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RECORD OF DECISION AMENDMENT
FOR
UNION CHEMICAL COMPANY SUPERFUND SITE
HOPE, MAINE

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 1

NOVEMBER 2013

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RECORD OF DECISION AMENDMENT
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List of Abbreviations

1,1- DCA:	1,1-dichloroethane
1,1-DCE:	1,1-dichloroethene
1,2-DCA:	1,2-dichloroethane
1990 ROD:	1990 EPA Record of Decision
2013 AROD:	2013 Record of Decision Amendment
µg/g:	Micrograms per gram or parts per million
µg/ℓ:	Micrograms per liter or parts per billion
bgs:	below ground surface
CERCLA:	Comprehensive Environmental Response, Compensation, and Liability Act
CFR:	Code of Federal Regulations
cis-DCE	cis 1,2-dichloroethene
COC:	Contaminant of Concern
DMF:	Dimethylformamide
EPA:	Environmental Protection Agency
GPTS:	Groundwater Pump-and-Treat System
HCCE:	Hope Committee for a Clean Environment
NCP:	National Contingency Plan
O&M:	Operation and Maintenance
OSRR:	EPA Region 1, Office of Site Remediation and Restoration
TCA:	1,1,1-trichloroethane
TCE:	Trichloroethene
TI:	Technical Impracticability
VC:	Vinyl Chloride
VOC:	Volatile Organic Compound

PART ONE: DECLARATION FOR THE RECORD OF DECISION AMENDMENT

SITE NAME AND LOCATION

Union Chemical Company Superfund Site, Knox County, Hope, Maine 04847
EPA Site ID #: MED042143883, Operable Unit 1

STATEMENT OF BASIS AND PURPOSE

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

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

The State of Maine concurs with the selected remedy.

RATIONALE FOR AMENDMENT

In a 1990 Record of Decision (1990 ROD) with the concurrence of Maine Department of Environmental Protection (MEDEP), EPA selected a comprehensive remedy for the Site that addressed contaminated groundwater, contaminated soils and facility structures and materials. Following pre-design work that resulted in a change in the approach for the contaminated soils, the remedy began in 1993 with the demolition and off-site disposal of the structures and materials. In 1994, contaminated Site soils were consolidated into a contiguous area, which was then capped. In the fall of 1995, construction was completed of a soil vapor extraction system enhanced with hot air injection and a groundwater pump and aboveground treatment (pump-and-treat) system. Start-up of these remediation systems began in January 1996.

Cleanup levels were attained for Site soils in 1998. Between 1997 and 2000, the groundwater pump-and-treat system was augmented with the *in-situ* application of permanganate. With groundwater contaminant recovery decreasing and contamination levels approaching an asymptote, the groundwater pump-and-treat system was turned off in December 2000. Two additional *in-situ* technologies were implemented in 2001-2002 and 2005, but with only limited success.

These cleanup efforts from 1996 through 2000 removed about 8,550 pounds of volatile organic compounds (VOCs) from the unsaturated soil and about 950 pounds from the groundwater. Despite these cleanup results, however, it was estimated that approximately 420 pounds of VOCs remain adsorbed in the soil and bedrock or dissolved in the groundwater.

Consequently, an evaluation of the technical practicability of restoring the groundwater to drinking water standards was performed. In December 2009, the Conceptual Site Model Report was updated, providing an initial evaluation of the feasibility on any *in-situ* and *ex-situ* technologies to address the remaining groundwater contamination at the Site. In January 2011, a Technical Impracticability (TI) Evaluation Report was also completed. In addition to assessing the selected groundwater remedy, the TI Evaluation Report also reviewed other technologies for their potential to restore the groundwater. This TI Evaluation Report concluded, after an evaluation of cleanup alternatives, that no suitable technology is available for achieving groundwater cleanup standards in a reasonable timeframe due to Site-specific hydrogeological and contaminant conditions and it was, therefore, technically impracticable to restore the bedrock groundwater aquifer, the primary drinking water source for the community, to cleanup levels within a reasonable timeframe.

Based on the results of the updated Conceptual Site Model and TI Evaluation Report, EPA proposed an amendment to its 1990 ROD in a Proposed Plan, published on June 6, 2013. On June 20, 2013, EPA hosted a public meeting immediately followed by a public hearing about the Proposed Plan. In the Proposed Plan, EPA recommended that the original groundwater component of the Site remedy be amended by invoking a technical impracticability waiver of the requirement to meet federal and state groundwater cleanup standards, supported by measures to ensure that the amended cleanup approach continues to be protective of human health and the environment. These measures include long-term monitoring of the remaining contaminants in groundwater and institutional controls including an environmental deed restriction on the Site property. Operation and maintenance and Five-Year Reviews to assure that the amended cleanup approach remains effective continue unchanged.

Two comments were received during the public hearing, both of which supported EPA's proposed approach. No other comments were received during the public comment period.

ASSESSMENT OF THE SITE

The Union Chemical Company began operations in 1967 as a formulator of paint and coating strippers. In 1969, the company expanded its operations and began handling and recovering petrochemical-based solvents. Contamination at the Site resulted from a combination of leaking stored drums, spills and the use of a permitted septic system for disposal of the process wastewater. In 1984, MEDEP and EPA removed all surface drums, over 100,000 gallons of liquid wastes and sludge from aboveground storage tanks, and some contaminated soil from the Site.

The primary contaminants at the Site include trichloroethene (TCE) and its degradation products cis 1,2-dichloroethene (cis-DCE), 1,1-dichloroethane (1,1-DCA), and vinyl chloride (VC) as well as dimethylformamide (DMF).

The 12-acre Site consists of Lots 18 and 19 shown on the Town of Hope Tax Map 8. In 1986, Maine Superior Court placed these lots, formerly owned by the Union Chemical Company, in receivership with MEDEP. With the majority of the contamination removed from the Site, EPA and MEDEP have held discussions with the Town of Hope regarding reuse possibilities for the Site. Provided that appropriate land use deed restrictions are recorded and abided by future land owners, EPA believes that reuse will not create an unacceptable risk.

DESCRIPTION OF THE ROD AS AMENDED

This 2013 AROD changes only the groundwater remedy component of the 1990 ROD. All other components of the Site remedy are complete. The changes to the 1990 ROD are:

- The requirement for rapid restoration of contaminated groundwater throughout the entire Site through an active groundwater pump-and-treat system to attain groundwater cleanup levels within a reasonable timeframe is amended by invoking a technical impracticability waiver of the requirement to meet federal and state groundwater standards (identified as the federal Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs), Maine Primary Drinking Water Standards, and Maine Maximum Exposure Guidelines, (MEGs)) pursuant to CERCLA § 121(d)(4) because Site-specific hydrogeological and contaminant conditions limit the availability of an advantageous remedial technology. This waiver will be applied to the portion of the Site where groundwater contamination remains in the overburden and bedrock aquifers.

- Long-term monitoring, as required in the 1990 ROD, will be adjusted to support this technical impracticability waiver approach. Long-term monitoring will be used to track the location of groundwater contamination and ensure it remains within the TI Zone, and to track the continued reduction of toxicity and volume of contaminants through natural processes.

- Institutional controls, as required in the 1990 ROD, will be adjusted to support this technical impracticability approach by requiring: (A) an environmental deed restriction on the Site property to, at a minimum, (1) prohibit the use of groundwater, (2) ensure access for monitoring and oversight, (3) prohibit activities that interfere with the remedy and on-site monitoring equipment, and (4) require the application of appropriate vapor barrier or remediation technology in any future buildings on the Site property; and (B) an environmental deed restriction or other mechanism to limit the use of properties adjacent to the Site, as deemed necessary by EPA based on new information, including but not limited to the development of properties adjacent to the Site or movement of the leading edge of either plume.

Consistent with the 1990 ROD, the 2013 AROD will continue to require long-term operation and maintenance of the monitoring wells, and Five-Year Reviews.

This 2013 AROD will provide a comprehensive approach for this Site that addresses all current and potential future risks caused by the remaining groundwater contamination.

STATUTORY DETERMINATIONS

The selected remedy is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment; complies with or meets the requirements for a waiver of Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective; and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. The selected groundwater remedy no longer satisfies EPA's preference for treatment which permanently and significantly reduces the toxicity, mobility or volume of the hazardous substances as a principal element of the remedy.

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure (groundwater and land use restrictions are necessary until cleanup levels are met), EPA will continue to conduct a review every five years to ensure that the remedy continues to provide adequate protection of human health and the environment.

ROD AMENDMENT DATA CERTIFICATION CHECKLIST

The following information and relevant updates are included in the 2013 AROD. Additional information can be found in the Administrative Record for this Site.

1. Key factors that led to amending the original 1990 ROD
2. Remedial Action Objectives and cleanup criteria
3. Chemicals of concern (COCs) and their respective concentrations
4. Human health risk represented by the COCs
5. Cleanup levels established for COCs and the bases for the levels
6. Amended Remedy components
7. Estimated capital, operation and maintenance (O&M), and total present worth costs

AUTHORIZING SIGNATURES

The selected remedy documented in this 2013 AROD will replace the 1990 ROD selected remedy for the management of migration component at the Union Chemical Company Superfund Site in Hope, Maine. This remedy was selected by EPA with the concurrence of MEDEP.

U.S. Environmental Protection Agency

By: _____ **Date:** 11/27/13

James T. Owens III, Director
Office of Site Remediation and Restoration
U.S. EPA New England, Region 1

PART TWO: THE RECORD OF DECISION AMENDMENT – DECISION SUMMARY

A. INTRODUCTION TO THE SITE AND STATEMENT OF PURPOSE

SITE NAME: Union Chemical Company Superfund Site, EPA Site ID No. MED042143883

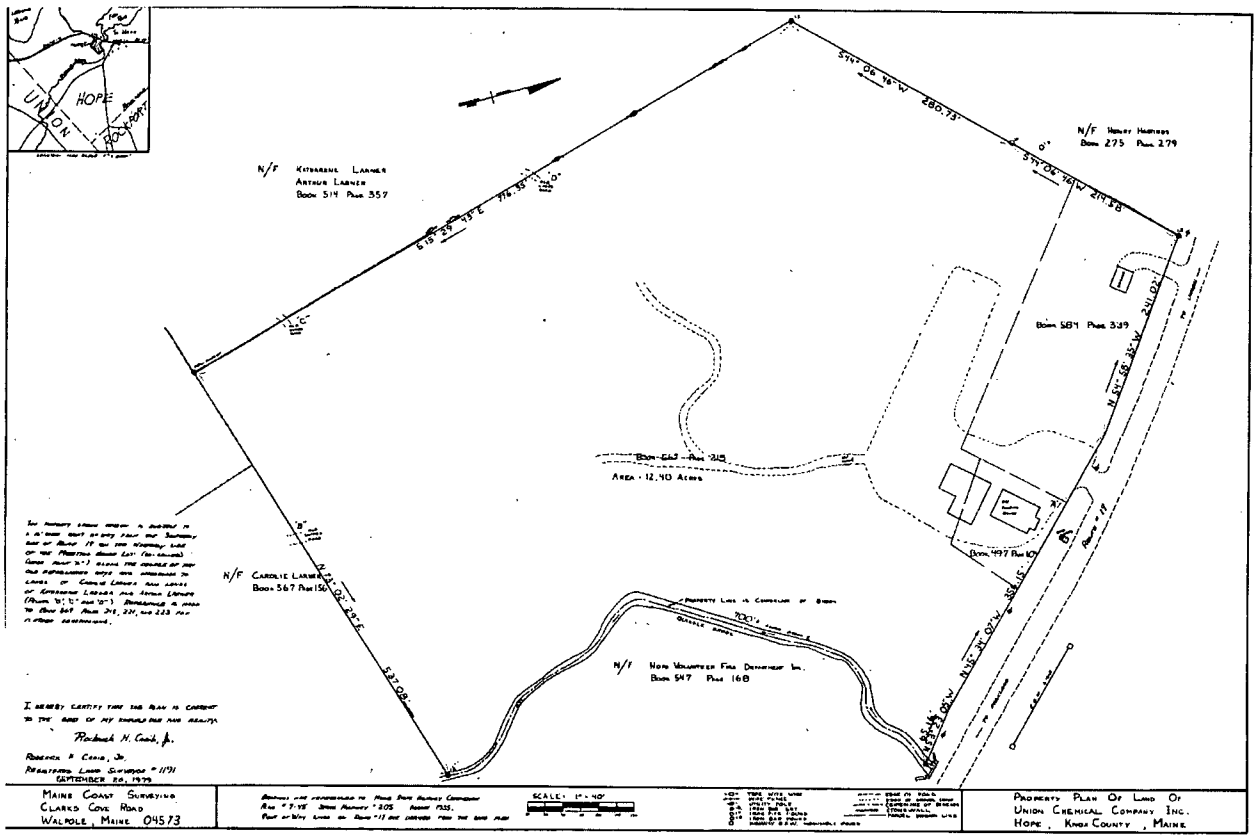
SITE LOCATION: The Union Chemical Company Superfund Site (the Site) is located on Route 17 in a rural residential area of Hope, Maine. The Site is bounded on the east and southeast by Quiggle Brook, a southerly flowing tributary to Crawford Pond, located approximately five miles south of the Site. Public water and sewer service are not available in the area surrounding the Site. Zoning in this area of Hope allows for some commercial use and there is a full-year business to the east of the Site and a seasonal business on the north side of Route 17. The closest water supply wells are located on the north side of Route 17 across from the Site entrance and are upgradient of the Site.

