Five-Year Review Report

Second Five-Year Review Report
for
W.R. Grace & Co., Inc. (Acton Plant) Superfund Site
Towns of Acton & Concord
Middlesex County, Massachusetts

September 2004

Prepared by:

The United States Environmental Protection Agency
Region 1, New England
Boston, Massachusetts

EPA
New England

Approved by:

Susan Studlien

Susan Studlien, Director,
Office of Site Remediation and Restoration
U.S. EPA, New England

Date:

09/28/04

SDMS DocID 000204880

TABLE OF CONTENTS

Page

LIST OF ACRONYMS AND ABBREVIATIONS iv

EXECUTIVE SUMMARY vi

FIVE-YEAR REVIEW SUMMARY FORM viii

SECTION 1.0 INTRODUCTION 1-1

SECTION 2.0 SITE CHRONOLOGY 2-1

SECTION 3.0 BACKGROUND 3-1
- 3.1 PHYSICAL CHARACTERISTICS AND LAND AND RESOURCE USE 3-1
- 3.2 HISTORY OF CONTAMINATION 3-2
- 3.3 INITIAL RESPONSE 3-2
- 3.4 BASIS FOR TAKING ACTION 3-3

SECTION 4.0 REMEDIAL ACTIONS 4-1
- 4.1 REMEDY SELECTION 4-1
- 4.2 REMEDY IMPLEMENTATION 4-2
- 4.3 SYSTEM OPERATIONS/O&M 4-4
  - 4.3.1 Industrial Landfill 4-4
  - 4.3.2 Aquifer Restoration System 4-6

SECTION 5.0 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW 5-1

SECTION 6.0 FIVE-YEAR REVIEW PROCESS 6-1
- 6.1 COMMUNITY NOTIFICATION AND INVOLVEMENT 6-1
- 6.2 DOCUMENT REVIEW 6-1
- 6.3 DATA REVIEW 6-2
  - 6.3.1 Landfill Gas at the Industrial Landfill 6-2
  - 6.3.2 ARS Operations Monitoring 6-3
  - 6.3.3 Groundwater Level Monitoring 6-4
  - 6.3.4 Groundwater Quality Monitoring 6-4
- 6.4 SITE INSPECTION 6-10
- 6.5 INTERVIEWS 6-10

SECTION 7.0 TECHNICAL ASSESSMENT 7-1
7.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS? 7-1
7.2 QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES (RAOs) USED AT THE TIME OF REMEDY SELECTION STILL VALID? 7-1
7.2.1 Review of Risk Assessments and Toxicity Factors Serving as the Basis for the Remedy 7-2
7.2.2 Ecological Risk Review 7-4
7.2.3 ARARs Review 7-4
7.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY? 7-6
7.4 TECHNICAL ASSESSMENT SUMMARY 7-6

SECTION 8.0 ISSUES 8-1

SECTION 9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS 9-1

SECTION 10.0 PROTECTIVENESS STATEMENTS 10-1

SECTION 11.0 NEXT REVIEW 11-1

TABLES

Table 1 Chronology of Site Events
Table 2 Ambient Impacts Summary
Table 3 ARS Operations Monitoring Results Summary
Table 4 Summary of VOCs Detected in Groundwater
Table 5 Summary of Inorganic Compounds Detected in Groundwater
Table 6 Results of Mann-Kendall Trend Test for Groundwater
Table 7 Comparison of 1988 and 2004 Oral Reference Doses and Oral Cancer Slope Factors for Compounds of Potential Concern
Table 8 Issues
Table 9 Recommendations and Follow-up Actions

ATTACHMENTS

Attachment 1 Site Maps:

Figure 1 Site Locus
Figure 2 Site Plan

Attachment 2 List of Documents Reviewed/References

Attachment 3 Selected Figures from: *Operable Unit Three Monitoring Program Report, 2003* (GeoTrans, Inc. 2004):

Unconsolidated Deposits Potentiometric Contour Map, August 2003
Bedrock Potentiometric Contour Map, August 2003
Distribution of VDC in Groundwater, Fall 2003
Distribution of Vinyl Chloride in Groundwater, Fall 2003
Distribution of Benzene in Groundwater, Fall 2003

Attachment 4 Interview Record Forms

Attachment 5 ARARs Review

LIST OF ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
1,1- DCE	1,1-Dichloroethene (also known as vinylidene chloride)
ACES	Acton Citizens for Environmental Safety
AAL	Allowable Ambient Limits
ARAR	Applicable or Relevant and Appropriate Requirement
ARS	Aquifer Restoration System
AWD	Acton Water District
AWQC	Ambient Water Quality Criteria
BEHP	Bis(2-ethylhexyl)phthalate
CDM	Camp, Dresser, & McKee Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Contaminants of Potential Concern
CWA	Clean Water Act
D&A	Dewey & Almy
FS	Feasibility Study
GPs	Government Parties
M&E	Metcalf & Eddy, Inc.
MADEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCE	Perchloroethene (also known as tetrachloroethene)
PPM	Parts Per Million
PRP	Potentially Responsible Party

ACRONYM	DEFINITION
RA	Remedial Action
RAC	Response Action Contract
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
SDWA	Safe Drinking Water Act
TBCs	To Be Considereds
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
TELs	Threshold Effects Exposure Limits
trans-1,2-DCE	trans-1,2-Dichloroethene
USEPA	United States Environmental Protection Agency
VC	Vinyl Chloride
VDC	Vinylidene Chloride (also known as 1,1-dichloroethene)
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The W.R. Grace & Co., Inc. (Acton Plant) Superfund Site (the Site) is a former chemical manufacturing facility composed of approximately 260 acres and located in the towns of Acton and Concord, Middlesex County, Massachusetts (see Figure 1, provided in Attachment 1 of this report). The Site is organized into three operable units (OUs), which are:

- OU-1 Disposal areas and surficial contamination areas at the Site;
- OU-2 Residual contamination in disposal areas at the Site following implementation of OU-1; and
- OU-3 Contaminated groundwater and the establishment of groundwater target cleanup goals

The selected remedy identified in the record of decision (ROD) for OU-1 included excavation of contaminated material from various source areas, off-site incineration of highly contaminated soil and sludge, and on-site solidification of less contaminated soil, sludge, and sediment after removal of volatile organic compounds (VOCs) by heat. Solidified waste was then disposed on site in the Industrial Landfill, an unlined landfill that was already in existence at the Site and used by W.R. Grace for disposal of various wastes and sludges. The remedy included capping of the Industrial Landfill following placement of solidified waste within it, landfill gas collection and treatment, and grading of the excavated waste areas. The remedy established soil cleanup goals for each source area and established post-excavation sampling and analysis requirements to determine whether soil cleanup goals had been met. Five indicator compounds, vinylidene chloride (VDC), vinyl chloride (VC), ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate (BEHP), were selected to represent the chemical contamination in the waste disposal areas. Attaining the soil cleanup goals for these five compounds would reduce the level of soil contamination in the source areas so that the concentration of water that migrated through the source areas would not exceed drinking water standards when it reached groundwater.

The ROD stated that a remedy for OU-2 would be necessary only if, following completion of the OU-1 remedy, residual contamination in soils under the source areas exceeded soil cleanup goals established for OU-1. Data collected during and after the completion of the OU-1 remedy indicated that the soil cleanup goals were met for each of the source areas, and therefore no remedy for OU-2 was necessary. The OU-3 investigation is on-going and will evaluate the extent of groundwater contamination, and determine if additional remedies are required to restore affected groundwater to meet federal MCLs. The OU-3 investigation also includes an ecological risk assessment. A remedy has not yet been selected for OU-3.

This is the second five-year review for the W. R. Grace & Co., Inc. (Acton Plant) Superfund Site. The first five-year review was completed in September 1999, and that date was the trigger for this second review. The five-year review is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

Protectiveness Statement

This five-year review concluded that the remedy for OU-1 currently protects human health and the environment. Soil in excess of cleanup levels has been excavated, stabilized, and placed in the Industrial Landfill. The Industrial Landfill was then sealed/closed with an impermeable cap designed and constructed in accordance with Massachusetts Hazardous Waste Regulations for landfills specified at 310 CMR 30.580-595 and 30.620-633. The Industrial Landfill is owned and maintained by W.R. Grace, access is restricted by a fence, and a deed notice has been filed with the Registry of Deeds. In order for the remedy at OU-1 to be protective in the long-term, it may be necessary to establish additional institutional controls that will be enforceable, so that the integrity of the cap is maintained.

There is no protectiveness statement for OU-2 because it was determined that a remedy for OU-2 was not needed.

The remedy for OU-3 has not yet been determined. Groundwater is currently being extracted and treated by an Aquifer Restoration System (ARS) that was constructed by W. R. Grace in 1985, prior to the ROD for OU-1 which was signed in 1989. The effectiveness of the ARS is being evaluated as part of the ongoing Remedial Investigation and Feasibility Study for OU-3. The Acton Water District provides treatment of groundwater from the five public water supply wells in the vicinity of the Site, and the Acton Board of Health has established a temporary moratorium on the installation of private wells within 500 feet of the groundwater contaminant plume. Hence, exposure pathways that could result in unacceptable risks to human health are being controlled, while the RI/FS process for OU-3 continues.

Overall, the remedial actions at all Operable Units are either protective or will be protective upon selection and completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: W.R. Grace and Co., Inc. (Acton Plant)		
EPA ID *(from WasteLAN)*: MAD001002252		
Region: 01	**State:** MA	**City/County:** Acton and Concord/Middlesex County
SITE STATUS		
NPL status: W Final G Deleted G Other (specify)_____		
Remediation status (choose all that apply): G Under Construction W Operating G Complete		
Multiple OUs?* W YES G NO	**Construction completion date:** OU1: June 17, 1997	
Has site been put into reuse? G YES W NO		
REVIEW STATUS		
Lead agency: W EPA G State G Tribe G Other Federal Agency _____		
Author name: Derrick Golden		
Author title: Remedial Project Manager	**Author affiliation:** U.S. EPA	
Review period:** 6/24/ 2004 to 9/29/ 2004		
Date(s) of site inspection: August 30, 2004		
Type of review: W Post-SARA G Pre-SARA G NPL-Removal only G Non-NPL Remedial Action Site G NPL State/Tribe-lead G Regional Discretion		
Review number: G 1 (first) W 2 (second) G 3 (third) G Other (specify) _____		
Triggering action: G Actual RA Onsite Construction at OU1____ G Actual RA Start at OU#____ G Construction Completion W Previous Five-Year Review Report G Other (specify) _____		
Triggering action date *(from WasteLAN)*: September 29, 1999		
Due date *(five years after triggering action date)*: September 29, 2004		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

1. Additional institutional controls for the Industrial Landfill may be needed, since the current control (deed notice) may not be legally enforceable upon future property owners. The controls would be needed to ensure that the integrity of the cap is maintained in the long term.

Recommendations and Follow-up Actions:

1. Consider establishment of additional institutional controls that could be enforced on future property owners.

Protectiveness Statement(s):

OU-1: The remedy for OU-1 currently protects human health and the environment. The Industrial Landfill is owned and maintained by W. R. Grace, access is restricted by a fence, and a deed notice has been filed with the Registry of Deeds. In order for the remedy at OU-1 to be protective in the long-term, it may be necessary to establish additional institutional controls that will be enforceable, so that the integrity of the cap is maintained.

OU-2: There is no protectiveness statement for OU-2 because it was determined that a remedy for OU-2 was not needed.

OU-3: There is no protectiveness statement for OU-3 because the remedy for OU-3 has not yet been determined.

Overall Protectiveness Statement: The remedial actions at all Operable Units are either protective or will be protective upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Other Comments:

OU-3: Groundwater is currently being extracted and treated by an Aquifer Restoration System (ARS) that was constructed by W. R. Grace in 1985, prior to the ROD for OU-1 which was signed in 1989. The effectiveness of the ARS is being evaluated as part of the ongoing Remedial Investigation and Feasibility Study for OU-3. The Acton Water District provides treatment of groundwater from the five public water supply wells in the vicinity of the Site, and the Acton Board of Health has established a temporary moratorium on the installation of private wells within 500 feet of the groundwater contaminant plume. Hence, exposure pathways that could result in unacceptable risks to human health are being controlled, while the RI/FS process for OU-3 continues.

SECTION 1.0
INTRODUCTION

This document is a comprehensive and interpretive report on the five-year review conducted for the W. R. Grace & Co., Inc. (Acton Plant) Superfund Site (the Site) in Acton and Concord, Massachusetts, for the U.S. Environmental Protection Agency (USEPA) Region I. This work was conducted by Metcalf & Eddy (M&E) under the Response Action Contract (RAC) (Contract No. 68-W6-0042).

The purpose of this five-year review is to determine whether the remedies for the Site are protective of human health and the environment. The methods, findings, and conclusions of this review are documented in this Five-Year Review report. In addition, Five-Year Review reports identify issues found during the review, if any, and provide recommendations to address them.

EPA Region I has conducted this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

This is the second five-year review for the Site. The completion of the first five-year review, in September 1999, is the trigger for this second five-year review. This statutory review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

SECTION 2.0
SITE CHRONOLOGY

The chronology of the Site, including significant site events and dates, is included in Table 1.

Table 1: Chronology of Site Events	
Event	**Date**
Dewey & Almy Chemical Company manufactures various products at the Acton site at various times, such as: latex, resins, plasticizers, and paper battery separators	1945 - 1954
W.R. Grace acquires Dewey & Almy and continues various chemical manufacturing processes at the Acton site	1954 - 1991
Organic contaminants (vinylidene chloride,vinyl chloride, ethylbenzene, and benzene) detected in municipal wells, Assabet #1 and #2	1978
The United States sues W.R. Grace to require cleanup of the Site	April 17, 1980
MADEP issues an Administrative Order to W.R. Grace, specifying procedures and requirements for evaluating and correcting Site contamination	July 14, 1980
W.R. Grace and EPA enter into a Consent Decree to cleanup waste disposal areas and restore groundwater in drinking water aquifers. The provisions of the Consent Decree are similar to the requirements of the July 14, 1980 MADEP Administrative Order.	October 21, 1980
MADEP issues an Amended Order to W.R. Grace, amending MADEP's July 14, 1980 order to conform with the Consent Decree language	April 15, 1981
Site added to the National Priorities List	September 8, 1983
Aquifer Restoration System construction completed and operation begins	March 1985
Phase IV Report and Addendum, detailing the OU-1 remedy, was completed by Camp, Dresser & McKee (CDM) for W.R. Grace	June 6, 1989

Table 1: Chronology of Site Events	
Event	**Date**
Risk Analysis Report completed by Alliance Technologies Corporation for EPA	June 30, 1989
Record of Decision for OU-1 signed by Paul G. Keough, Acting Regional Administrator	September 29, 1989
CDM issued Remedial Design/Remedial Action (RD/RA) Work Plan for OU-1	January 1991
CDM issued report on Field Pilot Programs for upgrading air stripping tower portion of ARS	May 1991
Quarterly well monitoring begins	March 1992
Odor controls for air-stripping tower installed and operational; Site security measures implemented	September 1992
CDM submitted revised 100% design package for OU-1 remedial action	August 1993
GZA issued Final Site Work Plan and Construction Quality Control Plan for OU-1 remedial action	July 1994
OU-1 Remedial Action initiated; Air monitoring system installed	October 17, 1994
Landfill gas treatment system delivered and installed; Permanent fencing around landfill installed	March 1997
Final site inspection performed	June 1997
Remedial Action Report for OU-1 issued by EPA	September 30, 1997
Revised Construction Quality Assurance Closeout Report for OU-1 issued by CDM for W.R. Grace	February 1998
First 5-year review report issued by EPA for the Site	September 1999
Draft Remedial Investigation Report and Phase 2 Work Plan for OU-3 issued by GeoTrans for W.R. Grace	August 30, 2002
Phase 2 Remedial Investigation Report issued by GeoTrans for W.R. Grace	May 14, 2003

Table 1: Chronology of Site Events	
Event	**Date**
Draft Baseline Ecological Risk Assessment issued by Menzie-Cura for W.R. Grace	July 30, 2004
Draft Public Health Risk Assessment Deliverable 3 issued by Menzie-Cura for W.R. Grace	August 5, 2004
Second 5-year review report issued by EPA for the Site	September 29, 2004

SECTION 3.0
BACKGROUND

3.1 PHYSICAL CHARACTERISTICS AND LAND AND RESOURCE USE

The W.R. Grace & Co., Inc. (Acton Plant) Superfund Site (the Site) is a former chemical manufacturing facility composed of approximately 260 acres and located in Acton and Concord, Massachusetts (see Figure 1 provided in Attachment 1 of this report). The Site is located off of Independence Road, and is bounded to the northwest by Fort Pond Brook and to the southeast by the Assabet River. The Site is bounded by industrial parks to the south and northeast, and by residential housing to the northwest, east, and west. A sand and gravel pit is located south of the Site. No buildings, except those buildings associated with the remedial action, are present on-site.

Waste disposal areas identified on-site include the former Battery Separator Area, the former Blowdown Pit, the former Primary Lagoon, the former North Lagoon, the former Tank Car Area, the former Secondary Lagoon, the former Emergency Lagoon, the former Boiler Lagoon (located between the Battery Separator Area and the Tank Car Area), the former Acid Neutralization Pit, and the Industrial Landfill (see Figure 2, provided in Attachment 1 of this report).

