture Assessment Branch

This memo is a draft response to your request for an oral assessment of the toxicity of tetrahydrofuran (THF) for the Mottolo NPL site. Although an oral RfD for THF was prepared and presented to the RfD Work Group on 01/28/87, it was not verified and was placed under review until a complete translation of the critical study (Katahira, 1982), published in Japanese, could be obtained. (An inhalation RfD for THF, based upon this same study, has been verified on 1/19/90.) Consequentially, ECAO has obtained a full translation of the Katahira (1982) study and based an interim oral RfD for THF of 0.002 mg/kg/day upon this data. Below is a summary of the Katahira (1982) study and oral RfD computations.

Male SD rats (11-12/group) were exposed to 0, 100, 200, 1000 or 5000 ppm (0, 295, 590,2449, or 14,744 mg/m^3) 4 hr/day, 5 day/week for 12 weeks. Rats exposed to 100 or 200 ppm had no effects other than redness about the eyes and nose. Increased levels of SGOT, indicative of liver damage, were observed in the rats exposed to 1000 ppm. Rats exposed to 5000 ppm had marked local irritation (edema or opacity of the cornea, salivation, discharge or bleeding from the nose), morphologically defined damage to the respiratory mucosa, significant alterations in blood counts and blood sugar, increased levels of SGOT, SGPT, and bilirubin and CNS effects (clonic muscle spasms, coma, cataleptoid posture). The rise in SGOT levels was dose related. Although a statistically significant increase in SGOT levels in rats exposed to 200 ppm is indicated in a table presented in the publication, the author only notes that increased serum enzyme changes were

observed in the two highest exposure levels. There were no changes in relative or absolute organ weights and no histopathological alterations in the brain, lungs, liver, spleen, kidneys or femur were detected in the exposed animals. Thus, the NOAEL for liver effects is 200 ppm, which is equivalent to an oral dose of 22 mg/kg/day. Application of an uncertainty factor of 10,000 (10 for use of a subchronic study; 10 for interspecies extrapolation. 10 for intraspecies variability, and 10 to account for the limited database) to the NOAEL yields an oral RfD of 0.002 mg/kg/day.

Conversion factors: 4 hr/24 hr, 5 day/7 day, 0.223 mg/m^3 rat inhalation rate, 0.35 kg rat body weight, 0.5 absorption factor (i.e. 590 mg/m^3 x 4 hr/24 hr x 5 day/7 day x 0.223 m^3/day x 1/0.35 kg x 0.5 = 22.4 mg/kg/day.

Although, this study did not find definitive evidence of liver damage, other studies have shown that the liver is a target organ. Katahira (1982) cites that other studies have reported liver damage in cats and rats following inhalation, intravenous, or intramedullary injection (Lehmann and Flury, 1943; Okhumra, 1958; Jochmann, 1961).

Liver effects (centrilobular cytomegaly) were observed in mice exposed to 5000 ppm THF 6 hr/day, 5 day/week for 13 weeks. Liver effects were not observed in rats in this study; however, acanthosis and supportive inflammation of the forestomach was observed in rats exposed to 5000 ppm (Grumbien, 1988)

Critical Studies:

Katahira, T. 1982. [Experimental studies on the toxicity of tetrahydrofuran]. Osaka Shiritsu Daugaku Igaku Zasshi 31;221-239. (Japanese)

Grumbein, S. 1988. 13-Week subchronic toxicity test by inhalation of tetrahydrofuran in Fisher 344 rats and B6C3F1 mice. Pathology Working Group Chairperson's Report. Submitted to National Toxicology Program, Research Triangle Park, NC.

Please note that the number derived is an interim number and ECAO is seeking further review of this assessment. We will forward any additional information to you as soon as it is available. Should you desire any additional information, do not hesitate to call me at FTS 684-7300

cc: C. DeRosa (ECAO-Cin)
S. Levinson (Region I)
B. Means (OS-230)
T. O'Bryan (OS-230)
S. Sokol (Balson Environmental Consulting)

U.S. ENVIRONMENTAL PROTECTION AGENCY
J.F.K. FEDERAL BUILDING
BOSTON, MA 02203

Date: **December 21, 1990**

Subj: **Mottolo Site Feasibility Study**

From: **Maureen R. McClelland, Environmental Scientist**
Ground Water Management and Water Supply Branch

To: **Roger Duwart, R.P.M.**
New Hampshire

I have reviewed the Mottolo Site Feasibility Study and have the following comments for clarification/revision.

I. In regards to setting a TCL for tetrahydrafuran: The US EPA approach to analyzing systemic toxicity data follow general format set forth by NRC in its description of the risk assessment process. The determination of the presence of risk and potential magnitude is made during the risk assessment process which consists of hazard identification, dose response assessment and risk characterization.

In general the Rfd is an estimate with <u>uncertainty spanning perhaps an order of magnitude</u> of a daily exposure to the human population including sensitive subgroups that are likely to be without an appreciable risk of deleterious effects during a lifetime.

Having been appraised by the risk assessor that a potential risk exists, the risk manager considers control options available under existing statutes and other relevant non risk factors (e.g. benefits to be gained and costs to be incurred). All of these considerations go into the determination of a TCL.

Therefore, use of a conservative, oral Rfd of 2.0×10^{-2} mg/kg/day calculated with an uncertainty factor of 1,000 (adjusted one order of magnitude) results in a action level of 0.77 mg/l for THF, a level considered to be protective of public health.

II. pg.2-12 ...within the EPA acceptable hazard index range of 1 to 10.

Comments: The EPA does not use a range of 1 to 10 for the hazard index. EPA policy is a hazard index less than or equal to one is acceptable.

APPENDIX D

State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES
WASTE MANAGEMENT DIVISION
6 Hazen Drive, Concord, NH 03301-6509
603-271-2900
TTY/TDD 225-4033

ROBERT W. VARNEY
COMMISSIONER

PHILIP J. O'BRIEN, Ph.D.
DIRECTOR

MICHAEL A. SILLS, Ph.D., P.E.
CHIEF ENGINEER

WASTE MANAGEMENT COUNCIL
G. BRADLEY RICHARDS, Chairman
ROBERT WHEELER, Vice-Chairman
WILLIAM ARNOLD
ROBERT BURROWS
T. TAYLOR EGHMY, Ph.D.
VIRGINIA O'BRIEN IRWIN
WILLIAM JENNESS
JOHN LAMALLEY
JOHN LPCRAW
FREDERICK MCGARRY
JOHN OSGOOD
LORRAINE SANDER
GAIL THERRIAULT

September 9, 1991

Julie Belaga
Regional Administrator
USEPA, Region I
JFK Federal Building
Boston, MA 02203

Re: Record of Decision
Dover Landfill Site
Dover, New Hampshire

Dear Administrator Belaga:

The New Hampshire Department of Environmental Services (DES) acting as agent for the State of New Hampshire has reviewed the above referenced draft Record of Decision and offers the following comments:

Source Control:

DES concurs with the source control measures selected by EPA including capping, installation of an upgradient groundwater diversion trench and the construction of a source leachate extraction and treatment system. These elements are consistent with DES policy.

Cap:

DES concurs with EPA's selection of a double impermeable layer cap in this instance. Such a cap reflects state of the art engineering practice required to insure cap integrity and longevity both of which are of critical importance due to (a) the presence of relatively high concentrations of hazardous contaminants; (b) the proximity of potential receptors; and, (c) the critical assumption of cap integrity as it relates to the proposed control of migration methods to be commented upon below.

Eastern Contaminant Plume Management:

DES concurs with EPA's decision to allow for natural attenuation of the eastern plume which is migrating toward the Cocheco River. This remedy affords protection of the Cocheco in that New Hampshire surface water quality standards will be met.

Southern Contaminant Plume Management:

DES is reserving it concurrence on that portion of the remedy which addresses the southern plume until the pre-design studies as described on page 60 of the ROD are completed.

Sincerely,

Philip J. O'Brien, Ph.D.
Director
Waste Management Division

Robert W. Varney
Commissioner
Department of Environmental Services

PJO/kki/WPP#151

cc: Carl W. Baxter, P.E., NHDES-WMEB
Richard H. Pease, P.E., NHDES-WMEB
Paul Currier, P.E., NHDES-WSPCD
Jeffrey A. Meyers, Esq., NHDOJ-AGO
Daniel Coughlin, P.E., USEPA, Region I
Cheryl Sprague, USEPA, Region I

APPENDIX E

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
STATE - NH Admin. Code ENV-Ws 403 Wastewater Discharge Permits	Relevant and Appropriate	Establishes effluent monitoring system for all industrial wastewater discharges to surface waters and sets general standards for maintaining water quality.	While no permits will be required under these regulations, discharge of water from the treatment systems will meet the general substantive standards of this regulation. In addition, all discharges will be monitored in accordance with this regulation.
STATE - NH Admin. Code ENV-A Part 1002 Fugitive Dust Control	Applicable	Requires precautions to prevent, abate and control fugitive dust during specified activities, including excavation, construction and bulk hauling.	Mitigative measures will be taken to control fugitive dust released during recontouring and other remedial activities.
STATE - NH Admin. Code ENV-A Part 1204 Control of VOC Emissions	Relevant and Appropriate	Specifies VOC emission control methods and establishes limitations on VOC emissions for various industries.	Any air emissions from the capped Landfill or the TSD facility will be controlled in accordance with current requirements. No emissions of VOC's above current state standards will be allowed.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
STATE - NH Admin. Code Saf-C-600 NH Department of Safety Rules for Transport of Hazardous Materials	Applicable	Identifies procedures for properly identifying, handling and shipping hazardous materials, identifies notification and manifesting procedures which must be followed.	Any on-site hazardous waste which must be shipped off-site will be packaged, labelled and shipped in accordance with this requirement.
STATE - NH Admin. Code ENV - Ws 410.05 Groundwater Protection	TBC	Prohibits discharge of hazardous waste to groundwater, or any discharge to groundwater that would result in a violation of surface water quality in adjacent surface waters. Also, groundwater cannot be altered so as to make it unsuitable for drinking.	State groundwater protection standards will be attained at and beyond the point of compliance at the completion of the remedy. In addition, any treatment system which discharges into surface waters and any activities conducted in the wetlands will be consistent with the maintenance or improvement of groundwater quality at and beyond the point of compliance. All remedial activities affecting the groundwater and surface water will be conducted so as to protect the Class A waters of the Bellamy Reservoir.
STATE - RSA 485-A:12 and NH Admin. Code ENV-Ws Parts 430-437 Surface Water Classification	Applicable	Prohibits the disposal of wastes in any manner that would lower the quality of surface water below the minimum requirements of its surface water classification.	Discharges into the Cocheco River and wetlands from the treatment systems will meet the most stringent criteria associated with the classifications of these water bodies. In addition, all remedial activities will be consistent with protecting the Class A waters of the Bellamy Reservoir.
STATE - RSA 495-A:17 and NH Admin. Code ENV-Ws 415 Terrain Alteration	Applicable	Establishes criteria for any activity that significantly alters the terrain.	Criteria identified in this regulation will be addressed during recontouring and capping of the Landfill and during any on-site construction and/or remediation activities. Mitigative measures will be employed to minimize impacts to the wetlands. Once all construction activities have been completed all impacted wetlands will be restored to their original state or an area of equal dimensions will be created on adjacent land.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
STATE - RSA 485-A:5 WS Part 904 Standards for Pretreatment of Wastes Discharged to Publically Owned Treatment Works (POTW)	Applicable	Sets general pretreatment standards for discharge to a POTW.	Any discharges to the POTW from treatment facilities will comply with these general pretreatment standards as well as any local POTW pretreatment standards.
STATE - NH Admin. Code Chapter ENV-A 800 Testing and Monitoring Procedures	Applicable	Identifies procedures which must be followed for the testing of air emissions from stationary sources.	If the on-site TSD facility emits air contaminants, appropriate testing will be conducted to determine the levels of these contaminants.
STATE - NH Admin. Code Chapter ENV-A 900 Owner or Operator Obligations	Applicable	Owners or operators of sources which discharge air pollutants in measure-able levels must retain records of the operation of the source feed stock input to the source and all available emission data. Section 902 of the regulation identifies instances (temporary failure of air pollution equipment) when the owner or operator of an air pollutant discharge source may be allowed to temporarily exceed the air discharge limits established by the State Air Board. Section 903 of the regulation requires that the owner or operator of a source which has had a compliance schedule established for their source (schedule set by State Air Board to bring air discharges from source in line with permit requirements), must comply with the schedule.	Provided that data indicates that pollutants may be readily calculated or estimated, records of air discharges from the various on-site sources will be collected and maintained in accordance with this regulation. Air pollution control device process upsets will be recorded in accordance with the appropriate requirements.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
STATE - He-P Ch. 1905.08(d)(6) a, b Monitoring of Hazardous Waste Treatment Facilities	Relevant and Appropriate	Requirements for installation and operation of one or more of the following monitoring systems: • Groundwater monitoring network. • Air emission monitoring network. • Leachate monitoring network.	Periodic monitoring of groundwater and surface water will be required in order to determine changes in site conditions and the migration of the contaminant plume. Air monitoring for workers' health and safety will be conducted during these periodic monitoring rounds.
STATE - He-P Ch. 1905.08(f)(2)(a) Additional Technical Standards - Treatment Standards	Relevant and Appropriate	General requirements for selection of treatment methods. Treatment method must accomplish one or more of the following objectives: • Render the waste non-hazardous; • Render the waste safe for handling and transport; • Make the waste amenable for recovery or reuse; • Render the waste more amenable to long-term storage or; • Reduce the volume of the hazardous waste.	These state hazardous waste treatment standards will govern the selection of the treatment technology to be determined during remedial design; that technology will comply with one or more of these standards.
STATE - He-P Ch. 1905.08 (f)(2)(c) Storage Standards	Applicable	Establishes requirements to ensure that handling and storage minimize danger to human health and the environment.	Any on-site storage of hazardous waste will be temporary in nature and will comply with all federal and state standards. Waste not treated on-site will be shipped to an off-site RCRA-approved TSD facility.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Standards for Owners and Operators of Hazardous Waste Facilities (Cont'd)		• Procedures to be followed for conducting analysis of waste to be handled or treated at the site. • Procedures for waste handling, storage, and inspection. • General closure requirements. • Environmental and health standards to be met for facility workers. • Contingency plan to address possible accidents or releases of contaminants from the site. • Groundwater monitoring requirements to be followed during active portion and closure period of facility or site. • Necessary response actions to be taken in the event of a spill. - Public notification plan. - Technical standards for waste treatment facilities. - Requirements for surface impoundments. - Requirements for waste piles. The requirements in Federal regulations 40 CFR Parts 264 and 265 are incorporated by reference.	
STATE - He-P Ch. 1905.08(d)(5) Transfer of Ownership or Relinquishment of Property Rights	Relevant and Appropriate	Requires approval of State prior to transfer of any ownership or operation permit for a hazardous waste facility. Owner or operator must also ensure that all future property owners are aware of former uses of site and any associated problems.	NHDES should be consulted prior to the transfer of ownership of the site. In addition, all future owners must be made aware of the wastes which remain at the site and any restrictions necessary to preserve the integrity of the contained waste.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
STATE - He-P Ch. 1905 New Hampshire Hazardous Waste Rules	Relevant and Appropriate	General requirements for treatment, storage and disposal of hazardous waste and closure of hazardous waste facilities.	Site activities will meet the substantive standards set out in these regulations.
STATE - He-P Ch. 1905.04 Manifesting Requirements	Applicable	General requirements for manifesting and documenting all off-site shipments of hazardous materials.	Any off-site shipment of hazardous waste will be manifested in accordance with these requirements.
STATE - He-P Ch. 1905.05 Packaging and Labelling Requirements	Applicable	Identifies requirements for packaging and labelling of all hazardous materials to be shipped off-site.	Any hazardous waste shipped off-site will be packaged and labelled in accordance with these regulations.
STATE - He-P Ch. 1905.06 Standards for Generators	Relevant and Appropriate	General definitions and requirements for generators of hazardous wastes. Outlines procedures to determine whether a person is a generator. Defines requirements for obtaining a generator's ID number and record-keeping procedures which must be followed.	These standards are relevant to all 'hot spot' wastes uncovered during recontouring and all sludges and filters generated by the treatment facilities. The substantive requirements of this regulation will be followed in handling, identifying, transporting and disposing of these wastes.
STATE - He-P Ch. 1905.08 Standards for Owners and Operators of Hazardous Waste Facilities	Relevant and Appropriate	General requirements for owners or operators of hazardous waste site or treatment facilities. Requirements include: • Security measures to minimize access to the facility or site. • Training requirements for employees at the site. • Design standards for hazardous waste treatment facilities.	All remedial activities will comply with the substantive provisions of state hazardous waste regulations. If any state standards under this regulation are more stringent than RCRA standards, then the more stringent state standard will control. Since this regulation addresses and incorporates by reference many of the RCRA hazardous waste regulations, see the actions to be taken for specific RCRA regulations listed above.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
FEDERAL - DOT 49 CFR Part 107 49 CFR Parts 171-179 Department of Transportation Regulation for Transport of Hazardous Materials	Applicable	Requirements for handling labelling, manifesting and transporting hazardous waste.	Hazardous wastes generated from the on-site TSD facility or from "hot spots" encountered during the Landfill recontouring will be shipped off-site. These off-site shipments will comply with handling, labelling, packaging, and transport requirements covered by this regulation.
FEDERAL - EPA Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program (December, 1987)	To be Considered	Provides technical guidance on the development of local limits. EPA's General Pretreatment Regulations require the establishment of local limits for POTWs with federally approved pretreatment programs.	Discharges to the local POTW will meet the applicable limits imposed on discharges to the sewer system.
FEDERAL - Permit Applicants Guidance Manual for the General Facility Standards of 40 CFR 264 (SW-968, October 1983)	To be Considered	Guidelines for determining the necessary requirements and standards which a proposed RCRA facility must meet prior to the facility obtaining an operating permit.	The substantive requirements identified in this guidance, as necessary to obtain a permit, will be addressed by this alternative but a permit need not be obtained prior to construction and operation of this facility.
FEDERAL - Guidance Manual for POTW Pretreatment Program Development (Oct. 1983)	To be Considered	Provides information necessary for local POTWs to develop approved pre-treatment program. The manual delineates what data and information must be submitted to EPA in order to obtain regulatory approval of the program.	Guidance will be used to evaluate whether site-generated waste water is compatible with the local POTW. Discharges to Dover POTW will meet applicable pre-treatment requirements.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
FEDERAL - CWA 40 CFR Part 122, 124, 125 National Pollutant Discharge Elimination System	Relevant and Appropriate	NPDES is the national program for issuing, monitoring, and enforcing permits for direct discharges into waters of the United States.	Discharges from the treatment systems, except in the case of discharges to the Dover POTW, are considered on-site discharges for the purpose of these regulations. No NPDES permit will be required for discharges to the Cocheco River and to the surrounding wetlands. However, all substantive requirements of the NPDES program must be met including the effluent standards (whether water quality based or technology based), the monitoring & testing requirements, and standard and special conditions for discharge. Discharges from the treatment system to the Dover POTW are considered off-site activities for purposes of this and other regulations. Therefore both the substantive and administrative provisions of this regulation must be met if discharge to the POTW is chosen during the remedial design.
FEDERAL - CWA 40 CFR Part 403 EPA Pretreatment Standards	Relevant and Appropriate	General guidelines to be followed in establishing pretreatment effluent discharge limits for pollutants which will be discharged to a publicly owned treatment works.	Discharges from the treatment system to the Dover POTW are considered off-site activities for purposes of this and other regulations. Therefore both the substantive and administrative provisions of this regulation must be met if discharge to the POTW is chosen during the remedial design.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
FEDERAL : RCRA 40 CFR Part 268 Land Disposal Restrictions	Relevant and Appropriate	Identifies hazardous waste types and specific EPA hazardous waste codes which must meet specified standards prior to placement or disposal of the waste in a land unit. Land Ban also specifies treatment processes to be used to meet goals.	This requirement is relevant and appropriate only to the extent that Land Ban hazardous materials are discovered on-site and moved outside the area of contamination. Any "hot spot" uncovered during recontouring of the landfill would have to be sent to an off-site RCRA TSD Facility. If the waste falls within one of the regulated waste codes under the Land Ban, then treatment of the waste to a point where the waste may be disposed of in an off-site RCRA land disposal unit, would be necessary. Any hazardous sludges or wastes generated during the treatment of containated groundwater will be tested to determine that all requirements established under the land ban regulation are complied with prior to any off-site disposal in a RCRA approved land disposal unit.
FEDERAL - RCRA - 40 CFR 264.170 - 178 (Subpart I) Use and Management of Containers	Relevant and Appropriate	Identifies requirements for the use and management of containers holding hazardous substances.	Any containers holding liquids which are uncovered by recontouring will meet the requirements of this regulation. In addition any containers used to store treatment sludges, 'hot spot' waste, or treatment filters will meet the standards of this regulation.
FEDERAL - RCRA - 40 CFR 264.1030 - 1036 and 264.1050 - 1064 (Subparts AA and BB) Standards for Air Emissions for Process Vents and Equipement Leaks	Relevant and Appropriate	These two subparts set standards for air emissions from treatment systems.	The design and maintenance of all components of the treatment systems will comply with the standards set out in these regulations
FEDERAL CAA - National Ambient Air Quality Standards 40 CFR Part 50	Applicable	Maximum primary and secondary 24-hour concentrations for particulate matter.	Mitigative measures to reduce generation of dust or particulate matter will be employed during all site activities.
FEDERAL - CAA - NESHAP 40 CFR 61, S[illegible]	Relevant and Appropriate	Sets National Emission Standards for Vinyl Chloride	Any on-site treatment processes such as air strippers must meet the relevant standard.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
FEDERAL - RCRA 40 CFR Part 264.70 - 264.77 (Subpart E) Manifest System, Recordkeeping and Reporting	Relevant and Appropriate	Regulations apply to owners and operators of both on-site and off-site facilities. Requirement identifies procedures to be followed in filling out, filing and submitting hazardous waste manifests for all shipments of hazardous waste sent from and received by a facility.	All hazardous materials generated by the treatment systems or 'hot spots' uncovered by recontouring, must be evaluated, manifested, packaged, labeled and recorded in accordance with these regulations prior to shipment off-site.
FEDERAL - RCRA 40 CFR Part 264.10-264.18 (Subpart B) General Facility Standards	Relevant and Appropriate	This subpart applies to all owners and operators of hazardous waste facilities. The subpart identifies procedures which must be followed for the operation and maintenance of a hazardous waste TSD facility. General areas covered under this subpart are: • Security requirements for TSD facilities. • General facility inspection requirements. • Personnel training requirements. • Procedures to prevent mixing of incompatible wastes. • Siting requirements for a TSD facility.	Only those portions of this subpart addressing security, inspection, personnel training, and precautions for handing incompatible wastes are relevant and appropriate to this remedy. All site operations, including the construction and operation of the treatment facilities will comply with the substantive requirements of these portions of this subpart.
FEDERAL - RCRA 40 CFR Part 264.30-37 (Subpart C) Preparedness and Prevention	Relevant and Appropriate	Identifies requirements which must be met during design, construction, and operation of TSD facilities to minimize possibility of fires, explosions or unplanned releases of waste.	All site operations, including the construction and operation of the treatment facilities, will be undertaken only after the substantive provisions of the preparedness and prevention regulations are in place.
FEDERAL - RCRA 40 CFR Part 264.50-264.56 (Subpart D) Contingency Plan and Emergency Procedures	Relevant and Appropriate	Identifies the requirements which must be addressed in a contingency plan. Each TSD facility must have a contingency plan which identifies all procedures to be followed in the event of fire, explosion or a planned release from a facility.	A contingency plan will be developed and implemented for the operation of the treatment facilities, for any recontouring activities, and for all other remedial activities. All on-site activities will comply with all emergency plans and procedures.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
FEDERAL - RCRA 40 CFR Sections 264.190 - 198 (Subpart J) Requirements for the design, installation and operation of any tanks or tank systems which are used to store or treat hazardous liquids or sludges.	Relevant and Appropriate	Regulates tanks or tank systems which are to be used to temporarily store hazardous liquids or as part of a treatment system for hazardous liquids or sludges must be designed, installed and operated in accordance with the RCRA Standards.	Tanks or tank systems used to temporarily store hazardous materials that have been generated by site treatment systems or uncovered as 'hot spots' during recontouring, will meet all substantive requirements of these regulations.
FEDERAL - RCRA 40 CFR Sections 264.220 -264.230 (Subpart K) Design, operation and closure of surface impoundments.	Relevant and Appropriate	General requirements for surface impoundments. Requirements include design standards, operational requirements, monitoring and record keeping requirements and closure requirements.	If surface impoundments are used to temporarily store 'hot spot' materials, treatment sludges, or treatment filters, then these impoundments will comply with all substantive provisions of these regulations. Those surface impoundment regulations relating to closure and post-closure care are also relevant and appropriate to the cap design and leachate treatment portions of this remedy.
FEDERAL - RCRA 40 CFR Sections 264.250 - 264.259 (Subpart L) Design and operation procedures for waste piles which are used to temporarily store hazardous soils or sludges.	Relevant and Appropriate	General design and operation requirements for temporary storage of hazardous soils and/or sludges. Locations must have an impermeable liner and materials stored in piles must be free of standing liquid.	If waste piles are used to temporarily store 'hot spot' materials, treatment sludges, or treatment filters, then these piles will comply with all substantive provisions of these regulations.
FEDERAL - RCRA 40 CFR Part 262 (Subpart E) Standards Applicable to Generators of Hazardous Waste	Relevant and Appropriate	Establishes requirements applicable to generation of hazardous wastes.	All hazardous materials generated by the treatment systems or 'hot spots' uncovered by recontouring, must be tested, manifested, packaged, labeled and recorded in accordance with these regulations prior to shipment off-site.
FEDERAL - RCRA 40 CFR Part 263.10 - 263.22 (Subparts A and B) Standards Applicable to Transporters of Hazardous Waste	Relevant and Appropriate	Identifies manifesting procedures to be followed for all shipments of hazardous waste.	Off-site shipments of hazardous waste or materials will be properly manifested and logged. Transporters will comply with these regulations.

ACTION-SPECIFIC ARARs

Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
FEDERAL - RCRA 40 CFR Sections 264.90-264.101 (Subpart F) Releases from Solid Waste Management Units. Identifies procedures to be followed to ensure that groundwater standards are met.	Relevant and Appropriate	General facility requirements for groundwater monitoring at affected facilities and general requirements for corrective action programs if required at regulated facilities.	A comprehensive groundwater monitoring system, designed to detect and measure groundwater contamination at and beyond the point of compliance, will meet the substantive standards of this regulation.
FEDERAL - RCRA 40 CFR Sections 264.110 - 264.120, (Subpart G) Closure and Post Closure Requirements for closure/post closure of a landfill. Groundwater monitoring and reporting requirements for a period of 30 years from the date of closure.	Relevant and Appropriate	Sets general standards for closing landfills. Requires owners/operators of landfills to develop closure and post-closure plans. In addition, the regulations set forth post-closure requirements such as groundwater monitoring for a period of 30 years after closure.	Implementation of this alternative would comply with the requirements of this alternative in the following manners: • Design of the cap will minimize the need for future maintenance. • Capping the Landfill would minimize to the extent necessary to protect human health and environment from physical exposure to the wastes on-site and continued fuguitive air emissions from the Landfill. Also, construction of the cap would minimize future on-site maintenance. • Collection and treatment of the contaminated groundwater from within and around the perimeter of the Landfill would minimize to the extent necessary the risk to human health and the environment from contaminated groundwater currently migrating off-site. Monitoring of the off-site groundwater will be conducted in accordance with this regulation

LOCATION-SPECIFIC ARARs

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Wetlands/ Floodplains/ Rivers/ Reservoirs	State - RSA 482-A NH Admin. Code ENV - Wt 300 New Hampshire Criteria and Conditions for Fill and Dredging in Wetlands	Applicable	Sets general standards and criteria for filling, dredging and construction in or near wetlands.	Any remedial activities affecting the wetlands will meet the substantive requirements of this state statute and its related regulations.
Wetlands/ Floodplains/ Rivers/ Reservoirs	State - ENV-Wa Part 415, RSA 485:A-17 NH Rules Relative to Prevention of Pollution from Dredging, Filling, Mining, Transporting, Construction	Relevant and Appropriate	Controls activities which invlove dredging in or around surface water bodies.	Any dredging or filling activities affecting the Bellamy Reservoir or the Cocheco River, including the dredging of the sediments in the swale, must meet the substantive requirements of this regulation.
Groundwater	State - Wellhead Protection Program	To be Considered	Sets general criteria for wellhead protection area delineation and identification of contamination sources to be excluded from protection areas.	State Plan will be considered to protect the Calderwood well.

LOCATION-SPECIFIC ARARs

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Wetlands/ Floodplains/ Rivers/ Reservoirs	Federal - 16 USC 661 et. seq., Fish and Wildlife Coordination Act	Applicable	Requires actions to be taken to avoid adverse effects, minimize potential harm to fish, or wildlife and to preserve natural and beneficial uses of the land.	Discharge from the treatment system(s) will be conducted in such a manner as to minimize adverse impacts on fish and wildlife. Federal and state agencies listed in this statute should be consulted during remedial design if any adverse impacts are anticipated.
Groundwater	Federal - Groundwater Protection Strategy	To be Considered	EPA's groundwater protection strategy [as identified in Groundwater Protection Strategy. EPA Office of Groundwater Protection, August, 1984], includes the following components: state. • Assessing the problems that may exist from unaddressed sources of contamination-in particular, leaking storage tanks, surface impoundments, and landfills; • Issuing guidelines for EPA decisions affecting groundwater protection and cleanup; and strengthening EPA's organization for groundwater management at the headquarters and regional levels, and strengthening EPA's cooperation with Federal and State agencies.	Groundwater at and beyond the point of compliance will be restored to its beneficial use by the remedy through a combination of capping, leachate collection and treatment, natural attenuation in the eastern plume and the collection and treatment of contaminated groundwater in the southern plume.
Groundwater	Federal - Groundwater Classification Guidelines	To be Considered	Classifies groundwater by its potential beneficial uses such as special groundwater (Class I) which are groundwaters that are "highly vulnerable to contamination because of the hydrological characteristics of the areas in which it occurs, and characterized by either of the following factors: • The groundwater is irreplaceable; no reasonable alternative source of drinking water is available to substantial populations. • The groundwater is ecologically vital; the aquifer provides the base flow for a particularly sensitive ecological system that, if polluted, would destroy a unique habitat."	These guidelines will be consulted in evaluating the success of the remedy and the speed with which groundwater is cleaned up.

LOCATION-SPECIFIC ARARs

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Wetlands/ Floodplains/ Rivers/ Reservoirs	Federal - Clean Water Act (CWA) Section 404; 40 CFR Part 230:33 CFR Parts 320-330	Applicable	Requirements under these codes prohibit the discharge of dredged or fill material into water bodies or wetlands without complying with the procedures identified under the permitting requirements for this code.	The substantive wetland dredge and fill requirements of the CWA will be met in all activities in and around the wetlands. No fil material from the recontouring of the Landfi from the construction of the interceptor trench/extraction well system, or from the construction of the leachate treatment plant will be placed in the wetlands surrounding t site. In addition, construction and maintenan of the off-site groundwater treatment system/extraction wells will be conducted to have the most limited impact on the wetland All material dug from the wetlands will be tested to determine whether it contains RCR. wastes; if so, that material will be disposed in accordance with RCRA requirements including the land ban regulations. That cle fill which is not redeposited in the excavatio will not be deposited in the wetlands. Wetlands will be restored to their natural sta at the completion of the remedy, to the exte technically practicable. Neither the procedura or permitting requirements of this statute nee to be met.
Wetlands/ Floodplains/ Rivers/ Reservoirs	Federal Executive Orders 11988 & 11990 Floodplain Management and Protection of Wetlands Federal - 40 CFR Part 6 Appendix A	Applicable	Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands and floodplains.	Measures to mitigate damage to the wetlands will be employed at all times during the construction and operation of the remedy. After the construction of the management of migration element of the remedy, measures will be undertaken to restore the wetlands.
Wetlands/ Floodplains/ Rivers/ Reservoirs	Federal - General Facility Standards 40 CFR 264.18(a) - Seismic Standards	Relevant and Appropriate	New treatment, storage or disposal of hazardous waste prohibited with 200 feet of a fault which has had a displacement in Holocene time.	Any groundwater/leachate treatment facility will be located in accordance with this requirement.
Wetlands/ Floodplains/ Rivers/ Reservoirs	Federal - General Facility Standards 40 CFR 264.18(b)	Relevant and Appropriate	Facility where RCRA hazardous waste will be treated, stored or disposed of that lies within a 100 year floodplain must be designed, constructed, operated and maintained to prevent the washout of any hazardous waste in the event of a 100 year flood.	Any groundwater/leachate treatment facility, i located in a floodplain, will be designed and constructed in accordance with these regulations.

CHEMICAL-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

MEDIA: AIR

Pollutant	National Ambient Air Quality Standards (40 CFR 50)(ug/m^3)/(ppm)	Ambient Air Standards (NH Admin Code - Chpt 300 - Part 303)(ug/m^3)	Toxic Air Contaminant Levels (NH Admin. Code ENV-A-1300 ((ug/m3)
Carbon Monoxide (CO)	40000 (1-hour average)/35 (1 hour average) 10000 (8-hour average)9 (8 hour average)	40000 (1 hour average) 10000 (8 hour average)[b]	
Lead (Pb)	1.5 (3 months)	1.5 (annual)	
Nitrogen Dioxide (NO_2)	100 (annual)/0.05 (annual)	100 (annual)	
Ozone (O_3)	235 (1-hour)/0.12 (1 hour)	235 (1 hour)	
Particulate Matter (PM-10)	150 (24-hour)/ NA 50 (annual)/ NA	150 (24 hour)[a] 50 (annual)	
Sulfur Dioxide (SO_2)	1300 (3-hour)/0.5 (3 hour) 365 (24-hour)/0.14 (24 hour) 80 (annual)/0.036 (annual)	1300 (3 hour) 365 (24 hour) 80 (annual)	
Hydrocarbon (HC)		160 (3 hour)	
Acetone			17800
Arsenic			0.48
Barium			1.7
Benzene			71
Beryllium			0.0048
Cadmium			0.024
Chromium			0.12
Cobalt			0.167
Copper			0.33
Dichloromethane			417
Hydrogen Sulfide			46.7
Methyl ethyl ketone			1967
Methyl isobutyl ketone			2050
Toluene			1500
1,1,1 Trichloroethane			6333
Trichloroethylene			643
Tetrachloroethylene			810
Xylene			1450
Vinyl Chloride			24
Zinc			50

a This maximum 24-hr level may not be exceeded more than once per year.
b This maximum 8-hr level may not be exceeded more than once per year.
NA Not Applicable.

CHEMICAL-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE

MEDIA: SURFACE WATER

CLEAN WATER ACT (CWA) - WATER QUALITY CRITERIA

Chemical	For Protection of Human Health		For Protection of Aquatic Life
Potential Chemicals of Concern	Water and Fish Ingestion (ug/l)	Fish Consumption Only (ug/l)	Freshwater Acute/ Chronic (ug/l)
Volatile Organic Compounds			
Acetone	-	-	-
Benzene	0.66	40	5,300/-[b]
Chloroethane	-	-	-
Dichloroethylene	0.033	-	-
1,1-Dichloroethylene	3100	1.85	11,600/-[b]
1,2-Dichloroethane	0.94	243	11,800/20,000-[b]
Ethylbenzene	1400	3,250	32,000/-[b]
Methylene Chloride	-	-	-
Methyl Ethyl Ketone	-	-	-
Methyl Isobutyl Ketone	-	-	-
Tetrachloroethylene	0.80	8.85	5,280/840[b]
Toluene	14000	424,000	17,500/-[b]
Trichloroethylene	2.7	80.7	45,000/21,900
1,1,1-Trichloroethane	18000	1,030,000	-
Tetrahydrofuran	-	-	-
Vinyl Chloride	2	2	-
Acid & Base/Neutral Extractable Organics			
Anthracene	-	-	-
Benzo(a)anthracene	-	-	-
Benzo(a)fluoranthracene	-	-	-
Benzo(a)pyrene	-	-	-
Bis(2-ethylhexyl) phthalate	-	-	-
Chrysene	-	-	-
Di(ethylhexyl)phthalate	-	-	-
Diethylphthalate	-	-	-
Fluoranthene	350000	3,980/-[b]	-
Fluorene	42	-	-
Phenanthrene	-	-	-
Pyrene	-	-	-
Metals			
Antimony	150	-	850/48[b][c][e]
Arsenic	0.0022	-	-
Beryllium	0.0068	-	0.64/10.32[f]
Cadmium	10	-	1,700/210[g]
Chromium	170[g]	3,433,000[b]	4/3[f]
Copper	-	-	22/5.2
Cyanide	200	5	11/.41[f]
Lead	50	-	2.4/0.012
Mercury	0.14	0.146	363/40[f]
Nickel	1.3×10^{-7}	100	-
Selenium	10	-	0.25[f]/0.12[f][h]
Silver	50	-	-
Thallium	13	-	30/27[f]
Zinc	-	-	-

a - Proposed MCLG or MCL (1988)(53 FR 31516).
b - Lowest Observed Effect Level (LOEL).
c - Proposed MCLGs 50 FR 46936 (November 13, 1985).
d - Value shown is for di-2-ethyl hexyl phthalate.
e - Value shown is for (pent) arsenic. (Tri) arsenic is 360/190 ppb.
f - Hardness dependable criteria (20 mg/l used). Values calculated using formulas listed in EPA Quality Criteria for Water, 1986. EPA 440/5-86-001.
g - Chromium +3.
h - Value shown corresponds to a hardness of 100 mg/l as C_aCO_3. EPA Quality Criteria for Water (1986) does not present a means (formula) to calculate a new value using a hardness of 20 mg/l as C_aCO_3.

CHEMICAL-SPECIFIC ARARs, CRITERIA, ADVISORIES AND GUIDANCE
MEDIA: GROUNDWATER

Chemical	Safe Drinking Water Act Maximum Contaminant Levels (MCLs)(ug/l) State NH Admin. Code WS 302 Federal 40 CFR 141	Safe Drinking Water Act Maximum Contaminant Levels Goals (MCLGs (ug/l) Federal 40 CFR 141	Resource Conservation and Recovery Act (RCRA) Maximum Contaminant Levels Federal 40 CFR 264.94 (ug/l)	DPHS - Health Based - GW Standards State WS 410.05(e)(ug/l)
Potential Chemicals of Concern				
Volatile Organic Compounds				
Acetone	-	-	-	700
Benzene	5	0[a]	-	-
Chloroethane	-	-	-	-
Dichloroethylene	-	7	-	7
1,1-Dichloroethylene	7	7	-	-
1,2-Dichloroethane	5	0	-	680
Ethylbenzene	-	700	-	5
Methylene Chloride	5	5	-	170
Methyl Ethyl Ketone	-	-	-	350
Methyl Isobutyl Ketone	-	-	-	.68
Tetrachloroethylene	5	0[c]	-	-
Toluene	-	1,000[f]	-	-
Trichloroethylene	5	0	-	-
1,1,1-Trichloroethane	200	200	-	154
Tetrahydrofuran	-	-	-	-
Vinyl Chloride	2	0		
Acid & Base/Neutral Extractable Organics				
Anthracene	-	-	-	-
Benzo(a)anthracene	-	-	-	-
Benzo(a)fluoranthracene	-	-	-	-
Benzo(a)pyrene	0.2[a]	0	-	.003
Bis (2-ethylhexyl) phthalate	-	-	-	50,000
Chrysene	-	-	-	-
Di(ethylhexyl)phthalate	4[a]	0	-	-
Diethylphthalate	-	-	-	1,800,000
Fluoranthene	-	-	-	54
Fluorene	-	-	-	-
Phenanthrene	-	-	-	-
Pyrene	-	-	-	-
				-
Metals				-
Antimony	10/5[e]	3	50	-
Arsenic	50	0[c]	-	-
Beryllium	0	0	10	-
Cadmium	1	5[c]	50	50(100)[d]
Chromium	10	50	-	-
Copper	50	1,300[a]	-	200
Cyanide	1,300[a]	200	50	-
Lead	200	20[c] (0[a])	2	-
Mercury	50/5[a]	2	10	-
Nickel	2	100	50	-
Selenium	100	50	-	-
Silver	10	-	-	-
Thallium	50	0.5	-	-
Zinc	2/1[e]	-		
	-			

a Proposed MCLG or MCL (1988)(53 FR 31516).
b Lowest Observed Effect Level (LOEL).
c Proposed MCLGs 50 FR 46936 (November 13, 1985).
d Value is for Chromium both in trivalent (III) and hexavalent (VI) form. Value in parentheses is for total combined Chromium III and Chromium VI.
e Alternative MCL options proposed 55 FR 30370 (July 25, 1990).
f Federal Register (January 30, 1991), Vol. 56 pg 3526

CHEMICAL-SPECIFIC
ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Sediments	Federal - NOAA Technical Memorandum NOS OMA 52	To be Considered	Reference doses for various contaminants in sediments and their potential biological effects on biota exposed to the contaminants.	All sediments in the drainage swale which contain arsenic in excess of 50 ppm will be removed from the swale and consolidated under the landfill cap. Measures will be tal to prevent contaminated sediment from washing into the Cocheco River during excavation.
Air	Federal - CAA - National Ambient Air Quality Standards (NAAQS) (40 CFR 50.1 - 50.12)	Relevant and Appropriate	NAAQS define levels of primary and secondary levels for six common air contaminants (sulfur dioxide, particulate matter, carbon monoxide, ozone, nitrogen dioxide and lead).	The Best Available Technology will be usec to limit the emission of hazardous airborne substances during recontouring, excavation, groundwater treatment and any gas collectio and treatment. Those chemical-specific standards set out in these regulations will be met by this technology.
Air	State - NH Admin. Code ENV-A:300 Ambient Air Quality Standards	Relevant and Appropriate	Establishes primary and secondary ambient air levels for eight air contaminants: • Particulate matter • Sulfur dioxide • Carbon monoxide • Nitrogen dioxide • Ozone • Hydrocarbons • Fluorides • Lead Seven of the primary and secondary standards established under this state standard are adopted from the Federal NAAQS.	The Best Available Technology will be employed to ensure that air emissions generated by remedial activities comply with the standards set out in this regulation.
Air	State - NH Admin. Code ENV-A 1300 Toxic Air Pollutants	Applicable	Establish ambient air limits for 74 chemicals. These ambient air limits (AALs) are levels at, or below, which ambient air concentrations of a respective air contaminant will not adversely affect human health.	Releases of contaminants to the air from any source on site will not exceed the respective AAL.

CHEMICAL-SPECIFIC
ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Groundwater	State - NH Revised Statutes Ch. 485 Drinking Water Standards	Relevant and Appropriate	Sets forth procedures for protection of drinking water supplies by establishing and adopting (under RSA 541-A) drinking water rules and primary drinking water standards. Statute also allows secondary drinking water rules to be adopted which are necessary to protect the public welfare. Maximum Contaminant Levels (MCLs) which are established under this statute shall be no less stringent than the most recent National Primary Drinking Water Standards which are in effect.	Groundwater at and beyond the point of compliance will attain state MCLs at the completion of the remedy. These levels will be obtained by the capture and treatment of leachate emanating from the landfill and contaminated groundwater in the southern plume. In the eastern plume, groundwater will reach MCLs through natural attenuation within 5 to 7 years.
Groundwater	State - ENV-Ws 410.05 Groundwater Protection Standards	To be Considered	Allowable limits for contaminants in groundwater are based upon New Hampshire Division of Public Health Services (health-based standards) and Federal MCLs, MCLGs and other relevant standards. Groundwater nondegradation requirements incorporate the surface water quality standards at ENV-Ws 432.	State groundwater protection standards will be attained at and beyond the point of compliance at the completion of the remedy. In addition, any treatment system which discharges into surface waters and any activities conducted in the wetlands will be consistent with the maintenance or improvement of groundwater quality at and beyond the point of compliance.
Groundwater	State - ENV-Ws-410.05(e)	To be Considered	Stipulation that groundwater shall not contain any substance in a concentration which the Water Supply and Pollution Control Commission determines is harmful to human health or the environment. Regulation states that Primary (health-based) Maximum Contaminant Levels (MCLs) will be used to regulate groundwater contaminants.	State groundwater protection standards will be attained at and beyond the point of compliance at the completion of the remedy. In addition, any treatment system which discharges into surface waters and any activities conducted in the wetlands will be consistent with the maintenance or improvement of groundwater quality at and beyond the point of compliance.
Groundwater	State - Admin. Code Part WS 315-319 Primary and Secondary Standards	Relevant and Appropriate	NH MCLs establish levels of contaminants allowable in water supplies. They are generally equivalent to SDWA MCLs.	At the completion of the remedy state MCLs will be met at and beyond the point of compliance.
Surface Water	Federal - CWA - Ambient Water Quality Criteria (AWQC) - Protection of Freshwater Aquatic Life, Human Health, Fish Consumption	Relevant and Appropriate	AWQC are developed under the Clean Water Act (CWA) as guidelines from which states develop water quality standards. A more stringent AWQC for aquatic life may be found relevant and appropriate rather than an MCL, when protection of aquatic organisms is being considered at a site.	Any treated water discharged into the Cocheco River or the wetlands surrounding the site must meet AWQCs.
Surface Water	State - RSA485A:8 NH Admin. Code ENV-Ws Part 432 Surface Water Quality Standards	Applicable	Surface water classification standards for Class B waters, and potentially Class A waters, are applicable to the site. New Hampshire Surface Water Quality standards are essentially the same as federal ambient water quality criteria.	Discharges into the Cocheco River and wetlands from the treatment systems will meet the most stringent criteria associated with the classifications of these water bodies. In addition, all remedial activities will be consistent with protecting the Class A waters of the Bellamy Reservoir.

CHEMICAL-SPECIFIC
ARARs, CRITERIA, ADVISORIES AND GUIDANCE

Media	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Groundwater	Federal - SDWA - Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)	Relevant and Appropriate	Standards; (abbreviated as MCLs - Maximum Contaminant Levels), which have been adopted as enforceable standards for public drinking water systems.	Groundwater at and beyond the point of compliance will attain MCLs at the completion of the remedy. These levels will be obtained by the capture and treatment of leachate emanating from the landfill and contaminated groundwater in the southern plume. In the eastern plume, groundwater will reach MCLs through natural attenuation within 5 to 7 years. Note that the SDWA MCL for arsenic in the groundwater has been determined to be relevant but not appropriate and therefore is not an ARAR. Instead, the RCRA concentration limits found at 40 CFR 264.94 will control.
Groundwater	Federal - RCRA Maximum Concentration Limits 40 CFR Part 264.94	Relevant and Appropriate	Standards; (MCLs-Maximum Concentrations Limits), for 14-toxic compounds. MCLs have been adopted as part of RCRA groundwater protection standards. These groundwater protection standards are equal to MCLs established under the National Primary Drinking Water Standards, based on 1962 Public Health Service Regulations under the Safe Drinking Water Act (SDWA).	Groundwater at and beyond the point of compliance will attain MCLs at the completion of the remedy. These levels will be obtained by the capture and treatment of leachate emanating from the landfill and contaminated groundwater in the southern plume. In the eastern plume, groundwater will reach MCLs through natural attenuation within 5 to 7 years. In addition, prior to or during remedial design, EPA and the state will determine whether background levels of arsenic in the groundwater exceed 50 ppm. If so, the cleanup standard will be set at background levels.
Groundwater	Federal - SDWA Maximum Contaminant Level Goals (40 CFR 141.50-141.51)	To be Considered	MCLGs-Non-enforceable health goals for public water systems. Maximum Contaminant Level Goals (MCLGs) are set at levels that would result in no known or anticipated adverse health effects with an adequate margin of safety.	At the completion of the remedy groundwater at and beyond the point of compliance will attain non-zero MCLGs for those substances which have no MCL. These levels will be obtained by the capture and treatment of leachate emanating from the landfill and contaminated groundwater in the southern plume. In the eastern plume, groundwater will reach these non-zero MCLGs through natural attenuation within 5 to 7 years.

APPENDIX F

STATEMENT OF FINDINGS
CONCERNING REMEDIAL ACTIVITIES
IN WETLANDS AND FLOODPLAIN

1. The remedy chosen for this Site includes excavation and construction activities in the wetlands to the south of the Site and may include limited excavation of sediments in the floodplain at the point where the drainage swale meets the Cocheco River.

Activities in the Wetlands

2. The installation of a groundwater extraction and treatment system for the management and cleanup of the Site's southern contaminant plume will require the placement of several extraction wells as well as the construction of a water transport system to convey the contaminated water to an on-site treatment facility. These activities will require that truck access through the wetlands be secured so that the wells can be drilled and the piping can be placed. In addition, these activities will require drilling and placement of wells in the wetlands and the excavation of trenches in the wetlands in which the transport pipes will be placed.

3. The remedial design of this extraction and treatment system will be guided by the principles set forth in 40 CFR Part 6, Appendix A and Executive Order 11990, as well as state wetlands law. The design will minimize the disturbance of the wetlands and its natural and beneficial uses. Mitigative measures will be taken during the construction and operation of this system so as to minimize adverse impacts on the wetlands.

4. A two phase wetland restoration plan will be undertaken, the first phase commencing at the completion of construction and the second phase commencing at the completion of the groundwater treatment. This plan will restore the wetland topography and vegetation to the extent practicable, or, if necessary, establish new wetlands of similar size in a nearby area.

5. The construction of this groundwater extraction system in the wetlands is the only practicable means for treating the contaminated groundwater in the southern plume. As documented in the ROD Decision Summary, groundwater modelling has indicated that extraction and treatment of this plume are necessary to attain ARARs at and beyond the point of compliance in a reasonable time, as well as to manage the contaminants in the short term so that they are prevented from continuing to migrate towards the Class A waters of the Bellamy Reservoir.

6. Alternative methods for contaminant cleanup in the southern plume would have a greater impact on the wetlands or would be ineffective in meeting the reasons for initiating the active

treatment of this contaminant plume. The alternative method for treating this groundwater evaluated in the Feasibility Study, the construction of an interceptor trench, would have a greater detrimental impact on the wetlands.

7. There are no alternative sites for establishing an active management of migration of the southern plume as the plume is directly under these wetlands.

8. The design, construction and operation of these remedial activities will meet state wetland protection requirements.

Activities in the Floodplain

9. If testing of the swale sediments where the swale meets the Cocheco River indicate that arsenic levels are above 50 ppm, then limited manual excavation will be undertaken to remove contaminated sediments. It is expected that this procedure will be conducted manually - without the assistance of heavy equipment - and that it will take no more than a few days.

10. This limited excavation will have minimal or no short term adverse impact on the floodplain area and it will have no long term adverse impacts.

11. The remedial activities in this area will be guided by the principles set forth in 40 CFR Part 6, Appendix A and Executive Order 11988, as well as state law protecting floodplains. Mitigative measures will be taken during the excavation of sediments in this area to protect the floodplain and its natural and beneficial uses as well as to prevent contaminants from washing into the Cocheco River.

12. No practicable alternative exists for meeting the remediation goals. As documented in the ROD Decision Summary, EPA has determined the clean-up of arsenic in the swale sediments is necessary to protect the environment. As documented in the Administrative Record and in the ROD Decision Summary, arsenic levels in sediments above 50 ppm pose a threat to the biota in the area.

13. Other clean-up/capping alternatives evaluated in the Feasibility Study are either ineffective in meeting remediation goals or will have a greater adverse impact on the floodplains while also providing less protection to the environment in the long term.

14. Since the sediments in questions are deposited in a floodplain area, the action cannot take place outside of the floodplain.

15. The remedial activities in the floodplain will comply with state floodplain protection laws.

APPENDIX G

United States
Environmental Protection Agency
Region I

RESPONSIVENESS SUMMARY

DOVER MUNICIPAL LANDFILL SITE

DOVER, NEW HAMPSHIRE

SEPTEMBER 10, 1991

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DOVER MUNICIPAL LANDFILL RESPONSIVENESS SUMMARY

PREFACE

The U.S. Environmental Protection Agency (EPA) held a 60-day comment period from March 26, 1991 to May 24, 1991 to provide an opportunity for the public to comment on the Remedial Investigation (RI), the Field Element Study (FES), the Feasibility Study (FS), the Proposed Plan and other documents developed for the Dover Landfill Superfund Site (the Site) in Dover, New Hampshire. The FS examined and evaluated various options, called remedial alternatives, to address contamination at the Site. EPA made a preliminary recommendation of its Preferred Alternative for site remediation in the Proposed Plan issued on March 15, 1991, before the start of the public comment period. All documents on which the preferred remedy was based were placed in the Administrative Record for review. The Administrative Record is a collection of all the documents considered by EPA to choose the remedy for the Site. It was made available at the EPA Records Center at 90 Canal Street in Boston, Massachusetts and at the Dover Public Library, 72 Locust Street, Dover, New Hampshire.

The purpose of this Responsiveness Summary is to document EPA responses to the questions and comments raised during the public comment period. EPA considered all of the comments in this document before selecting a final remedial alternative to address contamination at the Site.

This Responsiveness Summary is organized into the following sections:

I. **Overview of Remedial Alternatives Considered in the Feasibility Study and Proposed Plan, including the Preferred Alternative** - This section briefly outlines the remedial alternatives evaluated in the FS and the Proposed Plan, including EPA's Preferred Alternative.

II. **Site History and Background on Community Involvement and Concerns** - This section provides a brief Site history and a general overview of community interests and concerns regarding the Site.

III. **Summary of Comments Received During the Public Comment Period and EPA Responses** - This section summarizes and provides EPA's responses to the oral and written comments received from the public during the public comment period. In Part I, the comments received from citizens are presented. Part II summarizes comments received from Potentially Responsible Parties (PRPs).

IV. **Remaining Concerns** - This section summarizes comments raised during the public comment period that cannot be fully addressed at this stage of the Superfund process but which continue to be of concern during the design and implementation of EPA's selected remedy for the Site. EPA responds to these comments and will address these concerns during the Remedial Design and Remedial Action (RD/RA) phase of the cleanup process.

In addition, two attachments are included in this Responsiveness Summary. Attachment A provides a list of the community participation activities that EPA and the New Hampshire Department of Environmental Services (NHDES) have conducted to date at the Site. Attachment B contains a copy of the transcript from the informal public hearing held on April 16, 1991 in Dover, New Hampshire. The comments submitted by the citizens and the PRPs are available in the Administrative Record.

I. OVERVIEW OF REMEDIAL ALTERNATIVES CONSIDERED IN THE FEASIBILITY STUDY AND PROPOSED PLAN

Using information gathered during the Remedial Investigation, the Field Elements Study and the Risk Assessments (RI Risk Assessment and FES Supplemental Risk Assessment), EPA identified several cleanup objectives for the Site.

The primary cleanup objective is to reduce the risks to public health and the environment posed by exposure to the source of contamination onsite and to groundwater contamination that has already or may in the future migrate off-site. Cleanup levels for groundwater and sediments are set at levels that EPA considers to be protective of public health and the environment.

After identifying the cleanup objectives, EPA developed and evaluated potential cleanup alternatives, called remedial alternatives. The FS describes the remedial alternatives

considered to address the contaminants of concern and the media in which they pose a threat. The FS also describes the criteria EPA used to narrow the range of alternatives to 4 potential source control (SC) remedial alternatives and 4 potential management of migration (MM) remedial alternatives.

The cleanup plan selected by EPA to address Site contamination includes consolidation of the drainage ditch and drainage swale sediments and recontouring the Landfill followed by capping with a multi-layer cap and extraction and treatment of the contaminated groundwater and leachate. During remedial design, EPA will determine whether the treated contaminated groundwater will be discharged to the Cocheco River or Dover Publicly Owned Treatment Works (POTW). The selected remedy also restores contaminated groundwater at and beyond the point of compliance to cleanup levels through natural attenuation, in the eastern plume, and by active extraction and treatment of the contaminated groundwater in the southern plume. A monitoring program will be implemented during pre-design to further define the lateral extent and depth of contamination in the groundwater. In addition, the cleanup plan will rely on institutional controls to prevent any use of groundwater until contaminant concentrations have decreased to safe levels. A long-term monitoring program will also be implemented during pre-design and will continue until EPA determines that the remedy is considered protective. The estimated net present worth of the remedy is $24.2 million.

All of the remedial alternatives considered for implementation at this Site can be found in the ROD Decision Summary, the Proposed Plan and the Feasibility Study.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Site History

The Dover Municipal Landfill is located on a 55-acre parcel of land on Tolend Road in Dover, New Hampshire, near the Madbury and Barrington Town lines. The Bellamy Reservoir, which supplies drinking water for the towns of Portsmouth, Newcastle, Newington, Durham, Madbury, Greenland and Rye, is located 2000 feet south of the Site; and the Calderwood Well, which supplies drinking water for the City of Dover, is located approximately 2000 feet northeast of the Landfill. The Cocheco River is located approximately 500 feet east of the Landfill.

The Landfill was in use from 1960 to 1979. Wastes were disposed at the Landfill from both industrial and municipal sources. Flammable waste was reportedly dispersed across the Landfill surface and, at times, burned. A trench and cover method was used during most of the Landfill operation to dispose of the wastes. In September 1977, the New Hampshire Department of Environmental Services (NHDES) (formerly the Water Supply and Pollution Control Commission, or WSPCC) ordered landfill operators to stop accepting chemical waste for disposal. In 1980, the Town of Dover began capping procedures to close the Landfill and, in 1982, the City of Dover and NHDES closed the facility and re-excavated the firebreak ditch around the Landfill to intercept leachate.

In 1977, the Cities of Dover and Portsmouth, along with the NHDES began studying the Landfill because of its proximity to public and private water supplies. Study results indicated that ground water and surface water in the area of the Landfill contained elevated concentrations of organic and inorganic contaminants. Private drinking water wells in the vicinity of the Landfill were found to be contaminated with volatile organic compounds (VOCs). After further testing, state officials determined that the source of ground water contamination was the Dover Municipal Landfill. In 1981, an alternate water supply was provided for residents with affected wells. Residences along both Glen Hill and Tolend Roads have also tied onto this water supply line.

In 1983, the Site was evaluated by the EPA for possible inclusion on the National Priorities List (NPL). Because of the concentrations of contaminants present in sediments, surface water, and ground water, and because of the contaminants' proximity to drinking water sources, the Landfill was ranked and placed on the NPL. In 1984, the NHDES, under a cooperative agreement with EPA, initiated a Remedial Investigation (RI) of the Landfill. In 1988, a group of Potentially Responsible Parties (PRPs) signed an Administrative Order by Consent with the EPA to perform a Field Elements Study (FES), addressing data gaps of the RI, and a Feasibility Study (FS).

The RI and the FES confirmed the presence of VOCs and metals in groundwater and sediments, and VOCs in the drainage ditch surface water. A risk assessment conducted to evaluate potential risks to public health the environment revealed

increased carcinogenic and noncarcinogenic risks to human health if contaminated groundwater is consumed.

History of Community Involvement

EPA has conducted public meetings and has released fact sheets and press releases to keep the public informed of Site activities since 1984. In general, community concern about the Dover Landfill has been relatively low. However, community interest and concern increased following the release of EPA's preferred cleanup plan and the issuance of notice of potential liability for Site cleanup to the City of Dover and the Town of Madbury.

The first public meeting concerning the Dover Municipal Landfill was held on August 9, 1983. EPA and NHDES jointly discussed the findings and recommendations of the Remedial Action Master Plan (RAMP). In December 1984, EPA released a community relations plan which included a summary of the Site's history and contamination and described field activities expected to be conducted at the Site. Also in December of 1984, NHDES held a public meeting to inform the citizens about the upcoming activities of the RI/FS. After the completion of the RI/FS (March 1989), EPA and NHDES held another public meeting to discuss the results of sampling at the Site.
In March 1991, EPA and NHDES made the Administrative Record of the Site available for public review, released the Proposed Plan to the public and published a public notice and brief analysis of the Proposed Plan in Foster's Daily Democrat. The Proposed Plan was placed in the information repository at the Dover Public Library.

On March 25, 1991, EPA and NHDES held a meeting to discuss the FS results, the cleanup alternatives, and the Proposed Plan. Approximately 50 community members, including local officials and the news media attended the meeting.
Questions asked or comments made at the meeting were related to the following issues: remedial costs, availability of Federal and State aid for the City of Dover, rate of plume migration, landfill cap characteristics, and PRP liability.

Public Reaction to EPA's Preferred Alternative

The concerns voiced by citizens, local officials, and PRPs at the April 16, 1991 public hearing and in the comments received by EPA relate primarily to the cost of the Preferred Alternative. Community members expressed fear

that because the City of Dover and the Town of Madbury had been issued general notice of potential liability, that there would be a substantial increase in taxes. Many of these community members argued that an increase in taxes of the magnitude necessary to pay for the Preferred Alternative would drive businesses and residents away from the City of Dover and the Town of Madbury. Most citizens, officials, and PRPs who commented on the EPA's Proposed Plan said that a less costly solution - such as monitoring and institutional controls - would be sufficient to protect human health from the threats posed by the site.

Other members of the public supported EPA's Proposed Plan, including the Water Department of the City of Portsmouth, which draws drinking water from the Bellamy Reservoir.

III. SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

This Responsiveness Summary addresses comments received by EPA during the public comment period (March 26 to May 24, 1991). Twenty-one individuals (including representatives from the cities of Dover and Portsmouth and Town of Madbury, members of the Dover PRP Steering Committee, and area residents) addressed EPA's Preferred Alternative during the public hearing. Eight sets of written comments were received by EPA during the public comment period (including comments from area residents, the Dover City Manager, a Dover City Councilman, the Mayor of the City of Dover, the City of Portsmouth Public Works Department, the Town of Madbury, and the Dover PRP Group). A citizen's petition was also received.

Part I - Citizens, and Local Officials Comments

<u>Comment 1:</u> The majority of the comments received addressed the inability of the City of Dover to pay its share of the proposed $26 million cleanup cost. Twenty-two individuals commented that the Preferred Alternative would be too costly. Each comment emphasized the fact that local residents and industries are already experiencing economic difficulties and that the cost of EPA's Preferred Alternative is more than the City's taxpayers could possibly afford. The following specific issues related to the cost of remediation were raised by various individuals:

- The City of Dover has been allocated over 60 percent of the clean-up costs by the PRP Steering Committee and it's $16 million share of the cost

for the implementation of the Preferred Alternative exceeds the City's $13 million borrowing limit (City Manager, State Treasurer).

- The total cost in capital for the Preferred Alternative would be $3000 per Dover household (City Manager).

- Other financial demands on taxpayers currently include the cost for the water and wastewater treatment plant, education, fire and police protection, solid waste disposal, street repair, and public health services.

- Cities/towns are being forced to seek less costly means to achieve goals in a bad economy; it was requested that EPA do the same (Dover School Department Representative).

- Businesses do not have enough money to spend on cleanup. EPA should consider the fiscal impact on the community as well as the environmental impact. The cost of cleanup will have a devastating effect on the ability to compete and gain industries in Dover (Chamber of Commerce, Economic Commission, and Dover Industrial Development Authority representatives).

- Area taxpayers and businesses will also be affected by the costs to remediate the nearby Coakley and Somersworth Landfills. The total amount of money to clean up all sites was estimated at $70 million (Town of Madbury's Attorney).

- The harm to be caused by the taxes necessary to fund the Preferred Alternative outweighs the harm potentially caused by the effects of the contaminated drinking water (one resident and former City Council member).