The State of Maine has classified Quiggle Brook as a Class B water (acceptable for fishing, recreation, habitat for fish and other aquatic life, and, after treatment, for drinking water) and Crawford Pond as GPA (suitable for use as drinking water after disinfection, recreation, fishing and habitat for fish and other aquatic life). The groundwater aquifer underlying the Site is classified by the State as GW-A, a drinking water source.

The location of the Site is shown on Figure 1 and the Site property is shown on Figure 2.

Figure 1: Site Location Map

Figure 2: Site Property



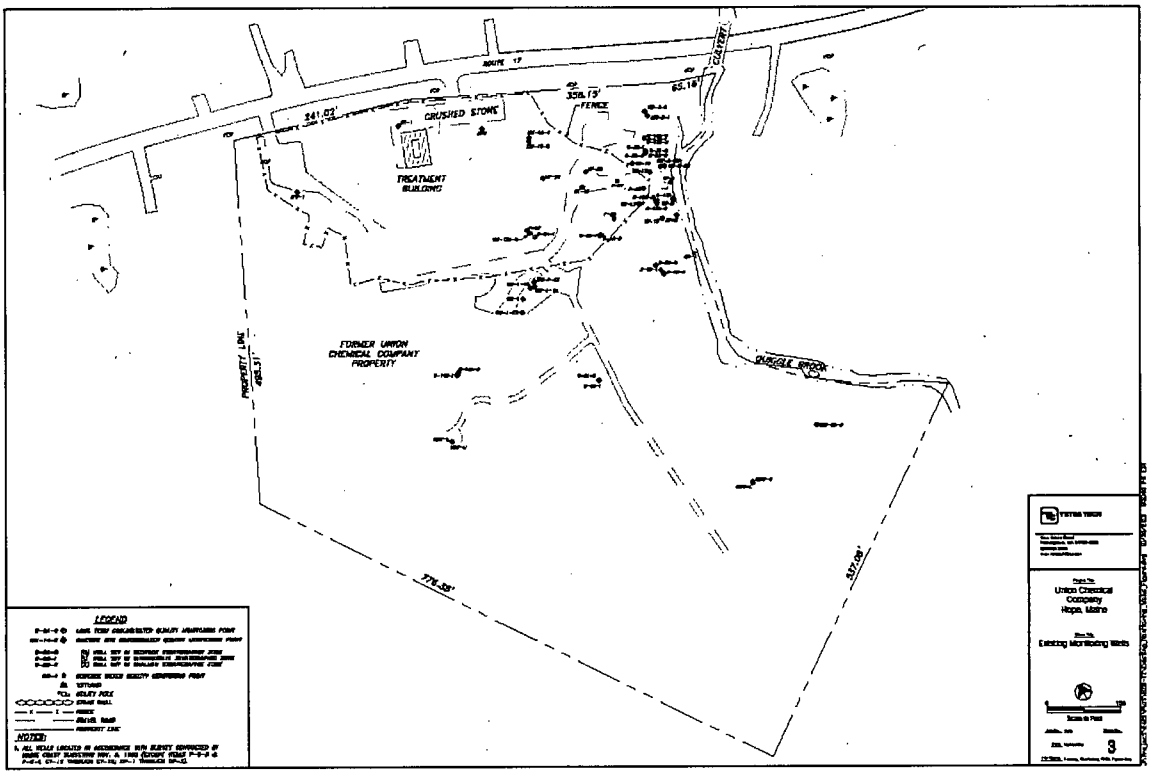
SITE DESCRIPTION: The Site consists of the former Union Chemical Company property, an approximately 12-acre parcel located on the south side of Route 17 in Hope, Maine. The facility's operations occurred in a two acre area on the northern portion of the parcel adjacent to Route 17. This area was the focus of the cleanup remedy that was the subject of the Record of Decision that was issued on December 27, 1990 for the Site, as modified by three subsequent Explanations of Significant Differences (the 1990 ROD[1]). The remainder of the property is primarily wooded upland with some wetlands along Quiggle Brook. A fence was constructed around the active cleanup area; portions of the fence were subsequently removed following the completion of the soil cleanup. The building that housed the treatment systems for the soil vapor system and groundwater extraction system remains on-site as do a number of groundwater extraction and monitoring wells.

[1] ESDs were issued in 1994, 1997, and 2000. The first ESD changed the cleanup approach for on-site soils from excavation and thermal treatment to *in-situ* soil vapor extraction. The second ESD changed the duration of time for the collection of meteorological data from five years to three years relative to the off-site soils, and the third ESD documented the augmentation of the groundwater pump-and-treat remedy with *in- situ* technologies.

The topography of the Site slopes downward to the south and southeast to Quiggle Brook. North of Route 17, across from the Site, there are residences and a seasonal business. The adjacent properties to east, south, and west are undeveloped. Groundwater flows through the saturated soils (also referred to as the overburden aquifer) generally from northwest to southeast consistent with the topography. Groundwater flow direction in the bedrock is similar with a secondary flow direction to the southwest that is constrained by fractures and bedding structures within the bedrock. Historically, the bedrock aquifer has been the primary drinking water source for residential water wells in the area surrounding the Site.

Long-term monitoring data collected since the late 1980s has been used to identify the extent of groundwater contamination beneath the Site. As explained below, the original 1990 ROD remedy, as modified by its ESDs, addressed a significant amount of contaminants in groundwater through the excavation and *in-situ* treatment of unsaturated and saturated soils and the pumping and treating of groundwater; however, those measures were inadequate to achieve groundwater cleanup levels in the shallow and bedrock aquifers within the estimated timeframe of 15 to 30 years. The location of remaining contaminated groundwater in the shallow aquifer is between the former operation area and Quiggle Brook. The location of the remaining contaminated groundwater in the bedrock aquifer is similar to the location of the contaminated groundwater in the overburden, and also extends southerly toward the property line. The Site, including the existing monitoring well network that EPA and MEDEP will continue to use for long-term monitoring of the plumes, is shown on Figure 3. Note, however, that the existing well network will be expanded as deemed necessary by EPA to include new wells at the Site perimeter or elsewhere if properties adjacent to the Site are developed or EPA detects any movement of the leading edge of either plume.

Figure 3: Existing Monitoring Wells



RATIONALE FOR THE AMENDMENT: An amendment to the 1990 ROD is necessary because (1) the original groundwater remedy reached the limits of its effectiveness, (2) three innovative *in-situ* technologies have proven unsuccessful in attaining the groundwater cleanup standards, and (3) an evaluation of cleanup alternatives indicates that no technology is available for achieving groundwater cleanup standards in a reasonable timeframe due to Site-specific hydrogeological and contaminant conditions.

In 1990, with the concurrence of Maine Department of Environmental Protection (MEDEP), EPA selected a cleanup remedy for the Site that included four components: (1) cleaning, demolition, and removal of structures; (2) cleaning unsaturated Site soils (the soil above the water table); (3) further testing of off-site soils; and (4) restoring groundwater in the saturated soils and bedrock through a pump and aboveground treatment (pump-and-treat) system. EPA later augmented its groundwater cleanup approach through the application of three different innovative *in-situ* treatment technologies. The first three components of the cleanup remedy have been successfully completed.

Cleanup efforts from 1996 through 2000 removed about 8,550 pounds of volatile organic compounds (VOCs) from the unsaturated soil and about 950 pounds from the groundwater. Complete groundwater remediation was not achieved through the operation of the pump-and-treat system from 1996 through 2000, and the implementation of three different innovative *in-situ* technologies (injection of permanganate from 1997 through 2000, injection of carbon sources from 2001 through 2002, and injection of hydrogen peroxide in 2005) that were added to the groundwater component of the 1990 ROD remedy.

These cleanup activities greatly reduced the amount of groundwater contamination at the Site, however, it is estimated that approximately 420 pounds of VOCs remain adsorbed in the soil and bedrock or dissolved in the groundwater. As described above, the remaining contaminated groundwater in the overburden aquifer is primarily located between the former operation area and Quiggle Brook, and the contaminated groundwater in the bedrock aquifer is similarly located but extends southerly toward the property line. The 2009 Conceptual Site Model Report concluded that contamination at the Site is generally stable and slowly declining with low potential for off-site migration.

In addition, since the 1990 ROD was issued, EPA has become aware of health risks posed by vapor intrusion in buildings located above groundwater contaminated with VOCs. As a result, EPA conducted an evaluation of potential impacts from vapor intrusion in the event the Site is redeveloped.

Under this Record of Decision Amendment (2013 AROD), EPA's cleanup approach to the remaining groundwater contamination at the Site is amended to remove the groundwater pump-and-treat component of the remedy due to Site-specific hydrogeological and contaminant conditions that limit the availability of an advantageous remedial technology. Typical of most pump-and-treat systems, after operating for four years the system became increasingly inefficient, recovering only 30 pounds in the final year of operation versus 920 pounds in the first three years of operation. The low permeability of the soil and bedrock limits the diffusion of contaminants from the soil and bedrock into the groundwater. This in turn limits the effectiveness of both pump-and-treat and *in-situ* technologies. As a result, EPA has determined that the ability to restore the groundwater to drinking water quality through available pump-and-treat and *in-situ* technologies within a reasonable timeframe is technically impracticable and is therefore invoking a technical impracticability waiver for groundwater cleanup levels (Maximum Contaminant Levels (MCLs), non-zero Maximum Contaminant Level Goals (MCLGs), Maine Primary Drinking Water Standards, and Maine Maximum Exposure Goals (MEGs)) within a designated technical impracticability zone (TI Zone) at the Site pursuant to CERCLA §121 (d)(4) .

EPA evaluated alternative means to address the remaining contaminants and determined that a combination of a technical impracticability waiver of state and federal groundwater ARARs for a portion of the Site, long-term monitoring of the location, volume and toxicity of groundwater contamination as it continues to be reduced through natural processes, and institutional controls would be the most viable available alternative to the original groundwater remedy.