Groundwater beneath the Site is classified as GW-1 by MADEP, defined as a current or potential future drinking water source area. The Site is located at or near a groundwater divide, therefore, groundwater from the Site flows to the northwest toward Fort Pond Brook and to the southeast and south, toward the Assabet River. The Assabet Wellfield, which supplies water for the Town of Acton, is located southwest of the Site. The wellfield consists of two municipal drinking water wells, Assabet #1 and Assabet #2A. Assabet #2A replaced Assabet #2 as a public water supply well in May 2001. Presently, both wells are operating and the extracted water is treated with an air stripping unit prior to public distribution. The Lawsbrook, Scribner, and Christofferson wells, comprising the School Street Wellfield, are located approximately 3,700 feet north of the Site. All three wells are within the Fort Pond Brook watershed. The Scribner and Lawsbrook wells are 150 and 1,000 feet south of Fort Pond Brook, respectively. The Christofferson well is immediately north of Fort Pond Brook. Water from these wells is treated using an air stripper prior to public distribution.

In addition to the five public wells, six private wells (1 Lisa Lane, 5 Bellantoni Drive, Powder Mill Plaza, Valley Sports Arena, and two wells at the Starmet-Nuclear Metals Superfund Site property) were identified during the private well survey conducted for the Site. The Lisa Lane and Bellantoni Drive wells are located in a residential area north of the W.R. Grace property and south of the School Street Wellfield. The well at 1 Lisa Lane has been converted into a monitoring well and the well at 5 Bellantoni Drive has been decommissioned. The Powder Mill Plaza well is located south of the Assabet Wellfield near the intersection of Route 62 and High Street, and is currently used for irrigation purposes. The Valley Sports Arena and Starmet wells are located across the Assabet River from the Site and are not considered part of the Site.
As described in the Record of Decision (ROD) for OU-1, the Site remedy has been organized into

three operable units (OUs), which are:

- OU-1 Disposal areas and surficial contamination areas at the Site;
- OU-2 Residual contamination in disposal areas at the Site following implementation of OU-1; and
- OU-3 Contaminated groundwater and the establishment of groundwater target cleanup goals.

3.2 HISTORY OF CONTAMINATION

The Site is a former chemical manufacturing facility, used for industrial purposes for over one hundred years. American Cyanamid Company and the Dewey & Almy Chemical Company (D&A) were former occupants of the Site. American Cyanamid manufactured explosives, and D&A produced synthetic rubber container sealant products, latex products, plasticizers, and resins. W. R. Grace acquired the property in 1954, and chemical operations were continued at the Site. Operations at the W. R. Grace facility included the production of materials used to make concrete and organic chemicals, container sealing compounds, latex products, and paper and plastic battery separators. Wastewater and solid industrial wastes from these operations were disposed of in several unlined lagoons (the Primary Lagoon, Secondary Lagoon, North Lagoon, and Emergency Lagoon), and were buried in or placed onto an on-site Industrial Landfill and several other waste sites (see Figure 2). These other waste sites include the Battery Separator Area (lagoon and chip pile), the Tank Car Area, and the Boiler Lagoon which was located between the Battery Separator and Tank Car Areas. Periodically, sludge from the Primary Lagoon was dredged, dried along the banks, and trucked to the landfill for disposal. In addition, the by-products of some chemical processes were disposed of in the Blowdown Pit. Discharge to all lagoons and the Battery Separator Area ceased in 1980. The production of organic chemicals was discontinued in 1982. A small distribution center for concrete additives was moved to another location in September 1996. A second plant for the manufacture of battery separators, known as the Daramic facility, was constructed in 1979 and operations there continued until 1991. All buildings, with the exception of the Aquifer Restoration System building associated with the remedial action, have been demolished.

Investigations in 1978 indicated that two Acton municipal wells, Assabet #1 and Assabet #2, were contaminated with VDC (also known as 1,1-dichloroethene or 1,1-DCE). Significant levels of vinyl chloride (VC), ethylbenzene, and benzene were also detected in these wells at that time. As a result of these findings, the Town took the precautionary action of closing the two wells. After the discovery of the municipal well contamination, investigations began at the Site which resulted in the addition of the Site to the National Priorities List (NPL) in September 1983.

3.3 INITIAL RESPONSE

After the discovery of the municipal well contamination, W. R. Grace and EPA entered into a Consent Decree in October 1980 which outlined the procedural framework for Site cleanup. The Consent Decree required cleanup and restoration of the quality of the drinking water in the

Sinking Pond Aquifer, the source of water for Assabet Wells #1 and #2. W. R. Grace initiated development of an engineering plan for aquifer cleanup which included a recovery well network to capture contaminated groundwater and prevent further off-site migration. Contaminated groundwater extracted from the network of wells would be pumped to a central treatment facility or treated at the well-head. The Aquifer Restoration System (ARS) was constructed in March 1985 and continues to extract and treat groundwater beneath the source areas. The approximate locations of the ARS building and extraction wells are shown on Figure 2. W.R. Grace also continues to monitor groundwater to evaluate the impact of Site contamination on the aquifer.

The Consent Decree also required W.R. Grace to assess and control sources of waste on-site using a phased investigation under EPA oversight. In Phases I and II, W.R. Grace prepared plans for studying and determining the nature and extent of contamination at the source areas, and after EPA approval, performed the study. In Phase III of the source area investigation, W.R. Grace identified, analyzed, and evaluated cleanup and remedial measures for the source areas. Following conditional approval of the Phase III scope of work, W.R. Grace performed the evaluations and submitted the results to EPA in a Phase IV Report. The final draft of the Phase IV Report was submitted to EPA on August 31, 1988. Following a series of meetings to discuss revisions to the report, W.R. Grace submitted an Addendum to the draft Phase IV Report on June 6, 1989. The remedial measures evaluated in the Phase IV Report and Addendum provide the basis for the remedy that was selected in the ROD for OU-1, signed on September 29, 1989.

3.4 BASIS FOR TAKING ACTION

The following summarizes the contaminants detected at the Site as identified in the Phase I and Phase II investigations:

Soils, Sludges, & Sediment. Soils and sludges have been identified as “surface materials” in the ROD for OU-1. The Blowdown Pit was found to contain the most highly contaminated material on the Site (primarily VDC), while material in and under the Boiler Lagoon demonstrated lower contaminant levels than the other lagoons.

VDC, VC, benzene, and ethylbenzene were the primary contaminants identified in the Primary Lagoon, Secondary Lagoon, and Emergency Lagoon sludge and underlying soils. Benzene, toluene, and ethylbenzene were the prominent compounds in soils underlying the Industrial Landfill. In North Lagoon sludges and underlying soils, VOC contamination was detected along with phthalates, metals, and cyanide. The principal contaminants found in Boiler Lagoon sludges and underlying soils were phthalates and metals, while VDC, benzene, ethylbenzene, formaldehyde, phenol, and metals predominated in Battery Separator Area soils/sludges. Soils in the Tank Car Area were contaminated with VDC, phthalates, and metals. Eight surface material indicator chemicals were selected for evaluation in the risk assessment. The eight indicator chemicals include: VDC, VC, benzene, toluene, ethylbenzene, formaldehyde, arsenic, and cadmium.

Groundwater. Fifteen indicator chemicals were selected for evaluation in the risk assessment.

The fifteen indicator chemicals include: VDC, VC, benzene, toluene, ethylbenzene, trichloroethene (TCE), formaldehyde, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, and zinc.

Surface Water. VDC and 1,1,1-Trichloroethane (TCA) were detected in surface water samples from the Assabet River. VDC, benzene, toluene, xylene, tetrachloroethene (PCE) and chloroform were detected in Fort Pond Brook surface water samples.

A risk analysis was performed by Alliance Technologies Corporation (Alliance, 1989) that evaluated future human health risks associated with site-wide exposure to surface material and groundwater and specific source area exposures under conditions of residential use. The risk analysis concluded that the W. R. Grace property was likely to pose significant carcinogenic and noncarcinogenic risk to human health in the event the property is developed and used for residential purposes, in the absence of remediation. Significant groundwater risk contributors included VDC, VC, arsenic, lead, and zinc. Risks associated with exposure to surface material were primarily attributed to VDC, VC, and arsenic.

These conclusions formed the basis of the selected remedy for OU-1 of the Site.

SECTION 4.0
REMEDIAL ACTIONS

4.1 REMEDY SELECTION

The ROD for Operable Unit 1 was signed on September 29, 1989. This ROD addresses the first of three operable units planned for the Site. The remedial action objectives as presented in the ROD for OU-1 are (as quoted from the Record of Decision, page 18):

1. *Protect exposure points, where humans or wildlife may be exposed to contaminants in soil, groundwater, surface water, and sediments, during and after site remediation.*

2. *Prevent the migration of contaminants in groundwater from sources on-site to public drinking water supplies.*

3. *Protect on- and off-site groundwater from contamination by site contaminants in excess of drinking water quality.*

4. *Eliminate the potential for contact in the future with waste materials by the public and the environment.*

5. *Protect on- and off-site surface water from contamination by site contaminants.*

6. *Prevent the migration of contaminated run-off from the waste sites.*

7. *Protect against direct contact with site contaminants and minimize environmental exposure during remedial activities.*

8. *Reduce to the maximum extent practicable the number of source areas to eliminate long-term management and permit unrestricted use.*

The goal of the selected remedy was to protect the drinking water aquifer by minimizing further contamination of the groundwater and surface water, and to eliminate the threats posed by direct contact with or ingestion of contaminants in soil and waste sludges at the Site.

The selected remedy for OU-1 (source control), as identified in the ROD, consisted of the following components (as quoted from page 2 of the ROD Declaration):

- *Excavation and transportation off-site for incineration of highly contaminated material from the Blowdown Pit;*

- *Excavation and stabilization of the remaining contents of the Blowdown Pit, as well as the contaminated sludges and soils of the Primary Lagoon, Secondary Lagoon, North Lagoon, and Emergency Lagoon;*

- *Excavation of contaminated soils from the Battery Separator Lagoons, Boiler Lagoon, and Tank Car Area;*

- *Placing both the stabilized and the non-stabilized materials excavated from the Site on the existing Industrial Landfill, and covering these materials with an impermeable cap;*

- *Post-excavation sampling and analysis;*

- *Capping the Battery Separator Chip Pile;*

- *Covering any disposal area which attains the soil cleanup goals;*

- *Modifying the ARS to address air stripper emission controls; and*

- *Establishing long-tem environmental monitoring at each disposal area designed to monitor the effectiveness of the proposed remedy.*

The ROD stated that a remedy for OU-2 would be necessary only if, following completion of the OU-1 remedy, residual contamination in soils under the source areas exceeded soil cleanup goals established for OU-1. Data collected during and after the completion of the OU-1 remedy indicated that the soil cleanup goals were met for each of the source areas, therefore no remedy for OU-2 was necessary (USEPA, 1999).

As stated in the OU-1 ROD, OU-3 "will evaluate the extent of groundwater contamination on- and off-site ... and will also determine whether additional remedial measures are necessary to restore the groundwater affected by the Site ... to protect public health and the environment." The objectives for OU-3 were expanded in the 1998 Statement of Work to read "Complete the definition of the extent of contaminants released to groundwater and the associated impacts on water, sediment, and air at the Site (including the release of these contaminants from the ARS)." The OU-3 investigation is on-going, therefore no remedy has yet been selected for OU-3.

4.2 REMEDY IMPLEMENTATION

The remedial design/remedial action activities for OU-1 were performed by W. R. Grace under a Consent Decree signed with EPA and lodged in U.S. District Court on October 10, 1980. For more detailed information on OU-1 remedial activities, see the Remedial Action Report for Operable Unit One, which was prepared by Foster Wheeler Environmental Corporation (September 1997).

The main components of the OU-1 remedy consisted of the following (excerpts from the 1999 5-year review):

- The contents of the Battery Separator Lagoons, Boiler Lagoon, and the Tank Car Area

were excavated to a depth of at least five feet. Additional excavation greater than five feet in depth was performed until the soil cleanup goals (see page 30 of the 1989 ROD) were met. These materials were then placed on the Industrial Landfill. The contaminant level of all excavated materials from these areas was analyzed prior to placement on the landfill. If unexpected levels of contaminants were detected, that could present implementation problems or impact the effectiveness of the landfill remedy, then those materials were stabilized prior to placement on the landfill or were disposed of off-site. Post-excavation sampling and analysis was conducted to ensure that soil cleanup goals were attained.

- Sludges and at least two feet of soil in each of the Primary, Secondary, and Emergency Lagoons were excavated, stabilized using the VFL process (developed by VFL Technology Corporation and consisting of mixing contaminated soils/sludges with quicklime, flyash, and portland cement), and placed on the Industrial Landfill. Additional excavation greater than two feet in depth was performed until the soil cleanup goals were met. Sediments from the North Lagoon were removed to a depth equivalent to the low groundwater level. These sediments were trucked to the treatment area, stabilized using the VFL process and placed on the Industrial Landfill. Materials in the Blowdown Pit containing greater than 100 parts per million (ppm) of VDC were excavated and shipped to an off-site disposal facility. Remaining sludge and other contaminated materials and at least two feet of underlying soil were excavated, stabilized using the VFL process and placed on the Industrial Landfill. Post-excavation sampling was then conducted to ensure that soil cleanup goals were attained.

- The Industrial Landfill was covered with excavated soils and then with stabilized materials from the lagoons and Blowdown Pit and then graded using excavated materials from the other waste disposal areas. The landfill was then sealed/closed with an impermeable cap designed and constructed in accordance with Massachusetts Hazardous Waste Regulations for landfills specified at 310 CMR 30.580-595 and 30.620-633. The impermeable cap included a synthetic cover to prevent infiltration of surface water into the waste materials beneath the cap.

  The cap was also constructed with vents to allow gases generated from the existing and new material to vent to the surface outside the landfill. Emissions from the Industrial Landfill were initially controlled utilizing a thermal oxidation unit, but, after proper evaluation, have since been allowed to vent passively to the atmosphere (USEPA, 2002).

  Additionally, a groundwater monitoring and recovery system was designed and installed at the Industrial Landfill to supplement the existing ARS recovery wells.

- Originally, the Battery Separator Chip Pile was to be capped in place, but the need to remove the underlying soils made in-place capping non-feasible. Therefore, the battery separator chips were excavated and placed in the Industrial Landfill and were covered with non-solidified material excavated from the source areas.

- Prior to implementation of the remediation work provided for in the ROD for OU-1, W.R. Grace constructed an ARS. This system began treating contaminated groundwater that was extracted from bedrock and overburden wells through an air stripping tower. The ARS began operation in March 1985 and continued treatment of the groundwater throughout OU-1 remedial action. The air stripping tower component of the ARS required upgrading by installing carbon filters to control vapors and odors; these upgrades were completed in September 1992 (Foster Wheeler, 1997). The effectiveness of the ARS is to be evaluated as part of OU-3.

All of the above remedial action activities have been completed and the contractor, Camp, Dresser & McKee, Inc. (CDM) has certified that the remedy was constructed according to all approved plans and specifications, as documented in the Revised Construction Quality Assurance Closeout Report, prepared by CDM, dated February 1998.

As noted in the previous section, OU-2 did not require remedy implementation, and the remedy for OU-3 is not yet established, because the RI/FS for OU-3 is ongoing. The Aquifer Restoration System remains in operation for extraction and treatment of groundwater.

4.3 SYSTEM OPERATIONS/O&M

The Post-Closure Operation & Maintenance Plan ("O&M Plan") (CDM, 1996) forms the basis for operation, maintenance, and monitoring of the Industrial Landfill through the year 2028. This plan applies to the physical maintenance of fencing/security systems, roadways, drainage systems, and the Industrial Landfill final cover and gas control systems. Operation and maintenance of the ARS, onsite monitoring wells, and groundwater monitoring are described in separate documents, including Amended Monitoring Plan - ARS Treatment System (approved October 22, 1996) and Revisions to the Groundwater Monitoring Programs (HSI Geotrans, March 9, 1999). There have been no noted significant issues at the Site to date.

4.3.1 Industrial Landfill

Inspections are designed to evaluate the Site for signs of deterioration, malfunction, or improper operation of various systems. Site inspections are currently performed on a quarterly basis and documented on Inspection Log forms that are included in Progress Reports to EPA and MADEP. Details on various inspection/O&M requirements are noted below.

Fencing, Security Systems, and Benchmarks. During each inspection, the entire Industrial Landfill perimeter fence must be inspected and the gate locks must be checked. Any breaches will be documented and repaired immediately. Missing signage should also be noted and replaced.

Permanent benchmarks will be inspected annually for signs of damage or deterioration. Maintenance may include replacing damaged or missing benchmarks, or conducting a survey to verify a benchmark's elevation.

Roadways. The site roadways (not including paved roadways) will be inspected regularly for signs of deterioration, poor drainage, and debris. Any deficiencies noted will be given corrective attention as soon as possible. Routine maintenance will include clearing, filling, and regrading. Provisions will be made for snow removal during the winter season, as needed.