EPA Response: In selecting the remedy for the Dover Site, several aspects of the costs associated with this remedy were evaluated in detail including, among others, the cost-effectiveness of the remedy when compared with other alternatives and the total short and long term costs of each alternative, including the remedy, compared with the level of protection offered by each alternative. As a result of

these evaluations EPA has determined that the selected remedy is cost-effective and that it complies with all statutory and regulatory mandates which address cost-effectiveness.

It should be noted that while the cost of each remedial alternative evaluated by EPA was an important factor in determining a remedy for this Site, cost is neither the only nor the most important criterion in EPA's analysis. In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan (NCP) and related EPA Guidance, cost was one of a number of factors used to evaluate potential remedial actions at several stages in the remedy selection process. First, a large number of technology process options which could be implemented at the Site were evaluated for their effectiveness, implementability, and cost. Secondly, a range of alternatives which combined the various technology process options to address all media and contaminants of concern were evaluated on the same three criteria, including estimated cost. Thirdly, a detailed analysis of several select alternatives was undertaken; this analysis was performed using the nine criteria set out in the NCP, one of which is cost. (These nine criteria appear in Section IX of the ROD Decision Summary and at 40 CFR 300.430(e)(9)(iii).) Lastly, the selected remedy - which in this case combined portions of several source control and management of migration alternatives and which cut more than $1.6 million from the proposed remedy - was evaluated on the same nine criteria, including cost.

As to the weight accorded cost-effectiveness in this multi-staged evaluation, the NCP and related EPA Guidance define cost as one of five primary balancing criteria to be considered only after the first two threshold criteria have been satisfied. Those threshold criteria include overall protection of the human health and the environment and compliance with all federal and state laws which are applicable or relevant and appropriate (ARARs) to this Site. In essence, any alternative which does not meet these threshold criteria cannot be selected as the remedy.

In this case the threshold requirement that the remedy meet all ARARs is particularly significant because ARARs establish the basic design criteria for major portions of the remedy, such as the multi-layer cap. For example, the multi-layer cap accounts for approximately 70 percent of the total costs of the remedy. Thus the threshold costs - those

that cannot be avoided if the EPA is to comply with its statutory and regulatory mandate - account for a very large portion of the total costs.

While the cost-effectiveness of the remedy has been thoroughly analyzed in the remedy selection process as set out above, neither the Superfund statute nor applicable regulations allow the economic climate of southern New Hampshire or the financial well-being of those who will ultimately bear the burden of the remedial costs to be a factor in the selection process. CERCLA's statutory mandate as well as the strictures of the NCP require that cleanup standards be established through an analysis of the risk to human health and the environment and the applicable or relevant and appropriate environmental laws. Cleanup levels are set without regard for who will be named as a Potentially Responsible Party and who will ultimately bear the costs of remedial action. EPA cannot establish different cleanup levels, comply with fewer ARARs or select a less protective remedy at a site as a result of who will be liable for the cleanup costs.

In this instance, the City of Dover and the Town of Madbury were issued general notice of potential liability because, on EPA's analysis they qualify under CERCLA Section 107 as generator, transporter, and/or owners/operators with respect to the Site. EPA has issued 37 notices of potential liability to Potentially Responsible Parties (PRPs). These PRPs include local industries, municipalities and individuals. The liability for the total costs for the implementation of the selected remedy is joint and several - that is, all parties are liable for the total costs of the remedy.

As liability for the cleanup is joint and several, the share of the costs to be borne by the taxpayers of Dover and Madbury will depend on any agreement these towns reach with the other PRPs at the Site. The City of Dover has been an active participant in the PRP Steering Committee which calculated the internal PRP allocation of costs to date.

Comment 2: Six individuals questioned why the Preferred Alternative was selected if the groundwater contaminant plume already appears to be receding and conditions appear to be improving as a result of the installation of the cover material and drainage trench when the Landfill was closed. Specific related issues raised include the following, listed as comments a through d.

EPA Response: Based on the extensive scientific study of the Site, EPA has concluded that the contaminant plume is not receding and that the original cover material and firebreak trench have been, and continue to be, ineffective at protecting the human health and the environment. Site studies have shown that total VOC concentrations in some wells have decreased, however these same studies have indicated that in other wells, total volatile organic compounds (VOC) concentrations have increased. Chemical concentration fluctuations are typically observed in contaminated groundwaters at hazardous waste sites. Figure 5-2 of the FES compares the HMM ND (non-detect) plume (FES) and the GZA ND Plume (RI). It is apparent from those interpretations that the lateral extent of the plume has not significantly changed from the Remedial Investigation to the Field Element Study. While contaminant concentration data for certain compounds in off-site wells, such as trichloroethylene and 1,2-Dichloroethane indicate a decrease in concentrations, other compounds such as vinyl chloride and methylene chloride indicate an increase in concentrations. Further, vinyl chloride, which was only found at trace levels in the RI, was detected in three wells during the FES at up to 31 times the Safe Drinking Water Act Maximum Contaminant Level (SDWA MCL).

As to the effectiveness of the closure activities in the early 1980s, the cover material placed on the Landfill consisted of sandy loam which provided only limited protection from dermal contact with contaminants and little or no hydraulic barrier which would prevent precipitation from infiltrating through the Landfill as this material is porous in nature. At present, much of this cover has eroded away, exposing some Landfill wastes. Only sparse vegetative growth covers the majority of the Landfill. Therefore, the cover currently does not preclude rainwater from infiltrating the Landfill resulting in the migration of contaminants into the groundwater, south and east of the Landfill.

In addition, the Landfill was constructed using standard fill and cover techniques, without any definitive drainage system or leachate collection systems. As a fire preventive measure, the Landfill was surrounded by a "firebreak" trench. The drainage trench was constructed by re-excavating to a shallow depth and berming the excavated materials to one side. The trench currently intersects the groundwater table during seasonal high groundwater level conditions and collects and conducts contaminated Landfill

leachate and surface water runoff to the Cocheco River. At certain times of the year, the drainage ditch is dry; it is believed that during that time, contaminated groundwater flows under the trench and migrates into the groundwater around the Landfill.

That the landfill was closed in the early 1980s in accordance with state standards, as asserted by one commenter, is not dispositive of the selection of a remedy at this site. CERCLA charges EPA with cleaning up Superfund sites so that they address the current and future threat to human health and the environment and meet all applicable or relevant and appropriate environmental laws. There is no 'grandfathering' of past ineffective remedial measures. In addition, EPA takes no position with respect to whether these past remedial measures were consistent with applicable state laws.

Comment a: The Mayor and the Attorney for the City of Dover expressed concern that the disturbance of the existing Landfill cover would probably do more damage to the environment and cause greater risk to human health than would occur if it were left untouched.

EPA Response: While it is possible that there may be some short-term, adverse impacts to the environment as a result of the recontouring of the Landfill, in the long-term the proper closure of this Landfill will provide far greater protection to human and health and the environment than the current Landfill cover and drainage trench.

The recontouring activities include consolidation of the existing Landfill perimeter soils and debris from the toe of the Landfill side slopes, as well as the drainage ditch sediments, on top of the Landfill prior to capping. The recontouring of the Landfill is to provide adequate slopes to allow proper drainage and to minimize the amount of imported clean fill required to achieve the necessary slopes (a significant reduction in cost is obtained by limiting the amount of clean fill necessary).

Before recontouring can begin, a preliminary assessment will be performed consisting of surface geophysics and test pit explorations to ensure that excavation is limited to areas containing predominately soils, debris and municipal waste. However, it is possible even with these precautionary measures that the excavation in the Landfill could expose some hazardous substances in various forms such as barrels,

sludges, etc., and some releases could occur. Therefore, EPA will require that extreme care be exercised during excavation in the Landfill and that contingency measures such as dust and odor suppressant foam be developed and implemented as necessary. Any hot spots or full drums encountered will be tested and removed, treated and disposed of in an off-site RCRA TSD facility.

In addition, continuous air monitoring will be conducted to detect unacceptable exposure levels to workers and area residents from inhalation of fugitive dust, organic vapors, and emissions generated during Site work.

Comment b: Two Dover City Council members questioned the appropriateness of using data collected seven years ago as the basis for the choice of the Preferred Alternative. These council members believed that contaminant levels have decreased. They suggested that actions be taken only if the public health is definitely threatened.

EPA Response: The statement that the remedy is being selected on data which is seven years old is inaccurate. Data collection at this Site commenced in the early 1980s and has continued up until this year. The last round of sampling - performed by NHDES - occurred in the spring of 1991, shortly before the issuance of the Proposed Plan. All of this data has been analyzed to determine whether remedial action is necessary and whether the remedy will be protective of human health and the environment.

Remedial action is taken at a Superfund site on the basis of unacceptable risk as well as the failure of the site to comply with all ARARs. The risk calculation in this case is based on that data collected in 1989 and 1990 by HMM in the Field Elements Study, as well as some portions of the data collected by Wehran Engineers in 1985 and 1986. Some of this data was confirmed as recently as several months ago. As discussed in the ROD and supported in the Administrative Record, all of this data indicated that there remain unacceptable risks to human health from this Site.

All of the data collected, including that collected in 1991, indicates that, among other things, off-site groundwater contains levels of contaminants above limits set by the Safe Drinking Water Act MCLs which are an ARAR for this Site. This exceedence of ARARs, confirmed by data taken just a few months ago, is another reason for the selected remedial action.

The comment that contaminant levels have decreased has been addressed in more detail in a EPA's response to comment number 2. In essence, while total VOC concentrations in certain well locations and some individual contaminant concentrations have decreased others have increased. The extent of the plume configuration does not appear to be receding. In addition, there is no indication that the risks associated with the Site has lessened.

Comment d: One resident did not understand the need for remediation since no one has seen any dead animals or birds and since there are plenty of shrubs and trees growing around the Site. He believes that the land will refurbish itself.

EPA Response: The lack of dead animals and the presence of trees and shrubs does not indicate the lack of contamination at the Site. The Site presents both current and future risks to humans, flora and fauna through contaminated groundwater, surface water, soils and sediments. Groundwater contamination, although not visible to the human eye, is a substantial threat at the Site. The contaminated groundwater and the threat it presents will continue if the source of this contamination is not controlled.

Additionally, contaminated sediments in the drainage swale present a threat to aquatic inhabitants of the Cocheco River and to a lesser extent, a threat to humans. The same is true of the perimeter drainage ditch which is a visible source of surface water contamination. Many wild animals, such as deer and raccoon, drink from this water, and are therefore exposed to the contaminants present in the water. Frogs in this drainage ditch are exposed to the contaminants in the sediments and surface water. Humans may also be exposed to these contaminant pathways.

As to the comment that this Site will 'refurbish' itself without remedial action, all sampling and modelling indicate that it would take decades for natural processes to make this Site safe and to return the natural resources of this area to their beneficial uses. As set out in the Feasibility Study, taking no action at this Site is to allow the contaminants to remain and spread for generations.

Comment 3: Representatives of the City of Dover and Town of Madbury, and other concerned citizens and officials recommend that a less costly alternative be considered. Specifically, these individuals recommended that EPA

consider the following actions before finalization of the Preferred Alternative:

- implementation of a limited action proposal such as Alternative SC-2;
- damming and mounding of water in the Bellamy Reservoir to reverse further flow toward the reservoir and creating the equivalent of a hydraulic control in that area;
- defer implementation of the Management of Migration alternative; and
- delete any requirements to install an upgradient interceptor trench, or at least separate its flow from the downgradient trench.

These individuals note that the above options would be less costly. They also believe that since institutional controls have been implemented, a public water supply has been provided and the contaminant plume appears to be receding, these options would be sufficient in protection of public health and the environment.

EPA Response: While EPA agrees that implementing a limited action remedy such as that proposed in these comments would be less costly in the short-term than implementing the selected remedy, a similar limited action plan was reviewed in detail in the remedy selection process and rejected. The analysis of such a limited action can be found in the Feasibility Study and summaries of the analysis can be found in the Proposed Plan and in the ROD Decision Summary. In essence, such a plan would be inconsistent with the intent of CERCLA and with the NCP insofar as it fails to comply with ARARs, it fails to provide adequate protection to human health and the environment, it fails to provide a long-term solution, and it fails to reduce toxicity, mobility or volume through treatment. In particular, the heavy reliance on institutional controls for a long-term solution is inconsistent with the NCP where active remedial measures are practical. In addition, the failure to return the off-site groundwaters to their beneficial uses in a reasonable time is also inconsistent with the NCP.

EPA does not agree that raising the water level of the Bellamy Reservoir will reverse further flow toward the reservoir, although it may decrease the hydraulic gradient

between the Landfill and the reservoir thereby reducing the groundwater velocity. This action does nothing to ameliorate the problem of the continued movement of contamination from the Landfill.

In addition, such an action, implemented without addressing the source of contamination, suffers from many of the same problems as long-term reliance on institutional controls that are listed above. In particular, it fails to prevent the formation of contaminated Landfill leachate and the future migration of the contaminants away from the Landfill. It also does not clean up the contaminated groundwater between the Landfill and the reservoir. In sum, such an action would be in contravention of CERCLA and inconsistent with the NCP in that it not only fails to satisfy the threshold criteria necessary for the selection of a remedial action but also meets few of the objectives for remediating this Site.

EPA has analyzed in detail the deferral of the management of migration portion of this remedy. As set out in the ROD, an active management of migration remedy has been chosen for the southern plume so as to clean-up the groundwater in a shorter time frame than that for natural attenuation and to manage the plume so it does not reach the Class A waters of the Bellamy Reservoir. In addition, deferring the management of migration portion of this remedy so that it may be re-evaluated after the cap has been placed, allows groundwater risks to remain for an extended period and fails to institute any short term protection for the Bellamy reservoir.

EPA agrees that there should be a separation of flows between the upgradient diversion portion of the trench and the downgradient interceptor trench. This was not made clear in the Proposed Plan. The function of the upgradient trench, included in the selected remedy, is to divert clean groundwater from any contact with the waste materials, thereby reducing the volume of contaminated groundwater requiring treatment. The clean groundwater will be diverted to the Cocheco River or as necessary, recharged back to the wetlands to prevent dewatering of the surrounding wetlands.

<u>Comment 4:</u> A resident suggested that grading the Landfill, diverting surface water away from the Landfill, and vegetating the Landfill surface should be sufficient in controlling and naturally abating the contamination.

EPA Response: The selected remedy as described in the ROD includes grading the Landfill, directing surface water away from the Landfill and establishing vegetation on the Landfill surface. As noted in the responses above and in the extensive analysis of this Site contained in the Administrative Record, these actions alone are not sufficient for the protection of human health and the environment and do not meet the ARARs for the Site. In essence, this proposal is little different than the no-action remedy evaluated in the Feasibility Study and rejected in the remedy selection process; it fails to meet not only the threshold criteria (protectiveness and satisfying ARARs) but also fails to provide long-term protection and to employ treatment as part of the solution to the contaminant threat.

Comment 5: A Dover resident questioned why the Dover Landfill was singled out for cleanup when thousands of other Sites are more contaminated.

EPA Response: The basis for this Site's proposal and then placement on the National Priorities List (NPL) can be found in the Hazardous Ranking Package and those studies on which these documents are based; all of these materials are contained in the Administrative Record. In essence, this Site was placed on the NPL after the discovery that contaminants from the Landfill had polluted residential wells adjacent to the Site, that contaminants were flowing from the Site directly into the Cocheco River and that two municipal drinking water sources, the Calderwood Well and the Bellamy Reservoir, were in close proximity to the Site.

The Dover Municipal Landfill was proposed for the NPL on December 30, 1982, was ranked and listed on the NPL on September 8, 1983. The activities leading to its placement on the NPL include studies of the Landfill and its impact on the surrounding area performed by the NHDES and the Cities of Dover and Portsmouth. These studies were conducted as a result of the concern that Landfill contaminants were in close proximity to the Calderwood Well and the Bellamy Reservoir. These studies indicated that although the Bellamy Reservoir and the Calderwood Well had not yet been contaminated by the Landfill, residential wells and the Cocheco River were being polluted. Residential wells near the Landfill were found to be contaminated with VOCs in 1981. The Cocheco River was being contaminated by leachate, generated by the Landfill, and discharging via a local stream (swale) to the river.

In 1982, the City of Dover informed the EPA of its concerns about the Site. EPA performed a preliminary assessment and site investigation of the Site, which then led to the development of a Hazardous Ranking Package and the ultimate proposal for and placement of the Site on the NPL.

For a comparison with other sites considered for the NPL, the public should consult EPA's Superfund Inventory called CERCLIS, which contains the preliminary assessments and site investigation reports of other "sites," which after evaluation, either did not require the generation of a Hazardous Ranking Package, or if a Hazardous Ranking Package was required, the "scoring" for that particular site did not meet the criteria for proposal on the NPL.

Comment 7: A City of Dover Councilman felt that during the public meeting EPA downplayed the danger to public health and safety posed by the Site. He questioned why remediation is necessary if the risks are not great.

EPA Response: EPA disagrees that the risks to public health and the environment have been "downplayed" by EPA. The immediate threat to public health from the Dover Municipal Landfill Site was removed from the Site when residents were supplied with a public water line in 1982. The baseline risk assessment (performed initially during the RI and supplemented in the FES) estimated current and potential exposures and risks to public health from several exposure pathways, using current data and assuming no remediation will take place in the future (no-action). EPA has identified the estimated risks for the Site, from the various exposure pathways, and these risks indicate that the primary threat of exposure is from future use (i.e., drinking) the contaminated groundwater around the Site. The risk assessment do not set clean-up levels for remediation, but is intended to be used as a basis for the evaluation of various alternatives proposed for the cleanup of the Site.

Comment 8: A City of Dover Councilman stated that a clay barrier many feet thick prevents water from reaching the bedrock from where the city wells draw their water. He concluded that this factor along with the fact the Bellamy Reservoir has not been affected calls for modifications to the Preferred Alternative.

EPA Response: EPA assumes that the "bedrock from where the City wells draw their water" is referring to the lower hydrogeologic unit comprised of sandy gravels and dense

till, rather than the actual bedrock unit. EPA agrees that the marine clay unit, which underlies the Site and separates the upper and lower hydrogeologic units, inhibits the contaminated groundwaters in the upper hydrogeologic unit from reaching the groundwaters in the lower hydrogeologic unit. Data has also indicated, to date, that the Bellamy Reservoir has not yet been contaminated by the groundwater migrating from the Landfill. Each of these factors has been taken into consideration in the selection of the remedy for this Site.

However, as discussed in detail in the Feasibility Study and in the ROD, these factors do not change the fact that the groundwater in the upper aquifer has contaminant levels exceeding those considered safe for drinking and thus the Site ARARs are not met. In addition, in accordance with the NCP and related EPA Guidance the remedy at this Site is based in part on the future risk related to the groundwater contamination in the upper aquifer. Again the facts cited in this comment do not address this risk.

In essence, this comment takes the position that if there is no threat to the current municipal drinking water sources, then the remedy should be less protective. The NCP and related EPA Guidance take the contrary view; all risks related to a Site, including risks associated with future private consumption of contaminated groundwater, must be addressed in the remedial action. A remedy which does not address the contaminants in the upper aquifer fails to satisfy even the threshold criteria required by the NCP.

Comment 9: The City of Portsmouth Public Works Department submitted a comment in support of EPA's Preferred Alternative because the "cleanup plan is taking the necessary steps to correct the problem and protect the Bellamy Reservoir". It was stated that since over thirty-thousand residents are served by the Bellamy Reservoir, this water supply should be protected. The City of Portsmouth also noted that the "reservoir would be difficult, if not impossible, to replace at a cost much higher than it would be to clean up the landfill that threatens it".

EPA Response: Each element of the selected remedy will be consistent with protecting the Class A waters of the Bellamy Reservoir. The remedy requires active groundwater treatment in the southern plume as well as the management of the plume so that it does not reach the reservoir. This active treatment of the southern plume will only be foregone if new

evidence reveals that the plume poses no threat to the Bellamy Reservoir.

Comment 10: Two area residents commented that they hope EPA will not relax necessary requirements based solely on the cost or financial impact to the PRPs. These residents are concerned about what effect no action or limited actions will have on their property value. They do not feel that placing a fence and warning signs around the Landfill protects either the public or the environment from possible hazards. Hunters, bikers, and four-wheel vehicles still use the Site and deer feed and drink from the land around the Landfill. These residents do not believe that they should be penalized for the PRPs unwillingness or inability to correct mistakes made in the past.

EPA Response: The selected remedy employs a combination of waste containment, capture and treatment, and natural attenuation that satisfies all statutory and regulatory requirements. The remedy is also consistent with this comment, in that it takes active measures to protect human health and the environment; neither no-action nor limited action were chosen for this Site.

Comment 11: A petition signed by Dover and Madbury citizens urges EPA to adopt a "reasonable and economically feasible" plan for the cleanup of the Dover Landfill. The petition recommends continued monitoring and installation of a new cap only if conditions worsen. It is also recommended that additional actions should be placed in only as necessary to correct worsening conditions.

EPA Response: The cost-effectiveness of the remedy is addressed in the response to Comment 1 as well as in the ROD. The limited action proposed - monitoring and staged implementation of remedial actions only if Site conditions worsen - is inconsistent with the NCP in that it fails to satisfy not only the threshold requirements for remedial action but does not meet the site-specific remedial objectives set out in the Feasibility Study and summarized in the ROD. In addition, the response to Comment 3 is equally relevant to this comment.

Part II Summary of Potentially Responsible Party Comments

Balsam Environmental Consultants, Inc. (Balsam) submitted written comments on behalf of the Dover Landfill PRP Group.

Balsam commented that certain elements of the Proposed Plan are overly protective of human health or are "environmentally or technically impracticable." The Balsam comments are summarized below.

Comment 1: Balsam recommends that EPA select a "sequential and phased" remedy for the Site instead of implementing all of the components of the Proposed Plan simultaneously. Balsam proposes the following four sequential phases.

> **Phase I:** Construction of a properly designed cap over the Landfill, installation of a ground water and surface water monitoring system, and implementation of access and institutional controls.
>
> **Phase II:** Construction of an interceptor trench upgradient of the Landfill with discharge of collected clean ground water to the Cocheco River through an NPDES-permitted outfall.
>
> **Phase III:** Installation of an interceptor trench downgradient of the Landfill, with treatment of collected ground water.
>
> **Phase IV:** Installation and operation of an offsite ground water extraction and treatment system.

Balsam proposes that if results of ground water monitoring reveal that Site cleanup objectives have not been achieved after the completion of each phase, additional phases would be implemented sequentially. Balsam contends that such an approach would be consistent with the National Contingency Plan 40 CFR 430(a)(ii)(A) and satisfies the nine criteria for evaluation outlined in 40 CFR 300.430(e)(a)(iii). Furthermore, Balsam contends that a phased remedial program is appropriate for the Dover Landfill Site because "significant" risks to human health and the environment are not currently posed by the Site and future risks are not "significant" because of institutional controls; therefore, Balsam takes the position that the additional time that may be associated with completion of its proposed remedial

program should not result in increased adverse impact to human health.

Balsam also states that it would be premature to implement onsite hydraulic controls and active ground water remediation without a more complete understanding of the current hydrogeologic conditions at the Site. Balsam recommends that implementation of the hydraulic control and management of migration elements of the Preferred Alternative be deferred until better evaluation of the post-cover system installation ground water flow regime is developed, and associated changes in ground water flow and plume migration direction have been monitored in the field.

EPA Response: EPA has reviewed the Balsam proposal in detail and determined that it fails to meet not only the threshold criteria for the selection of remedial action, protection of the human health and the environment and compliance with ARARs, but fails to compare favorably with the selected remedy when evaluated against the five primary balancing criteria. The following response summarizes a number of important faults EPA has found with the Balsam proposal. In addition, one particularly important shortcoming of this proposal is addressed in detail.

In sum, the proposal fails to meet the threshold criteria for selecting a remedial action because: the proposal fails to satisfy many ARARs including groundwater clean-up levels established by Safe Drinking Water Act and the Resource Conservation and Recovery Act (RCRA), the federal and state hazardous waste laws requiring complete containment of hazardous wastes, and the federal and state laws protecting surface waters; the proposal fails to prevent the generation of contaminated leachate from the Landfill and the migration of this leachate into the surrounding groundwater and surface water, in contravention to ARARs and cleanup objectives; the proposal fails to provide sufficient protection to the Bellamy Reservoir in the short-term and long-term; the proposal does not provide for groundwater cleanup in a reasonable time frame; the proposal does not adequately address the long-term risks posed by the contaminant plumes; the proposal fails to address contaminated sediments in the drainage swale; and, by its nature, the proposal is not a permanent solution. In addition, reviewing this proposal in light of the five primary balancing criteria, among other problems with this proposal are the following: the proposal employs treatment as a last measure, contrary to the NCP's bias towards

treatment of hazardous wastes; the phased approached may not be cost-effective if early remedial measures do not meet cleanup levels; a phased approach will generate substantially more administrative problems, and transaction costs will increase as well; risks may increase substantially if leachate is allowed to continue to migrate from the Site; the proposal conflicts with the NCP's mandate that institutional controls are to be used for long-term solution only where other means are not practical for cleaning up the contamination; and the phased approach may significantly delay the ultimate cleanup of this Site.

Of particular concern is the failure of the Balsam proposal to include a leachate collection and treatment system at the outset of the remedy. As described below, this proposal would allow continued contaminant migration from the Site, threatening human health and the environment and failing to meet many of the ARARs, in the hope that a limited remedial action will eventually meet cleanup objectives. Such a 'wait-and-see' approach to remedy implementation provides little assurance of either short term or long term protection from the Site.

At the Dover Site, substantial amounts of waste material currently lie beneath the water table and remain saturated during all or major portions of the year. The leachate from these saturated wastes coupled with the leachate produced by rainwater infiltrating through wastes above the groundwater table is the source of the contaminated groundwater downgradient of the Dover Landfill. While the cap alone will minimize or prohibit the amount of rainwater infiltrating through the waste, it will not abate the continued migration of contamination from the Landfill associated with normal groundwater flow.

The installation of an effective capping system is expected to somewhat alter the current hydraulic conditions within the Landfill and thereby influence local groundwater flow and direction characteristics; it will not decrease the amount of hazardous substances that are currently in the contaminant plumes and beneath the Landfill proper. Leachate that has been generated within the waste mass can also be expected to continue to move outward until such time as the waste mass is effectively de-watered (recharge being denied by installation of the cap). Portions of the waste mass may continue to remain beneath the water table unless the now relaxed groundwater mound falls permanently below the bottom of the wastes. Thus, the remedy's interceptor system will

provide for collection of leachate until such time as the benefits of capping the landfill become fully effective or in the event that wastes remain beneath the water table collection will continue until leachate concentrations fall to and remain within acceptable limits.

Modeling conducted during the FS estimated cleanup levels will be attained within 5 to 7 years in the eastern plume and within 10 to 24 years in the southern plume provided source control measures are implemented including cap and the leachate/groundwater collection system around the Landfill. Without the leachate/groundwater collection system, contamination from within the Landfill or already in the aquifer will continue to migrate offsite thus increasing estimated times to attain cleanup levels in the eastern and southern plumes. Given these circumstances, ARARs would not be met in either plume at or beyond the compliance boundary within a reasonable time frame as required by the NCP and certainly not within the time frame which could be attained using active measures to control the migration of leachate/groundwater from the Landfill. A phased approach to instituting source control measures thus builds into the cleanup of the Site long periods during which contaminants may migrate off the Site and increase the threat to human health and further harm the environment.

Based on the above conclusions it is EPA's opinion that employing a "wait and see" method of remedy implementation does nothing to diminish, and could magnify, potential risks to human health and the environment.

EPA agrees that additional data must be gathered during pre-design and design to allow for the proper design and construction of the groundwater/leachate collection system. EPA also agrees that the groundwater/leachate flow patterns may change somewhat after the installation of the cap. However, EPA has not concluded that the resultant change will be significant. Further, EPA has concluded that the groundwater/leachate collection system can be appropriately designed in conjunction with the cap design. EPA acknowledges that, after implementation of both systems, some fine tuning of the collection system may be required to optimize its effectiveness. However, this is not considered unusual and can be provided for in the design.

Finally, the time to design and install the cap, to then wait until the groundwater flow regime under and around the landfill to stabilize, and to then design and construct the

groundwater/leachate collection treatment system would take a substantial number of years, possibly in excess of ten. Only after this lengthy period would the groundwater remediation process begin. In the meantime contaminants would continue to migrate from the Landfill in the groundwater and surface water. EPA does not consider this approach to be consistent with the NCP in that the groundwater will not be returned to its beneficial use in a reasonable time frame, and the contaminated leachate entering the local surface waters would violate ARARs.

Comment 2: Balsam comments that the remediation of the southern plume through groundwater extraction and treatment does not appear justified. Balsam bases this opinion on the following factors: 1) EPA has concluded that the Bellamy Reservoir will not be significantly affected by contaminated ground water; 2) installation of an engineered cap over the Site will both significantly improve ground water quality and modify the existing hydrogeologic regime, both of which will serve to mitigate the southern plume; 3) ground water in the area will not be utilized due to institutional controls implemented by the City of Dover; and 4) closer examination of the risk assessment, which indicates that the majority of the potential future risk associated with the southern plume is attributed to arsenic, reveals that risks may be overestimated.

EPA Response: The possibility that the Class A waters of the Bellamy may be contaminated by the southern contaminant plume is one of several reasons for including the active treatment of this plume as part of the Proposed Plan and the overall remedy for this Site. EPA has determined that, to date, the plume has not had an adverse impact on the waters of the Bellamy; this does not mean that future contamination will not occur. As noted below, groundwater sampling and modelling has indicated that contaminants in the southern plume are moving towards the reservoir. In addition, natural attenuation will take from 10 to 24 years to improve groundwater quality to cleanup levels after the source control measures are put into place. Without active plume management these contaminants may reach the Bellamy during this lengthy period. More importantly, as discussed in the ROD, active plume extraction and treatment is justified even if the contaminants posed no threat to the Bellamy; the fact that groundwater contaminants exceed MCLs in an area that could be used for drinking water is sufficient justification for employing active treatment and management of this plume.

As to the second basis for Balsam's opinion, EPA acknowledges that an effective cap over the Landfill may alter the ground water flow characteristics in the area of the southerly plume. However, there is little support for the position that a cap alone will cause a significant improvement in ground water quality in the downgradient plume. Even if an effective cap is installed on the Landfill, it is likely that groundwater will still flow in a southerly, downgradient direction. As indicated from Table 3-2 in the FES report entitled Elevation Information for HMM Installed Monitoring Wells, groundwater elevation in the upper unconfined aquifer ranges from one to five feet below surface grade. Therefore, it is assumed that some of the disposed waste deposited in the Landfill exists in the saturated zone. Accordingly, as indicated in a groundwater contour map of the Landfill area (Figure 3-6 in the FES), ground water could flow in a southerly, downgradient direction underneath the Landfill, through the existing industrial and municipal waste. This scenario would likely cause a continued migration and expansion of the VOC plume in a southern direction towards the Bellamy Reservoir. The cap will reduce the vertical flow of water through the waste but not the horizontal flow through the waste in the saturated zone.

In addition to allowing leachate to continue to flow beyond the Landfill boundaries, the cap would have little or no impact on the contaminants that have already migrated within at least 900 feet of the reservoir. While the flow may be somewhat retarded by a cap, those contaminants will continue to pollute the groundwater at and beyond the point of compliance and will continue to flow towards the reservoir.

It should also be noted that the calculation of the natural attenuation time frames for the eastern and southern plumes, by HMM, assumed that an active source control alternative had been installed and that further migration of contaminated groundwater and leachate had been eliminated. The natural attenuation time frames were estimated to be 5 to 7 years for the eastern plume and 10 to 24 years in the southern plume. These estimated time frames will increase if leachate and contaminated groundwaters are allowed to continue to migrate from the Landfill.

As noted in response to prior comments and in the ROD, institutional controls, if they are implemented, will provide protection from contaminated groundwater in the short-term. However, the NCP requires that such controls be

used as a long-term measure only when other alternatives are not practical. In sum, the proposal that institutional controls be used for an indefinite period while Landfill leachate continues to contaminate groundwater is inconsistent with the NCP.

Balsam's position that the risk attributable to arsenic in the groundwater is overestimated is addressed in detail in EPA's responses to the Public Health Evaluation submitted by Environmental Standards, Inc. for the Dover PRP Steering Committee (comment c). In addition, the reasonable maximum risk for vinyl chloride, found at 31 times the drinking water standard in the southern plume, exceeds EPA's acceptable risk range.

Comment 3: Balsam states that EPA has not established criteria for the termination of the proposed groundwater recovery and treatment systems. Specifically, Balsam states that EPA does not discuss target cleanup levels (TCLs) or specific points of compliance that would be used to terminate recovery and treatment operations. Balsam recommends that these criteria should include attainment of TCLs in defined monitoring wells for a defined period of time. Balsam further recommends that, in determining TCLs, EPA should consider documented operational limitations of the ground water recovery and treatment system. Balsam notes that the use of Maximum Contaminant Level Goals (MCLGs) as a TCL is infeasible when the MCLG is zero, citing the preamble to the NCP.

EPA Response: EPA has set interim groundwater cleanup levels in the ROD which must be met before completion of the remedial action at and beyond the point of compliance. In accordance with the NCP, the point of compliance is established at the edge of the waste management area. When the interim cleanup levels have been attained in all monitoring wells at and beyond the point of compliance, a risk assessment will be performed on residual groundwater contamination to determine whether the remedial action is protective. Remedial actions shall continue until protective concentrations of residual contamination have been achieved or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final cleanup levels for the ROD and shall be considered the ultimate performance standards for the remedial action. The groundwater monitoring system will then be utilized to collect information for three years to ensure that the protective residual levels remain and the

remedy is protective. The details of the groundwater monitoring program, such as number and location of monitoring wells and parameters, will be determined during remedial design.

EPA has also determined that until Site-specific data indicates that groundwater cleanup levels will not be met, it is inappropriate to include provisions which allow treatment to be terminated prior to the attainment of these levels. There is currently no Site-specific information that leads EPA to believe that the cleanup levels cannot be attained through extraction and treatment.

As noted in the ROD, interim cleanup levels for known and probable carcinogenic compounds (Class A and B) have been set at the appropriate MCL given that the MCLGs for these compounds are set at zero.

Comment 4: Balsam proposes that the compliance boundary for Site cleanup be established at the shore of the Bellamy Reservoir and at the banks of the Cocheco River. Balsam submits that the area bounded by the Landfill to the north, and the Bellamy and Cocheco to the south and east, would be established as a non-attainment zone. Balsam asserts that such a non-attainment zone is consistent with current New Hampshire groundwater policy which, it claims, is to be incorporated into New Hampshire's groundwater regulations at an undetermined point in the future. Balsam also commented that such a proposal is justified because institutional controls can be used to prevent the extraction of drinking water from this area, a City water supply can be provided in this area, and the source control measures will help eliminate the contaminant plume. A similar comment was also submitted by counsel for the City of Dover at the public hearing.

EPA Response: EPA has considered the above comment and determined that the establishment of a compliance boundary at the shores of the Bellamy and the banks of the Cocheco would be inconsistent with the NCP, insufficiently protective of the human health and the environment, and contrary to ARARs and the EPA's Groundwater Protection Strategy. In addition, a review of the current New Hampshire regulation which addresses this issue (Ws 410.13) but which is not an ARAR, indicates that even if it were an ARAR, the proposed compliance boundary would meet neither the letter nor the spirit of that regulation. Finally, the policy to which commenters refer is neither specified in

their comment nor could be an ARAR as it is not an enforceable promulgated state regulation.

In accordance with the NCP, groundwater remediation levels will be attained at and beyond the edge of the waste management area. In this case the waste management area includes the Landfill and the perimeter drainage ditch. At the completion of construction of the source control portion of the remedy, the compliance boundary will be set at the outer edge of the interceptor trench; contaminants at and beyond that point must meet cleanup levels. While the NCP allows for site-specific exceptions to this general policy, at the current time no site-specific factors indicate that such an exception is appropriate.

In addition to being inconsistent with the NCP, the establishment of a zone of non-compliance beyond the edge of waste management area would be contrary with both federal and state ARARs controlling the protection of groundwater and surface water. Such a proposal, if accepted, would institutionalize the pollution of a potential drinking water resource and could allow the Class A waters of the Bellamy to be contaminated before any remedial action was taken. In addition, if groundwater remains contaminated in this area, an unacceptable risk to human health would also remain.

Finally, an examination of the current state regulation controlling compliance boundaries, from which the comment draws support but which is not an ARAR for this Site, indicates that the boundary should be set at the closer of: the property boundary, 500 feet from the waste material, or a distance set in a permit. In this case, a compliance boundary at the edge of the Bellamy Reservoir and Cocheco River would far exceed that set by this regulation because the property lines for this Site fall far short of those surface water bodies. In addition, it appears contrary to the letter and spirit of this state regulation for contamination to remain in groundwater beneath privately owned properties surrounding the Site.

As to the unspecified pending changes to New Hampshire regulations, in accordance with the NCP, ARARs are "frozen" at the time that the ROD is issued unless a later-identified ARAR is necessary to ensure that the remedy is protective of human health and the environment. The non-attainment area policy to which Balsam refers will not attain ARAR status by the time the ROD is issued, and, being less stringent than

existing requirements, will not later be necessary to ensure protectiveness; it is therefore not an ARAR for this Site.

Related issues raised in Balsam's comment, such as the use of institutional controls, the nature of the groundwater flow, and the movement of the plume are addressed in other EPA responses.

Comment 5: Balsam states that EPA's preferred RCRA cap construction is overprotective. Balsam believes RCRA requirements are not applicable to the Dover Landfill Site cap because disposal activities ceased before the effective date of RCRA. Balsam recommends that EPA consider a five-layer capping system with a single hydraulic barrier, consistent with NHDES requirements: a soil cover layer, a sand buffer layer, a low permeability layer, a layer of free draining sand, and a layer of topsoil. Balsam notes that EPA has selected caps of similar design at other solid waste landfill Superfund sites in Region I.

EPA Response: EPA and the NHDES have reviewed Balsam's single barrier cap for use at this Site and rejected it. The single barrier cap fails to satisfy ARARs and does not provide adequate protection to human health and the environment. In addition it does not compare favorably with the selected remedy when evaluated on the five balancing criteria set out in the NCP and summarized in the ROD. EPA has determined that the selection of the multi-layer cap is consistent with the NCP and all relevant Guidance.

The NHDES cap, as proposed by Balsam for use at this Site and described above, was designed by the State of New Hampshire for closure of solid waste landfills in that state; the design requirements are the minimum engineering requirements for solid waste landfill caps. While this Site received large quantities of municipal solid waste during its operation, it also received substantial amounts of industrial wastes which would be considered hazardous (and regulated by RCRA) if disposed today. These wastes were not RCRA wastes at the time of disposal only because the regulatory and statutory requirements of RCRA were not in place at that time. These RCRA-type industrial wastes are now the source of contamination migrating from the Landfill into the surrounding groundwater.

Since significant quantities of RCRA-type wastes have been disposed in the Landfill and continue to pose a threat to human health and the environment, federal and state

hazardous waste regulations have been deemed relevant and appropriate to the cleanup of this Site. The state solid waste laws are not ARARs for this Site. The cap will be designed to meet or exceed, among other standards, the performance requirements set forth in the state and federal ARARs including 40 CFR 264.111, 40 CFR 264.310 and the guidance document Final Covers on Hazardous Waste Landfills and Surface Impoundments, July 1989 (EPA/ 530-SW-89-047) (Technical Guidance). In addition, the use of a RCRA-type cap is consistent with EPA Guidance concerning the selection of remedies at municipal landfill sites; the Guidance manual Conducting Remedial Investigations/ Feasibility Studies for CERCLA Municipal Landfill Site, February 1991, EPA/540/P-91/000 (OSWER Directive 9355.3-11), recommends that a composite-barrier cap (multi-layer) is to be used when a landfill contains RCRA listed wastes, wastes sufficiently similar to RCRA listed waste, or RCRA characteristic waste.

In addition to compliance with ARARs, the multi-layer cap was selected for the Dover Landfill because infiltration is a primary concern due to the high annual precipitation in New Hampshire. The multi-layer cap provides an additional "barrier" layer, which reduces the rate of infiltration more than a single-barrier cap, such as the NHDES solid waste closure cap. The multi-layer cap is the best available cap, designed to provide maximum, long-term protection from infiltration due to precipitation.

Comment 6: Balsam submits that installation of a ground water interceptor trench around the entire perimeter of the Landfill, proposed by EPA, does not provide for segregation of upgradient ground water, which is presumed clean, from downgradient ground water. Balsam states that clean upgradient ground water would be conveyed for on-site treatment prior to discharge to the Cocheco River or the Dover POTW. Balsam believes that upgradient ground water should be conveyed directly to the Cocheco River and discharged. Balsam also states that the efficiency and effectiveness of the treatment process is greatly reduced when impacted ground water becomes diluted.

EPA Response: Although not clearly indicated in the FS, the upgradient portion of the "interceptor trench" will collect and divert clean groundwater around the Landfill. This point is clarified in the ROD.

Comment 7: Balsam comments that the remediation of drainage swale sediments to address risk associated with arsenic present in the sediments is overprotective. Balsam states that the risks associated with direct contact and ingestion of swale sediments are within EPA's acceptable risk range. Balsam concludes that remediation of the drainage swale sediments does not appear to be warranted.

EPA Response: While EPA agrees that cleanup of the contaminated swale sediments is not necessary for the protection of human health because the risks associated with ingestion and dermal contact with these sediments falls within the accepted risk range, cleanup of the arsenic in the swale is necessary for the protection of the environment. EPA, in conjunction with NOAA, have determined that a cleanup level for arsenic in the sediments should be set at 50 ppm for the protection of aquatic biota.

Comment 8: One PRP commented that $2 million have already been spent on trying to determine the best cleanup alternative for the Site and not one "shovel-full of dirt" has been removed. The PRP felt money was being spent "capriciously" and that less money should be spent on the Preferred Alternative.

EPA Response: The NCP and related EPA Guidance outline the process which EPA must follow in conducting Remedial Investigations and Feasibility Studies. While such a process may seem expensive and cumbersome, it is aimed at ensuring that the best remedy is chosen at each site while also creating national consistency in the proper selection of remedies for Superfund sites.

Following the issuance of the Record of Decision for the remediation of this Site, the design of the remedy will be undertaken. Once the design is completed, the construction of the remedy will commence. It is estimated that the design and construction will take approximately four years to complete.

RISK ASSESSMENT

The Dover Landfill PRP Group submitted a report titled "An Updated Public Health Evaluation of the Dover, New Hampshire Municipal Landfill Superfund Site" dated May 18, 1991 and prepared by Environmental Standards, Inc. (ESI Report).

The EPA has evaluated this report as it did other public comments and considered it in selecting a remedy at this Site. Since the report was not submitted in comment format and did not specify particular areas of the HMM risk assessment with which it disagreed, it is particularly difficult for EPA to "respond" to the report. While this Responsiveness Summary does not provide a forum for EPA's detailed evaluation of the ESI Report, as noted below, efforts have been made to address major differences in the HMM risk assessment and the ESI assessment, and to highlight portions of the ESI Report with which EPA does not agree.

In sum, after a complete review of the ESI Report, EPA is not persuaded that, as ESI concludes, the Site poses no risk outside EPA's acceptable risk range. In EPA's view, the ESI Report does not comply with Regional risk assessment standards, at times employs collections of data which are not justifiable, considers factors which the Region determines to be inappropriate, and makes assumptions inconsistent with Regional policy.

General Comments & Responses:

Comment a: ESI provided risk analysis for three separate groundwater data sets:

1) RI data set, utilizing data from the most highly contaminated well (Well B-2U) as a basis of hypothetical long term exposure

2) the 95th percent upper confidence interval of the mean concentrations of the RI and FES data sets combined, and

3) the average concentrations of the most recent and validated data (FES data)

EPA Response: EPA determined it was not appropriate to use only the RI data set or the combined RI and FES data set because these data sets do not represent the most current

chemical concentration levels (e.g, latest sampling results) found at the Site. EPA determined that the risk analyses for data sets 1 and 2 were not relevant because the estimated risks derived from those data sets would not reflect the risks associated with the current concentration levels found at the Site. EPA agrees that the use of data set 3, FES data, was appropriate to conduct the risk assessment. For the above reason, many of the responses which follow address ESI's risk assessment on data set 3.

EPA's risk assessment data set used average and maximum concentrations from the data collected during the Field Element Study by HMM Associates, except for two compounds: 1,2-dichloroethane which was not detected during the FES and tetrahydrofuran, which was not analyzed for during the FES. Data for these two compounds was taken from the RI. The supplemental risk assessment in the FES presented the average (most-probable) and maximum (worst-case) risks using the FES data except for the two compounds as noted above.

Comment b: ESI submitted this report to provide a summary of the methodologies and results of an independent risk assessment of the Dover Landfill utilizing the most current guidelines and data obtained during the RI and FES.

EPA Response: Region 1 policy, and the policy in effect when the risk assessment for the Dover Municipal Landfill was initiated was to calculate average and reasonable worst case risk estimates based on average and maximum observed concentrations. This approach was consistent with EPA Regional Policy and National EPA Policy at the time the risk assessment was initiated. Furthermore, it has remained consistent with current Regional Policy despite changes to the National Policy.

Reasonable Maximum Exposure
Recent EPA national risk guidance (RAGS) recommends calculating one risk estimate using the 95% upper confidence limit on the mean concentration corresponding to a reasonable maximum exposure estimate. The authors of this guidance have not yet provided sufficient information to employ that portion of the guidance related to the 95% upper confidence limit in a nationally consistent manner. Furthermore, the recent national guidance is simply that - guidance. Current Region I risk assessment policy is consistent with the NCP which requires the evaluation of the Reasonable Maximum Exposure. Region I, therefore, has

chosen to follow its consistent policy of using average and reasonable worst case risk assessments until such time as a nationally consistent methodology is developed. Furthermore, in the case of the Dover Risk Assessment, not only were EPA's average and reasonable worst case risk estimates in excess of EPA's acceptable risk range, but a 95% upper confidence level of the mean concentration as computed by ESI (following the recent National EPA Policy) also appears to exceed the acceptable risk range. The average and maximum cumulative risks, from the HMM FES Supplemental Risk Assessment (and thus EPA's risk assessment), are 1.86×10^{-2} and 6.97×10^{-2}, respectively.

Exposure Parameters

EPA's risk assessment prepared by HMM was submitted on February 11, 1991 and presented both average and maximum risks. Exposure parameters used in this assessment were consistent with Region I policy and National Superfund Policy, applicable at that time, and the Office of Drinking Water which uses a 70 year exposure period to derive MCLs. Some of EPA's parameters differ from those used by ESI. For example, EPA assumed a 70-year vs. 30-year exposure duration for groundwater ingestion, and assumed that 100% vs. 75% of groundwater ingestion occurs at home. Furthermore, the use of ESI parameters would not have resulted in significant decreases in EPA's risk estimates.

Exposure Pathways

ESI has also included two exposure pathways in the quantitative risk assessment which EPA did not: inhalation and dermal absorption during household use of groundwater. Currently Region I only evaluates these pathways qualitatively because there is no consensus either in Region or in Headquarters on how to quantitate the risks from these exposure pathways. If EPA had evaluated these pathways quantitatively, the total risks would have been even greater (by perhaps a factor of 2).

ESI's Missing Compound

EPA Regional policy as well as the national guidance state that risks for all classes of carcinogens should be added. ES omitted the one class C compound from the cumulative risk, 1,1-dichloroethylene. EPA calculated a risk range of 2.2×10^{-5} to 2.2×10^{-4} for this compound which factored into EPA's cumulative risk estimate.

Specific Comments & Responses:

Comment c: ESI States that elevated arsenic levels were found in groundwater samples at the Site, in wells which are clearly upgradient of possible Site influence, and in other wells where no VOCs or other markers of landfill impacts were evident. ESI also states that New Hampshire is known to have high concentrations of arsenic in pristine groundwaters. ESI states "According to EPA's guidelines, it may be appropriate to eliminate this element from the risk assessment." In addition, ESI states that very few samples were filtered and that by limiting water analysis to unfiltered arsenic, "this aspect of the investigation was rendered meaningless". ESI states that arsenic data does not appear to correlate with the levels of contamination by VOCs, therefore no conclusion can be drawn with respect to landfill influence on arsenic in the shallow aquifer at this Site.

EPA Response: EPA agrees that there may be elevated levels of arsenic in the groundwater around the Site. EPA does not agree that arsenic should be eliminated from the baseline risk assessment when background levels of arsenic in the groundwater has not been readily identified at this Site. Given the high concentrations of arsenic found at the Site, EPA does not anticipate that once the background level is determined, that it will significantly alter EPA's risk assessment. EPA's approach to evaluating risks at a site, is that all risks for the Site, whether background, site related, or both be included in the baseline risk assessment.

Data indicate that for VOCs, the four most contaminated, shallow aquifer wells during the RI: OW-1A, B-4U, OW-5U, and B-2U respectively, are also the four most contaminated wells for arsenic according to FES data. EPA notes that although well OW-1A was not sampled for arsenic during the FES, MW-101, located approximately 20 feet north was sampled for arsenic and high concentrations of arsenic were found. In addition, well MW-101 had the highest total VOC concentrations during the FES.

The higher levels of arsenic found on-site (up to 1300 ppb) suggest a potential influence of the Landfill Leachate (i.e., VOC, organic acids, sulfides, iron, etc.) in the groundwater on the mobility of naturally occurring arsenic. In addition, arsenic may have been disposed of at the

Landfill due to its presence in typical municipal wastewater sludge and industrial wastes.

The national guidance (RAGS) states that while filtration of groundwater samples provides useful information for understanding chemical transport within an aquifer, the use of filtered samples for estimating exposure may underestimate chemical concentrations in water from an unfiltered tap. Therefore, data from unfiltered samples should be used to estimate exposure concentrations.

The ROD states that a background level for arsenic will be determined by the EPA and the NHDES after the pre-design sampling results have been evaluated. EPA will set the cleanup level for arsenic in groundwater to the RCRA MCL of 50 ug/l or background, whichever is determined to be higher. The cleanup level will be set for total arsenic in groundwater (unfiltered) because this is representative of the residential use of groundwater for a drinking water supply.

Comment d: ESI states that the baseline risk assessment is based on the unrealistic assumption that contaminated off-site groundwater will be consumed and utilized on a daily basis. The reason stated is because at present: 1) private residences that could be impacted by the Site are connected to the municipal water supply; and 2) an ordinance prohibiting the installation or use of a well for any purpose within 1500 feet of the Landfill was added to the City of Dover Code (116-7.1). ESI did, however, calculate risks for the ingestion, inhalation and dermal adsorption of off-site groundwaters.

EPA Response: The NCP states that the role of the baseline risk assessment is to address the current and future risk associated with a site in the absence of any remedial action or control, including institutional controls. EPA addressed the use of institutional controls as a component of remedial action in comment number 3.

Comment e: ESI presented an evaluation of potential pathways considered as part of the RI risk assessment and supplemental risk assessment (FES) and their associate risks, including the exposure to contaminated swale sediments. ESI concluded that contamination present in off-site groundwater represented the only significant potential concern at the Dover Landfill.

EPA Response: EPA agrees that the primary risk is the ingestion of the off-site contaminated groundwater. Based on the risk assessment performed by HMM for the Supplemental Risk Assessment, and as stated in the ROD, the risks from other exposure pathways are within EPA's risk management goal of 10^{-4} to 10^{-6}. Because EPA did not consider these additional pathways a primary threat, EPA did not critically evaluate ESI's assumptions given that ESI's conclusion was consistent with that of EPA.

Comment f: ESI lists the chemicals regarded as compounds posing the only significant potential concern at this Site. These compounds include: arsenic, benzene, methylene chloride, tetrachloroethylene, trichloroethene and vinyl chloride.

EPA Response: EPA agrees that these compounds present a potential concern at the Site, however, this list is not complete. In addition to the compounds listed by ESI, HMM lists ten chemicals of concern. EPA has determined that these ten compounds are also concern. In particular, tetrahydrofuran, 1,1-dichloroethene and 1,2-dichloroethane pose significant risks.

Comment g: ESI developed "provisional" RfDs values for various chemical compounds, where EPA has not published oral and/or inhalation RfD values in IRIS or HEAST for noncarcinogenic toxicity endpoints.

EPA Response: ESI developed "provisional" RfDs for benzene, tetrachloroethylene, trichloroethylene and vinyl chloride. EPA did not attempt to quantitatively evaluate the noncarcinogenic effects of these compounds because the overriding concern is for the carcinogenic effects. The Hazard Indices for these compounds, as derived by ESI, are 0.44, 0.0062, 0.0099, and 0.29 respectively. EPA determined that those Hazard Indices for noncarcinogenic effects for those particular compounds were insignificant when compared to the Hazard Indices evaluated for arsenic (37) and tetrahydrofuran (24) as presented in the FES Supplemental Risk Assessment.

Comment h: ESI quotes the conclusion of the EPA's Risk Assessment Council review of the Risk Assessment Forum's proposal for quantifying risks associated with oral exposure to arsenic at Superfund Sites. This quote states that the "qualities and uncertainties could, in a specific risk management situation, modify one's concern downward as much

as an order of magnitude". ESI states that the risk assessment(s) utilized the findings and all the recommendations of the Science Advisory Board's review of the arsenic issues develop provisional slope factors for quantifying increased risks resulting from ingestion of inorganic arsenic.

EPA Response: ESI has factored in the so-called risk management factor into the derivation of the cancer potency factor for daily intakes of 2.86 x 10-3 or less. EPA does not include this risk management factor in calculating the risk assessment, but, rather uses it as a risk management factor in determining cleanup levels for a Site. The use of this risk management factor in estimating risks would result in the risk estimate being decreased by a magnitude of order (ten-fold).

Comment i: ESI states "An MCL of 0.005 mg/l and an MCLG of zero concentration in drinking water has been proposed" for tetrachloroethylene. In addition, ESI lists an MCL for toluene at 2000 ug/l and a Drinking Water Equivalent Level (DWEL) for methylene chloride at 2000 ug/l. These values were presented in Tables comparing chemical concentration levels found at the Site and MCLs or other advisories.

EPA Response: The MCL for tetrachloroethylene at 5 ug/l and the MCLG at zero has been finalized. The MCL for toluene has been finalized at 1000 ug/l. EPA used the proposed MCL (5 ug/l) and MCLG (zero) for methylene chloride to set cleanup levels rather than the DWEL.

Comment j: ESI reports that the combined hazard indices for the three data sets, used in their report, showed consistency and ranged from 0.9 to 1.2. ESI states that a value marginally exceeding unity does not indicate a health hazard.

EPA Response: Although ESI concludes that the noncarcinogenic effects of contaminants are not of concern, EPA's assessment indicated a concern with noncarcinogenic effects of arsenic and tetrahydrofuran; the maximum Hazard Indices being 37 and 24, respectively.

Comment k: ESI developed and presented a "provisional" oral RfD for chloroethane in appendix H of their report (pRfD of 33 mg/kg/day). The Hazard Index for chloroethane was determined by ESI to be 0.00071 for noncarcinogenic effects.

EPA Response: EPA's Environmental Criteria and Assessment Office recently provided the Regional Office with an interim oral reference dose for Chloroethane of 0.4 mg/kg/day. This oral RfD was derived through extrapolation of the inhalation reference concentration verified by EPA in December 1990. The principle toxicological study for the reference concentration was a developmental inhalation study conducted by Scortichini, et. al., 1986. The noncarcinogenic effects of chloroethane, as presented by EPA in the ROD Decision Summary, is a Hazard Index of 1.0.

IV. REMAINING CONCERNS

Issues raised during the public comment period that will continue to be of concern as the RD/RA phase of site remediation gets underway are listed below. EPA will continue to address these issues as more information becomes available during the RD/RA.

1. Area residents and local officials will wish to be kept informed of the results of site monitoring. Potential contamination of bedrock wells and the Bellamy Reservoir will likely remain a concern.

2. Community members will want assurances that the most cost effective measures are taken through the entire remedial process.

Community interest in the Site may rise due to remedial activity at neighboring Sites such as Somersworth Sanitary Landfill and the Coakley Landfill.

ATTACHMENT A

LIST OF FORMAL COMMUNITY RELATIONS ACTIVITIES CONDUCTED TO DATE AT THE DOVER LANDFILL SUPERFUND SITE

9 August 1983	Meeting held by EPA and the NHDES at the Dover City Hall to discuss the findings and recommendations of the Remedial Action Master Plan (RAMP).
December 1984	Community Relations Plan issued for the Dover Landfill Site.
13 December 1984	Informational meeting held by NHDES at Dover City Hall to describe plans for the RI/FS.
30 March 1989	Informational meeting held by EPA and NHDES at Dover City Hall to discuss results of the RI.
15 March 1991	EPA Proposed Plan published.
16 March 1991	Administrative Record made available for public review at the EPA office in Boston and at the Dover Public Library.
16 March 1991	EPA press release issued regarding the Proposed Plan, the public meeting and hearing, and the opening of the comment period.
22 March 1991	EPA published a public notice in the Foster's Daily Democrat announcing the availability of the Feasibility Study, Administrative Record; and Proposed Plan; the public comment period; and the scheduled meeting and hearing.
25 March 1991	Informal meeting held by EPA at the Horne Street Elementary School to discuss the results of the RI and FES, and to present cleanup alternatives and EPA's Proposed Plan.
26 March 1991- 24 May 1991	Public comment period on EPA's Proposed Plan.
16 April 1991	Informal hearing held by EPA on Proposed Plan.

28 June 1991	EPA Responsiveness Summary issued for Record of Decision on EPA's Preferred Alternative for the Dover Landfill Site.

ATTACHMENT B

TRANSCRIPT OF THE APRIL 16, 1991 INFORMAL PUBLIC HEARING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

Dover Municipal Landfill Superfund Site

Dover, New Hampshire

DOVER PUBLIC HEARING

April 16, 1991

7:55 p.m.

Moderator: Dan Coughlin,

Chief N.H. Superfund

Nancy D. Lowney

Certified Court Reporter

I-N-D-E-X

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Cheryl Sprague	5
John R. Peltonen	8
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Lee Perlman	40
Thomas Cravens	41
Hamilton R. Krans, Jr.	42
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(Meeting opened 7:55 p.m.)

DAN COUGHLIN: My apologies for the inconvenience of making you sit around for a half hour or so. Our stenographer, as I told you, called at the last minute and said they couldn't make it. I appreciate your indulgence.

My name is Dan Coughlin. I'm Chief of the New Hampshire Superfund section We're here tonight to conduct a public hearing for the Remedial Action Proposed Plan Feasibility Study for the remediation of the Dover Municipal Landfill Superfund site.

With me tonight up front are Cheryl Sprague, Remedial Project Manager for EPA, and Carl Baxter representing the Department of Environmental Services.

Before we start let me just give you a quick format on how we'll conduct the meeting. Cheryl will first give you a very quick discussion on the Proposed Plan itself. We've mailed out numerous copies of those Proposed Plans. If you don't have one and would like one, we have some up over here by Doug, who is from our Human Relations office. And then we will go into the comments.

After, we'll hear the comments in the order in which you find them. I think we have about twelve of them. I would reserve the right to ask to limit the comments to about ten minutes. If you think it's going to run more than ten minutes, please summarize your comments and give us a text, full text afterwards, and we'll make sure that text gets in the record.

All the comments tonight will be transcribed. Transcriptions will be available, and also be responded to in the Responsiveness Summary, which is part of the Agency's Record of Decision which is our over-al. decision document for remediation of the site.

The comment period ends May 24th, so if you're going to submit written comments, and we would recommend that you do or encourage you to do so, please make sure they're postmarked by May 24th when you send them into us.

At the end of the comments I will close the public hearing and we will be available to answer questions up front here if anybody has anything they would like to discuss with me. And then we'll go home.

Again, I thank you for your putting up with us in our not having any stenographer. We'll do the best we can.

Okay. Any questions on the format?

I call on Cheryl.

CHERYL SPRAGUE: Thank you.

My name is Cheryl Sprague. I'm Remedial Project Manager for the Dover Landfill Superfund site.

On March 25th we held a public meeting at the Horne Street elementary school. Mr. Richard Pease, from the New Hampshire Department of Environmental Services, described the activities during the remedial investigation. At this meeting Mr. Rick Cote, of H.M. and M. Associates, the potential responsible party's contractor, presented the alternatives that were retained for detailed analysis and feasibility study. And I presented the EPA's Preferred Alternative.

Tonight I would like to briefly describe the Preferred Alternative, and then we'll open the floor to solicit your comments.

The Dover Landfill is situated at the

1 intersection of Glen Hill and Tolend Road in
2 Dover. It is a 55-acre landfill that operated
3 from 1960 to 1979, and accepted both municipal and
4 industrial waste.
5 The Feasibility Study developed
6 alternatives that pertained to either source
7 control or management of migration. Source
8 control for this site refers to the landfill, the
9 perimeter drainage's sediment, the drainage swale
10 sediment and the groundwater and leachate directly
11 under the landfill.
12 The management of migration refers to
13 the contaminated groundwater when it's migrated
14 away from the landfill. We refer to this as the
15 eastern plume and the southern plume.
16 The EPA Preferred Alternative for source
17 control includes recontouring the existing
18 landfill and placing a 55-acre multi-layer cap
19 over the landfill. There will be construction of
20 a groundwater and leachate collection system,
21 which includes the installation of interceptor
22 trench/extraction wells or a combination of the
23 two around the perimeter of the landfill to
24 intercept and collect the leachate.

There will be use of an on-site powdered activated carbon treatment system or an equivalent system to treat the groundwater and leachate with discharge to the Cocheco River, or we will have pretreatment with discharge to the Dover Publicly Owned Treatment Works.

There will also be limited excavation of the sediments in the drainage swale with deposition back onto the landfill prior to capping.

The multi-media cap consists of the following layers. There will be a vegetative topsoil, a common fill layer, a drainage layer, a flexible membrane, low permeability layer. That makes up the multi-media portion. And a gas ventilation layer covering the waste.

The preferred alternative on the Management of Migration includes the use of institutional controls, where possible, to prohibit the use of groundwater, site use and site access. There will be an implementation of a long-term groundwater monitoring program. There will also be the implementing of pre-design studies which would include the installation of

1 additional monitoring wells to further define the
2 lateral extent and depth of contamination. We
3 will be conducting one or more pump tests to
4 determine the ability and rate that the
5 contaminated groundwater can be extracted from the
6 aquifer. There will be the attainment of the
7 target cleanup levels in the eastern plume for
8 natural attenuation processes such as adsorption,
9 dispersion and degradation.
10 There will also be the installation of
11 groundwater extraction wells in the southern plume
12 with an on-site treatment system, either a
13 powdered activated carbon treatment system or an
14 equivalent system, with recharge back to the
15 wetlands and or discharge to the Cocheco River.
16 The cost for these preferred
17 alternatives is approximately 26 million dollars.
18 A large portion of these costs is due to the need
19 to import large volumes of fill material needed to
20 construct the 55-acre cap.
21 That concludes the presentation. I will
22 now turn it back to Dan to open for any comments.
23 DAN COUGHLIN: Okay. Thank you, Cheryl.
24 The first comments, John Peltonen,

1 attorney representing the city of Dover.

2 JOHN PELTONEN: Good evening, ladies and

3 gentlemen. For the record, my name is John

4 Peltonen and I'm an attorney and I'm legal counsel

5 to the city of Dover in this matter.