EPA also determined that no current unacceptable human health or ecological risk exists at the Site because no one is drinking or exposed to the contaminated groundwater, the Site property is held in receivership by MEDEP, and there is no significant ecological risk due to Site contaminants in Quiggle Brook, based on the original 1989 risk assessment and subsequent monitoring of VOCs in surface water. Future risks were found to exist if groundwater is used for drinking water or potentially through vapor intrusion of groundwater contaminants if buildings are built without engineering controls over the contaminant plume.

This 2013 AROD amends the requirement for rapid restoration of contaminated groundwater throughout the Site through an active groundwater pump-and-treat system by invoking a technical impracticability waiver of state and federal groundwater ARARs for a portion of the Site. Two other elements of the 1990 ROD will be adjusted to support this new technical impracticability approach: long-term monitoring to track the location, toxicity and volume of contaminants as they continue to be reduced through natural processes, and institutional controls, including an environmental deed restriction to limit certain land uses that pose unacceptable risk to human health and the environment. Consistent with the 1990 ROD, the 2013 AROD will continue to require long-term operation and maintenance of the monitoring wells, and Five-Year Reviews.

The documents that form the basis for this 2013 AROD are available at the following Information Repositories:

EPA Records and Information Center
5 Post Office Square, First Floor
Boston, MA 02109-3912
617-918-1440

Hope Town Office
441 Camden Road
Hope, Maine 04847
207 763-4199

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Union Chemical Company began operations in 1967 as a paint stripping and solvent manufacturing business. Initially, the company manufactured and used patented solvents on the premises. The company later expanded its operations to include the recycling of used stripping compounds and solvents from other businesses. In 1982, the company further expanded operations with an incinerator to treat waste solvents and other compounds. Process water for these operations was provided by two bedrock wells, one located near Route 17 and the other located near the southern boundary of the property.

Soil and groundwater contamination beneath the Site and surface water contamination in Quiggle Brook were first discovered by MEDEP in late 1979. VOCs, similar to those processed by the facility, were the principal contaminants observed in the groundwater and in Quiggle Brook. In June 1984, MEDEP required the company to close its hazardous waste treatment operations. By the end of November 1984, MEDEP and EPA removed approximately 2,000 - 2,500 55-gallon drums and 30 liquid storage tanks. In 1986, Maine Superior Court evicted the company from the Site property and appointed MEDEP as the receiver of the property. In October 1989, EPA formally included the Site on the National Priorities List.

Table 1 summarizes the critical events in the history of the Union Chemical Company Site.

TABLE 1 CHRONOLOGY OF SITE EVENTS

DATE	EVENT
1967	The Union Chemical Company (UCC) began paint stripping and solvent manufacturing operations
November 1979	MEDEP discovered groundwater contamination beneath the UCC property and in Quiggle Brook
1981	UCC conducted soil and groundwater contamination studies
June 1984	MEDEP closed the hazardous waste treatment operations
November 1984	MEDEP and EPA completed the removal of over 2,000 55-gallon drums and the contents of 28 liquid storage tanks
1986	UCC evicted from the property by state court order; MEDEP appointed as receiver of the property
Fall 1987	Under two Administrative Orders by Consent, Potentially Responsible Parties (PRPs) agree to reimburse EPA and MEDEP for response costs and perform an RI/FS. The removal of all storage tanks was completed
August 7, 1989	Additional PRPs sign Consent Decree, reimbursing EPA for past response costs
October 4, 1989	Final listing of the Site on the National Priorities List
1990	PRPs complete the RI/FS
December 27, 1990	EPA signs ROD
June 16, 1992	Consent Decree for Remedial Design/Remedial Action entered in US District Court Between EPA, MEDEP, and Settling Parties (a subset of the PRPs)
April 1993	Settling Parties complete a focused feasibility study demonstrating soil vapor extraction as a viable soil treatment technology
October 23, 1993	EPA approves Facilities Remedial Design
Spring 1994	Settling Parties complete the Facilities Remedial Action
1994 – 1996	Settling Parties collect on-site meteorological data to support off-site soils component of ROD
June 24, 1994	EPA issues Explanation of Significant Differences (ESD), changing source control remedy from excavation and low-thermal aeration to *in-situ*, thermal enhanced soil vapor extraction (SVE)

October 1994 – May 1995	Settling Parties excavate and consolidate unsaturated soil from four on-site outlying areas into central location and construct soil cap over SVE area to assist *in-situ* treatment
April 5, 1995	EPA approves SVE and groundwater Remedial Design
January – June 1996	Start-up period for SVE and groundwater
October 1996	EPA and Settling Parties perform joint off-site soil investigation
April 27, 1997	EPA and MEDEP perform Operational & Functional final inspection for SVE and groundwater systems
September 25, 1997	EPA signs ESD documenting change to off-site soil remedy
November 1997	Settling Parties perform permanganate pilot study
December 19, 1997	EPA approves Construction Completion Report for SVE and groundwater systems
Summer - Fall 1998, 1999, 2000	First, second, and third full-scale permanganate application
December 17, 1999	EPA approves Final Closure Action Plan for Soils, Findings, and Summary, completing source control component of remedy
2000 – 2001	Decommissioning of SVE system begins
December 2000	Shutdown of groundwater extraction and treatment system
Summer – Fall 2001, 2002	First and second carbon source application, using solutions of sodium lactate and food-grade molasses
September 21, 2001	EPA signs ESD documenting permanganate and carbon source *in-situ* enhancements of groundwater remedy
September 2002	EPA completes first Five-Year Review
Fall 2003	Settling Parties install new bedrock well in southwestern portion of Site and replacement wells along Quiggle Brook
2004	Agencies and Settling Parties synthesize Site data (going back more than twenty years) into Site Conceptual Model
July 2004	Settling Parties perform bromide tracer tests in ODW, the bedrock monitoring well located farthest south on the Site
Summer 2005	Settling Parties complete decommissioning of vapor extraction wells and monitoring wells on upgradient portion of the Site
June – November 2005	Settling Parties conduct bedrock pump tests, then hydrogen peroxide injections
Dec 2005 – Oct 2006	Settling Parties conduct four post-injection sampling events
Summer 2006	Settling Parties decommission second set of monitoring wells in soil cap area
Winter – Spring 2006	EPA holds two public meetings with MEDEP and meets twice with Town of Hope selectmen to develop possible reuse scenarios
September 2007	EPA completes second Five-Year Review
Fall 2008, 2010, and 2012	Long-term groundwater and surface water sampling events
January 2011	Final Technical Impracticability Evaluation Report submitted
September 2012	EPA completes third Five-Year Review
June 2013	EPA issues a Proposed Plan that recommends changing the groundwater remedy

Table 1 shows enforcement activities beginning at the Site in 1979 and culminating in a Consent Decree for Remedial Design/Remedial Action entered in US District Court on June 16, 1992. Sixty parties signed the Consent Decree to finance and perform the RD/RA (Settling Parties); another group of parties reached a separate agreement with EPA and MEDEP and cashed out.

C: COMMUNITY PARTICIPATION

This ROD Amendment meets the criteria for community involvement specified in Sections 300.435(c)(2)(ii)(A) through (H) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as amended, 40 CFR Part 300. During the initial investigation of the Site leading up to the 1990 ROD there was a high level of community concern and involvement. That high level was reflected in the 88 comments received on the 1990 Proposed Plan and a petition signed by 160 citizens requesting further actions.

There is an established community group, Hope Committee for a Clean Environment (HCCE), which received support through an EPA technical assistance grant issued in 1990. While active remediation of the soils and groundwater was underway, HCCE met regularly with EPA, MEDEP, and the Settling Parties' Project Coordinator. These regular meetings ceased after the termination of active remedial efforts in 2005 and now communication between HCCE and the agencies is primarily through email and Site visits. Beyond the involvement of two active members of HCCE, periodic meetings with the owners of property across Route 17 from the Site, and periodic updates to the Town of Hope Administrator and Board of Selectmen, there has been little participation or involvement from the local community since active treatment ended.

A public information meeting immediately followed by a public hearing for this ROD Amendment was held on June 20, 2013. The meeting and hearing were attended by approximately 20 people including the Town Administrator and Board of Selectmen. Many questions were asked during the public information meeting, primarily regarding the future use of the Site property, the anticipated restrictions that will be placed on the property deed, and liability for the Site. At the hearing, MEDEP provided testimony and one community member offered comments. No other comments were received during the public hearing or during the 30-day public comment period.

D. IMPLEMENTATION OF THE 1990 ROD

The 1990 ROD had four components: (1) cleaning, demolition, and removal of structures; (2) cleaning unsaturated soils (the soil above the water table); (3) further testing of off-site soils; and (4) restoring groundwater in the saturated soils and bedrock through a pump and aboveground treatment (pump-and-treat) system.

The first component was completed in Winter 1994. Following pre-design studies, the remedy for the second component, the unsaturated Site soils, was changed from excavation and aboveground treatment to *in-situ* soil vapor extraction (SVE) and aboveground treatment augmented with hot air injection. Additionally, after consolidation of outlying contaminated soils, a cap of eighteen inches of compacted clay soil overlain by six inches of gravel was installed over the entire SVE treatment area in order to minimize the amount of ambient air drawn into the SVE system during operation. Due to its limited purpose, no long-term maintenance of this cap is needed. These changes in the remedy were documented in an Explanation of Significant Differences (ESD) in 1994. The SVE system operated from January 1996 through March 1998. After allowing conditions to return to equilibrium, soil samples were collected in September 1998, and EPA determined that the soil cleanup levels (below) had been met.

TABLE 2 SOIL CLEANUP LEVELS

Soil Contaminant	Soil Cleanup Level (ppm)
Carcinogenic Contaminants	
1,1-Dichloroethene (DCE)	0.1
Trichloroethene (TCE)	0.1
Tetrachloroethene (PCE)	0.1
Non-Carcinogenic Contaminants	
1,1-DCE	0.1
PCE	0.1
Total xylenes	100

Source: ROD, 1990, Table B.1

Under the third remedial component, EPA evaluated the potential for off-site impacts from the facility's incinerator through the collection of on-site meteorological data and soil samples from adjacent and nearby properties selected with input from HCCE, the local community group. The 1990 ROD stated that meteorological data would be collected for five years. After review of three years of data and discussions with HCCE, all parties agreed that the data was consistent, consistent with meteorological data collected during the Remedial Investigation at the airport in Augusta, Maine, and that data collection could be completed ahead of schedule in Summer 1996. In a 1997 ESD, EPA documented this shortened off-site data collection effort and its conclusion that the incinerator had no off-site impacts.

For the fourth component, the 1990 ROD set the following cleanup levels for groundwater based on MCLs, non-zero MCLGs, Maine Primary Drinking Water Standards, and Maine MEGs:

TABLE 3 GROUNDWATER CLEANUP LEVELS

Contaminant	Cleanup Level	Maximum Concentration in RI/FS (µg/L)	Frequency of Detection in RI/FS
Carcinogenic			
Bis-2 (ethylhexyl)phthalate (BEHP)	4	590	2/48
Carbon tetrachloride	5	25	2/137
Chloroform (as THM)	100	770	18/137
1,1-Dichloroethane (DCA)	5	12,000	79/137
1,2-DCA	5	80	5/137
1,1-DCE	7	2,700	49/137
Methylene chloride	5	20,000	20/137
PCE	5	150	4/137
TCE	5	84,000	61/137
Vinyl chloride	2	8	1/137
Non-Carcinogenic			
BEHP	4	590	2/48
Carbon tetrachloride	5	25	2/137
Chloroform (as THM)	100	770	18/137
Cis-1,2-DCE	70	19,000	32/91
Trans-1,2-DCE	100	8,500	2/98
1,1-DCA	5	12,000	79/137
1,1-DCE	7	2,700	49/137
Ethylbenzene	700	2,700	22/137
Methylene chloride	5	20,000	20/137
Methyl Ethyl Ketone (MEK)	170	28,000	10/69
PCE	5	150	4/137
Toluene	2,000	4,400	24/137
1,1,1-trichloroethane (TCA)	200	73,000	45/137
Total xylenes	10,000	80,000	21/84

Source: ROD, 1990, Tables A.1, A.2, and Table 2

The 1990 ROD stated that EPA and MEDEP believed these groundwater cleanup levels could be achieved within 15 to 30 years of full-scale operation of the pump-and-treat system. However, the 1990 ROD also acknowledged that the groundwater contaminant levels at the Site may cease to decline and may remain constant at concentrations higher than the cleanup levels specified above. The 1990 ROD states that in this scenario the groundwater extraction and treatment system, its performance standards, and/or the management of the groundwater migration component of the selected remedy may require later reevaluation.