Drainage Systems. Drainage swales and culverts associated with the Industrial Landfill will be checked for proper operation, particularly after storm events. Observations should include checking for the presence of excess debris and obstructions at inlet structures, obstructions in culverts and stormwater drain pipes, and areas where vegetative stress and scouring are present. Routine maintenance involves clearing accumulated debris and as-needed repair of undermining and/or cracking at headwalls. Drainage swales may need regrading or reconstruction to promote surface water flow and discourage ponding.

Industrial Landfill Cover. Inspection of the capped Industrial Landfill will focus on the following:

- Identification of eroded areas, vegetation deterioration or excessive growth;
- Evidence of ponded water on landfill top indicating landfill settlement;
- Side slope cover material slippage, depressions, or other signs of problems on side slopes;
- Evidence of leachate seepage;
- Rodent holes, animal burrows and mounds;
- Disturbance and damage to site facilities, including landfill gas vents;
- Cracks and ripples; and
- Odors.

Observed deficiencies will be recorded. It may be necessary to determine surface elevations through a field survey in areas of localized subsidence or settlement. Corrective actions may include filling ruts and gullies in eroded areas and minor regrading. Any major repairs will require a plan approved by EPA and MADEP. Mowing and vegetation improvement (e.g., reseeding and fertilizer addition) will be performed as necessary. Annual elevation surveys will be conducted until the average of all settlement grid monitoring locations is less than 0.1 feet.

Landfill Gas Control. Following approximately 4 years of active landfill gas extraction and treatment via thermal oxidation, it was determined that system shutdown (change to passive venting only) would not cause an unacceptable health risk. As noted in the concurrence by EPA and MADEP (USEPA, 2002), the thermal oxidation unit and all associated piping and equipment shall remain in place and be maintained in an operational and functional condition. Should the long-term air quality monitoring program (currently quarterly) detect an unacceptable health risk, it may be necessary to activate the thermal oxidation unit and active gas collection system.

Gas extraction wells/vents, both those designed to be active and passive, will be visually examined during inspections. Severely damaged wells will require excavation of the well base to check the integrity of the liner welds. If welds are broken or the geomembrane is torn, the damage must be

repaired.

4.3.2 Aquifer Restoration System

The ARS was designed to mitigate the migration of contaminated groundwater to the Assabet wells, the Assabet River, and Fort Pond Brook; and to accelerate the removal of contaminants from the groundwater to restore the aquifer as required by the Consent Decree (HSI GeoTrans, 1998). The ARS originally consisted of nine extraction wells (see Figure 2): wells SLGP and SLBR near the Primary and Emergency Lagoons, wells NLGP and NLBR near the Tank Car Area, the North Lagoon well (NMGP), and the Industrial Landfill wells (ELF, MLF, RLF, and WLF). The SL wells are designed to intercept contaminated groundwater from the Primary Lagoon, Emergency Lagoon and Blowdown Pit to protect the Assabet River. The LF wells are designed to intercept contaminants from the Industrial Landfill and Secondary Lagoon to protect the Assabet River, and the NL wells are designed to intercept contaminants from the Blowdown Pit and North Lagoon to protect Fort Pond Brook (CDM, 1984; as cited in HSI GeoTrans, 1998).

The majority of the ARS began operation in 1985. Extraction well NMGP was added in August 1987 and extraction well MLF was added in September 1992. Groundwater from the extraction wells is treated by air stripping and treated water is discharged to Sinking Pond (HSI Geotrans, 1998).

In addition to the nine wells described above, two other wells are part of the ARS: extraction well RP-1 and former W.R. Grace production well WRG-1 located north of Muskrat Pond. RP-1 is designed to protect the Assabet wells, and water from RP-1 is treated in a small air stripper then discharged into well WRG-1. Groundwater pumped from WRG-1 is not contaminated, but is pumped and discharged with treated ARS effluent to Sinking Pond, to help create a groundwater flow barrier to divert contaminants away from the Assabet well field (HSI GeoTrans, 1998).

The air stripping tower component of the ARS was upgraded in September 1992 by installing carbon filters to control vapors and odors (Foster Wheeler, 1997). Progress reports have been completed periodically since system operation was initiated. These reports contained results of groundwater sampling which monitored ARS operation, sampling required by MADEP Discharge Permit No. 1-88 for ARS stripping tower monitoring (Discharge Permit No. 1-88 was replaced by "Amended Monitoring Plan - ARS Treatment System," approved by MADEP on October 22, 1996), water level measurements for contour map development, and details of system operation conducted during the reporting period. From 1986 to 1995, ARS Progress Reports were completed semi-annually as independent reports.

During OU-1 efforts, pre-closure and closure monitoring reports were submitted quarterly as independent reports to document groundwater quality in areas with soil contamination requiring remediation. As agreed to by the Government Parties (GPs), after an area with soil contamination was remediated, groundwater sampling would be conducted quarterly for one year and annually thereafter.

From 1996 to 1998, results for the ARS groundwater monitoring and the post-closure monitoring were presented in combined annual Groundwater Monitoring Reports. Reporting requirements for groundwater monitoring data as part of these reports were suspended through the duration of the OU-3 RI/FS with the approval of the GPs of the Revisions to the Groundwater Monitoring Programs dated March 9, 1999, submitted by HSI Geotrans. Annual reports are currently submitted which contain information on O&M associated with the ARS (e.g., permit sampling, extraction well O&M, and air stripping tower O&M). Annual submittals have also been provided which contain the groundwater level monitoring and groundwater quality monitoring results during the OU-3 RI/FS process.

ARS Performance. Performance of the ARS is evaluated through the following:

- Sampling and analysis of groundwater samples from monitoring wells to evaluate capture efficiency;
- Monitoring of the groundwater capture wells to verify effective pumping rates and associated capture zones;
- Collection and analysis of influent and effluent samples from the air stripping tower to evaluate contaminant loading and removal efficiency;
- Collection and analysis of surface water samples from the inlet to Sinking Pond to verify compliance with surface water discharge standards; and
- Monitoring the operation of wells WRG-1 and RP-1 which provide protection for the Assabet well field.

System Maintenance Activities. Standard system O&M activities have occurred over the past few years. Replacement of worn/inoperative components, as well as cleaning of various system components due to iron fouling has occurred. Activated carbon canisters have been replaced regularly.

Operational problems with three extraction wells in 2002 have resulted in evaluating the need to continue the use of these wells. The wells that are currently offline are WRG-1, RP-1, and NMGP. These wells were shut down because of breaks in the underground piping. The Government Parties agreed to allow W.R. Grace to leave these wells offline, with additional groundwater monitoring implemented to evaluate whether their being offline was impacting plume containment. These results will be considered in the OU-3 RI/FS process.

Iron has been an issue both with respect to maintenance (due to fouling of the air stripper) and exceedances of discharge permit criteria. Concentrations of iron in the effluent from the ARS that discharges to Sinking Pond have consistently exceeded the effluent standard. The effect of these exceedances will also be considered when a remedy is selected for OU-3.

SECTION 5.0
PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The following recommendations were made in the previous Five-Year Review report (USEPA, 1999).

- Review OU-3 RI/FS and ROD;
- Review groundwater data from the Industrial Landfill and Site monitoring wells.

RI/FS and ROD. The RI/FS for OU-3 is still under development by W. R. Grace and its consultants. The draft RI report has been submitted and reviewed by the Government Parties. Preparation of the human health and ecological risk assessments and feasibility study are ongoing, with completion currently scheduled for the summer of 2005. EPA's goal is to complete the ROD for OU-3 by September 2005.

Groundwater Data Evaluation. Groundwater data evaluation will be incorporated in the RI/FS for OU-3, which is still being developed. Annual OU-3 Monitoring Program Reports were submitted for 2002 and 2003 and provide results of the groundwater level monitoring and groundwater quality monitoring (see Section 6.3 for a summary of the results). Annual ARS O&M reports have also been submitted which show the existing system to be operating consistently. Impacts of the shutdown of three extraction wells and possible upgrades of the ARS will also be evaluated in the RI/FS.

Landfill Gas System. In the fall of 2002, the landfill gas system for extraction and treatment via thermal oxidation was shut down after studies determined that changing to passive venting only would not cause an unacceptable health risk. Quarterly air quality monitoring has been performed to evaluate if there is any change in the study's conclusion. The thermal oxidation unit and all associated piping and equipment are still in place and are in an operational and functional condition, so if the air quality monitoring program detects an unacceptable health risk, the thermal oxidation unit and active gas collection system can be reactivated. Beginning in September 2004, air monitoring will be conducted on an annual basis.

Institutional Controls. Institutional controls may be required to regulate land use of the Industrial Landfill, including activities which may compromise the integrity of the cap. These controls would supplement the requirements of the existing Consent Decree, which required W. R. Grace to file a notice with the Registry of Deeds, and also requires W. R. Grace to obtain the consent of the United States before transferring any of their Site property. W. R. Grace has filed the notice with the Registry of Deeds. However, because a deed notice is an informational device that is potentially non-enforceable (USEPA, 2000), an enforceable institutional control may also need to be put in place.

With respect to groundwater use, the Acton Board of Health has established a temporary moratorium on the installation of private irrigation wells within 500 feet of the mapped region of

contaminated groundwater that lies within the town. The temporary moratorium may or may not become permanent, depending on the outcome of the remedial investigation, feasibility study, and public health risk assessment currently in preparation for OU-3. The potential need for long-term institutional controls on groundwater use will be evaluated in the feasibility study for OU-3 and a determination will be made in the ROD for OU-3.

SECTION 6.0
FIVE-YEAR REVIEW PROCESS

This section describes the activities performed during the five-year review process and provides a summary of findings. The W. R. Grace five-year review team was led by Derrick Golden of EPA, Remedial Project Manager for the Site. Daniel Keefe of MADEP assisted in the review as the representative for the support agency. The team included staff from Metcalf & Eddy, Inc. with expertise in hydrogeology and risk assessment.

6.1 COMMUNITY NOTIFICATION AND INVOLVEMENT

On August 26, 2004, EPA issued a press release announcing that the five-year review was underway. The final Five-Year Review report will be provided to the towns of Acton and Concord and a press release will be issued to announce its availability.

6.2 DOCUMENT REVIEW

This five-year review included a review of the documents listed below.

- Risk Assessment of the W.R. Grace Site by prepared by CDM for W.R. Grace (8/31/88)
- Risk Analysis of the W.R. Grace Site prepared by Alliance Technologies for EPA (6/30/89)
- ROD for OU-1 (9/29/89)
- Post-Closure O&M Plan (8/15/96)/Response to Comments (11/8/96)
- Remedial Action Report (9/30/97)
- Revised Construction Quality Assurance Closeout Report (2/98)
- Proposed Revision of Groundwater Monitoring Programs (3/9/99)
- Phase I Remedial Investigation Work Plan (5/14/99)
- 5-Year Review (9/29/99)
- Flow Measurements of Passive Perimeter Wells and Proposed Monitoring of Landfill Gas Emissions (May 2001)
- Landfill Gas Emission Monitoring and Request to Begin Passive Operation (August 2001)
- OU-3 Monitoring Program Report, 2002 (3/28/03)
- March 2004 Landfill Gas Emission Monitoring (4/04)
- Aquifer Restoration System Operations Reports (2001, 2002, and 2003)
- OU-3 Monitoring Program Report, 2003 (5/4/04)
- Annual Post Closure O&M Report (7/04)

Complete references are provided in Attachment 2.

6.3 DATA REVIEW

During the post-closure period of OU-1, data evaluation has only been necessary for landfill gas at the Industrial Landfill and site groundwater monitoring/extraction/treatment. While the groundwater is currently being evaluated as part of the OU-3 RI/FS process, a brief review of the existing data is presented below.

6.3.1 Landfill Gas at the Industrial Landfill

Active operation of the landfill gas collection and treatment system occurred at the Industrial Landfill until Fall 2002. Studies performed in 2001 provided results which determined that passive venting would not cause an unacceptable health risk. Quarterly air quality monitoring is currently performed (changing to annual monitoring after September 2004) to evaluate if there is any change in the studies' conclusions.

The most recent set of monitoring data collected (March 2004) indicates that the maximum impacts of landfill emissions during passive operation (determined via stack monitoring and air dispersion modeling) are significantly below the Massachusetts 24-hour Threshold Effects Exposure Limits (TELs) and Allowable Ambient Limits (AALs) for each of the six target compounds associated with the system (see Table 2) (Sullivan DCM, 2004). Therefore, the data support the continued passive operation of the landfill gas system.

Table 2. Ambient Impacts Summary (after Sullivan DCM, 2004)

Pollutant	24-hour Impact (ug/m^3)	24-hour TEL (ug/m^3)	Percent of TEL	Annual Impact (ug/m^3)	Annual AAL (ug/m^3)	Percent of AAL
Ethylbenzene	0.1023	300	0.03%	0.01	300	0.00%
Vinyl chloride	0.0535	3.47	1.54%	0.006	0.38	1.69%
Xylenes	0.1077	11.8	0.91%	0.013	11.8	0.11%
Benzene	0.0695	1.74	3.99%	0.008	0.12	6.95%
Toluene	0.0857	80	0.11%	0.010	20	0.05%
1,1-Dichloroethene	0.0813	215.62	0.04%	0.010	107.81	0.01%

6.3.2 ARS Operations Monitoring

Annual ARS operations reports currently provide quarterly monitoring results for two surface water samples (two locations within the inlet to Sinking Pond, which is the surface water body receiving the treated effluent) and air stripper tower influent and effluent samples.

In the most recent three years of ARS operations reports (for 2001, 2002, and 2003), there have been no VOCs showing MCL exceedances in the tower effluent. However, a few inorganics in both the tower effluent and Sinking Pond inlet samples have been found to exceed either MCLs or standards based on ARS Amended Monitoring Plan Requirements. Iron has consistently exceeded the evaluation criterion of 300 ug/L, while nickel was found to be above its criterion of 100 ug/L once, in December 2000. That exceedance appears to be a one-time occurrence, as all other sampling efforts showed results well below the evaluation criterion for nickel. Arsenic had consistently been below the 50 ug/L criterion set in the Amended Monitoring Plan Requirements; however, that MCL has since changed to 10 ug/L and all effluent samples exceed this criterion. Table 3 presents these analytes showing criteria exceedances.

TABLE 3. ARS OPERATIONS MONITORING RESULTS SUMMARY

	Concentration (ug/L)								
	Arsenic			Iron			Nickel		
Sample Date	Influent	Effluent	Pond	Influent	Effluent	Pond	Influent	Effluent	Pond
12/20/2000	7.7	49.2	3.9	65,900	40,100	3,120	174	89.2	154
2/14/2001	62.4	35.2	15.6	11,400	4,710	744	2.8	5.8	5.5
3/29/2001	63.0	26.0	19.9	11,100	2,300	1,280	3.4	4.7	6.2
6/26/2001	51.3	22.6	10.2	9,910	2,510	622	3.3	6.5	4.1
9/19/2001	50.5	20.5	9.3	11,100	3,070	863	2.3	4.1	3.9
3/25/2002	48.5	24.3	13.3	10,200	2,440	898	<2.5	<2.5	2.6
6/25/2002	49.7	24.9	9.9	10,100	2,490	844	3.4	6.1	5.9
9/23/2002	55.6	25.9	13.0	11,400	3,340	1,180	<13.5	14	<13.5
12/9/2002	61.6	20.3	7.5	9,370	3,400	662	<13.5	<13.5	<13.5
3/31/2003	53.6	27.0	17.6	11,800	7,420	3,890	3.0	5.3	5.7
6/11/2003	120.0	29.1	43.4	16,600	4,320	6,770	2.8	3.5	3.8
7/23/2003	55.7	19.8	16.2	12,800	3,160	1,640	3.1	3.3	3
9/23/2003	56.4	21.2	15.8	12,700	3,480	1,930	2.4	4.2	4.5
12/17/2003	53.5	26.0	15.1	13,000	4,260	2,390	<4.5	<6.2	<4.5

Notes

Analytes presented had at least one detection above respective criteria in either tower effluent or pond influent sample.

Results taken from Aquifer Restoration System Operations Reports for 2001, 2002, and 2003. Data qualifiers have not been included.

< - Not Detected; sample-specific detection limit displayed

Influent - Air stripping tower influent water

Effluent - Air stripping tower effluent water

Pond - Water at inlet of Sinking Pond

Criteria (ug/L)

Arsenic - 50 (MCL at the time which requirements were established; current MCL = 10 ug/L)

Iron - 300 (based on ARS Amended Monitoring Plan Requirements)

Nickel - 100 (based on ARS Amended Monitoring Plan Requirements)

6.3.3 Groundwater Level Monitoring

To evaluate groundwater flow direction under and near the Site, annual water level measurements are collected from the available network of monitoring wells. Capture zones are estimated for operating recovery and water supply wells, and vertical hydraulic gradients are evaluated.

Figures 2-1 and 2-2 from the Operable Unit Three Monitoring Program Report, 2003 (GeoTrans, 2004; see Attachment 3) present the estimated overburden and bedrock potentiometric surfaces for data collected in August 2003. These figures also include model-generated capture zones for the ARS, simulated using long-term average stage elevations from the area surface water bodies.

The figures show that groundwater beneath most of the former source areas at the Site is being captured by the ARS. Beyond the ARS capture zone, groundwater flows to the south and southeast towards the Assabet River, and to the north and northwest towards Fort Pond Brook GeoTrans, 2004).