6 And I want to thank you for this

7 opportunity to speak on behalf of the City, and

8 remind you that in the order of sign-up this

9 evening my remarks will be followed by his Honor,

10 George Maglaras', mayor of the city of Dover, and

11 his remarks in turn will be followed by those of

12 Mr. David Wright, who is the city manager.

13 First and foremost, the City recognizes

14 that it has two principal obligations in this

15 matter. One is to protect the public health and

16 the environment. And in that regard the City has

17 undertaken several tasks to assure that public

18 health is assured and is safe.

19 The second obligation and of equal

20 importance is to protect the public fisc, that is,

21 the public treasury. And the City has a great

22 concern with the expenditure of tens of millions

23 of dollars in view of the minimal if any risk

24 which confronts us, especially since we feel that

1 risk otherwise can be controlled.

2 We would urge on behalf of the City that
3 the Agency consider instituting a limited action
4 proposal alternative along the lines perhaps of
5 SC-2, holding in abeyance implementation of any
6 other remedy, because this would provide overtime
7 protection to human health since there will be no
8 exposure pathways for ingestion of groundwater,
9 ingestion of soils, or inhalation of airborne
10 contaminants.

11 This site was covered with a vegetative
12 cover in 1979, pursuant to then existing
13 regulations. Institutional controls in effect and
14 which can be put into effect can prevent the
15 disturbance of that cover and prevent access to it
16 to prevent ingestion or inhalation.

17 The City already has provided public
18 water and has enacted a restrictive use ordinance
19 to prevent the use of the ground water in that
20 area.

21 In fact, from the moment that site was
22 permitted by the State as a dump site, as a
23 landfill, the use of that aquifer for drinking
24 purposes was doomed from that point on in the

1 early '60s.

2 Institutional controls can be instituted
3 at the Bellamy to keep the water dammed and
4 mounded, reversing further flow in that direction
5 and creating the equivalent of a hydraulic control
6 in that area.

7 And the compliance boundary can and
8 should be extended out to at least the five
9 hundred foot level beyond the waste pile,
10 consistent with New Hampshire water supply
11 regulations, WS, part 410.

12 Evidence already suggests that the plume
13 is retracting, probably as a result of the cover
14 materials already over the site and the drainage
15 ditch that was installed around the site in the
16 mid 1980s. Nothing more has been done on the site
17 with regard to remediation since that time, and it
18 appears conditions are improving.

19 Before we spend 26 million dollars we
20 must give a limited alternative a chance, so that
21 we can monitor that plume. We are of the opinion
22 that it presents no realistic threat to health
23 since the actions already taken, combined with a
24 limited action alternative, will eliminate

1 exposure pathways. In fact, we would urge you to
2 consider that construction of the remedy with its
3 necessary disturbance of the site will create much
4 greater risk to residents and to the workers than
5 would compliance with a limited action
6 alternative. And this factor must be weighed in
7 the analysis.
8 Now, we understand the Agency's need to
9 avoid the time and expense of performing another
10 RIFS and a ROD five years from now. And what we
11 recommend is to include SC-7A with modifications,
12 which I will discuss, but defer its
13 implementation, because we believe that limited
14 action with institutional controls over time will
15 prove to be all we need to protect human health
16 and the environment.
17 With regard to the proposed plan which
18 we urge you to hold in abeyance, clearly the
19 Management of Migration component is not
20 necessary, at least not now. The plume to the
21 Bellamy appears to be retracting. Contaminants
22 from the landfill probably will not reach the
23 Bellamy reservoir and we should permit a time to
24 continue monitoring that area. We believe we will

be proven right, and at least implementation should be deferred to permit that monitoring.

Consideration should be given to deleting any requirement to install an up-gradient interceptor trench, or at least to separate its flow from that in the down-gradient trench, thereby reducing the volume of water to be treated and decreasing the capital costs in the time of treatment associated with a water treatment facility. And the compliance boundary should be set away from the edge of the waste pile to permit a more realistic ability to reach desired goals.

We are concerned that the extent of the effort proposed is an unnecessary and extraordinary expenditure of scarce assets when a limited action alternative can provide adequate protection over time. Cost and community acceptance are two of your criteria. Just as you eliminated an 800 million dollar remedy, we believe you can eliminate a 26 million dollar remedy and still protect the public.

Please listen to the comments that you will hear tonight, and please be flexible in the development of the ROD to permit limited action

alternatives and a very delayed and slow approach to the expenditure of this amount of money.

Now, it's easy, either in an academic or judicial environment, for us to fall into the trap of tearing each other's positions down. And all of us here, everybody here has an obligation to avoid doing that. Our task is to work together to forge an agreement on the most reasonable and fair response to this situation, and the city of Dover has been working very closely with the Agency in this regard and we will continue to do so. But it's important, however, for the Agency to understand that the imposition of an obligation to pay tens of millions of dollars in response to a situation which presents minimal if any risk will be destructive to the civic and industrial community of Dover. Thank you.

DAN COUGHLIN: Mayor Maglaras.

GEORGE MAGLARAS: Good evening, and welcome to our fine City one more time.

The City's actions, to respond along with the PRP's, has been a commendable one. We as a community over many years have been up-front and aggressive in taking a number of responsible and

appropriate steps to ensure the public's health and safety as it relates to the landfill.

Specifically, I don't want to be redundant, but the restrictive use of ground water in the area, we've installed water lines in the area for our residents. We've instituted proper zoning regulations to make everyone aware of the existence of a landfill. The installation of a trench and the vegetative cover as well, and the pursuit of other institutional controls, and we have fully cooperated with the State and Federal officials as progress has surely been made and we will continue to do . But as mayor of the city of Dover, it is the city council's official position that we stand in opposition to the EPA's Preferred Alternative, and would announce our preference for a limited action alternative which may be modified through future negotiations.

Given the demographics and the socioeconomic conditions of our community, to apply our limited resources to fund a 25 million dollar project of this type, given the minimal threat the landfill imposes, is at best ill-advised and morally fleeting.

1 I don't want you to misunderstand what
2 I'm saying, because we stand ready to accept our
3 responsibility and not bury our heads in the sand;
4 however, given all that we face as a community and
5 as a State and as a nation, we should be able to
6 work together to bring about a common-sense
7 resolution to this issue, which will surely
8 enhance and promote our quality of life. Thank
9 you.
10 DAN COUGHLIN: David Wright, city
11 manager, city of Dover.
12 DAVID WRIGHT: Thank you.
13 For the record, my name is David B.
14 Wright. I live at 203 Henrila Avenue, and since
15 February of last year I have been the town
16 administrator, city manager of this community.
17 I want to start off by talking about
18 what this really means. Everett Dirkson, one of
19 my favorite U.S. Senators said: You know, a
20 billion here, a billion there, it adds up to real
21 money.
22 That's just what we have here. We've
23 got a million here, a million there, and it gets
24 lost. The impact of that is unclear, especially

if you're far away and don't see how it affects the community and what 25 million means in terms of alternatives to this community. I may want to go work through some of those economics.

The Tolend Road landfill, SC-5, which is Source Control Preferred Alternative of the EPA and the Migration of Management option chosen by the EPA at a total cost of almost 26 million dollars, 25,954,000. If you divide it into the population of the two cities involved, Madbury and Dover, it is $2,975 per person on a capital expenditure, not including interest, on a capital expenditure. To put that in perspect ., to equal 26 million dollars, you have to go back twelve years for every single capital expenditure the City has ever made. Twelve years equals 26 million dollars.

The average household in this community pays less than 2 thousand a year, $1997 in taxes; yet the total cost in capital for this preferred alternative is $3000 per household in this community.

You can argue that, or say that that 3000 isn't all coming out of the City's share,

1 it's not to be paid in taxes. But frankly, who's
2 kidding who? This is coming out of this
3 community. And if it's coming out of the
4 employers of this community it's going to come out
5 in the form of wages that they can't take. The
6 lay-offs they're going to make, expansions they're
7 going to put off, or even plants that they have to
8 close. And more importantly, what the City's
9 share is going to be is going on the taxpayers of
10 this community. That's who is going to pay the
11 bill.
12 I want to talk about some of what the
13 impact is of the solution in terms of EPA's, the
14 City's share that's now currently proposed. Now,
15 granted, we don't believe necessarily that we're
16 going to pay this total amount. But we don't know
17 because we haven't got the design. And
18 traditionally, the conceptual amount of money that
19 we have on the table in this just-proposed remedy,
20 when we get the design I believe that history
21 shows has been higher. And so this is what
22 hopefully is not a realistic cost but probably
23 low. And so maybe our share is high, but the cost
24 of total construction is way below. Currently the

share based on the formula that has been publicized that the City would pay the 63 percent, that is $16,351,000 that the City would pay somehow, into a bond or out of the operating budget. And just to give you some ideas of what that is compared to, what that really is, $16,275,000 is the whole City budget this year as has been proposed by me, and the city council has told me to cut it. They haven't told me how much yet, but that's clearly what's happening. Which is no where near, or not as much as your proposed alternative and our share.

The school budget is $16,500,000. Madbury's town budget is only $532,000. Dover's legal limit, how much we can bond, is only 13 million dollars as opposed to 16. And you can see why this figure is frankly ludicrous for the risk to the public posed by this landfill.

Let's talk about what we're giving up. What things we would give up to pay for this, and how maybe they affect public health.

The City's share, I hope, and this is a big hope, of the present sewer treatment plan as is proposed is a $1,600,000. For a EPA mandated

1 23 million dollar facility down the river that's
2 at least our share. So we could do ten of those
3 with the amount of money that you're going to
4 require to close this landfill to protect a
5 minimal risk.
6 A fire pumper, just on today's current
7 business, about $198,000. We could buy 82 fire
8 trucks. That's more than we'd ever buy in this
9 century and maybe two centuries. And we're having
10 offers from -- we need two and we're having a
11 terrible struggle to get beyond one within the
12 operating budget and within the capital budget.
13 That's 82 pumpers.
14 We have an iron, manganese problem in
15 our water wells. We have numerous wells in the
16 City, I think in the order of about seven or
17 eight. We have one well with an iron, manganese
18 plant in it so that people can get decent water
19 quality. That cost us $900,000. This particular
20 expenditure, we could build eighteen of those and
21 cover all our wells and any wells in the future
22 with iron, manganese plants, this double
23 expenditure mandated by the EPA.
24 We spend $100,000 a year fixing

1 sidewalks up. This is 163 years worth of sidewalk
2 repair to this community. And the City has been -
3 - as a matter of fact was the test case. They've
4 been held liable for anybody that falls down on
5 the sidewalks by the court system. We have to pay
6 if somebody gets hurt, so we have to make those
7 kinds of expenditures.
8 And to put it in perspective, we need to
9 build a new public works garage. The facility now
10 is a terrible space that directly impacts the
11 Cocheco River, frankly. It has more of an impact
12 on the Cocheco River than probably this particular
13 landfill does. And that cost us 3 million
14 dollars. That's five of those to build this
15 landfill to solve a minimal risk.
16 We need a new elementary school. We've
17 been struggling year after year for five or six
18 years. And I think there's some people here from
19 the school board who will talk about this. To
20 build an elementary school, that costs about 3
21 million dollars. There's 4.7 elementary schools
22 that we could pay for out of that amount of money.
23 We need a new interchange at Reed
24 Circle. This is the State -- ours, of course, and

1 the State's share. The sum of money -- and the
2 State's money is involved in this, because they
3 know this is a dangerous circle and people are
4 going to die if we don't do something on this
5 circle. And our share's a million dollars.
6 This landfill, we could build 16 of
7 those for the amount of money we're going to spend
8 capping the landfill on the preferred alternative
9 selected by the EPA.
10 For $200 a foot, a running foot, we can
11 get a first-class water, sewer line, road and
12 drainage project going. We could build 81,000
13 feet of road, almost 82,000 square feet, or 15
14 miles of new streets for this money.
15 Some of our streets are in very poor
16 shape and we need that money. We can spend -- we
17 are currently in active negotiation to build a new
18 industrial park in conjunction with private
19 industry, where we would acquire the land and sell
20 it to people building in this town, not the
21 developers but the builders. The total amount of
22 money we have available for that up to our maximum
23 bond unit at 1 million and 3, $1,135,000. We
24 could build 14 industrial parks of that size,

which would pay for this cleanup over and over again, that we could build.

It cost us every time we buy a school bus $38,000. We could buy 429 school buses. That's more than probably the whole State of New Hampshire, certainly in this area, for this kind of money. And our school bus fleet is aging. And those are school children riding it daily.

I guess that's why the City feels that frankly this amount of money is not only just a waste of money, it is a moral bankrupt position and I'm saying that it's taking away from more pressing public health needs and needs of the City.

I want to talk a little bit about the financial situation next. In the last several years the city of Dover, not unlike every other city in the State, is experiencing a downturn in the economy. This top line represents tax collections. You can see that they're going. People are not able to pay their taxes now. That's the clear bottom line. Year after year after year, the last three years, that has risen to the level of about 6 million. It has never

1 been that level historically. People cannot pay
2 their taxes, so we don't have the wherewithal,
3 and that drives up our costs. We have to borrow
4 more. We don't have the interest on our money.
5 But that's the taxes that we now have.
6 Our sum balance, which is, well, the way
7 the world looks is called surplus, perhaps, but
8 it's the money left over. It's our reserve. It's
9 how much money we have to cover any contingencies
10 on the basis of the government finance accounting,
11 taking in these accruals is in a negative
12 position. Because of that Moody's has dropped the
13 City's bond rating for an A, for B double A 1,
14 which is the same level as Massachusetts, or one
15 step above, I'm sorry, the State of Massachusetts,
16 which is the lowest in the country. And that's
17 the bond rating we have to show these bonds at.
18 That's the interest rate that's going to be set
19 because of that bond rating to float this bond to
20 take care of the EPA's Preferred Alternative.
21 There's some other anecdotal things that
22 I will share with you. This is nothing I
23 prepared. This came out of the Union Leader, the
24 newspaper we have in this State. It's a Monday

business thing of this week dated today, and it talks about the level of foreclosures and the level of bankruptcies in this State. How they've reached levels never seen before. I'd like to have that entered.

And I checked with the Stratford County Registry of Deeds today. And we've had 186 foreclosures in Stratford County, 72 in the city of Dover. That's an historical high that has never been reached since we've had records, and this is a very old county. So the ability to pay is not there, and everything we have to do we can't push on when we have to take it out of the budget and it becomes an operating cost. That's just assuming we can bond this, if we can bond this.

Let's go with how it affects the operating costs of the City.

If we were to take and float a 16 million dollar bond our debt service, principal and interest, what we have to pay a bank at 7 percent interest -- hopefully which will stay firm if our bond rating doesn't get any worse, because the direction of our collections or fund balance

1 hasn't improved any, it's gotten worse -- is 2
2 million dollars, almost. $1,962,000.
3 What is that? That's my fire
4 department. The entire thing is more money than
5 we spend there.
6 That's more money than we spend in
7 insurance and fringe benefits for all the city
8 employees and to cover all the insurances for the
9 City.
10 That's more than we spend in trash
11 disposal.
12 And it's more than what the school
13 department spends to operate and provide teachers
14 for the Horne Street School and all the staff and
15 all associated costs, gas, heat, books,
16 everything.
17 It is three times the amount for the
18 entire parks and recreation budget.
19 It is probably five times the size of
20 the entire planning and development of this City,
21 including building inspection and all those
22 departments.
23 The total existing City debt -- we pay
24 this now -- is 3 million dollars a year. It's

almost double that.

The total police department is only 2.5 million. This is the largest department I have in the whole City.

Our property tax values, one dollar equals, is $501,000. Hopefully. That may go down. It's certainly not going to increase. This may be the first year in decades where the City has not had a growth in their tax evaluation. We may have a negative growth. We may have more abatements than we will have tax increases, new evaluations coming on line. So that's hopefully the best figure we're going to get. This works out to almost $4, just to pay for the debt. On a rate right now which is just under $50.

My whole budget increase which the council is sending back to me to make a major change is proposed as $4.40 to cover every increase that we have after I've bare-boned it. So there's no new programs. We've offered, you know, positions that we could. I still have $4 tax increases, I have no revenues. Your bonding will double, almost double that amount.

In terms of the total funds for the

City, I think this is a telling table. This is how much money since 1959 -- now, in 1959, I want to tell you a secret, I was 9 years old, in elementary school. Cheryl wasn't born. I'll tell you that Dan was, sort of. But he was probably about 7.

In 1959 for this year we only spent a little less than 15 million dollars for City purposes in bonds. The schools managed to do a little less than 10 million dollars. We have the water department, the sewer department and all the others. None of them can equal the Tolend Road landfill, an EPA mandate, or the waste water treatment plant was an EPA mandate. Now, everybody says you're supposed to get State funding for that, and this is supposed to be our share, not including the -- you know, there's a 23 million dollar treatment plant, 5 million dollars of which is coming from you guys. The rest is coming from the State of New Hampshire. I suppose you haven't followed the budgets up here. In Boston you may not get that. They have not funded that.

The House budget was passed last week;

did not include a dime to repay us for the bonds for this item. So this is going to go on our tax rate, this mandate. We're going to pay all that, unless there's some change, and the State's in worse shape than we are, frankly.

If you add up every single expenditure paid for by bonds -- I think it's about 40 million going back to 1959. And I'll bet a good 6 million of that or so is for EPA mandates for other things doing with the sewer plant, sewer separation and those kinds of things. That's 40 million dollars; that's everything we've ever bonded for all those years. If yo dd these two projects together, the waste water treatment plant we were mandated by the EPA to do, and the Tolend Road project at the level we're thinking about that it appears we're going to have to pay, that's 40 million dollars. That equals every bond we've had since I was 9 years old.

I guess you can see why the City is concerned. I understand where you guys are coming from. I understand it that you're concerned about the taxpayers. The EPA, the Superfund was established by taxpayers ultimately through, they

paid money for oil and other, those kinds of surcharges. And they set up the Superfund and the EPA has been very cognizant of that and has acted very responsibly toward that to make sure the taxpayers are not having that money wasted. But in this case, to paraphrase my other favorite politic theorist, Pogo: We have met the taxpayers and these are them. These are your taxpayers that are paying your salary and my salary, and they're going to be paying for this closure one way or another in the wages that they can't get or in taxes. And I think that deserves the EPA's full attention on this issu I think it deserves the EPA to look hard at the question of mixed funding for we have a lot of industries who have gone away. Because if you don't pay for it these taxpayers, your taxpayers will pay for it. And that's basically my remarks to this point and I have copies of this to enter on the record.

DAN COUGHLIN: Okay. Thank you.

Richard Houghton, Chairman, Madbury Board of Selectmen.

RICHARD HOUGHTON: My name is Richard Houghton. I am chairman of the Madbury Board of

1 Selectmen. Together with my fellow Selectmen,
2 Joseph Moriarty and Bruce Hodson, both of whom are
3 with me tonight, I speak on behalf of the 1200
4 residents of the Town of Madbury who potentially
5 face an enormous liability exposure threatening
6 the economic well-being of our town.
7 For your perspective, my comments are
8 organized to address just who Madbury is, what
9 ties Madbury has to the Tolend landfill, and
10 finally, how Madbury hopes that the EPA's
11 practical and equitable use of discretion in
12 overseeing the future remediation of the site can
13 balance environmental and fisca concerns, neither
14 of which is any more important than the other to
15 our citizens' day-to-day life.
16 At the conclusion of my statement I wish
17 to submit my comments, supporting detail in
18 writing to be made a part of EPA's administrative
19 record.
20 When waste disposal operations were
21 initiated at the Tolend landfill between 1961 and
22 1962, the Town of Madbury had an approximate
23 population of 556 people. The non-school portion
24 of our Town budget then slightly exceeded $15,000.

1 Excerpts from our Town's Master Plan evidences our
2 town's population growth, 704 people by 1970; 987
3 by 1980; and 1202 by 1988. Master Plan excerpts
4 show that only one out of every four Madbury
5 citizens has been a resident in town for more than
6 ten years.

7 The building of single-family homes over
8 the past three decades has caused our rural
9 agricultural town to become in part a bedroom
10 community, a suburb to Dover, Durham, the
11 University of New Hampshire, Portsmouth and the
12 Seacoast generally. Very few people work in town.
13 Our households are made up primarily of married
14 couples, many with children.

15 Any remediation costs to be paid by
16 Madbury citizens will have a significant fiscal
17 impact on every household. The Town's
18 appropriations or budget for the calendar year
19 1991 anticipate expenditures, excluding school
20 costs, of only $502,868. This is one fiftieth the
21 cost of EPA's proposed remediation plan for the
22 Tolend landfill site as announced by EPA in
23 midMarch. Actual town expenditures for fiscal
24 year 1990, excluding school costs, were $437,131.

15 percent of our local real estate taxes funds our schools, our town's budget. An average family household's tax bill may range from $3500 to $4000. Last year's $40.75 tax rate per $1000 of assessed valuation was allocated as follows:

$31.13, or 76 percent of the total tax rate funded the Oyster River School District, a cooperative school district, including the towns of Madbury, Durham and Lee.

9 cents, or 1 percent of the total tax rate funded the Madbury water district.

$3.35, or 8 percent of the total tax rate funded Stratford County expenditures.

And finally $6.18 or 15 percent of the total tax rate funded the 1990 town budget of $437,131.

A proposed remediation plan costing more than 50 times the town's current annual budget opens eyes in Madbury. Whatever portion Madbury must bear of a proposed 25 million dollar remediation plan will have a direct and costly effect on the $6.18 portion of our current tax rate.

During the 1960s and '70s, when the Tolend landfill was in operation, Madbury's population varied between only 500 and 800 people. For so long as the Tolend site was being used there was never any general garbage collection in town resulting in waste disposal at the Tolend landfill. The majority of town residents disposed of household trash through personal incineration, trash burial and private dumps. Townspeople contributed negligible waste to the site.

During the same time there were only and still only three major industries in town.

The Taylor egg farm composted, burned and buried most of its waste on it's own premises. Some rotten eggs were brought to the Tolend landfill.

Madbury Metals did not even open until 1975.

The Elliot Greenhouse is also in Madbury, but both it and its greenhouses operations use private dumps on their own property.

Since 1955 New Hampshire state law has required municipalities to provide public disposal

1 facilities for either privately or publicly owned
2 land. The language of the applicable state
3 statute, RSA 147:23 was then, just as it is now,
4 per RSA 149 M 13, mandatory in its requirement
5 that a municipality provide for and assure access
6 to a public disposal facility for garbage and
7 other solid waste.
8 The lack of a town dump in Madbury
9 appears to have been a problem resolved by a
10 permitting procedure by which a limited number of
11 Madbury residents could obtain permits to use the
12 Tolend Road landfill. Our 1963 Town Report
13 confirms this arrangement for the limited number
14 of only 40 families.
15 Nothing can be confirmed about this
16 limiting permitted use except for the 1971 payment
17 of $97 to the city of Dover for dump permit fees.
18 By 1972 lease arrangements were made by
19 prior selectmen, presumably in a continued effort
20 to fulfill state mandates and allow for continued
21 minimal use of the site by Madbury residents. A
22 general survey of town residents conducted in
23 February of 1988 confirms nothing more than a
24 diminutive non-environmentally threatening use of

1 the site my a minimal number of Madbury residents.
2 Realizing the small town that we are and
3 the negligible use that we made of the dump, and
4 while one can well imagine the level of concern
5 Madbury residents have about their need and
6 ability to contribute toward the remediation of
7 the Tolend landfill site, municipal budgets have
8 everything to do with the allocation of scarce
9 financial resources among a wide variety of
10 community needs. The Dover landfill cleanup
11 presents a potentially greater cost than any other
12 municipal expenditure in the town's history.
13 Madbury is environmentally conscious.
14 As one example, the town is currently reviewing a
15 major recodification of our zoning ordinance,
16 doing away with more typical dimensional
17 requirement schemes, and instead proposing zoning
18 to encourage appropriate use of suitable soils and
19 the protection of aquifers. However, the
20 potential joint and several liability to pay for
21 environment damage as a result of Federal and
22 State statutes and regulations imposed strictly
23 and retroactively is of great concern. While a
24 sharing of the burden may be inevitable, it is

appropriate to assure that any burden shared is cost effective and one which is reasonably necessary to eliminate practical health risk while not financially crippling the town's ability to address other needs.

The town of Madbury joins in supporting the comments of the Dover city attorney.

The town of Madbury will join in the submission of professional comments addressing EPA's selected proposed plan.

The town of Madbury believes that the selection of a cost effective remediation, as required by federal statute and regulation, requires EPA to compare the marginal benefit and overly designed remedy will have to the communities of Madbury and Dover to the more direct benefits citizens of our municipalities will obtain by directing scarce tax dollars to other needed municipal services and household budgets.

Any design and implementation of a Management of Migration remedy must be deferred until the benefits of Source Control can be assessed through well monitoring.

1 It was literally with some amazement
2 that my fellow Selectmen and I listened to EPA's
3 current assessment of risk to both the Cocheco
4 River and the Bellamy reservoir at EPA's public
5 hearing at the Dover Horne Street School on
6 Monday, March 25th.
7 Much of the immediate and irreparable
8 harm perceived some years ago has significantly
9 subsided. Contaminant plumes have been controlled
10 and the previously perceived threat to both the
11 Cocheco and Bellamy reservoir has lessened
12 considerably. No one in Madbury would spend large
13 sums of money to design a school which only might
14 become necessary in the future. Particularly when
15 future needs might actually differ from present
16 perceived needs, thus requiring redesign of any
17 actually needed school.
18 If town residents are to support and
19 fund even a portion of a multi-million dollar
20 remediation plan to the Dover Tolend landfill
21 site, residents will expect the same Yankee spirit
22 to influence discretionary decisions of the EPA.
23 The technical comments to be submitted
24 on behalf of the participating PRPs should be

1 seriously and earnestly considered by the EPA.
2 Every effort must be made to assure that cost-
3 effective decisions are made with regard to
4 choice, design and implementation of remedy.
5 Federal law mandates EPA to consider cost,
6 technology, reliability, administrative and other
7 concerns and their relevant effects on the public
8 health and welfare and the environment.
9 Madbury's obligations to educate its
10 young, extend essential fire and police protection
11 to all, care for its needy and to provide other
12 basic municipal services are equally important
13 provisions for the public health and welfare.
14 Excessive remedy design, implementation costs will
15 adversely affect the public health and welfare. A
16 cost-effective remedy is justified, but its
17 effects will be certain and significant to Madbury
18 residents and the essential municipal services
19 they demand, which together with Madbury's
20 remediation liability exposure can only be funded
21 by what has already become an overbearing property
22 tax burden. Thank you. I do have a submission
23 for you.
24 DAN COUGHLIN: Thank you.

1 Lee Perlman, Eastern Air Devices.

2 LEE PERLMAN: My name is Lee Perlman.

3 I'm president of Eastern Air Devices. We are a

4 manufacturing company located in Dover. We have a

5 150 employees, approximately 40 percent of them

6 are residents of Dover.

7 I'm an owner of this business and I'm a

8 taxpayer in Dover. I want to say what I have to

9 say will be short, because much of what has

10 already been said I want to tell you I

11 wholeheartedly endorse and agree with in detail in

12 terms of the selected remedy and its benefits.

13 An increment of 20 million,

14 approximately 20 million dollars is simply not

15 worth it. As I see the problem, there isn't an

16 incentive on the part of the people who are

17 deciding how much money is to be spent simply

18 because they're spending other people's money.

19 There's a very, very small incremental benefit you

20 get for spending a very, very large incremental

21 dollars that doesn't have to be spent because it

22 can be spent later, if you follow the Dover

23 suggestion and the problems can be eliminated. It

24 does not have to be spent now, instantaneously.

1 The aquifer, the Bellamy can be protected and
2 decisions can be made on an ongoing basis.
3 One last point. To show you how I feel
4 about the sensitivity for spending money, so far
5 well over 1 and a half million dollars -- 1 and a
6 half million dollars has been spent by the PRPs,
7 and probably, my guess, somewhere between a
8 quarter of a million and another half million
9 dollars has been spent outside of the PRPs or not
10 counted in the PRP expenditure. So somewhere
11 between 1 and 3 quarters and 2 million dollars
12 have been spent so far on this so-called problem
13 to remedy th' problem and not a single shovel of
14 dirt has been moved. I think that's a telling
15 fact that we're spending money capriciously. So I
16 recommend that the presentation of the Dover
17 managers be received carefully and implemented.
18 Thank you.
19 DAN COUGHLIN: Thank you.
20 Thomas Cravens, Portsmouth Water
21 Division.
22 THOMAS CRAVENS: My name is Thomas
23 Cravens. I'm the representative for the
24 Portsmouth Water Division. And we certainly

sympathize with the residents of Dover and Madbury who have quite a cost and impact to their budget for this cleanup.

And I think that we are probably seeing something similar of this sort in our own landfill that we have declared as a Superfund site, the Coakley landfill. However, in the water division we have a responsibility to our water customers that we do what we can to protect their drinking water and the sources of drinking water. To that end we are also working to develop well head protection programs to protect our well areas. And we have written o: letter to the EPA already stating that we support the EPA's proposed cleanup program for this Dover Superfund site. Thank you.

DAN COUGHLIN: Hamilton R. Krans, Jr. D.I.D.A. Can you tell me what that is?

HAMILTON R. KRANS, JR.: Yes, I will.

DAN COUGHLIN: Thank you.

HAMILTON R. KRANS, JR.: My name is Hamilton Krans. I live on Hamilton Street in Dover, and I represent the Dover Industrial Development Authority, which is the D.I.D.A.

As a former chairman and member, the

other members have asked me to speak against the preferred action by the EPA and for a more limited and less expensive alternative.

Dover is in competition with a number of communities throughout this State and throughout the Country to attract industry into this City.

One of the ways that we are planning on doing this and have done so in the past is to create an industrial park. As Mr. Wright has indicated, our bonding capacity now is a little over 1 million dollars. I believe he indicated that the City's bonding capacity is 13 million dollars. What we are fearful , as Mr. Wright indicated, is that this preferred action will usurp all of the bonding capacity that the City has. And consequently I think that one can see the dire consequences of not being able to compete either locally or nationally for industries.

Consequently, I won't belabor the point, but a number of people have testified here tonight concerning the balancing of the good that the preferred plan would do with the devastating effect that it would have economically on Dover. And specifically speaking for the Dover Industrial

1 Development Authority, I can assure you that this
2 will have a devastating effect on our ability to
3 compete, to gain industries into this city. Thank
4 you.
5 DAN COUGHLIN: Otis Perry.
6 OTIS PERRY: Thank you. My name is Otis
7 Perry. I live at 137 County Farm Crossroad in
8 Dover. I'm a member of the city council.
9 I don't have any prepared remarks and I
10 wasn't sure about the format, so I'll speak off
11 the cuff. But I want to emphasize very strongly
12 my support for the idea that we're talking here
13 not about just cleaning up the Tolend Road
14 landfill, we're talking about an allocation of
15 resources issue and a moral issue about how the
16 City and the government will distribute our taxes.
17 As far as I can see from what I've read
18 in the proposed remediation and in the FS that was
19 shown, the situation and from what I heard you
20 say, Mr. Coughlin, at the original public hearing,
21 public meeting at Horne Street School, the
22 situation at the Tolend Road landfill is not that
23 serious. It is not the overriding public health
24 problem that it was conceived to be seven years

ago when we started this process. And it seems to me that a careful, well-monitored program of watching the situation out there, fully prepared to step in and do whatever is necessary to protect the public health, if and when the public health is really threatened by the pollutants in the ground out there, is a much more preferred alternative to spending a lot of money piling dirt up on top of what is already there, with the hope that by doing that nothing at all will happen when we know that something probably will anyway.

As I said originally, I think of this as an economic resource allocation issue and the city manager made a very eloquent statement about how we have to think about spending, allocating our resources and spending the money we have to provide the services, public health services for the people who live in this community and in our neighboring communities, and I think that spending this kind of money on this particular proposal is a waste of that money and is probably -- well, I won't say that. I just think it's a waste of money.

DAN COUGHLIN: Thank you.

1 David Penniman.

2 DAVID PENNIMAN: I'm David Penniman, of
3 51 Evans Road in Madbury. And I'm a member of the
4 Oyster River Cooperative School Board, which is
5 made up of the Towns of Madbury, Lee, and Durham.

6 As a school board member, certainly I'm
7 charged not only to ensure the quality education
8 of our children, but even more so in these times
9 to use scarce fiscal resources effectively.
10 Education of our children is naturally of prime
11 importance. Failure to do so ransoms our future,
12 but more importantly their future.

13 We're already strapped for school funds,
14 as we had in our district, a major battle to
15 reduce spending this last budget cycle, and we
16 expect another such endeavor this next budget
17 cycle.

18 In the town of Madbury, which is the
19 smallest of the three towns, 76 percent as already
20 attested to, makes up, of Madbury's tax revenue is
21 for the schools. And with no industry in town,
22 being a residential community, you're talking
23 about people that own homes to produce the tax
24 base in the town of Madbury. And such an effort

as you have portrayed in this particular thing is just going to kill people when it comes to trying to keep their homes.

Unfortunately, further monetary requirements for whatever reason again must be raised by property taxes. As you well know in this State there aren't many other ways to get more money. Property taxes seems to be the only way. Some people are trying other methods, but it's going to be a long term, if any. Residents are already at their limit regarding property taxes and are strapped just to support our schools, to say nothing about just trying to support the minimal town requirements we have in Madbury.

Monetary requirements on the Town of the magnitude are you proposing will break the taxpayer's backs. Many are at the limit and are barely able to hang onto their homes at this point just trying to support the taxes required today. With what you are implying, many will probably have to lose their homes. There's no way they can keep them and pay such a tax burden.

We ask a reasonable approach to the

landfill situation. I strongly support environmental protection, but we mustn't go for the silver spoon approach when a plastic spoon approach would do the job in this case. Thank you very much.

DAN COUGHLIN: Thank you.

Gerald Daley, Dover School Department.

GERALD DALEY: My name is Gerald Daley. I'm the superintendent of schools here in Dover. And I'm here this evening to ask that the EPA give careful consideration to one of the less costly but viable alternatives for solving the problem at the Tolend landfill. I certainly recognize the severity of the problem, but I want to be sure that I also bring forth the severity of the school's problems.

We're facing severe budget crunches at this particular time, due at least in part to the new sewage treatment plant which is going on line very shortly.

I really fear that the impact of this particular plan, the preferred plan, will have a serious, very serious effect on our situation. We need a new elementary school in Dover. We don't

have it because we can't afford it.

We don't have a kindergarten in Dover. We can't afford it.

This month I sent out reduction force notices, layoffs, to 26 professional staff people, including our elementary librarians and classroom teachers on every level. There's every possibility that we can't afford them.

We also can't afford continuing costs, continuing hits like the one that may come to us if the preferred plan goes through.

The EPA has a responsibility to protect the citizenry from environmental hazards, and I respect that. I have a responsibility to educate the citizenry. I'm willing to seek less costly means to discharge my responsibility and I ask that the EPA do the same. Thank you.

DAN COUGHLIN: Thank you.

James Richards, director of public works, Dover.

JAMES RICHARDS: Good evening. My name is Jim Richards, 143 Long Hill Road, Dover. I'm the director of public works and I agree with all that has been said before me.

First, the landfill was closed in conformance with the standards that existed in 1979.

Second, the pollution plume appears to be lessening in size and intensity, and doesn't warrant this type of expense.

Third, as you've seen indicated before you tonight, the means of payment is more than the populace can afford.

Lastly, I've built secure, sanitary landfills that were generally lined, albeit on the bottom, with clay or membrane. The proposed barriers, all of them, vinyl, clay and membrane are excessive in their approach to protection.

I believe that monitoring and monitoring only should be required and hopefully a more common sense design, rather than building a pyramid of trash -- maybe even to extraction wells or hydraulic barriers or just some more thought given. The existing layer, the capping that was put on in '79 apparently is working fairly decently. That's all I have to say. Thank you.

DAN COUGHLIN: Thank you.

Rosie Walker-Bois, president, Greater

1 Dover Chamber of Commerce.

2 ROSIE WALKER-BOIS: Thank you.

3 I'm the president of the Greater Dover
4 Chamber of Commerce, and I'm a resident of Dover
5 as well. I represent close to 500 business people
6 in the community, most of whom live here.

7 The words that I hear when I go out and
8 talk with business people in the community -- I'm
9 in the real estate business myself, and I have an
10 opportunity to be out and about and talking with
11 people on a daily basis. And the words that I
12 hear them saying is: Well, we're struggling
13 along. We're here for the long haul, but it's
14 going to be very hard. We're working very, very
15 hard for even fewer dollars.

16 And this is the point that I would like
17 you to really sincerely keep in mind. Everybody
18 is really struggling to try to do their very best
19 to live and work in this community, to be able to
20 stay in this community. And a greater tax burden
21 is going to make it increasingly difficult for
22 them.

23 I see the responsibility here as a two-
24 part responsibility. It is your responsibility to

1 come up with some kind of a plan to help us, give
2 us some ideas of how we can take care of this
3 landfill, and that's one part of the
4 responsibility.
5 The other part of the responsibility is
6 the fiscal impact on the community. And I
7 sincerely hope that you will take that part of
8 your responsibility as seriously as you take the
9 part of giving us the ideas in the plan put
10 forward to take care of the hazardous waste.
11 Thank you.
12 DAN COUGHLIN: Thank you.
13 Jim Caliendo, tax payer.
14 JIM CALIENDO: Good evening. My name is
15 Jim Caliendo, and I am a taxpayer, and when I see
16 something like this, why. I do get a little irate.
17 You've heard from all of the illustrious
18 people here in the city of Dover except a
19 taxpayer. And I'd like to ask a couple of
20 questions. You said we could ask you some
21 questions, so I'd like to ask you some.
22 Number one, why, out of all the
23 multimillion places that are more contaminated
24 than the city of Dover that you picked the city of

Dover?

DAN COUGHLIN: I should explain before we go on with the questions, we will take comments. We'll respond to the comments in the Responsiveness Summary as part of the Record of Decision. This is not a question and answer session right now. We'll take down all the questions and we can assure you'll be given an answer in the Responsiveness Summary.

JIM CALIENDO: Well, I thought I was the last speaker so I thought I'd throw that in and give you a chance anyway.

DAN COUGHLIN: Okay.

JIM CALIENDO: As a taxpayer, as you've already noted, it would fall on our shoulders to pay an additional 2 or 3 thousand dollars. When I moved to Dover in 1965 I was paying $400 a year for taxes. Now I'm paying in excess of 4000.

And I do fight city hall and I do fight the school department and I do fight the public works and I do fight the fire department and I do fight the federal government.

And I've seen some places in this State that need a lot more work done than the Dover

landfill.

I am also a contractor and I am well aware that given a given period of time the land seems to refurbish itself in many cases. And we do have facts right here in this City that the Dover landfill in the last 30 years has receded from becoming any more hazardous than it was originally thought to be.

And like a lot of farms that went to waste 200 years ago, you can walk in the woods and about the only thing you can see is some stone fences. Outside of that, the trees are there, the pines are there, and forth.

We don't see any dead animals out there around the Dover landfill, we don't see any dead birds out there and we don't see anything out there. We've got shrubs, you've got trees, everything else is growing out there. And I just can't see the government coming in here and asking us to spend 26 million dollars when there's really no need of it. And I'd like to have you take some real consideration on that fact. Thank you very much.

DAN COUGHLIN: Thank you, sir.

1 Bi l Dube.

2 BILL DUBE: My name is Bill Dube. I

3 live 242 Dover Point Road. I'm chairman of the

4 Dover Economic Commission.

5 I'd like to make my comments to let you

6 know how this extensive cleanup will impact the

7 economy of this City.

8 I really support a limited action plan

9 that would reduce the cost to the city of Dover.

10 The size of this obligation that the City would be

11 incurring is tremendous. We've heard the city

12 manager point out that it's as large as our school

13 budget, as large as our total city budget. As a

14 small businessman in the community, it's 15 to 20

15 years total salary for our whole dealership. I

16 just -- it's mind-boggling.

17 We need to look at the economic

18 development, the ability to pay for this if the

19 City is saddled with this obligation, the increase

20 in the tax rate, the number of foreclosures, as

21 mentioned before by other people. It's just going

22 to create a problem that will stifle economic

23 development. There will be no economic

24 development. Businesses will refuse to come to

1 this City because of the tax rate. We're going to
2 stifle all of the growth of the community and I
3 think that we're going to wind up either
4 bankrupting or tremendously crippling this
5 community that we will not be able to go forward.
6 I really respect the EPA's abilities,
7 their knowledge, but please think of us and take a
8 limited approach that will serve all of us and not
9 just an extensive cleanup that will serve to
10 destroy the city rather than clean it. Thank you
11 very much.
12 DAN COUGHLIN: Thank you, sir. Is there
13 anybody else that would like to comment?
14 ROBERT GALLO: My name is Robert Gallo,
15 and I'm counsel for the town of Madbury. And I
16 just wanted to add the larger perspective to what
17 you've heard here.
18 Assume everything you've heard is true,
19 and then multiply that by three because of the
20 impact on the seacoast area of New Hampshire that
21 results from similar remedies being required at
22 Coakley in Northhampton and at Somersworth and
23 here in Dover. And I think a fair assessment of
24 the amount of money that's being looked for is

1 probably in the range of about 70 million dollars.

2 And you can't miss the fact that those

3 are not three absolutely isolated communities.

4 People in Dover work in the Portsmouth-Northampton

5 area. People from Portsmouth-Northampton area

6 come to Dover to work. The same kind of exchange

7 has happened with Dover and Somersworth. I mean,

8 these are interrelated communities.

9 So once again, everything that you've

10 heard about what will happen to Dover and Madbury

11 is absolutely true, although unfortunately it's

12 going to be multiplied by three by the general

13 proposals you've made for this area. Thank you.

14 DAN COUGHLIN: Anybody else?

15 Okay. With that I'll close the hearing.

16 Do I have somebody else that would like

17 to comment?

18 GARY SEAR: My name is Gary Sear. I'm a

19 councillor of Ward 3. I'd just like to take a

20 second and respond to some of the comments made

21 tonight.

22 You know, when we think of Switzerland

23 we think of fine chocolate and fine watchmaking.

24 In 1967 they had a council of watchmakers that

1 met, which they do meet every year, but in 1967
2 there was a gentlemen who introduced an electronic
3 watch. And in that time the council of
4 watchmakers, who were the people that were in the
5 know of fine watchmaking, decided that it would
6 never work. That individual two years later sold
7 that patent to a Japanese firm and as you know it
8 today we have what we have, the electronic watch.
9 Okay?
10 Now, in 1967 the Swiss had 85 percent of
11 the watch market and today they have 20 percent of
12 the watch market. Okay? Because they failed to
13 listen and to [illegible] with the times.
14 In 1967 I was 14 years old and I had my
15 first cigarette. A few years after that cigarette
16 packs came out and said it could cause, it could
17 be hazardous to your health. I think today -- I
18 don't smoke anymore, but they do in fact say it is
19 hazardous to your health. Times do change and we
20 have to be cognizant of that, but we all try to do
21 the right thing. We stopped drinking coffee, we
22 drink decaffeinated coffee until they tell us it's
23 no longer good for you, and then we go back to
24 drinking regular coffee.

When I first went in the service they told me salt tablets were great for you, so they gave me all kinds of salt tablets. Now they say it's bad for your blood pressure.

We continue to be in a vicious cycle and be led by government officials, and I can perfectly appreciate where you're standing right now because we all are there from time to time. But the bottom line is that we are faced with a decision that has to be made over the next several months which could effect the future of this City and could destroy the City if it wasn't dealt with properly.

Nobody wants to do the wrong thing here, and we all want to do the right thing. I think consciously we want to do that, but I think there are alternatives and I think there have been some presentations made tonight that show that we can in fact do something that's positive but do it in a way that's not going to be a detriment to the community. And I would strongly urge you to take those into consideration. Thank you.

DAN COUGHLIN: Yes, ma'am.

JANET WALL: For the record, I'm State

1 rep. Janet Wall. I live in the town of Madbury.
2 I was not going to speak this evening, but I think
3 I need to join the unanimous voice that you've
4 heard here tonight that the project you're
5 planning to implement is going to more than
6 cripple us, it's going to cripple the next
7 generation.
8 In our school district this year we
9 nearly had a taxpayers' revolt. We desperately
10 needed school funds, and yet at the same time
11 people are crying out saying they simply cannot
12 afford the property taxes anymore.
13 Tonight you've heard f civic leaders
14 in the city of Dover and the town of Madbury.
15 You've heard from businessmen. All of us are
16 saying the same thing: We simply can't afford any
17 more. As a State rep. I can tell you that the
18 State of New Hampshire is hurting and hurting
19 badly. That's not political rhetoric, that's
20 called hard reality. There's not going to be any
21 money coming from the State to help the cities and
22 towns this year; we don't have it. And I think
23 you folks from Massachusetts need to realize what
24 we're feeling up here. We're no better off than

1 Massachusetts.

2 As a private citizen I need to tell you,
3 I live in a house that's been in my family since
4 1740. Our family has been around since Madbury
5 was part of the city of Dover, town of Dover at
6 that time, before it became a town of its own. In
7 the years I was growing up in the town of Madbury
8 our family had land. Our family had an
9 alternative means for disposing of our household
10 waste. We had an incinerator and we had ways of
11 burying and places to bury what we could bury. In
12 the whole time that I have lived in the town of
13 Madbury I believe that our family has made use or
14 did make use of the landfill at the Tolend site
15 approximately two years.

16 Now, I fully believe in having
17 responsibility for cleaning up problems that we
18 have created over time, and I don't abhor the idea
19 at all of picking up my share of the
20 responsibility. But when I heard the figures
21 tonight for what I'm going to have to probably pay
22 as a taxpayer, I'm going to tell you that I am so
23 crippled at this point financially that I'm quite
24 frightened about how I'm going to hang onto my

house.

From a household that -- a family, rather, that once had large portions of land and more than once house, I live in the old family homestead on one acre of land. My taxes are in the vicinity of $4000 a year. I have two sons, one of college age, one about to go to college. I don't know how I'm going to do it.

I'm doing the best I can to be fiscally responsible, and I realize that you know that the rest of the city of Dover and the town of Madbury are trying to do the same. But when you're dipping into the till for resources there comes a point when there's nothing left to take. We now have gone to the well to draw out for the school district, we've gone out to handle our major responsibilities for simply maintaining our municipalities. And we've gone to the well so often and for so much, and we've been so careful, actually, in how we've done it. But at the same time there's just nothing there to take anymore. We're at a point now where people are leaving the area because people just cannot afford to live here anymore. And I ask that you seriously

consider an alternative plan.

I'm sure that you will be very careful in choosing exactly what is best for the cleanup of that site, and I have a tremendous amount of respect for the EPA. But I also ask that you consider what a burden it's going to put on us and our children. Thank you.

DAN COUGHLIN: Yes, sir.

TOM FORBES: Hi. My name is Tom Forbes. I live at 254 Tolend Road. I'm also chairman of the Dover Planning Board. Welcome to Dover. Three brave souls.

I guess I'm just naive, and I was just sitting back there and I talked to a guy next to me. I said, "They don't really, they don't' really propose to mandate this on us, do they?" And no disrespect. It's just beyond me. That kind of money is just beyond me. You know, being on the planning board we work with the CIP and I have to smile about it. Because, you know, we sit there and quibble about fire trucks, but we quibble about smaller things than that. Air conditioners in the library, in the children's reading room. I mean, we bartered that thing

1 around for two or three years. We don't have the
2 capability of paying this. It's just, you know,
3 preferred plan, that's good.
4 It's like going to the doctor, you know,
5 and having an injury to my back and the preferred
6 treatment would be surgery. Well, I couldn't up
7 for that. You know, I can't feed my family if I'm
8 laid up for six months. So I'd say to the doctor:
9 Well, what else can we do? You know, maybe I can
10 change my exercising habits, maybe I can change my
11 diet? What can I do?
12 What can we do over there and still not
13 compromise the water in the Bellamy reservoir or
14 in the Cocheco.
15 Again, I guess I'm just naive. It seems
16 to me if you go out there and grade it, if you go
17 up-slope and divert the water, if you put some
18 vegetation back on it, some trees, some grasses,
19 it seems to me nature mends very well.
20 And again, you know, I don't profess to
21 be a scientist in environmental studies or
22 anything else. Just common sense, there must be
23 things that can be done on an interim basis and
24 still make sure that, you know, number one utmost

1 concern is the protection of the water. There
2 ought to be things that can be started right now
3 and monitor the situations. From what I
4 understand it's already getting better. If we do
5 some simple things out there maybe we won't have
6 to go forward with a plan that has a price tag
7 that really is just beyond us. It's beyond us.
8 Thank you.
9 DAN COUGHLIN: Thank you.
10 Any last comments? Yes, sir.
11 JAMES H. McADDAMS: My name is James H.
12 McAddams. I am a forty-five year resident of this
13 community. Was for a lengthy period of time the
14 executive officer of the chamber of commerce
15 during a period of years when the community
16 experienced a large growth and development, and
17 since 1980 have been a member of the city council,
18 presently a mayor pro tem of the community.
19 My remarks are directed in the hope that
20 EPA might consider one of the several alternatives
21 that have been suggested to the much more
22 elaborate and expensive program as laid out in
23 your report and recommendations.
24 There are several reasons why I think

1 that consideration is worthy of thought. For one
2 thing, I have been, as many others have, closely
3 aware of this particular landfill site since we
4 first began to worry about it in the late '70s and
5 early '80s. There are at least one or two
6 features -- and this information may have been
7 shared earlier. I'm sorry, I was unable to be
8 here earlier this evening. But there are at least
9 two or three features in this landfill that
10 perhaps make it somewhat different than some of
11 the others.
12 And I think the most important thing
13 that I want to emphasize is that from the very
14 beginning the citizens of this community and the
15 government of this community have been primarily
16 interested in the health and welfare in the
17 residents of this community and the areas nearby.
18 And consideration of one of the
19 alternative methods, and I refer particularly to
20 perhaps monitoring, even more extensive monitoring
21 while we have a chance to learn if any of the bad
22 effects of this landfill are permeating further
23 than they are at the present time can be studied.
24 So without further comment, I just

simply feel that on the basis of the community's record and being interested in public safety and its continued interest in wanting that to be the first and most important thing -- I know that there's been lots of testimony about the economic situation and the terrible impact it might have upon this community. So if there's any way possible, I would want to be one of those who worked in every way that we possibly could to support and guarantee public health and safety but do it in the way that might let us determine what the problem may be in the future. Thank you.

DAN COUGHLIN: Thank you.

Yes, sir.

HOWARD WILLIAMS: My name is Howard Williams. I live at 18 Lisabeth Circle. I am also a member of the Dover City Council, and I couldn't let an opportunity go by, Dan, without sharing my views again with you on my feelings on the landfill.

I certainly support the cleanup the landfill and protecting the environment at every opportunity. I don't want to do anything that might damage our water supply or damage the water

1 supply of Portsmouth. I'm certainly concerned
2 about that, like every member of the Dover City
3 Council is.
4 However, as you can see from the
5 presentation from the city manager of Dover, we
6 have trained him well in the value of a dollar.
7 This city council is very fiscal responsible and
8 we're working very hard to control our tax rate.
9 I would hope that you would look at the
10 options, and don't look at them in terms of the
11 risk that was present seven or eight or nine or
12 ten years ago. Look at it in terms of the risk
13 that's present today. And is this elaborate type
14 of a cleanup really merited based on the risk that
15 we have present to us today and what looks like
16 the risk that we could be facing in the future.
17 And I certainly want to assure you, and
18 I'm sure that you would not do otherwise, that you
19 would look at this and present to the taxpayer of
20 Dover a cleanup proposal that is both safe and
21 economically justifiable. Thanks very much.
22 DAN COUGHLIN: Thank you.
23 Anybody else?
24 JEANNE SHAHEEN: Like the officials in

Dover, I, as a state senator for this district, can't pass up this opportunity to express my concern about where the money to fund cleanup will come from. As you heard earlier from State Representative Janet Wall, the State is in a real fiscal crisis. It's my hope that the State senate will be able to put back the funds for the waste water treatment plant, but if we cannot the city of Dover is looking at a 13.9 million dollar cost for the waste water treatment plant. If that comes on top of 26 million for the cost of cleanup of the landfill, clearly that's a burden that the local taxpayer is not going to be able to pay. Therefore we can hopefully all work together. The State, the city of Dover, the town of Madbury, the other responsible parties and the EPA to reach a cooperative agreement on how we can best cleanup the landfill in everyone's best interests. Thank you.

DAN COUGHLIN: Thank you. What is your name, please?

JEANNE SHAHEEN: Yes. My name is Jeanne Shaheen, and I'm a resident of the town of Madbury.

DAN COUGHLIN: Okay. Anybody else?

We thank you for your participation tonight. I'd like to remind you that May 24th is the close of comments. If you do want to make written comment, please do so. Make sure they are postmarked by May 24th. The address is included in the Proposed Plan. And it's also on the board, Cheryl tells me. So we thank you for coming, and I declare the hearing closed. We will be here to answer any questions up front if you'd like.

(Hearing closed.)

C-E-R-T-I-F-I-C-A-T-E

I hereby certify the above 71 pages to be a true and correct transcription of the tape recorded on April 16th 1991, at the Dover Public Hearing, Dover, New Hampshire, to the best of my knowledge, skill and ability.

Nancy D. Lowney
Certified Court Reporter
Notary Public

My Commission expires January 16, 1994

APPENDIX H

Dover Municipal Landfill

NPL Site Administrative Record

Index

ROD Signed: September 10, 1991

Prepared for

Region I
Waste Management Division
U.S. Environmental Protection Agency

With Assistance from

AMERICAN MANAGEMENT SYSTEMS, INC.
One Bowdoin Square, Seventh Floor • Boston, Massachusetts 02114 • (617) 557-2000

Section I

Site-Specific Documents

Introduction

This document is the Index to the Administrative Record for the September 10, 1991 Record of Decision (ROD) for the Dover Municipal Landfill National Priorities List (NPL) site. Section I of the Index cites site-specific documents and Section II cites guidance documents used by EPA staff in selecting a response action at the site.

The Administrative Record is available for public review at EPA Region I's Office in Boston, Massachusetts, and at the Dover Public Library 73 Locust Street, Dover, New Hampshire. *This Index contains confidential documents that are available only for judicial review.* Questions concerning the Administrative Record should be addressed to the EPA Region I site manager.

The Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

ADMINISTRATIVE RECORD INDEX

for the

Dover Municipal Landfill NPL Site

(ROD Signed: September 10, 1991)

1.0 Pre-Remedial

1.1 CERCLIS Site Discovery

1. "Notification of Hazardous Waste Site" Form, EPA Region I (June 8, 1981) with attached Letter from Jay E. Stephens, City of Dover to Paul Dade, EPA Region I.

1.2 Preliminary Assessment

1. "Potential Hazardous Waste Site Identification and Preliminary Assessment" Form, EPA Region I (March 13, 1981).
2. "Potential Hazardous Waste Site Identification and Preliminary Assessment" Form, EPA Region I (October 15, 1981).
3. "Potential Hazardous Waste Site Identification and Preliminary Assessment" Form, EPA Region I (May 3, 1982) with attached National Priorities List Checklist of Data Requirements.

1.3 Site Inspection

1. "Potential Hazardous Waste Site - Site Inspection Report" Form, EPA Region I (September 24, 1981).

3.0 Remedial Investigation (RI) and Field Elements Study (FES)

3.1 Correspondence - Remedial Investigation (RI)

1. Letter from Paul J. Cavicchi, State of New Hampshire Water Supply and Pollution Control Commission to Judy Bersin (February 23, 1981). Concerning well water testing on February 11, 1981 and the precautionary recommendation that the water supply not be used for drinking purposes.
2. Memorandum from Paul J. Cavicchi, State of New Hampshire Water Supply and Pollution Control Commission to File (March 23, 1981). Concerning results of a meeting to discuss groundwater contamination in the vicinity of the site.
3. Trip Report on a Visit to Dover Municipal Landfill Site, Tom Roy, State of New Hampshire Bureau of Waste Management, Susan Hanamoto and Steve Mangion, EPA Region I (September 24, 1981). Concerning inspection of contaminated water.
4. Letter from Dan H. Allen, State of New Hampshire Water Supply and Pollution Control Commission to Robert Steele, City of Dover (January 15, 1982). Concerning agreement that a second round of sampling, as recommended by Camp, Dresser & McKee, is advisable.
5. Memorandum from John R. Moebes, EPA Region I to Merrill S. Hohman, EPA Region I (August 9, 1983). Concerning transmittal of the second Draft Remedial Action Master Plan and recommending its release.

3.1 Correspondence - Remedial Investigation (RI) (cont'd.)

6. Letter from John F. Zipeto, EPA Region I to Robert D. Steele, City of Dover (September 14, 1983). Concerning transmittal of the Final Remedial Action Master Plan.
7. Letter from John F. Zipeto, EPA Region I to Michael Donahue, State of New Hampshire Water Supply and Pollution Control Commission (September 14, 1983). Concerning transmittal of the Final Remedial Action Master Plan.
8. Letter from Timothy J. Porter, EPA Region I to Jean Doherty (October 4, 1984). Concerning transmittal of the Final Remedial Action Master Plan.
9. Letter from Patrick G. Gillespie, Wehran Engineering Corporation to Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission (July 1, 1985). Concerning transmittal of the Phase I Hydrogeological Investigation Report for review.
10. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Patrick G. Gillespie, Wehran Engineering Corporation (February 14, 1986). Concerning the request that additional background information be submitted and the status of all deliverables be reported.
11. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Renny Perry, City of Dover (April 15, 1987) with attached map of observation wells, "Water Quality Monitoring Data - OW-1" and "Water Quality Monitoring Data - OW-1A". Concerning groundwater samples taken from observation wells and notification that the lower aquifer (observation well OW-1) is contaminated.
12. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Ferioli (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
13. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Susan Conner (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
14. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Thomas Dubois (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
15. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Wagner (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
16. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Delp (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
17. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. D. Dubois (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
18. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Nystedt (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.

3.1 Correspondence - Remedial Investigation (RI) (cont'd.)

19. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Miles (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
20. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Dowaliby (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
21. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. H. Ekola, Sr. (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
22. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. K. Purrington (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
23. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Dumas (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
24. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Doherty (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
25. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Gagnon (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
26. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. R. Grant (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
27. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. A. Purrington (May 17, 1988). Concerning negative results of water samples taken from the local water supply well.
28. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Doherty (June 9, 1988). Concerning negative results of water samples taken from the local water supply well.
29. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Dubois (December 7, 1988). Concerning negative results of water samples taken from the local water supply well.
30. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Connors (December 7, 1988). Concerning negative results of water samples taken from the local water supply well.
31. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Mr. and Mrs. Thomas Dubois (October 12, 1989). Concerning negative results of water samples taken from the local water supply well.

3.1 Correspondence - Remedial Investigation (RI) (cont'd.)

32. Letter from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission to Susan Conner (October 12, 1989). Concerning negative results of water samples taken from the local water supply well.

3.1 Correspondence - Field Elements Study (FES)

33. Letter from Cheryl L. Sprague for Paul N. Marchessault, EPA Region I to Randall L. Lund, Davidson Interior Trim/Textron (July 19, 1989). Concerning field locations for the proposed monitoring wells.
34. Letter Report from Walter L. Graf Jr., Geo/Resource Consultants, Inc. to Cheryl L. Sprague, EPA Region I (September 19, 1989). Concerning a summary of drilling activities for monitoring well MW-101 during the period of August 9-25, 1989.
35. Letter from Richard C. Cote, HMM Associates, Inc. to Cheryl L. Sprague, EPA Region I (January 23, 1990). Concerning transmittal of the pages to be inserted into the January 8, 1990 "Draft Field Elements Study," HMM Associates.
36. Letter from Richard C. Cote, HMM Associates, Inc. to Cheryl L. Sprague, EPA Region I (March 6, 1991). Concerning modifications to the Management of Migration Alternative MM-4.

3.2 Sampling and Analysis Data

Sampling and Analysis Data - Remedial Investigation (RI)

1. Memorandum from C. E. Fuller, Camp Dresser & McKee, Inc. to Don Muldoon (March 23, 1981). Concerning analysis of water samples taken from private residential wells near the site. The following are attached:
   A. "Sample & Site Data - Water Analysis - Former Landfill Area."
   B. "Test Locations - Existing Wells."
   C. "Certificate of Laboratory Analysis," Camp Dresser & McKee, Inc. (April 3, 1981).
   D. "Certificate of Laboratory Analysis," Camp Dresser & McKee, Inc. (April 8, 1981).
2. Letter from Rance G. Collins, City of Portsmouth to Paul J. Cavicchi, State of New Hampshire Water Supply and Pollution Control Commission (June 5, 1981). Concerning transmittal of the results of surface water samples for volatile organic analysis.
3. Letter from Brook S. Dupee, State of New Hampshire Division of Waste Management to Beatrice Fogg, City of Dover (August 10, 1984). Concerning attached results of a private analysis of water which is discharging from the site and recommending that direct contact with run-off water be avoided.

The remaining Sampling and Analysis Data for the Remedial Investigation (RI) may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

Sampling and Analysis Data - Field Elements Study (FES)

4. Letter from Cheryl L. Sprague, EPA Region I to Randall L. Lund, Davidson Interior Trim/Textron (October 3, 1989). Concerning the Air Monitoring Program at the site.
5. Split Sampling Results, State of New Hampshire Department of Environmental Services (October 1989).

3.2 Sampling and Analysis Data - Field Elements Study (FES) (cont'd.)

6. Memorandum from David N. Pease, Resource Analysts, Inc. to William Rice, State of New Hampshire Department of Environmental Services (November 3, 1989). Concerning the attached:
   A. "Certificate of Approval - Wastewater Analysis."
   B. "Certificate of Approval - Drinking Water Analysis."
   C. Test results for pesticides, PCBs, and acid/base/neutral extractable organic compounds.
7. Letter from Richard H. Pease, State of New Hampshire Department of Environmental Services to Cheryl L. Sprague, EPA Region I (January 5, 1990). Concerning transmittal of attached Chain of Custody forms and split sampling results taken at the site on November 12 - 13, 1989.
8. Memorandum from Richard C. Cote, HMM Associates, Inc. to Cheryl L. Sprague, EPA Region I (March 7, 1990). Concerning the treatability study work plan and the attached list of wells and parameters to be sampled.
9. Letter from Walter L. Graf Jr., Geo/Resource Consultants, Inc. to Cheryl L. Sprague, EPA Region I (March 13, 1990). Concerning the attached data comparison tables for samples split between HMM Associates, Inc. and the Geo/Resource Consultants, Inc. oversight team between November 6 - 11, 1989.
10. Letter from Cheryl L. Sprague, EPA Region I to Randall L. Lund, Davidson Interior Trim/Textron (January 9, 1991). Concerning transmittal of the "Ambient Air Risk Summary."
11. Letter from Richard H. Pease, State of New Hampshire Department of Environmental Services to Cheryl L. Sprague, EPA Region I (March 7, 1991). Concerning the results from sampling conducted on February 19, 1991 at B-8WT and B-8U monitoring wells.
12. Letter from Richard H. Pease, State of New Hampshire Department of Environmental Services to Cheryl L. Sprague, EPA Region I (March 26, 1991). Concerning the results from sampling conducted on March 8, 1991 from eight wells at four locations between the Bellamy Reservoir and the Dover Municipal Landfill.

The remaining Sampling and Analysis Data for the Field Elements Study (FES) may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

3.4 Interim Deliverables

Reports - Remedial Investigation (RI)

1. "Remedial Action Master Plan," NUS Corporation (September 1983).

The maps associated with the record cited as entry number 2 are oversized and may be reviewed, by appointment only, at EPA Region I in Boston, Massachusetts.