The groundwater pump-and-treat system began operation in January 1996. It was augmented with *in-situ* applications of potassium and sodium permanganate during the summers of 1997-2000 and *in-situ* applications of sodium lactate and molasses during the summers of 2001 and 2002. These augmentations and the termination of the pump-and-treat system in December 2000 were documented in a third ESD in September 2001. An additional *in-situ* effort was attempted in 2005 with the injection of hydrogen peroxide into the subsurface.

With the limited effect from the sodium lactate and molasses applications, the focus turned to further definition of the extent of groundwater contamination in the bedrock and development of the Conceptual Site Model Report, a document that integrates historic Site data into a picture depicting the movement of Site contaminants and their degradation over time and space. Through installation and testing of two bedrock wells in the southwest portion of the Site, a secondary flow pattern, reflective of the fracture and bedding features in the bedrock, was discovered. Low levels of contaminants near their cleanup levels were detected in samples from these wells. Pump tests were performed in three locations to map out connections in the bedrock fractures, demonstrating the extent of contaminant flow.

In 2009, the Settling Defendants submitted the fourth revision of the Conceptual Site Model Report that included a review of other technologies that might be applicable for the Site. In January 2011, EPA and MEDEP conditionally approved a Technical Impracticability Evaluation Report, in which three cleanup alternatives to address the remaining groundwater contamination in both the saturated soils and bedrock were evaluated. The updated Conceptual Site Model Report and Technical Impracticability Evaluation Report formed the basis for EPA's preferred method for addressing the remaining contamination at the Site.

Together, these documents included the following findings:

1. The extensive monitoring of groundwater quality (currently 42 separate sampling events since 1992) has demonstrated that the contaminant concentrations in the overburden and bedrock are decreasing and the contaminant plumes have achieved equilibrium and may be decreasing.
2. Conditions at the Site are not conducive to significant migration of VOC/SVOC contaminants beyond the limits of the Site. The till at the Site has been shown to yield very little water under pumping conditions and, therefore, is expected to transmit very little water. Yields for wells screened in the till were observed to be

only fractions of a gallon per minute. Similar low yields are generally observed in the bedrock.

3. The same subsurface conditions that limit the migration potential also make removal of the residual VOC/SVOC contaminants difficult. The low influent flow rates into the groundwater pump-and-treat system (less than 8 gpm total from approximately 28 separate recovery wells with less than 1,000 pounds of VOCs removed) have demonstrated that active remediation of the dissolved phase contamination through conventional means is not feasible. Similar difficulties associated with the permeability and transmissivity of the subsurface soil strata and bedrock were observed during the implementation of the remedial additive and *in-situ* oxidation technologies.
4. Irrespective of the available technology used, the time frame for restoration of the groundwater in the bedrock with the calculated degradation rates was estimated to be 345 years for the most recalcitrant contaminants.

E. SUMMARY OF PRESENT SITE CONDITIONS AND CONTAMINATION

Pursuant to the 1990 ROD and 1992 Consent Decree, a groundwater and surface water monitoring program has been operative since Summer 1992. Samples were collected quarterly through Fall 1997, semi-annually from Spring 1998 through Fall 2004, annually in 2006, 2007, and 2008. Since 2010, samples have been collected every two years. The monitoring data has demonstrated that: (1) the contaminant plumes are stable, (2) the location of remaining contaminated groundwater in the overburden is between the former operation area and Quiggle Brook, and (3) the location of the remaining contaminated groundwater in the bedrock is similar to the overburden and also extends southerly toward the property line. Tables 4 and 5 lists the concentrations of contaminants found at the Site since October 2002.

TABLE 4 OVERBURDEN GROUNDWATER DATA

Contaminant Performance Standard	Q32 (Fall 2002)* Max/Avg Exceedances /Samples	Q37 (Fall 2006) Max/Avg Exceedances /Samples	Q39 (Fall 2008) Max/Avg Exceedances /Samples	Q40 (Fall 2010) Max/Avg Exceedances /Samples	Q41 (Fall 2012) Max/Avg Exceedances /Samples
(all concentrations in parts per billion)					
1,1,1,-TCA 200	20U/13U 0/4	10U/8U 0/4	1U/1U 0/4	2U/1U 0/4	1U/1U 0/4
1,1-DCA 5	2800/1120 4/4	2800/921 4/4	2210/601 3/4	1670/546 4/4	1750/507 4/4
1,1-DCE 7	190/56 3/4	250/66 1/4	114/31 1/4	57/32 1/4	58/34 3/4
MEK 170	410/267 2/4	1000/285 1/4	1180/373 1/4	1190/550 3/4	1060/528 3/4
Ethylbenzene 700	180/50 0/4	460/127 0/4	178/52 0/4	120/49 0/4	154/59 0/4
Xylenes 10,000			60/17 0/4	100U/61 0/4	100U/49 0/4
PCE 5	20U/10U 3/4 **	10U/8U 3/4 **	25U/9 1/4	50U/30 1/4 **	50U/30 3/4 **
TCE 5	1300/355 3/4	570/176 3/4	439/119 3/4	108/45 3/4	98/44 3/4
Vinyl chloride 2	60/38 3/4	110/42 2/4	103/35 2/4	50U/30 3/4 **	50U/33 4/4 **
cis-1,2,-DCE 70	2000/820 3/4	1500/583 2/4	2600/646 2/4	1830/467 2/4	1220/350 2/4
Trans-1,2 DCE 100	480/128 1/4	250/66 1/4	920/238 1/4	670/185 1/4	700/195 1/4
DMF 390	470/245 1/4	1500/425 1/4	556/202 1/4	121/60 0/4	930/280 1/4

TABLE 5 BEDROCK GROUNDWATER DATA

Contaminant Performance Standard	Q32 (Fall 2002)* Max/Avg Exceedances	Q37 (Fall 2006) Max/Avg Exceedances	Q39 (Fall 2008) Max/Avg Exceedances	Q40 (Fall 2010) Max/Avg Exceedances	Q41 (Fall 2012) Max/Avg Exceedances
(all concentrations in parts per billion)					
1,1,1,-TCA 200	2U 0/6	20U/5U 0/6	1U/1U 0/6	1U/1U 0/6	1U/1U 0/6
1,1-DCA 5	690/207 4/6	3000/596 4/6	3630/750 5/6	2970/610 4/6	2500/507 4/6
1,1-DCE 7	230/40 1/6	310/82 2/6	228/70 2/6	138/28 1/6	100U/22 2/6**
MEK 170	1900/382 2/6	100U/27 0/6	250U/72 1/6	1000U/22 0 2/6**	1000U/220 2/6**
Ethylbenzene 700	20/5 0/6	1900/320 1/6	3120/523 1/6	3060/515 1/6	3150/531 1/6
Xylenes 10,000			2060/178 0/6	2190/376 0/6	2390/215 0/6
PCE 5	2U 0/6	20U/5U 1/6**	25U/7 1/6**	100U/22 2/6**	100U/22 2/6**
TCE 5	20/5 1/6	66/16 2/6	11/7 2/6	100U/22 2/6**	100U/22 2/6**
Vinyl chloride 2	5/3 6/6	220/39 2/6	729/125 2/6	354/64 4/6**	151/31 4/6
cis-1,2,-DCE 70	78/27 1/6	2100/363 1/6	1380/246 2/6	867/150 1/6	315/58 1/6
Trans-1,2-DCE 100	2U 0/6	45/9 0/6	26/21 0/6	100U/22 0/6	100U/22 0/6
DMF 390	1400/613 1/3	1200/302 2/6	556/176 1/6	138/39 0/6	158/47 0/6

* Q32 (Fall 2002) was the first monitoring report that separated the bedrock from the overburden data

** Because of the dilution needed to measure 1,1-DCA and cis-1,2,-DCE concentrations, the detection limits for the other compounds were raised and in some cases, the detection limit was raised above their respective performance standard. When 1,1-DCA and cis-1,2-DCE concentrations have decreased such that dilution is no longer necessary to measure samples at the lab, detection levels for all compounds will be below their respective cleanup levels.

Table 4 shows the prevalent remaining contaminants in the overburden above their performance standards are 1,1-DCA, cis-1,2-DCE, trans-1,2-DCE, DMF, MEK, TCE, and 1,1-DCE. In addition, because of the elevated detection levels, vinyl chloride and PCE concentrations may be above their performance standards in the overburden. Table 5 shows the prevalent remaining

contaminants in the bedrock above their performance standards are 1,1-DCA, vinyl chloride, ethylbenzene, and cis-1,2-DCE. In addition because of the elevated detection levels, 1,1-DCE, PCE, and TCE concentrations may be above their performance standards in the bedrock. Comparing the 2012 concentrations to the concentrations reported during the RI/FS (Table 3) illustrates the significant reductions in the contaminants following the active remedial efforts of soil vapor extraction, pump-and-treat, and *in-situ* applications. Calculations presented in the 2009 Conceptual Site Model Report and 2011 Technical Impracticability Report indicated that approximately 95% of the contamination has been removed from the subsurface and the reductions in concentrations reflect the results of the active remediation. The remaining contamination is tightly bound up, however, adsorbed onto the saturated soils and in bedrock fractures, making the remaining contamination inaccessible to available remedial technologies. See Figures 4 and 5 for a representation of the current extent of groundwater contamination in the overburden soils and in bedrock.