Vertical hydraulic gradients across most of the Site are downward. However, the vertical gradients are upward at most locations near the Assabet River and Fort Pond Brook, which indicates that the river and brook are groundwater discharge points (GeoTrans, 2004).

6.3.4 Groundwater Quality Monitoring

As part of continued ARS effectiveness evaluation, groundwater quality monitoring is performed both within and outside of ARS capture zones. Contaminant migration and reduction are reviewed as part of the evaluation. An overall review will be included in the OU-3 RI/FS. This section presents a brief summary of results provided in the most recent (2003) Operable Unit Three Monitoring Program Report (GeoTrans, 2004).

Tables 4 and 5 present summaries of VOCs and inorganics detected in groundwater during 2003, respectively. Of the 25 VOCs detected, eight were detected at concentrations greater than their screening value. The screening value is the minimum chemical-specific ARAR for each compound or, for compounds with no ARAR, it is based on the EPA Region 9 PRG. The screening values are only used to describe the data and are not intended to be cleanup standards for the Site (GeoTrans, 2004).

Three compounds, VDC, VC, and benzene, were most frequently detected at concentrations greater than their screening values and were the most widespread in their occurrence. Figures 3-4, 3-5, and 3-6 in Attachment 3 (reproduced from GeoTrans, 2004) illustrate the extent of groundwater contamination with these compounds in the vicinity of the Site.

While most of the iron and manganese detections appear to be consistent with naturally occurring background concentrations, Site data suggests that local geochemical conditions associated with Site activities in the area downgradient of the Industrial Landfill and near former source areas, have resulted in increased solubility of naturally occurring manganese and iron (GeoTrans, 2004).

Table 4. Summary of VOCs Detected in Groundwater, Fall 2003 (after GeoTrans, 2004).

Compound	Screening Value (ug/L)		Locations > Screening Value (113 Total Locations)	Detections	Maximum Concentration Detected (ug/L)	
1,1-Dichloroethene	7		47	92	600	*
Vinyl chloride	2		41	62	190	*
Benzene	5		27	69	4000	*
1,2-Dichloroethane	5		6	21	99	*
Chloroethane	4.6	#	6	15	56	*
1,2-Dichloropropane	5		4	16	92	*
Trichloroethene	5		1	9	21	*
Tetrachloroethene	5		1	1	6.1	*
Acetone	3000		0	42	68	
1,1-Dichloroethane	70		0	33	10	
Methyl tert-butyl ether (MTBE)	70		0	16	6.4	
Ethylbenzene	700		0	14	290	
cis-1,2-Dichloroethene	70		0	13	13	
Toluene	1000		0	11	3.5	
Xylenes (total)	10000		0	9	5.4	
2-Butanone (MEK)	350		0	7	14	
Carbon Disulfide	100	#	0	5	7.6	
Methylene chloride	5		0	4	1.5	
1,1,1-Trichloroethane	200		0	3	59	
trans-1,2-Dichloroethene	100		0	3	3.5	
4-methyl-2-pentanone (MIBK)	350		0	2	3.7	
Chloromethane	1.5	#	0	2	0.83	
Styrene	100		0	2	1.3	
Chloroform	5		0	2	2.4	
1,1,2-Trichloroethane	3		0	1	1.5	

Notes:

- Compound does not have ARAR. USEPA Region 9 preliminary remediation goal (PRG) used as screening value for carcinogenic compounds, and 0.1 x PRG for non-carcinogenic compounds.

* - Compound detected above Screening Value.

Table 5. Summary of Inorganic Compounds Detected in Groundwater, Fall 2003 (after GeoTrans, 2004)

Compound	Screening Value (ug/L)		Locations > Screening Value (12 Total Locations)	Detections	Maximum Concentration Detected (ug/L)	
Aluminum	3600	#	0	2	549	
Antimony	6		0	3	5.1	
Arsenic	10		0	2	6.6	
Barium	1000		0	13	43.2	
Beryllium	4		0	8	0.43	
Calcium	none		NA	13	45400	
Chromium	50		1	1	762	*
Cobalt	220	#	0	3	7.9	
Copper	1000		0	1	1.6	
Iron	300		6	9	9860	*
Lead	15		0	2	2.8	
Magnesium	none		NA	13	11000	
Manganese	50		9	13	2260	*
Nickel	100		1	8	214	*
Potassium	none		NA	13	9170	
Selenium	10		0	4	4.5	
Sodium	20000		6	13	62600	*
Vanadium	26	#	1	13	41.1	*
Zinc	5000		0	6	52.5	

- Compound does not have ARAR. USEPA Region 9 preliminary remediation goal (PRG) used as screening value for carcinogenic compounds, and 0.1 x PRG for non-carcinogenic compounds.

* - Compound detected above Screening Value. NA - Not Applicable

Groundwater quality trend tests were performed by GeoTrans (2004) for VDC, vinyl chloride, and benzene using data collected from 1999 through 2003 to determine if there is a statistically significant upward or downward trend in water quality at the 95 percent confidence level. The test requires a minimum of four samples collected at regular intervals, and therefore the analysis could only be applied to wells sampled annually since 1999. Results indicate that, in most data sets evaluated, there was either a downward trend or no trend shown. Table 6 presents a summary of these tests.

The Trend Test for VDC concentrations was performed on 53 wells. Thirteen wells showed statistically significant downward trends, and some represented a relatively large decrease in VDC concentration. Only two wells were identified as having an upward trend for VDC concentrations. These wells were LF-02A, a shallow well downgradient of the Industrial Landfill, and OSA-03BR, a bedrock well east of the former Blowdown Pit. Both of these wells are within the ARS capture zone.

For vinyl chloride concentrations the Trend Test was performed on 45 wells, and eleven wells showed downward trends. Some of the largest downward trends for vinyl chloride concentration were in the unconsolidated deposits. Only well OSA-03BR was identified as having an upward trend for vinyl chloride concentration. This well is within the ARS capture zone.

The Trend Test for benzene concentrations was performed for 47 wells. Downward trends were statistically significant in ten wells. The largest downward benzene concentration trends were in the areas where the highest benzene concentrations are measured, downgradient of the eastern edge of the Industrial landfill. Two wells were identified as having an upward trend for benzene concentrations and are extraction well ELF, located southeast of the Industrial Landfill, and bedrock well OSA-03BR. Both of these wells are within the ARS capture zone.

Table 6. Results of Mann-Kendall Trend Test for small sample size (GeoTrans, 2004)

Location	VDC Trend	VDC 1999/2003	Vinyl Chloride Trend	Vinyl Chloride 1999/2003	Benzene Trend	Benzene 1999/2003
AR-03B1	NONE		NONE		NONE	
AR-09A	NONE		NONE		NONE	
AR-09BR	NONE		NONE		NONE	
AR-11B1	NONE		NONE		NONE	
AR-11B2	NONE		NONE		NONE	
AR-16ADP	NONE		NONE		NONE	
AR-20	NONE		NONE		NONE	
AR-20A	NONE		NONE			
AR-21			DOWNWARD	4.3/ND	NONE	
AR-21A	DOWNWARD	10/5.7	DOWNWARD	3.5/1.5	NONE	
AR-22	NONE					
AR-25B	DOWNWARD	8.7/ND	DOWNWARD	11/2.3	NONE	
B-06B5	NONE					
B-08A			NONE		NONE	
B-08B					DOWNWARD	2000/550
B-08B3					DOWNWARD	1100/17
B-08C	NONE		NONE		DOWNWARD	180/5.3
B-09B4	DOWNWARD	5.7/1.2	NONE			
B-08D					DOWNWARD	190/0.5
CLF-2A	DOWNWARD	4.6/1.3	DOWNWARD	1.5/ND		
ELF	NONE		NONE		UPWARD	16./83.7
G-3A	NONE		NONE		NONE	
G-3BR					NONE	
LF-02A	UPWARD	160/250	NONE		NONE	
LF-05E	NONE		NONE		NONE	
LF-06					DOWNWARD	120/21.5
LF-06C					NONE	
LF-06N					DOWNWARD	960/340
LF-10	NONE		NONE		NONE	
LF-10A	NONE		DOWNWARD	50/30	NONE	
LF-10B	DOWNWARD	160/80	DOWNWARD	51/21	DOWNWARD	12/4.6
LF-11AR	NONE		NONE		NONE	
LF-11BR	NONE		NONE		DOWNWARD	4.9/4.2
LF-11R	DOWNWARD	4.7/2.5	NONE		NONE	
LF-12	NONE		NONE		NONE	
LF-12A	DOWNWARD	7/ND				
LF-13A	NONE		DOWNWARD	5.5/ND	DOWNWARD	2.4/ND
LF-13B	NONE				NONE	
LF-15					DOWNWARD	11/ND
MLF	NONE		NONE		NONE	
MW-04B	NONE		NONE		NONE	
MW-06B	DOWNWARD	260/170	NONE		NONE	
MW-07B	NONE		NONE		NONE	
MW-13B	NONE		NONE		NONE	

Table 6. Continued

Location	VDC Trend	VDC 1999/2003	Vinyl Chloride Trend	Vinyl Chloride 1999/2003	Benzene Trend	Benzene 1999/2003
NLGP	NONE		NONE			
OSA-01A	DOWNWARD	62/23	NONE			
OSA-01BR	NONE		DOWNWARD	8.6/0.5		
OSA-01C	NONE					
OSA-02A	NONE					
OSA-03BR	UPWARD	20/50	UPWARD	3.6/23	UPWARD	0.4/2.6
OSA-05B	NONE					
OSA-06BR	NONE		NONE		NONE	
OSA-07B	DOWNWARD	41/7.1	NONE			
OSA-09B	DOWNWARD	46/4.9	DOWNWARD	27/0.5		
OSA-11A	DOWNWARD	22/5.4				
OSA-11B	DOWNWARD	130/24				
OSA-12B			NONE		NONE	
OSA-13B					NONE	
OSA-16B	NONE		NONE		NONE	
PT-03B1	NONE		DOWNWARD	4.7/2.8	NONE	
PT-09	NONE					
PT-11B1	NONE					
SLBR	NONE		NONE		NONE	
SLGP-R	NONE		NONE		NONE	
WLF	NONE		DOWNWARD	23/8.4	NONE	

All concentrations reported in ug/L.

ND is non-detect.

VDC 1999/2003 indicates the VDC concentration detected in 1999 and the VDC concentration detected in 2003.

Vinyl chloride 1999/2003 indicates the VC concentration detected in 1999 and the VC concentration detected in 2003.

Benzene 1999/2003 indicates the benzene concentration detected in 1999 and the benzene concentration detected in 2003.

6.4 SITE INSPECTION

A site inspection of the Industrial Landfill was conducted on August 30, 2004. Representatives from EPA, Metcalf & Eddy (EPA contractor), Remedium (W.R. Grace subsidiary) and O & M, Inc. (O&M contractor for W.R. Grace) participated in the inspection. The purpose of the inspection was to help assess the protectiveness of the OU-1 remedy by observing the condition of the site fence, the landfill cover and drainage system, and the landfill gas passive vent system.

Several minor issues were noted during the site inspection. 1) There is standing water in several locations in the rip-rapped perimeter drainage swale around the landfill. Standing water in the perimeter swale on the south, southeast, and northwest sides appears to be the result of sedimentation adjacent to and directly below the rip-rap downchutes just downstream of the standing water. Accumulation of vegetation clippings from previous mowing may be contributing to the build-up in these areas also. Standing water in the perimeter swale on the west side of the landfill appears to be a result of localized settling. 2) Hay bales have been placed along the mid-slope vegetated drainage swale on the northwest side of the landfill just upstream of a rip-rap downchute. Apparently runoff was able to flow out of the swale before entering the downchute. It was not evident during the inspection that there had been a breach of the swale berm, however, the swale depth in this area is shallow. 3) Several of the polyethylene manhole covers on the landfill, notably well covers #3 and #24, are missing the "Keep Out" signs that were attached.

Sediment and mowing clippings should be removed from the perimeter swale to promote positive drainage and eliminate standing water on the south, southeast and northwest sides of the landfill. Swale grades should be checked along the west side, and if necessary the swale bottom should be re-graded to provide positive drainage to the outlet. As it was not clear what was causing mid-slope runoff to flow over the vegetated swale berm, this area should be observed during the next storm event and measures taken to assure swale runoff enters the rip-rap downchute as intended. "Keep Out" signs consistent with signage on other manhole covers around the landfill should be replaced.

6.5 INTERVIEWS

A series of interview questions was developed based on suggested questions in the EPA guidance for five-year reviews (USEPA, 2001). Questions asked included:

1. What was the respondents' overall impression of the project to date;
2. What effects do site operations have on the surrounding community;
3. If the respondent was aware of any community concerns regarding the Site or its operation and administration;
4. Was the respondent aware of any events or incidents or activities at the Site such as vandalism, trespassing, or emergency responses from local authorities;
5. Did the respondent feel well-informed about the Site and Site activities;
6. Did the respondent have any comments, suggestions, or recommendations regarding the Site's

management or operation.

A list of interviewees was developed that included representatives of the towns of Acton and Concord, the citizens' group Acton Citizens for Environmental Safety, and W. R. Grace. The following individuals were interviewed by telephone:

Doug Halley, Health Director, Town of Acton
Michael Moore, Public Health Administrator, Town of Concord
Jane Ceraso, Environmental Manager, Acton Water District
Mary Michelman, President, Acton Citizens for Environmental Safety (ACES)

The following individuals were interviewed in conjunction with the site inspection performed on August 30 (see Section 6.4):

Maryellen Johns, Remedium - Project Manager representing W. R. Grace for the Site
Peter Davis, O&M, Inc. - landfill O&M contractor for W. R. Grace

A record of each interview was produced and has been included in this report as Attachment 4.

In general, the response from town representatives was consistent in that they feel progress is being made towards Site cleanup and that they are kept well-informed, but that the progress is slower than they would like. W. R. Grace similarly feels that progress is being made, but that the costs for investigation and cleanup for OU-1 have been high. Town representatives and W. R. Grace representatives also expressed concern about trespassing and vandalism and explained their continued efforts to prevent it. Representatives of Acton and Concord commented that the most frequent inquiries they receive about the Site are from prospective home buyers from other areas who are concerned about living near a Superfund site. One suggestion was that a flyer be developed that would summarize the Site for prospective home buyers or individuals who may have recently moved to the area. The ACES website was noted as a good source of information to which people can be directed.

SECTION 7.0
TECHNICAL ASSESSMENT

This section discusses the technical assessment of the remedy and provides answers to the three questions posed in the EPA Guidance (USEPA, 2001).

7.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

The review of documents indicates that the OU-1 remedy was implemented in accordance with the ROD for OU-1. The fence surrounding the Site is intact and kept in good repair. O&M of the Industrial Landfill cap and associated drainage structures has been effective. Some minor landfill O&M issues were identified during the site inspection (see Section 6.4) but they do not impede the effectiveness of the remedy. The passive venting of landfill gas at the Industrial Landfill does not result in air levels in excess of Massachusetts 24-hour Threshold Effects Exposure Limits (TELs) and Allowable Ambient Limits (AALs) for each of the six target compounds associated with the system.

The ARS air stripping tower appears to be well-maintained and performing properly in the removal of organics. However, there have been exceedances of discharge criteria for inorganics because the current treatment system is not designed for removal of inorganics. This issue will need to be addressed in the selection of the OU-3 remedy.

Extraction wells which are part of the ARS have required frequent maintenance due to iron fouling, and three are currently not operating because of underground piping breaks. Impacts of these shutdowns will be considered in the OU-3 RI/FS and in selection of the remedy for OU-3.

A deed notice is in place for the Industrial Landfill and access is strictly controlled by W. R. Grace, and hence there is no current potential for exposure to waste left in place under the landfill cap. The Acton Board of Health has established a temporary moratorium on the installation of private wells within 500 feet of the groundwater contaminant plume. The need for an enforceable institutional control for the Industrial Landfill will need to be evaluated, to ensure the remedy remains protective over the long term. The status of the temporary private well moratorium will be evaluated based on the outcome of the RI/FS and ROD for OU-3.

7.2 QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES (RAOs) USED AT THE TIME OF REMEDY SELECTION STILL VALID?

Question B is addressed by reviewing the risk assessments that formed the basis for the selected remedy, describing any significant differences as compared to current risk assessment practice, and qualitatively evaluating the impact of any such differences on remedy protectiveness.

7.2.1 Review of Risk Assessments and Toxicity Factors Serving as the Basis for the Remedy

The risk analysis conducted for the Site (Alliance, 1989) evaluated the risks associated with the ingestion of groundwater for the entire Site and for direct contact with and ingestion of surface material for: (1) the entire Site considered as a single source; and (2) the individual source areas. The primary risks observed in this analysis were those associated with ingestion of contaminated groundwater by a small child and adult/youth. The greatest risks associated with groundwater ingestion were for VDC, VC, arsenic, lead, and zinc. The risks associated with direct contact with and ingestion of surface material were less significant than those estimated for groundwater ingestion. However, elevated risks for soil exposures were attributable to VDC, VC, and arsenic. No ecological evaluation was included in the 1989 risk analysis.