2. "Phase I Geophysical Investigations," Weston Geophysical Corporation for Wehran Engineering Corporation (March 1985).
3. "Quality Assurance Project Plan," Wehran Engineering (April 1985).
4. "Appendices - Quality Assurance Project Plan," Wehran Engineering (April 1985).

The maps associated with the record cited as entry number 5 are oversized and may be reviewed, by appointment only, at EPA Region I in Boston, Massachusetts.

5. "Data Report - Phase I - Field Investigations," Goldberg-Zoino & Associates, Inc. for Wehran Engineering Corporation (June 1985).

3.4 Interim Deliverables (cont'd)

Reports - Remedial Investigation (RI) (cont'd.)

6. "Quality Assurance Project Plan," State of New Hampshire Water Supply and Pollution Control Commission (October 1986).

Comments - Remedial Investigation (RI)

7. Comments Dated December 4, 1985 from Richard H. Pease, State of New Hampshire Water Supply and Pollution Control Commission on the March 1985 "Phase I Geophysical Investigations," Weston Geophysical Corporation for Wehran Engineering Corporation.

Reports - Field Elements Study (FES)

8. "Quality Assurance Project Plan - Enforcement Support," Jacobs Engineering Group, Inc. (July 12, 1989).
9. "Quality Assurance Project Plan for the Field Elements Study," HMM Associates, Inc. (August 8, 1989).

3.6 Remedial Investigation (RI) Reports

Reports - Remedial Investigation (RI)

1. "Volume I - Remedial Investigation," Goldberg-Zoino & Associates, Inc. and Wehran Engineering Corporation (November 1988).

The maps associated with the record cited as entry number 2 are oversized and may be reviewed, by appointment only, at EPA Region I in Boston, Massachusetts.

2. "Volume II - Remedial Investigation - Tables and Figures," Goldberg-Zoino & Associates, Inc. and Wehran Engineering Corporation (November 1988).
3. "Volume III - Remedial Investigation - Appendices A-H," Goldberg-Zoino & Associates, Inc. and Wehran Engineering Corporation (November 1988).
4. "Volume IV - Remedial Investigation - Appendices I & J," Goldberg-Zoino & Associates, Inc. and Wehran Engineering Corporation (November 1988).
5. "Section 8 - Risk Assessment - Volume I - Remedial Investigation," Wehran Engineering Corporation (February 1989).

Reports - Field Elements Study (FES)

6. "Draft Field Elements Study," HMM Associates (January 8, 1990).
7. "Draft Field Elements Study and Supplemental Risk Assessment," HMM Associates (May 18, 1990).
8. "Draft Field Elements Study and Supplemental Risk Assessment - Appendices," HMM Associates (May 18, 1990).
9. "Final Field Elements Study and Supplemental Risk Assessment," HMM Associates (February 11, 1991).
10. "Final Field Elements Study and Supplemental Risk Assessment - Appendices," HMM Associates (February 11, 1991).

Comments - Field Elements Study (FES)

11. Comments Dated January 14, 1991 from Cheryl L. Sprague, EPA Region I on the May 18, 1990 "Draft Field Elements Study," HMM Associates, Inc.
12. Comments Dated January 29, 1991 from Cheryl L. Sprague, EPA Region I on the May 18, 1990 "Draft Field Elements Study," HMM Associates, Inc.
13. Cross-Reference: Letter from Cyndi Perry, United States Department of the Interior to Cheryl L. Sprague, EPA Region I (May 24, 1991). Concerning comments on the February 11, 1991 "Final Field Elements Study and Supplemental Risk Assessment," HMM Associates and the February 28, 1991 "Final Feasibility Study," HMM Associates, Inc. [Filed and cited as entry number 2 in 16.1 Correspondence]

3.7 Work Plans and Progress Reports

Work Plans - Field Elements Study (FES)

Reports

1. "Work Plan for Dover Municipal Landfill Field Elements Study," HMM Associates, Inc. (August 23, 1989).

Comments

2. Letter from Cheryl L. Sprague, EPA Region I to Randall L. Lund, Davidson Interior Trim/Textron (September 18, 1989). Concerning EPA approval of the Field Elements Study Quality Assurance Project Plan, Field Elements Study Work Plan, and the Feasibility Study Final Work Plan pending one correction to the Field Elements Study Work Plan.

Responses to Comments

3. Letter from Richard C. Cote, HMM Associates, Inc. to Paul Marchessault, EPA Region I (October 3, 1989) with the attached "FS Field Element Work Plan Addendum" and "Draft Project Schedule." Concerning the correction requested by EPA in the September 18, 1989 letter.

Progress Reports - Field Elements Study (FES)

4. "Monthly Progress Status Report," HMM Associates, Inc. (August 1988).
5. "Monthly Progress Status Report," HMM Associates, Inc. (September 1988).
6. "Monthly Progress Status Report," HMM Associates, Inc. (October 1988).
7. "Monthly Progress Status Report," HMM Associates, Inc. (November 1988).
8. "Monthly Progress Status Report," HMM Associates, Inc. (December 1988).
9. Letter from Sherilyn Burnett Young, Rath, Young, Pignatelli and Oyer (Attorney for the Settling Parties) to Paul N. Marchessault, EPA Region I (January 17, 1989). Concerning transmittal of the attached Contract Task Summary which is a supplement to the monthly progress reports (The cost information of the Attachment is Withheld as CONFIDENTIAL).
10. "Monthly Progress Status Report," HMM Associates, Inc. (January 1989).
11. "Monthly Progress Status Report," HMM Associates, Inc. (February 1989).
12. "Monthly Progress Status Report," HMM Associates, Inc. (March 1989).
13. "Monthly Progress Status Report," HMM Associates, Inc. (April 1989).
14. "Monthly Progress Status Report," HMM Associates, Inc. (May 1989).
15. "Monthly Progress Status Report," HMM Associates, Inc. (June 1989).
16. "Monthly Progress Status Report," HMM Associates, Inc. (July 1989).
17. "Monthly Progress Status Report," HMM Associates, Inc. (August 1989).

3.7 Work Plans and Progress Reports (cont'd.)

Progress Reports - Field Elements Study (FES) (cont'd.)

18. "Monthly Progress Status Report," HMM Associates, Inc. (September 1989).
19. Memorandum from Richard C. Cote, HMM Associates, Inc. to Cheryl L. Sprague, EPA Region I (October 16, 1989). Concerning the status of sediment, surface water, and air sampling.
20. "Monthly Progress Status Report," HMM Associates, Inc. (October 1989) with attached "Soil Borings - Phase II Summary - 11/10/89."
21. "Monthly Progress Status Report," HMM Associates, Inc. (November 1989).
22. "Monthly Progress Status Report," HMM Associates, Inc. (April 1990).

3.9 Health Assessments

1. "Health Assessment for Dover Municipal Landfill," Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR) (April 12, 1989).

4.0 Feasibility Study (FS)

4.1 Correspondence

1. Cross-Reference: Letter from Richard C. Cote, HMM Associates to Cheryl L. Sprague, EPA Region I (March 6, 1991). Concerning modifications to the Management of Migration Alternative MM-4 [Filed and cited as entry number 36 in 3.1 Correspondence].

4.2 Sampling and Analysis Data

The record cited in entry number 1 may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

1. Routine Sampling Results from Selected Wells at the Site (Samples Collected March 15, 16, and 17, 1989) State of New Hampshire Department of Environmental Services.

4.6 Feasibility Study (FS) Reports

Reports

Some figures associated with the record cited as entry number 1 are oversized and may be reviewed, by appointment only, at EPA Region I in Boston, Massachusetts.

1. "Draft Feasibility Study," HMM Associates, Inc. (June 1990).
2. "Draft Feasibility Study - Appendices," HMM Associates, Inc. (June 1990).
3. "Draft Feasibility Study," HMM Associates, Inc. (November 1990).
4. Letter from Richard C. Cote, HMM Associates to Dover Landfill PRP Group (May 1, 1989). Concerning the attached report. [This document was submitted to EPA Region I in November 1990 as "Draft Feasibility Study - Appendices - Arsenic," HMM Associates, Inc.]

Some figures associated with the record cited as entry number 5 are oversized and may be reviewed, by appointment only, at EPA Region I in Boston, Massachusetts.

5. "Draft Feasibility Study," HMM Associates, Inc. (January 30, 1991).

4.6 Feasibility Study (FS) Reports (cont'd.)

Reports (cont'd.)

6. "Draft Feasibility Study - Appendices - Groundwater-Remediation Time Frame Model," HMM Associates, Inc. (January 30, 1991).
7. "Final Draft Feasibility Study," HMM Associates, Inc. (February 6, 1991).
8. "Final Draft Feasibility Study - Appendices," HMM Associates, Inc. (February 6, 1991).
9. Letter from Richard C. Cote, HMM Associates, Inc. to Cheryl L. Sprague, EPA Region I (February 20, 1991) with the attached "Draft Feasibility Study - Appendix VIII Estimates of Remediation Time Frame." Concerning the Groundwater-Remediation Time Frame Model.
10. "Final Feasibility Study," HMM Associates, Inc. (February 28, 1991).
11. "Final Feasibility Study - Appendices," HMM Associates, Inc. (February 28, 1991).

Comments

12. Comments Dated August 31, 1990 from Cheryl L. Sprague, EPA Region I on the June 1990 "Draft Feasibility Study," HMM Associates, Inc.
13. Comments Dated January 4, 1991 from Cheryl L. Sprague, EPA Region I on the November 1990 "Draft Feasibility Study," HMM Associates, Inc.
14. Cross-Reference: Comments Dated January 29, 1991 from Cheryl L. Sprague, EPA Region I on the May 18, 1990 "Draft Field Elements Study," HMM Associates, Inc. [Filed and cited as entry number 12 in 3.6 Remedial Investigation (RI) Reports].
15. Comments Dated February 20, 1991 from Andrew W. Serell for Sherilyn Burnett Young, Rath, Young, Pignatelli and Oyer (Attorney for PRP Steering Committee) on the February 6, 1991 "Final Draft Feasibility Study," HMM Associates, Inc.
16. Comments Dated February 22, 1991 from Cheryl L. Sprague, EPA Region I on the February 6, 1991 "Final Draft Feasibility Study," HMM Associates, Inc.
17. Cross-Reference: Letter from Cyndi Perry, United States Department of the Interior to Cheryl L. Sprague, EPA Region I (May 24, 1991). Concerning comments on the February 11, 1991 "Final Field Elements Study and Supplemental Risk Assessment," HMM Associates and the February 28, 1991 "Final Feasibility Study," HMM Associates, Inc. [Filed and cited as entry number 2 in 16.1 Correspondence]

Responses to Comments

18. Correction Guide from HMM Associates, Inc. to the Comments Dated January 4, 1991 from EPA Region I on the November 1990 "Draft Feasibility Study," HMM Associates, Inc.

4.7 Work Plans and Progress Reports

1. "Final Work Plan Dover Municipal Landfill Feasibility Study," HMM Associates, Inc. (September 8, 1989).

4.9 Proposed Plans for Selected Remedial Actions

1. "EPA Proposes Cleanup Plan for the Dover Municipal Landfill Site," EPA Region I (March 1991).

5.0 Record of Decision (ROD)

5.1 Correspondence

1. Letter from Robert J. Gallo, McNeill & Taylor (Attorney for the Town of Madbury) to John T. McNeil, EPA Region I (March 26, 1991). Concerning the request that the public comment period on the March 1991 Proposed Plan be extended an additional thirty days.
2. Letter from Andrew W. Serell, Rath, Young, Pignatelli and Oyer (Attorney for the PRP Steering Committee) to Cheryl L. Sprague, EPA Region I (March 29, 1991). Concerning the request that the public comment period on the March 1991 Proposed Plan be extended an additional forty-five days.
3. Letter from Merrill S. Hohman, EPA Region I to Robert J. Gallo, McNeill & Taylor (Attorney for the Town of Madbury) (April 5, 1991). Concerning notification that the public comment period has been extended thirty days and will now close on May 24, 1991.
4. Letter from Merrill S. Hohman, EPA Region I to Andrew W. Serell, Rath, Young, Pignatelli and Oyer (Attorney for the PRP Steering Committee) (April 5, 1991). Concerning notification that the public comment period has been extended thirty days and will now close on May 24, 1991.
5. Letter from Philip J. O'Brien and Robert Varney, State of New Hampshire Department of Environmental Services to Julie Belaga, EPA Region I (September 9, 1991). Concerning state concurrence with the selected remedy.

5.3 Responsiveness Summary

1. Cross-Reference: Responsiveness Summary is an attachment to the September 10, 1991 "Record of Decision," EPA Region I [Filed and cited as entry number 1 in 5.4 Record of Decision (ROD)].

The following citations indicate documents received by EPA Region I during the formal public comment period.

2. Comments Dated April 12, 1991 from David S. Allen and Richard G. McCann, City of Portsmouth on the March 1991 Proposed Plan.

The record cited as entry number 3 is oversized and may be reviewed by appointment only at EPA Region I, Boston, Massachusetts.

3. "An Updated Public Health Evaluation of the Dover Municipal Landfill," Environmental Standards, Inc. for Dover Landfill PRP Group (May 18, 1991).
4. Comments Dated May 22, 1991 from John and Linda Sibik on the March 1991 Proposed Plan.
5. Comments Dated May 23, 1991 from Otis E. Perry, Green Fields Farm on the March 1991 Proposed Plan.
6. Comments Dated May 23, 1991 from George Maglaras, City of Dover on the March 1991 Proposed Plan.
7. Comments Dated May 23, 1991 from Robert J. Gallo, McNeill & Taylor (Attorney for the Town of Madbury) and Christopher A. Wyskiel, Wyskiel, Boc & Reid (Attorney for the Town of Madbury) on the March 1991 Proposed Plan with the attached Exhibits A through P.
8. Letter from Christopher A. Wyskiel, Wyskiel, Boc & Reid (Attorney for the Town of Madbury) to Cheryl L. Sprague, EPA Region I (May 24, 1991). Concerning corrections to be made to the Comments Dated May 23, 1991 on the March 1991 Proposed Plan.
9. Comments Dated May 24, 1991 from David B. Wright, City of Dover on the March 1991 Proposed Plan with the attached financial charts.

5.3 Responsiveness Summary (cont'd.)

10. Comments Dated May 24, 1991 from Gary M. Garfield and John A. Gilbert, Balsam Environmental Consultants, Inc. for the Dover Municipal Landfill PRP Group on the March 1991 Proposed Plan.
11. "Comments on the EPA Preferred Remedy for the Dover Landfill Site," Balsam Environmental Consultants, Inc. for the Dover Municipal Landfill PRP Group (May 24, 1991).
12. Letter from Gary M. Garfield and John A. Gilbert, Balsam Environmental Consultants, Inc. for the Dover Municipal Landfill PRP Group to Cheryl L. Sprague (May 24, 1991). Concerning the attached "Alternative Remedy for the Dover Landfill Superfund Site," Balsam Environmental Consultants, Inc. for the Dover Municipal Landfill PRP Group.
13. "Petitions to the City of Dover, New Hampshire."

The following citation indicates a document received by EPA Region I after the formal public comment period.

14. Comments Dated May 24, 1991 from Kenneth R. Mahony, City of Portsmouth on the March 1991 Proposed Plan.

5.4 Record of Decision (ROD)

1. "Record of Decision," EPA Region I (September 10, 1991).

9.0 State Coordination

9.1 Correspondence

1. "A95 State Clearinghouse Form," State of New Hampshire Office of State Planning with the following attachments:
   A. "Authorization to File Application," State of New Hampshire Office of State Planning (October 12, 1983).
   B. "Acknowledgement," State of New Hampshire Office of State Planning (September 22, 1983).
   C. "Request for Review of Project Notification," State of New Hampshire Office of State Planning (September 22, 1983).

10.0 Enforcement

10.3 State and Local Enforcement Records

1. Letter from David B. Wright, City of Dover to Cheryl L. Sprague, EPA Region I (February 20, 1991). Concerning an update on the status of the Municipal Ordinance.

11.0 Potentially Responsible Party

11.7 PRP Steering Committee Documents

1. Letter from Andrew W. Serell, Rath, Young, Pignatelli and Oyer (Attorney for PRP Steering Committee) to Gretchen M. Muench, EPA Region I (June 20, 1990). Concerning notification that Rosen Trucking and United Parcel Service have joined the Dover Landfill PRP Group.

11.7 PRP Steering Committee Documents (cont'd.)

2. Letter from Andrew W. Serell, Rath, Young, Pignatelli and Oyer (Attorney for PRP Steering Committee) to Gretchen M. Muench, EPA Region I (July 6, 1990). Concerning notification that Cleary Cleaners has joined the Dover Landfill PRP Group.
3. Letter from Sherilyn Burnett Young, Rath, Young, Pignatelli and Oyer (Attorney for PRP Steering Committee) to Cheryl L. Sprague, EPA Region I (February 27, 1991). Concerning transmittal of the attached signature pages to the Site Trust Agreement.
4. Cross-Reference: Letter from Daniel Coughlin, EPA Region I to Randall Lund, Davidson Interior Trim/Textron (April 1, 1991). Concerning additional tasks to be completed under the Administrative Order [Filed and cited as entry number 2 in 11.9 PRP-Specific Correspondence].
5. Cross-Reference: Letter from Gary M. Garfield and John A. Gilbert, Balsam Environmental Consultants, Inc. for the Dover Municipal Landfill PRP Group to Cheryl L. Sprague (May 24, 1991). Concerning the attached "Alternative Remedy for the Dover Landfill Superfund Site," Balsam Environmental Consultants, Inc. for the Dover Municipal Landfill PRP Group [Filed and cited as entry number 12 in 5.3 Responsiveness Summaries].
6. Letter from Young, Rath, Young, Pignatelli and Oyer (Attorney for PRP Steering Committee) to Daniel Coughlin, EPA Region I (May 30, 1991). Concerning a response to the April 1, 1991 Letter from EPA Region I to Randall Lund, Davidson Interior Trim/Textron regarding additional tasks to be completed under the Administrative Order.

11.9 PRP-Specific Correspondence

1. Letter from Merrill S. Hohman, EPA Region I to attached list of Addressees (March 15, 1991). Concerning notification of potential liability for the Dover Municipal Landfill site and the invitation to voluntarily participate in the site cleanup.
2. Letter from Daniel Coughlin, EPA Region I to Randall Lund, Davidson Interior Trim/Textron (April 1, 1991). Concerning additional tasks to be completed under the Administrative Order.
3. Letter from George A. Thomas, State of New Hampshire Treasury Department to Cheryl L. Sprague, EPA Region I (May 16, 1991). Concerning the inability of the City of Dover to finance sixty-three percent of the site cleanup.
4. Letter from David B. Wright, City of Dover to Cheryl L. Sprague, EPA Region I (May 17, 1991). Concerning the attached resolution of the Dover City Council regarding the site on May 8, 1991.
5. Letter from David B. Wright, City of Dover to Cheryl L. Sprague, EPA Region I (May 24, 1991). Concerning confirmation that EPA Region I has received the May 16, 1991 Letter from David B. Wright, City of Dover to Cheryl L. Sprague, EPA Region I.
6. Letter from Robert J. Gallo, McNeil & Taylor (Attorney for the Town of Madison) to John T. McNeil, EPA Region I (June 6, 1991). Concerning the requested information regarding property owned by the Town of Madbury which may exist between the Dover Municipal Landfill and the Bellamy Reservoir.

11.9 PRP-Specific Correspondence (cont'd.)

The map cited as an attachment to the record cited below may be reviewed, by appointment only, at EPA Region I Boston, Massachusetts.

7. Letter from David B. Wright, City of Dover to Cheryl L. Sprague, EPA Region I (June 11, 1991). Concerning the requested information regarding property owned by the Town of Dover and the attached:
   A. "Hazardous Waste Landfill District I," City of Dover (May 13, 1987).
   B. "Health, Public, and Chapter 152 Streets and Sidewalks," City of Dover (April 10, 1991).
   C. "Proposed Hazardous Waste Protection Zone Map," City of Dover (January 28, 1991).
8. Letter from John E. Peltonen, Stark and Peltonen (Attorney for the City of Dover) to John T. McNeil, EPA Region I (June 25, 1991). Concerning notification that the February 1991 "Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites," EPA Region I should be considered in the Record of Decision.

13.0 Community Relations

13.2 Community Relations Plans

1. "Community Relations Plan," NUS Corporation (July 1985).

13.3 News Clippings/Press Releases

1. "Environmental News Release," EPA Region I (July 20, 1983). Concerning notification of a public meeting on August 9, 1983 to discuss the Remedial Action Master Plan.
2. "Press Release," State of New Hampshire Water Supply and Pollution Control Commission (April 4, 1984). Concerning the announcement that a Cooperative Agreement has been reached between the State of New Hampshire and EPA.
3. "Environmental News," EPA Region I (August 16, 1988). Concerning the announcement that the State of New Hampshire and EPA have reached an agreement with the City of Dover and eight potentially responsible parties.
4. "Environmental News," State of New Hampshire Department of Environmental Services (December 16, 1988) with the attached "New Hampshire Department of Environmental Services Background Information for Press Release Announcing DES Release of the Remedial Investigation." Concerning the release of the Remedial Investigation Report.
5. "Environmental News," State of New Hampshire Department of Environmental Services (March 9, 1989). Concerning the announcement that the Risk Assessment for the site has been released.
6. "Environmental News," EPA Region I (March 15, 1991). Concerning the announcement that EPA has proposed a $25 million cleanup plan for the site.
7. "Environmental News," EPA Region I (April 5, 1991). Concerning the announcement that EPA has made a correction in the March 1991 Proposed Plan and that the public comment period has been extended until May 24, 1991.
8. "Bankruptcy Filing Rate Soars," The Union Leader - Manchester, NH (April 15, 1991).
9. "State Pollution Control Commission Updates Progress at Dover Municipal Landfill," State of New Hampshire Water Supply and Pollution Control Commission. Concerning an update of site activities.
10. "State Pollution Control Commission Updates Progress at Dover Municipal Landfill," State of New Hampshire Water Supply and Pollution Control Commission. Concerning an update of site activities.

13.4 Public Meetings

1. Cross-Reference: "Environmental News Release," EPA Region I (July 20, 1983). Concerning notification of a public meeting on August 9, 1983 to discuss the Remedial Action Master Plan [Filed and cited as entry number 1 in 13.3 News Clippings/Press Releases].
2. Attendance List, Remedial Action Master Plan Public Meeting for the Dover Municipal Landfill (August 9, 1983).
3. Meeting Agenda, Remedial Action Master Plan Public Meeting for the Dover Municipal Landfill (August 9, 1983)
4. Memorandum from John F. Zipeto, EPA Region I to Project Files (August 11, 1983). Concerning the August 9, 1983 Public Meeting.
5. Meeting Agenda, Public Meeting for the Dover Municipal Landfill (December 13, 1984) with the attached:
   A. "Fact Sheet."
   B. "State to Present a Public Informational Meeting on the Dover Municipal Landfill Remedial Investigation on December 13, 1984," State of New Hampshire Water Supply and Pollution Control Commission.
6. Meeting Agenda, Public Meeting for the Dover Municipal Landfill (March 30, 1989) with the attached "New Hampshire Department of Environmental Services Dover Municipal Landfill Remedial Investigation."
7. "Final Summary of the March 25, 1991 Public Informational Meeting on the Proposed Plan & Feasibility Study," Alliance Technologies Corporation.
8. Transcript, Dover Municipal Landfill Public Hearing (April 16, 1991).
9. "Statement of Richard R. Houghton, Chairman, Madbury Board of Selectmen Submitted to EPA Region I at the April 16, 1991 Public Hearing" with attached Exhibits.

13.5 Fact Sheets

1. "Fact Sheet," State of New Hampshire Department of Environmental Services (July 30, 1987). Concerning past remedial actions at the site.

13.6 Mailing Lists

The record cited as entry number 1 is withheld as CONFIDENTIAL and available only for judicial review.

1. Letter from Richard H. Pease, State of New Hampshire Department of Environmental Services to Paul Marchessault, EPA Region I (April 27, 1989). Concerning transmittal of the attached mailing list.

14.0 Congressional Relations

14.1 Correspondence

1. Letter from Robert C. Smith, Member of the U.S. House of Representatives to Michael R. Deland, EPA Region I (February 4, 1988). Concerning the issue of providing credit incentive for private parties to participate in the Remedial Investigation.
2. Letter from Paul Keough for Michael R. Deland, EPA Region I to Robert C. Smith, Member of the U.S. House of Representatives (March 1, 1988) with the attached Letter from Robert C. Smith, Member of the U.S. House of Representatives to Michael R. Deland, EPA Region I (February 4, 1988). Concerning clarification of the results of the administrative order signed on February 11, 1988.

16.0 Natural Resource Trustee

16.1 Correspondence

1. Letter from Bruce Blanchard, United States Department of the Interior to David Webster, EPA Region I (December 29, 1988). Concerning the preliminary natural resources survey.
2. Letter from Cyndi Perry, United States Department of the Interior to Cheryl L. Sprague, EPA Region I (May 24, 1991). Concerning comments on the February 11, 1991 "Final Field Elements Study and Supplemental Risk Assessment," HMM Associates and the February 28, 1991 "Final Feasibility Study," HMM Associates, Inc.
3. Letter from Kenneth Finkelstein, U.S. Department of Commerce National Oceanic and Atmospheric Administration to Cheryl L. Sprague, EPA Region I (June 5, 1991). Concerning information on a protective ecological level for arsenic in sediment.

16.3 Natural Resource Trustee Release

1. Letter from Robert Pavia, U.S. Department of Commerce National Oceanic and Atmospheric Administration to Dennis P. Gagne, EPA Region I (March 20, 1990). Concerning the attached Preliminary Natural Resource Survey.

16.4 Trustee Notification Form and Selection Guide

1. Letter from Patricia L. Meaney for Merrill S. Hohman, EPA Region I to Sharon Christopherson, United States Department of Commerce National Oceanic and Atmospheric Administration (May 15, 1987). Concerning the attached "Trustee Notification Form" and "Guide to Trustee Selection."
2. Letter from Patricia L. Meaney for Merrill S. Hohman, EPA Region I to William Patterson, United States Department of Commerce National Oceanic and Atmospheric Administration (May 15, 1987). Concerning the attached "Trustee Notification Form" and "Guide to Trustee Selection."

17.0 Site Management Records

17.1 Correspondence

1. Letter from Arthur L. Hoffman, City of Dover to Robert Donovan, Lakes Region Disposal Co., Inc. (April 10, 1979). Concerning the quantities and characteristics of the sludge produced by the Dover Sewage Treatment Plant.

17.7 Reference Documents

The records cited below as entries number 1 and 2 may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

1. "Analytical Methods for the Prediction of Leachate Plume Migration," Douglas C. Kent, Wayne A. Pettyjohn, and Thomas A. Prickett (Spring 1985).
2. "Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites," EPA Region I (February 1991).

17.8 State and Local Technical Records

Reports

1. "Report on Ground Water Investigation at 'The Hoppers' for the City of Dover," Camp Dresser & McKee, Inc. (March 1971).
2. Trip Report on a Visit to the Dover Municipal Landfill Site, William J. Carter and Jay Stevens, State of New Hampshire (July 25, 1975). Concerning a soil site investigation.
3. "Report on Groundwater Supply Investigations at 'The Hopper's,'" Camp Dresser & McKee, Inc. (January 1978).
4. "Report to the Board of Water Commissioners on New Water Supply Sources and Improvements," Camp Dresser & McKee, Inc. (November 1979).
5. "Tolend Road Landfill Site Investigation," Camp Dresser & McKee, Inc. (July 1982).

Comments

6. Comments Dated September 21, 1982 from Dan H. Allen, State of New Hampshire Water Supply and Pollution Control Commission on the July 1982 "Tolend Road Landfill Site Investigation," Camp Dresser & McKee, Inc.

The Sampling and Analysis Data for the Site Management Records may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

Section II

Guidance Documents

GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at EPA Region I, Boston, Massachusetts.

General EPA Guidance Documents

1. "Protection of Wetlands (Executive Order 11990), Appendix D," Federal Register (Vol. 42), 1977.

2. U.S. Environmental Protection Agency. Guidance Manual for Minimizing Pollution from Waste Disposal Sites (EPA/600/2-78/142), August 1978.

3. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Biodegradation and Treatability of Specific Pollutants (EPA/600/9-79/034), October 1979.

4. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Carbon Adsorption Isotherms for Toxic Organics (EPA/600/8-80/023), April 1, 1980.

5. U.S. Environmental Protection Agency. Office of Water and Waste Management. Evaluating Cover Systems for Solid and Hazardous Waste, 1980.

6. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Costs of Remedial Response Actions at Uncontrolled Hazardous Waste Sites, April 15, 1981.

7. U.S. Environmental Protection Agency. Office of Water and Waste Management. Engineering Handbook for Hazardous Waste Incineration (SW-889, OSWER Directive 9488.00-5), September 1981.

8. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Evaluating Cover Systems for Solid and Hazardous Waste (Revised Edition) (SW-867, OSWER Directive 9476.00-1), September 1982.

9. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Lining of Waste Impoundment and Disposal Facilities (SW-870, OSWER Directive 9480.00-4), March 1983.

10. U.S. Environmental Protection Agency. Municipal Environmental Research Laboratory. Handbook for Evaluating Remedial Action Technology Plans (EPA/600/2-83/076), August 1983.

11. "Final and Proposed Amendments to the National Oil and Hazardous Substances Pollution Contingency Plan," Code of Federal Regulations (Title 40, Part 300), September 8, 1983.

12. "National Oil and Hazardous Substances Pollution Contingency Plan," Code of Federal Regulations (Title 40, Part 300), 1985.

13. "National Oil and Hazardous Substances Pollution Contingency Plan," Federal Register (Vol. 55, No. 46), March 8, 1990.

14. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/HW-6), September 1983.

15. U.S. Environmental Protection Agency. Office of Research and Development and Office of Emergency and Remedial Response. Case Studies 1-23: Remedial Response at Hazardous Waste Sites (EPA 540/2-84/002b), March 1984.

16. "National Emission Standards for Hazardous Air Pollutants Asbestos Regulations," Code of Federal Regulations (Title 40, Part 61), April 5, 1984.

17. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory. Soil Sampling Quality Assurance User's Guide (EPA/600/4-84/043), May 1984.

18. U.S. Environmental Protection Agency. Office of Ground-Water Protection. Ground-Water Protection Strategy (EPA/440/6-84/002), August 1984.

19. U.S. Environmental Protection Agency. Environmental Criteria and Assessment Office. Health Effects Assessment Documents (58 Chemical Profiles) (EPA/540/1-86/001-058), September 1, 1984.

20. "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule," Federal Register (Vol. 49, No. 209), October 26, 1984.

21. U.S. Environmental Protection Agency. Hazardous Response Support Division. Standard Operating Safety Guides, November 1984.

22. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Field Standard Operating Procedures Manual #4: Site Entry (OSWER Directive 9285.2-01), January 1, 1985.

23. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Field Standard Operating Procedures Manual #8: Air Surveillance (OSWER Directive 9285.2-03), January 1, 1985.

24. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Field Standard Operating Procedures Manual #9: Site Safety Plan (OSWER Directive 9285.2-05), April 1, 1985.

25. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Project Summary: Settlement and Cover Subsidence of Hazardous Waste Landfills (EPA/600/S2-85/035), May 1985.

26. U.S. Environmental Protection Agency. Environmental Research Laboratory. EPA Guide for Minimizing the Adverse Environmental Effects of Cleanup of Uncontrolled Hazardous-Waste Sites (EPA/600/8-85/008), June 1985.

27. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Remedial Investigations under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/002), June 1985.

28. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Guidance on Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (EPA/540/G-85/003), June 1985.

29. Record of Decision, McKin, Gray, Maine, EPA Region I, Boston, Massachusetts, July 22, 1985.

30. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory. Sediment Sampling Quality Assurance User's Guide (EPA/600/4-85/048), July 1985.

31. Memorandum from William N. Hedeman, Director, U.S. Environmental Protection Agency Office of Emergency and Remedial Response to Toxic and Waste Management Division Directors, Regions I-X (OSWER Directive 9280.0-02), August 1, 1985 (discussing policy on flood plains and wetland assessments for CERCLA Actions).

32. U.S. Environmental Protection Agency. Office of Waste Programs Enforcement. Toxicology Handbook (OSWER Directive 9850.2), August 1, 1985.

33. U.S. Environmental Protection Agency. Office of Waste Programs Enforcement. Endangerment Assessment Handbook, August 1985.

34. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory and Office of Emergency and Remedial Response. Covers for Uncontrolled Hazardous Waste Sites (EPA 540/2-85/002), September 1985.

35. U.S. Department of Health and Human Services. National Institute for Occupational Safety and Health, and Occupational Safety and Health Administration. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.

36. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Handbook of Remedial Action at Waste Disposal Sites (EPA/625/6-85/006), October 1985.

37. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Handbook: Remedial Action at Waste Disposal Sites (Revised) (EPA/625/6-85/006), October 1985.

38 U.S. Environmental Protection Agency and Michigan Department of Natural Resources. Field Screening for Organic Contaminants in Samples from Hazardous Waste Sites, April 2, 1986.

39. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance Document for Cleanup of Surface Impoundment Sites (OSWER Directive 9380.0-6), June 1986.

40. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Handbook for Stabilization/Solidification of Hazardous Waste (EPA/540/2-86/001), June 1986.

41. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Remedial Design and Remedial Action Guidance (OSWER Directive 9355.0-4A), June 1986.

42. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Treatment Technology Briefs: Alternatives to Hazardous Waste Landfills (EPA/600/8-86/017), July 1986.

43. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2), September 20, 1986.

44. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2), December 1988.

45. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Mobile Treatment Technologies for Superfund Wastes (EPA 540/2-86/003 (f)), September 1986.

46. U.S. Environmental Protection Agency. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended October 17, 1986.

47. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Public Health Evaluation Manual (EPA/540/1-86/060, OSWER Directive 9285.4-1), October 1986.

48. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites (OSWER Directive 9283.1-2), October 1986.

49. "Hazardous Waste Management Systems; Land Disposal Restrictions; Final Rule," Federal Register (Vol. 51, No. 216), November 7, 1986.

50. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Interim Guidance on Superfund Selection of Remedy (OSWER Directive 9355.0-19), December 24, 1986.

51. Memorandum from J. Winston Porter, U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response to Regional Administrators, Regions I-X; Regional Counsels, Regions I-X, Director, Waste Management Division, Regions I, IV, V, VII, and VIII; Director, Emergency and Remedial Response Division, Region II; Director, Hazardous Waste Management Division, Regions III and VI; Director, Toxics and Waste Management Division, Region IX; Director, Hazardous and Waste Division, Region X; Environmental Services Division Directors, Regions I, VI, and VII (OSWER Directive 9355.0-19), December 24, 1986 (discussing interim guidance on Superfund selection of remedy).

52. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund State-Lead Remedial Project Management Handbook, (EPA/540/G-87/002), December 1986.

53. U.S. Environmental Protection Agency. Office of Ground-Water Protection. Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy, December 1986.

54. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Glossary (WH/FS-86-007), Winter 1986.

55. U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Technology Briefs: Data Requirements for Selecting Remedial Action Technology (EPA/600/2-87/001), January 1987.

56. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Data Quality Objectives for Remedial Response Activities: Development Process (EPA/540/G-87/003, OSWER Directive 9355.0-7B), March 1987.

57. Letter from Lee M. Thomas, U.S. Environmental Protection Agency to James J. Florio, Chairman, Subcommittee on Consumer Protection and Competitiveness, Committee on Energy and Commerce, U.S. House of Representatives, May 21, 1987 (discussing EPA's implementation of the Superfund Amendments and Reauthorization Act of 1986).

58. U.S. Environmental Protection Agency. Quality Assurance Management Staff. Guidelines and Specifications for Preparing Quality Assurance Program Documentation, June 1987.

59. Memorandum from J. Winston Porter, U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response to Addressees ("Regional Administrators, Regions I-X; Regional Counsel, Regions I-X; Director, Waste Management Division, Regions I, IV, V, VII, and VIII; Director, Emergency and Remedial Response Division, Region II; Director, Hazardous Waste Management Division, Regions III and VI; Director, Toxics and Waste Management Division, Region IX; Director, Hazardous Waste Division, Region X; Environmental Services Division Directors, Region I, VI, and VII") (OSWER Directive 9234.0-05), July 9, 1987 (discussing interim guidance on compliance with applicable or relevant and appropriate requirements).

60. Memorandum from Henry L. Longest, U.S. Environmental Protection Agency Office of Emergency and Remedial Response to Directors, Waste Management Division, Regions I, IV, V, VI, VII, and VIII; Director, Emergency and Remedial Response Division, Region II; Directors, Hazardous Waste Management Division, Regions III and X; Directors, Toxics and Waste Management Division, Region IX (OSWER Directive 9355.0-20), July 23, 1987 (discussing RI/FS improvements).

61. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Additional Interim Guidance for Fiscal Year 1987 Record of Decisions, (OSWER Directive 9355.0-21), July 24, 1987.

62. Memorandum from Francis S. Blake, General Counsel, to J. Winston Porter, Assistant Administrator for Solid Waste and Emergency Response, July 31, 1987 (discussing the scope of the CERCLA petroleum exclusion under sections 101 (14) and 104 (a) (2)).

63. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Alternate Concentration Limits Guidance (OSWER Directive 9481.00-6C, EPA/530-SW-87-017), July 1987.

64. Memorandum from Henry L. Longest, U.S. Environmental Protection Agency Office of Emergency and Remedial Response and Gene Lucero, U.S. Environmental Protection Agency Office of Waste Programs Enforcement to Waste Management Division Directors, Regions I-X and Environmental Services Division Directors, Regions I, VI, and VII, August 11, 1987, (discussing land disposal restrictions).

65. Record of Decision, Davis Liquid Waste, Smithfield, Rhode Island, EPA Region I, Boston, Massachusetts, September 29, 1987.

66. U.S. Environmental Protection Agency. Center for Environmental Research Information. A Compendium of Technologies Used in the Treatment of Hazardous Waste (EPA/625/8-87/014), September 1987.

67. U.S. Environmental Protection Agency. Office of Research and Development and Office of Solid Waste and Emergency Response. Remedial Action Costing Procedures Manual, October 1987.

68. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Public Involvement in the Superfund Program (WH/FS-87-004R), Fall 1987.

69. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund (WH/FS-87-001R), Fall 1987.

70. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. The Superfund Remedial Program (WH/FS-87-002R), Fall 1987.

71. Memorandum from J. Winston Porter, U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response to Regional Administrators, Region I-X (OSWER Directive 9834.11), November 13, 1987 (discussing revised procedures for implementing off-site response actions) with attached "Revised Procedures for Implementing Off-Site Response Actions."

72. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Draft Guidance on CERCLA Compliance with Other Laws Manual (OSWER Directive 9234.1-01), November 25, 1987.

73. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Draft Guidance on CERCLA Compliance with Other Laws Manual (OSWER Directive 9234.1-01), August 8, 1988.

74. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. A Compendium of Superfund Field Operations Methods (OSWER Directive 9355.0-14), December 1987.

75. "Estimated Soil Ingestion Rates for Use in Risk Assessment," Risk Analysis (Vol. 7, No. 3), 1987.

76. U.S. Environmental Protection Agency. Hazardous Evaluation Division. Laboratory Data Validation Functional Guidelines for Evaluating Organics, February 1, 1988.

77. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response and Office of Research and Development. The Superfund Innovative Technology Evaluation Program: Progress and Accomplishments (EPA/540/5-88/001), February 1988.

78. Record of Decision, Keefe, Epping, New Hampshire, EPA Region I, Boston, Massachusetts, March 21, 1988.

79. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Conducting Remedial Investigations and Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act), March 1988.

80. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Interim Final Guidance on Conducting Remedial Investigations and Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act), October 1988.

81. Memorandum from Henry L. Longest, U.S. Environmental Protection Agency Office of Emergency and Remedial Response to Directors, Waste Management Division, Regions I, IV, V, and VI; Director, Emergency and Remedial Response Division, Region II; Directors, Hazardous Waste Management Division, Regions III and X; Directors, Toxics and Waste Management Division, Region IX; Director, Environmental Services Division, Regions I-X (OSWER Directive 9355.0-05), April 25, 1988 (discussing RI/FS improvements follow-up).

82. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Draft Guidance on Remedial Actions for Contaminated GroundWater at Superfund Sites (OSWER Directive 9283.1-2), April 1988.

83. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Superfund Exposure Assessment Manual (EPA/540/1-88/001, OSWER Directive 9285.5-1), April 1988.

84. Memorandum form J. Winston Porter, U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response to Regional Administrators, Regions I-X; Regional Counsel, Regions I-X; Director, Waste Management Division, Regions I, IV, V, VII, and VIII; Director, Emergency and Remedial Response Division, Region II; Director, Hazardous Waste Management Division, Regions III and VI; Director, Toxics and Waste Management Division, Region IX; and Director, Hazardous and Waste Division, Region X (OSWER Directive 9835.1a), May 16, 1988 (discussing interim guidance of potentially responsible party participation in remedial investigations and feasibility studies).

85. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version) (EPA/540/G-88/002, OSWER Directive 9230.0-3A), June 1988.

86. U.S. Environmental Protection Agency. Hazardous Site Evaluation Division. Laboratory Data Validation Functional Guidelines for Evaluating Inorganics, July 1, 1988.

87. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Catalog of Superfund Program Directives (Interim Version) (OSWER Directive 9200.7-01), July 1988.

88. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) Compliance with Other Laws Manual (EPA/540/G-89/006, OSWER Directive 9234.1-01), August 1988.

89. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Technology Screening Guide for Treatment of CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) Soils and Sludges (EPA 540/2-88/004), September 1988.

90. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Field Screening Methods Catalog: User's Guide (EPA/540/2-88/005), September 1988.

91. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) (Interim Final) (EPA/540/G-89/004, OSWER Directive 9355.3-01), October 1988.

92. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Community Relations in Superfund: A Handbook (Interim Version), Chapter 6 (OSWER Directive 9230.0-3B), November 3, 1988.

93. Memorandum from Don. R. Clay, Assistant Administrator, U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response to Waste Management Division Directors, Regions I-X and Regional Counsel, Regions I-X (OSWER Directive 9234.1-06), December 27, 1988 (discussing applicability of land disposal restrictions to RCRA and CERCLA ground water treatment reinjection; Superfund management review: recommendation No. 26).

94. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites (EPA/540/G-88/003, OSWER Directive 9283.1-2), December 1988.

95. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. User's Guide to the Contract Laboratory Program (OSWER Directive 9240.0-1), December 1988.

96. Interagency Cooperative Publication. Federal Manual for Identifying and Delineating Jurisdictional Wetlands, January 1989.

97. Memorandum from Bruce M. Diamond, U.S. Environmental Protection Agency Office of Waste Programs Enforcement et al. to Addressees ("Directors, Waste Management Division, Regions I, IV, VII, VIII; Director, Emergency and Remedial Response Division, Region II; Directors, Hazardous Waste Management Division, Regions III, VI; Director, Toxic and Waste Management Division, Region IX; Director, Hazardous Waste Division, Region X"), February 9, 1989 (discussing interim final guidance on soil ingestion rates).

98. Memorandum from Jonathan Z. Cannon to Regional Administrators, Regions I-X (OSWER Directive 9347.1-0), April 17, 1989 (discussing policy for Superfund compliance with the RCRA land disposal restrictions).

99. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. A Guide on Remedial Actions for Contaminated Ground Water (OSWER Directive 9283.1-2FS), April 1989.

100. U.S. Environmental Protection Agency. Office of Research and Development. Requirements for Hazardous Waste Landfill Design, Construction, and Closure (EPA/625/4-89/022), April 1989.

101. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. ARARs Q's & A's (OERR 9234.2-01FS), May 1989.

102. Memorandum from Henry L. Longest, U.S. Environmental Protection Agency Office of Emergency and Remedial Response to Directors, Waste Management Division, Regions I, IV, V, VII, VIII et al. (OSWER Directive 9347.2-01), June 5, 1989 (discussing land disposal restrictions as relevant and appropriate).

103. Memorandum from Henry L. Longest II and Gerald Emison, EPA Headquarters to Addressees ("Regional Waste Management Division Directors; Regional Superfund Branch Chiefs; Regional Air Division Directors; Regional Air Branch Chiefs; OERR Division Directors; OAQPS Division Directors"), June 15, 1989 (discussing control of air emissions from air strippers).

104. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Land Disposal Restrictions: Summary of Requirements, June 1989.

105. U.S. Environmental Protection Agency. Risk Assessment Work Group, Region I. Supplemental Risk Assessment Guidance for the Superfund Program (Draft Final) (EPA/901/5-89/001), June 1989.

106. "Protection of Environment," Code of Federal Regulations (Title 40, Parts 190-299), Revised as of July 1, 1989.

107. "Land Disposal Restrictions for Certain 'California List' Hazardous Wastes and Modifications to the Framework (Final Rule)," Federal Register (Vol. 52, No. 130), July 8, 1989.

108. Memorandum from Louis F. Gitto, U.S. Environmental Protection Agency Air, Pesticides, and Toxic Management Division, Region I to Merrill S. Hohman, Waste Management Division, Region I (OSWER Directive 9355.0-28), July 12, 1989 (discussing air stripper control guidance).

109. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #1, Overview of RCRA Land Disposal Restrictions (LDRs) (OSWER Directive 9347.3-01FS), July 1989.

110. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #2, Complying With the California List Restrictions Under Land Disposal Restrictions (LDRs) (OSWER Directive 9347.3-02FS), July 1989.

111. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #3, Treatment Standards and Minimum Technology Requirements Under Land Disposal Restrictions (LDRs) (OSWER Directive 9347.3-03FS), July 1989.

112. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #4, Complying With the Hammer Restrictions Under Land Disposal Restrictions (LDRs) (OSWER Directive: 9347.3-04FS), July 1989.

113. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #5, Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions. (OSWER Directive: 9347.3-05FS), July 1989.

114. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #6A, Obtaining a Soil and Debris Treatability Variance for Remedial Actions. (OSWER Directive: 9347.3-06FS), July 1989.

115. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Interim Final Guidance on Preparing Superfund Decision Documents (OSWER Directive 9355.3-02), July 1989.

116. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Risk Assessment Guidance for Superfund. Human Health Evaluation Manual Part A, July 1989.

117. "RCRA Regulations," Code of Federal Regulations (Title 40, Part 264), July 1989.

118. U.S. Environmental Protection Agency. Office of Research and Development. Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments (EPA/530-SW-89-047), July 1989.

119. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) Compliance with Other Laws Manual - Part II: Clean Air Act and Other Environmental Statutes and State Requirements (EPA/540/G-89/009, OSWER Directive 9234.1-02), August 1989.

120. Record of Decision, So. Municipal, Petersborough, New Hampshire, EPA Region I, Boston, Massachusetts, September 27, 1989.

121. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Evaluation of Ground Water Extraction Remedies, Volume 1, Summary Report (EPA/540/2-89/054), September 1989.

122. Memorandum from Jonathan Z. Cannon, EPA Headquarters to Regional Directors, October 18, 1989. (Discussing considerations in ground water remediation at Superfund sites).

123. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - RCRA ARARs: Focus and Closure Requirements (OSWER Directive 9234.2-04), October 1989.

124. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Ground Water Issue - Performance Evaluation of Pump-and-Treat Remediations (EPA/540/4-89/005), October 1989.

125. U.S. Environmental Protection Agency. OSWER Directive Initiation Request. Analysis of Treatability Data for Soil and Debris: Evaluation of Land Ban Impact on Use of Superfund Treatment Technologies (OSWER Directive 9380.3-04), November 30, 1989.

126. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Superfund Innovative Technology Evaluation Program: Technology Profiles (EPA/540/5-89/013), November 1989.

127. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Feasibility Study: Development and Screening of Remedial Action Alternatives (OSWER Directive 9355.3-01FS3), November 1989.

128. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Getting Ready Scoping the RI/FS (OSWER Directive 9355.3-01FS1), November 1989.

129. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Remedial Investigation: Site Characterization and Treatability Studies (OSWER Directive 9355.3-01FS2), November 1989.

130. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. State and Local Involvement in the Superfund Program (9375.5-01/FS), Fall 1989.

131. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Risk Assessment Guidance for Superfund - Volume I: Human Health Evaluation Manual (Part A - Interim Final) (EPA/540/1-89/002), December 1989.

132. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Superfund LDR Guide #7. Determining When Land Disposal Restrictions (LDRs) are Relevant and Appropriate to CERCLA Response Actions. (OSWER Directive 9347.3-08FS), December 1989.

133. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - CERCLA Compliance with State Requirements (OSWER Directive 9234.2-05/FS), December 1989.

134. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - Overview of ARARs - Focus on ARAR Waivers (Publication 9234.2-03/FS), December 1989.

135. U.S. Environmental Protection Agency. Risk Reduction Engineering Laboratory. Handbook on In Situ Treatment of Hazardous Waste-Contaminated Soils (EPA/540/2-90/002), January 1990.

136. U.S. Environmental Protection Agency. Risk Engineering Laboratory. Project Summary - State of Technology Review: Soil Vapor Extraction Systems (EPA/600/S2-89/024), January 1990.

137. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - CERCLA Compliance with the CWA and SDWA (OSWER Directive 9234.2-06/FS), February 1990.

138. "National Oil and Hazardous Substances Pollution Contingency Plan," Federal Register (Vol. 55, No. 46), March 8, 1990, p. 8666.

139. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. The Feasibility Study: Detailed Analysis of Remedial Action Alternatives (OSWER Directive 9355.3-01FS4), March 1990.

140. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. ROD Annual Report: FY 1989 (EPA/540/8-90/006), April 1990.

141. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual - Summary of Part II - CAA, TSCA, and Other Statutes (OSWER Directive 9234.2-07/FS), April 1990.

142. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Personnel Protection and Safety.

143. U.S. Environmental Protection Agency. Impact of the RCRA Land Disposal Restrictions of Superfund Response Actions in Superfund.

144. U.S. Department of Health and Human Services. Agency for Toxic Substances and Disease Registry. ATSDR Fact Sheet.

Appendix B

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 1

Remedial Design / Remedial Action
Statement of Work to the Amended Consent Decree
(“2007 SOW”)

Dover Municipal Landfill Superfund Site
Dover, New Hampshire

2007

Dover Municipal Landfill Superfund Site Remedial Design/Remedial Action Statement of Work 2007

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Attachment A: Requirements for Project Operation Plans

LIST OF ACRONYMS

This is a list of acronyms in general use and does not include acronyms for specific deliverables that are mandated by this Statement of Work. Acronyms for specific documents are explained and delineated in Attachment.

1991 ROD - Record of Decision issued by EPA in September 1991.
1993 Consent Decree - Consent Decree entered by the Court on July 23, 1993.
1993 SOW - Statement of Work that accompanied the 1993 Consent Decree.
2004 AROD - Amended Record of Decision issued by EPA in September 2004.
2007 ACD - Amended Consent Decree of which is this Statement of Work is an appendix.
2007 SOW - This Statement of Work.
ARARs - Applicable or Relevant and Appropriate Requirements..
Amended Consent Decree - Document that this 2007 SOW is attached to as Appendix B.
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.
CFR - Code of Federal Regulations.
CQAPP - Construction Quality Assurance/Quality Control Plans.
EMP - Environmental Monitoring Program.
EPA - Environmental Protection Agency.
GMZ - Ground Water Management Zone.
ICLs - Interim Cleanup Levels.
MNA - Monitored Natural Attenuation.
NCP - National Contingency Plan.
NHDES - New Hampshire Department of Environmental Services.
O&F - Operational and Functional.
O&M - Operations and Maintenance.
PDI - Pre-Design Investigation.
POP - Project Operations Plan.
POTW - Publiclly-owned Treatment Works.
RCRA - Resource Conservation and Recovery Act.
RD/RA - Remedial Design/Remedial Action.
RFFS - Revised Focused Feasibility Study.
THF - Tetrahydrofuran.
VOC - Volatile Organic Compound.
WMA - Waste Management Area.
WP - Work Plan.

Appendix B: Dover Municipal Landfill
Revised Draft Remedial Design / Remedial Action Statement of Work
2007

1. INTRODUCTION AND PURPOSE

This Remedial Design/Remedial Action Statement of Work (the "2007 SOW") further defines the activities and deliverables to be performed by the Work Settling Defendants for Remedial Design/Remedial Action ("RD/RA") activities and Operation and Maintenance ("O&M") under the Amended Consent Decree, Civil Action No. 1:92-CV-406-N (the "Amended Consent Decree"), to be lodged with this 2007 SOW in the U.S. District Court for the District of New Hampshire, and pursuant to the 2004 Amended Record of Decision (the "2004 AROD") and the appropriate portions of the 1991 Record of Decision (the "1991 ROD") for the Dover Municipal Landfill Superfund Site, issued by the United States Environmental Protection Agency ("EPA").

EPA, the State of New Hampshire Department of Environmental Services ("NHDES"), and the Work Settling Defendants signed a Consent Decree, which was entered by the Court on July 23, 1993 (the "1993 Consent Decree"), agreeing to perform the work set forth in the Statement of Work (the "1993 SOW") that was attached as Appendix B to the 1993 Consent Decree (the 1993 SOW is currently attached to the Amended Consent Decree as Appendix B-1). The Source Control landfill cap portion of the 1991 ROD remedy was designed for the Site; however, investigations during and following that design demonstrated that an alternate Source Control remedy could be as effective or even superior to the cap. Following a Revised Focused Feasibility Study (the "RFFS") proposed by the Work Settling Defendants and EPA's Addendum to the RFFS, EPA issued the 2004 AROD revising the Source Control component of the 1991 ROD on September 30, 2004.

This 2007 SOW supersedes the 1993 SOW that was attached to the 1993 Consent Decree as Appendix B; however, the following sections of the 1993 SOW are incorporated into this 2007 SOW, as amended by the 2004 AROD and Amended Consent Decree, and as may be modified by the provisions and requirements within this 2007 SOW:

> Section C - *Overview of Remedy for Consolidation of Sediments in the Drainage Swale*, excepting disposal of sediments under the landfill cap, those sediments shall be disposed of off-site.
>
> Section E - *Overview of Remedy for Treating Contaminated Groundwater*, specifically the relevant portions of Sections E.2. and E.3., *Technology for Restoring Groundwater* and *Standards for Contaminated Groundwater Collection/Extraction and Treatment System*, respectively.
>
> Section F - *Administrative Review of Certain Performance Standards*, the entire section applies with the exception of those elements amended by the 2004 AROD.

Section J (listed as Section I in the text) - *Institutional Controls*, the entire section applies.

Attachment 4 - *Construction Quality Assurance/Quality Control Plans* ("CQAPPs"), this attachment is retained and shall be performed for each remedial action performed at the Site regardless of whether or not a contingency remedy is invoked.

Additionally, if a contingent remedy is required to be performed as outlined in Section 9.1 herein, the following sections of the 1993 SOW are also incorporated into the 2007 SOW:

Section D - *Overview of Remedy for Capping the Landfill*, the entire section applies as presented in the draft 100% design of the 1991 ROD remedy and as required by any updates as outlined by this 2007 SOW. EPA held in abeyance approval of the 1996 Draft 100% Source Control Remedial Design based on the potential changes that may occur over the life of the pilot study. Therefore, implementation of the contingent Source Control remedy would require an updating of the 1996 Draft 100% Design prior to implementation.

Section E - *Overview of Remedy for Treating GroundWater*, for those portions applying to the landfill cap and groundwater/leachate collection/extraction and treatment system as presented in the draft 100% design of the 1991 ROD remedy and as required by any updates as outlined by this 2007 SOW.

Section G - *Remedial Design*, the entire section applies with the exception of those items completed through previous work or which are precluded by the 2004 AROD.

Section H - *Remedial Action*, the entire section applies to implementation of the draft 100% design of the 1991 ROD remedy and as required by any updates as outlined by this SOW.

Section I - *Long-Term Operation and Maintenance*, the entire section applies to implementation of the draft 100% design of the 1991 ROD remedy and as required by any updates as outlined by this 2007 SOW.

Attachment 2 - *Dover Municipal Landfill Waste Management Area and Groundwater Extraction System Capture Zone* is retained for use with the Source Control contingent remedy.

The Work Settling Defendants shall perform all Pre-Design Investigations ("PDIs"), RD/RA and O&M activities set forth in the 2007 SOW unless otherwise specified by EPA. To the extent that there are conflicts between the 2007 SOW and applicable provisions of CERCLA or the NCP, CERCLA or the NCP shall control. Final Work Plans, approved or modified by EPA, after reasonable opportunity for review and comment by NHDES, will be deemed to address the requirements of the 2007 SOW and will be the controlling documents governing project

activities, deliverables, and schedules implemented pursuant to the Amended Consent Decree and the 2007 SOW.

2. DEFINITIONS AND CONVENTION

In addition to those definitions contained in the Amended Consent Decree the following definitions shall apply to this 2007 SOW:

2.1 "Constituents of Concern" or "COCs" shall mean the contaminants listed in Table 11of the Amended Record of Decision issued in September 2004, i.e., arsenic, vinyl chloride, benzene, trichloroethene, tetrachloroethene, methylene chloride, 1,1-dichloroethene, 1,2-dichloroethane, cis-1,2-dichloroethene, chloroethane, tetrahydrofuran, acetone, methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK), and toluene.

2.2 "Contingent Remedy" shall mean those remedies conducted to attain performance standards if EPA determines that the remedial action for either the Source Control or Management of Migration for the Eastern Plume as defined in the 2004 AROD have failed. The contingent remedies for the Source Control and Eastern Plume Management of Migration are described in Sections 3, 6, 8 and 9 of this 2007 SOW.

2.3 "Design" or "**Remedial Design**" shall mean an identification of the technology and its performance and operational specifications, in accordance with all applicable federal, state, and local laws, including, but not limited to:

2.3.1. All computations used to size units, determine the appropriateness of technologies, and the projected effectiveness of the system.

2.3.2. Materials handling and system layouts for any excavation and treatment of soils, if required; the extraction and treatment of ground water, or in-situ treatment of soil and ground water, if required; and the decontamination and demolition of facilities including size and location of units, treatment rates, location of electrical equipment and pipelines, and treatment of effluent discharge areas.

2.3.3. Scale drawings of all system layouts identified above and including, but not limited to, excavation cross-sections, well logs and geologic cross-sections.

2.3.4. Quantitative analysis demonstrating the anticipated effectiveness of the Remedial Design to achieve the Performance Standards.

2.3.5. Technical specifications which detail the following:

2.3.5.1. Size and type of each major component.
2.3.5.2. Required performance criteria of each major component.

2.3.6. Description of the extent of ambient air monitoring needed including equipment, monitoring locations, and data handling procedures; and

2.3.7. Description of access, land easements and/or other institutional controls required, to be supplied with the construction plans and specifications.

2.4 "Drainage Swale" or the "Swale" shall mean the waterway that begins at Tolend Road (where the Southern and Northern Perimeter Ditches separately discharge) and flows northward to the Cocheco River. The Drainage Swale is shown on Figure 2, herein.

2.5 "Eastern Plume" shall have the same meaning as in the 1993 Consent Decree and is also shown schematically on Figure 2, herein. The Eastern Plume is defined as the contaminated ground water which flows towards and discharges to the Cocheco River, and not contaminated ground water that flows towards the Bellamy Reservoir.

2.6 "Groundwater Management Zone" or the "GMZ" is an area defined by the extent of ground water contamination pursuant to State of New Hampshire Administrative Rule Env-Or 602.13, as amended. For purposes of this 2007 SOW, the GMZ will include the subsurface volume in which ground water associated with the landfill contains constituent concentrations that exceed ICLs.

2.7 "Interim Cleanup Levels" or "ICLs" are target cleanup levels for the COCs identified in Table 11 of the Amended Record of Decision issued in September 2004.

2.8 "Monitored Natural Attenuation" or "MNA" shall mean the reduction of contaminants in ground water through natural mechanisms in the undisturbed aquifer underlying the Site. MNA will be implemented, operated and evaluated in accordance with *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites* (OSWER Directive 9200.4-17P, April 21, 1999) and other guidance accepted by EPA.

2.9 "Northern Perimeter Ditch" referred to as the Northern Drainage Ditch in the 2004 AROD and also referred to as the "Northern Ditch" shall mean the waterway that drains the northwestern and northern edges of the landfill, flowing first northeast and then east. The Northern Ditch enters a subsurface culvert pipe on the west side of Tolend Road, then traverses southeasterly under Tolend Road and discharges to a network of roadside ditches along the north side of the intersection of Tolend and Glen Hill Roads, which discharge through a culvert under Glen Hill Road into the west end of the Drainage Swale. The Northern Ditch is shown on Figure 2, herein.

2.10 "Performance Standards" shall mean those cleanup standards, standards of control, cleanup levels, treatment standards, Institutional Controls, and other substantive requirements, criteria or limitations set forth in Section 4 of this 2007 SOW and in Section K of the 2004 AROD.

2.11 "Response Action" shall mean those actions taken to reduce or eliminate risk or to ensure the effectiveness of other remedial components.

2.12 "Source Area" shall mean areas of ground water or soil contamination that will, or may have the potential to, cause ground water to migrate outside the Waste Management Area with COCs at concentrations above ICLs.

2.13 "Southern Perimeter Ditch" referred to as the Southern Drainage Ditch in the 2004 AROD and also referred to as the "Southern Ditch" shall mean the waterway that runs along the southern and eastern perimeter of the landfill. The Southern Ditch flows eastward and then northward, enters a subsurface pipe beneath Tolend Road and discharges to the Swale. The Southern Ditch is shown on Figure 2, herein.

2.14 "Southern Plume" shall have the same meaning as in the 1993 Consent Decree and is also shown on Figure 2, herein.

2.15 "Waste Management Area" or the "WMA" shall mean both the horizontal limit and that limit projected vertically into the subsurface of the area in which waste still exists at the Site.

2.16 "Work" shall mean all activities Work Settling Defendants are required to perform under the Amended Consent Decree, the 2004 AROD, and this 2007 SOW.

Figure 1
Location of Site. The landfill is shown in red at the center of the USGS topographic map. The main features surrounding the site are noted.