Figure 4: Contamination in Overburden Soils

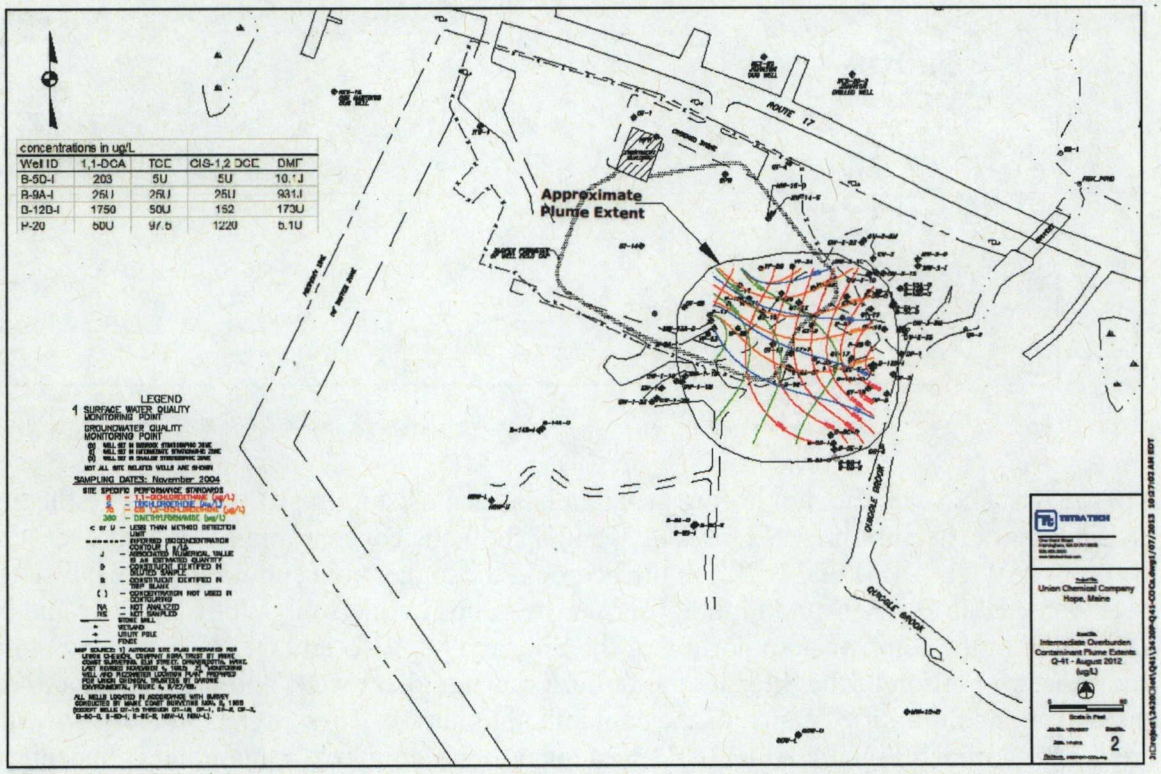
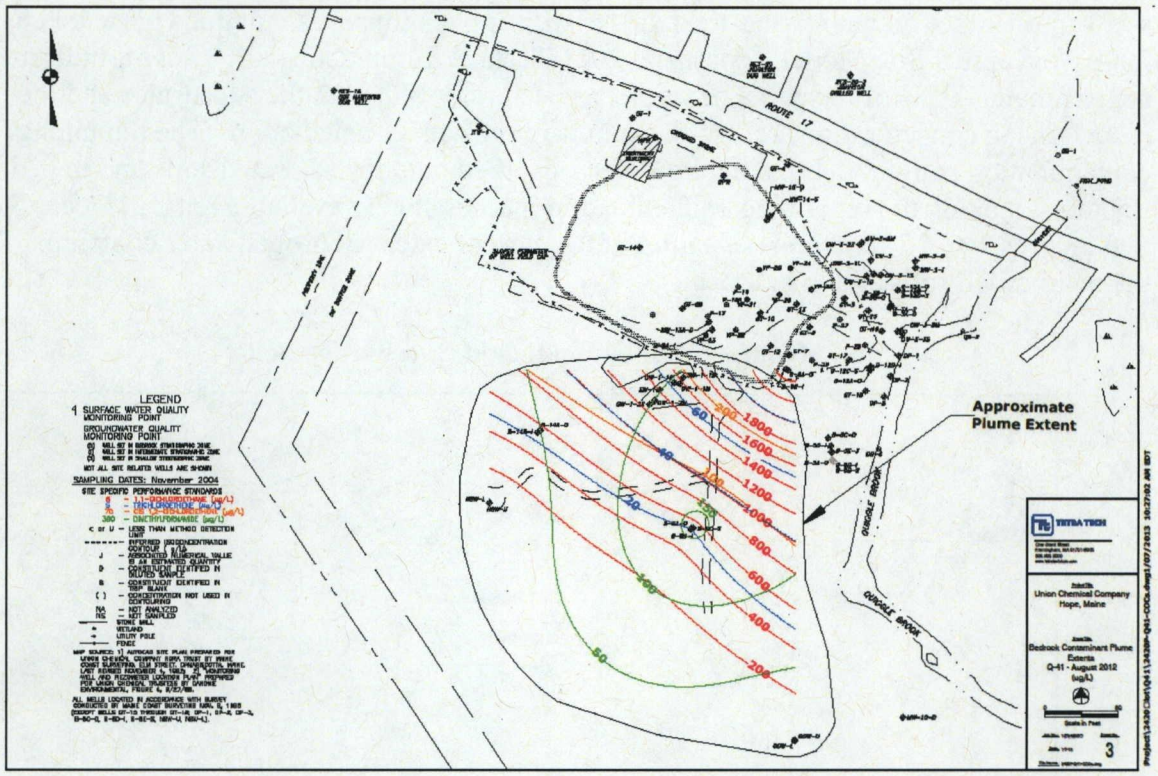
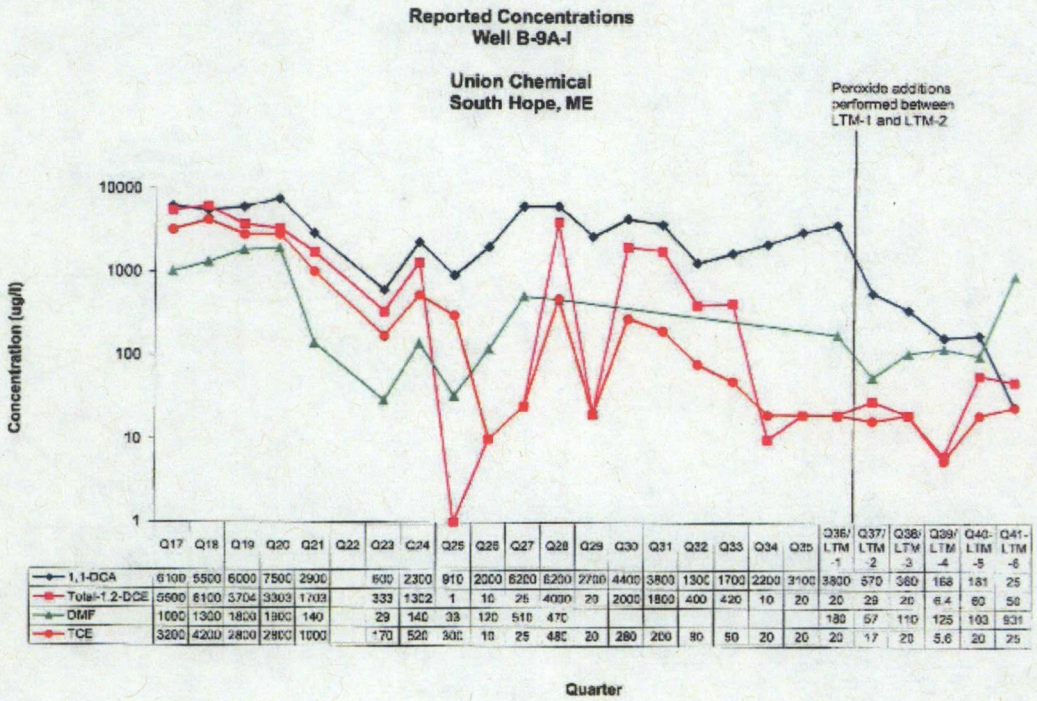


Figure 5: Contamination in Bedrock Aquifer



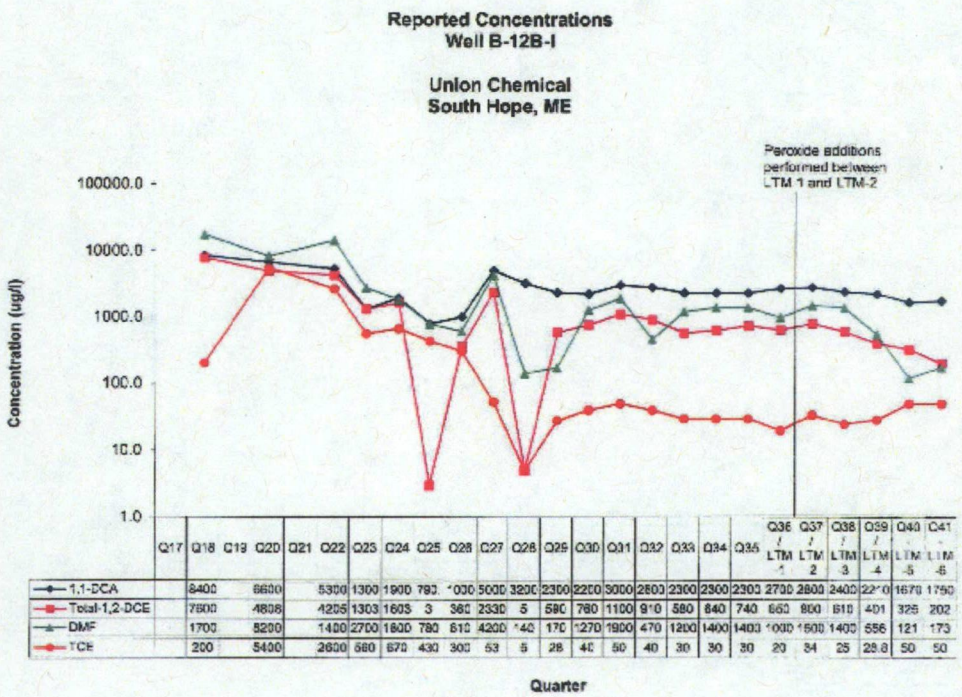
For the past six years the monitoring program has been used to track the wells with the higher contaminant concentrations. Figures 6, 7, and 8 show the concentration trends in overburden wells B-9A-I, B-12B- I and P-20. In the bedrock, the higher concentrations have consistently been detected in B-6A-D and Figure 9 shows the trends in that well. Wells NBW-U and NBW-D, located in the southwestern portion of the Site, and ODW-U and ODW-L, located in the southeastern portion of the Site, are the farthest downgradient wells and provide data to project the extent and migration, if any, of the contaminant plumes. These trends in these downgradient wells are shown in Figures 10 - 13. As presented in these figures, contaminant concentrations are slowly decreasing across the Site.

Figure 6: Contamination Trend in Well B-9A-I



	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36/ LTM -1	Q37/ LTM -2	Q38/ LTM -3	Q39/ LTM -4	Q40- LTM -5	Q41- LTM -6
1,1-DCA	6100	5500	6000	7500	2900		600	2300	910	2000	6200	6200	2700	4400	3800	1300	1700	2200	3100	3800	570	360	168	181	25
Total-1,2-DCE	5500	6100	3704	3303	1703		333	1302	1	10	25	4000	20	2000	1800	400	420	10	20	20	29	20	6.4	60	50
DMF	1000	1300	1800	1900	140		29	140	33	120	510	470								180	57	110	125	103	931
TCE	3200	4200	2800	2900	1000		170	520	300	10	25	480	20	280	200	90	50	20	20	20	17	20	5.6	20	25

Figure 7: Contamination Trend in Well B-12B-I



	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36 / LTM 1	Q37 / LTM 2	Q38 / LTM 3	Q39 / LTM 4	Q40 / LTM 5	Q41 / LTM 6
1,1-DCA		8400		6600		5300	1300	1900	793	1030	5000	3200	2300	2200	3000	2600	2300	2300	2300	2700	2800	2400	2210	1670	1750
Total-1,2-DCE		7600		4808		4205	1303	1603	3	360	2330	5	590	760	1100	910	580	640	740	660	800	610	401	325	202
DMF		1700		5200		1400	2700	1800	780	610	4200	140	170	1270	1900	470	1200	1400	1400	1000	1500	1400	556	121	173
TCE		200		5400		2600	680	670	430	300	53	5	28	40	50	40	30	30	30	20	34	25	28.8	50	50