EPA established soil cleanup goals for five indicator chemicals (VDC, VC, ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate). The attainment of cleanup goals for the indicator chemicals was expected to reduce residual contamination of other compounds found at the Site to such low levels as to present no significant risk from direct contact or from migration of contaminants to groundwater. The indicator chemicals selected also included compounds, identified in underlying soils, that could contribute to risk following leaching to groundwater. The soil cleanup goals were generated based on a model that calculated the level of the indicator chemical which, if left in soil as a residual, would not lead to further contamination of groundwater at levels that exceed drinking water standards (i.e., MCLs). Arsenic, though identified as a risk contributor for soil, was not selected as an indicator chemical. Metals generally do not appreciably leach to groundwater, and arsenic concentrations in on-site surface material were largely consistent with background levels present in native soils.

Table 7 presents the changes in toxicity values (oral reference doses and oral cancer slope factors) for compounds selected as indicator chemicals in 1989. Updated toxicity information was obtained from the *Integrated Risk Information System* (IRIS; USEPA, 2004). Only minor changes (i.e., increases or decreases within an order of magnitude) in toxicity values have occurred. Groundwater, surface water and sediment risks will be evaluated using current toxicity values in the baseline human health risk assessment being completed for OU-3.

Soil contaminants requiring cleanup were selected based on direct contact risk contributors identified in the 1989 risk analysis and on the potential of other soil contaminants to leach to groundwater. To assure that the soil cleanup goals for the selected indicator compounds in soil do not present a direct contact risk using current toxicity information, a comparison of the soil cleanup goals to EPA Region 9 residential soil preliminary remediation goals (PRGs) has been performed. PRGs are developed based on current toxicity information and correspond to a carcinogenic risk of 1E-06 and a noncarcinogenic risk of 1. This comparison indicates that the soil cleanup levels remain adequately protective for a residential exposure scenario.

Emissions from the Industrial Landfill were not evaluated in the 1989 risk analysis, but have been evaluated since then to support the change from an active landfill gas collection and treatment

system to passive venting. Air dispersion modeling performed on March 2004 landfill gas emission data for six target compounds indicates that exposure concentrations during passive operation are significantly below the Massachusetts 24-hour Threshold Effects Exposure Limits (TELs) and Allowable Ambient Limits (AALs) (Sullivan DCM, 2004). AALs and TELs are conservative risk-based airborne concentrations, protective of continuous exposures to the most sensitive receptor populations. Therefore, the data demonstrate that the landfill emissions do not cause an unacceptable human health risk.

Table 7: Comparison of 1989 and 2004 Oral Reference Doses and Oral Cancer Slope Factors for Compounds of Potential Concern

Contaminant of Potential Concern	Oral Reference Dose (RfD) (mg/kg-day)			Oral Slope Factor (SF) $(mg/kg\text{-}day)^{-1}$	
	1989	2004		1989	2004
Benzene	N/A	0.004		0.029	0.055
Ethylbenzene	0.1	0.1		N/A	N/A
Toluene	0.3	0.2		N/A	N/A
Trichloroethene	0.007	0.0003		0.011	0.4
Vinyl chloride	N/A	0.003		2.3	1.5
Vinylidene chloride	0.009	0.05		0.6	N/A
Arsenic	0.001	0.0003		15	1.5
Beryllium	0.0005	0.002		N/A	N/A
Cadmium (food)	0.0005	0.001		N/A	N/A
Cadmium (water)	0.0005	0.0005		N/A	N/A
Chromium (as VI)	0.005	0.003		N/A	N/A
Copper	0.037	0.03		N/A	N/A
Lead	0.0014	N/A		N/A	N/A
Nickel	0.02	0.02		N/A	N/A
Zinc	0.2	0.3		N/A	N/A
N/A = Not Applicable or Not Available					

In the most recent three years of ARS operations reports (for 2001, 2002, and 2003), a few inorganics in Sinking Pond inlet samples have been found to exceed either MCLs or standards based on ARS Amended Monitoring Plan Requirements. The inorganics noted as exceeding either MCLs or standards include iron, arsenic, and nickel. The OU-3 baseline risk assessment will determine the risk to human and ecological receptors based on exposures to measured surface water and sediment data collected from Sinking Pond.

Groundwater quality monitoring is performed both within and outside of ARS capture zones. The 2003 sampling indicated the continuing presence of VOCs in excess of MCLs (see Section 6.3). Three compounds, VDC, vinyl chloride, and benzene, were most frequently detected at concentrations greater than MCLs and were the most widespread in their occurrence. Groundwater data collected from the Site will be evaluated for potential impacts to human health and the environment in the OU-3 baseline risk assessment.

Even though soil cleanup goals remain protective, soil containing contaminant levels in excess of cleanup goals exists in the capped Industrial Landfill. In order to prevent direct contact exposures and the leaching of contaminants from these soils, maintenance of the landfill cap is required. Until the risk assessment for OU-3 is completed, exposure to contamination in site-related surface water and sediment should be prevented. Efforts to prevent trespassing at the Site should continue, to limit direct contact sediment and surface water exposures for trespassers. The current institutional controls, consisting of the deed notice on the Industrial Landfill and the temporary private well installation moratorium, may need to be supplemented with additional enforceable controls in the future. The ROD for OU-3 will determine which, if any, surface water, sediment, and groundwater exposure pathways will require institutional controls and remedial action.

7.2.2 Ecological Risk Review

Though soil cleanup levels presented in the ROD for OU-1 were based on human health criteria, they are protective of ecological receptors. Ecological screening benchmarks for soil (selected from the lowest values of USEPA, 2003; Sample, Opresko, and Suter, 1996; Efroymson *et al.*, 1997a; Efroymson, Will, and Suter, 1997b) which did not exist at the time the ROD was written, are currently available for vinyl chloride, benzene, and bis-2(ethylhexyl)phthalate. The screening values are above the soil cleanup goals established for OU-1, indicating that cleanup goals for OU-1 are protective of the environment. Furthermore, because remediation involved excavation of the top two to five feet of soil, contaminants were removed from the zone of biological activity. The ROD for OU-3 will determine which, if any, surface water and sediment exposure pathways require remedial action to protect ecological receptors.

7.2.3 ARARs Review

M&E performed a review of Applicable or Relevant and Appropriate Requirements to check for possible impacts on the remedy due to changes in standards that were identified as ARARs in the

ROD for OU-1, newly promulgated standards for chemicals of potential concern, and TBCs (to be considereds). The tables in Attachment 5 provide the ARARs review. The review is summarized below.

The OU-1 ROD set forth the following ARARs for the selected remedy:

Location-specific:

1. None identified

Chemical-specific:

2. Safe Drinking Water Act (SDWA)
3. Massachusetts Drinking Water Regulations
4. Massachusetts Groundwater Quality Standards

Action-specific:

5. Massachusetts Hazardous Waste Regulations
6. Clean Air Act
7. Massachusetts Air Quality Standards and Air Quality Control Regulations
8. Department of Transportation Regulations
9. Occupational Safety and Health Administration (OSHA)
10. Massachusetts Groundwater Protection Regulations
11. Federal Protection of Archaeological Resources
12. Massachusetts Sanitary Landfill Regulations

Tables A5-1 and A5-2 of Attachment 5 provide an evaluation of ARARs using the regulations and requirement synopses listed in the OU-1 ROD as a basis. The evaluation includes a determination of whether the regulation is currently ARAR or TBC and whether the requirements have been met. Most of the listed ARARs remain applicable or relevant and appropriate to the site and are being complied with.

Since the 1999 Five-Year Review, the MCL for arsenic was lowered from 50 µg/L to the currently proposed 10 µg/L. The arsenic concentration measured in the effluent from the ARS system has been greater than 10 µg/L. The OU-3 FS will evaluate alternative treatments in response to this change.

The Massachusetts Sanitary Landfill Regulations are no longer considered ARAR. They would have been applicable to capping in place of the Battery Separator Area chip piles, which was part of the ROD-specified remedy for OU-1. However, the chip piles were excavated and placed in the Industrial Landfill instead of being capped in place.

7.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

There is no other information that calls into question the protectiveness of the remedy.

7.4 TECHNICAL ASSESSMENT SUMMARY

According to the data reviewed, the site inspection, and the interviews, the OU-1 remedy is functioning as intended by the ROD. Remedial actions for OU-1 have been completed. No remedy for OU-2 was necessary, as residual contamination in soils under the source areas did not exceed soil cleanup goals established for OU-1. The OU-1 soil cleanup goals remain adequately protective for a residential exposure scenario, based on a comparison of the goals to Region 9 residential soil PRGs.

The remedy for OU-3 is not yet completed. OU-3 will evaluate groundwater contamination on- and off-site to determine if additional remedial action is required to restore groundwater to federal MCLs and be protective of public health and the environment. OU-3 also includes an ecological risk assessment and evaluation of on-site wetlands and surface water bodies. The OU-3 investigation is on-going; therefore a remedy has not yet been selected for OU-3.

To maintain the protectiveness of the OU-1 remedy, institutional controls for the Industrial Landfill should remain in place. Currently there is a deed notice and W. R. Grace maintains the landfill and controls access. It may be necessary to establish an enforceable institutional control to supplement the deed notice, to ensure the protectiveness of the remedy in the future.

The ARARs cited in the OU-1 ROD were met for the OU-1 remedial actions. ARARs that will need to be met for the OU-3 remedy that were not explicitly described in the ROD for OU-1 have been identified, and will be used as a basis for selection of the OU-3 remedy. Since the 1999 Five-Year Review, the MCL for arsenic was lowered from 50 to 10 µg/L. The arsenic concentration measured in the effluent from the ARS stripper has been greater than the 10 µg/L standard. The OU-3 FS will need to evaluate alternative treatments in response to this change.

There is no other information that calls into question the protectiveness of the remedy.

SECTION 8.0
ISSUES

Based on the activities conducted during this Five-Year Review, the issues identified in Table 8 have been noted.

Table 8: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Enforceable Institutional Controls may be required for the Industrial Landfill to ensure the protectiveness of the remedy in the future.	N	Y

SECTION 9.0
RECOMMENDATIONS AND FOLLOW-UP ACTIONS

In response to the issues noted above, it is recommended that the actions listed in Table 9 be taken:

Table 9: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Enforceable Institutional Controls may be required for the Industrial Landfill to ensure the remedy remains protective in the future.	Evaluate options for enforceable institutional controls and implement.	W. R. Grace	EPA and MADEP	Before next five year review (September 2009)	N	Y

SECTION 10.0
PROTECTIVENESS STATEMENTS

This five-year review concluded that the remedy for OU-1 currently protects human health and the environment. Soil in excess of cleanup levels has been excavated, stabilized, and placed in the Industrial Landfill. The Industrial Landfill was then sealed/closed with an impermeable cap designed and constructed in accordance with Massachusetts Hazardous Waste Regulations for landfills specified at 310 CMR 30.580-595 and 30.620-633. The Industrial Landfill is owned and maintained by W. R. Grace, access is restricted by a fence, and a deed notice has been filed with the Registry of Deeds. In order for the remedy at OU-1 to be protective in the long-term, it may be necessary to establish additional institutional controls that will be enforceable in the future. The controls would focus on the protectiveness of the remedy and preventing Site activities that could reduce remedy effectiveness.

There is no protectiveness statement for OU-2 because it was determined that a remedy for OU-2 was not needed.

The remedy for OU-3 has not yet been determined. Groundwater is currently being extracted and treated by an Aquifer Restoration System (ARS) that was constructed by W. R. Grace in 1985, prior to the ROD for OU-1 which was signed in 1989. The effectiveness of the ARS is being evaluated as part of the ongoing Remedial Investigation and Feasibility Study for OU-3. The Acton Water District provides treatment of groundwater from the five public water supply wells in the vicinity of the Site, and the Acton Board of Health has established a temporary moratorium on the installation of private wells within 500 feet of the groundwater contaminant plume. Hence, exposure pathways that could result in unacceptable risks to humans are being controlled, while the RI/FS process for OU-3 continues.

Overall, the remedial actions at all Operable Units are either protective or will be protective upon selection and completion, and in the interim, all exposure pathways that could result in unacceptable risks are being controlled.

SECTION 11.0
NEXT REVIEW

The next Five-Year Review for the W. R. Grace (Acton Plant) Superfund Site will be completed by September 29, 2009, five years from the date of this review. The next Five-Year Review should include:

- Review of institutional control status for the Industrial Landfill
- Evaluation of OU-3, including the data collected in the investigation phase and a discussion of the selected remedy
- Evaluation of progress towards implementation of the OU-3 selected remedy
- Continued evaluation of air quality monitoring, to ensure that the Industrial Landfill's passive gas control system does not present any unacceptable risks.
- Review of groundwater monitoring to confirm that the remedial actions are protective of human health and the environment.