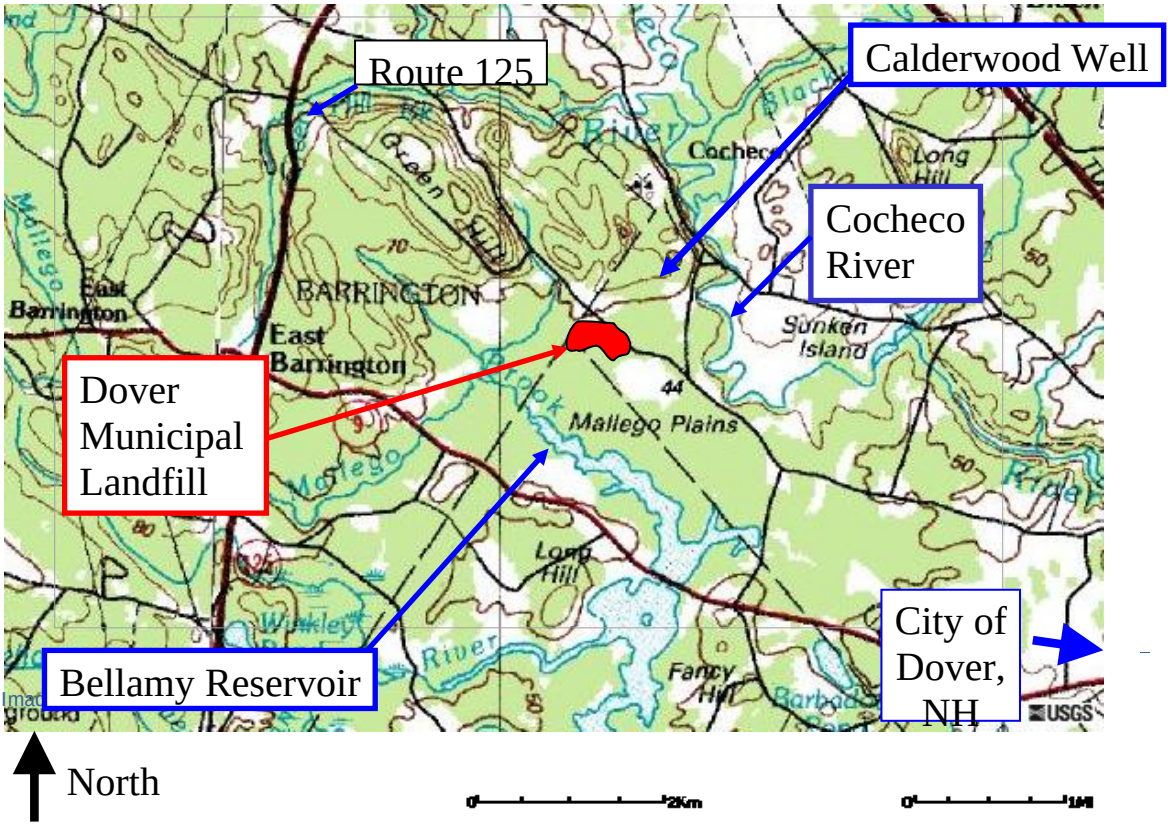
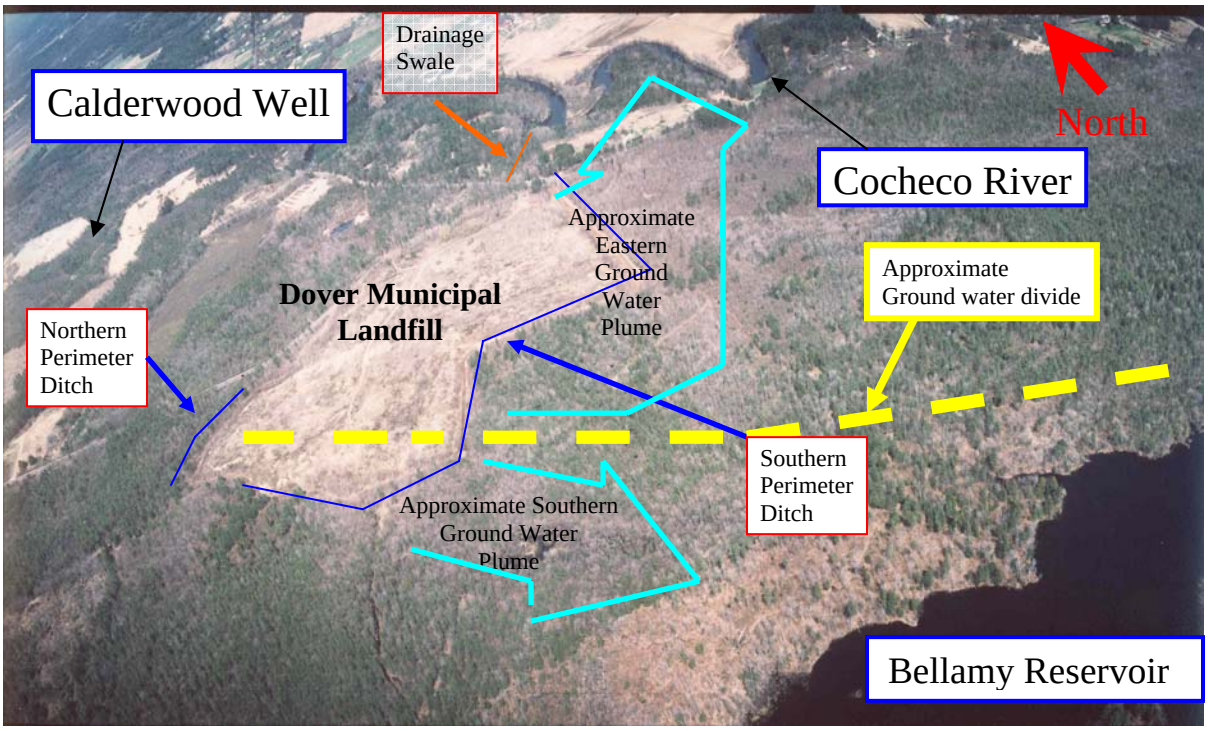


Figure 2
Site Features. The landfill is the light-colored area enclosed by the Northern and Southern Perimeter Ditches. A thin blue line is superimposed over the location of the Northern and Southern Perimeter Ditches for clarity.



EPIC photo, May 7, 1992

3. OVERVIEW OF THE SELECTED REMEDY

EPA selected the Mixed Alternative in the 2004 AROD as providing the best balance between the nine criteria to restore the impacted ground water, source areas and sediments, and to evaluate potential indoor air risks associated with the Site. Section K.1. in the 2004 AROD describes the activities to be performed with respect to Source Control and Management of Migration, as well as addressing issues such as contaminated sediments and indoor air. Section X of the 1991 ROD further describes the contingent remedies for the Source Control and Eastern Plume Management of Migration components of the 2004 AROD. The designs for the landfill cap were presented in the draft 100% Remedial Design Report completed by Golder & Associates, Inc. ("Golder") in December 1996 and may have to be modified by updates as required by this 2007 SOW.

The 2004 AROD also identified data gaps and set schedules for acquiring information through several PDIs. The schedules for delivery of the results of these PDIs are contained in Section 4.8.8., herein. Below is an overview of the major components of the remedy to be performed by the Work Settling Defendants arranged in the sections where they are discussed in this 2007 SOW.

<u>Section 5 - Sampling, Assessment and Remedial Response Action</u>
This section contains several elements that are not readily identified with either the Source Control or Management of Migration Remedies, but are important in managing risk at the Site. Section 5 of this 2007 SOW outlines, in detail, the required tasks with respect to:

- Characterizing sediments in the Southern Perimeter Ditch, Drainage Swale, and the Cocheco River and appropriately managing those sediments that either exceed promulgated standards, or create a human health risk, or impair ecological receptors.

- Characterizing potential human health risks from COCs associated with possible vapor intrusion of volatile organic compounds ("VOCs") into indoor air in residences overlying contaminated ground water, and if necessary, taking actions to reduce any risk.

- Determining the source of high concentrations of COCs detected in surface water in the northwest corner of the landfill.

- Completing a Ground Water Model and a Fate and Transport Model to guide future investigations and remedial efforts.

- Modifying the existing Environmental Monitoring Plan ("EMP") to integrate future remedy monitoring needs, comply with GMZ monitoring requirements, and adapt to changing conditions at the Site as remedial efforts are implemented.

- Establishing and modifying existing Institutional Controls as necessary to eliminate risk due to contact with COCs in all environmental media and to minimize adverse effects associated with remedial action taken at the Site.

Section 6 - Source Control

The 2004 AROD selected an air-sparging trench that will run along the edge of the landfill from the northeast corner, to the western edge. The trench will be constructed to key into the underlying marine clay. The trench will capture target COCs, including volatile organic compounds ("VOCs") and hydrocarbons, will degrade tetrahydrofuran ("THF"), and will capture arsenic. The air-sparging trench will not allow ground water with COC concentrations above ICLs to leave the WMA and will ultimately allow ground water beneath the landfill to reach interim cleanup levels. Section 6 will discuss the PDIs, and the design and construction phases of the air-sparging trench. This section will also discuss how monitoring and assessment of the air-sparging trench will occur, and how failure will be determined. The contingent remedy required for the air-sparging trench, if EPA determines it has failed, is discussed in Section 9.

Section 7 - Southern Plume Management of Migration
This portion of the site remedy is unchanged from the 1991 ROD; however, it is more clearly defined in Section 7 of this 2007 SOW. The Southern Plume Management of Migration remedy will capture or contain ground water with COC concentrations above ICLs migrating towards the Bellamy Reservoir and restore ground water in the Southern Plume through pump-and-treat. Extracted ground water will be treated to remove COCs; treatment will occur either on-site or at the Dover Publicly-Owned Treatment Works ("POTW"). If treatment occurs on-site, the treated ground water will be discharged in the area of the Southern Plume.

Section 8 - Eastern Plume Management of Migration
This portion of the site remedy is unchanged from the 1991 ROD, except that the 2004 AROD requires that the plume be monitored and otherwise addressed in accordance with EPA's guidance for MNA remedies. The Monitored Natural Attenuation ("MNA") remedy will restore ground water in the Eastern Plume that is currently discharging to the Cocheco River. If EPA determines that MNA will not restore ground water in the Eastern Plume in a reasonable time after the Source Control Remedy is Operational and Functional as described in Section 6.3.7 or that the Eastern Plume creates an unacceptable risk as described in Section 4.1.2, the contingent pump-and-treat remedy shall be implemented. The Eastern Plume contingent remedy is outlined in Section 9 of this document.

3. PERFORMANCE STANDARDS

The Work Settling Defendants shall design, construct, operate, monitor, and maintain the remedy in compliance with all ARARs identified in the 2004 AROD and those ARARs, as appropriate, identified in the 1991 ROD. In addition, the Work Settling Defendants shall secure and maintain

Institutional Controls on properties inside the GMZ precluding the use of ground water on those properties and prohibiting any activities that EPA determines will either create an exposure to impacted ground water that presents unacceptable risk or that may compromise the performance of either the Source Control or Management of Migration Remedies. At the conclusion of the remedy it is expected that hazardous waste in the landfill will no longer leach COCs into the ground water surrounding and beneath the landfill at concentrations that pose an unacceptable risk to either human health or the environment and that no cross-media contamination will occur.[1] Further activities at the landfill at that time will be subject to State of New Hampshire regulations. The Work Settling Defendants shall also attain the following Performance Standards at the Site:

4.1 Performance Standards for Ground Water Restoration within the GMZ

The goal of the remedy at the Site is cleanup of ground water impacted by COCs to meet ICLs and, ultimately, to concentrations that do not pose an unacceptable risk to human health and the environment throughout the GMZ and to comply with the USEPA clean closure policy (as also outlined on p. 77 of the 2004 AROD) in the WMA. The GMZ includes contaminated ground water within the waste, in the aquifer beneath the landfill, and in the existing contaminated plumes of ground water in the aquifer surrounding the Site. Interim Cleanup Levels ("ICLs") for ground water contamination are specified by EPA in Table 11 of the 2004 AROD. Although the concentrations in Table 11 of the 2004 AROD are consistent with ARARs, the levels are considered ICLs because the cumulative risk posed by these contaminants, after attainment of each ICL may still exceed EPA's and/or the State's risk management standards. If so, cleanup levels will be revised to ensure protectiveness. The Work Settling Defendants must demonstrate that they have achieved compliance throughout the GMZ according to the evaluation procedure defined in 40 C.F.R. § 264.97 and New Hampshire Rules Env-Or 600, as amended.

4.1.1. Standards for Ground Water Restoration in the Southern Plume

Ground water in this portion of the Site will be restored by extracting contaminated ground water, treating it to appropriate standards and then discharging that water in compliance with Section 4.5, herein. The ground water extraction and treatment system for the Southern Plume will be operated in a manner that will restore ground water in this portion of the aquifer to contaminant concentrations protective of human health and the environment within a reasonable time, and that will prevent further migration of contaminants exceeding ICLs to the Bellamy Reservoir. Failure to meet these standards, as determined by EPA, may require the performance of additional remedial action activities within the Southern Plume.

Using procedures defined in 40 C.F.R. § 264.97, the Work Settling Defendants shall demonstrate that the ICLs within the Southern Plume have been attained and maintained for a period of one year before requesting that the pump-and-treat system be deactivated. Once the system is

[1] Risk-Based Clean Closure. USEPA, Elizabeth Cotsworth, Acting Director, Office of Solid Waste, March 16, 1998.

deactivated, the Work Settling Defendants shall demonstrate through monitoring that the ICLs are being maintained within the Southern Plume until the Site-wide remedial action as described in Section 10 of this SOW, is complete. Once the system is deactivated and before issuance of a Certificate of Completion as described in Section 10.4, routine maintenance of the pump-and-treat system shall occur and system readiness shall be such that it can be re-activated and at full operation within 30 days of notice by EPA. If, at any time, EPA determines that monitoring data indicate ICLs are not being maintained within the Southern Plume, Work Settling Defendants shall resume active ground water pump-and-treat.

4.1.2. Standards for Ground Water Restoration in the Eastern Plume

Ground water in the Eastern Plume exceeds ICLs and is currently discharging to the Cocheco River. The ground water remedy for the Eastern Plume is Monitored Natural Attenuation ("MNA"). If the entire Source Control remedy up-gradient of the Eastern Plume is not Operational and Functional ("O&F") by October 2010, and if EPA determines that the Eastern Plume creates unacceptable current risks to human health or the environment in surface waters or sediments of the Cocheco River, or ground water, it may require that a contingent pump-and-treat remedy be implemented to restore ground water in the Eastern Plume and halt its discharge into the Cocheco River. The success of MNA is dependent upon operation of the Source Control remedy to halt the supply of contaminants from the Waste Management Area to the Eastern Plume. Once a segment of the air-sparging trench is O&F, EPA will assess whether MNA in the Eastern Plume will attain cleanup levels within what EPA determines is a reasonable time frame.

4.2. Performance Standards for the Landfill Cover

The landfill cover shall be maintained as it presently exists with natural vegetation except for designated Work areas described under a Work Plan or other deliverable required by this 2007 SOW. Success of the Source Control remedy depends on uninterrupted flushing through the waste material. The landfill cover shall be maintained to allow infiltration of precipitation to flow through the wastes, mobilizing COCs and conveying them to the air-sparging trench. Any designated Work areas shall be repaired with natural soils, stabilized by an inert material, and allowed to naturally re-vegetate if the Work in that area is finished or if no Work is proposed in that area for more than 3 months. Direct contact with solid or hazardous wastes in the landfill is to be prevented and exposures of such materials shall be promptly corrected. Results of previous air monitoring performed on top of the landfill indicated that air quality did not pose a risk to human health; accordingly, to ensure that persistent, unacceptable inhalation risks do not occur, air monitoring will be performed if the cover is disturbed by excavation and after the cover is replaced following closure of the excavation. Areas of erosion or where a lack of organic material prevents vegetative growth will be patched with soil and seeded with annual grass seed or covered by an erosion control mat sufficient to allow native vegetation to re-vegetate the disturbed surface. Invasive species will not be introduced in maintaining the landfill cover or in restoring areas disturbed by PDI and remedial action activities. To the extent practicable, invasive plant species encountered on, or in close proximity to the landfill, during construction or maintenance activities shall be removed from the areas within which construction or maintenance activities occur. If the contingent Source Control remedy (i.e., the landfill cap in

the 1991 ROD) is implemented, the Performance Standards in Section D.1. of the 1993 SOW shall apply.

4.3 Performance Standards for the Air Sparging Trench and Ground Water in the Air-Sparging Trench

For each segment of the air-sparging trench, interim cleanup levels ("ICLs") for all COCs will be met in all ground water exiting the trench. The air-sparging trench shall be maintained to intercept and treat all ground water with concentrations of COCs above ICLs emanating from the WMA and comply with the criteria in Section 6. The methods to determine and meet this standard are also explained in Section 6.

The precipitation of inorganic compounds or organic growths in the air-sparging trench and within the adjoining aquifer shall be monitored during conduct of the remedy and assessed at the conclusion of the remedy. Within the air-sparging trench, the goal is to determine the effectiveness of the remedy to treat or immobilize contaminants. Up-gradient and down-gradient of the air-sparging trench, the goal is to ensure that arsenic precipitates are not formed that will cause ICLs to be exceeded in the ground water in the future under expected post-remedy conditions.

During the performance of the remedy, the air sparging trench shall maintain hydraulic conductivity sufficient to capture, immobilize or destroy all COCs. To determine if potential clogging of the air-sparging trench is occurring, hydraulic conductivity will be monitored. If EPA determines that the trench is not treating contaminants sufficiently due to clogging of the trench materials or adjacent native soils, it may direct that the porous media in the air-sparging trench be excavated or that operational hydraulic conductivity be restored by other technologies proposed by the Work Settling Defendants and approved by EPA.

During performance of the remedy, monitoring of ground water geochemistry up-gradient and down-gradient of the air-sparging trench will be performed. The objective will be to evaluate redox conditions that affect precipitation of iron and arsenic-containing phases that may result in clogging of native aquifer materials up-gradient and down-gradient of the trench. Testing of aquifer solids may also be performed to support this evaluation. The standard is that arsenic-containing materials will not be allowed to precipitate in the adjacent native soils or aquifer matrix at concentrations that adversely affect performance of the air-sparging trench and that, when exposed to expected post-remedy environmental conditions, EPA determines may solubilize in aqueous concentrations that exceed ICLs for arsenic.

4.4 Performance Standards for the Excavation of Sediments

Ground water containing arsenic and iron discharges to the Northern and Southern Perimeter Ditches, the Drainage Swale, and the Cocheco River. On exposure to oxidizing conditions, arsenic and iron generally precipitate and form metalliferous sediments. Sediments containing predominantly arsenic and iron are located in the Northern and Southern Perimeter Ditches and Drainage Swale as well as in localized areas along the west bank of the Cocheco River down-

gradient of the landfill. Figure 2 displays the location of the Perimeter Ditches and Drainage Swale as well as the Cocheco River.

In conducting the excavation of sediments, the Work Settling Defendants shall take every measure practicable to avoid adverse impact on and disturbance to wetland and floodplain areas and the Cocheco River; Work Settling Defendants shall also minimize adverse impact to the flora and fauna in these areas to the maximum extent practicable. In performing the excavation, Work Settling Defendants shall use appropriate engineering controls such as coffer dams, silt barriers and/or straw bales, and erosion control matting to prevent erosion or isolate the sediments and to minimize suspension and downstream transport of these materials. Following completion of the sediment excavation, the Work Settling Defendants shall restore wetlands and floodplains adversely affected by the Work to a condition similar to that of the immediately adjacent undisturbed wetlands or floodplains.

The Work Settling Defendants shall conduct all activities involving the wetlands and floodplains in a manner consistent with Executive Orders 11990 and 11988, and 40 C.F.R. Part 6, Appendix A. The Work Settling Defendants shall conduct all activities in the wetlands and floodplains in a manner utilizing the best practicable alternative that will have the least adverse impact on the aquatic ecosystem and the environment, consistent with and pursuant to all ARARs identified in Appendix A of the 2004 AROD.

The Work Settling Defendants shall test the soils/sediments remaining after excavation by analyzing representative samples of those soils/sediments as outlined in Section 5.1.3., herein.

4.4.1. In compliance with the 1991 ROD, sediments in the Perimeter Ditches and Drainage Swale above the 50 ppm arsenic cleanup level will be excavated and disposed of at an approved off-site facility. Portions of the Perimeter Ditches surrounding the landfill may be excavated and backfilled as part of the Source Control Remedy; therefore no future monitoring of sediments is required for those segments. However, portions of the Perimeter Ditches and Drainage Swale that are not back-filled may still accumulate arsenic-contaminated sediments; therefore, periodic monitoring of those sediments will be required. Should sediment with concentrations exceeding the 50 ppm arsenic cleanup level become re-deposited, they shall be excavated and disposed of at an approved off-site facility. In those areas where wetlands are disturbed by remedial actions, the Work Settling Defendants shall map the extent of the disturbance and provide appropriate mitigation within that watershed, including, if appropriate and practicable, in-place restoration.

4.4.2. Cocheco River sediments will be assessed during the Sediment PDI. Thereafter, sediments at the locations sampled during the Sediment PDI and at the confluence of the erosional swale located southeast of the B-9 well cluster with the river, shall be sampled annually by the Work Settling Defendants until three sets of sediment data, including those obtained during the Sediment PDI have been collected. At the end of the three year period, EPA will evaluate the results with respect to human health and ecological risk. If EPA determines from this risk evaluation that annual sediment sampling is no longer necessary, then sediment sampling shall occur at five-years intervals to support 5-Year Reviews required at the Site. If EPA determines from this risk evaluation that sediments that pose an unacceptable risk to human

health or the environment, then EPA will determine the proper action to be taken by the Work Settling Defendants to minimize or eliminate that risk.

4.5 Performance Standards for Discharges of Treated Ground Water

Ground water, after extraction from beneath the landfill or from the aquifers surrounding the landfill, shall be treated to standards appropriate to the media to which it will be discharged. If discharge is to surface waters, the treated water shall meet all Federal and State of New Hampshire surface water discharge standards. If discharge is to a Publicly-Owned Treatment Works ("POTW"), the discharge shall meet the pre-treatment requirements of that POTW.

4.6 Performance Standards for Emissions to Air

Air discharges from any remedial actions and/or treatment processes at the Site shall meet all Federal and State of New Hampshire ARARs for air emissions. Indoor air concentrations of COCs originating from site ground water into structures overlying the Eastern Plume shall not pose an unacceptable risk to inhabitants.

4.7 Performance Standards for Institutional Controls and Access Restrictions

A GMZ shall be proposed and established prior to the source control or extended plume remedies becoming O&F then monitored during active treatment to ensure compliance with State Groundwater Management Permit Rule Env-Or 607, as amended. Institutional controls shall be established restricting the use of ground water for any purpose inside the GMZ and restricting activities on or near the landfill until the ground water at the Site is restored to meet Performance Standards as set forth in Section 4.1. of this SOW. These restricted uses and activities include the installation and operation of any wells and excavation into the water table or waste materials located within the GMZ. With respect to the landfill surface, an activity and use restriction shall be placed on the WMA, in accordance with Env-Or 608, as amended, that prohibits activities on the landfill surface that may create a human health or environmental risk or that may negatively affect the Source Control or Management of Migration remedies, until the cleanup is complete. The Work Settling Defendants shall notify the public through signage and public notice of areas where EPA determines that exposure to sediment or surface water may pose an unacceptable risk to the public through activities performed pursuant to Section 4.4.2. of this SOW.

With respect to the ground water institutional controls, as long as Dover and Madbury maintain in effect municipal ordinances prohibiting the use of ground water in the GMZ or equivalent protections, and as long as the Groundwater Management Permit issued pursuant to the requirements of State Groundwater Management Permit Rule Env-Or 607 (which became effective on February 1, 2007) or equivalent rules remains in effect, EPA will not require the execution and recordation of easements on properties where public water supply is available and which are owned or controlled by persons other than any of the Settling Defendants.

4.8 Deliverables and Submissions

Below are the general requirements for all Work Plans ("WPs") required by this 2007 SOW. One critical element of all Work Plans is the Project Operations Plan ("POP"). The POP is comprised of several documents listed in Attachment A. Because some of these documents that form the POP will be identical for all phases of Work, while others may require customization, each Work Plan shall contain the POP documents that are specific to that Work Plan and will reference those POP documents. A critical document contained in the POP is a Quality Assurance Project Plan ("QAPP"). The Work Settling Defendants have submitted, and EPA has approved a QAPP that regulates the data collection at the Site.[2] Investigations or methods not approved under the existing QAPP that are required at the Site will either require an amendment to the existing QAPP or a new QAPP as appropriate. For Work performed pursuant to this 2007 SOW, QAPP(s) that are approved or modified by EPA will be deemed to comply with the provisions of Paragraph 23 of the Amended Consent Decree.

4.8.1. Work Plans and all other deliverables shall be submitted to EPA and the State in accordance with Section XI of the Amended Consent Decree for any Work conducted under the Amended Consent Decree. The Work Plans shall discuss the techniques, methods, and results expected under each investigation or for the Work to be conducted. Each Work Plan shall contain a detailed description of all activities to be undertaken in connection with each investigation or Work to be conducted. The detailed descriptions shall contain a statement of purpose and objectives, identification of the specific activities necessary to complete the task, and a detailed schedule for the performance of the task. The Work Plans shall contain additional details as they bear on that particular task and are explained in each of the sections below. The Work Plans will reference the necessary Project Operations Plan components noted in Section 4.8.2. below, including the Quality Assurance Project Plan ("QAPP"), Site Management Plan ("SMP"), and Health and Safety Plan ("HASP") and whether those components are present in other Work Plans/POPs or are new and attached to that Work Plan. The Work Plans shall also contain, at a minimum:

4.8.1.1. A description of all activities necessary to implement all components of the task. The described activities must include but are not limited to the following additional information:

4.8.1.1.1. Award of project contracts, including all agreements with off-site treatment and/or disposal facilities.

4.8.1.1.2. Contractor mobilization/Site preparation activities, including construction of necessary support zones, staging areas, utility hookups, and any other necessary facilities.

[2] EPA has reviewed and approved a QAPP dated March 30, 2005 covering investigations currently under-way.

4.8.1.1.3. The location of construction, work areas, as well as a description of transportation routes, and any necessary material and equipment. The description shall designate work areas and describe how construction in those areas will comply with ARARs and substantive regulations.

4.8.1.1.4. Sample collection, preservation, management, and analysis procedures for all media that will be tested or monitored in conjunction with PDIs or remedial action.

4.8.1.1.5. The methods of construction, shake-down, and start up of any remediation systems.

4.8.1.1.6. The methods of demobilization of all treatment facilities, wells, work areas, or investigation residuals upon completion of the Work or investigations. This description shall also describe how the areas altered by the Work will be restored to pre-work conditions.

4.8.1.2. A detailed schedule for the completion of all activities, including the required deliverables, and an identification of milestone events in the performance of the Work Plan tasks.

4.8.1.3. An outline of any deliverable that will be produced from the data sufficient to provide an understanding of the scope of the deliverable that will result from the Work or investigation.

4.8.2. The documents that comprise a Project Operations Plan ("POP") shall either be referenced from previous documents or be prepared to accompany each Work Plan in support of all field activities and investigations conducted under this 2007 SOW as described in Section 4.8.1. Each Work Plan's POP will be prepared in accordance with Attachment A of this 2007 SOW.

4.8.3. Any revised submittals shall contain a letter restating EPA's full comment and how that comment was addressed. All submittals and responses by the Work Settling Defendants shall refer to the specific location where supporting data are presented.

4.8.4. Implementation of Work will be performed as set forth in the schedules contained in each approved or modified deliverable. Delivery of draft and final documents will be according to the schedule in the approved or modified Work Plan.

4.8.5. All plans, deliverables and reports identified in the 2007 SOW for submission to EPA shall be delivered to EPA and NHDES in accordance with the Amended Consent Decree.

4.8.6. The Work Settling Defendants shall submit four copies of any plan, deliverable, or report to EPA for review and approval and one copy to NHDES for review and comment. One electronic copy of the text and to the extent practical, any and all tables and figures, shall be submitted in an editable format compatible with EPA hardware and software and shall accompany each deliverable. A second electronic copy of the deliverable in a locked format will

be submitted at the same time to ensure that there is an unedited record version of the deliverable. In an effort to increase public access and decrease file storage requirements, NHDES requests that deliverables approved by EPA, following a reasonable opportunity for review and comment by NHDES, also be submitted electronically and adhere to the format and submittal process described at:

http://www.des.nh.gov/orcb/doclist/Electronic_Submittal_Guidelines.pdf

At EPA's request, the Work Settling Defendants shall deliver an additional copy as an unbound, photo-ready original with two-sided printing and marked "Draft" in bold type in the header of each page.

4.8.7. Any draft deliverable transmitted to USEPA and NHDES shall include, in a prominent location in the document, the following disclaimer: "Disclaimer: This document is a DRAFT document prepared by the Work Settling Defendants under a government Consent Decree. This document has not undergone formal review by the U.S. Environmental Protection Agency and New Hampshire Department of Environmental Services. The opinions, findings, and conclusions, expressed are those of the author and not those of the U.S. Environmental Protection Agency and the New Hampshire Department of Environmental Services." All draft deliverables shall contain the following "Draft – Work in Progress" in either the header or footer of the document. Draft deliverables will not be made available to the public prior to completion of EPA review and approval, following a reasonable opportunity for review and comment by NHDES. Exceptions may be granted if all parties mutually consent to release documents to stakeholders with an active interest.

4.8.8. The schedules for completion of deliverables and required activities shall be based on the Amended Consent Decree, this 2007 SOW, the schedules in the approved or modified Work Plans, and, as appropriate in the contingent remedy, the 1993 Consent Decree and 1993 SOW. The schedules in approved Work Plans will control the conduct of the Work.

5. SAMPLING, ASSESSMENT AND RESPONSE ACTIONS

The objectives of the actions in this section are to locate and eliminate present risks at the Site. The actions herein encompass several elements of the remedy that do not fall neatly into the category of Source Control or Management of Migration, but for clarity in the 2004 AROD were described as part of one category or the other. These elements are key to managing risk at the Site and in reducing the time and costs of remediation. These Pre-Design Investigations ("PDIs") will also better determine future monitoring needs, may assist in the design of the other elements of the 2004 AROD, or provide information to support additional Response Actions. Prior to the lodging and entry of the Amended Consent Decree, several of these PDIs have already been initiated and executed by the Work Settling Defendants. The performance of these PDIs shall be governed by the schedules set forth in the applicable, approved or modified Work Plans.

5.1 EcoToxicity and Human Health Assessment of the Cocheco River PDI

The Work Settling Defendants shall develop and implement the ECOTOXICITY AND HUMAN HEALTH ASSESSMENT OF THE COCHECO RIVER PDI WORK PLAN (the "Cocheco Sediment PDI - WP") for the conduct of sediment sampling in the Cocheco River. Implementation of the Cocheco Sediment PDI-WP will result in the ECOTOXICITY AND HUMAN HEALTH ASSESSMENT OF COCHECO RIVER SEDIMENT PDI REPORT (the "Cocheco Sediment PDI Report"). The draft Cocheco Sediment PDI Report will be delivered to EPA and NHDES in accordance with the schedule established in the Cocheco Sediment PDI-WP approved or modified by EPA.

In determining the risk to the environment, the Work Settling Defendants shall conduct the second tier of the ecological assessment protocols of EPA and NHDES to determine if sediments in the Cocheco River are harmful to aquatic life (i.e., sediment toxicity bioassays). If the results of the second tier ecological assessment are determined by EPA to indicate toxicity, the Work Settling Defendants will perform the third tier of the ecological assessment protocol (i.e., benthic community assessment). Sampling will also assess the risk to human health from arsenic in sediments as well as the transport and fate of arsenic in the Cocheco River. The following sub-sections describe how the Work Settling Defendants will perform these actions:

5.1.1. Sampling

For the Cocheco River, sampling will consist of a sufficient number of samples to determine the impact of Site ground water and surface water discharge to the sediment of the Cocheco River. Sufficient sediment samples shall be taken for use in sediment toxicity tests to be performed in accordance with the ecological assessment protocol of EPA and NHDES.

5.1.2. Assessment

The Work Settling Defendants shall prepare the Cocheco Sediment PDI Report for the Cocheco River based on the results of the sampling, and will summarize the results of all sediment and bioassay testing.

For the Cocheco River, the Sediment PDI Report shall contain sufficient information to prepare risk assessments for the sediments and to evaluate the toxicity to ecological and human receptors. The triad approach in the State of New Hampshire's Guidance Document for the Evaluation of Sediment Quality (WD-04-9, 2004) will be used to accomplish the sediment ecological risk assessment. This approach includes chemical analysis, sediment toxicity bioassays, and community assessments as warranted. If the results of the testing of any sediments indicate that the sediments are toxic in accordance with criteria established in the draft NHDES guidance on sediment quality evaluation or the results are inconclusive, EPA, after consultation with NHDES, may direct the Work Settling Defendants to perform a Tier 3 assessment of biota in the Cocheco River. If a Tier 3 assessment is required, the Work Settling Defendants shall submit an addendum to the Cocheco River Sediment PDI-WP that describes the methods to be employed and the activities to be performed to accomplish the Tier 3 assessment.

5.1.3. Response Actions

Based on the results of the Cocheco River Sediment PDI Report and any other sediment sampling, EPA will determine if any Response Actions, other than institutional controls and access restrictions as outlined in Section 4.7., herein, are required based upon unacceptable human health or ecological risk and, if so, will convey the project scope and schedule. If a Response Action is required, Work Settling Defendants shall prepare a Work Plan to support such Work. The Work Plan shall evaluate appropriate remedies and propose actions to address those sediments that exceed ecological risk or exceed human health risk criteria. Once EPA determines that a Response Action is required, the Work Settling Defendants shall prepare a *Cocheco Sediment Response Action Work Plan* (CSRA-WP) to conduct the Response Action that incorporates the Performance Standards of Section 4.4. In addition to those requirements in Section 4.8, the SRA-WP shall describe sediment sampling to confirm that the sediment remedy continues to be protective of human health and ecological receptors. At the conclusion of the Response Action, the Work Settling Defendants shall prepare a *Cocheco Sediment Response Action Summary Report* that will describe the nature and scope of the sediment remedy and the confirmation testing results.

5.1.4. Future Monitoring

The Cocheco River shall be sampled on an annual basis as outlined in Sections 4.4.2 and 5.1 Sampling results shall be reported in the annual report described in Section 5.7., herein. If any Response Actions are necessary, due to either human health or ecological risks they shall be performed in accordance with Section 5.1., herein.

5.2 Indoor Air PDI

The Work Settling Defendants shall develop and implement an INDOOR AIR PDI WORK PLAN (the "Indoor Air PDI-WP").

5.2.1. Sampling

This PDI will be conducted in the area of those residences that overlie or are in close proximity to the Eastern Plume, following appropriate indoor air guidance.[3] The goal is to determine if volatile COCs in the contaminated ground water beneath the residences on Glen Hill and Tolend Roads are entering those residences in vapor form at concentrations that pose an unacceptable risk to inhabitants. The Indoor Air PDI-WP will describe the number and types of samples and analyses. The sampling program will address conditions in the vicinity of all residences on Tolend Road and Glen Hill Road that overlie the Eastern Plume.

[3] Draft *Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (Subsurface Vapor Intrusion Guidance), USEPA, November 26, 2002, and *Vapor Intrusion Guidance*, NHDES, July 2006.

5.2.2. Assessment

Based on the results of samples and analysis from the implementation of the Indoor Air PDI-WP, the Work Settling Defendants shall submit the INDOOR AIR PDI REPORT (the "Indoor Air PDI Report") that will describe the results of sampling in accordance with the approved Work Plan. If EPA determines that a possible pathway exists, USEPA will require additional investigation and assessment of potential human health risks associated with indoor air exposures. The Indoor Air PDI Report will be delivered in accordance with the schedule established in the Indoor Air PDI-WP approved or modified by EPA.

5.2.3. Response Actions

Based on the results of the Indoor Air PDI Report, EPA will determine if any Response Actions are required to address human health risks and convey the project scope and schedule to the Work Settling Defendants. If a Response Action is required, Work Settling Defendants shall prepare an *Indoor Air Response Work Plan* (IAR-WP) to conduct the Response Action that incorporates the Performance Standards of Section 4.6., herein, to support such Work. At the conclusion of the Response Action, the Work Settling Defendants shall prepare an *Indoor Air Response Action Summary Report*.

5.2.4. Future Monitoring

The Work Settling Defendants shall continue to assess any potential impacts to indoor air on an annual basis under EPA and the State guidelines for assessing indoor air. Sampling results shall be reported in the annual report described in Section 5.7., herein. If any Response Actions are warranted, they shall be performed in accordance with Section 5.2.3.

5.3 Northwest Landfill PDI

The small, intermittent stream in the northwest corner of the landfill (the Northern Perimeter Ditch), historically sampled as point SW-E, has surface water concentrations of volatile organic contaminants such as *cis*-1,2 dichloroethylene and vinyl chloride that indicate a potential source of high ground water concentrations in the northwest corner of the landfill. The Northwest Landfill PDI-WP will result in the Northwest Landfill PDI Report that outlines what contamination is present and the potential Response Actions to address that contamination.

5.3.1. Sampling

Following approval or modification of the Northwest Landfill PDI-WP, the Work Settling Defendants shall collect sufficient surface water, ground water, sediment, and soil samples to determine the source(s) of contamination in the area up-gradient of sampling point SW-E.

5.3.2. Assessment

The Work Settling Defendants shall prepare the Northwest Landfill PDI Report that will summarize the results of the sampling and analysis and describe the nature and location of Source Area(s).

5.3.3. Response Actions

If EPA determines that a Response Action is required, the Work Settling Defendants shall prepare a *Northwest Landfill Response Action Work Plan* (NWLFRA-WP). The NWLFRA-WP shall evaluate potential methods to address high concentrations of contaminants either through excavation or other *ex situ* or *in situ* treatment technologies. The NWLFRA-WP shall describe the sampling needed to confirm that the Response Action has achieved a significant reduction in contamination and that Performance Standards will be attained in a reasonable time. At the conclusion of the Response Action, the Work Settling Defendants shall prepare a *Northwest Landfill Response Action Summary Report* that will describe the nature and scope of the Response Action undertaken and future actions and monitoring.

5.4 Ground Water Model

A draft of this model is currently contained in Appendix N of the January 2004 Draft Revised Focused Feasibility Study (RFFS).[4] The Work Settling Defendants will take the information in Appendix N and, in consultation with representatives of USEPA and NHDES, revise it to address comments expressed by the Agencies during the May 16, 2005 meeting between the Agencies and the Work Settling Defendants for design of the 2004 AROD remedy components. Additionally, the Work Settling Defendants will review prior information and, if necessary, collect additional field data in accordance with other PDIs conducted at the Site to determine and verify parameters employed in the model. The objective will be to construct a model that simulates the effect on ground water flow of constructing and operating the Source Control remedy and, in the Southern Plume, constructing and operating a pump and treat system. The Ground Water Model will be important in designing the air-sparging trench and Southern Plume ground water extraction and treatment system.

5.5 Fate and Transport Model

A draft of a Fate and Transport Model for the Site currently accompanies the Ground Water Model in Appendix N of the RFFS. The Work Settling Defendants will take the information in Appendix N and revise it according to comments from EPA and NHDES provided at the May 16, 2005 meeting and in previous correspondence for design of the 2004 AROD remedy components. The objective of this model will be to simulate the fate of COCs in ground water beneath the landfill and in the Eastern and Southern Plumes. The Fate and Transport model will

[4] GeoInsight, Draft Revised Focused Feasibilty Study, January 30, 2004.

be important in the design and operation of the air-sparging trench and Southern Plume ground water extraction and treatment system.

5.6 Model Data Acquisition

If field activities are necessary to obtain data or inputs for the Ground Water and for the Fate and Transport Models, the Work Settling Defendants shall consult with EPA and NHDES regarding the data to be collected and its quality.

5.7 Site-Wide Environmental Monitoring Program

The current Environmental Monitoring Program (the "EMP") has been in use for more than 12 years. The EMP must be updated with respect to the media to be monitored, the types of analysis, and frequency of sampling. The Work Settling Defendants shall develop a revised EMP (the "REMP") based on existing information and from available results of the PDIs being performed. It is expected that sampling will focus on the migration of contaminants from the Site in ground water, sediments, air, and surface water.

A draft REMP should be prepared for submission to EPA for review and approval within 12 months after the Regional Administrator signs the Amended Consent Decree. Thereafter, it should be re-examined and modified every two years, at a minimum, or as directed by EPA. Results from the REMP shall be submitted to EPA in an annual report titled DOVER LANDFILL ENVIRONMENTAL MONITORING REPORT, 200X (the "REMP Annual Report") for review and comment. The deadline for submission of the first REMP Annual Report shall be one year after EPA approves or modifies the REMP.

The REMP Annual Reports shall contain the results of all monitoring conducted in the past year and contain a tabular comparison of that year's sampling with all previous annual monitoring results. This includes physical inspections and evaluations of the effectiveness of any Response Actions taken at the Site or other investigations, and any wetlands/floodplain restoration and maintenance of the wetlands/floodplain. The results of wetland restoration monitoring shall be described with recommendations for meeting the Performance Standards in Section 4.

5.8 Institutional Controls

In accordance with Section X of the 1993 Consent Decree, Section J of the 1993 SOW (listed as Section I in the text), and 2004 AROD, the Work Settling Defendants shall secure and maintain Institutional Controls at the Site.

At least once per year, the Work Settling Defendants shall make reasonable efforts to ascertain whether residences in areas subject to institutional controls are in compliance with applicable control requirements and shall send an ANNUAL INSTITUTIONAL CONTROL VERIFICATION LETTER REPORT (the "Annual IC Letter Report") to EPA and NHDES certifying that Institutional Controls, including the Dover and Madbury municipal ordinances prohibiting the use of ground water or equivalent protective measures, remain in effect and

describing the findings of these efforts. Any time the Work Settling Defendants know, or have reason to believe, that a violation of the Institutional Controls is occurring they shall notify EPA within 24 hours and take appropriate action as directed by EPA.

5.8.1. Groundwater Management Permit

Within 45 days after lodging of the Amended Consent Decree, the Work Settling Defendants shall submit a Groundwater Management Permit ("GMP") application that meets the requirements of Env-Or 607, as amended, to EPA and the State. The GMP application shall contain a plan that delineates a proposed Groundwater Management Zone ("GMZ") and identifies a sufficient number of monitoring wells to delineate a "clean edge" of the GMZ and to monitor the effectiveness of the remedial measures and ground water quality. Upon issuance of the GMP from NHDES, the Work Settling Defendants shall record notice of the permit in the Registry of Deeds for all lots of record within the GMZ and follow other appropriate notification protocols per Env-Or 607, as amended. The Work Settling Defendants shall apply for a renewal of the GMP every 5 years per Env-Or 607, as amended.

6. SOURCE CONTROL

The Source Control component of the 2004 AROD shall be designed and constructed to eliminate the discharge of Site COCs in ground water at the WMA boundary at concentrations above ICLs, to restore ground water outside the WMA boundary to meet State ground water standards, and to enable the landfill to be closed using Clean Closure standards.[5] The remedial measures for the Source Control remedy are described in detail in Section K of the 2004 AROD. The Performance Standards for each sub-component of the Source Control remedy are detailed in Section 4, herein.

The remedy proposed for Source Control is innovative and complex. Therefore, it requires a Pre-Design Investigation to obtain information required for the definitive design elements and it requires a Contingent Remedy which is outlined in Section 9.1., herein. To avoid delay in implementing the contingent Source Control remedy, should the air-sparging trench fail and operation as a ground water extraction trench prove to be impractical, the 100% Source Control Remedial Design, dated December 1996, shall be updated as described in Section 9.1.1., herein.

6.1 Source Control Pre-Design Investigations

There are two pre-design investigations necessary to design and operate the Source Control remedy for the Site selected in the 2004 AROD. These include the Air-Sparging Trench Pre-Construction PDI and the Outdoor Air PDI. Additional data from the 1994 and 1995 PDIs, as well as the Southern Plume PDI, MNA PDI, and Ground Water and Fate & Transport PDIs will supply data critical to the Source Control design as well. The Outdoor Air PDI will be

[5] USEPA, March 16, 1998. Risk-based Clean Closure memorandum from Elizabeth Cotsworth, Acting Director, Office of Solid Waste.

implemented during the Source Control Remedial Design phase and continue, with modifications, through the Source Control Remedial Action.

6.1.1. Air-Sparging Trench Pre-Construction PDI

Within 60 days following signature of the Amended Consent Decree by the Regional Administrator, the Work Settling Defendants shall submit the AIR-SPARGING TRENCH PRE-DESIGN INVESTIGATION WORK PLAN (the "Air-Sparging PDI-WP") to gather data to support design and construction of the Source Control Remedial Design. The Air-Sparging PDI-WP will result in an AIR-SPARGING PDI FINAL REPORT (the "Air-Sparging PDI Report") that outlines the results of the PDI and provides parameters for designing the full-scale Source Control remedy at the Site.

The goal of this PDI will be to determine the depth, location and construction methods for the air-sparging trench and the proper means to operate, maintain and monitor the air-sparging trench. The investigation will determine:

6.1.1.1. The subsurface stratigraphy along the path of the trench.

6.1.1.2. The depth to which the air-sparging trench segments will need to be excavated to key into the marine clay, subject to confirmation during design that this requirement is necessary to effectively intercept and treat all COCs migrating from the WMA in ground water at concentrations above ICLs.

6.1.1.3. Other physical parameters important to the design of an air-sparging trench. This also includes a ground water monitoring plan based on the Performance Standards contained in Section 4.3 and further developed in this Section.

6.1.1.4. The location of potential source areas and areas where the concentrations of COCs in ground water or soil exceed the treatment capacity of the air-sparging trench.

6.1.1.5. For those areas identified pursuant to paragraph 6.1.1.4., EPA may require additional investigations to determine the nature of contamination in that locality, and if appropriate may require that remedial action(s) be proposed for each identified area to attain cleanup levels that will prevent adverse impacts on performance of the Source Control remedy and attain Performance Standards in a reasonable time frame. These actions may include *in situ* treatment technologies or *ex situ* techniques.

6.1.1.6. A detailed characterization of ground water contamination and stratigraphy along the line of the trench and in up-gradient areas, where such contamination may impact the air sparging remedy. Contamination characteristics shall be determined through vertical profiling or other drilling techniques approved or modified by EPA. Stratigraphy shall be determined by drilling and geophysical methods, as appropriate.

6.1.1.7. Based on Sections 6.1.1.1. - 6., above, the Work Settling Defendants shall recommend to EPA the location of pilot segment(s) to be constructed to demonstrate the adequacy of the design performance of the air-sparging technology. In determining performance, EPA will consider factors such as the effectiveness of the trench to immobilize and allow the extraction of arsenic at its highest concentrations, its effectiveness in attaining cleanup levels for all COCs emanating from the landfill at concentrations above ICLs, and its ability to be installed to the marine clay or other suitable depth to intercept and treat all COCs migrating from the WMA in ground water at concentrations above ICLs.

6.1.2. Ditch and Swale Sediments

The Work Settling Defendants shall monitor arsenic in the sediments and surface water in the Northern and Southern Perimeter Ditches and in the Drainage Swale annually. The amount and distribution of sediments in the Northern and Southern Perimeter Ditches and Drainage Swale that exceed the 50 mg/kg standard for arsenic, which was established in the 1991 ROD, shall be removed and disposed off-site, unless EPA determines that on-site management is practicable, protective of human health and the environment, and is in compliance with ARARs. If a response action is required to address sediment conditions in the Perimeter Ditches or Swale, the Work Settling Defendants shall prepare a *Ditch and Swale Sediment Response Action Work Plan* ("DSSRA-WP") to remediate such sediments and shall prepare and submit to EPA and the State for review and approval a Response Action Summary Report at the conclusion of the sediment removal. Sediment sampling and reporting of results shall be described in the Revised Environmental Monitoring Plan.

6.1.3. Outdoor Air PDI

Although primarily considered a part of the Remedial Action, pre-construction monitoring must be performed to establish base-line, ambient air conditions prior to implementation of the selected remedy together with performance monitoring during remedy implementation.

6.1.3.1. This investigation requires sampling outdoor air before, during, and following construction activities to ensure that implementation and operation of the Source Control remedy does not pose a risk to human health from exposure to COCs in outdoor air. Areas to be sampled include, at a minimum, near SW-E (in the Northern Perimeter Ditch), near the head of the Drainage Swale and at the bottom of the Drainage Swale as it enters the Cocheco River.

6.1.3.2. The Work Settling Defendants shall develop and implement the OUTDOOR AIR PRE-DESIGN INVESTIGATION WORK PLAN (the "Outdoor Air PDI-WP") for the conduct of ambient air sampling before, during and after any construction activities. The Outdoor Air PDI-WP will describe how monitoring will occur to establish base-line conditions, and then how monitoring will occur during implementation of the Source Control Remedial Action. The Outdoor Air PDI-WP will result in an OUTDOOR AIR PDI FINAL REPORT (the "Outdoor Air PDI Final Report") that will describe all the results of the monitoring. Implementation of the Outdoor Air PDI-WP must be initiated 3 months prior to construction beginning, and the Outdoor Air PDI

Final Report must be submitted 3 months after EPA's determination that the air-sparging trench is operational and functional.

6.1.3.3. If monitoring demonstrates that construction activities at the Site cause outdoor air to exceed Federal or State of New Hampshire Air Quality Standards, construction activities will be suspended, and the Work Settling Defendants shall submit to EPA an *Outdoor Air Abatement Plan* to attain compliance. The plan shall be submitted within 14 days of detected exceedances attributed to Site remediation activities.

6.2 Source Control Remedial Design

The Source Control Remedial Design Phase shall consist of developing a full design to construct the air-sparging trench as described in Section K of the 2004 AROD. The Work Settling Defendants shall design the air-sparging trench to intercept ground water with concentrations of COCs above ICLs at the edge of the WMA and either capture or destroy those contaminants. No contaminants shall exit the down-gradient side of the air-sparging trench at concentrations exceeding ICLs as defined in Section K of the 2004 AROD. The Work Settling Defendants shall include in the design of the air-sparging trench those actions to address concentrations of COCs in the WMA that may exceed the treatment capacity of the trench that are identified by the Air-Sparging PDI described in Section 6.1.1.

6.2.1. Source Control Remedial Design Work

This remedy component is intended to halt the flow of contaminants exceeding ICLs from the WMA and restore ground water beneath the WMA to concentrations consistent with EPA's Clean Closure Policy. To complete this component the Work Settling Defendants shall:

6.2.1.1. Inspect, maintain, and repair the natural cover that currently exists on the landfill periodically and meet the landfill cover Performance Standards in Section 4.2. throughout operation of the air-sparging trench.

6.2.1.2. In areas where concentrations of ground water contaminants are identified through the Air-Sparging PDI to exceed the treatment capacity of the trench, design a treatment system or a ground water extraction and *ex situ* or *in situ* treatment system, as approved or modified by EPA, that reduces concentrations in ground water so that the air-sparging trench can function effectively, meets the Performance Standards in Section 4.3., and that minimizes operating time of the air-sparging trench.

For instance, one area of high ground water concentrations is located in the southwestern corner of the landfill. The ground water in this area is contaminated principally by THF with concentrations that may exceed the treatment capacity of the air-sparing trench. This area will be characterized during the Air-Sparging PDI Work and, if appropriate, addressed through an *in situ* treatment system or a ground water extraction and treatment system designed to attain ICLs. Treated ground water will be re-injected into the landfill at an up-gradient location if such re-injection will not adversely affect the operation of the Source Control remedy.

6.2.1.3. Design an air-sparging trench to meet the Performance Standards contained in Section 4 of this 2007 SOW and the standards contained in this Section.

6.2.1.3.1. The air-sparging trench shall be designed to intercept all COC-impacted ground water that exceeds ICLs flowing from the WMA. The approximate length of the air-sparging trench is 3,000 to 4,000 linear feet. The numbers, locations, and orientations of the trench segments will be determined through pre–design efforts and detailed in the Source Control design documents, subject to approval or modification by EPA, and will specifically address ground water flow and COC impacts along the downgradient toe of the landfill.

6.2.1.3.1.a. The depth of the air-sparging trench will be determined by the depth of the marine clay into which the trench will be installed unless pre-design and design analyses demonstrate that the trench can be operated at a depth above the marine clay surface in a manner that ensures that ground water contaminated with COCs above ICLs does not flow under the air-sparging trench.

6.2.1.3.1.b. The Work Settling Defendants shall design the air-sparging trench such that contaminated ground water from the up-gradient, landfill side of the trench enters the air-sparging trench, passes though the trench material for treatment, then exits the down-gradient side of the trench at concentrations that do not exceed the ICLs for all COCs.

6.2.1.3.1.c. The air-sparging trench shall be designed to intercept, capture or destroy all COCs emanating from the WMA in ground water at concentrations above ICLs. The air-sparging trench shall be designed such that it can be converted to extract ground water for *ex situ* treatment. Air emitted from the air-sparging trench is not expected to require treatment; however, the air vents will be designed so that they may be retro-fitted with treatment devices if necessary.[6]

6.2.1.3.2. One or more hydraulic barriers shall be designed to direct leachate emanating from the landfill through the air-sparging trench. The design may be modified, if EPA agrees with the Ground Water and/or the Fate and Transport modeling results that are used to support such a modification.

6.2.1.3.3. The air-sparging trench shall be designed in segments that will allow each segment to be operated independently. Although air-sparging will be the primary mode of operation, design flexibility must enable the air-sparging trench to be operated as a ground water extraction trench or, if appropriate, a re-injection trench in the future. The air-sparging trench will be designed to operate as described below:

6.2.1.3.3.a. As ground water passes through the trench, air-sparging will capture target volatile COCs, such as vinyl chloride, and 1,2 DCE, as well as

[6] RFFS, January 30, 2004, pages 4-27.

hydrocarbons such as benzene in the ground water. Captured volatile COCs will be discharged to the atmosphere if they are below regulatory standards. If not, they will be captured or treated with methods that will attain compliance with State and federal air pollution control standards. Concentrations of COCs in the ground water exiting the down-gradient side of the air-sparging trench will be at ICLs.

6.2.1.3.3.b. The aerobic environment created by the air-sparging trench will also allow micro-organisms to degrade THF. This aerobic environment will also co-precipitate iron and arsenic so that arsenic concentrations in ground water will reach ICLs before exiting the down-gradient side of the air-sparging trench.

6.2.1.3.3.c. Should the precipitation of inorganic compounds or organic growths cause fouling in the trench such that the hydraulic conductivity through the trench is reduced and impairs performance of the remedy, the porous media in the air-sparging trench will be excavated or operational hydraulic conductivity will be restored by other technologies proposed by the Work Settling Defendants and approved by EPA. The design must accommodate removal or *in situ* stabilization of precipitated arsenic through a method approved or modified by EPA, unless it is demonstrated through monitoring that precipitated arsenic will not re-mobilize after shutdown of the trench. The design must incorporate hydraulic conductivity monitoring in the trench, the up-gradient aquifer, and the down-gradient aquifer to detect fouling, either by inorganic or organic substances, or channelization of air, either in the media or the surrounding aquifer, or significant hydraulic mounding that may impair treatment in the trench or altering ground water flow patterns in a manner that impairs the effectiveness of the remedy.

6.2.2. Source Control Remedial Design Work Plan

Within 60 days after EPA approval or modification of the Air-Sparging PDI Report, the Work Settling Defendants shall submit a SCRD-WP that incorporates the design elements in Section 6.2.1. and any other activities that are necessary to complete the Remedial Design. The SCRD-WP shall include, at a minimum and in addition to the requirements of Section 4.8.1., herein, a detailed description of all activities to be undertaken in connection with the design and implementation of the air-sparging system. The detailed descriptions shall contain a statement of purpose and objectives, identification of the specific activities, and a detailed schedule for the completion of the Source Control Remedial Design. The SCRD-WP shall also designate the following submissions and supply a schedule for submitting the 30%, 75% and 100% Source Control Remedial Design documents, plans and specifications as set forth in this Section. EPA may also require several technical meetings to discuss design elements based on the review of any of the Remedial Design documents.

6.2.3. 30% Remedial Design Submission

Within 120 days of receiving EPA's approval or modification of the SCRD-WP, the Work Settling Defendants shall submit to EPA the 30% Source Control Remedial Design ("SCRD") submission. The 30% SCRD submission is a conceptual design that contains those criteria identified in Section 6.2.1. and 6.2.2., above. In addition, the 30% SCRD submission shall include, at a minimum, the results of all field investigations, a discussion of how ARARs are being met by the SCRD, the design criteria, the project delivery strategy, preliminary plans, drawings, sketches, and calculations, an outline of the required technical specifications and a preliminary construction schedule and costs.

6.2.4. 75% Remedial Design Submission

Within 90 days of receiving EPA's approval or modification of the 30% SCRD submission, the Work Settling Defendants shall submit to EPA the 75% SCRD submission. The 75% SCRD submission is an intermediate design that contains all the components of the approved or modified 30% SCRD, as well as additional information sufficient to construct the remedy. The 75% SCRD submission shall also include, at minimum, critical milestones in the construction, a discussion of how ARARs are being met by the SCRD, the design criteria, the project delivery strategy, intermediate plans, drawings, sketches, and calculations, all required technical specifications in detail and an intermediate construction schedule and costs.

6.2.5. 100% Remedial Design Submission

Within 60 days of receiving EPA's approval or modification of the 75% SCRD submission, the Work Settling Defendants shall submit the 100% SCRD reflecting those changes approved or modified by EPA in the 75% SCRD submission. The 100% SCRD submission shall address all Source Control components and contain, but not be limited to:

6.2.5.1. The final design plans and specifications in reproducible format.

6.2.5.2. Final bid documents.

6.2.5.3. A contingency plan that shall address the safety of on-site construction workers and the local affected population in the event of an accident or emergency.

6.2.5.4. A detailed schedule of activities to implement the entire Source Control Remedial Action.

6.2.5.5. A constructability review that evaluates the suitability of the project and its components in relation to the Site.

6.2.5.6. A QA/QC check of the design plans with the technical specifications.

6.2.5.7. A detailed statement of how ARARs are met, and a statement of all assumptions and all drawings and specifications necessary to support the analysis of compliance with ARARs.

6.3 Source Control Remedial Action

The Source Control Remedial Action is intended to allow infiltrating water to mobilize COCs in the landfill and convey them to an air-sparging trench to be removed, immobilized or degraded.

6.3.1. Remedial Action Source Control Work Plan

The Source Control Remedial Action construction activities shall include, but are not limited to: development of a REMEDIAL ACTION SOURCE CONTROL WORK PLAN ("SCRA-WP") and other actions listed below.

Within 90 days of receiving EPA's approval or modification of the 100% SCRD, the Work Settling Defendants shall submit to EPA the SCRA-WP for implementing the Source Control Remedial Action ("SCRA"). The SCRA-WP shall contain, in addition to those items in Section 4.8.1. and 4.8.2., herein, the following:

6.3.1.1. The sequence of air-sparging trench construction activities showing how each segment will be installed, accompanied by a schedule.

6.3.1.2. A step-by-step description of how each air-sparging trench segment will be constructed and how staging areas will be moved to facilitate construction of the trench and associated monitoring network.

6.3.1.3. A description of the monitoring system as described in Section 6.4., herein.

6.3.1.4. A CQAPP as outlined in Attachment 4 of the 1993 SOW.

6.3.2. Pre-Construction Conference

Within 60 days of receiving EPA's approval or modification of the SCRA-WP, the Work Settling Defendants shall hold a PRE-CONSTRUCTION CONFERENCE. The participants shall include all Work Settling Defendants involved in the SCRA and their representatives, EPA and the State.

6.3.3. Initiation of Construction

Within 60 days of receiving EPA's approval or modification of the SCRA-WP, the Work Settling Defendants shall initiate SCRA construction activities in accordance with the construction sequence and schedule contained therein.

6.3.4. Meetings During Construction

During the construction period, the Work Settling Defendants and their construction contractor(s) shall meet with EPA and NHDES regarding progress of construction at least bi-weekly, or as otherwise agreed to by all parties.

6.3.5. Operations and Maintenance Plan

Within 30 days following the 75% construction complete date, as described in the approved or modified SCRA-WP schedule, the Work Settling Defendants shall submit to EPA a SOURCE CONTROL REMEDIAL ACTION OPERATION AND MAINTENANCE PLAN (the "SCRA-O&M Plan") to ensure the long-term, continued effectiveness of the SCRA. The SCRA-O&M Plan shall include, at a minimum, the following:

6.3.5.1. A description of normal operations and maintenance and inspection schedules.

6.3.5.2. A description of potential operational problems, including arsenic fouling of the trench media or aquifer matrix by either inorganic or organic precipitates, and anticipated measures to detect and correct these operational problems.

6.3.5.3. A description of routine process performance, monitoring and analysis, which includes the requirements in Section 6.4.

6.3.5.4. A description of methods and frequency of assessing optimization of operation and monitoring, which includes the requirements in Section 6.4.

6.3.5.5. An operational health and safety plan.

6.3.5.6. Annual operation and maintenance budget projections over the lifetime of the SCRA.

6.3.5.7. Record-keeping and reporting requirements.

6.3.5.8. In addition to the above, for monitoring wells, extraction wells, and any equipment that recovers contaminated ground water or air from the subsurface as part of the Source Control Remedial Action, the SCRA-O&M Plan shall also include, at a minimum, the following:

6.3.5.8.1. A provision for prompt and proper abandonment in accordance with State ARARs and, if needed, replacement, as required by EPA, of any wells or equipment that are unusable or that have become unusable during the SCRA-O&M activities.

6.3.5.8.2. A schedule for inspection, continued maintenance, and repair or replacement, if necessary, of all wells and subsurface recovery equipment associated with the SCRA.

6.3.5.8.3. A schedule for continued assessment of the effectiveness of any well or subsurface extraction or monitoring equipment. Those wells or equipment that are no longer effective shall be proposed for abandonment as required in subparagraph 6.3.5.8.1. above. This program shall continue until a Certificate of Completion is issued as required in Section 10.4., herein.

6.3.5.8.4. A provision for the addition of new wells or equipment to assess any potential contaminant migration or obtain other hydrogeological information.

6.3.6. Final Construction Inspection

Within 45 days after the Work Settling Defendants conclude that SCRA construction has been fully (100%) completed, the Work Settling Defendants shall schedule and conduct a Pre-Final Source Control Construction Inspection to identify punch-list items. Within 75 days of the Pre-Final Inspection, the Work Settling Defendants shall schedule and conduct a FINAL SOURCE CONTROL CONSTRUCTION INSPECTION to determine completeness. Each inspection shall include all Work Settling Defendants and their representatives, EPA and NHDES.

6.3.7. Final Construction Report

Within 60 days of completion of the Final Source Control Construction Inspection, the Work Settling Defendants shall submit to EPA for review and approval the FINAL SOURCE CONTROL REMEDIAL ACTION CONSTRUCTION REPORT: AIR SPARGING TRENCH, verifying that all punch-list items are addressed and that the Source Control remedy construction is complete. The constructed Source Control Remedial Action is Operational and Functional ("O&F") once EPA approves or modifies the Report.

6.4 Source Control Remedy Operation, Assessment, and Optimization

Work Settling Defendants shall implement the Work detailed in the SCRA-O&M Plan upon approval or modification of the Final Source Control Remedial Action Construction Report.

The Source Control remedy shall be operated to reduce COCs migrating from the WMA to ICLs prior to exiting the down-gradient side of the air-sparging trench as described in Section 4.3, herein. Assessment shall consist of monitoring to establish that COCs above ICLs do not migrate beyond the WMA and air-sparging trench. If EPA determines that monitoring indicates that the trench is not performing as required, the Source Control remedy shall be optimized to attain Performance Standards and ICLs. Optimization may include operational adjustments, conversion to a ground water extraction or re-injection system, as well as other targeted supplemental response actions. Remedy assessment and optimization of performance will be a critical facet of the air-sparging trench operation. The key will be assessing, optimizing, and determining if operation of the air-sparging trench can treat COCs in ground water migrating from the WMA to ICLs and restore ground water throughout the WMA. The elements to be evaluated are described below:

6.4.1. Monitoring of Remedy Performance

The air-sparging trench shall be monitored and assessed throughout the active length to determine whether COC concentrations in the ground water migrating from the WMA are being treated to meet ICLs. The monitoring techniques include, but are not limited to:

6.4.1.1. Several sets of Performance Monitoring Wells ("PMWs") shall be installed inside and outside the air-sparging trench. The locations and construction of all PMWs will be designed to evaluate performance of the remedy with regard to both hydraulics and treatment of COCs to meet ICLs and attain Performance Standards.