Figure 8: Contamination Trend in Well P-20

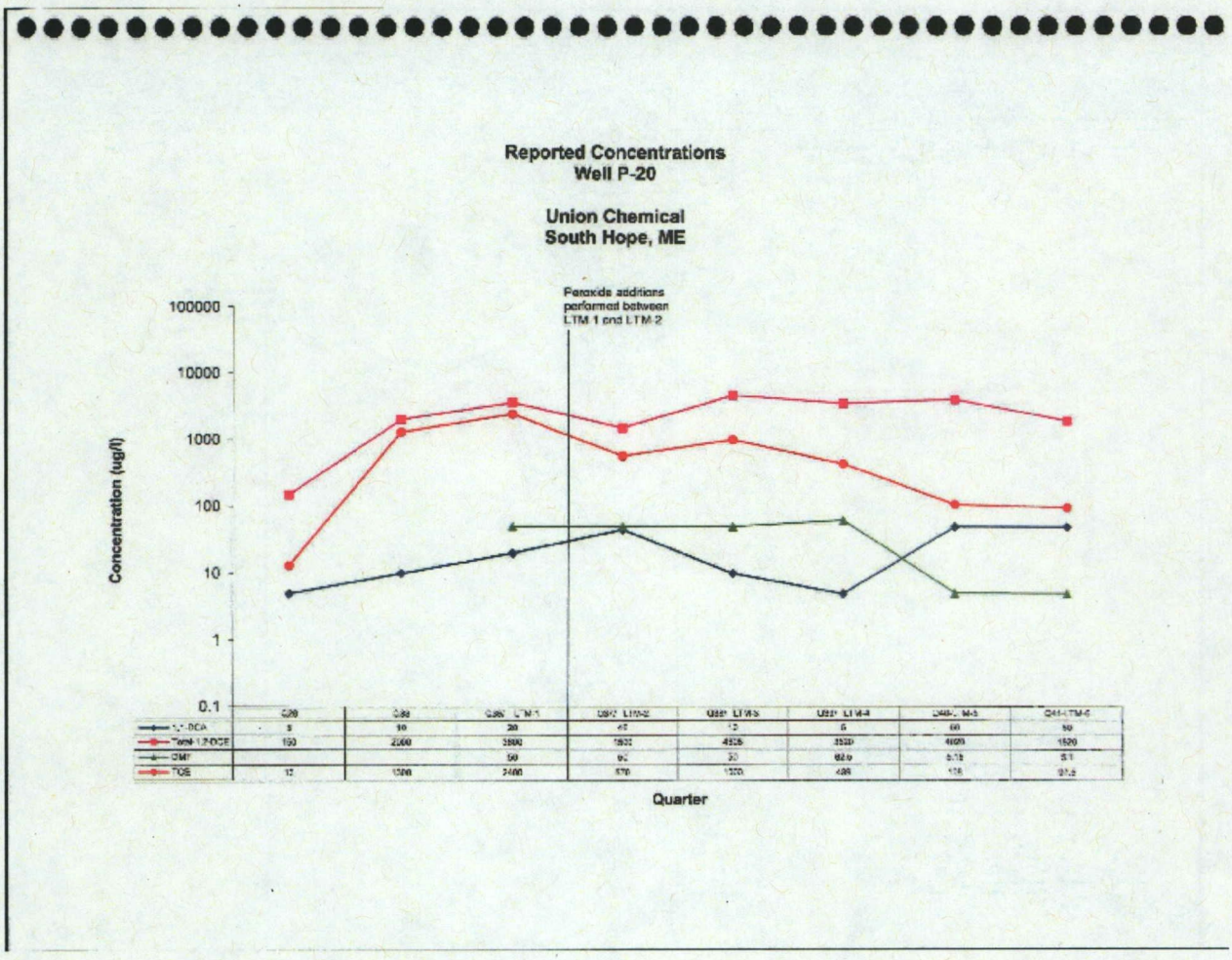


Figure 9: Contamination Trend in Well B-6A-D

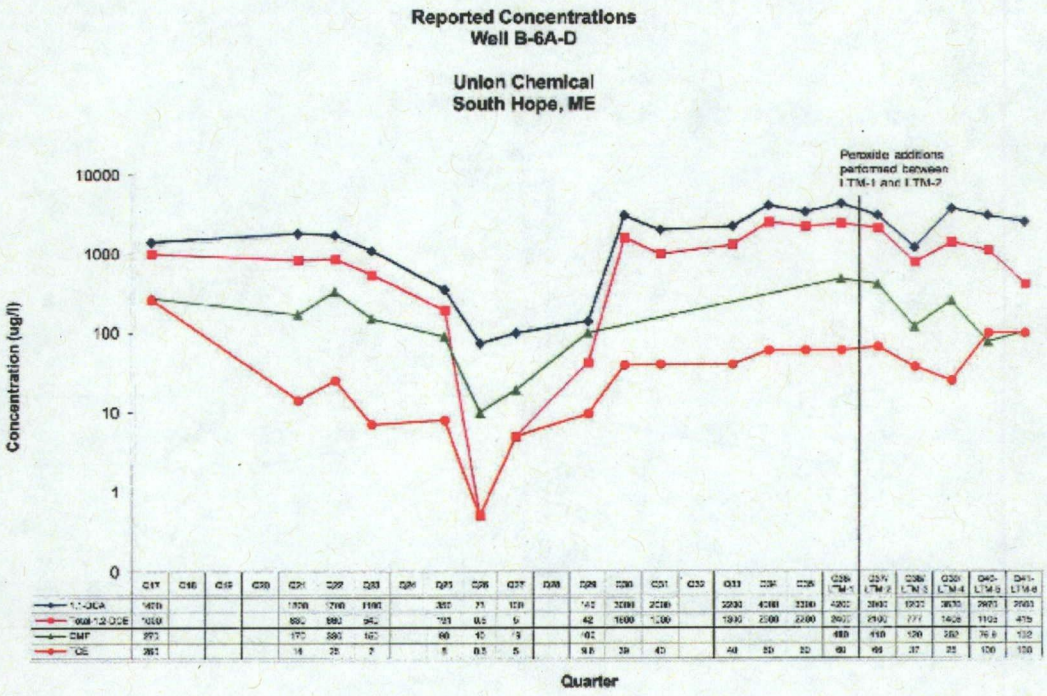


Figure 10: Contamination Trend in Well NBW-U

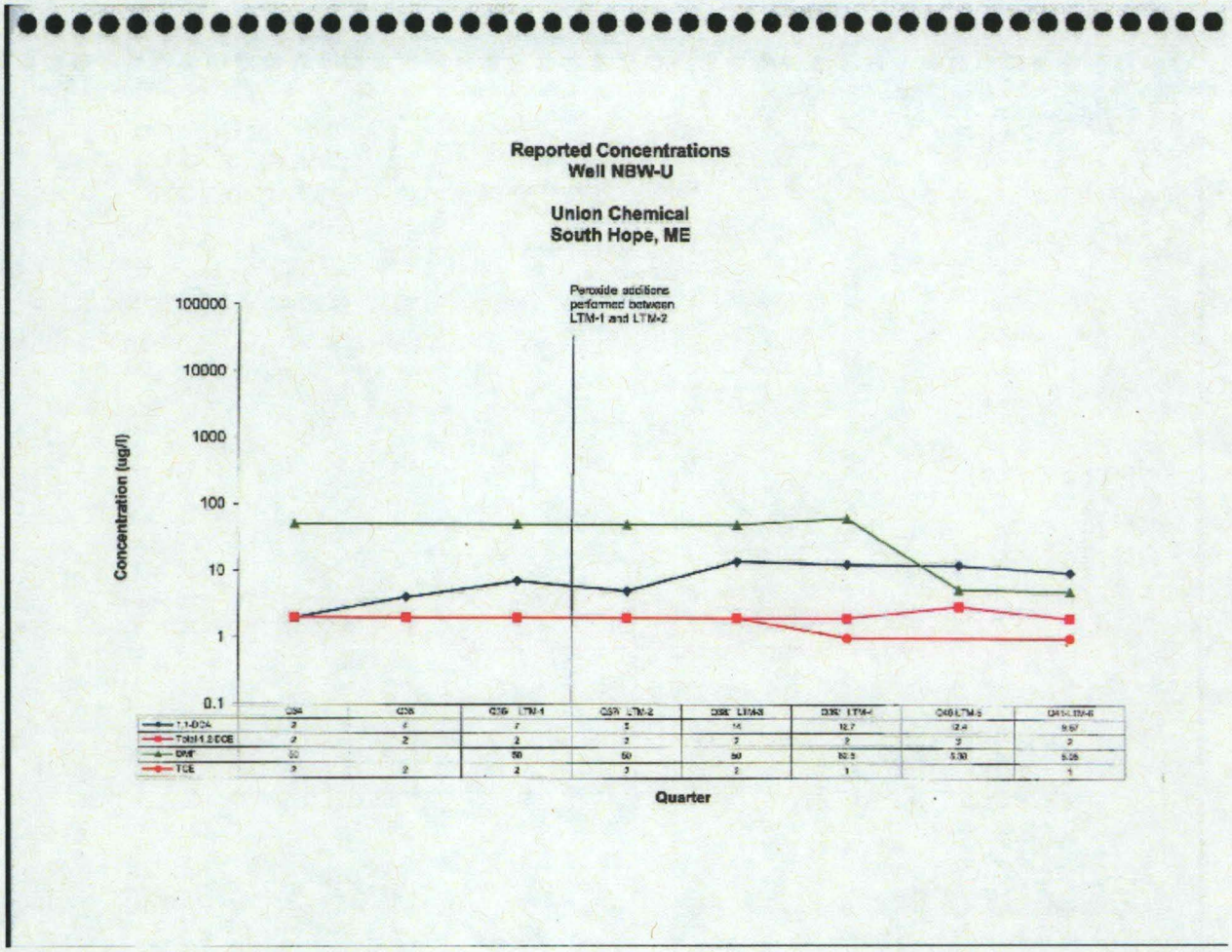


Figure 11: Contamination Trend in Well NBW-L

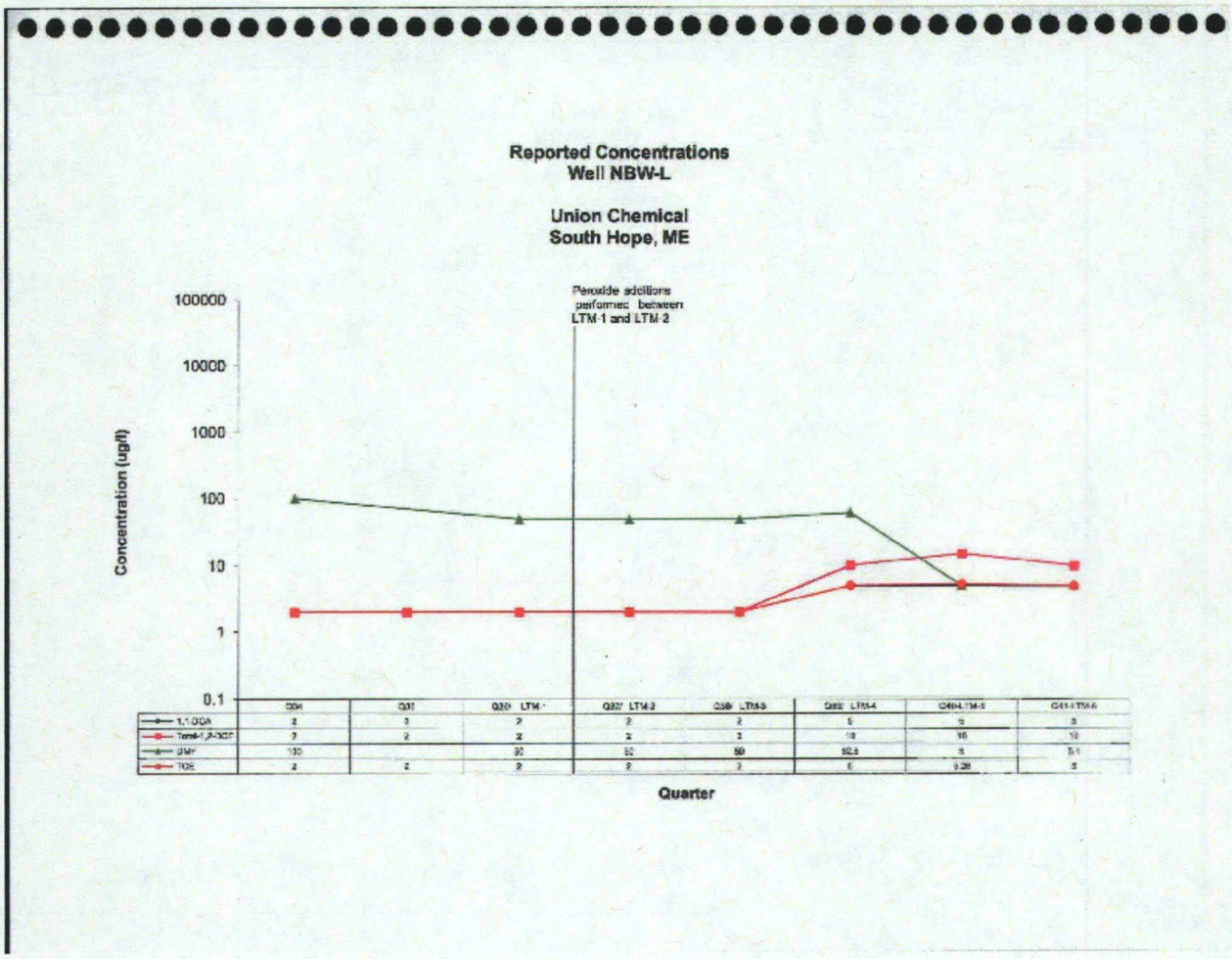


Figure 12: Contamination Trend in Well ODW-U

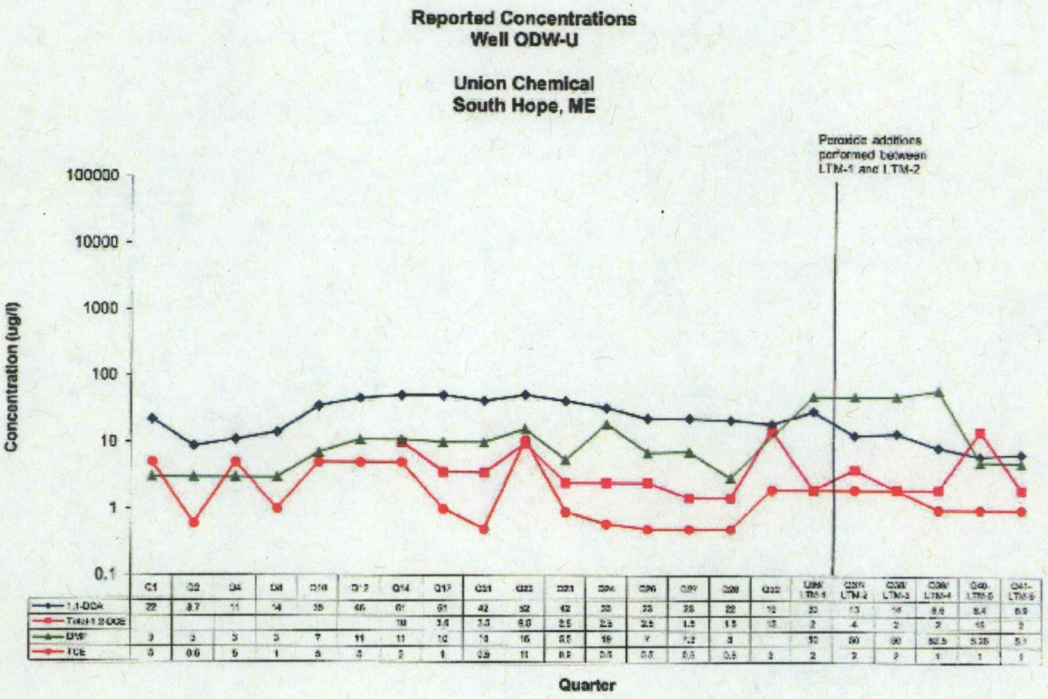
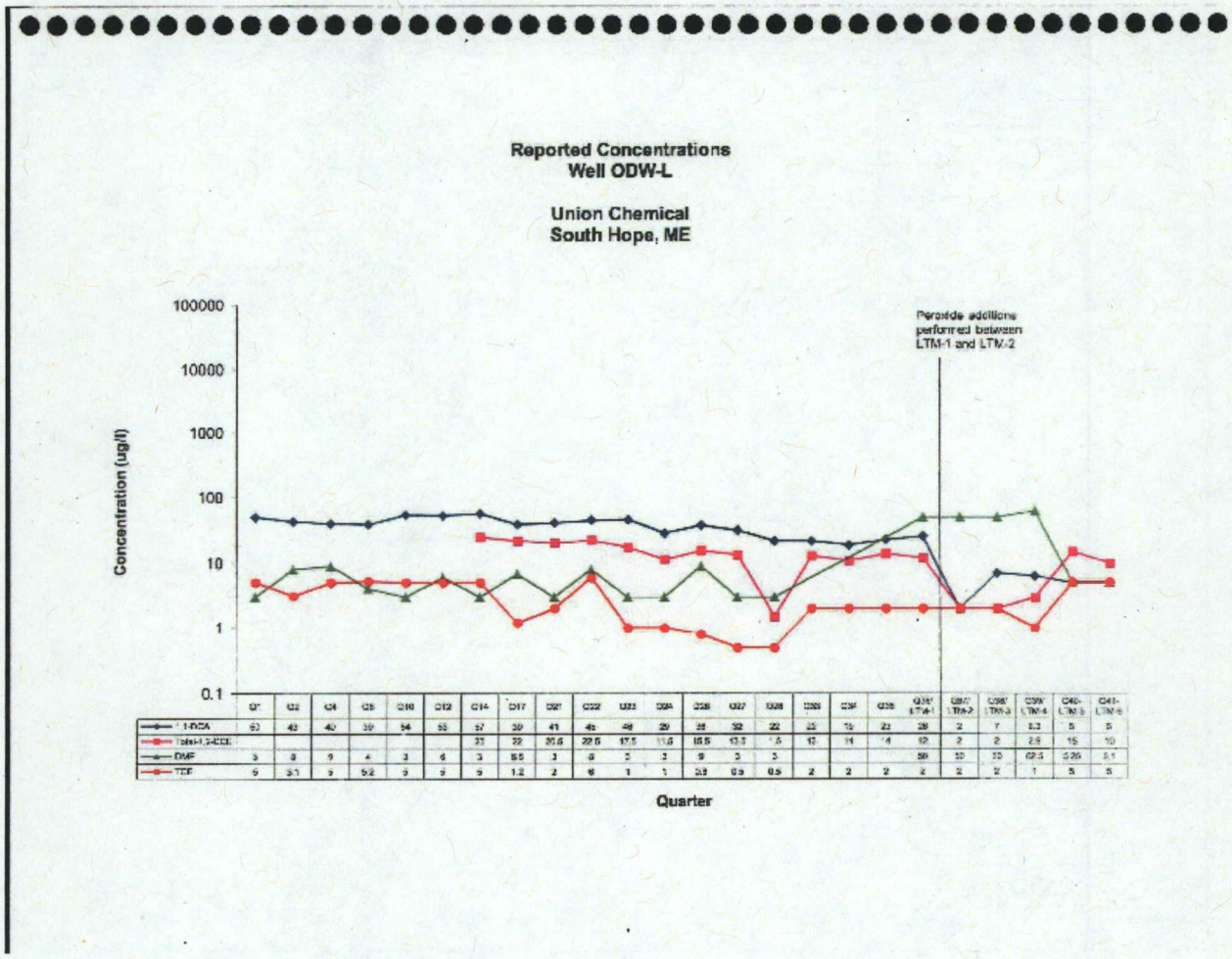


Figure 13: Contamination Trend in Well ODW-L



Surface water samples were collected at five locations in Quiggle Brook during the Remedial Investigation in 1987-1988. The VOCs cis-1,2-DCE (four times), 1,1,1-TCA and 1,1-DCE (each three times), TCE and PCE (each one time) were detected in 23 samples at concentrations ranging from 0.6 to 27 ppb. These concentrations were less than those detected in 1981 when the facility was operational. The environmental assessment concluded that the organic and inorganic contaminants observed in Quiggle Brook would not adversely affect the benthic organisms in this brook. Following the 1990 ROD, surface water samples were collected from two locations in Quiggle Brook. Monitoring was further reduced to one location after the 2001 *in-situ* carbon addition event. VOCs were last detected in the Q24 sampling event (Fall 1998).

F. TECHNICAL IMPRACTICABILITY DETERMINATION

Because groundwater contamination remains at the Site despite the application of the pump-and-treat system and various *in-situ* technologies between 1996 and 2005, EPA and MEDEP agreed to a proposal by the Settling Parties to more thoroughly evaluate whether it would be technically practicable to restore contaminated groundwater to drinking water standards, including MCLs and MEGs, within a reasonable timeframe. In December 2009, the Settling Parties updated the Conceptual Site Model, which concluded that contamination at the Site is generally stable and slowly declining with low migration potential off-site, and also provided an initial evaluation of the feasibility of any *in-situ* and *ex-situ* technologies to address the remaining groundwater contamination at the Site. In January 2011, the Settling Parties completed a Technical Impracticability (TI) Evaluation Report. In addition to assessing the selected groundwater remedy, the TI Evaluation Report also reviewed other technologies for their potential to restore the groundwater.