ATTACHMENT 1
SITE MAPS

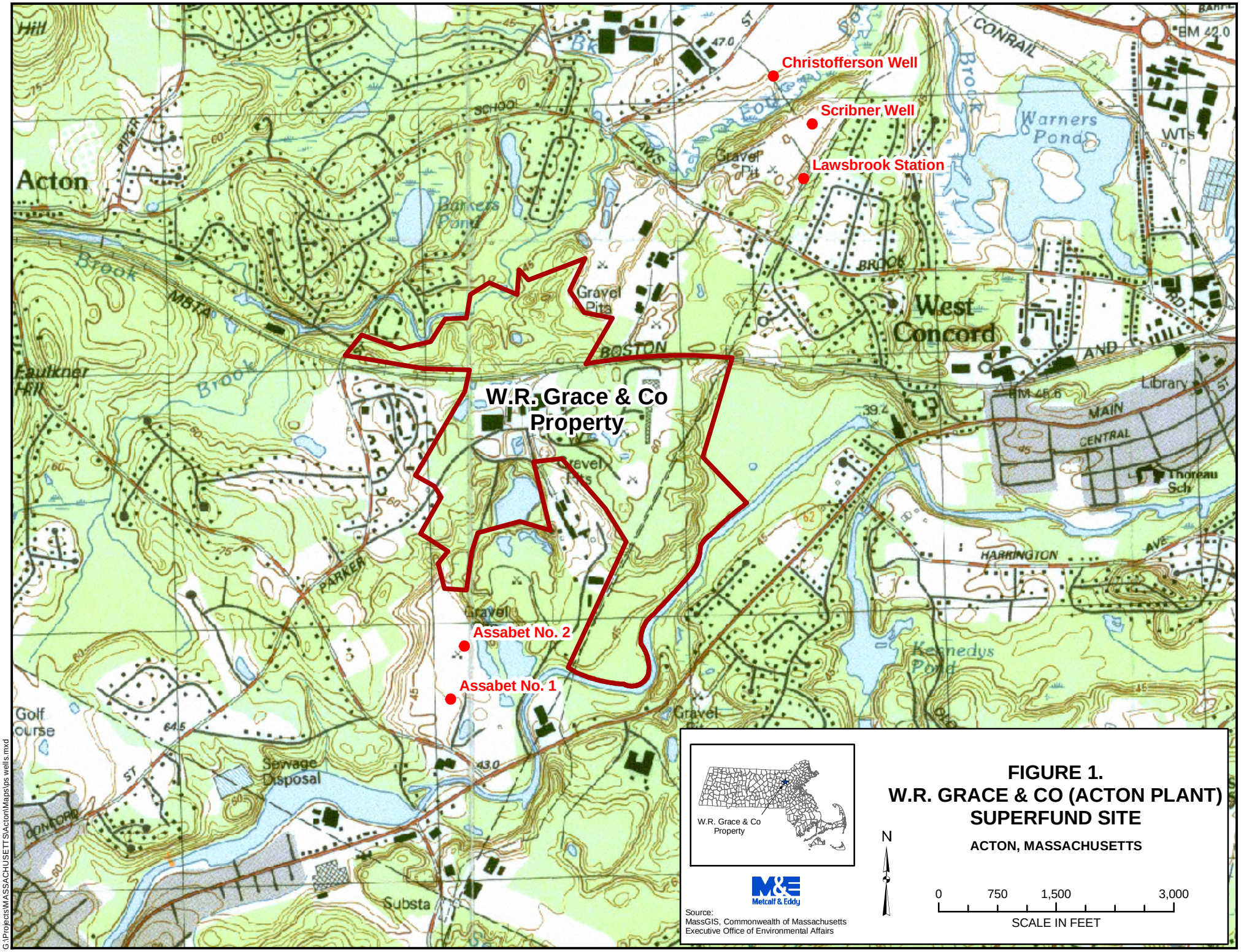


FIGURE 1.
W.R. GRACE & CO (ACTON PLANT) SUPERFUND SITE

ACTON, MASSACHUSETTS

G:\Projects\MASSACHUSETTS\Acton\Maps\ps wells.mxd

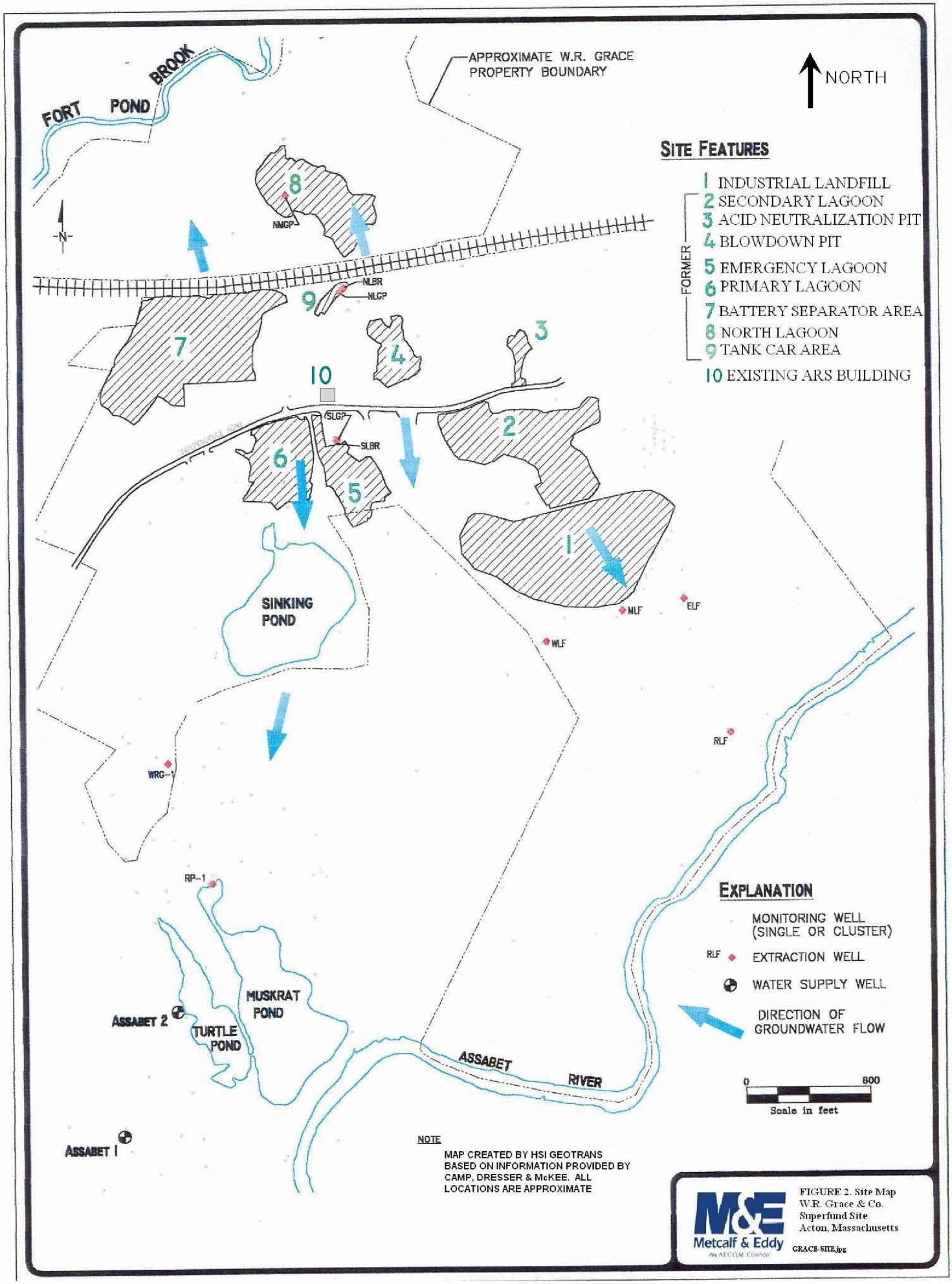


FIGURE 2. Site Map
W.R. Grace & Co.
Superfund Site
Acton, Massachusetts

ATTACHMENT 2
LIST OF DOCUMENTS REVIEWED/REFERENCES

Alliance Technologies Corporation, 1989. Risk Analysis of the W.R. Grace Site, Acton, Massachusetts. Prepared for U.S. Environmental Protection Agency, Office of Waste Programs Enforcement, Washington, DC, Contract No. 68-W9-0003. June 30, 1989.

Camp Dresser & McKee. 1984. The Final Report on Aquifer Restoration Program, 3 Volumes, June 1984 (as cited in HSI GeoTrans, 1998).

Camp Dresser & McKee. 1988. Appendix D Risk Assessment for W..R. Grace Site, Acton, Massachusetts. August 31, 1988.

Camp Dresser & McKee. 1996. Post-Closure Operations and Maintenance (O&M) Plan. W..R. Grace Superfund Site, Acton, Massachusetts. August 15, 1996.

Camp Dresser & McKee. 1996.Response to Comments: Post-Closure Operations and Maintenance (O&M) Plan. W..R. Grace Superfund Site, Acton, Massachusetts. November 8, 1996.

Camp Dresser & McKee. 1998. Revised Construction Quality Assurance Closeout Report. W..R. Grace Superfund Site, Operable Unit One, Acton, Massachusetts. February 1998.

Camp Dresser & McKee. 2002. Aquifer Restoration System Operations Report, December 2001, W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts. January 3, 2002.

Efroymson, R.A, M. E. Will, G. W. Suter II, and A. C. Wooten. 1997a. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision. Prepared for the U.S. Department of Energy. ES/ER/TM-85/R3. November 1997.

Efroymson, R., M.E. Will, and G.W. Suter. 1997b. Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revision. Prepared for U.S. Department of Energy. ES/ER/TM-126/R2. November 1997.

Foster Wheeler. 1997. Remedial Action Report for Operable Unit One: W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts. prepared for USEPA. September 1997.

GeoTrans Inc. 1999. *Proposed Revision of Groundwater Monitoring Programs.*, W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts, prepared for W.R. Grace & Co. March, 9, 1999.

GeoTrans Inc. 1999. *Phase I Remedial Investigation Work Plan*, W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts, prepared for W.R. Grace & Co. May 14, 1999.

GeoTrans Inc. 2003. *Operable Unit Three Monitoring Program Report, 2002,* W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts, prepared for W.R. Grace & Co. March 28, 2003.

GeoTrans Inc. 2004. *Operable Unit Three Monitoring Program Report, 2003,* W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts, prepared for W.R. Grace & Co. May 4, 2004.

HSI GeoTrans, 1998. *Initial Site Characterization Report - Operable Unit Three*. W.R. Grace Superfund Site, Acton, Massachusetts, prepared for W.R. Grace & Co. August 12, 1998.

HSI GeoTrans, 1999. *Proposed Revision of Groundwater Monitoring Programs.* W.R. Grace Superfund Site, Acton, Massachusetts, prepared for W.R. Grace & Co. March 9, 1999.

O&M Inc. 2003. Aquifer Restoration System Operations Report, January 2002 through December 2002, W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts. February, 2003.

O&M Inc. 2004. Aquifer Restoration System Operations Report, January 2003 through December 2003, W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts. February, 2004.

Sample, BE., and D.M. Opresko, G.W. Suter II. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. Prepared for U.S. Department of Energy. ES/ER/TM-86/R3. June 1996.

Sullivan Design and Construction Management (DCM), P.C. 2001. Landfill Gas Emission Monitoring and Request to Begin Passive Monitoring. W.R. Grace Landfill, Acton, Massachusetts. August 2001.

Sullivan Design and Construction Management (DCM), P.C. 2001. Flow Measurements of Passive Perimeter Wells and Proposed Monitoring of Landfill Gas Emissions. W.R. Grace Landfill, Acton, Massachusetts. May 2001.

Sullivan Design and Construction Management (DCM), P.C. 2004. March 2004 Landfill Gas Emission Monitoring. W.R. Grace Landfill, Acton, Massachusetts. April 18, 2004.

United States Environmental Protection Agency (USEPA). 1988. Record of Decision, September 1988.

United States Environmental Protection Agency (USEPA). 1989. Risk Analysis of the W.R. Grace Site, Acton, Massachusetts. June 30, 1989.

United States Environmental Protection Agency (USEPA). 1989. Record of Decision, W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts. September 29, 1989

U. S. Environmental Protection Agency (USEPA), 1991. *Structure and Components of Five-Year Reviews*. OSWER Directive 9355.7-02. May 23, 1991.

United States Environmental Protection Agency (USEPA). 1999. Five Year Review, W.R. Grace (Acton Plant) Superfund Site, Acton, Massachusetts. September 1999.

United States Environmental Protection Agency (USEPA). 2001. *Comprehensive Five-Year Review Guidance*. June 2001.

United States Environmental Protection Agency (USEPA). 2000. *Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups*. EPA 540-F-005. September 2000.

U.S. Environmental Protection Agency (USEPA). 2003. ECO-SSL - Ecological Soil Screening Levels (for various compounds), Office of Emergency and Remedial Response, Washington, DC: November, 2003.

U. S. Environmental Protection Agency (USEPA), 2002. *Preliminary Remediation Goals.* U.S. EPA Region 9. October 2002.

U. S. Environmental Protection Agency (USEPA), 2004. *Integrated Risk Information System (IRIS)*. On-line Database. August 2004.

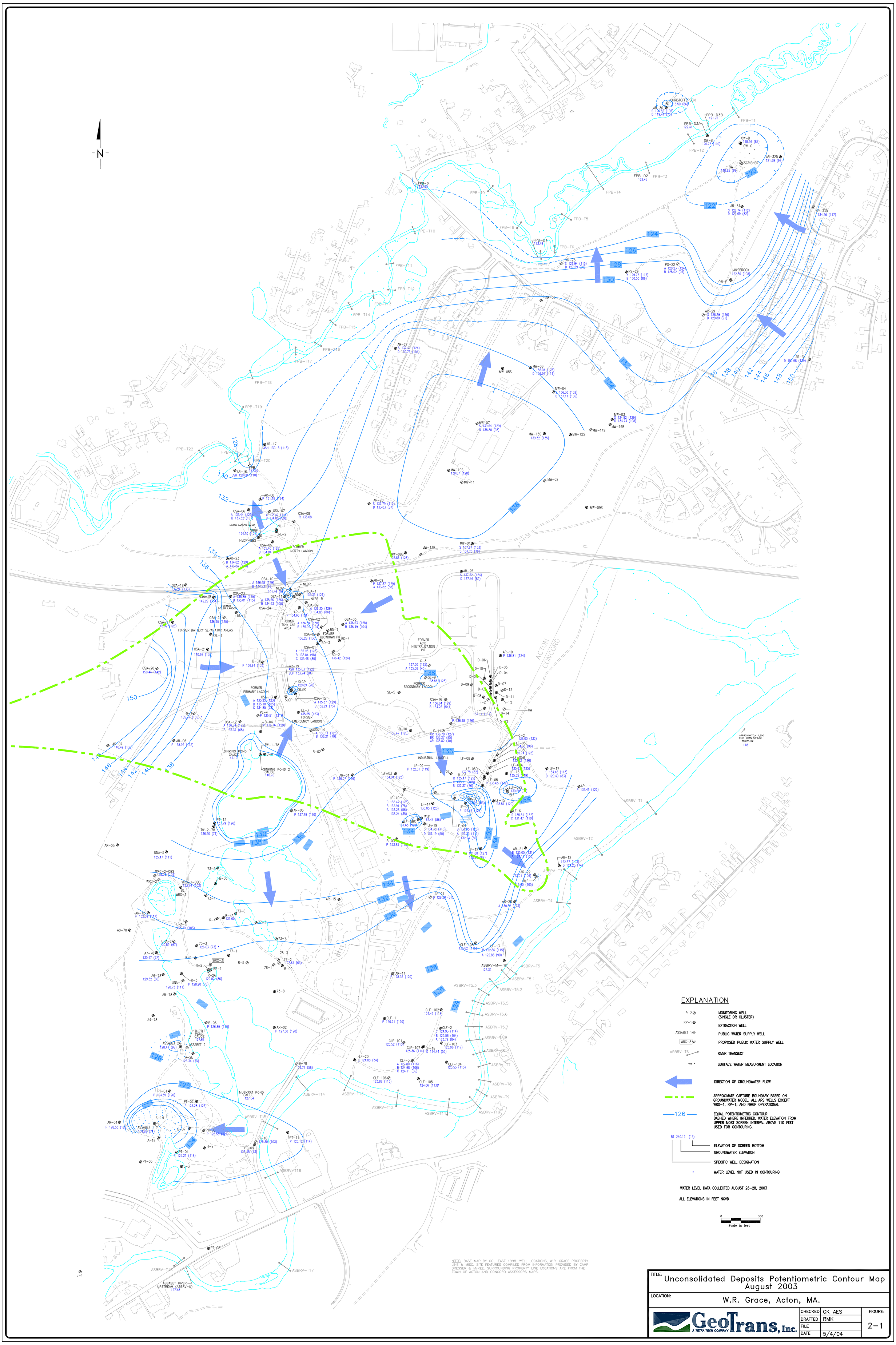
U.S. Environmental Protection Agency (USEPA). 2002. Letter from Derrick S. Golden, EPA Remedial Project Manager, to Maryellen Johns, Remedium Group, Inc., Re: The Thermal Oxidation Unit on the Industrial Landfill at the W.R. Grace Superfund Site - Acton, Massachusetts. October 31, 2002.

ATTACHMENT 3

Selected Figures from: *Operable Unit Three Monitoring Program Report, 2003*
(GeoTrans, Inc. 2004)

Unconsolidated Deposits Potentiometric Contour Map, August 2003
Bedrock Potentiometric Contour Map, August 2003
Distribution of VDC in Groundwater, Fall 2003
Distribution of Vinyl Chloride in Groundwater, Fall 2003
Distribution of Benzene in Groundwater, Fall 2003

G:\WRG-ACT_2004\03-04WRK\WL-ob-Fall03-D.dwg, GeoTrans, Inc.



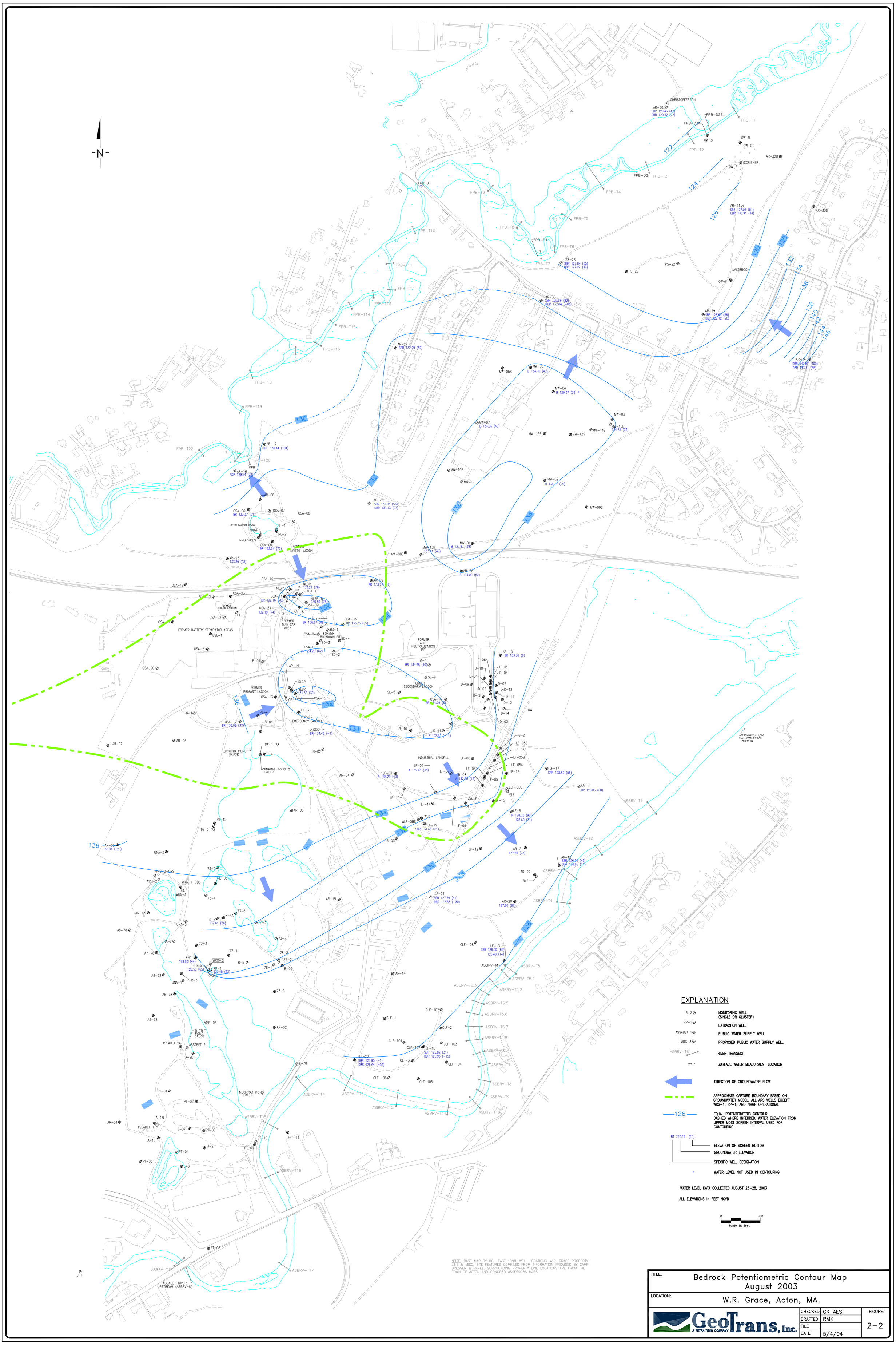
TITLE: Unconsolidated Deposits Potentiometric Contour Map August 2003

LOCATION: W.R. Grace, Acton, MA.