Inside the trench a sufficient number of PMWs shall be installed vertically and/or laterally to evaluate COC concentrations and hydrologic parameters up-gradient of, within, and down-gradient of the sparging trench. These wells shall be monitored at an interval sufficient to effectively evaluate performance. The objectives of the monitoring network design will be to assess ground water flow, possible clogging of the trench backfill media and nearby native soils, and treatment effectiveness in terms of changes in COC concentrations. The design and locations of the PMWs will be based upon the results of the PDI; it should be noted that, based upon currently available information, the PMWs will likely be constructed as couplets or triplet wells with differing screen intervals in the wells that comprise the couplet or triplets to ensure adequate hydrogeologic and COC concentration monitoring both vertically and laterally.

6.4.1.2. After each segment of the air-sparging trench begins operation the PMWs shall be sampled every three months initially to determine performance and a more appropriate sampling frequency based on flow velocities and conditions created by air sparging Thereafter, monitoring will be conducted based on a frequency approved or modified by EPA that is designed to monitor seasonal variability in ground water flow and quality. Monitoring may be scheduled to coordinate with the EMP or REMP, when determined by EPA to be appropriate.

6.4.1.3. Comparison of ground water quality data from locations within the trench on its up-gradient and down-gradient sides will be used to demonstrate capture of arsenic in the trench. Testing of hydraulic conductivity in the trench media will be used to evaluate the degree of fouling and the ability of the trench to fully treat all COCs. The ground water flow path will be verified through the use of potentiometric data from wells located up-gradient of, within, and down-gradient of the air-sparging trench.

6.4.1.4. Testing of the hydraulic conductivity changes in wells installed within the trench shall occur annually during operation of the air-sparging trench to evaluate possible fouling of the trench backfill material. Ground water samples collected up-gradient and down-gradient of each trench segment will be tested annually for parameters appropriate to evaluate the potential fouling of the native aquifer material up-gradient and down-gradient of the trench by the formation of precipitates that contain iron and arsenic. Solid matrix samples may also be collected down-gradient and up-gradient of the air-sparging trench annually to support evaluation of potential aquifer fouling. At a minimum, such sampling shall provide sufficient

information to demonstrate that the precipitation of arsenic is occurring within the air-sparging trench and not in the surrounding aquifer.

6.4.2. Remedy Performance Assessment

The Work Settling Defendants shall submit an AIR-SPARGING TRENCH REMEDY PERFORMANCE REPORT (the "Source Control Assessment") annually, based on the results of monitoring set forth in Section 6.4.1., herein, following a determination by EPA that the first trench segment is O&F. Using data from the PMWs, the annual Source Control Assessment shall describe how the air-sparging trench is reducing COC concentrations in ground water to ICLs and meeting Performance Standards. The annual Source Control Assessment shall also demonstrate the ability of the air-sparging trench to sequester arsenic in the trench. Following review, EPA may ask for additional data or data analysis to assess air-sparging trench performance and/or direct the Work Settling Defendants to install additional SC-PMWs to address evident data gaps.

The annual Source Control Assessment shall also include an evaluation of the operation and maintenance of the Source Area Remedial Action, discussion of the relevant points of the SCRA-O&M Plan with respect to the functioning remedy and an evaluation of the functional components of the remedy, including any potential for optimization. The annual Source Control Assessment shall also include an assessment of remedial efforts up-gradient of the Source Control remedy, in the landfill, that are acting to reduce or eliminate COCs within the landfill.

The optimization section of the annual Source Control Assessment, for both the Source Control remedy and any additional up-gradient source control remedial efforts, shall evaluate the current remedial system and recommend changes to either minimize costs, improve efficiency, or reduce operating time. The annual Source Control Assessment Optimization Section shall discuss the Site conceptual model and how the current system is reducing risk and how any changes may affect the Site conceptual model.

After air-sparging trench operations are shut-down, it must be demonstrated that precipitated arsenic within the trench will not re-mobilize. If chemical stability is not demonstrated by ground water quality monitoring or other methods determined by EPA to ensure proper characterization, media containing arsenic-precipitates will be removed from or stabilized within the trench through technologies proposed by the Work Settling Defendants and approved by EPA before a Certification of Completion of Work can be approved by EPA in accordance with Section 10.4., herein.

6.5. Source Control Remedy Failure Trigger

In accordance with the 2004 AROD, a contingent cap remedy will be implemented in the event the air-sparging trench fails.

6.5.1. The 1991 ROD Source Control component (SC7/7A) shall be implemented if EPA determines that the Source Control remedy, including optimization efforts as described in

Section 6.4., fails to attain Performance Standards for all COCs exiting the down-gradient side of the Source Control remedy, and the condition cannot be corrected through the optimization efforts within a reasonable time. The failure to attain Performance Standards or treat to ICLs shall be determined by EPA through a review of the Source Control Assessment Reports and the application of statistical tests acceptable to EPA that consider both the trend of COC concentrations over the monitoring period and the magnitude of contamination on the down-gradient side of the trench with respect to the ICL for each compound.

6.5.2. Additionally, if at any time, operation of the Source Control remedy creates conditions that EPA determines will increase or not decrease risk at the Site, such as air exposures or the creation of higher-risk daughter products, and those conditions are not corrected in what EPA determines to be a reasonable time, the 1991 ROD Source Control component (SC-7/7A) will be implemented. These conditions may include, but not be limited to, inability to manage concentrations of COCs entering the treatment zone that exceed the Source Control remedy's capacity, alteration of ground water flow directions or rates to a degree that impairs the effectiveness of the Source Control remedy, changes in ground water geochemistry that inhibit the ability to achieve remedial objectives, the production of recalcitrant daughter products that are not able to be treated or recovered by the Source Control remedy, and the creation of physical hazards.

7. SOUTHERN PLUME MANAGEMENT OF MIGRATION

Ground water in the Southern Plume will be restored to meet ICLs established in the 2004 AROD, and ultimately the final cleanup levels, in a reasonable time, as determined by EPA, by extracting contaminated ground water, treating it on-site to reduce COC concentrations to ICLs and discharging it to the surrounding land in a manner and location that will not impair operation of the Southern Plume or Source Control remedies. Alternatively, the extracted ground water may be discharged to the Dover POTW for treatment, following pretreatment if necessary. Failure to demonstrate that COCs are no longer migrating towards the Bellamy Reservoir at concentrations above ICLs or that ground water will not be restored to meet ICLs in a reasonable time, as determined by EPA, shall require the Work Settling Defendants to undertake additional response actions to ensure the restoration of the ground water within the Southern Plume. The Work Settling Defendants shall conduct a Southern Plume Pump-and-Treat Pre-Design Investigation to design a system to control COC migration and restore ground water to ICLs, and ultimately the final cleanup levels. The Work Settling Defendants shall design, construct, operate, monitor, and maintain a ground water pump-and-treat remedy as outlined in Section X of the 1991 ROD and the 2004 AROD to restore ground water in the Southern Plume.

7.1 Southern Plume Management of Migration Pre-Design Investigation

A Southern Plume PDI was completed in 1994. Since that time ground water has migrated and COC concentrations in several wells in the area of the Southern Plume have increased in the last three years. Based on monitoring information gathered since completion of the SEA Southern Plume PDI in 1994 and the Golder PDI in 1995, it is necessary to update the Southern Plume PDI. The goals of this new PDI are three-fold: first, determine the extent of ground water with

COC concentrations above ICLs in the Southern Plume; second, determine the location of the ground water flow divide between the Eastern and Southern Plumes; and third, determine the location for a ground water extraction system and the nature of an *ex situ* treatment system.

The Work Settling Defendants have submitted to EPA a SOUTHERN PLUME PUMP-AND-TREAT PRE-DESIGN INVESTIGATION WORK PLAN (the "SP-PDI WP") and begun implementation of the SP-PDI-WP to gather sufficient data to meet the goals of the PDI and to design and monitor the Southern Plume pump and treat system. The SP-PDI WP will result in a SOUTHERN PLUME PUMP-AND-TREAT PDI FINAL REPORT (the "Southern Plume PDI Report") that outlines the parameters for designing the full-scale Southern Plume ground water remedy at the Site. This PDI shall be completed in accordance with the schedule in the Work Plan approved by EPA on June 15, 2006. The Southern Plume Phase I PDI Report, for field work performed in 2006, shall be submitted on or before June 15, 2007.

7.2 Southern Plume Management of Migration Remedial Design

The Southern Plume Management of Migration Remedial Design ("SPRD") shall consist of developing a full design to construct a ground water pump-and-treat remedy that will control migration of COCs in ground water towards the Bellamy Reservoir at concentrations above ICLs and restore the ground water to meet ICLs throughout the Southern Plume in a reasonable time, as determined by EPA. The extracted contaminated ground water will either be treated on-site to meet appropriate discharge standards to the ground surface or will be discharged to the Dover POTW for treatment.

7.2.1. Southern Plume Management of Migration Remedial Design Work Plan and Project Operations Plan

Based on the results of the Southern Plume PDI Report, the Work Settling Defendants shall prepare and submit to EPA a SOUTHERN PLUME REMEDIAL DESIGN MANAGEMENT OF MIGRATION WORK PLAN ("SPRD-WP") for conducting any Southern Plume Design activities including additional sample collection and analysis identified in the PDI.
The Work Settling Defendants shall submit the SPRD-WP within 30 days of EPA approval of the Final SP-PDI report. The SPRD-WP shall include, at a minimum, a detailed description of all activities to be undertaken in connection with the design and implementation of the pump-and-treat system. The detailed descriptions shall contain a statement of purpose and objectives, identification of the specific activities, and a detailed schedule for the implementation. The SPRD-WP shall designate the following submissions and supply a schedule for submitting the 30% and 100% Southern Plume Remedial Design documents and plans as set forth in this Section.

7.2.2. 30% and 60% Remedial Design Submissions

Within 45 days of receiving EPA's approval or modification of the SPRD-WP, the Work Settling Defendants shall submit to EPA the 30% Southern Plume Remedial Design submission. The 30% SPRD submission is a conceptual design that will contain, at a minimum, a summary of all

Southern Plume PDI results, a summary of other relevant field investigations that may bear on the Southern Plume such as the Northwest Landfill PDI, a discussion of how ARARs are being met by the SPRD, the design criteria, the project delivery strategy, preliminary plans, drawings, sketches, and calculations, an outline of the required technical specifications and a preliminary construction schedule and costs including capital and O&M.

Within 60 days of receiving EPA's approval or modification of the 30% SPRD Submission, the Work Settling Defendants shall hold a progress meeting with EPA and NHDES to present the 60% SPRD and discuss the content of the 100% SPRD.

7.2.3. 100% Remedial Design Submission

Within 120 days of receiving EPA's approval or modification of the 30% SPRD submission, the Work Settling Defendants shall submit the 100% Southern Plume Remedial Design. The 100% SPRD submission shall address all EPA comments to date, with responses, and shall contain, but not be limited to the following:

7.2.3.1. The final design plans and specifications in reproducible format.

7.2.3.2. Final bid documents.

7.2.3.3. A contingency plan that shall address the safety of on-site construction workers and the local affected population in the event of an accident or emergency.

7.2.3.4. A detailed schedule of activities to complete implementation of the entire Southern Plume Management of Migration remedy.

7.2.3.5. A constructability review that evaluates the suitability of the project and its components in relation to the Site.

7.2.3.6. A QA/QC check of the design plans with the technical specifications.

7.2.3.7. A detailed statement of how ARARs are met, and a statement of all assumptions and all drawings and specifications necessary to support the analysis of compliance with ARARs.

7.3 Southern Plume Management of Migration Remedial Action

The Work Settling Defendants shall prepare the following documents and implement the following actions, based on the approved or modified 100% SPRD:

7.3.1. Southern Plume Management of Migration Remedial Action Work Plan

The Remedial Action construction activities shall include, but are not limited to: development of a SOUTHERN PLUME MANAGEMENT OF MIGRATION REMEDIAL ACTION WORK PLAN ("SPRA-WP") and other actions that follow.

Within 60 days of receiving EPA's approval or modification of the 100% SPRD, the Work Settling Defendants shall submit to EPA for review and approval or modification the SPRA-WP for implementing the approved or modified 100% Southern Plume Remedial Design. Included with the SPRA-WP shall be a CQAPP as outlined in Attachment 4 of the 1993 SOW.

7.3.2. Pre-Construction Conference

Within 30 days of receiving EPA's approval or modification of the SPRA-WP, the Work Settling Defendants shall hold a SOUTHERN PLUME PRE-CONSTRUCTION CONFERENCE. The participants shall include all Work Settling Defendants and their representatives, EPA and the State.

7.3.3. Initiation of Construction

Within 30 days of receiving EPA's approval or modification of the SPRA-WP, the Work Settling Defendants shall initiate all Southern Plume construction activities in accordance with the construction sequence and schedule contained therein.

7.3.4. Meetings during Construction

During the construction period, the Work Settling Defendants and their construction contractor(s) shall meet with EPA and NHDES regarding progress and details of construction at least bi-weekly, or as otherwise agreed to by all parties.

7.3.5. Operations and Maintenance Plan

Within 30 days following the 75% construction complete date, as described in the detailed schedule in the approved or modified SPRA-WP, the Work Settling Defendants shall submit to EPA for review and approval a SOUTHERN PLUME MANAGEMENT OF MIGRATION OPERATION AND MAINTENANCE PLAN ("SPRA-O&M Plan") to ensure the long-term, continued effectiveness of the Southern Plume pump-and-treat remedy. The SPRA-O&M Plan shall include, at a minimum, the following:

7.3.5.1. A description of normal operations and maintenance and inspection schedules.

7.3.5.2. A description of potential operational problems, and anticipated measures to detect and correct these problems.

7.3.5.3. A description of routine performance monitoring and analysis, which include the requirements in Section 7.4.

7.3.5.4. A description of methods and frequency of optimization of operation and monitoring, which include the requirements in Section 7.4.

7.3.5.5. An operational health and safety plan.

7.3.5.6. Annual operation and maintenance budget projected over the lifetime of SPRA.

7.3.5.7. Record-keeping and reporting requirements.

7.3.5.8. In addition to the above, for monitoring wells, extraction wells, and any equipment that recovers contaminated ground water from the subsurface within the Southern Plume, the SPRA-O&M Plan shall also include, at a minimum, the following:

7.3.5.8.1. A provision for prompt and proper abandonment in accordance with State ARARs and, if needed, replacement, as required by EPA, of any wells or equipment that are unusable or that have become unusable during the SPRA-O&M activities.

7.3.5.8.2. A schedule for inspection, continued maintenance, and repair or replacement, if necessary, of all wells and subsurface recovery equipment associated with the Southern Plume remedy.

7.3.5.8.3. A schedule for continued assessment of the effectiveness of any well or subsurface extraction or monitoring equipment. Those wells or equipment that are no longer effective shall be proposed for abandonment as required in subparagraph 7.3.5.8.1. above.

7.3.5.8.4. A provision for the addition of new wells or equipment to assess any potential contaminant migration or obtain other hydrogeological information.

7.3.6. Final Construction Inspection

Within 45 days after the Work Settling Defendants conclude that the SPRA construction has been fully (100%) completed, the Work Settling Defendants shall schedule and conduct a Pre-Final Southern Plume Construction Inspection to identify any punch list items that need to be addressed before construction is completed. Within 75 days of the Pre-Final Inspection, the Work Settling Defendants shall schedule a Final Southern Plume Construction Inspection to determine completeness. Each inspection shall include all Work Settling Defendants and their representatives, EPA and NHDES.

7.3.7. Final Construction Report

Within 75 days of completion of the Pre-Final Southern Plume Construction Inspection, the Work Settling Defendants shall submit to EPA for review and approval the FINAL SOUTHERN PLUME REMEDIAL ACTION CONSTRUCTION REPORT, verifying that all punch-list items were addressed and that the Southern Plume Remedial Action is complete. The constructed Southern Plume Remedial Action is Operational and Functional ("O&F") once EPA approves or modifies the Final Southern Plume Remedial Action Construction Report.

7.4 Southern Plume Management of Migration Operation, Remedy Assessment, and Optimization

Work Settling Defendants shall implement the Work detailed in the SPRA-O&M Plan upon approval or modification of the Final Southern Plume Remedial Action Construction Report. Effective operation, remedy assessment and optimization of performance are important to achieve the objectives of the Southern Plume Remedial Action (e.g., to control the migration of COCs at concentrations above ICLs towards the Bellamy Reservoir and restore the aquifer to meet ICLs, and ultimately the final cleanup levels, in a reasonable amount of time as determined by EPA). The key elements are described below:

7.4.1. Monitoring of Remedy Performance

The method of monitoring and verification shall be developed using the results of the Southern Plume PDI. Remedy performance shall be determined through the following monitoring program.

7.4.1.1. Southern Plume Performance Monitoring Wells ("SP-PMWs") will be installed to monitor the plume at locations that include areas up-gradient of the plume, within the plume, and at the down-gradient edge of the plume, the latter of which is defined to be areas or locations where the PDI identifies COC concentrations that meet ICLs. SP-PMWs will also be installed to monitor the lateral margins of the plume, with respect to the direction of ground water flow, as they are identified during the PDI. The objectives of the monitoring network design will be to monitor ground water flow and COC concentrations in the area of the Southern Plume to support evaluation of remedy performance and plume migration. Based upon currently available information, the SP-PMWs will likely be constructed as couplets or triplet wells with differing screen intervals in the wells that comprise the couplet or triplets to ensure adequate hydrogeologic and COC concentration monitoring.

7.4.1.2. Each SP-PMW shall be sampled at a frequency of once every three months after EPA determines the pump-and-treat remedy to be Operational and Functional and shall continue for one year, followed by sampling at a frequency of twice a year until EPA determines another monitoring frequency is appropriate to monitor seasonal variability in ground water flow and remedy performance. Monitoring may be scheduled to coordinate with the EMP or REMP, when determined by EPA to be appropriate.

7.4.2. Remedy Performance Assessment

The Work Settling Defendants shall submit a SOUTHERN PLUME PUMP-AND-TREAT REMEDY PERFORMANCE REPORT (the "SP-P&T Assessment") annually following a determination by EPA that the pump-and-treat remedy is O&F. Using data from the SP-PMWs, the SP-P&T Assessment will use trend analyses and other statistical methods approved or modified by EPA to evaluate changes in COC concentrations within and between monitoring wells and the performance of the pump-and-treat system relative to the remedy Performance

Standards. Following review, EPA may ask for additional data or data analysis and/or require the Work Settling Defendants to install additional SP-PMWs to address evident data gaps.

The SP-P&T Assessment shall also include an evaluation of the operation and maintenance of the extraction, treatment and discharge system, discussing the relevant points of the SPRA-O&M Plan with respect to the functioning of the remedy and include an evaluation of the functional components of the remedy, including any potential for optimization. The optimization section shall evaluate the current remedial system in conjunction with other remedy components employed at the Site, and recommend changes to the SP-P&T system to either minimize costs, improve efficiency, or reduce operating time. The SP-P&T Assessment Optimization Section shall also discuss the Site conceptual model and how the current system is reducing risk and how any changes may affect the Site conceptual model or be required to address changes in the location of ground water contaminants.

8. EASTERN PLUME MANAGEMENT OF MIGRATION

In the Eastern Plume, natural processes will restore ground water flowing to the Cocheco River to meet ICLs for site COCs through Monitored Natural Attenuation ("MNA").[7] The ability of natural processes to restore ground water in the Eastern Plume is dependent upon the success of the 2004 AROD Source Control remedy to stop the flow of contaminants from the Waste Management Area.

8.1 Monitored Natural Attenuation Pre-Design Investigation

The Work Settling Defendants shall submit an EASTERN PLUME MNA PRE-DESIGN INVESTIGATION WORK PLAN (the "EP-PDI-WP") for conducting a Pre-Design Investigation that will gather sufficient data to produce the EASTERN PLUME MNA PDI FINAL REPORT (the "EP-MNA-PDI Final Report"). The EP-MNA-PDI Final Report will define the monitoring system and the parameters for monitoring the full-scale Eastern Plume MNA remedy at the Site. The EP-MNA-PDI Final Report shall be completed in accordance with the schedule approved or modified by EPA in the EP-PDI-WP.

8.2 MNA Implementation Work Plan

The EP-MNA-PDI Final Report shall contain a description of the monitoring to be performed consistent with the MNA guidance[8] including the location and construction of monitoring wells to assess MNA, those wells described in Section 8.3.1., and a description of monitoring necessary to determine the progress of MNA in reducing the concentrations of COCs in the Eastern Plume ground water. The EP-MNA-PDI Final Report shall also describe the data and methods to be employed in assessing MNA progress and performance, as required by Section 8.3.2, including identifying statistical data analysis methods and MNA models to be used, if any.

[7] *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*. OSWER Directive 9200.4-17P, April 21, 1999.

Work Settling Defendants shall implement the EP-MNA-PDI Final Report within 180 days after the Source Control remedy is O&F.

8.3 MNA Remedy Assessment and Optimization

Remedy assessment is important to achieve the objectives of MNA for the Eastern Plume, which are to restore the aquifer to meet ICLs, and ultimately the final cleanup levels, in a reasonable amount of time as determined by EPA and prevent discharge of COCs to the Cocheco River above ICLs. The key elements of the MNA Remedy assessment are described below:

8.3.1. Monitoring of Remedy Performance

The method of monitoring and verifying the performance of MNA in the Eastern Plume will be measured, at a minimum, through the following monitoring program:

8.3.1.1. The Eastern Plume Performance Monitoring Wells ("EP-PMWs") will initially consist of the existing monitoring network to the degree practicable to maximize the utility of the existing EMP database obtained over the last 10 years. The objectives of the monitoring network design will be to monitor ground water flow and COC concentrations in the area of the Eastern Plume to support evaluation of MNA performance and plume migration. Additional EP-PMWs shall be installed if EPA determines that such monitoring points are required to meet the requirements of EPA or NHDES guidance on MNA or if a significant data gap is found to exist. It should be noted that, based upon currently available information, any additional EP-PMWs will likely be constructed as couplets or triplet wells with differing screen intervals in the wells that comprise the couplet or triplets to ensure adequate hydrogeologic and COC concentration monitoring.

8.3.1.2. Each EP-PMW shall be sampled at a frequency of every six months once the EP-MNA PDI Final Report is approved or modified by EPA. Monitoring may be scheduled to coordinate with the EMP or REMP, when determined by EPA to be appropriate.

8.3.2. Remedy Performance Assessment

The Work Settling Defendants shall submit an EASTERN PLUME MNA REMEDY PERFORMANCE REPORT (the "EP-MNA Assessment") annually, beginning one year after EPA approves or modifies the EP-MNA-RA-WP. The EP-MNA Assessment shall discuss the progress of MNA in the Eastern Plume using statistical methods and models approved or modified by EPA in the EP-MNA-RA-WP, describing the MNA processes occurring, the fate of COCs, and any confounding factors identified, compliance with EPA's MNA guidance, the effect of other remedial actions and events at the Site, and how MNA is reducing COC concentrations in ground water to ICLs and meeting Performance Standards. Following review by EPA of each annual MNA Assessment, EPA may ask for additional data or data analysis and/or direct Work Settling Defendants to install additional PMWs to address evident data gaps.

8.3.2.1. Five years after EPA determines that the Source Control remedy is O&F, the MNA remedy for the Eastern Plume will be assessed by EPA to determine if ground water cleanup has progressed sufficiently to indicate that ICLs (and ultimately the final cleanup levels) will be attained in a reasonable time-frame as determined by EPA.

8.3.2.2. Every five years, thereafter, the MNA remedy for the Eastern Plume will be assessed by EPA to determine if ground water cleanup has progressed sufficiently to indicate that ICLs (and ultimately the final cleanup levels) will be attained in a reasonable time-frame as determined by EPA.

8.4. Eastern Plume MNA Remedy Failure Trigger

EPA may require a pump-and-treat remedy for the restoration of ground water in the Eastern Plume if it determines, at any time, that the MNA remedy has failed. Failure of the MNA remedy for the Eastern Plume shall be defined as the inability of MNA to attain Performance Standards, ICLs, or the final cleanup levels, within a reasonable time. In this determination EPA will consider the results of the EP-MNA Assessments (e.g., trends in COC concentrations over the monitoring period, the areal extent of COCs at concentrations above ICLs in the Eastern Plume, and analyses of whether any ICL exceedances may have resulted from factors that do not equate with overall remedy failure), statistical tests, and models approved or modified by EPA. After determining the MNA remedy's failure to treat to ICLs, EPA may consider whether a more targeted supplemental response action that would achieve Performance Standards, *in lieu* of the contingent pump-and-treat remedy, would be appropriate.

9. CONTINGENT REMEDIES

The 2004 AROD identified a RCRA C cap as the contingent remedy in the event of failure of the Source Control air-sparging trench remedy as defined in Section 6.5., herein. The 1991 ROD identified pump-and-treat of ground water in the Eastern Plume in the event of failure of MNA. Below are the requirements for implementing these contingent remedies in the event that EPA determines that either remedy has failed as outlined previously in Sections 6.5. and 8.4., both titled "Remedy Failure Trigger." Section 9.1.1., below, is required regardless of whether a contingent remedy is required or not.

9.1 Source Control, 1996 Remedial Design

9.1.1. Design Update and Preparation

Sixty (60) days after approval or modification of the Air-Sparging PDI Report by EPA, the Work Settling Defendants shall submit to EPA a letter report entitled 1996 SOURCE CONTROL REMEDIAL DESIGN UPDATE (the "SC RD Update") regarding the 100% Remedial Design for the 1996 Source Control remedy (the "1996 SC RD"), prepared by Golder Associates and submitted to EPA in December 1996. The Update shall contain an analysis of the 1996 SC RD regarding constructability, ability to meet Performance Standards, and compliance with ARARs. Upon receipt of EPA approval or modification of the 1996 SC RD Update letter report, the Work

Settling Defendants shall revise the 1996 SC RD as needed, either with annotations on the existing plans or through correspondence. New, full plan sets are not required unless EPA determines that Source Control Contingent Remedy is required as described in Section 6.5., herein. The Work Settling Defendants shall submit a 1996 SC RD Update letter report every 18 months thereafter, until EPA determines that Section 9.1.2. has been triggered or until Certification of Completion of Work is issued under Section 10.4.

9.1.2. Implementation of the Source Control Contingent Remedy

Thirty (30) days after EPA notifies the Work Settling Defendants in writing that the air-sparging trench has failed, the Work Settling Defendants shall submit a CONTINGENT SOURCE CONTROL REMEDIAL ACTION WORK PLAN (the "1996 SC RA WP") that includes a schedule of all activities to implement the 1996 SC RD as updated in Section 9.1.1., above. The Work Settling Defendants shall comply with Section H of the 1993 SOW in implementing the Contingent Remedy.

The 1996 SC RA WP and implementation of the 1996 SC RA construction activities, including the O&M, shall be performed as outlined in the 1991 ROD and 1993 Consent Decree as modified by the 1996 SC RD and any approved or modified 1996 SC RD Updates.

9.2 Eastern Plume Management of Migration Contingent Remedy, Pump-and-Treat

Thirty (30) days after EPA notifies, in writing, the Work Settling Defendants that the Eastern Plume MNA remedy has failed, in accordance with Section 8.4., or if the entire Source Control remedy is not implemented and O&F by October 2010 and EPA so directs, the Work Settling Defendants shall meet the Performance Standards contained in Section 4.1.1., herein, and perform the tasks described in this Section:

9.2.1. Eastern Plume Management of Migration Contingent Remedy Pre-Design Investigation

Significant amounts of ground water and geotechnical data have been collected in the Eastern Plume since 1983. Other, proximal PDIs will provide additional information to design an Eastern Plume PDI. The goals of this new PDI, if necessary, would be three-fold: first, determine the extent of ground water with COC concentrations above ICLs; second, determine hydraulic and geochemical conditions that are extant; and third, determine the location for a ground water extraction system and the nature of an *ex situ* treatment system.

The Work Settling Defendants shall submit to EPA an EASTERN PLUME PUMP-AND-TREAT PRE-DESIGN INVESTIGATION WORK PLAN (the "EP-PDI WP") within 30 days after receipt of EPA's written notification identified in Section 9.2., above. Implementation of the EP-PDI WP will gather sufficient data to meet the goals of the PDI and to design and monitor the Eastern Plume pump and treat system. The EP-PDI WP will result in an EASTERN PLUME PUMP-AND-TREAT PDI FINAL REPORT (the "Eastern Plume PDI Report") that outlines the parameters for designing the full-scale Eastern Plume ground water remedy at the Site. This PDI shall be completed in accordance with the schedule in the Work Plan approved or modified by EPA

9.2.2. Eastern Plume Management of Migration Remedial Design

The Eastern Plume Management of Migration Remedial Design ("EPRD") shall consist of developing a full design, based on the Eastern Plume PDI Report approved or modified by EPA, to construct a ground water pump-and-treat remedy that will restore the ground water to ICLs throughout the Eastern Plume in a reasonable time, as determined by EPA. The extracted contaminated ground water will either be treated on-site to meet appropriate standards for discharge to the ground surface or will be discharged to the Dover POTW for treatment.

9.2.2.1. Eastern Plume Management of Migration Remedial Design Work Plan and Project Operations Plan

Based on the results of the Eastern Plume PDI Report, the Work Settling Defendants shall prepare and submit to EPA a EASTERN PLUME REMEDIAL DESIGN MANAGEMENT OF MIGRATION WORK PLAN ("EPRD-WP") for conducting any Eastern Plume Design activities including additional sample collection and analysis identified in the PDI.

The Work Settling Defendants shall submit the EPRD-WP based on the schedule in the Eastern Plume PDI Report. The EPRD-WP shall include, at a minimum, a detailed description of all activities to be undertaken in connection with the design and implementation of the pump-and-treat system. The detailed descriptions shall contain a statement of purpose and objectives, identification of the specific activities, and a detailed schedule for the implementation. The EPRD-WP shall designate the following submissions and supply a schedule for submitting the 30% and 100% Eastern Plume Remedial Design documents and plans as set forth in this Section.

9.2.2.2. 30% and 60% Remedial Design Submissions

Within 45 days of receiving EPA's approval or modification of the EPRD-WP, the Work Settling Defendants shall submit to EPA the 30% Eastern Plume Remedial Design submission. The 30% EPRD submission is a conceptual design that will contain, at a minimum, a summary of all Eastern Plume PDI results, a summary of other information obtained from relevant field investigations that may bear on the Eastern Plume, a discussion of how ARARs are being met by the EPRD, the design criteria, the project delivery strategy, preliminary plans, drawings, sketches, and calculations, an outline of the required technical specifications and a preliminary construction schedule and costs including capital and O&M.

Within 60 days of receiving EPA's approval or modification of the 30% EPRD Submission, the Work Settling Defendants shall hold a progress meeting with EPA and NHDES to present the 60% EPRD and discuss the content of the 100% EPRD.

9.2.2.3. 100% Remedial Design Submission

Within 120 days of receiving EPA's approval of the 30% EPRD submission, the Work Settling Defendants shall submit the 100% Eastern Plume Remedial Design. The 100% EPRD

submission shall address all EPA comments to date, with responses, and shall contain, but not be limited to the following:

9.2.2.3.1. The final design plans and specifications in reproducible format.

9.2.2.3.2. Final bid documents.

9.2.2.3.3. A contingency plan that shall address the safety of on-site construction workers and the local affected population in the event of an accident or emergency.

9.2.2.3.4. A detailed schedule of activities to complete implementation of the entire Eastern Plume Management of Migration remedy.

9.2.2.3.5. A constructability review that evaluates the suitability of the project and its components in relation to the Site.

9.2.2.3.6. A QA/QC check of the design plans with the technical specifications.

9.2.2.3.7. A detailed statement of how ARARs are met, and a statement of all assumptions and all drawings and specifications necessary to support the analysis of compliance with ARARs.

9.2.3. Eastern Plume Management of Migration Remedial Action

The Work Settling Defendants shall prepare the following documents and implement the following actions, based on the approved or modified 100% EPRD:

9.2.3.1. Eastern Plume Management of Migration Remedial Action Work Plan

The Remedial Action construction activities shall include, but are not limited to: development of a EASTERN PLUME MANAGEMENT OF MIGRATION REMEDIAL ACTION WORK PLAN ("EPRA-WP") and other actions that follow.

Within 60 days of receiving EPA's approval of the 100% EPRD, the Work Settling Defendants shall submit to EPA for review and approval or modification the EPRA-WP for implementing the approved or modified Eastern Plume Remedial Design. Included with the EPRA-WP shall be a CQAPP as outlined in Attachment 4 of the 1993 SOW.

9.2.3.2. Pre-Construction Conference

Within 30 days of receiving EPA's approval or modification of the EPRA-WP, the Work Settling Defendants shall hold a EASTERN PLUME PRE-CONSTRUCTION CONFERENCE. The participants shall include all Work Settling Defendants and their representatives, EPA and the State.

9.2.3.3. Initiation of Construction

Within 30 days of receiving EPA's approval or modification of the EPRA-WP, the Work Settling Defendants shall initiate all Eastern Plume construction activities in accordance with the construction sequence and schedule contained therein.

9.2.3.4. Meetings During Construction

During the construction period, the Work Settling Defendants and their construction contractor(s) shall meet at least bi-weekly, or as otherwise agreed to by all parties, with EPA and NHDES regarding progress and details of construction.

9.2.3.5. Operations and Maintenance Plan

Within 30 days following the 75% construction complete date, as described in the detailed schedule in the approved or modified EPRA-WP, the Work Settling Defendants shall submit to EPA for review and approval a EASTERN PLUME MANAGEMENT OF MIGRATION OPERATION AND MAINTENANCE PLAN ("EPRA-O&M Plan") to ensure the long-term, continued effectiveness of the Eastern Plume pump-and-treat remedy. The EPRA-O&M Plan shall include, at a minimum, the following:

9.2.3.5.1. A description of normal operations and maintenance and inspection schedules.

9.2.3.5.2. A description of potential operational problems, and anticipated measures to detect and correct these problems.

9.2.3.5.3. A description of routine performance monitoring and analysis, which include the requirements in Section 7.4.

9.2.3.5.4. A description of methods and frequency of optimization of operation and monitoring, which include the requirements in Section 7.4.

9.2.3.5.5. An operational health and safety plan.

9.2.3.5.6. Annual operation and maintenance budget projected over the lifetime of EPRA.

9.2.3.5.7. Record-keeping and reporting requirements.

9.2.3.5.8. In addition to the above, for monitoring wells, extraction wells, and any equipment that recovers contaminated ground water from the subsurface within the Eastern Plume, the EPRA-O&M Plan shall also include, at a minimum, the following:

9.2.3.5.8.a. A provision for prompt and proper abandonment in accordance with State ARARs and, if needed, replacement, as required by EPA, of any wells or equipment that are unusable or that have become unusable during the EPRA-O&M activities.

9.2.3.5.8.b. A schedule for inspection, continued maintenance, and repair or replacement, if necessary, of all wells and subsurface recovery equipment associated with the Eastern Plume remedy.

9.2.3.5.8.c. A schedule for continued assessment of the effectiveness of any well or subsurface extraction or monitoring equipment. Those wells or equipment that are no longer effective shall be proposed for abandonment as required in subparagraph 9.2.3.5.8.a. above.

9.2.3.5.8.d. A provision for the addition of new wells or equipment to assess any potential contaminant migration or obtain other hydrogeological information.

9.2.3.6. Final Construction Inspection

Within 30 days after the Work Settling Defendants conclude that the EPRA construction has been fully (100%) completed, the Work Settling Defendants shall schedule and conduct a PRE-FINAL EASTERN PLUME CONSTRUCTION INSPECTION to identify any punch list items that need to be addressed before construction is completed. This inspection shall include all Work Settling Defendants and their representatives, EPA and NHDES.

9.2.3.7. Final Construction Report

Within 60 days of completion of the Pre-Final Eastern Plume Construction Inspection, the Work Settling Defendants shall submit to EPA for review and approval the FINAL EASTERN PLUME REMEDIAL ACTION CONSTRUCTION REPORT, verifying that all punch-list items were addressed and that the Eastern Plume Remedial Action is complete. The constructed Eastern Plume Remedial Action is Operational and Functional ("O&F") when EPA approves or modifies the Final Eastern Plume Remedial Action Construction Report.

9.2.4. Eastern Plume Management of Migration Operation, Remedy Assessment, and Optimization

Work Settling Defendants shall implement the Work detailed in the EPRA-O&M Plan upon approval or modification of the Final Eastern Plume Remedial Action Construction Report. Effective operation, remedy assessment and optimization of performance are important to achieve the objectives of the Eastern Plume Remedial Action to restore the aquifer to meet ICLs, and ultimately the final cleanup levels, in a reasonable amount of time as determined by EPA. The key elements are described below:

9.2.4.1. Monitoring of Remedy Performance

The method of monitoring and verification shall be developed using the results of the Eastern Plume PDI. COC concentrations shall be determined through the following monitoring program.

9.2.4.1.1. Eastern Plume Performance Monitoring Wells ("EP-PMWs") will be installed to monitor the performance of the remedy. EP-PMWs will also be installed to monitor the lateral margins of the plume, with respect to the direction of ground water flow, as they are identified during the PDI. The objectives of the monitoring network design will be to monitor ground water flow and COC concentrations in the area of the Eastern Plume to support evaluation of remedy performance and plume migration. Based upon currently available information, the EP-PMWs will likely be constructed as couplets or triplet wells with differing screen intervals in the wells that comprise the couplet or triplets to ensure adequate hydrogeologic and COC concentration monitoring.

9.2.4.1.2. Each EP-PMW shall be sampled at a frequency of once every six months after EPA determines the pump-and-treat remedy to be Operational and Functional. Monitoring may be scheduled to coordinate with the EMP or REMP, when determined by EPA to be appropriate.

9.2.4.2. Remedy Performance Assessment

The Work Settling Defendants shall submit an EASTERN PLUME PUMP-AND-TREAT REMEDY PERFORMANCE REPORT (the "EP-P&T Assessment") annually following a determination by EPA that the pump-and-treat remedy is O&F. Using data from the EP-PMWs, the EP-P&T Assessment will use trend analyses and other statistical methods approved by EPA to evaluate changes in COC concentrations within and between monitoring wells and the performance of the pump-and-treat system relative to the remedy Performance Standards. Following review, EPA may ask for additional data or data analysis and/or require the Work Settling Defendants to install additional EP-PMWs to address evident data gaps.

The EP-P&T Assessment shall also include an evaluation of the operation and maintenance of the extraction, treatment and discharge system, discussing the relevant points of the SPRA-O&M Plan with respect to the functioning of the remedy and include an evaluation of the functional components of the remedy, including any potential for optimization. The Optimization section shall evaluate the current remedial system in conjunction with other remedy components employed at the Site, and recommend changes to the EP-P&T system to either minimize costs, improve efficiency, or reduce operating time. The EP-P&T Assessment Optimization Section shall also discuss the Site conceptual model and how the current system is reducing risk and how any changes may affect the Site conceptual model.

10. SITE CLOSEOUT

Once all remedial actions have been completed, and at least one 5-year review has been conducted, if the Work Settling Defendants believe that all ICLs (and ultimately the final

cleanup levels) have been attained, Performance Standards have been met, and both will be maintained, and that O&M is no longer necessary, the Work Settling Defendants may submit to EPA a DEMONSTRATION OF COMPLIANCE PLAN ("DCP") to provide data necessary for EPA to determine that all ICLs (and ultimately the final cleanup levels) have been attained and Performance Standards have been met, and both will be maintained, and that O&M is no longer necessary. Once EPA approves or modifies the DCP, the Work Settling Defendants shall submit a DEMONSTRATION OF COMPLIANCE REPORT ("DCR") that follows the outlines of the DCP. The DCR should provide the data and evidence sufficient to determine that ICLs (and ultimately the final cleanup levels) have been attained and Performance Standards have been met, and both will be maintained, and that O&M is no longer necessary. Upon approval or modification of the DCR, the Work Settling Defendants shall submit to EPA a Remedial Action Demobilization Work Plan (the "RAD-WP") to outline necessary activities to demobilize all Remedial Action activities at the Site. Following EPA approval or modification of completion of the implementation of the RAD-WP, EPA will issue a Certificate of Completion of Work, as described in Section 10.4., below.

10.1 Demonstration of Compliance Plan

The Work Settling Defendants shall submit a Demonstration of Compliance Plan to EPA. The Demonstration of Compliance Plan shall describe in detail all activities that will be conducted to:

10.1.1. Demonstrate compliance with all Performance Standards, and all applicable or relevant and appropriate requirements ("ARARs") including;

- Specify the citation of the ARAR.
- Identify if the ARAR is state or federal.
- Summarize the requirements of the ARAR.
- Specify in detail all activities that will be conducted to demonstrate compliance with the ARAR.

10.1.2. Demonstrate that all activities have been completed in accordance with design/construction criteria

10.1.3. Provide adequate monitoring, data collection and analysis, and reporting to assure protectiveness and that O&M is no longer necessary and to support post-closure human health and ecological risk assessments; and

10.1.4. When sampling and analysis is required to demonstrate compliance or to support post-closure human health and ecological risk assessments, the Demonstration of Compliance Plan shall be developed in accordance with the requirements of the Agency's guidance and policies for Monitored Natural Attenuation, Indoor Air, Ground Water Pump-and-Treat, Landfill Clean Closure, and 40 C.F.R. § 264.97, and shall specify:

10.1.4.1. Sampling locations.

10.1.4.2. Sampling frequency.

10.1.4.3. Sampling methods.

10.1.4.4. List of analytes and analytical methods.

10.1.4.5. Data and standard operating procedures for quality assurance and quality control measures.

10.1.4.6. Statistical analysis and/or modeling and/or other data interpretation techniques consistent with EPA guidance and policies.

10.1.5. Provide for monitoring and assuring landfill cover integrity over time and complying with State closure standards.

10.1.6. Demonstrate that landfill gas concentrations, ground water, surface waters and sediments down-gradient of the landfill are sustained at levels protective of human health and the environment once all active and passive treatment systems are discontinued.

10.2 Demonstration of Compliance Report

Consistent with the schedule established in the DCP, the Work Settling Defendants shall submit the Demonstration of Compliance Report (the "DCR") (or its modifications as discussed below) which shall contain the information identified in Section 10.1. of this 2007 SOW to demonstrate compliance. The DCR shall also contain:

10.2.1. A detailed summary of the Remedial Design and Remedial Action activities undertaken;

10.2.2. Documentation of all sampling locations, analytical methods and results; the basis for determining that the Performance Standards (including those for ground water and surface water) have been met; QA/QC documentation of these results; the location and frequency of tests and comparison of test results with the Performance Standards in a tabular form, and otherwise provide attenuation trends, modeling or other data in support of the findings.

10.2.3. A human health and ecological risk assessment and all data and quality assurance/quality control requirements that support the human health and ecological risk assessments. The risk assessment of the residual ground water contamination will assess the cumulative risks posed to current and potential future receptors for carcinogens and non-carcinogens through the consumption of Site ground water. The risk assessment will follow EPA Region 1 guidelines and use site-specific values, reviewed and accepted by EPA, as inputs for the various exposure parameters.

10.3 Remedial Action Demobilization

The Work Settling Defendants shall develop and submit to EPA a REMEDIAL ACTION DEMOBILIZATION WORK PLAN (the "RAD-WP") to describe necessary activities to demobilize the Remedial Action activities. The RAD-WP shall be submitted within 30 days of the date that the DCR is approved or modified by EPA and will result in a Remedial Action Demobilization Final Report (the "RAD Final Report") that outlines the completion of the tasks in the approved or modified RAD-WP. The RAD-WP shall contain the following components:

10.3.1. A description of the techniques for stabilization or removal of COCs present in the air-sparging trench media that may otherwise be remobilized and cause ground water conditions to create an unacceptable risk to human health or the environment.

10.3.2. A description of all the extraction, treatment, and monitoring apparatuses at the Site that will be removed and that will remain.

10.3.3. An evaluation of all areas of wetland/floodplain restoration sufficient to determine that Performance Standards outlined in Section 4 for restoration have been attained.

10.4 Certification of Completion of Work

Upon review of the Demonstration of Compliance Report if EPA determines that all ICLs have not been attained or that the Performance Standards have not been achieved, EPA shall notify the Work Settling Defendants of its disapproval of the Demonstration of Compliance Report. The Work Settling Defendants shall then perform those activities necessary to correct deficiencies and resubmit the Demonstration of Compliance Report to EPA for approval, according to a schedule set forth, approved or modified by EPA.

If EPA, based on the risk assessments and all other information contained in the DCR, determines that the risks are within EPA's risk management standard for carcinogens and non-carcinogens for ground water, the ICLs will be deemed protective and will become the final cleanup levels for the Site. If EPA finds that the ICLs are not protective of human health or the environment after a risk assessment has been performed, EPA will establish new, final cleanup levels. EPA, based on the determination that ICLs or final cleanup levels have been attained at the site and a determination that the RAD Final Report is adequate, will then issue a Certification of Completion of Work to the Work Settling Defendants.

Attachment A - Requirements for Project Operations Plans

Before any field activities commence on the Site, the Work Settling Defendants shall submit several site-specific plans to establish procedures to be followed by the Work Settling Defendants in performing field, laboratory, and analysis work. These site-specific plans include the:

1. SITE MANAGEMENT PLAN ("SMP")
2. Sampling and Analysis Plan ("SAP"), not a separate document, but comprised of:
   - 2a. QUALITY ASSURANCE PROJECT PLAN ("QAPP")
   - 2b. FIELD SAMPLING PLAN ("FSP")
3. HEALTH AND SAFETY PLAN ("HASP")

These four volumes form the Site Project Operations Plan ("POP"). The four components of the POP are described in Sections 1 through 3, herein.

The format and scope of each Plan shall be modified as needed to describe the sampling, analyses, and other activities that are clarified as each PDI is implemented and as the RD/RA progresses. EPA may modify the scopes of these activities at any time during the PDI or RD/RA at the discretion of EPA in response to the evaluation of PDI or RD/RA results, changes in PDI or RD/RA requirements, and other developments or circumstances.

There is substantial overlap in the content of the POP elements for the PDIs, RD, and RA. Accordingly, the Work Settling Defendants will prepare an SMP, a HASP, and a QAPP that will apply to all the PDI, RD, and RA activities. Aspects of these plans that are unique to specific PDIs or RD/RA elements will be discussed in the Work Plans for those PDIs and RD/RA elements. Also, the FSPs will be described in the PDI and RD/RA Work Plans because they will be unique and specific to the objectives of the individual Work Plans. When approved or modified by EPA, the SMP, HASP, QAPP, and Work Plans will control in the event of conflicts between their content and the requirements of this Attachment A to the 2007 SOW.

1. SITE MANAGEMENT PLAN ("SMP")

The Site Management Plan ("SMP") shall describe how the Work Settling Defendants shall manage the project to complete the Work required at the Site. The overall objective of the Site Management Plan is to provide EPA and NHDES with a written understanding and commitment of how access, security, contingency procedures, management responsibilities, waste disposal, budgeting, and data handling are being managed by the Work Settling Defendants. The Site Management Plan shall:

1. Provide a map and list of properties, the property owners, and addresses of owners to whose property access may be required.

2. Clearly indicate the exclusion zone, contamination reduction zone, and clean area for on-site activities (may be addressed in individual PDI and RD/RA Work Plans).

3. Establish necessary procedures and provide sample letters to land owners to arrange field activities and to ensure EPA is aware of access-related problems and issues.

4. Provide for the security of government and private property on the Site.

5. Prevent unauthorized entry to the Site, which might result in exposure of persons to potentially hazardous conditions.

6. Establish the location of a field office for on-site activities. The location and types of supporting documents for each element of Work shall be listed (HASP, FSP, etc.).

7. Provide contingency and notification plans for potentially dangerous activities associated with the PDIs and RD/RA.

8. Monitor airborne contaminants released by Site activities which may affect the local populations.

9. Describe how all Work areas will be maintained and restored to meet all performance standards (may be addressed in individual PDI and RD/RA Work Plans). Restored areas shall have native vegetation established and not allow erosion.

10. Communicate to EPA, NHDES, and the public the organization and management of the PDIs and RD/RA, including key personnel and their responsibilities.

11. Provide a list of contractors and subcontractors of the Work Settling Defendants in the PDI and RD/RA activities and description of their activities and roles (may be addressed in individual PDI and RD/RA Work Plans).

12. Provide regular financial reports of the Work Settling Defendants expenditures on the PDI and RD/RA activities.

13. Provide for the proper disposal of materials used and wastes generated during the PDI and RD/RA (e.g., drill cutting, extracted ground water, protective clothing, disposable equipment). These provisions shall be consistent with the off-site disposal aspects of CERCLA, RCRA, and applicable state laws. The Work Settling Defendants, or their authorized representative, or another party acceptable to EPA and NHDES shall be identified as the generator of wastes for the purpose of regulatory or policy compliance.

14. Provide plans and procedures for organizing, manipulating, and presenting the data generated and for verifying its quality before and during the PDIs and RD/RA. These

plans shall include the description of the proposed computer data management system which shall be compatible with hardware and software available to EPA Region I and NHDES personnel for handling media-specific sampling results obtained before and during the PDIs and RD/RA. The description shall include data to be managed, appropriate quality assurance/quality control to ensure accuracy, and capabilities of data manipulation. The data management system shall be compatible with the current EPA Region I and NHDES data storage and analysis systems.

2. SAMPLING AND ANALYSIS PLAN ("SAP")

The SAP shall be consistent with Section VIII of the Amended Consent Decree; SAP(s) that are approved by EPA will be deemed to comply with Section VIII of the Amended Consent Decree. The SAP is not a single document but instead consists of the following two separate volumes:

(1) a Quality Assurance Project Plan ("QAPP") that describes the policy, organization, functional activities, and the quality assurance and quality control protocols necessary to achieve the data quality objectives dictated by the intended use of the data; and

(2) the Field Sampling Plan ("FSP") that provides guidance for all fieldwork by defining in detail the sampling and data-gathering methods to be used on a project.

The first SAP, presented in the Work Plan, shall be the framework of all anticipated field activities (e.g., sampling objectives, evaluation of existing data, standard operating procedures) and contain specific information on the initial field work (e.g., sampling locations and rationale, sample numbers and rationale, analyses of samples). During the PDIs and RD/RA, the SAP shall be revised as necessary to cover subsequent field or laboratory activities. The purpose of the SAP is to ensure that sampling data collection activities will be comparable to and compatible with previous data collection activities performed at the Site while providing a mechanism for planning and approving field activities. The overall objectives of the two documents comprising the SAP are as follows:

1. to document specific objectives, procedures, and rationales for fieldwork and sample analytical work;

2. to provide a mechanism for planning and approving Site and laboratory activities;

3. to ensure that sampling and analysis activities are necessary and sufficient; and

4. to provide a common point of reference for all Work Settling Defendants to ensure the comparability and compatibility of all objectives and the sampling and analysis activities.

To achieve this last objective, the SAP shall document all field and sampling and analysis objectives as noted above, as well as all data quality objectives and specific procedures/protocols for field sampling and analysis.

The following critical elements of the SAP shall be described for each sample medium (e.g., ground water, surface water, soil, sediment, air, and biota) and for each sampling event:

1. sampling objectives;

2. data quality objectives, including data uses and the rationale for the selection of analytical levels and detection limits (see Guidance for the Data Quality Objectives Process, EPA QA/G-4 (EPA/600/r-96/055, September 1994); Draft Data Quality Objectives Decision Errors Feasability Trials (DEFT) Software, EPA/600/R-96/056, September 1994; Final Guidance Data Usability in Risk Assessment (Part A) (publication 9285.7-09A, April 1992, PB92-963356); and Guidance for Data Usability in Risk Assessment (Part B) (publication 9285.7-09B, May 1992, PB92-963362));

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3. site background update, including an evaluation of the validity, sufficiency, and sensitivity of existing data;

4. sampling locations and rationale;

5. sampling procedures and rationale and references;

6. numbers of samples and justification;

7. numbers of field blanks, trip blanks, and duplicates;

8. sample media (e.g., ground water, surface water, soil, sediment, air, and buildings, facilities, and structures, including surfaces, structural materials, and residues);

9. sample equipment, containers, minimum sample quantities, sample preservation techniques, maximum holding times;

10. instrumentation and procedures for the calibration and use of portable air, soil-, or water-monitoring equipment to be used in the field;

11. chemical and physical parameters in the analysis of each sample;

12. chain-of-custody procedures (see EPA NEIC Policies and Procedures Manual, EPA 330/9-78 001-R May 1978, revised May 1986);

13. procedures to eliminate cross-contamination of samples (such as dedicated equipment);

14. laboratory analytical procedures, equipment, and detection limits;

15. equipment decontamination procedures;

16. analysis from each medium for all inorganic and organic COCs;

17. analysis for other site-specific constituents in each media as required for design or monitoring of treatment systems and their performance; and

19. for any limited field investigation (field screening technique), provisions for the collection and laboratory analysis of duplicate samples and for the quantitative correlation analysis in which screening results are compared with laboratory results.

The SAP must be the framework of all anticipated field activities (e.g., sampling objectives, evaluation of existing data, standard operating procedures) and contain specific information on each round of field sampling and analysis work (e.g., sampling locations and rationale, sample numbers and rationale, analyses of samples). During the PDIs and RD/RA, the SAP shall be revised as necessary to cover subsequent field or laboratory activities. Revisions or a statement regarding the need for revisions shall be included in each deliverable describing all new field work.

The SAP shall allow for notifying EPA, at a minimum, three weeks before field sampling or monitoring activities commence. The SAP shall also allow split, replicate, or duplicate samples to be taken by EPA (or their contractor personnel) and by other Work Settling Defendants approved by EPA. At the request of EPA the Work Settling Defendants shall provide these samples in appropriately pre-cleaned containers to the government representatives. Identical procedures shall be used to collect the Work Settling Defendants and the duplicate split samples.

Several references shall be used to develop the SAP, for example:

- Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (OSWER Directive 9355.3-01, EPA/540/G-89/004, October 1988);

- Test Methods for Evaluating Solid Waste, Physical/Chemical Method (EPA Pub. SW-846, Third Edition, most recent update);

- EPA Requirements for Quality Assurance Plans, EPA QA/R-5 (EPA/240/B-01/003), March 2001;

- Region I, EPA-New England Compendium of Quality Assurance Project Plan Requirements and Guidance (U.S. EPA-New England Region I Quality Assurance Unit Staff, Office of Environmental Measurement and Evaluation; October 1999 Final);

- Guidance for the Data Quality Objectives Process, EPA QA/G-4 (EPA/600/r-96/055, September 1994);
- Draft Data Quality Objectives Decision Errors Feasability Trials (DEFT) Software, EPA/600/R-96/056, September 1994;

- Guidance for the Data Quality Objectives Process for Hazardous Waste, EPA QA/G-4HW Draft;

- Guidance for Preparing Standard Operating Procedures(SOPs), EPA QA/G-6 (EPA/240/B-01/004), March 2001;

- Region I, EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses, Revised December 1996; and

- Guidance for Data Quality Assessment: Practical Methods for Data Analysis, EPA QA/G-9 (EPA/600/R-96-084, QA 97 Version, January 1998).

2.1 QUALITY ASSURANCE PROJECT PLAN ("QAPP")

The Quality Assurance Project Plan ("QAPP") shall document in writing the site-specific objectives, policies, organizations, functional activities, sampling and analysis methods and specific quality assurance/quality control activities designed to achieve the data quality objectives ("DQOs") of the PDIs and RD/RA. The QAPP developed for this project shall document quality control and quality assurance policies, procedures, routines, and specifications.

Project activities throughout the PDIs and RD/RA shall comply with the QAPP. QAPP sampling and analysis objectives and procedures shall be consistent with EPA Requirements QAPP for Environmental Data Operations (EPA QA/R-5) and appropriate EPA handbooks, manuals, and guidelines including Region I, EPA-New England Compendium of Quality Assurance Project Plan Requirements and Guidance (October 1999 Final) (the "Compendium"), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Pub. SW-846, Third Edition, latest update), Guidelines Establishing Test Procedures for the Analysis of Pollutants (40 C.F.R. Part 136), and Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air (EPA-600/4-84-041 April 1984).

All the QAPP elements identified in EPA QA/R-5 and the "Compendium" must be addressed.

As indicated in EPA QA/R-5 and the "Compendium", a list of essential elements must be considered in the QAPP for the PDIs and RD/RA. If a particular element is not relevant to a project and therefore excluded from the QAPP, specific and detailed reasons for exclusion must be provided.

Information in a plan other than the QAPP may be cross-referenced clearly in the QAPP provided that all objectives, procedures, and rationales in the documents are consistent, and the reference material fulfills requirements of EPA/QA/R-5. Examples of how this cross reference might be accomplished can be found in the Guidance for the Data Quality Objectives Process (EPA/600/R-96/055) and the Data Quality Objectives Decision Errors Feasibility Trials (DEFT) Software (EPA/600/R-96/056). EPA-approved references, or equivalent, or alternative methods

approved by EPA shall be used, and their corresponding EPA-approved guidelines should be applied when they are available and applicable.

Laboratory QA/QC Procedures

The QA/QC procedures and SOPs for any laboratory (both fixed and mobile) used during the PDIs and RD/RA shall be included in the Work Settling Defendants' QAPP. When this work is performed by a contractor to a private party, each laboratory performing chemical analyses shall meet the following requirements:

1) be approved by the State Laboratory Evaluation Program, if available;

2) have successful performance in one of EPA's National Proficiency Sample Programs (i.e., Water Supply or Water Pollution Studies or the State's proficiency sampling program);

3) be familiar with the requirements of 48 C.F.R. Part 1546 contract requirements for quality assurance; and

4) have a QAPP for the laboratory including all relevant analyses, which shall be referenced as part of the contractor's QAPP.

Data Validation Procedures

The Work Settling Defendants are required to certify that a representative portion of the data has been validated by a person independent of the laboratory according to the Region I, EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses, revised December 1996, amended as necessary to account for the differences between the approved analytical methods for the project and the current Contract Laboratory Program Statements of Work ("CLP SOW"). A data validation reporting package as described in the guidelines cited above must be delivered at the request of the EPA project manager. Approved validation methods shall be described in the QAPP.

The independent validator shall not be the laboratory conducting the analysis and should be a person with a working knowledge of or prior experience with EPA data validation procedures. The independent validator shall certify that the data has been validated, discrepancies have been resolved, if possible, and appropriate data qualifiers noted.

Data Package Requirements:

The Work Settling Defendants must require and keep the complete data package and make it available to EPA on request in order for EPA to conduct an independent validation of the data. The complete data package shall consist of all results, the raw data, and all relevant QA/QC information. The forms contained in the data validation functional guidelines must be utilized

to report the data when applicable. Raw data are to be retained by the laboratory performing the analysis and include the associated chromatograms and the instrument printouts with area and height peak results. The peaks in all standards and samples must be labeled. The concentration of all standards analyzed with the amount injected must be included. All laboratory tracking information must also be included in the data package. An example data package deliverable is listed below:

1) a summary of positive results and detection limits of non-detects with all raw data;
2) tabulated surrogate recoveries and QC limits from Methods 3500 and 8000 in SW-846 and all validation and sample raw data;
3) tabulated matrix spike/matrix spike duplicate recoveries, relative percent differences, spike concentrations, and QC limits from Methods 3500 and 8000 in SW-846 and all validation and sample raw data;
4) associated blanks (trip, equipment, and method with accompanying raw data for tests);
5) the chain of custody for the sample shipment groups, and
6) a narrative summary of method and any problems encountered during extraction or analysis.

In addition to raw data for all samples and blanks, the laboratory will be responsible for retaining the following information for review by EPA for data validation purposes:

1) tabulated initial and continuing calibration results (concentrations, calibration factors or relative response factors and mean relative response factors, % differences and % relative standard deviations) with accompanying raw data;
2) tabulated retention time windows for each column;
3) a record of the daily analytical scheme (run logbook, instrument logbook) which includes samples and standards order of analysis;
4) the chain of custody for the sample shipment groups*;*
5) example calculation for positive values and detection limits; and
6) tabulated sample weights, volumes, and % solids used in each sample calculation.

The forms utilized to report the data will be identified in the laboratory QAPP.

2.2 FIELD SAMPLING PLAN ("FSP")

The objective of the Field Sampling Plan is to provide EPA and all Work Settling Defendants involved with the collection and use of field data with a common written understanding of all field work. The FSPs will be presented in the individual PDI and RD/RA Work Plans and should be written so that a field sampling team unfamiliar with the Site would be able to gather the samples and field information required. Guidance for the selection of field methods, sampling procedures, and custody can be acquired from the Compendium of Superfund Field

Operations Methods (OSWER Directive 9355.0-14, EPA/540/P-87/001), December 1987, which is a compilation of demonstrated field techniques that have been used during remedial response activities at hazardous waste sites. The FSP shall be site- and activity-specific and shall include the following elements:

1. Site Background. If the analysis of the existing Site details is not included in the Work Plan or in the QAPP, it must be included in the FSP. This analysis shall include a description of the Site and surrounding areas and a discussion of known and suspected contaminant sources, probable transport pathways, and other information about the Site. The analysis shall also include descriptions of specific data gaps and ways in which sampling is designed to fill those gaps.

2. Sampling Objectives. Specific objectives of sampling effort that describe the intended uses of data must be clearly and succinctly stated.

3. Sampling Location and Frequency. This section of the FSP identifies each matrix to be collected and the constituents to be analyzed. Tables shall be used to clearly identify the numbers of samples, the types of sample (water, soil, etc.), and the number of quality control samples (duplicates, trip blanks, equipment blanks, etc.). Figures shall be included to show the locations of existing or proposed sample points.

4. Sample Designation. A sample numbering system shall be established for the project. The sample designation should include the sample or well number, the sample round, the sample matrix (e.g., surface soil, ground water, soil boring), and the name of the Site.

5. Sampling Equipment and Procedures. Sampling procedures must be clearly written. Step-by-step instructions for each type of sampling that are necessary to enable the field team to gather data that will meet the Data Quality Objectives ("DQOs"). A list should include the equipment to be used and the material composition (e.g., Teflon, stainless steel) of equipment along with decontamination procedures.

6. Sampling Handling and Analysis. A table shall be included that identifies sample preservation methods, types of sampling jars, shipping requirements, and holding times. Examples of paperwork such as chain-of-custody forms and sample tags to be filled out for each sample, as well as instructions for filling out the paperwork, must be included. Field documentation methods including field notebooks and photographs shall be described.

Each Field Sampling Plan for the PDI and RD/RA activities shall be sufficiently detailed to carry out the study, and shall provide data needed to address the objective of the study and to complete the study. Each study shall be designed to achieve a high performance on the first attempt. Each work plan shall be related (by cross-references) to the other requirements in the Project Operations Plan.

3. HEALTH AND SAFETY PLAN ("HASP")

The objective of the Site-specific Health and Safety Plan is to establish the procedures, personnel responsibilities and training necessary to protect the health and safety of all on-site personnel during the PDIs and RD/RA. The plan shall provide for routine but hazardous field activities and for unexpected Site emergencies.

The Site-specific health and safety requirements and procedures in the HASP shall be updated based on an ongoing assessment of Site conditions, including the most current information on each medium. For each field task during the PDIs and RD/RA, the HASP shall identify:

1. possible problems and hazards and their solutions;

2. environmental surveillance measures;

3. specifications for protective clothing;

4. the appropriate level of respiratory protection;

5. the rationale for selecting that level; and

6. criteria, procedures, and mechanisms for upgrading the level of protection and for suspending activity, if necessary.

The HASP shall also include the delineation of exclusion areas on a map and in the field. The HASP shall describe the on-site person responsible for implementing the HASP for the Work Settling Defendants representatives at the Site, protective equipment personnel decontamination procedures, and medical surveillance. The following documents shall be consulted:

1. Interim Standard Operations Safety Guides (Hazardous Response Support Division, Office of Emergency and Remedial Response, EPA, Wash. D.C., 1982);

2. Superfund Public Health Evaluation Manual (OSWER Directive 9285.41, EPA/540/1-861060, EPA, 1986);

3. Hazardous Waste Operations and Emergency Response Standard (Department of Labor, Occupational Safety and Health Administration ("OSHA"), 29 C.F.R. Part 1910.120); and

4. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities: Appendix B (NIOSH/OSHA/EPA 1986).