Restoration of contaminated groundwater is one of the primary objectives of the Superfund program. The NCP states that "EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a time frame that is reasonable given the particular circumstances of the site." Section 300.430(a)(1)(iii)(F) of the NCP. Generally, restoration cleanup levels in the Superfund program are established by applicable or relevant and appropriate requirements (ARARs), such as the use of Federal or State standards for drinking water quality. Because the groundwater aquifer underlying the Site is classified GW-A, a drinking water aquifer, restoration is to drinking water standards.

Further, under CERCLA, an alternative selected to address contamination at a Site must achieve the ARARs identified for the action, or provide the basis for waiving the ARARs. ARARs may be waived for any of six reasons, including where compliance with the requirement is technically impracticable from an engineering perspective. See Section 121(d)(4) of CERCLA and Section 300.430(f)(1)(ii)(C) of the NCP.

The primary considerations for determining the technical impracticability of achieving ARARs are engineering feasibility and reliability. See NCP Preamble, 55 Fed. Reg. 8748 (March 8, 1990).

EPA's Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration, (OSWER Dir. 9234.2-25, September 1993, Interim Final) specifies the following components as necessary for a TI evaluation:

1. Specific ARARs or media standard for which TI determinations are sought;

2. Spatial area over which the TI decision will apply;

3. Conceptual model that describes site geology, hydrogeology, groundwater contamination sources, fate and transport;

4. An evaluation of the restoration potential, including predictive analyses of the time frames to attain required cleanup levels and a demonstration that no other remedial technologies could be capable of achieving groundwater restoration; and

5. Cost estimates of the proposed remedy options.

Following a TI evaluation, EPA's goal of restoring contaminated groundwater within a reasonable time frame will be modified where restoration is found to be technically impracticable. In such cases, EPA will select an alternative remedial strategy that is technically practicable, protective of human health and the environment, and satisfies the requirements of CERCLA and the NCP. Where groundwater ARARs are waived at a Superfund site due to technical impracticability, EPA's general expectations are to prevent further migration of the contaminated groundwater plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction measures as appropriate. See Section 300.430(a)(1)(iii)(F) of the NCP. Alternatives designed to meet these expectations are evaluated using the nine remedy selection criteria provided in the NCP.