GeoTrans, Inc. A TETRA TECH COMPANY

CHECKED	GK AES	FIGURE:
DRAFTED	RMK	2-1
FILE		
DATE	5/4/04	

G:\WRG-ACT_2004\03-04WRK\WL-Br-Fall03-D.dwg, GeoTrans, Inc.



TITLE: Bedrock Potentiometric Contour Map August 2003

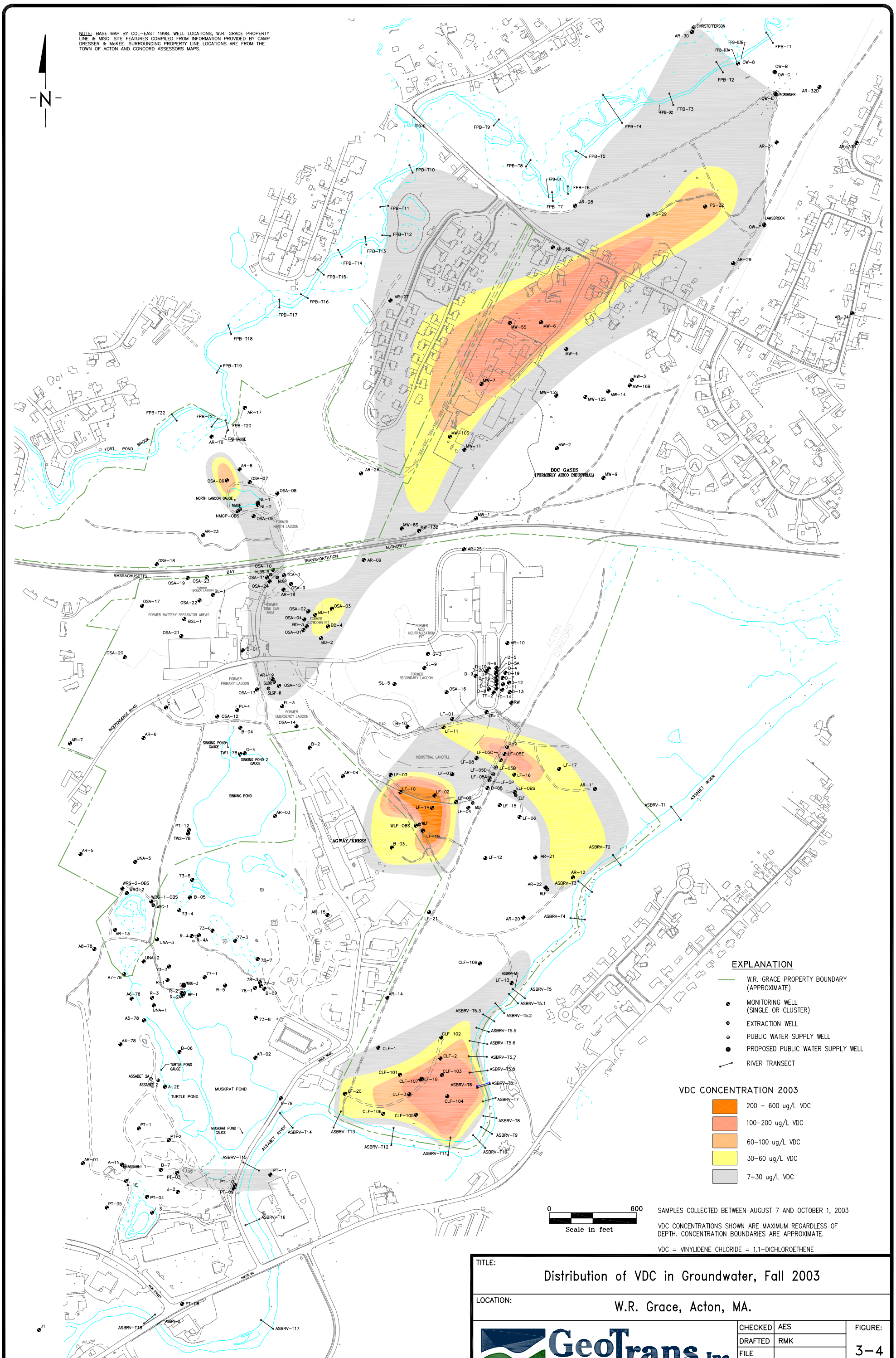
LOCATION: W.R. Grace, Acton, MA.

GeoTrans, Inc. A TETRA TECH COMPANY

CHECKED	GK AES
DRAFTED	RMK
FILE	
DATE	5/4/04

FIGURE: 2-2

G:\WRG-ACT_2004\03-04WRK\Aug03-VDC-B-2.dwg, GeoTrans, Inc.



SAMPLES COLLECTED BETWEEN AUGUST 7 AND OCTOBER 1, 2003

VDC CONCENTRATIONS SHOWN ARE MAXIMUM REGARDLESS OF DEPTH. CONCENTRATION BOUNDARIES ARE APPROXIMATE.

VDC = VINYLIDENE CHLORIDE = 1.1-DICHLOROETHENE

TITLE: Distribution of VDC in Groundwater, Fall 2003

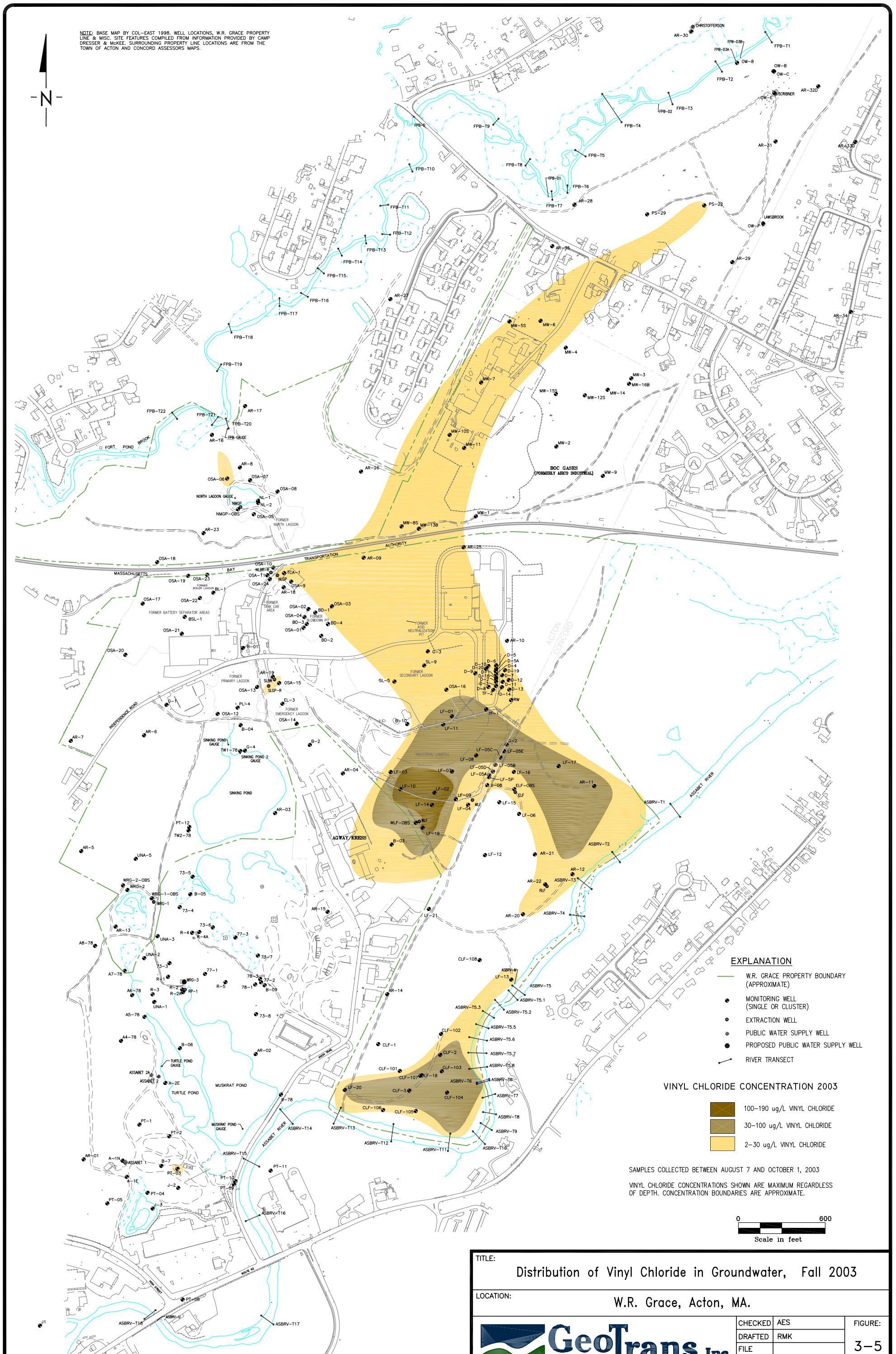
LOCATION: W.R. Grace, Acton, MA.

GeoTrans, Inc. A TETRA TECH COMPANY

CHECKED	AES
DRAFTED	RMK
FILE	
DATE	5/4/04

FIGURE: 3-4

G:\WRG-ACT_2004\03-04WRK\Aug03-VinClr-B-2.dwg, GeoTrans, Inc.



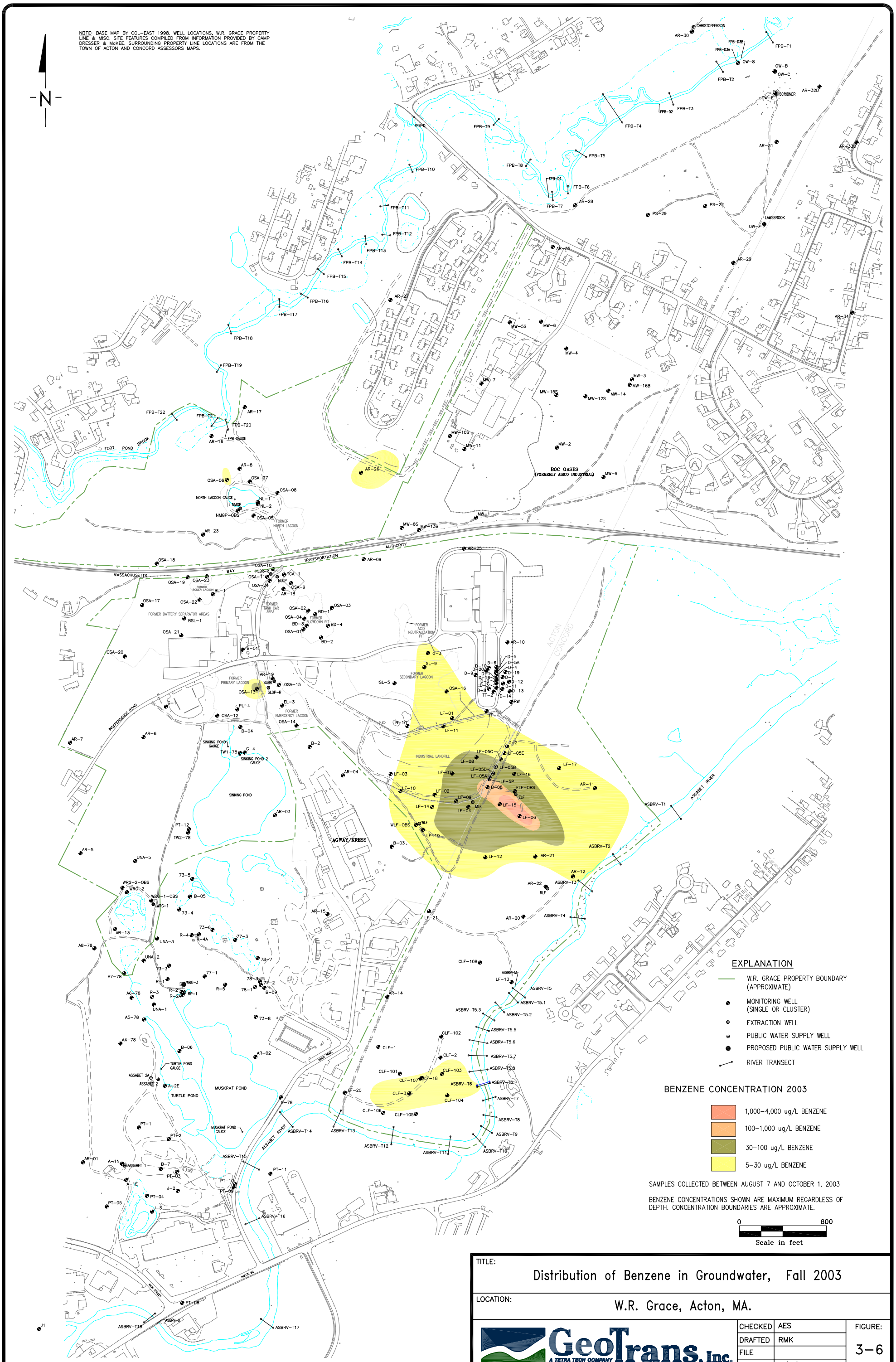
TITLE: Distribution of Vinyl Chloride in Groundwater, Fall 2003

LOCATION: W.R. Grace, Acton, MA.

GeoTrans, Inc. A TETRA TECH COMPANY

CHECKED	AES	FIGURE:
DRAFTED	RMK	3-5
FILE		
DATE	5/4/04	

G:\WRG-ACT_2004\03-04WRK\Aug03-Benz-B.dwg, GeoTrans, Inc.



TITLE: Distribution of Benzene in Groundwater, Fall 2003

LOCATION: W.R. Grace, Acton, MA.

GeoTrans, Inc. A TETRA TECH COMPANY

CHECKED	AES	FIGURE:
DRAFTED	RMK	3-6
FILE		
DATE	5/4/04	

ATTACHMENT 4
INTERVIEW RECORD FORMS

INTERVIEW DOCUMENTATION FORM

The following is a list of individuals interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Jane Ceraso	Environmental Manager	Acton Water District	August 19, 2004
Maryellen Johns	Project Manager	Remedium - a subsidiary of W.R. Grace	August 30, 2004
Peter Davis	Operator	O&M, Inc. (contractor for W.R. Grace)	August 30, 2004
Doug Halley	Health Director	Acton Health Department	September 2, 2004
Michael Moore	Health Director	Concord Health Department	September 3, 2004
Mary Michelman	President	Acton Citizens for Environmental Safety	September 2, 2004

INTERVIEW RECORD

Site Name: W. R. Grace (Acton Plant), Acton & Concord, MA	**EPA ID No.:** MAD001002252	
Subject: Five Year Review	**Time:** 2 pm	**Date:** 8/19/04
Type: ¾ Telephone V Visit V Other **Location of Visit:** Not applicable	V Incoming ¾ Outgoing	

Contact Made By:

Name: Barbara Weir	**Title: Project Manager**	**Organization: M&E**

Individual Contacted:

Name: Jane Ceraso	**Title: Environmental Manager**	**Organization: Acton Water District**

Telephone No: 978-263-9107 **Fax No: 978-264-0148** **E-Mail Address: JCeraso@Actonh2o.com**	**Street Address: 693 Massachusetts Avenue** **City, State, Zip: PO Box 953, Acton, MA 01720**

Summary Of Conversation

1. What is your overall impression of the project? (general sentiment). **There has been good progress made; the site is definitely cleaner now. It has taken awhile to get there and all perhaps wish the cleanup would move faster, but overall, Jane is happy with the progress that has taken place.**

2. What effects have site operations had on the surrounding community? **Currently, the only effect Jane has noticed is that there are occasional complaints about odor from the ARS.**

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. **The greatest concerns Jane has encountered are for people outside of Acton who are considering buying a home near the site. She receives calls from prospective home buyers fairly often, who want to learn about the site and possible water quality impacts. She has a packet of information she supplies when she receives such inquiries (fact sheets and such), that some people may find hard to digest. She thinks that it might be worthwhile to develop a flyer for people new to Acton, or potential home buyers, that provides some background and possibly the most frequently asked questions with answers.**

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
Trespassing occurs fairly frequently on the AWD-owned land bordering the Grace property and impacted by the plume (All Terrain Vehicles and such, mostly around the School Street wellfield). AWD has barriers in place but it is nearly impossible to keep trespassers out.

5. Do you feel well informed about the site's activities and progress?
Jane feels she is well informed.

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
Keep doing the level of public involvement that is currently practiced. Her perception is that people are more comfortable about site progress if they are kept informed. Making technical documents as readable as possible is important.