OSHA regulations at 40 C.F.R. 1910 and Chapter 9 of the Interim Standard Operating Safety Guide, which describes the routine emergency provisions of a site-specific health and safety plan, shall be the primary reference used by the Work Settling Defendants in developing and implementing the Health and Safety Plan.

The measures in the HASP shall be developed and implemented to ensure compliance with all applicable state and Federal occupational health and safety regulations. The HASP shall be updated at the request of EPA during the course of the RD/RA and as necessary.

CONSENT DECREE EPA DOCKET NO. CERCLA I-23

APPENDIX B

STATEMENT OF WORK

DOVER MUNICIPAL LANDFILL SUPERFUND SITE

APPENDIX B
TO
CONSENT DECREE
U.S. V. City of Dover et al
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APPENDIX B
TO
CONSENT DECREE
U.S. V. City of Dover et al
STATEMENT OF WORK FOR REMEDIAL DESIGN AND REMEDIAL ACTION
DOVER MUNICIPAL LANDFILL

A. PURPOSE OF THE SOW

This Remedial Design/Remedial Action Statement of Work (SOW) further defines the response activities and deliverable obligations that the Work Settling Defendants shall perform under the terms of the Consent Decree, EPA Docket No. CERCLA I-23 (the Consent Decree) in order to perform the Work as specified in the Consent Decree. The intent of this SOW is to provide an enforceable plan to carry out all aspects of the United States Environmental Protection Agency (EPA) Record of Decision (ROD) signed by the Regional Administrator, Region I, on September 10, 1991, for the Dover Municipal Landfill Site, with one exception: neither the SOW nor the Consent Decree provide for the remediation of the contaminated groundwater currently in the Eastern or Southern Plumes as those terms are defined in the Consent Decree. To the extent that this document refers to and relies on the ROD, it refers to all portions of that document and its attachments with the exception of the remediation of the Eastern and Southern Plumes.

Sections C, D and E of this Appendix give an overview and general description of the Work required for consolidation of sediments in the drainage swale (Section C), the recontouring and capping of the Landfill (Section D) and treating the contaminated leachate/groundwater (Section E). Sections G, H, and I of this Appendix set forth in greater detail the requirements and procedures that the Work Settling Defendants shall follow during the Remedial Design (Section G), Remedial Action (Section H) and Operation and Maintenance (Section I) phases of the work. Section K of this Appendix sets forth the schedule of deliverables.

B. DEFINITIONS

The definitions provided in the Consent Decree are incorporated herein by reference. In addition, the following definitions shall apply:

1. Aquifer - A geological formation, or group of formations, capable of producing usable amounts of groundwater to wells and springs.

2. Point of Compliance - The point at and beyond which groundwater shall meet Cleanup Levels as specified in the ROD; specifically, the Point of Compliance will be set at the current areal extent of the Waste Management Area. The Waste Management Area, as defined below, will include those locations where Waste has been disposed or moved during the operation of the Landfill, and the drainage ditch surrounding the Landfill. The exact location of the Point of Compliance shall be determined by EPA in connection with the site survey to be conducted by the Work Settling Defendants in pursuant to Section G.1.d. of this SOW. The Point of Compliance shall be set in accordance with applicable or relevant and appropriate requirements as set out in the ROD; specifically, it shall be set in accordance with 40 C.F.R § 264.95 and the National Contingency Plan, 40 C.F.R. Part 300.

3. Hot Spots - Highly toxic and/or highly mobile material that present a potential threat to human health or the environment.

4. Hydraulic barrier - A dynamic artificial groundwater divide created through the use of extraction and/or injection systems in order to prohibit groundwater movement from contaminated areas to less contaminated or uncontaminated areas.

5. Margin - That portion of the Waste Management Area from which Waste will be removed during recontouring.

6. Overburden - The unconsolidated rock and soil material overlying bedrock.

7. Sludge - a semi-solid residue produced during the metals removal process of a groundwater treatment system.

8. Upper Aquifer - The hydrogeologic formation existing at and continuing beyond the Site above the marine clay formation.

9. Waste - shall include Waste Material as defined in the Consent Decree and solid waste as defined at 42 U.S.C. §6903.

10. Waste Management Area - The area where Waste has been disposed or moved during the operation of the Landfill and the drainage ditch surrounding the Landfill.

C. OVERVIEW OF REMEDY FOR CONSOLIDATION OF SEDIMENTS IN THE DRAINAGE SWALE

During remedial activities at this Site, the Work Settling Defendants shall excavate contaminated sediments in the drainage swale, adjacent to the eastern corner of the Landfill and down to the Cocheco River, and consolidate those sediments on the Landfill before constructing the composite cap on the Landfill.

These activities will also include the restoration of the natural and beneficial values of the wetlands and floodplains adversely affected by the removal of these contaminated sediments.

1. Cleanup Levels for Soils and Sediments

The Work Settling Defendants shall perform the Work such that at the conclusion of the excavation and restoration of the drainage swale, the concentrations of arsenic in the sediments shall be at or below the Cleanup Level listed below.

Indicator Compound	Cleanup Level (mg/kg)
Arsenic	50

2. Standards for Removal of Sediments in the Drainage Swale

In designing, constructing, operating, maintaining, and monitoring the remedial technology for removal of sediments in the drainage swale, the Work Settling Defendants shall comply with all applicable or relevant and appropriate requirements as identified in Appendix E to the ROD and all terms of the Consent Decree and this SOW.

The Settling Defendents shall provide for predesign sediment sampling to identify areas of sediment deposition exhibiting contaminant concentrations in excess of the Cleanup Level. The Work Settling Defendants shall excavate all contaminated sediments with arsenic concentrations above the Cleanup Level, as defined in Section C.1, from the drainage swale adjacent to the eastern side of the Landfill down to the Cocheco River as well as those contaminated sediments which have accumulated at the convergence of the swale and the river, as denoted as area 3 in Attachment 3 to this SOW. Work Settling Defendants shall consolidate these excavated sediments on the Landfill under the composite cap.

In conducting the excavation and consolidation of the sediments, the Work Settling Defendants shall take every measure practicable to avoid adverse impact on and disturbance to wetland and floodplain areas and the Cocheco River; Work Settling Defendants shall also minimize adverse impact to the flora and fauna in these areas to the maximum extent practicable. In performing the excavation, Work Settling Defendants shall use appropriate engineering controls such as coffer dams, silt barriers, and/or bales of hay, to isolate the sediments in the drainage swale and to minimize suspension and downstream transport of these sediments.

The Work Settling Defendants shall test the soils/sediments remaining after excavation by analyzing representative samples of those soils/sediments according to EPA CLP Methods to confirm that the remaining soils/sediments do not exceed the Cleanup Levels, as defined in Section C.1, for soils and sediments.

Following the completion of the sediment excavation, the Work Settling Defendants shall restore the natural and beneficial values of the wetlands and floodplains where sediments were removed and other wetlands or floodplains adversely affected by the remedial work to a condition similar to that of the immediately adjacent undisturbed wetlands or floodplains.

The Work Settling Defendants shall also continue to evaluate the effectiveness of the sediment cleanup and the wetlands/floodplain restoration and maintenance of the wetlands/floodplain, for five years or until the wetland/floodplain restoration is approved by the EPA as complete, which ever comes first.

The Work Settling Defendants shall conduct all activities involving the wetlands and floodplains in a manner consistent with Executive Orders 11990 and 11988, and 40 CFR Part 6, Appendix A. The Work Settling Defendants shall conduct all activities in the wetlands and floodplains in a manner utilizing the practicable alternative that will have the least adverse impact on the aquatic ecosystem and the environment, consistent with and pursuant to all applicable or relevant and appropriate requirements as identified in Appendix E of the ROD.

D. OVERVIEW OF REMEDY FOR CAPPING THE LANDFILL

During remedial activities, the Work Settling Defendants shall place a composite cap system over the Waste Management Area except in those areas where Waste has been removed as part of recontouring and EPA determines that a less stringent cap design is acceptable for those areas. The Waste Management Area is delineated on Attachment 2 of this Appendix to the Consent Decree.

1. Standards for Capping the Landfill

The Work Settling Defendants shall design, construct, operate and maintain the composite cap on the Waste Management Area except in those areas where Waste has been removed as part of recontouring and EPA determines that a less stringent cap design is acceptable for those areas. In so doing, the Work Settling Defendants shall comply with all applicable or relevant and appropriate requirements as identified in Appendix E to the ROD and all terms of the Consent Decree and this SOW.

The Work Settling Defendants shall design and construct the cap system to provide long-term minimization of the migration of liquids through the Landfill and to reduce to Final Cleanup Levels the migration of contaminants beyond the Point of Compliance. The cap must provide long-term performance with minimum maintenance; as such, the Work Settling Defendants shall design the final cover to promote drainage, minimize erosion, minimize accumulation of gas pressures, and accommodate settling. The Work Settling Defendants shall design, construct and maintain the cap in accordance with 40 CFR Part 264 Subparts G and N and the New Hampshire Admin. Code ENV-WM 708.02(k) and 708.03(d)(6).

The final two-component, low permeability layer cap design (composite cap) shall at a minimum meet the performance standards and material specifications set out in the EPA RCRA Technical Guidance Document "Final Covers of Hazardous Waste Landfills and Surface Impoundments" (EPA/530-SW-89-047), dated July 1989 and comply with 40 CFR Part 264, Subparts G and N regulations and the NH Administrative Code ENV-WM 708.02(k) and 708.03(d)(6). The Work Settling Defendants shall design and install a composite cap which includes the following elements, from top to bottom:

a. a soil layer, comprised of a vegetative top soil, to minimize erosion and a soil component;

b. a minimum one-foot-thick granular drainage layer, or equivalent material composition with a permeability greater than or equal to 1×10^{-2} cm/sec;

c. a flexible membrane liner (FML) at least 40 mils thick, lying wholly below the maximum depth to frost penetration (EPA shall not require the FML to lie at a depth greater than 36 inches below grade if a geosynthetic clay liner, such as bentonitic blankets, is used as a substitute for the two feet of 1×10^{-7} cm/sec low permeability soil);

d. a minimum two-foot-thick underlying clay barrier of low-permeability soil, or an equivalent material composition, such as a geosynthetic clay liner, with a maximum in-place saturated hydraulic conductivity of less than or equal to 1×10^{-7} cm/sec; and

e. a gas vent layer consisting of a minimum 1-foot-thick coarse-grained, porous material, or an equivalent material composition such as a drainage geocomposite, that allow gases emanating from the Wastes buried in the Landfill to be collected.

Work Settling Defendants shall design and construct the composite cap using filter layers between layers comprised of soils of greatly different particle sizes, to prevent one from migrating into the other, unless such filter layers are unnecessary as determined by EPA. The filters may be constructed of graded soil materials or geosynthetic materials.

Prior to placing the composite cap, the Work Settling Defendants may, to the extent practicable, recontour the Landfill using material from the toe of the Landfill, the side slopes of the Landfill, the perimeter drainage ditch and the soils adjacent to the drainage ditch (see attachment 3). Recontouring may reduce the amount of imported clean fill required to obtain adequate slopes to allow for proper surface water drainage from the Waste Management Area and to facilitate the construction of the cap. The composite cap must extend over those areas excavated for purposes of recontouring unless Work Settling Defendants can demonstrate that levels of contaminants in soils in those areas will not result in contaminant levels in groundwater above the groundwater Interim and Final Cleanup Levels at the Point of Compliance and that those soil levels are otherwise protective of human health and the environment as described in the paragraph that follows.

The Work Settling Defendants shall submit as part of the Pre-Design Work Plan, the sampling and analysis program for soils in the areas to be recontoured and the model(s) to be used to evaluate contaminant fate and transport. The Work Settling Defendants shall also submit to EPA a proposal for establishing cleanup levels in the soils in accordance with EPA guidance. EPA may conduct a risk assessment on the remaining soil contaminants in accordance with EPA Guidance, and may include, but not be limited to, a contact and ingestion risk analysis. The risk assessment shall employ methods and assumptions consistent with Interim and Final EPA guidance, policies and regulations available at the time the risk assessment is conducted. The Work Settling Defendants shall propose for EPA approval a cap design and performance standards for capping the Margin. Upon approval by EPA, those soil cleanup levels and cap performance standards shall become enforceable Performance Standards for purposes of this SOW and Decree. In no case shall the Work Settling Defendants' proposal to employ a cap other than the composite cap in the Margin delay design and implementation of the composite cap.

During recontouring, Waste Material at the perimeter of the Landfill may be uncovered, and hot spots may be encountered. Work Settling Defendants shall minimize the possibility of encountering hot spots by conducting a preliminary assessment of materials beneath the surface of the Landfill in areas to be recontoured. To the maximum extent practicable, Work Settling Defendants shall limit excavation to areas containing predominantly soils, debris, and municipal waste. If hot spots are exposed, Work Settling Defendants shall test the material and, if the material is determined to be a hazardous waste as defined by the Resources Conservation and Recovery Act (RCRA) or a waste exhibiting the characteristics of a RCRA hazardous waste, Work Settling Defendants shall remove, treat, and dispose of it off-site in accordance with RCRA and state hazardous waste laws.

If at any time prior to or during recontouring activities, EPA determines that recontouring activities in a given area of the Site are posing a threat to human health and the environment or shall pose such a threat as described in the Site Specific Health and Safety Plan required under Section G.1.b of this SOW, then such activities in that area shall be immediately suspended and immediate measures taken to stop or prevent that threat. Recontouring activities in that area shall only continue after the Work Settling Defendants have proposed, and EPA has approved, corrective actions that allow those activities to occur in a manner that protects human health and the environment and meet ARARs. Alternatively, the Work Settling Defendants can terminate recontouring in that area and if that area is not a hot spot, Settling Defendant's may place clean fill to provide the necessary subgrade for the landfill cover.

During recontouring Work Settling Defendants shall employ appropriate engineering methods to control odor and hazardous emissions; such methods may include the use of vapor suppression foam. Work Settling Defendants shall conduct continuous ambient air monitoring throughout recontouring in order to ensure that State air quality standards are not exceeded. Work Settling Defendants shall cease recontouring activities resulting in exceedance of air quality standards or limits at the monitoring stations established in the Field Sampling and Analysis Plan; recontouring shall not recommence until Work Settling Defendants provide, and EPA approves, a corrective action plan.

In addition, prior to placing the cap over the Landfill, the Work Settling Defendants shall excavate and deposit onto the Landfill sediments from the drainage swale, as described in Section C of this SOW.

The Work Settling Defendants shall proofroll, grade and prepare Site soils, with minimal disturbance of buried Wastes, to form a proper subgrade for the cap. The Work Settling Defendants shall ensure that the final slope is free from significant surface irregularities and shall design the slope to provide proper drainage and minimize erosion. If needed for construction of the composite cap, the Work Settling Defendants shall use soil materials from off-site locations. The Work Settling Defendants shall control runoff and sedimentation during construction activities by using silt fences, sedimentation ponds, or other means, in order not to disturb or negatively impact the wetlands or other areas adjacent to the Landfill.

As part of the capping procedure, the Work Settling Defendants shall also collect and vent Landfill gases, such as methane, that are generated below the cap. The Work Settling Defendants shall perform pre-design investigations to determine whether passive gas collection and venting is sufficient to protect human health and the environment and to prevent potentially significant

adverse impacts to any component of the source control remedy from gas generation. The Work Settling Defendants shall propose in the Pre-Design Report, for EPA acceptance, whether passive gas collection and venting meets the above requirements. If venting to the atmosphere is determined to be acceptable by EPA, then the Work Settling Defendants shall vent methane and other gases by means of a passive interior gas collection/recovery system, allowing the gases to vent to the atmosphere. In designing, constructing and operating any gas venting system, the Work Settling Defendants shall comply with ARARs and take measures necessary to protect human health and the environment including measures to reduce odors and VOC emissions.

The Setting Defendants shall coordinate the construction of the Landfill cap with the construction of the gas ventilation, groundwater diversion system and groundwater/leachate collection/extraction and treatment systems, in order to accommodate construction below, and adjacent to, the composite cap. The Work Settling Defendants shall install the Landfill gas collection system and the groundwater/leachate collection/extraction and treatment systems before or during the cap construction phase. The Work Settling Defendants shall seal perforations made to the FML and other layers of the cap, to maintain the integrity and the required performance of the multi-layer, composite cap.

E. OVERVIEW OF REMEDY FOR TREATING CONTAMINATED GROUNDWATER

Also during the remedial activities, the Work Settling Defendants shall construct a groundwater/leachate collection/extraction and treatment system which will minimize and control further contamination of groundwater by the Wastes left in place such that groundwater contaminant concentrations at the Point of Compliance meet Final Cleanup Levels. This shall be accomplished through the diversion of clean upgradient groundwater away from the Waste Management Area and the capture and treatment of contaminated groundwater from the upper aquifer migrating beyond the Point of Compliance above Final Cleanup Levels. The collected groundwater/leachate shall be treated by the Work Settling Defendants as set forth in Section E.2. of this SOW, prior to discharge to the Cocheco River or to the City of Dover Publicly Owned Treatment Works (POTW). The Work Settling Defendants shall continue to operate and maintain the groundwater/leachate treatment system such that Final Cleanup Levels are achieved at the Point of Compliance and the quality of groundwater migrating beyond the Point of Compliance meets Performance Standards.

The Work Settling Defendants shall conduct long-term groundwater monitoring in the Southern Plume in accordance with Section G.2.a.(3) of this SOW. The Work Settling Defendants shall install a groundwater monitoring system as set forth in Section G.2.a.(3) of this SOW to monitor the Eastern Plume. A report shall be submitted every three (3) years to EPA, beginning three years after achieving 75% construction completion, which compares the behavior of the Eastern Plume to conditions at the time of the ROD and over time. The Work Settling Defendants shall sample groundwater and submit sampling results to EPA and the State on a semi-annual or quarterly basis as set out in Section G.2.a.(3) of this SOW. The Work Settling Defendants shall submit a report to EPA and the State, evaluating the attenuation of the Eastern Plume, beginning three years from achieving 75 percent construction completion of the cap and groundwater collection/extraction and treatment systems. The Work Settling Defendants shall submit a report every three years for the first 9 years and then every 5 years thereafter or until Cleanup Levels, established in the ROD, have been met throughout the Eastern Plume. The report shall include an evaluation of the "natural attenuation" of the plume including estimates of the time to reach Cleanup Levels established in the September 10, 1991 ROD.

The remedial activities called for in the ROD for the treatment of contaminated groundwater in the Southern Plume and any active remediation for the treatment of contaminated groundwater in the Eastern plume are not addressed in this SOW or in the Consent Decree. By excluding remedial activities for the Eastern and Southern Plumes from these documents, the EPA in no way implies that those remedial activities will not be undertaken in the future or that cleanup levels must not be met in these plumes in the future.

1. Interim Groundwater Cleanup Levels

Interim Cleanup Levels for groundwater contamination are specified below and in the ROD. While these cleanup levels are consistent with applicable or relevant and appropriate requirements (ARARs), a cumulative risk that could be posed by these compounds and others emanating from the Landfill may exceed the risk limits as set out in the National Contingency Plan. Consequently, these levels are considered to be Interim Cleanup Levels for groundwater. As set out in Section E.3 of this SOW, after Settling Defendant's attain Interim Cleanup Levels, EPA will perform a risk assessment on residual groundwater contamination at the Point of Compliance. Final Cleanup Levels will then be set by EPA and Work Settling Defendants shall attain those Final Cleanup Levels.

The Work Settling Defendants shall conduct remedial activities such that the following Interim Cleanup Levels are achieved at the Point of Compliance.

Contaminant	Cleanup Level (ug/L)
Carcinogens	
Arsenic	50*
Benzene	5
1,1-Dichloroethylene	7
1,2-Dichloroethane	5
Methylene Chloride	5
Tetrachloroethylene	5
Trichloroethylene	5
Vinyl Chloride	2
Non-Carcinogens	
Arsenic	50*
Chloroethane	14,000
Tetrahydrofuran	700
Acetone	700
Methyl Ethyl Ketone (MEK)	200
Methyl Isobutyl Ketone (MIBK)	350
Toluene	1,000

* Due to the presence of naturally occurring arsenic at and around the Site, the cleanup level will be 50 ug/l (MCL) or background, whichever is higher. Background levels will be determined by EPA based upon the results of groundwater analyses performed during pre-design and design activities.

2. Technology for Restoring Groundwater

The Work Settling Defendants shall design, construct, operate and maintain the groundwater/leachate collection/extraction and treatment system to achieve the Cleanup Levels in accordance with the following:

a. The Work Settling Defendants shall design the groundwater/leachate collection/extraction and treatment system to attain Cleanup Levels in the groundwater at the Point of Compliance and to prevent all future migration of contaminants away from the Waste Management Area above Interim Cleanup Levels. The Work Settling Defendants shall utilize an extraction system, such as wells, trenches or a combination of the two, to extract groundwater and leachate from the upper aquifer beneath the Waste Management Area. The Work Settling Defendants shall propose an extraction system design based on data analyzed to determine the vertical extent of contamination at the perimeter of the Waste Management Area and other aquifer characteristics. EPA shall make the final selection of the method(s) after receiving the Settling Defendant's proposal.

b. The Work Settling Defendants shall install monitoring wells in the Waste Management Area to evaluate groundwater contamination levels directly under the Landfill and to monitor water table levels within and beneath these areas. Work Settling Defendants shall install and operate extraction wells in the Waste Management Area to supplement the perimeter groundwater/leachate collection/extraction system in lowering the water table beneath the Landfill Wastes unless the Work Settling Defendants can demonstrate to EPA's satisfaction that extraction from within the Landfill will not be necessary to lower the groundwater beneath the Landfill Waste.

c. The Work Settling Defendants shall design, construct and operate a treatment system, utilizing the PACT^R process as set forth in the ROD or an alternative, equally effective treatment process, to treat the collected groundwater/leachate to levels necessary for discharge to the Cocheco River or the City of Dover Publicly Owned Treatment Works (POTW).

If EPA determines based upon pre-design studies that the PACT^R System will not be as effective or efficient as an alternative system, then this alternative treatment system may be employed. Controls must be employed on the alternative treatment system to remove VOC's prior to their emission into ambient air.

d. The Work Settling Defendants shall design and operate the groundwater/leachate collection/extraction and treatment system so that effluent discharged from the system to the Cocheco River meets the substantive requirements of the National Pollutant Discharge Elimination System (NPDES) as well as other applicable or relevant and appropriate requirements as set out in the ROD at Appendix E. The Work Settling Defendants shall monitor the treatment system to ensure that the effluent meets all such requirements.

If the groundwater/leachate is discharged to the POTW, the Work Settling Defendants shall meet the procedural and substantive requirements of those ARARs concerning the discharge of the groundwater/leachate from the Site to the POTW.

e. The Work Settling Defendants shall construct a groundwater diversion system upgradient of the Landfill designed to minimize clean groundwater from contact with the Landfill Wastes, thus reducing the volume of contaminated groundwater requiring treatment. The clean groundwater flowing into the diversion system shall be diverted to either the wetlands or the Cocheco River without mixing with the collected groundwater/ leachate. The diverted clean groundwater discharged to the Cocheco River may be discharged with the treated groundwater/leachate.

f. The Work Settling Defendants shall design and construct the contaminated groundwater/leachate collection/extraction system, the upgradient diversion system and the extraction wells within the Waste Management Area in such a manner as to minimize redundant functions of each individual component. The objective of the system as a whole is to meet groundwater Final Cleanup Levels at the Point of Compliance and to minimize the amount of groundwater needing treatment. This shall be achieved by minimizing contact of clean groundwater with the Waste left in place through the use of a diversion system, and by lowering the groundwater level beneath the Waste, to the extent technically practicable.

g. The Work Settling Defendants shall meet federal and state discharge requirements for all discharges to surface waters, and shall also meet all applicable or relevant and appropriate requirements to such discharges as set out in the ROD at Appendix E. The Work Settling Defendants shall design, monitor, construct and maintain effluent treatment units in order to attain ARARs and meet Performance Standards.

h. To mitigate dewatering of the wetlands, the Work Settling Defendants shall, as necessary to prevent dewatering of the wetlands, discharge diverted clean groundwater to groundwater downgradient from the Site or to wetland areas where dewatering may have occurred as a result of groundwater extraction operations. Any discharge of treated groundwater to groundwater at the Site shall meet all applicable or relevant and appropriate requirements as identified in the ROD at Appendix E.

i. The Work Settling Defendants shall, as part of pre-design, evaluate the practicability of discharging the contaminated groundwater and leachate to the Publicly Owned Treatment Works (POTW) facility in Dover, New Hampshire. If the POTW is used to treat contaminated waters, Work Settling Defendants shall pre-treat contaminated groundwater/leachate prior to sending those waters to the POTW if necessary to meet local sewer pre-treatment standards and federal and state pre-treatment and discharge regulations.

3. Standards for Contaminated Groundwater Collection/Extraction and Treatment System

The Work Settling Defendants shall design, construct, operate and maintain the groundwater/leachate collection/extraction and treatment system in compliance with all applicable or relevant and appropriate requirements as identified in Appendix E to the ROD and all terms of the Consent Decree and this SOW.

Work Settling Defendants shall test sludge generated by the groundwater/leachate treatment system, and if determined to be a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) or other ARARs, such sludge shall be removed from the Site, transported and disposed of in accordance with the applicable or relevant and appropriate requirements set out in the ROD at Appendix E, including but not limited to the requirements of RCRA and State hazardous waste disposal requirements. If the Work Settling Defendants determine that the sludge is not a hazardous waste pursuant to RCRA, the sludge may be managed as a solid waste and disposed of according to State solid waste laws.

The Work Settling Defendants shall design, construct, operate, and maintain the groundwater/leachate collection/extraction and treatment system, which will be handling hazardous materials, in accordance with all applicable or relevant and appropriate requirements as identified in the ROD at Appendix E, including but not limited to the federal (RCRA) and state (Part ENV-WM 353 and 708) hazardous waste requirements relating to standards for generators, security, inspection and training, tank systems, use and management of containers, miscellaneous treatment units (activated carbon columns), and packaging, labelling, manifesting and transportation.

Any discharge of treated groundwater to surface water at or about the Site shall meet all applicable or relevant and appropriate requirements as identified in the ROD at Appendix E, including but not limited to the substantive requirements of the National Pollutant Discharge Elimination System, 40 C.F.R. Part 125, and New Hampshire Administrative Code Ch. Ws 430, Parts 437 and 439, the Federal Clean Water Act (CWA), 33 U.S.C. §§ 1251 et seq., and regulations promulgated thereunder.

The Work Settling Defendants shall develop and implement an Operation and Maintenance Program designed to ensure the long-term, continued effectiveness of the groundwater extraction and treatment system, as set forth in Section I of this SOW. The Work Settling Defendants shall perform the required activities in the Operation and Maintenance Plan.

When groundwater Interim Cleanup Levels have been met at the Point of Compliance and in the groundwater/leachate collected in the groundwater/leachate collection/extraction system for two consecutive quarterly groundwater sampling rounds, the Work Settling Defendants may request that EPA approve a plan to cease collection/extraction and treatment of the leachate/groundwater. The Work Settling Defendants' request must demonstrate that migration of contaminated groundwater from under the Landfill will not, in the absence of active collection/extraction and treatment, cause groundwater at the Point of Compliance to exceed Interim Cleanup Levels. Pending approval by EPA to cease

collection/extraction and treatment of groundwater/leachate, the Work Settling Defendants shall continue to operate and maintain the collection/extraction and treatment system as approved by EPA under this SOW and the Consent Decree.

When the Interim Cleanup Levels have been met at the Point of Compliance for three consecutive years after cessation of the collection/extraction and treatment system, Work Settling Defendants shall submit a Demonstration of Compliance Report summarizing the data which supports the conclusion that the Interim Cleanup Levels have been achieved. Upon EPA's acceptance of the conclusion in such a report and that Interim Cleanup Levels have been achieved in accordance with 40 CFR 264.100 (d) and (f), Work Settling Defendants shall collect, tabulate and submit all data to be specified by EPA, which will be necessary for EPA to conduct a risk assessment as called for in the ROD. The risk assessment of the residual groundwater contamination will assess the cumulative risks for carcinogens and non-carcinogens posed by Site groundwater at the Point of Compliance. The risk assessment will employ methods and assumptions consistent with Interim and Final EPA guidance, policies and regulations available at the time the risk assessment is conducted.

If EPA determines that the risks are within EPA's risk management standards as set out in the National Contingency Plan, the Interim Cleanup Levels will be Final Cleanup Levels and will become Performance Standards. If EPA determines that the risks are not within EPA's risk management standards, then EPA will establish New Cleanup Levels, and the Work Settling Defendants shall renew the operation of the groundwater/leachate collection/extraction and treatment systems until the New Cleanup Levels, specified by EPA, are achieved (as set out above), or the remedy is otherwise deemed protective by EPA. These New Cleanup Levels shall constitute the Final Cleanup Levels for the Site and shall be Performance Standards.

Work Settling Defendants shall maintain the groundwater/leachate collection/extraction and treatment equipment for the Site in operable condition until the Work Settling Defendants can demonstrate through the groundwater monitoring program that the Final Cleanup Levels have not been exceeded at the Point of Compliance for a period of three consecutive years after cessation of the groundwater/leachate collection/extraction and treatment in accordance with the procedures in 40 C.F.R. 264.100(d) and (f).

F. ADMINISTRATIVE REVIEW OF CERTAIN PERFORMANCE STANDARDS

Notwithstanding any other provision of this Statement of Work, if at any point during the performance of the Work, legislative or administrative amendments are made to the applicable or relevant and appropriate federal laws and regulations (ARARs) identified in the ROD at Appendix E, or EPA issues Interim or Final national policy or guidance concerning the applicability, relevance or appropriateness of those federal ARARs to Superfund sites, such that the Point of Compliance would be moved or the Interim Cleanup Levels (as set out in this SOW and in the ROD) would be changed if that amendment/policy/guidance were applied to this Site, the Work Settling Defendants may propose modifications to the remedy selected in the ROD and modifications of the requirements of this Statement of Work. Notwithstanding any other provision of this Statement of Work, if at any point prior to Work Settling Defendants' submission of the Pre-Final design (95% design), legislative or administrative amendments are made to the applicable or relevant and appropriate federal laws and regulations (ARARs) identified in the ROD at Appendix E, such that the composite cap design would be changed if those amendments were applied to this Site, the Work Settling Defendants may propose, prior to the submission of the Pre-Final design, modifications to the remedy selected in the ROD and modifications of the requirements of this Statement of Work. EPA shall review the Work Settling Defendants' proposed modifications and, after review and comment by the State, EPA shall issue a decision to the Work Settling Defendants. EPA's decision concerning such proposed adjustments to the Point of Compliance, changes in the Interim Cleanup Levels, or changes to the composite cap in this Statement of Work shall be subject to the dispute resolution provisions in Section XX of the Consent Decree; in particular judicial review of such a decision shall be in accordance with Paragraph 70 of the Decree. Nothing in this paragraph shall require EPA to take action which is contrary to the NCP or other law, nor shall this paragraph require EPA to apply retroactively those amendments/policies/guidances which expressly prohibit retroactive application. In addition, nothing in this paragraph shall be construed to relieve the Work Settling Defendants of their obligation to implement the Work on the schedules set out in this SOW and the plans submitted pursuant to this SOW; there shall be no delay in the Work required under the Decree and this SOW while Work Settling Defendants propose changes to the SOW, while they await EPA's decision with respect to such a proposal, or while they await the outcome of dispute resolution.

G. REMEDIAL DESIGN

The remedial design process shall consist of initial remedial activities, pre-design activities, and remedial design activities. The Work Settling Defendants shall prepare separate work plans for the pre-design activities and the remedial design activities and shall submit them to EPA for review and acceptance.

1. Initial Remedial Steps

a. Design Contractor

(1) Within thirty (30) days after notice of the lodging of the Consent Decree, the Work Settling Defendants shall notify EPA and the State, in writing, of the name, title, and qualifications of the Supervising Contractor to be used in carrying out the Remedial Design Activities to be performed pursuant to the Consent Decree. Work Settling Defendants shall notify the EPA and the State of the names of any other contractors and/or subcontractors proposed within 60 days from the lodging of the Consent Decree. Selection of any such contractor shall be subject to disapproval by EPA. If EPA disapproves of the selection of any contractor, the Work Settling Defendants shall submit a list of contractors, including their qualifications, to EPA and the State within 21 days of receipt of the disapproval of the contractor previously selected. Upon EPA response, the Work Settling Defendants may at their election select any one not disapproved on the list. After selection of a contractor, Work Settling Defendants shall notify EPA and the State of the name of the contractor within 14 days following receipt of EPA's response.

(2) Within thirty (30) days after Work Settling Defendants submit the list of the proposed contractors, pursuant to Section G.1.a.(1) above, the Work Settling Defendants shall select a contractor and submit to the EPA a Letter of Acceptance from the selected Remedial Design Contractor(s), copies of the signed contract(s), and final bid packages from the bidders for such contracts.

b. Health and Safety Plan

(1) Within seventy (70) days after the lodging of the Consent Decree, the Work Settling Defendants shall develop and submit to EPA for review and approval a site-specific Health and Safety Plan including a Contingency Plan in accordance with Attachment 1 of the SOW and in compliance with 40 CFR § 264 Subpart D and New Hampshire Admin. Code Part ENV-WM-708.02(i).

c. Site Security Plan

(1) Within sixty (60) days after the Work Settling Defendants submit the Letter of Acceptance, the Work Settling Defendants shall complete a study of existing site security measures (e.g. gate, fence, signs) and shall submit to EPA for review and approval by EPA a Site Security Plan. This plan shall detail the results of the study and shall specify appropriate measures to control unauthorized entry onto the Site, including construction of a security fence at the edge of the Landfill area along Tolend Road, and posting signs around the perimeter of the Site alerting the public to the presence of hazardous materials and the conduct of remedial action activities at the Site. The security plan shall be consistent with 40 C.F.R. § 264.14 and the parallel state regulations. The security plan shall specifically address the security measures to be taken during recontouring of the Landfill, the measures to be taken to prevent contact with the drainage swale, and the necessity of 24-hour security services. The Work Settling Defendants shall design the security plan to reflect and complement the level of work activity on Site at the various phases of the work.

d. Site Survey/Site Access/Site Map

(1) Within sixty (60) days after the Work Settling Defendants submit the Letter of Acceptance, the Work Settling Defendants shall submit to EPA a topographical or otherwise appropriate land survey which delineates property boundaries within and surrounding the Site to which access may be required to conduct the Work, identifies all current property owners of such land, identifies the edge of the Waste and the Waste Management Area, and identifies all utilities, rights of way, and easements on all lands to which access may be required at any time to conduct the Work. The exact location of the Point of Compliance shall be set by EPA at the edge of the Waste Management Area in accordance with the applicable or relevant and appropriate requirements as set out in the ROD, Appendix E; specifically, it shall be set in accordance with 40 C.F.R § 264.95 and the National Contingency Plan, 40 C.F.R. Part 300. Prior to submittal of the topographical survey drawing, Work Settling Defendants shall propose and EPA shall approve, the specific scale and, if a topographic map, the contour interval.

2. Pre-Design Steps

a. Within 75 days after the Work Settling Defendants receive approval of the Health and Safety Plan, the Work Settling Defendants shall submit to EPA for review and approval a Project Operations Plan, a Pre-Design Work Plan, and an Environmental Monitoring Plan, as set forth below.

(1) The Project Operations Plan shall include the following components, each of which is described in detail in Attachment 1 to this SOW:

(a) A Quality Assurance/Quality Control Plan;

(b) The Health and Safety Plan developed pursuant to Section G.1.b of this SOW, updated as appropriate;

(c) A Field Sampling and Analysis Plan; and

(d) A Project Management Plan.

(2) The Pre-Design Work Plan shall specify in detail the investigations necessary for the design of all remedial activities. The Pre-Design Work Plan shall include, for each such investigation, a statement of its purpose and objectives, an identification of the specific activities necessary to conduct the investigation, and a timetable/schedule for performance of those activities, including the deadline for submittal of the final study reports for each investigation. The specifics of these investigations are set forth below.

(a) Consolidation of Drainage Swale Sediments - The Work Settling Defendants shall, at a minimum:

(i) Perform appropriate sampling to define the extent of contaminated sediments in the drainage swale to be consolidated. This investigation shall estimate the depth of those sediments in the swale, confirm the location of those sediments, and confirm the amount of those sediments to be consolidated into the Landfill.

(ii) Develop a drainage swale wetlands restoration plan which requires that all wetlands from which sediments have been removed to be reestablished to attain the natural and beneficial values. In developing this plan, the Work Settling Defendants shall perform a detailed assessment of the pre-remediation condition of the wetland areas likely to be disturbed by the sediment excavation. The Work Settling Defendants shall also identify those factors that are essential to restoration of the natural and beneficial values, as required by ARARs. The Work Settling Defendants shall also include a plan for monitoring selected features of the restored wetland at periodic intervals, as described in Section G.2.a.(3) of this SOW.

(b) Capping of the Landfill - The Work Settling Defendants shall perform an initial assessment of both the composite cap design and the margin area cap design in accordance with SOW Section D. This study shall include the availability and costs of materials proposed for each layer of the caps, the design assumptions and bases for layer thickness and materials chosen, the expected cost and time requirements for operation and maintenance of the caps and expected lifetime of the caps, expected difficulties during construction, expected failure and infiltration rates and a comparison to other cap designs. The assessment shall also include, at a minimum:

(i) A limited investigation to define the horizontal and vertical extent of the Waste in the Waste Management Area for the purpose of determining the area to be covered by the caps.

(ii) An investigation to determine the volume of materials to be moved in the recontouring of the Landfill and from where those materials will be moved, should the Work Settling Defendants elect to undertake recontouring. This investigation shall estimate the volume of sediments, soils and debris to be consolidated into the Landfill. Investigations such as borings and test pit excavations shall be conducted to determine areas of the Landfill that are suitable for recontouring. The Work Settling Defendants shall propose as part of the Pre-Design Workplan, for EPA approval, a soil sampling and analysis program and the model(s) to be used to evaluate soil contaminant fate and transport. The Work Settling Defendants shall also submit a proposal for establishing cleanup levels in the soils in accordance with EPA guidance. During these investigations, and at all other times during remedial activities, appropriate measures shall be taken by the Work Settling Defendants to prevent air emissions, dust and leachate from adversely affecting nearby receptors.

(iii) An investigation into stability, settlement, and subsidence problems associated with placing a composite cap on the Landfill. The Work Settling Defendants shall conduct geotechnical testing prior to construction to assess slope stability and potential settlement of the Landfill. Such testing shall include, but not necessarily be limited to, a topographic survey, soil borings, construction and settlement monitoring of the test

fill. The settling and subsidence analysis will be used to accommodate possible settling and subsidence of the Landfill in the cap design.

(iv) An investigation into the appropriate Landfill configuration. The Work Settling Defendants shall grade or "contour" the slopes in accordance with RCRA closure guidelines, NH standards and good engineering design practices. The side slopes of the Landfill's final cover shall be no steeper than 3 (horizontal) : 1 (vertical). The Work Settling Defendants shall flatten slopes steeper than 3 : 1 by filling in those areas with compacted clean fill or stabilized by appropriate methods. To adequately perform the slope stability analyses, the Work Settling Defendants shall assess the strength properties of the cover system components, the Waste, and the foundation soils, along with seepage conditions. In selecting the FML for the final cover, the Work Settling Defendants shall address the specific geomembrane's coefficient of friction for preventing slippage of cover components and its ability to undergo deflection due to differential settlement. The Work Settling Defendants shall consider benches with ditches as part of a cover design to control drainage and limit slope lengths to meet slope stability and erosion requirements.

(v) An investigation using the Hydrologic Evaluation of Landfill Performance (HELP) model to calculate percolation in each layer of the Landfill for various cap designs. The Work Settling Defendants shall verify the coefficient of run off, default data, climatologic data and soil data used by the HELP model. The Work Settling Defendants shall submit to EPA for approval the input parameters used in the HELP model as appropriate to this Site, and shall calculate surface runoff, evapotranspiration, changes in water storage, lateral drainage, and percolation through each layer.

(c) Groundwater/Leachate Collection/Extraction System - The Work Settling Defendants shall perform a hydrogeological assessment of the groundwater/leachate collection/extraction system to develop data to determine the final location, number and size of extraction wells and/or trenches in compliance with SOW Section E. This assessment shall evaluate extraction rates and determine influent flow at the treatment

plant; it shall also evaluate extraction techniques, such as cyclic pumping, to enhance system performance. The assessment shall be sufficient to support the design of an effective groundwater/leachate collection and extraction system that meets the objectives of the ROD, the Consent Decree, and Section E of this Statement of Work. At a minimum, the Work Settling Defendants shall conduct a hydrogeological assessment which shall include:

(i) a systematic review and incorporation of all existing hydrogeologic work conducted at the Site;

(ii) a well inventory and inspection, with an evaluation of well suitability and integrity for future sampling;

(iii) evaluation of geologic cross-sections to identify data gaps and inaccuracies;

(iv) an overburden water table map based on a recent round of water levels and re-survey, as well as an investigation to determine the groundwater elevation in the Landfill and the directions of flow;

(v) an investigation to determine the vertical extent of contamination at the perimeter of the Landfill, which may include the evaluation of existing data;

(vi) identification of design criteria for vertical and horizontal placement of the leachate collection and groundwater extraction system;

(vii) a plan for conducting one or more pump tests in several locations at the Landfill's perimeter;

(viii) identification of leachate collection system design elements and current data gaps; and

(ix) a plan of proposed Site activities to address data gaps, if warranted to complete Remedial Design.

(d) Groundwater/Leachate Treatment System - If on-site treatment is warranted based upon discharge requirements, the Work Settling Defendants shall assess the groundwater/leachate treatment system by conducting a treatability study for the unit processes to be

employed in the groundwater treatment system. The Work Settling Defendants shall conduct the treatability study in order to optimize design and operating conditions necessary for performance, and shall perform the treatability study consistent with the "Guide for Conducting Treatability Studies under CERCLA," Interim Final, EPA 549/2-89/058, December 1989 and OSWER Directive 9380.3-02FS and any updates to these documents. At a minimum, the Work Settling Defendants shall design the treatability study to satisfy the following criteria, and the Work Settling Defendants shall submit a plan to conduct bench and/or on-site pilot sized treatability studies in order to achieve these criteria:

(i) to determine the effectiveness of treatment in terms of contaminant removal;

(ii) to determine design criteria, to properly size the equipment and to determine residual management needs; and

(iii) to determine the nature and extent of expected Operation and Maintenance.

(e) The Work Settling Defendants shall evaluate whether discharging contaminated groundwater and leachate to the Dover POTW is practicable. At minimum the POTW discharge investigation shall:

(i) evaluate the long term capacity of the Dover POTW to accept and treat the contaminated groundwater and leachate;

(ii) evaluate the need for pre-treatment of the contaminated groundwater and leachate prior to discharge to the POTW to meet the Dover POTW pretreatment requirements; and

(iii) evaluate construction issues related to the extension of the existing sewer line to the Landfill.

(f) Background Arsenic Determination - The Work Settling Defendants shall propose, for EPA's review and approval, a study to statistically determine the background concentrations of arsenic in the groundwater in the general area of the Landfill. The background arsenic study for groundwater shall conform to the regulations set out in 40 C.F.R. § 264.97. The study shall be based upon data from a new sampling round(s)

of groundwater using wells and locations and sampling procedures proposed by the Work Settling Defendants and approved by EPA. Groundwater samples shall be analyzed for unfiltered arsenic according to approved CLP methods. The Work Settling Defendants' proposal for the arsenic study, shall, at a minimum, include the following:

1) the statistical approach to be utilized;

2) the number of samples required;

3) the proposed locations of the wells, where samples are to be collected; and

4) the analytical methods to be employed for sample analysis.

The Work Settling Defendants, upon EPA's approval of the study proposal, shall conduct the arsenic study as part of the Pre-Design Studies.

At the conclusion of the arsenic study, the Work Settling Defendants shall submit to EPA a Technical Memorandum identifying the number of samples taken, location of the samples, analytical results, and the statistical tests employed including, but not limited to, all assumptions, calculations and conclusions employed in or derived from the statistical analysis of the data.

(3) The Environmental Monitoring Plan shall include monitoring programs relating to the groundwater, surface water, air and wetlands remediation, as set forth below.

(a) The Work Settling Defendants shall develop a groundwater monitoring program for the following purposes: to monitor contaminant concentrations at and beyond the Point of Compliance over time; to evaluate the hydraulic effectiveness of the remedial activities and attainment of the groundwater Cleanup Levels; to determine whether Cleanup Levels are sustained once they are achieved; and to monitor whether groundwater contaminant levels in treated effluent meet Performance Standards. The groundwater monitoring program shall include, but not necessarily be limited to, the following components:

(i) Performance monitoring - The Work Settling Defendants shall implement a program consistent with 40 C.F.R. § 264.100(d) and N.H. Admin. Code Part ENV-WM-708.02(j), which require implementation of a monitoring program to assess the effectiveness of the remedial activities. To ensure compliance with discharge requirements, the Work Settling Defendants shall, no less often than monthly, sample treatment plant effluent that is discharged to groundwater for VOCs using EPA Method 524.2 or updated versions of this method. To ensure compliance with substantive NPDES requirements, the Work Settling Defendants shall, no less often than monthly, sample treatment plant effluent that is discharged to surface water for VOCs using EPA Method 524.2, for semi-volatiles using EPA Method SW-846 8270, with data validation performed according to EPA-Region 1 data validation functional guidelines for evaluating organic analysis, and for metals using the EPA Contract Laboratory Program (CLP Methods) or another methods described in 40 CFR 136. Work Settling Defendants may propose, for EPA's approval, or EPA may require, equivalent alternative testing methods. EPA may required Work Settling Defendants to add or delete specific analysis parameters, depending on sampling results and observed trends.

(ii) Groundwater monitoring - The Work Settling Defendants shall sample those monitoring wells proposed by the Work Settling Defendants and approved by EPA on a quarterly basis beginning within thirty (30) days from 50 percent construction completion. The Work Settling Defendants shall continue such quarterly sampling for at least the first two years of full-scale operation of the groundwater/leachate collection/extraction and treatment system. Subsequently, the Work Settling Defendants shall sample the wells at an appropriate sampling frequency, but no less often than annually, as determined by EPA after review of each set of results. The Work Settling Defendants shall analyze VOC samples using EPA Method 524.2, semi-volatile compounds using EPA Method SW-846 8270, with data validation performed according to EPA-Region 1 data validation functional guidelines for evaluating organic analysis or where EPA determines, CLP Methods, and metals using CLP Methods or another method described in 40 CFR 141 or their updated versions. Work Settling

Defendants may propose, for EPA's approval, or EPA may require, equivalent alternative testing methods. EPA may require Work Settling Defendants to add or delete specific analysis parameters, depending on sampling results and observed trends. The Work Settling Defendants shall measure water levels quarterly throughout the monitoring program.

(iii) Eastern and Southern Plumes Groundwater Monitoring - The Work Settling Defendants shall sample those monitoring wells proposed by the Work Settling Defendants and approved by EPA on a semi-annual basis beginning within thirty (30) days of EPA approval of the Pre-Design Work Plan. The Work Settling Defendants shall continue such semi-annual sampling until the construction of the cap and the groundwater/leachate collection/extraction and treatment systems have achieved 75 percent construction completion. The Work Settling Defendants shall sample those monitoring wells proposed by the Work Settling Defendants and approved by EPA on a quarterly basis beginning within thirty (30) days of achieving 75 percent construction completion. The Work Settling Defendants shall continue such quarterly sampling for at least five years from commencing the quarterly sampling. Subsequently, the Work Settling Defendants shall sample the selected wells at an appropriate sampling frequency, but no less often than annually, as determined by EPA after review of each set of results. The Work Settling Defendants shall analyze VOC samples using EPA Method 524.2, semi-volatile compounds using EPA Method SW-846 8270, with data validation performed according to EPA-Region 1 data validation functional guidelines for evaluating organic analysis and CLP Methods, metals using CLP Methods or another method described in 40 CFR 141 or their updated versions. Work Settling Defendants may propose, for EPA's approval, or EPA may require, equivalent alternative testing methods. EPA may require Work Settling Defendants to add or delete specific analysis parameters, depending on sampling results and observed trends. The Work Settling Defendants shall measure water levels quarterly throughout the monitoring program.

(b) The Work Settling Defendants shall develop an air monitoring program which shall include, but not limited to, the following components:

(i) Pre-Design Sampling and Assessment - The Work Settling Defendants shall conduct field and office studies to evaluate the rate and quality of gaseous emissions from the Landfill to determine if passive gas collection and venting to the atmosphere are sufficient for the protection of human health and the environment. Chemical analysis performed in conjunction with these studies shall include, at a minimum, those compounds listed on Table 1-2 of the February 28, 1991 Feasibility Study. The Work Settling Defendants shall conduct sample collection and analyses according to EPA approved methods.

(ii) Ambient sampling - The Work Settling Defendants shall install and maintain permanent air quality sampling stations at EPA approved locations to confirm that air quality during performance of the Work does not exceed ambient air quality standards or limits, meets all applicable or relevant and appropriate requirements as set out in Appendix E of the ROD, and are protective of human health and the environment. Continuous ambient air monitoring shall be conducted throughout recontouring in order to confirm established air quality standards and limits are not exceeded. Any exceedance of standards or limits at monitoring stations established in the Field Sampling and Analysis Plan shall result in immediate cessation of recontouring activities until EPA approves a corrective action plan.

(iii) Performance monitoring - The Work Settling Defendants shall propose for EPA approval, and implement a gas migration monitoring program, including, but not limited to, the installation of soil gas monitoring wells to determine the effectiveness of the passive gas collection system as it operates, so that operational adjustments can be made as needed. The Field Sampling and Analysis Plan shall describe at a minimum, the proposed locations of gas monitoring wells and gas migration monitoring points.

The Work Settling Defendants shall sample emissions quarterly at the outlets of the gas vents and gas migration monitoring points and submit the data on a quarterly basis to EPA and the State. The Work Settling Defendants may propose, for EPA approval, a sampling interval, other than quarterly, based upon the evaluation of gas migration data trends. The Field Sampling and Analysis Plan shall describe at a minimum, the parameters, sampling methods, sampling locations, and analytical techniques.

(c) The Work Settling Defendants shall develop a wetlands monitoring program which shall include, but not necessarily be limited to, the following components:

(i) Pre-Remediation Assessment - The Work Settling Defendants shall make an inventory of the indigenous flora and fauna in conjunction with the study set forth in Section G.2.a(2)(a). The Work Settling Defendants shall conduct sampling to determine areas of sediment deposition, along the drainage swale down to the Cocheco River, including the area just beyond where the swale and the river converge, where contaminant concentrations exceed the Cleanup Level described in Section C.

(ii) Performance monitoring - The Work Settling Defendants shall monitor surface drainage from the Site during excavation, recontouring and cap construction. The Work Settling Defendants shall monitor potential impacts on the wetlands surrounding the Landfill as a result of excavation, recontouring and cap construction activities (i.e. soil erosion of cap materials into the wetlands). Prior to wetlands restoration of the drainage swale, the Work Settling Defendants shall sample the remaining soils to confirm that those soils do not exceed Cleanup Levels, as set out in Section C.

(iii) Ambient monitoring - The Work Settling Defendants shall monitor the wetlands restoration at one year intervals to verify that restoration has been maintained in accordance with the approved wetlands restoration plan. The Work Settling Defendants shall evaluate the effectiveness of the restoration of the natural and beneficial values of the wetlands and maintain the wetlands in a restored state for a minimum of

five years or until approved by the EPA as complete.

The Setting Defendants shall monitor the wetlands adjacent to the Site for adverse changes to the wetlands during the operation of the groundwater/leachate collection/extraction and treatment system and report annually on the condition of the wetlands and any adverse affects of the treatment plant to EPA.

The Work Settling Defendants shall conduct activities to limit the impact on wetlands and to the extent practicable, utilize existing roadways and former logging paths to minimize the amount of clearing required for the installation of additional monitoring wells.

(d) The Work Settling Defendants shall review and evaluate all monitoring data on a regular basis during the implementation of the remedial action to ensure that the monitoring data accurately reflects the environmental conditions at the Site and to ensure that the response objectives are achieved.

b. Within seven (7) days after the Work Settling Defendants receive approval of the Project Operations Plan, the Pre-Design Work Plan, and the Environmental Monitoring Plan from EPA, the Work Settling Defendants shall initiate Work set forth in the Pre-Design Work Plan, the Environmental Monitoring Plan and Project Operations Plan in accordance with the terms of those plans and the schedules contained therein. The Work Settling Defendants shall complete all such work set forth in accordance with the schedules contained in those plans.

c. Within two hundred fifty (250) days after Work Settling Defendants receive approval of the Project Operations Plan, the Pre-Design Work Plan and the Environmental Monitoring Plan, the Work Settling Defendants shall submit for review and approval by EPA a Pre-Design Report for each investigation performed in accordance with the Pre-Design Work Plan and this SOW. Those reports shall include sediments consolidation, Landfill recontouring and capping, Landfill gas ventilation system, groundwater/leachate extraction, groundwater/leachate treatment, and treated groundwater discharge. The Pre-Design Reports shall set forth in detail the results of the work performed and shall identify the Performance Standards for each component of the remedy.

3. Remedial Design Work Plan

a. Within 60 days after Work Settling Defendants receive approval of the Pre-Design Report the Work Settling Defendants shall submit for review and approval by EPA an updated Health and Safety Plan and a Remedial Design Work Plan which shall set forth all tasks to be undertaken in connection with the design of the Remedial Action, and shall include a proposed schedule for completion of the design process. The Remedial Design Work Plan shall include, at a minimum, the schedule and tasks for the following activities:

(1) Development of detailed design plans, specifications (including schedules of implementation) and a Construction Quality Assurance Project Plan (CQAPP) in accordance with Attachment 4 of this SOW for the consolidation of sediments, recontouring of the Landfill, capping of the Landfill, and implementation of groundwater/leachate remediation;

(2) Submission of design plans for each component of the Work for review and approval by EPA at four stages during development of those plans, as indicated in items (a) through (d) below:

(a) Preliminary design addressing approximately 30% of the total design. The deliverables for this 30% submission will be specified in the Remedial Design Work Plan and will include, without limitation, the following items:

(i) design criteria;

(ii) results of additional field sampling;

(iii) project delivery strategy;

(iv) preliminary plans, drawings and sketches;

(v) required specifications in outline form; and

(vi) preliminary construction schedule.

(b) Intermediate design addressing approximately 60% of the total design. The deliverables for this 60% design submission will be specified in the Remedial Design Work Plan;

(c) Pre-final design addressing 95% of the total design which shall include, at a minimum:

(i) corrected design prints and calculations with written comments to define corrections and/or additions to the 60% design plans;

(ii) plans, specifications and calculations equivalent to 95% of the overall design;

(iii) initial draft Operation and Maintenance Plan consistent with Section G.3.a.(5&6), below;

(iv) preliminary bid documents; and

(v) a summary of the experience and qualifications of the invited bidders.

(d) a final design addressing 100% of the total design for each portion of the Work which shall include:

(i) final plans and specifications in reproducible format;

(ii) final bid documents;

(iii) an Operation and Maintenance Plan consistent with Section G.3.a.(5&6), below.

(3) Submission of the assumptions, drawings and specifications necessary to support the conclusion that the design will meet all performance standards identified in the Pre-Design Reports; this submission shall be made with the submission of the pre-final design report.

(4) Submission of a final Environmental Monitoring Plan which updates and refines the Pre-Design Environmental Monitoring Plan described in Section G.2.a.(3); this submission shall be made with the submission of the final design reports.

(5) Submission of a Draft Final Operation and Maintenance Plan that shall ensure the long-term, continued effectiveness of the groundwater/leachate collection/extraction and treatment system. The Operation and Maintenance Plan will be finalized when the construction of the treatment system is 90 percent complete. The Draft Final Operation and Maintenance Plan shall include:

(a) Description of normal operation and maintenance;

(b) Description of potential operating problems;

(c) Description of routine process monitoring and analysis;

(d) Description of contingency operation and management;

(e) Operational safety plan;

(f) Description of equipment;

(g) Annual operation and maintenance budget;

(h) Record keeping and reporting requirements;

(i) A cost estimate for post-closure care; and

(j) Establishment of a financial assurance mechanism for long-term operation and maintenance and post-closure care.

(6) Development of a Draft Operation and Maintenance Plan that shall ensure the long-term, continued effectiveness of the Landfill cap and gas collection system (GCS). The Operation and Maintenance Plan will be finalized when construction of the cap and GCS are 90 percent complete. The Draft Operation and Maintenance Plan shall include:

(a) Description of normal operation and maintenance;

(b) Description of potential operating problems;

(c) Description of routine process monitoring and analysis;

(d) Description of contingency operation and maintenance plan;

(e) Operational safety plan;

(f) Description of equipment to be available on site;

(g) Annual operation and maintenance budget;

(h) Record keeping and reporting requirements;

(i) A cost estimate for long-term operation and maintenance; and

(j) Establishment of a financial assurance mechanism for long-term operation and maintenance.

b. Within seven (7) days after the Work Settling Defendants receive approval from EPA of the updated Health and Safety Plan and the Remedial Design Work Plan, the Work Settling Defendants shall initiate the activities set forth therein in accordance with the Plan, including all specified schedules, and shall submit for review and approval by EPA each of the items described in the Remedial Design Work Plan. The Work Settling Defendants shall complete all such work set forth in accordance with the schedules contained in those plans.

H. REMEDIAL ACTION

1. Remedial Action Contractor

a. Within thirty (30) days after Work Settling Defendants receive EPA approval of the final (100 %) design, the Work Settling Defendants shall submit the names, titles and qualifications of the Supervising Contractor and the names contractors and/or subcontractors from whom the Work Settling Defendants intend to solicit bids to perform the remedial action tasks set forth in this SOW. EPA may disapprove any or all of the proposed bidders. The failure of EPA to disapprove any bidder shall not preclude EPA from disapproving the selected contractor.

b. Within sixty (60) days after Work Settling Defendants submit their list of bidders, the Work Settling Defendants shall notify EPA of the name of the selected contractor and shall submit to EPA a Letter of Acceptance from the contractor, copies of the signed contract(s), and final bid packages from the bidders for such contracts.

2. Remedial Action Work Plan

a. Within ninety (90) days after approval of the final design submittal, the Work Settling Defendants shall submit for review and approval by EPA a Remedial Action Work Plan for implementing the Site remedial actions and associated activities, including implementing the Operation and Maintenance Plans for each component of the Work consistent with the approved design, the Consent Decree, and this Statement of Work. The Work Settling Defendants shall submit new or updated Sample and Analysis Plan, Health and Safety Plan, Site Management Plan and a Quality Assurance/ Quality Control Project Plan for review and approval by EPA, as necessary and appropriate to implement each component of the Work.

The Remedial Action Work Plan shall contain:

(1) A description of activities necessary to implement the remedial actions consistent with the Consent Decree, this SOW, the ROD, and the approved Remedial Design, as well as activities necessary to meet all Performance Standards, including but not limited to the following:

(a) methods for satisfying permitting requirements;

(b) contractor mobilization/site preparation;

(c) excavation/dredging of sediments in the drainage swale and if necessary due to capping operations, in the drainage ditch;

(d) restoration of the natural and beneficial value of the disturbed wetland areas;

(e) dewatering of the excavated/dredged sediments;

(f) exploratory investigations such as borings and test pits into the Landfill margins;

(g) analysis of the vertical extent of contamination at the perimeter of the Landfill, which may include the evaluation of existing data;

(h) hydraulic analysis of the groundwater system within the Landfill prior to and after extraction system startup;

(i) construction of the composite cap with a gas collection and ventilation system;

(j) construction and start-up of groundwater/leachate extraction and treatment facilities;

(k) construction of the groundwater diversion trench;

(l) performance monitoring of groundwater and demobilization of treatment facilities;

(m) performance monitoring of air and wetlands;

(n) operation and maintenance for each component of the Work; and

(o) long-term environmental monitoring.

(2) A schedule for the completion of all these activities, which shall also identify milestone events in the remedial action process. The milestone schedule shall be consistent with Section K of this SOW and with schedules approved by EPA pursuant to this SOW and the Consent Decree.

b. Within fifteen (15) days after the Work Settling Defendants receive notice that EPA has approved the Remedial Action Work Plan, the Work Settling Defendants shall initiate remedial activities in accordance with the Remedial Action Work Plan and schedules contained therein.

c. After initiation of the remedial activities and throughout the construction period, the Work Settling Defendants and the Work Settling Defendants' contractor(s) shall meet weekly with EPA regarding progress and details of implementation of the Work, unless EPA determines that any such meeting is unnecessary.

d. Within thirty (30) days of completion of construction of the Work the Work Settling Defendants shall submit a Final Remedial Construction Report for the Work for approval by EPA. The Final Remedial Construction Report shall include the following documentation, at a minimum:

(1) a summary of procedures actually used (in chronological order) to excavate the contaminated soils and sediments, to recontour the existing landfill, to construct the composite cap, collect the contaminated groundwater/leachate, treat the contaminated groundwater/leachate, handle all residues from the groundwater/leachate treatment unit, and monitor the air quality during all on-site activities;

(2) tabulation of all analytical data and field notes prepared during the course of the Remedial Design and Remedial Action activities including, but not limited to, horizontal and vertical perimeter locations to confirm the extent of the Landfill Waste, soil and sediment data confirming Cleanup Levels have been met for the drainage swale excavation activities, groundwater monitoring results confirming the effectiveness of the groundwater/leachate collection/extraction system in minimizing the migration of contaminants beyond the Point of Compliance, pre- and post-treatment groundwater results confirming the effectiveness of the treatment process, air monitoring data and types of monitoring devices used to confirm that air quality standards were maintained during all on-site treatment processes, Eastern Plume groundwater monitoring and natural attenuation modeling results, Southern Plume groundwater monitoring results and any other analytical data collected during treatment. Results and notes shall be available to and produced for EPA and State Environmental Agency review upon request. These documents shall include, but not be limited to;

(a) QA/QC documentation of these results;

(b) presentation of these results in appropriate figures;

(c) a description, with appropriate photographs, maps and tables of the Site,

(d) final, detailed cost breakdowns for each of the treatment process components;

(e) conclusions regarding conformance of treatment processes with the Performance Standard;

(f) descriptions of actions taken and a schedule of anticipated future actions to be taken to complete the Work.

3. Final Construction Inspection

Within 15 days after Work Settling Defendants conclude that the construction has been fully (100% complete) performed, the Work Settling Defendants shall schedule and conduct a FINAL CONSTRUCTION INSPECTION. This inspection shall include participants from all parties involved in the Remedial Action, including but not limited to the Work Settling Defendants and their contractors, EPA and the State.

4. Certification of Completion of Construction

The Remedial Construction shall be considered complete when the following has been achieved:

a) EPA and the State have conducted the Final Construction Inspection;

b) The Final Remedial Construction Report has been approved by EPA;

c) The remedy is operational and functional;

d) All punch list items have been completed to EPA's satisfaction; and

e) EPA approves of the Final Operation and Maintenance Plan.

EPA shall review the Final Remedial Construction Report, following the Final Construction Inspection. If EPA, after reasonable opportunity for review and comment by the State, determines that the Performance Standards for construction and design specifications (including approved changes in design specifications) have been achieved, and the requirements set out above have all been met to EPA's satisfaction, then EPA will issue the Work Settling Defendants a Certification of Completion of Construction.

I. LONG-TERM OPERATION AND MAINTENANCE

Immediately after receipt of notice that EPA has approved the Work Settling Defendants' Final Remedial Construction Report for the Work, the Work Settling Defendants shall review and update the corresponding monitoring plans developed in accordance with Section G.2.a(3) of this SOW and finalize the long-term Operation and Maintenance (O&M) Plan for each component of the Work developed in accordance with Section G.3.a.(5) and (6) of this SOW. The Work Settling Defendants shall submit the finalized O&M plans for EPA approval within 30 days after notice of EPA approval of the Final Remedial Construction Report. All O&M

plans shall meet those standards set out in the applicable or relevant and appropriate requirements identified in Appendix E of the ROD. The Operation and Maintenance Plans shall include the following:

1. Landfill Cap Operation and Maintenance Plan

Work Settling Defendants shall update the Operation and Maintenance Plan to ensure the long-term, continued effectiveness of the composite cap. The Work Settling Defendants shall perform all required activities in the Operation and Maintenance Program for as long as required by ARARs.

2. Groundwater/Leachate Collection/Extraction and Treatment Systems Operation and Maintenance Plan

Work Settling Defendants shall update the Operation and Maintenance Plan, including groundwater, surface water, sediment and air monitoring plans, to ensure the long-term, continued effectiveness of the groundwater/leachate collection/extraction and treatment systems. The Work Settling Defendants shall perform all required activities in the Operation and Maintenance Plan until groundwater Performance Standards and Final Cleanup Levels are attained as set forth in Section E of this SOW and the ROD. Once these standards and levels are attained, the Work Settling Defendants shall implement a long term monitoring program for the Site in accordance with RCRA and the New Hampshire Hazardous Waste and Solid Waste regulations.

3. Landfill Gas Ventilation Systems Operation and Maintenance Plan

Work Settling Defendants shall update an Operation and Maintenance Plan, including the air monitoring plan, to ensure the long-term, continued effectiveness of the gas ventilation systems. The Work Settling Defendants shall perform all activities required in the Operation and Maintenance Plan until such time as the Work Settling Defendants demonstrate to EPA's satisfaction that: gases collected and vented are at levels protective of human health and meet ARARs; volumes of gases generated in the Landfill are not and in the future will not have a detrimental effect on the integrity of the cap; and that gases are not migrating beyond the Waste Management Area above levels protective of human health and in excess of ARARs. Risk assessments will employ methods and assumptions consistent with Interim and Final EPA guidance, policies and regulations available at the time the risk assessment is conducted.

I. INSTITUTIONAL CONTROLS

In accordance with Section X of the Consent Decree, the Work Settling Defendants shall propose and, after approval by EPA, implement Institutional Controls designed to achieve the following purposes:

1. Restrict the Use of Contaminated Groundwater

Work Settling Defendants shall take all measures necessary, including the implementation of Institutional Controls, to prevent anyone but the Parties from extracting and/or using groundwater from the upper aquifer at the Site, from drilling any wells at the Site, or from taking any actions which may disturb the marine clay unit between the upper and lower aquifers, until such time as the Final Cleanup Levels are achieved.

2. Limit Exposure to Waste Material

Work Settling Defendants shall take all measures necessary, including the implementation of Institutional Controls, to prevent or limit exposure to the Waste Material at the Site during and after remedial activities. Such measures shall include inhibiting unauthorized access to the Site, patrolling the Site, and preventing any unauthorized activities, such as digging or dumping at the Site.

Since Waste is to be left in place at this site, Work Settling Defendants shall implement such irrevocable Institutional Controls as easements, covenants running with the land and other deed restrictions preventing for as long as allowable under law any activities which may disturb the environmental monitoring wells and equipment or the composite cap over the Waste Management Area. Such deed restrictions shall be binding on all heirs, successors and assigns of the Work Settling Defendants that own, occupy, or control property within the Waste Management Area, and shall benefit and be enforceable by EPA and the State. Zoning By-Laws or other such revocable controls shall not be sufficient for this purpose.

3. Prevent Disturbance to the Performance of the Work

Work Settling Defendants shall take all measures necessary, including the implementation of Institutional Controls, to prevent the disturbance to or delay of the performance of the Work on any portion of the Site. Such measures shall include, but not be limited to, taking measures for protecting the equipment and structures on the Site and for obtaining access for the conduct of remedial activities on and about the Site.

4. Ensure Effectiveness and Integrity of the Work

Work Settling Defendants shall take all measures necessary, including the implementation of Institutional Controls, to ensure the long-term effectiveness and integrity of the Work performed pursuant to this SOW and the Consent Decree. As noted above, Work Settling Defendants shall implement irrevocable Institutional Controls to ensure the effectiveness and integrity of the composite cap for as long as allowable under law. Work Settling Defendants shall also take such measures as are necessary for protecting Site structures and the environmental monitoring wells and equipment.

The extent to which Institutional Controls are employed should reflect the level of remedial activities at the Site and the risks posed by those activities. EPA may require of the Work Settling Defendants the implementation of additional Institutional Controls as such controls become necessary.

Institutional controls shall include, but not be limited to, deed restrictions such as easements and covenants running with the land, enforceable zoning restrictions, physical barriers such as fences and gates, notices such as posted signs in areas where the public may approach the Site, and education and outreach such as public forums, advertisements and brochures.

These Institutional Controls shall not in any way impede or prohibit the Parties to the Consent Decree from carrying out their obligations under this SOW and the Consent Decree, nor shall they impede or prevent the EPA or the State from carrying out its statutory and administrative functions.

J. SCHEDULE SUMMARY

Below is a summary of tasks or deliverables and due dates which are described above. In the event of inconsistency between this Section and any textual description set forth elsewhere in the SOW, the textual description shall control.

Task/Deliverable	Due Date
Remedial Design Supervising Contractor (Section G.1.a.(1))	30 days after lodging of the Consent Decree
Remedial Design contractors and/or subcontractors list (Section G.1.a.(1))	60 days after lodging of the Consent Decree

DOVER MUNICIPAL LANDFILL SUPERFUND SITE RD/RA STATEMENT OF WORK

Task/Deliverable	Due Date
Letter of Acceptance from Remedial Design Contractor(s) (Section G.1.a.(2))	30 days after submission to EPA of RD Contractor List
Health and Safety Plan (Section G.1.b.)	70 days after lodging of the Consent Decree
Site Security Plan (Section G.1.c.)	60 days after submission to EPA of Letter of Acceptance
Site Map (Section G.1.d.)	60 days after submission to EPA of letter of Acceptance
Pre Design Activities 1. Project Operation Plan (Section G.2.a.(1)) 2. Pre-Design Work Plan (Section G.2.a.(2)) 3. Environmental Monitoring Plan (Section G.2.a.(3))	75 days after EPA approval of the Health & Safety Plan
Pre-Design Work Plan Implementation (Section G.2.b)	7 days after EPA approval of Pre-Design Work Plan
Pre-Design Report (Section G.2.c)	250 days after EPA approval of Pre-Design Work Plan.
Remedial Design Work Plan (Section G.3.a) Design Report	60 days after EPA approval of Pre-
Remedial Design Work Plan Implementation (Section G.3.b.)	7 days after EPA approval of Remedial Design Work Plan
Remedial Action Contractor List (Section H.1.a.)	30 days after EPA approval of final (100%) design plans

DOVER MUNICIPAL LANDFILL SUPERFUND SITE RD/RA STATEMENT OF WORK

Task/Deliverable	Due Date
Submission of Letter of Acceptance from Remedial Action Contractor (Section H.1.b.)	60 days after submission to EPA of Remedial Action Contractor List
Remedial Action Work Plan (Section H.2.a.)	90 days after submittal to EPA of the Letter of Acceptance
Remedial Action Implementation (Section H.2.b.)	15 days after EPA approval of Remedial Action Work Plan
Final Remedial Construction Report (Section H.2.d.)	30 days after completion of construction of Remedial Action
Operation and Maintenance Plans (Section I)	30 days after EPA approval of Final Remedial Construction Report
Demonstration of Compliance Report (Section E.3)	60 days after Interim Cleanup Levels have been achieved for three consecutive years

ATTACHMENT 1
PROJECT OPERATIONS PLAN

The purpose of this attachment is to outline the specific requirements of four aspects of the Project Operations Plan: the Health and Safety Plan, the Quality Assurance and Quality Control Plans, the Field Sampling and Analysis Plans and the Project Management Plan. All such plans shall be submitted to EPA for approval in accordance with section F of the SOW.

A. SITE SPECIFIC HEALTH AND SAFETY PLAN

The Work Settling Defendants shall develop a Site-specific Health and Safety Plan (HSP) to address potential hazards caused by Site activities to individuals carrying out or monitoring field activities and to the surrounding community. This plan shall be consistent with the applicable guidelines of EPA's Health and Safety Planning for Remedial Investigations under CERCLA (EPA/540/G-85/002, June 1985) and the requirements of the Occupational Safety and Health Administration (OSHA) Guidelines for Hazardous Waste Operations and Emergency Response Activities (interim final rule, 29 CFR Part 1910 as amended, Federal Register Vol. 51, No. 244, December 19, 1986) and any updates to these documents.

The HSP shall be adequate to assure the safety of the field team and the surrounding community during all activities conducted pursuant to the Consent Decree, including sampling, construction and operation of the Work. The HSP shall contain contingency plans which address those situations which may adversely affect the surrounding community.

The Work Settling Defendants shall develop a Health and Safety Plan which addresses, at a minimum, the following items:

1. personal protective equipment requirements;
2. on-site monitoring equipment requirements;
3. safe working procedures specifications;
4. equipment decontamination procedures;
5. personnel decontamination procedures; and
6. special and emergency procedures, including contingency plans consistent with 40 CFR § 264 Subpart D and ENV-WM 708.02(i).

B. PROJECT ACTIVITIES QUALITY ASSURANCE/QUALITY CONTROL PLAN

The Work Settling Defendants shall prepare Quality Assurance/Quality Control (QA/QC) Plan to specify the procedures to be used to insure that the technical specifications of the materials and equipment are met and to specify the procedures to be used in all sampling and analyses to insure that representative, accurate, reliable data is obtained. The QA/QC Plan shall be developed for the sampling and analysis events described in the Field Sampling and Analysis Plan submitted with the Pre-Design Report. The Work Settling Defendants shall prepare this QA/QC plan in accordance with EPA guidance document QAMS-005/80 and Data Quality Objectives guidance documents EPA/540/G-87/003 and 004 (March 1987) and any updates to these documents. At a minimum the following topics shall be addressed in the QA/QC Plan:

1. title page with provisions for signatures of principal investigators;
2. table of contents;
3. project description;
4. project organization and responsibility;
5. quality assurance objectives for measurement data, stated in terms of precision, accuracy, completeness, representativeness, correctness and comparability;
6. sampling procedures;
7. sample chain of custody;
8. field and analytical equipment, calibration procedures, references and frequency;
9. EPA approved analytical procedures;
10. data reduction, validation and reporting;
11. internal quality control checks and frequency;
12. quality assurance performance audits, system audits and frequency of implementation and non-conformance reports;
13. preventive maintenance procedures and schedules;
14. specific routine procedures to be used to assess the precision, accuracy and completeness of data and to assess specific measurement parameters involved;

B. PROJECT ACTIVITIES QUALITY ASSURANCE/QUALITY CONTROL PLAN

The Work Settling Defendants shall prepare Quality Assurance/Quality Control (QA/QC) Plan to specify the procedures to be used to insure that the technical specifications of the materials and equipment are met and to specify the procedures to be used in all sampling and analyses to insure that representative, accurate, reliable data is obtained. The QA/QC Plan shall be developed for the sampling and analysis events described in the Field Sampling and Analysis Plan submitted with the Pre-Design Report. The Work Settling Defendants shall prepare this QA/QC plan in accordance with EPA guidance document QAMS-005/80 and Data Quality Objectives guidance documents EPA/540/G-87/003 and 004 (March 1987) and any updates to these documents. At a minimum the following topics shall be addressed in the QA/QC Plan:

1. title page with provisions for signatures of principal investigators;
2. table of contents;
3. project description;
4. project organization and responsibility;
5. quality assurance objectives for measurement data, stated in terms of precision, accuracy, completeness, representativeness, correctness and comparability;
6. sampling procedures;
7. sample chain of custody;
8. field and analytical equipment, calibration procedures, references and frequency;
9. EPA approved analytical procedures;
10. data reduction, validation and reporting;
11. internal quality control checks and frequency;
12. quality assurance performance audits, system audits and frequency of implementation and non-conformance reports;
13. preventive maintenance procedures and schedules;
14. specific routine procedures to be used to assess the precision, accuracy and completeness of data and to assess specific measurement parameters involved;

15. corrective action; and

16. quality assurance reports.

C. FIELD SAMPLING AND ANALYSIS PLAN

The Work Settling Defendants shall develop a Field Sampling and Analysis Plan which indicates the procedures to be followed for all samples to be taken pursuant to the Consent Decree and this SOW. The Field Sampling and Analysis Plan shall, at a minimum, address the following elements for all sampling of water, soil, sediments, and air pursuant to the Consent Decree and this SOW:

1. data quality objectives of the sampling effort, with particular emphasis on determining whether Performance Standards have been met;

2. type, location, rationale and construction specifications for placement of any proposed monitoring wells, well screens and borings;

3. type, quantity, frequency, and location of samples to be collected;

4. sampling methods to be used including any bio-assessment techniques, any well sampling and evaluation procedures, provisions for split sampling, split spoon sampling, composite sampling, soil and soil gas sampling, sampling preservation techniques, equipment needs and equipment cleaning and decontamination procedures, and field support requirements;

5. sample shipping and chain-of-custody procedures;

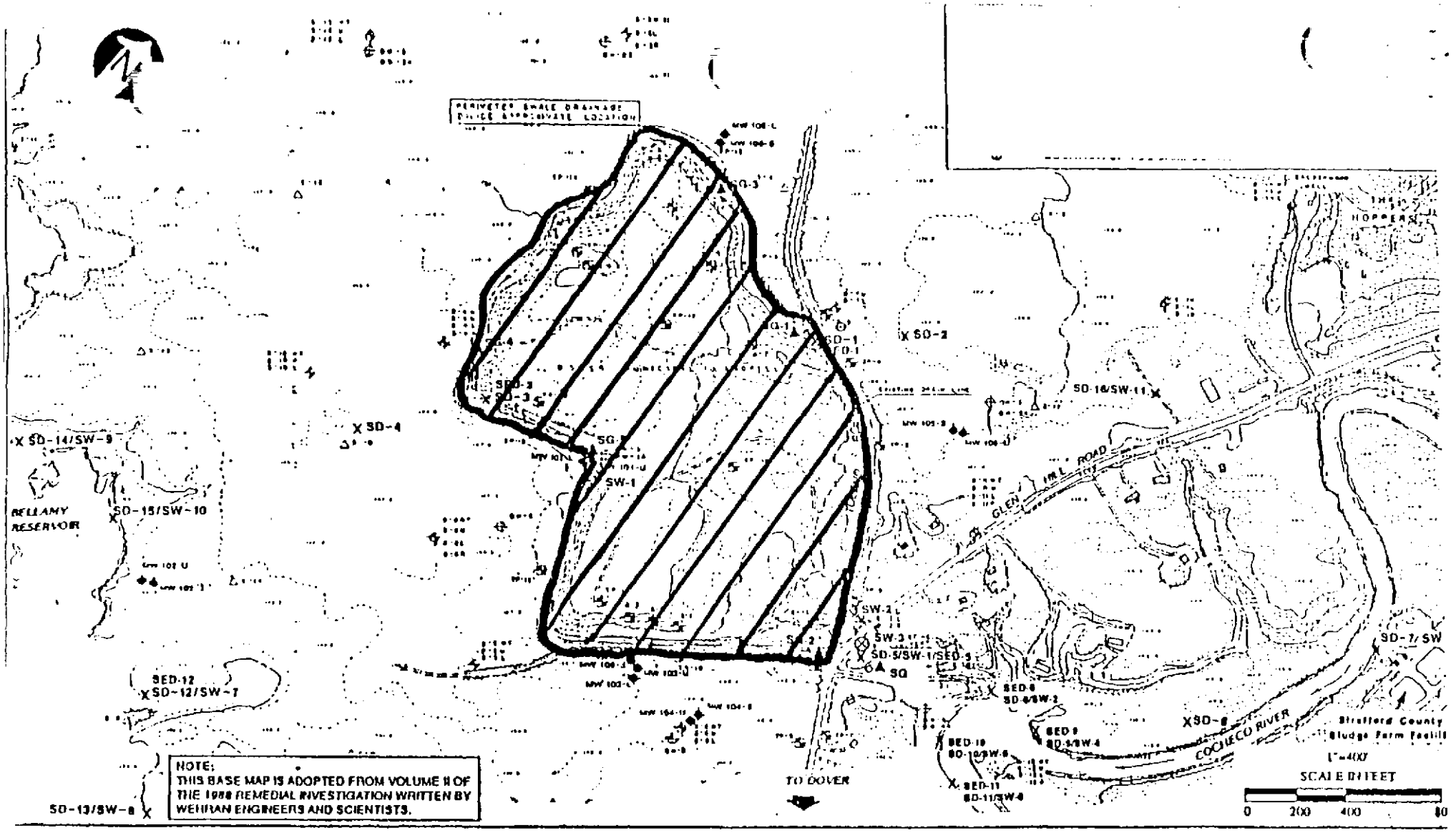
6. type of analysis to be run on each sample including reference to appropriate EPA approved/specified analytical methods; and

7. a discussion of chemical constituents of interest and historical ranges at the Site of concentrations based on available data.

D. PROJECT MANAGEMENT PLAN

A Project Management Plan to provide the project organizational structure, the responsibilities of project personnel and the field operations schedule.

ATTACHMENT 2
DOVER MUNICIPAL LANDFILL WASTE MANAGEMENT AREA AND GROUNDWATER EXTRACTION SYSTEM CAPTURE ZONE

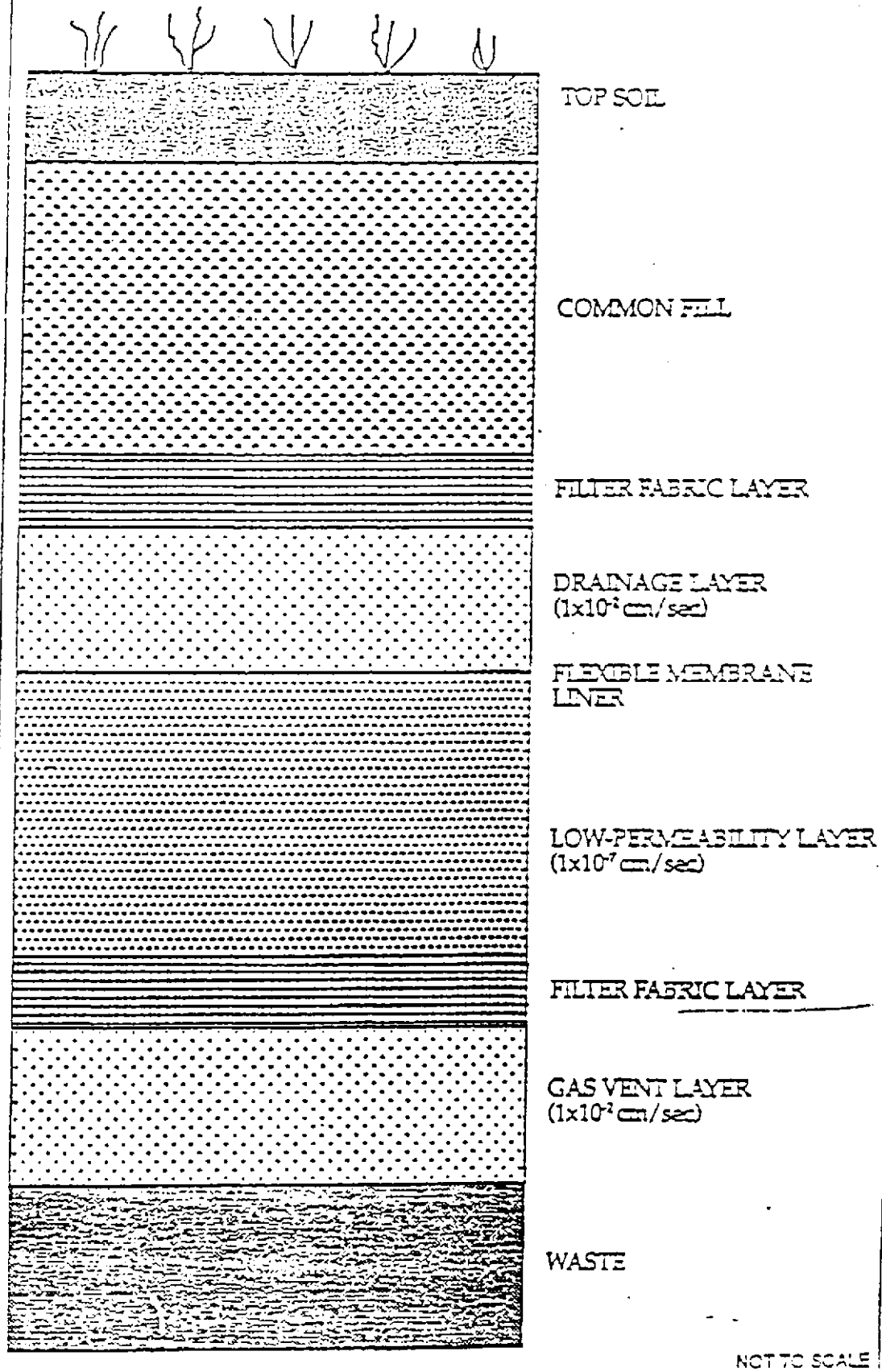


NOTE:
THIS BASE MAP IS ADOPTED FROM VOLUME II OF THE 1988 REMEDIAL INVESTIGATION WRITTEN BY WEHRAN ENGINEERS AND SCIENTISTS.

DOVER MUNICIPAL LANDFILL WASTE MANAGEMENT AREA AND GROUNDWATER EXTRACTION SYSTEM CAPTURE ZONE

ATTACHMENT 3
DOVER MUNICIPAL LANDFILL SUBGRADE CAP PREPARATION

DOVER MUNICIPAL LANDFILL SUBGRADE CAP PREPARATION



A91-167C

ATTACHMENT 4
CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL PLANS

The Work Settling Defendants shall prepare a Construction Quality Assurance Project Plan (CQAPP) to specify the procedures to be used during construction activities to insure that the technical specifications of the materials and equipment are met. The CQAPP shall specify the procedures to be utilized to insure that the Performance Standards and technical specifications for each component of the remedy are met and shall be developed in accordance with OSWER Report No. EPA/530-SW-86-031, Construction Quality Assurance for Hazardous Waste Land Disposal Facilities, and any future relevant guidance documents. The Work Settling Defendants shall prepare the CQAPP in accordance with EPA guidance document QAMS-005/80 and any updates to this document. At a minimum the following topics shall be addressed in the CQAPP:

1. title page with provisions for signatures of principal investigators;
2. table of contents;
3. project description;
4. project organization and responsibility;
5. field equipment including maintenance and decontamination;
6. internal quality control checks and frequency;
7. preventive maintenance procedures and schedules;
8. corrective action; and
9. quality assurance reports.

APPENDIX C:

MAP OF THE SITE

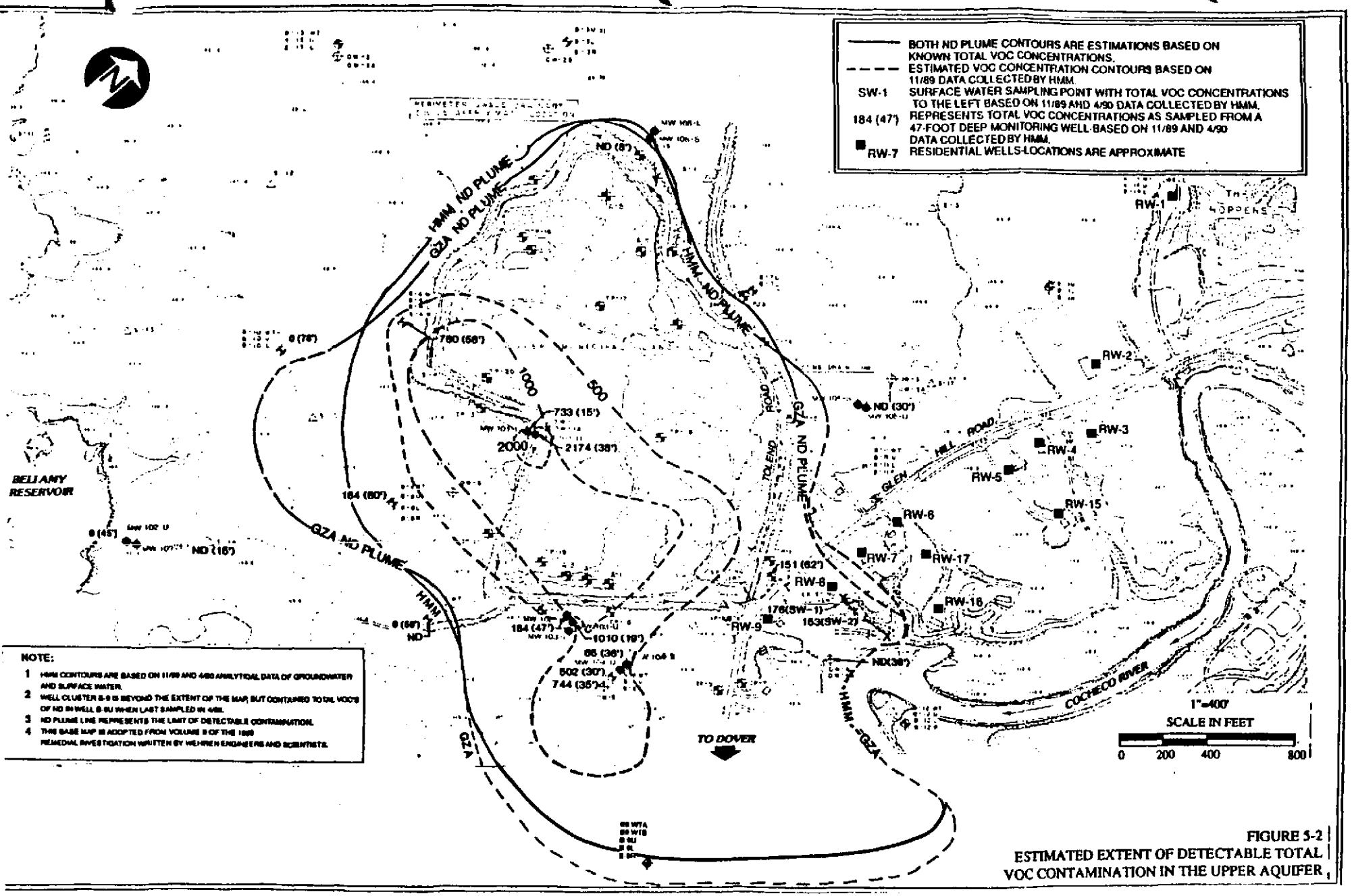
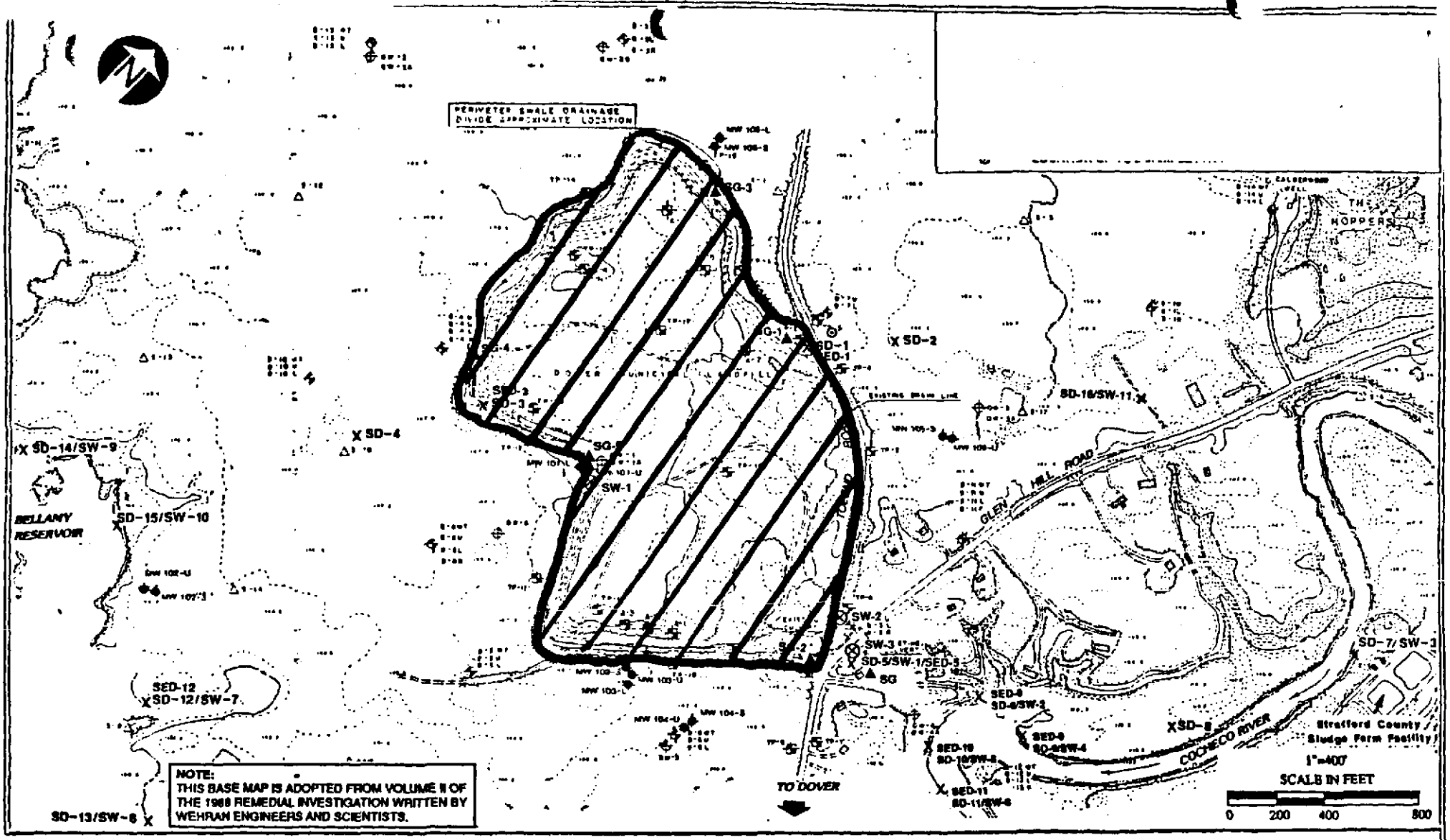


FIGURE 5-2
ESTIMATED EXTENT OF DETECTABLE TOTAL VOC CONTAMINATION IN THE UPPER AQUIFER

DOVER MUNICIPAL LANDFILL SITE

APPENDIX C



DOVER MUNICIPAL LANDFILL

APPENDIX C

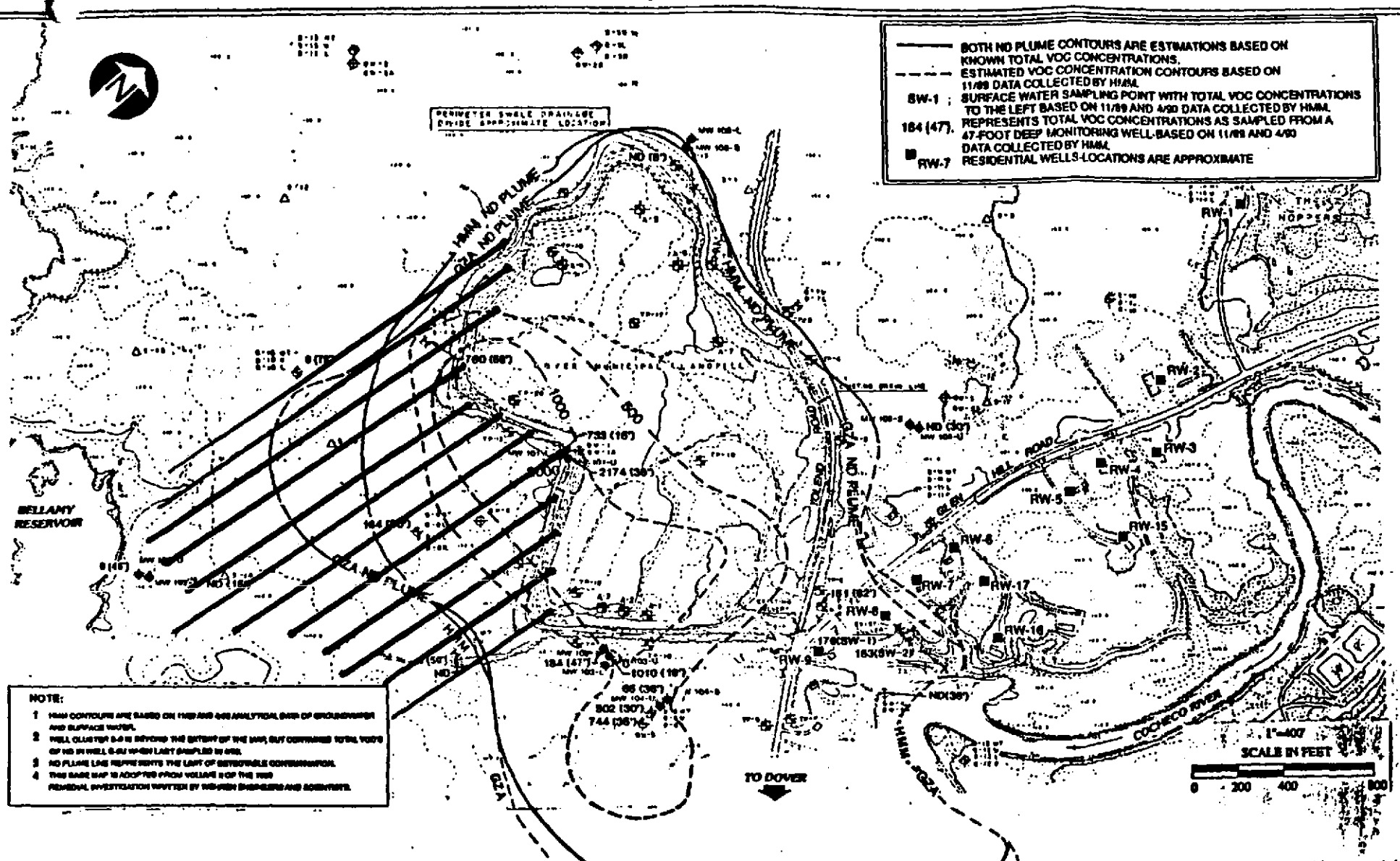


FIGURE 5-2
ESTIMATED EXTENT OF DETECTABLE TOTAL VOC CONTAMINATION IN THE UPPER AQUIFER

SOUTHERN PLUME AREA

APPENDIX C

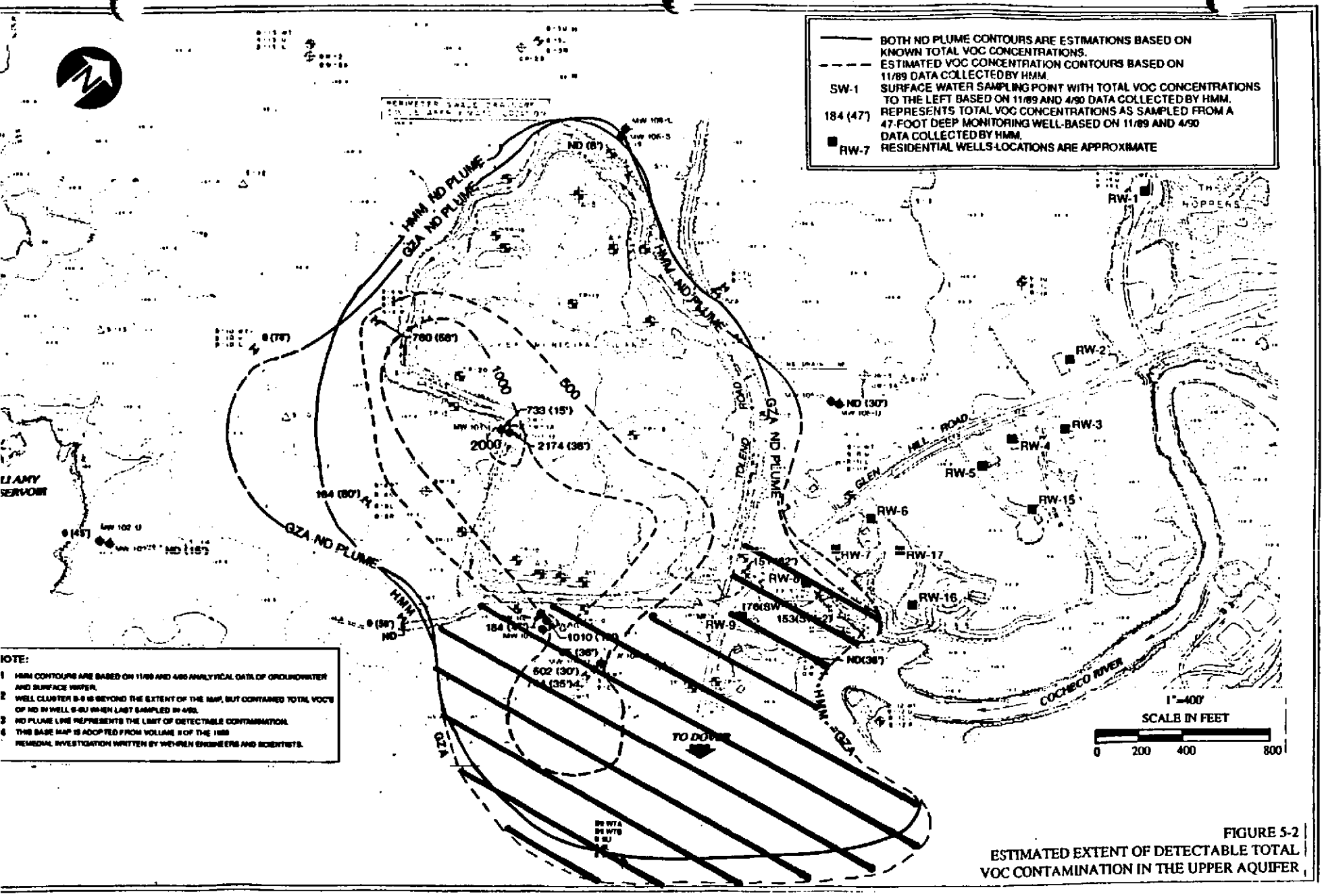


FIGURE 5-2
ESTIMATED EXTENT OF DETECTABLE TOTAL VOC CONTAMINATION IN THE UPPER AQUIFER

EASTERN PLUME AREA

APPENDIX C

APPENDIX D:

LIST OF NON-OWNER WORK SETTLING DEFENDANTS

Browning-Ferris Industries of New Hampshire, Inc.
Clarostat Manufacturing Company, Inc.
Davidson Interior Trim/Textron
Eastern Air Devices, Inc.
Town of Madbury
Melville Corporation/Miller Shoe
Moore Business Forms, Inc.
Leonard Rosen
United Tanners, Inc.
Wentworth-Douglas Hospital

APPENDIX E:

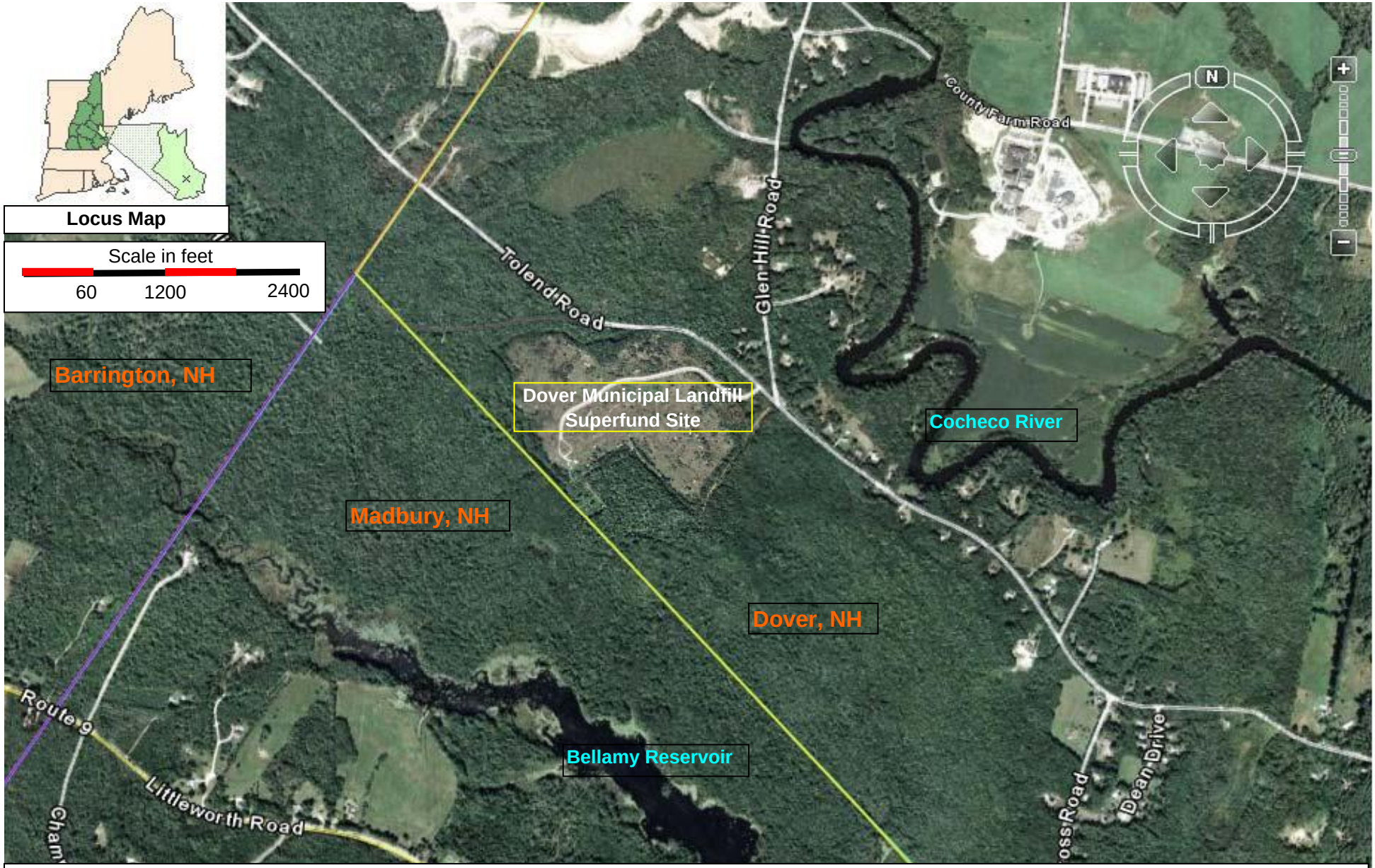
LIST OF OWNER WORK SETTLING DEFENDANTS

City of Dover

APPENDIX F:

LIST OF CASH-OUT SETTLING DEFENDANTS

Bayhead Products Corporation
Cleary Cleaners
Electric Motor Servicenter, Inc.
Franklin ElectroPlating Company, Inc.
General Electric
George J. Foster Company, Inc.
GFS Manufacturing Company
New England Telephone
Northeast Container Corporation
Portland Glass
Public Service of New Hampshire
United Parcel Service
Varney's Cleaners and Launder Center
Waste Management of Maine, Inc.
Waste Management of New Hampshire, Inc.



Appendix C: Aerial photo and locus map of the Dover Municipal Landfill Superfund Site (the "Site") and surrounding features. The Site is located in the northwest corner of Dover, New Hampshire near the border with Madbury and Barrington, New Hampshire. The Site is centered at N45º 12' 45" & W70º 57' 10". The Site's landfill covers approximately 50-acres and is surrounded by mixed deciduous/conifer forest including many wetlands. Light residential use is located along Tolend and Glen Hill roads near the Site. The majority of ground water flow is to the north and to the Cocheco River although a minor component of flow is towards the Bellamy Reservoir. The aerial photo is from GoogleEarth through license and the inset locus map is from the EPA's NPL website for the Dover Municipal Landfill Superfund Site.

Dover Municipal Landfill Superfund Site RD/RA Amended Consent Decree
Civil Action No. 1:92-CV-406-M

APPENDIX D

LIST OF NON-OWNER WORK SETTLING DEFENDANTS

BFI Waste Systems of North America, LLC[1]
CVS Pharmacy, Inc.[2]
ElectroCraft New Hampshire, Inc.[3]
Town of Madbury
Moore Wallace North America, Inc.[4]
Leonard Rosen
Siebe Inc.[5]
Wentworth-Douglass Hospital

---

[1] as successor to Browning Ferris Industries of New Hampshire, Inc.
[2] as successor by merger to CVS New York, Inc., formerly known as Melville Corporation/Miller Shoe
[3] as successor to Eastern Air Devices, Inc.
[4] as successor to Moore Business Forms, Inc.
[5] as successor through liquidation to Clarostat Manufacturing Company, Inc.

Dover Municipal Landfill Superfund Site RD/RA Amended Consent Decree
Civil Action No. 1:92-CV-406-M

APPENDIX E

LIST OF OWNER WORK SETTLING DEFENDANTS

City of Dover

Dover Municipal Landfill Superfund Site RD/RA Amended Consent Decree
Civil Action No. 1:92-CV-406-M

APPENDIX F

LIST OF CASH-OUT SETTLING DEFENDANTS

Bayhead Products Corporation
Cleary Cleaners
Dover Technologies International, Inc.[1]
Electric Motor Servicenter, Inc.
General Electric Company
George J. Foster & Company, Inc.
J&E Specialty, Inc.[2]
Northeast Container Corporation
Portland Glass
Public Service of New Hampshire
United Parcel Service, Inc.
Varney's Cleaners and Laundercenter
Verizon New England Inc.[3]
Waste Management of Maine, Inc.
Waste Management of New Hampshire, Inc.

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[1] as successor to GFS Manufacturing Company
[2] as successor to Franklin ElectroPlating Company, Inc.
[3] as successor to New England Telephone

Dover Municipal Landfill Superfund Site RD/RA Amended Consent Decree
Civil Action No. 1:92-CV-406-M

APPENDIX G

DECLARATION OF ACTIVITY AND USE RESTRICTIONS

Site: Dover Municipal Landfill Superfund Site
Dover, New Hampshire
Tax Map __, Lot __

NHDES Site No.: _____

This Declaration of Activity and Use Restriction ("Declaration") is made on this _____ day of _____, 20__ by _____, together with its successors and assigns (collectively "Owner").

The Owner grants to the State of New Hampshire and EPA, as a third-party beneficiary, the right to enforce the restrictions set forth in this Declaration.

WITNESSETH

WHEREAS, in conjunction with a Consent Decree executed by a number of parties, the United States on behalf of the U.S. Environmental Protection Agency ("EPA") brought a lawsuit, Civil Action No. 1:92-CV-406-M, in the United States District Court for the District of New Hampshire under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9601-9675, and the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. § 6973, seeking the cleanup of the Dover Municipal Landfill Superfund Site (the "Site") in Dover, New Hampshire.

WHEREAS, the State of New Hampshire (the "State") also filed a complaint raising claims under CERCLA, RCRA, and the State of New Hampshire Hazardous Waste Management Act, New Hampshire RSA Chapter 147-A, and joining in the Consent Decree.

WHEREAS, the original remedy for the Site, set forth in the September 10, 1991 Record of Decision ("1991 ROD"), requires source control (through consolidation of contaminated sediment and capping of the landfill, and construction and operation of a groundwater leachate diversion/interceptor trench) and management of migration (through extraction and treatment of groundwater contamination in the Southern Plume and natural attenuation of groundwater contamination in the Eastern Plume).

WHEREAS, an Amended Record of Decision, issued on September 30, 2004 ("2004 AROD"), amends the source control portion of the selected remedy but does not change the remedy for management of migration of groundwater in the Eastern or Southern Plumes (the 2004 AROD provides for, inter alia, construction and operation of an air sparging trench with a contingency for implementation of the 1991 ROD's source control remedy).

WHEREAS, the 2004 AROD requires that institutional controls protect the integrity of the remedy and prevent the use of contaminated groundwater at the Site.

WHEREAS, _____ is the owner in fee simple of a portion of the Site, consisting of a parcel of land situated at _____ in Dover, New Hampshire, identified respectively as Tax Map __, Lot __, recorded respectively at the Strafford County, New Hampshire Registry of Deeds at Book _____, Page _____, which are more particularly bounded and described in Exhibit A, attached hereto and made a part hereof, and which are depicted in Exhibit B, attached hereto and made a party hereof (the "Property").

WHEREAS, the Owner agrees, and intends by this document, to restrict activity and use of the Property as set forth herein, and to have all such restrictions run with the land and be binding upon Owner's heirs, successors and assigns.

WHEREAS, the Owner also agrees, and intends by this document, to grant to the State of New Hampshire the right to enforce such restrictions, and to have that grant secured by the lien filed _[date]____by the State. This grant will also provide the State and EPA access to the Property to implement the remedy set forth in the 2004 AROD or subsequent remedy selection document(s) (hereinafter "Selected Remedy") and will permit the State and EPA, as a third-party beneficiary, the right to enforce the terms of the grant in order to protect any components of the Selected Remedy on the Property and to protect human health and the environment by reducing the risk of exposure to contaminants.

WHEREAS, the State, acting by and through the Department of Environmental Services ("NHDES"), and EPA have reviewed and approved this Declaration,

NOW, THEREFORE, the Owner declares, and notice is hereby given, that the Activity and Use Restrictions ("AUR") set forth below apply to the Property:

1. **Permitted Activities and Uses.**

All activities required by EPA, after consultation with the State, to meet the requirements of the Selected Remedy and any associated Statement of Work are specifically permitted.

Following completion of source control activities, the following activities may occur at the Site:

(a) Any otherwise allowed activity involving the use of the surface of the Property;

(b) Groundwater remediation activities as required by EPA under the Selected Remedy, including, but not limited to, any required treatment of deeper soils and on-site pumping and treating of groundwater; and

(c) Such other activities and uses, as requested by Owner, which, in the opinion of EPA, with the concurrence of NHDES, shall present no greater risk or harm to human health, safety, or welfare, or to the environment,

than the permitted activities and uses set forth herein.

2. **Restricted Activities and Uses.**

All activities and uses that, if implemented at the Site, may result in a significant risk of harm to human health, safety, or welfare, or to the environment, or present a substantial hazard, are prohibited as follows:

(a) Use of the Property as a residence, school, nursery, or recreational areas (such as parks or athletic fields) prior to the time source control measures have been completed in accordance with the Selected Remedy;

(b) Any activity including, but not limited to, relocation of contaminated soil unless such activity is first evaluated and approved by EPA and NHDES; and

(c) Installation of groundwater wells, or any removal or exposure to groundwater (except for remediation purposes), unless such activity is first evaluated and approved by EPA and NHDES.

3. **Proposed Changes in Activities and Uses.**

The restricted activities and uses set forth above may be amended or modified upon mutual agreement by the Owner, the NHDES and EPA. Any proposed changes in activities and uses at the Property that may result in a greater risk of exposure to contaminated media than currently exists at the Property shall be evaluated by the NHDES and EPA as to whether the proposed changes will present an unacceptable level of risk to human health and the environment. Approval by the NHDES and EPA shall be required before such proposed activity or use is commenced.

4. **Duration of Activity and Use Restrictions.**

The activity and use restrictions set forth herein shall run with the land, and, pursuant to New Hampshire RSA 147-A:14-a and 147-B:10-b (2005), and for the benefit of public health, safety, welfare, and environment of the State, the restrictions shall become binding upon the Owner of the Property or portions of the Property and shall remain in effect until the groundwater contamination at the Property meets the applicable state and federal standards for any restricted activity or use. These restrictions and easements shall be deemed to constitute conservation restrictions pursuant to RSA 477:45 through 47 (2001), and shall be enforceable by the State.

5. **Termination of Activity and Use Restrictions.**

The activity and use restrictions set forth herein may be terminated upon mutual agreement by the Owner, the NHDES and EPA and upon a showing that these restrictions are no longer necessary to maintain the protection of human health

and the environment.

6. **Recordation.**

This Declaration of Activity and Use Restriction, any modifications or amendments, and any terminations, are effective upon recordation of notice in the chain of title for the Property at the Strafford County, New Hampshire, Registry of Deeds. All recordation costs shall be the responsibility of the Owner. The Owner shall provide certified copies of all AUR recorded instruments to NHDES and EPA within 60 days of recordation.

7. **Incorporation Into Deeds, Mortgages, Leases, and Instruments of Transfer.**

This Declaration of Activity and Use Restriction shall be incorporated either in full, or by reference into the chain of title in all deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instrument of transfer, whereby an interest in and/or a right to use the Property or a portion thereof is conveyed. The notice in such instrument shall be substantially in the following form:

> **NOTICE: THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ACTIVITY AND USE RESTRICTION, DATED _____, 20__, RECORDED IN THE PUBLIC LAND RECORDS DATED _____, 20__, AND RECORDED IN BOOK _____, PAGES _____ OF THE STRAFFORD COUNTY LAND RECORDS.**

8. **Notices.**

Any notice, demand, request, consent, approval, or communication that any party desires or is required to give to the other shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Property Owner:

_____
_____
_____
_____

To New Hampshire Department of Environmental Services:

Dover Municipal Landfill Superfund Site State Project Coordinator
New Hampshire Department of Environmental Services
P. O. Box 95, 29 Hazen Drive
Concord, NH 03302-0095
(603) 271-3503

To United States Environmental Protection Agency:

Dover Municipal Landfill Superfund Site Remedial Project Manager
United States Environmental Protection Agency, Region 1
One Congress Street, Suite 1100, MC HBO
Boston, MA 02114-2023
(617) 918-1394

The Owner hereby authorizes and consents to the filing and recordation of this Notice, which shall become effective upon approval of NHDES and EPA and recordation of this instrument at the Strafford County, New Hampshire Registry of Deeds in the chain of Title for the Property.

WITNESSETH the execution hereof this _____ day of _____, 20__.

For: _____
Owner/Grantor

THE STATE OF NEW HAMPSHIRE _____, SS.

On the _____ day of _____, 20__, before me appeared _____, known to me (or satisfactorily proven) to be the person whose name appears above, and he/she subscribed his/her name to the foregoing document.

_____
Notary Public/Justice of the Peace
My commission expires:

ACCEPTED ON BEHALF OF STATE OF NEW HAMPSHIRE.

By: STATE OF NEW HAMPSHIRE
DEPARTMENT OF ENVIRONMENTAL SERVICES

_____
Michael J. Walls
Assistant Commissioner

THE STATE OF NEW HAMPSHIRE _____, SS.

On the _____ day of _____, 20__, before me appeared _____, known to me (or satisfactorily proven) to be the person whose name appears above, and he/she subscribed his/her name to the foregoing document.

_____
Notary Public/Justice of the Peace
My commission expires:

EXHIBIT A

[Property Description]

EXHIBIT B

[Plan of Property]

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW HAMPSHIRE

UNITED STATES OF AMERICA and STATE OF NEW HAMPSHIRE Plaintiffs, v. CITY OF DOVER, et al., Defendants.	)	CIVIL ACTION NO. 1:92-cv-406-M

NOTICE OF LODGING

Plaintiff, the United States of America ("United States"), hereby notifies the Court that it is lodging herewith a proposed Second Consent Decree ("Second Decree"), attached as Exhibit 1, between Plaintiffs the United States of America and the State of New Hampshire, and Defendants the City of Dover, BFI Waste Systems of North America, LLC, CVS Pharmacy, Inc., ElectroCraft New Hampshire, Inc., Town of Madbury, Moore Wallace North America, Inc., Leonard Rosen, Siebe Inc., Wentworth-Douglass Hospital, Bayhead Products Corporation, Cleary Cleaners, Dover Technologies International, Inc., Electric Motor Servicenter, Inc., J&E Specialty, Inc., General Electric Company, George J. Foster & Company, Inc., Northeast Container Corporation, Portland Glass, Public Service of New Hampshire, United Parcel Service, Inc., Varney's Cleaners and Laundercenter, Verizon New England, Inc., Waste Management of Maine, Inc., and Waste Management of New Hampshire, Inc. (collectively, the "Settling Defendants").

The Second Decree amends an original settlement of the United States' claims against the Settling Defendants under Sections 106 and 107(a) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. §§ 9606, 9607(a), and Section 7003 of the Resource Conservation and Recovery Act, as amended ("RCRA"), 42 U.S.C. § 6973, and the State of New Hampshire's claims against the Settling Defendants under Section 107 of CERCLA, 42 U.S.C. § 107, Section 7003 of RCRA, 42 U.S.C. § 6973, New Hampshire RSA 147-B, and the New Hampshire common law of nuisance. (Docket Nos. 26, 27.) Under the Second Decree, the Settling Defendants agree to design, construct and operate source control and groundwater remedies for the Site, estimated to cost $19.4 million. The original Consent Decree among the parties was entered by this Court in July 1993 (Docket No. 35).

Pursuant to 28 C.F.R. § 50.7, the United States shall publish a notice in the Federal Register that the Second Decree has been lodged with the Court. For a period of 30 days from the date of such publication, the public has an opportunity to submit comments relating to the proposed Second Decree. The parties agree and the Second Decree reflects that the final approval and entry of the Decree is subject to these public notice requests. After the close of the public comment period, the United States will evaluate any comments received and will move for entry of the Second Decree, unless the comments disclose facts or considerations which indicate that the proposed Second Decree is inappropriate, improper or inadequate.

Accordingly, the United States requests that the Court take no action on the proposed Second Decree until the United States notifies the Court that it supports entry of the Second Decree after expiration of the public comment period.

Respectfully submitted,
RONALD J. TENPAS
Assistant Attorney General
Environment & Natural Resources Division

Date: 5/15/2008

/s/ Laura J. Rowley
Laura J. Rowley
Trial Attorney
Environmental Enforcement Section
Environment & Natural Resources Division
P.O. Box 7611
Washington, DC 20044-7611
(202) 616-8763

THOMAS P. COLANTUONO
United States Attorney
District of New Hampshire

Gretchen Leah Witt
Chief, Civil Division
Office of the United States Attorney
53 Pleasant Street, Fourth Floor
Concord, NH 03301-3904

OF COUNSEL:
Man Chak Ng, Senior Enforcement Counsel
United States Environmental Protection Agency
Region 1
One Congress Street, Suite 1100 (SES)
Boston, MA 02114

CERTIFICATE OF SERVICE

I hereby certify that on May 15, 2008, I caused copies of the foregoing document and exhibits to be served by first class mail, postage prepaid, on the parties listed below.

/s/ Laura J. Rowley
Laura J. Rowley

State of New Hampshire: Peter Roth Senior Assistant Attorney General State of New Hampshire Office of the Attorney General 33 Capitol Street Concord, New Hampshire 03301	Electric Motor Servicenter, Inc.: R. Timothy Phoenix Hoefle Phoenix & Gormley, PA 402 State Street P.O. Box 4480 Portsmouth, NH 03802
City of Dover: John Peltonen Sheehan, Phinney, Bass & Green PA 1000 Elm Street 17th Floor Manchester, NH 03101	J&E Specialty, Inc. (formerly Franklin ElectroPlating Company, Inc.): Stephen H. Roberts McNeill Taylor & Gallo, PA 180 Locust Street P.O. Box 815 Dover, NH 03821
BFI Waste Systems of North America, LLC: Curtis J. Shipley Ellis & Winters LLP 100 North Greene St., Suite 102 Greensboro, NC 27401	General Electric Company: Kenneth F. Gray Pierce Atwood LLP One Monument Square Portland, ME 04101 Laurence Horvath, Counsel Environment, Health & Safety One River Road, Bldg. 43-233 Schenectady, NY 12345
CVS Pharmacy, Inc.: Carl Everett Saul Ewing LLP Centre Square West 1500 Market Street, 38th Floor Philadelphia, PA 19102	Geo. J. Foster & Co., Inc.: Gregory H. Smith McLane Graf Raulerson & Middleton, PA 11 South Main St., Suite 500 Concord, NH 03301
ElectroCraft New Hampshire, Inc.: Michael J. Donahue Donahue, Tucker & Ciandella, PLLC 104 Congress St. Portsmouth, NH 03801	Northeast Container Corporation: Robert E. McDonnell Bingham McCutchen LLP 150 Federal Street Boston, MA 02110

Town of Madbury: Bruce E. Hodsdon Selectman Chair Town of Madbury 13 Town Hall Rd. Madbury, NH 03823	Portland Glass: M. Steven LaCroix Assistant General Counsel Glass Operating LLC 1010 N. University Parks Drive P.O. Box 3146 Waco, TX 76707
Moore Wallace North America, Inc.: Monica Roth Evans Vice President & Associate General Counsel RR Donnelly 111 S. Wacker Drive Chicago, IL 60606	Public Service Company of New Hampshire: Linda T. Landis, Senior Counsel Public Service Company of New Hampshire P.O. Box 330 Manchester, NH 03105-0330
Leonard Rosen: Leonard Rosen 9231 N.W. 9th Place Plantation, FL 33324	United Parcel Service, Inc.: Kristin Holloway Jones Alston & Bird LLP 1201 West Peachtree Street, NE Atlanta, GA 30309
Siebe, Inc.: Lynn Cordaro Vice President, Treasurer and Corporate Controller Siebe Inc./Invensys Inc. 33 Commercial Street, B51-2C Foxboro, MA 02035 Mr. Michael J. Quinn McLane, Graf, Raulerson & Middleton 100 Market St., Suite 301 P.O. Box 459 Portsmouth, NH 03802-0459	Varney's Cleaners and Laundercenter: Stephen H. Roberts McNeill Taylor & Gallo, PA 180 Locust Street P.O. Box 815 Dover, NH 03821 James W. Varney, Owner Varney's Cleaners and Laundercenter P.O. Box 1401 Dover, NH 03821-1401
Wentworth-Douglass Hospital: Mr. Peter Walcek Vice President of Finance/CFO Wentworth-Douglass Hospital 789 Central Avenue Dover, NH 03820	Verizon New England, Inc.: Seth Jaffe Foley Hoag LLP Seaport World Trade Center West 155 Seaport Blvd. Boston, MA 02210

Bayhead Products Corp.: Elissa Moore, President 173 Crosby Road Dover, NH 03800	Waste Management of Maine, Inc.: Stephen T. Joyce Director - CSMG 4 Liberty Lane West Hampton, NH 03842 Steven M. Morgan Vice President & Asst. General Counsel - Regulatory/HSE 1001 Fannin, Suite 4000 Houston, TX 77002
Cleary Cleaners: Lawrence J. Cleary, President Cleary Cleaners 67 Allen St. Rochester, NH 03867	Waste Management of New Hampshire, Inc.: Stephen T. Joyce Director - CSMG 4 Liberty Lane West Hampton, NH 03842 Steven M. Morgan Vice President & Asst. General Counsel - Regulatory/HSE 1001 Fannin, Suite 4000 Houston, TX 77002
Dover Technologies International, Inc.: Kenneth F. Gray Pierce Atwood LLP One Monument Square Portland, ME 04101	