INTERVIEW RECORD

Site Name: W. R. Grace (Acton Plant), Acton & Concord, MA	**EPA ID No.:** MAD001002252	
Subject: Five Year Review	**Time:** 1 pm	**Date:** 8/30/04
Type: V Telephone ¾ Visit V Other **Location of Visit:** W.R. Grace (Acton plant) site	V Incoming V Outgoing	

Contact Made By:

Name: Barbara Weir	**Title: Project Manager**	**Organization: M&E**

Individual Contacted:

Name: Maryellen Johns/ Peter Davis	**Title: Project Manager/ O&M contractor**	**Organization: Remedium Group/ O&M, Inc.**

For Maryellen Johns **Telephone No: 617-498-2668** **Fax No: 617-498-2677** **E-Mail Address: Maryellen.Johns@grace.com**	**For Maryellen Johns** **Street Address: 62 Whittemore Avenue** **City, State, Zip: Cambridge, MA 02140**

Summary Of Conversation

1. What is your overall impression of the project? (general sentiment) **It is moving along well, although overall costs for OU-1 are high.**
2. Is the remedy functioning as expected? How well is the remedy performing? **It is functioning well and as expected.**
3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? **Groundwater data show decreasing trends and shrinking of the plume.**
4. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? Please describe changes and impacts. **For the Industrial Landfill, passive venting is now in place (with EPA approval) and the thermal oxidizer is off line. Gas monitoring will move to an annual schedule starting in September 2004. O&M for the landfill now includes more frequent mowing, removal of cattails, and spraying to reduce weeds.**
5. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details. **There have been minor difficulties but none that are unusual or unexpected.**
6. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency. **See item 4 - going to passive venting and no thermal oxidizer, and more frequent weeding, have reduced costs. Gas sampling will go to an annual basis soon which is also a cost savings.**
7. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. **Vandalism and trespassing are frequent occurrences. The ARS treatment area and site trailer are now surrounded by a fence with razor wire which has protected that area; previously the trailer and porta john had been vandalized. Signs around the site perimeter don't last long (vandalized or stolen). Grace occasionally hires a police detail to patrol the site to try to discourage trespassing. Hunters and walkers enter the property and people walk along the MBTA tracks. Grace contacts the Acton police when incidents are noted. People trespass the Concord property also. Trespassers do not get onto the Industrial Landfill (it is completely fenced); but do access other parts of the property despite Grace efforts.**
8. Do you have any comments, suggestions, or recommendations regarding the project? **No.**

INTERVIEW RECORD

Site Name: W. R. Grace (Acton Plant), Acton & Concord, MA	**EPA ID No.:** MAD001002252	
Subject: Five Year Review	**Time:** 1 pm	**Date:** 9/2/04
Type: ¾ Telephone V Visit V Other **Location of Visit:** Not applicable	V Incoming ¾ Outgoing	

Contact Made By:

Name: Barbara Weir	**Title: Project Manager**	**Organization: M&E**

Individual Contacted:

Name: Doug Halley	**Title: Health Director**	**Organization: Acton Health Department**

Telephone No: 978-264-9634 **Fax No: 978-264-9630** **E-Mail Address: dhalley@town.acton.ma.us**	**Street Address: 472 Main Street** **City, State, Zip: Acton, MA 01720**

Summary Of Conversation

1. What is your overall impression of the project? (general sentiment)
   Doug's overall impression is positive. Some things could perhaps have been performed more quickly or a bit differently, but project goals are being attained.
2. What effects have site operations had on the surrounding community? Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   In a way, Doug feels the site has had a positive effect. Before the site was discovered the town was not a good caretaker of its water resources. The discovery of the site and the potential risk of losing its water supply led the town to take action to protect its water resources. From a public health perspective, the increased concern about protecting water resources has been a positive development.
3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   Doug is tangentially aware of the fact that people walk on the Grace site, but his perception is that it is mostly inadvertent trespassing.
4. Do you feel well informed about the site's activities and progress?
   Doug feels he is well informed. The difficulty he encounters is how to inform others, particularly those new to the area. Doug often receives questions about the site from potential home buyers or people new to the area. Housing turns over roughly every 9 years, so many Acton residents were not around when the site was discovered, the first ROD was written, etc. The information available about the site is very extensive and it is difficult to explain it to people concisely without leaving out important elements. It would be nice to have "one piece of paper" that explains key elements of the site for people, although he realizes that it would be very difficult to explain the site simply enough to fit on one piece of paper, without being overly simplistic.
5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? **A simple overall fact sheet about the site might be helpful (see Item 4). In Doug's view, the major goals should be to 1) clean up the site, and 2) to communicate with the community so that when the cleanup is completed, the community will be confident that the site is cleaned up appropriately. Building trust with the community is as important as the cleanup itself, Doug feels. He thinks that ACES has a major role and that the community will support a cleanup that has ACES support.**

INTERVIEW RECORD

Site Name: W. R. Grace (Acton Plant), Acton & Concord, MA	**EPA ID No.:** MAD001002252	
Subject: Five Year Review	**Time:** 1 pm	**Date:** 9/2/04
Type: ¾ Telephone V Visit V Other **Location of Visit:** Not applicable	V Incoming ¾ Outgoing	

Contact Made By:		
Name: Barbara Weir	**Title: Project Manager**	**Organization: M&E**

Individual Contacted:		
Name: Mary Michelman	**Title: President**	**Organization: Acton Citizens for Environmental Safety**

Telephone No: 978-263-7370 **Fax No:** **E-Mail Address: MSMichelman@cs.com**	**Street Address:** **City, State, Zip:**

Summary Of Conversation

NOTE: Ms. Michelman circulated a list of 5 year review questions to the ACES membership in preparation for this telephone interview, and the responses reflect a compilation of the input she received.

1. What effects have site operations had on the surrounding community? Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. **ACES commonly receives questions from prospective home buyers and also people who have lived in the town for various lengths of time. Questions from residents come after a newspaper article or event related to the site (e.g. Earth Day, public well moratorium hearing) or may be out of the blue. People typically ask "I thought the site was cleaned up; what is going on now?" while potential home buyers are concerned about buying near a Superfund site. Awareness is growing as the site approaches the feasibility study for OU3. People are referred to sources of information such as the ACES web site, site repository (library), town health director, Acton Water District, and EPA project manager.**
2. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. **ACES members hear complaints about odors from time to time. People have expressed concern about air emissions from the ARS being a possible health risk (Mary mentioned that this question was brought up at the meeting held by ATSDR in October 2003). It is common knowledge that people trespass the site - walkers and kids on dirt bikes. ACES is concerned about potential health impacts to kids playing on the site, and would like to see greater security to prevent this until cleanup is complete. ACES wants cleanup to meet residential standards; this would eliminate the concern about trespasser exposure. People are also concerned about the water quality in Sinking Pond.**
3. Do you feel well informed about the site's activities and progress? **Yes. ACES helps to keep people informed, along with the town and EPA. There is a lot of material available and people who want to become informed can do so, although the material is not all "user-friendly." It would be good if ACES and the town could get more copies of the "Community Updates" to hand out to people. Mary thinks these updates are very useful and informative, and not biased. She would be concerned that a flyer tailored to potential home buyers might be too simplistic. ACES has put the more recent Community Updates on their web page, http://www.actonaces.org. The EPA website is hard to navigate for people.**
4. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? **Mary has heard from a number of people that they feel the timing of major activities, such as this five year review and releases of major documents, is not good because so many people vacation in August. It limits who can participate and can create an impression that their input is not really that important. If possible it would be better to have public meetings and requests for public comment take place at a different time of year; April might be a good time.**

INTERVIEW RECORD

Site Name: W. R. Grace (Acton Plant), Acton & Concord, MA	**EPA ID No.:** MAD001002252	
Subject: Five Year Review	**Time:** 10 am	**Date:** 9/3/04
Type: ¾ Telephone V Visit V Other **Location of Visit:** Not applicable	V Incoming ¾ Outgoing	

Contact Made By:		
Name: Barbara Weir	**Title: Project Manager**	**Organization: M&E**

Individual Contacted:		
Name: Michael Moore	**Title: Public Health Administrator**	**Organization: Concord Board of Health**

Telephone No: 978-318-3275 **Fax No: 978-318-3281** **E-Mail Address: mmoore@concordnet.org**	**Street Address: 141 Keyes Road** **City, State, Zip: Concord, MA 01742**

Summary Of Conversation

1. What is your overall impression of the project (general sentiment)? **Mike has limited involvement with the site now. He has not received any complaints from Concord residents since he started in 1992. It is possible that Concord residents with complaints may call Acton Health Department instead since most of the site is in Acton. He gets calls from people thinking about buying or selling homes, but most questions are about other Superfund sites (e.g. Nuclear Metals). He sometimes refers questions about the Grace site to Doug Halley, Acton Health Director.**

2. What effects have site operations had on the surrounding community? Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. **People trying to sell homes have expressed concern about the Grace site plume possibly moving into Concord. When Grace's consultant was trying to locate some wells in Concord to check for this, people in those neighborhoods were concerned and did not want monitoring wells on their property or in front of their homes. Mike would be interested to know if the wells in Concord will be monitored in the future, and how those results might be made available. People selling homes there may need to disclose the presence of the wells and any available data to potential buyers, he felt. He is also curious if the Superfund sites in the area have affected home prices. Concord has no plans to establish a private well moratorium the way Acton has.**

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. **Not aware of any incidents.**

4. Do you feel well informed about the site's activities and progress? **Yes, Mike feels well informed and knows how to obtain additional information if he needs it.**

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? **Mike thinks that information on the site should be kept current and available via an easy-to-use web site. We discussed the ACES website, and its posting of the Community Updates (site fact sheets), and he is going to refer people to it. We discussed that Doug, Jane and Mary had similar suggestions on the need for continued communication with the community and potential home buyers.**

ATTACHMENT 5
ARARS REVIEW

TABLE A5-1. CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
W.R. GRACE SUPERFUND SITE - ACTON AND CONCORD, MASSACHUSETTS

ARARs	REQUIREMENTS	REQUIREMENT SYNOPSIS AND APPLICATION FOR THE RI/FS	FIVE YEAR REVIEW
Federal Regulatory Requirements	SDWA - Maximum Contaminant Levels (MCLs) (40 CFR 141.11 - 141.16)	MCLs have been promulgated for a number of organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water. MCLs for indicator compounds were used as target cleanup levels for groundwater under each waste area. Attaining soil cleanup goals was expected to ensure that any future migration of residual contaminants in the soil will not cause exceedances of MCLs in groundwater under each waste area.	MCLs are still exceeded in groundwater at many site locations. This is being evaluated as part of OU-3. ARS air stripping tower effluent standards also utilize MCLs. Note that the arsenic MCL utilized in data reports is still listed as 50 ug/L. The MCL is currently 10 ug/L and would be exceeded by most of the effluent samples collected over the past few years. Soil cleanup goals were met during the OU-1 source control remedy.
State Regulatory Requirements	Massachusetts Drinking Water Regulations (310 CMR 22.00)	Establishes MCLs for drinking water supplies, as the federal MCLs. State drinking water standards are the same as the federal MCLs that were used.	See above. The state MCL for arsenic will be lowered to 10 ug/L, effective in February 2006.
	Massachusetts Groundwater Quality Standards (314 CMR 6.00)	Establishes minimum groundwater quality criteria. Similar to MCLs, groundwater quality criteria were expected to be attained by reducing residual soil contaminants to the Soil Cleanup Goals.	Soil cleanup goals were met during the OU-1 source control remedy. Groundwater quality criteria attainment will be evaluated as part of OU-3.

TABLE A5-2. ACTION-SPECIFIC ARARS
W.R. GRACE SUPERFUND SITE - ACTON AND CONCORD, MASSACHUSETTS

ARARs	REQUIREMENTS	ORIGINAL STATUS	REQUIREMENT SYNOPSIS AND APPLICATION FOR THE RI/FS	FIVE YEAR REVIEW
Federal Regulatory Requirements	Clean Air Act - National Air Quality Standards for Total Suspended Particulates (40 CFR 50.6)	Applicable	This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter. These standards were to be met during excavation and cap construction.	These requirements are not ARARs per se, but are implemented through the State implementation requirements.
	OSHA - Worker Safety Regulations (29 CFR 1926)	Applicable	This regulation specifies the type of safety equipment, training and procedures to be followed during construction of the remedy. These regulations were applicable during construction of the selected remedy.	The OSHA rules are not ARARs per se, but they are worker safety rules that must always be complied with during operations, maintenance, and monitoring activities at the site.
	Protection of Archaeological Resources (32 CFR 229.4)	Applicable	This provides procedures for the protection of archaeological resources. If any of these resources are found during soil excavation, work would stop until the area has been reviewed by federal and state archaeologists. Research performed prior to remedy construction suggested that none would be found at this site.	No archaeological resources were found during remedy implementation.
	DOT Rules for the Transportation of Hazardous Materials (49 CFR 107, 171.1 - 171.500)	Applicable	This regulation outlines procedures for the packaging, labeling, manifesting, and transport of hazardous materials. Any shipments to and from the site during the remedy are to comply with these rules.	DOT rules are not ARARs because they regulate off-site activities. However, DOT rules must always be complied with for off-site shipments.

TABLE A5-2 (Continued). ACTION-SPECIFIC ARARS
W.R. GRACE SUPERFUND SITE - ACTON AND CONCORD, MASSACHUSETTS

ARARs	REQUIREMENTS	ORIGINAL STATUS	REQUIREMENT SYNOPSIS AND APPLICATION FOR THE RI/FS	FIVE YEAR REVIEW
State Regulatory Requirements	Massachusetts Standards for Owners and Operators of Permitted Hazardous Waste Facilities (310 CMR 30.510-516)	Relevant and Appropriate	This regulation provides general facility requirements for waste analysis, security measures, inspections, and training requirements. The Industrial Landfill was constructed and is operated in accordance with these requirements.	These requirements remain relevant and appropriate and are being complied with.
	Contingency Plan, Emergency Procedures, Preparedness and Prevention (310 CMR 30.520-524)	Relevant and Appropriate	This regulation outlines the requirements for emergency procedures to be used following explosions and fires, as well as safety equipment and spill-control requirements. This regulation also requires that threats to public health and the environment be minimized.	These requirements remain relevant and appropriate and are being complied with.
	Massachusetts Manifesting, Recordkeeping, and Reporting (310 CMR 30.530-545)	Relevant and Appropriate	Requires manifesting hazardous waste shipped off-site for disposal. Any off-site shipments of waste materials were to be manifested.	These requirements are not ARARs, as they are considered off-site requirements.
	Massachusetts Closure and Post-closure (310 CMR 30.580-595)	Relevant and Appropriate	This requirement details the specific requirements for closure and post-closure of hazardous waste facilities. The landfill cap was constructed in accordance with these requirements except for inclusion of a double liner and leachate collection system, which are not appropriate for this Site.	These requirements remain relevant and appropriate. Post-closure operations, maintenance and monitoring are currently being performed in accordance with the Post Closure Operations and Maintenance Plan. The landfill closure was designed to meet RCRA requirements for landfill closure.

TABLE A5-2 (Continued). ACTION-SPECIFIC ARARS
W.R. GRACE SUPERFUND SITE - ACTON AND CONCORD, MASSACHUSETTS

ARARs	REQUIREMENTS	ORIGINAL STATUS	REQUIREMENT SYNOPSIS AND APPLICATION FOR THE RI/FS	FIVE YEAR REVIEW
State Regulatory Requirements (continued)	Massachusetts - Landfills (310 CMR 30.620-633)	Relevant and Appropriate	Establishes requirements for construction, operation, monitoring, and maintenance of hazardous waste landfills. The landfill cap was constructed in accordance with these requirements except for inclusion of a double liner and leachate collection system, which are not appropriate for this Site. Operations and maintenance have also been performed in accordance with these requirements.	These requirements remain relevant and appropriate. The landfill closure was designed to meet the requirements for landfill closure. Post-closure operations, maintenance and monitoring are currently being performed in accordance with the Post Closure Operations and Maintenance Plan.
	Massachusetts Groundwater Protection (310 CMR 30.660-675)	Relevant and Appropriate	Provides performance requirements for a groundwater monitoring network, and standards for a monitoring program and sample analysis. Groundwater at each disposal area is monitored to determine the effectiveness of the remedial measures; a groundwater monitoring program is already implemented as part of the ARS.	Monitoring activities continue at the site. These regulations are still relevant and appropriate.
	Massachusetts Ambient Air Quality Standards (310 CMR 6.00) and Air Quality Control Regulations (310 CMR 7.00)	Applicable	Establishes primary and secondary standards for emissions of dust and odor from construction and remedial activities. Particulate emissions during excavation and solidification activities were performed to meet the requirements. Odor emissions from the groundwater treatment air stripper are controlled with Best Available Control Technology (BACT). A gas control system utilizing BACT was installed during landfill cap construction to control emissions.	These requirements remain applicable. Landfill gas control and groundwater treatment using air stripping are still performed.

TABLE A5-2 (Continued). ACTION-SPECIFIC ARARS
W.R. GRACE SUPERFUND SITE - ACTON AND CONCORD, MASSACHUSETTS

ARARs	REQUIREMENTS	ORIGINAL STATUS	REQUIREMENT SYNOPSIS AND APPLICATION FOR THE RI/FS	FIVE YEAR REVIEW
State Regulatory Requirements (continued)	Massachusetts Sanitary Landfill Regulations (310 CMR 19.00)	Applicable	This regulation outlines the requirements for closure of solid waste landfills. The Battery Separator Area chip piles were to be closed as a solid waste landfill with, among other things, an intermediate cover consisting of impervious material or flexible membrane which prevents the percolation of surface or rain water.	These requirements are no longer applicable. These requirements would have applied to capping of the Battery Separator Area chip piles, which was part of the OU-1 ROD-specified remedy. However, the chips were actually excavated and placed in the Industrial Landfill.