The results of the TI evaluation for the Site are provided below.

1. ARARs

The groundwater in the aquifer underlying the Site is classified by the State as GW-A, a drinking water source. Thus, MCLs and non-zero MCLGs, established under the Safe Drinking Water Act, are ARARs. At the time of the 1990 ROD, Maine MEGs were health-based guidelines intended to determine drinking water quality for private residential wells. MEGs were used to establish groundwater remediation levels since no MCL or other ARAR existed at the time the ROD was issued. In 1992, Maine MEGs were promulgated by reference; in Five-Year Review reports for the Site, EPA identified Maine's Primary Drinking Water Standards, which are equivalent to MCLs. Through this ROD Amendment, EPA recognizes that the Maine MEGs and Primary Drinking Water Standards are ARARs, but is waiving them along with the MCLs and MCLGs pursuant to Section 121(d)(4). Table 6 shows chemical-specific ARARs.

TABLE 6 SUMMARY OF CHEMICAL SPECIFIC ARARS

Contaminant	Q38 Maximum Groundwater Concentration (ug/L) and Location	MCL	1992 MEG	1990 ROD Performance Standard (ug/L)
Bis (2-ethylhexyl) phthalate	<62.5*	4	25	4
Carbon tetrachloride	<1.0	5	2.7	5
Chloroform (as total trihalomethanes)	<1.0	100	100	100
1,1 DCA	2,210 - B-12B-I	7	5	5
1,2 DCA	<1.0	5	5	5
cis - 1,2 DCE	740 - B-12B-I	70	70	70
1,1 DCE	200 – B-6A-D	7	7	7
Ethylbenzene	3,120 – B-6A-D	700	700	700
methylene chloride	<5.0	5	48	5
methyl ethyl ketone (2-butanone)	1,280 – B9A-I	170	170	170
PCE	<1.0	5	3	5
Toluene	41.6 – B-9A-I	2,000	1,400	2,000
trans 1,2 DCE	<25.0	100	70	100
1,1,1 TCA	<25.0	200	200	200
TCE	439 – VP-20	5	5	5
vinyl chloride	729 – B-6A-D	2	0.15	2
xylenes, (total)	2,060 – B-6A-D	10,000	600	10,000
DMF	557 - B-8A-D	NS	NS	390 (amended ROD Standard)

* the detection limit is higher than the MCL so it cannot be determined whether there are exceedances

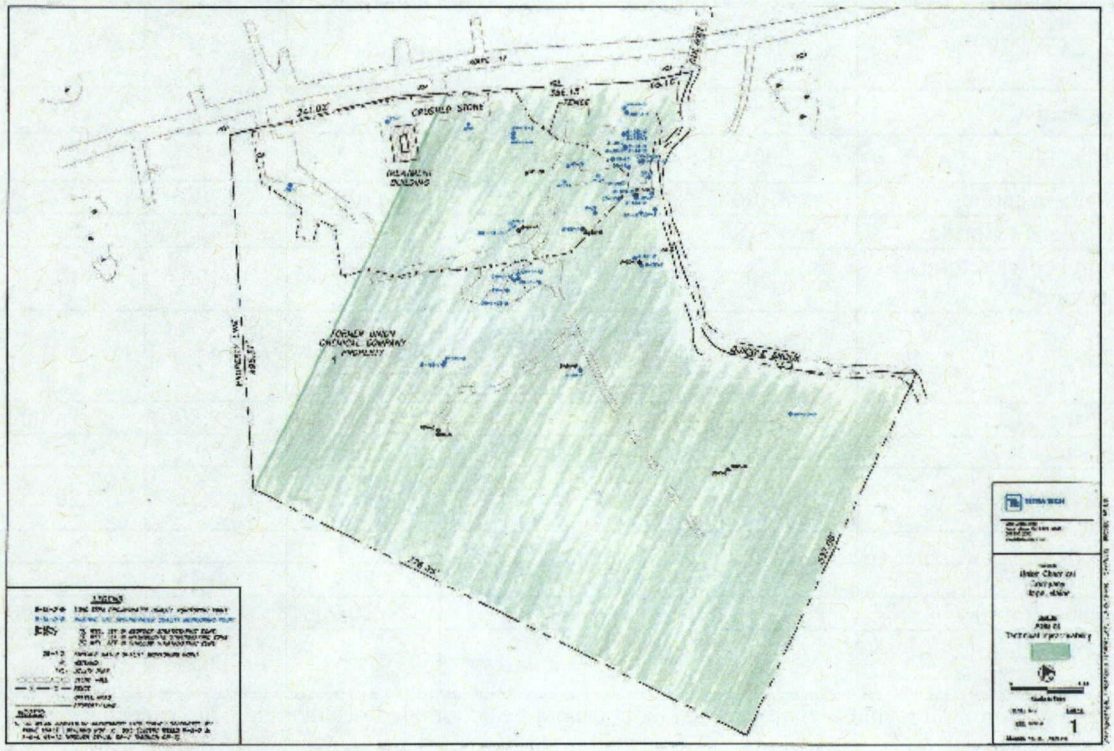
NS – No Standard

2. Spatial Extent of the Technical Impracticability Zone

This section describes the proposed horizontal and vertical extent over which the technical impracticability decision would apply (TI Zone). This includes the portion of groundwater known to contain VOCs above groundwater cleanup levels that would require substantial time frames to remediate using currently available technologies, as well as areas where VOC contamination above cleanup levels is inferred (bedrock aquifer). Section F.4 below provides the estimated cleanup time frames for groundwater containing VOCs.

Horizontally, the TI Zone reaches the Site property boundaries with the exception of the upgradient northwest corner of the Site. Vertically, the TI Zone extends to 245 feet below ground surface (bgs) in the deep bedrock aquifer. This TI Zone's vertical depth, based on EPA's current understanding from existing well depths and Site geology, may be subject to change based on new information at a future time. Institutional controls in the form of a deed restriction will be recorded on the Site property, prohibiting the use of groundwater from any depth. See Figure 14 for a depiction of the TI Zone and the Site boundaries.

Figure 14: Technical Impracticability Zone



3. **Conceptual Site Model**

The Conceptual Site Model serves as a foundation for evaluating the restoration potential of the Site and, thereby technical impracticability as well. It includes the Site geology and hydrogeology, nature and extent of contaminants in groundwater, fate and transport processes, and current or potential receptors. This Conceptual Site Model has been developed through review of reports of previous investigations and previous Conceptual Site Models. As may be

expected for a site with an extensive collection of historical analytical data and computer modeling, the conceptual model developed for the Site has evolved through four iterations. The current 2009 Conceptual Site Model should be seen therefore as a continuing refinement of previous models, reflecting the analytical data and subsurface investigations to date, and forms the basis for evaluating potential remedial actions.

Site Geology - Overburden

A review of the historical boring logs logged at the Site indicated that the overburden lithologies correlate well with regional and county surficial geology descriptions. The overburden consists of glacially deposited, poorly sorted, dense to very dense silty till with sandy till strata, cobble and boulder till strata, and a bottom dense clay till strata that effectively separates the overburden aquifer from the underlying bedrock aquifer. The less dense till units and tills with comparatively significant sand content are likely the water bearing strata within the overburden. Compared to the other tills observed at the Site, these low permeable soil units appear to be the most transmissive layers in the overburden. The dense and very dense silt and clay till layers have the potential to act as aquacludes or aquitards due to their density and low permeability and act in concert with more sandy, less dense and relatively higher permeability layers to create preferential groundwater flows and contaminant migration pathways.

Generally, the till units appear to become more dense and compact with depth. Therefore, the ability of the overburden to transmit water through these strata will become more difficult both vertically and horizontally with greater depth. The presence of these very dense and low permeability layers will also limit both the vertical and horizontal migration of the groundwater at the Site. These very dense silty clay tills and clay tills are in contact with the bedrock to the south of the Site cap. This overburden soil condition will limit and likely make improbable any significant groundwater flows to the south and southeast of the Site via the intermediate and deep overburden. Where the very dense tills and clay tills contact the bedrock, it is likely that vertical migration of groundwater either upward (from the bedrock), downward (from the overburden to the bedrock) or horizontally (at depth through the overburden till) is not probable except where fractures in the till intersect with the upper bedrock surface. However, as noted below, the slow groundwater velocity through the lower till makes migration (either upwards or downwards) minimal. Due to the existence of these variable soil conditions (permeability, porosity etc.), preferred pathways exist through the till for groundwater flow at the Site.

Overburden soils on the northwestern portion of the Site are found at thicknesses no greater than approximately 20 feet below the ground surface (bgs) before encountering the top of the shallow bedrock. Overburden soil thicknesses increase in a southwesterly direction to a maximum thickness of approximately 53 feet bgs and increase in an easterly direction to a maximum thickness of approximately 88 feet bgs adjacent to Quiggle Brook. The increase in observed overburden strata thicknesses occurs west to east in this area of the Site and appears to be related to the easterly sloping limb of a synform fold in the shallow bedrock.

Site Geology - Bedrock

A review of the historical boring logs logged at the Site indicated that the bedrock lithologies correlate well with regional and county bedrock geology descriptions. The shallow bedrock consists of highly metamorphosed granites and schists on the northern and northeastern portions of the Site that are intruded by granite pegmatite and altered to gneiss to the west and south of the Site cap. The gneiss and granite pegmatites make up the deep bedrock defined as the predominant rock types at depths greater than 225 feet.

The structure of the shallow bedrock on the northern portion of the Site is that of a synform fold consisting of granite and schist centered in the vicinity of well B-6A-D and extending under Quiggle Brook. This bedrock fold may also be hydraulically connected to Fish Pond (upgradient of the Site and serves as a boundary. Surface water samples collected from Fish Pond in the Remedial Investigation were non-detect). The granite and schist fold appears to pinch out to the south and southwest of well B-6A-D and transitions to the deeper bedrock at depths greater than 225 feet bgs which consists of a more massive and gently sloping gneiss with associated granitic pegmatite intrusions.

Due to the rock types, observed small aperture size and low frequency of fracture occurrence, the deep bedrock below the shallow bedrock weathered zones appears to be a low to very low transmissive formation which will not yield substantial flows or volumes of water. The primary recharge area for the bedrock at the Site appears to be the western highlands above the Site with a potential for limited recharge from Fish Pond along the eastern portion of the Site. The occurrence of groundwater gradients to the southeast, weathered shallow bedrock occurrence, the slope of the deep bedrock surface to the southeast and the orientation of the dip in the fractures/deformation in the shallow bedrock to the southeast indicate that groundwater flow within this rock unit will be towards Quiggle Brook, which represents the discharge area for the shallow bedrock aquifer. The fracture orientation and orientation of the fold in the shallow bedrock also trend in the direction of Fish Pond and its drainage area. The fracture orientation (strike) of the deep bedrock also trends toward Quiggle Brook and the frequency and aperture of bedrock fractures diminish with depth.

Hydrogeology – Overburden

The Site is situated between two highland areas that act as groundwater divides and serve as the natural groundwater recharge areas that provide water to the Site's aquifers. Groundwater between these two highland areas discharges to Quiggle Brook, which flows to Crawford Pond. Groundwater in the overburden till soils to the west of Quiggle Brook flows in an easterly direction through the Site cap area toward Quiggle Brook. Groundwater to the east of Quiggle Brook flows in an opposing westerly direction toward Quiggle Brook. The groundwater flow direction for each of these recharge areas follows the regional topography. Because of the Site cap constructed over most of the contaminated soils in the overburden, Site groundwater recharge is predominantly due to the horizontal flows from the western highlands that flow in an easterly direction across and through the overburden soils beneath the Site cap to Quiggle Brook. Little if any vertical groundwater recharge via precipitation can occur at the Site due to the cap.

The measured depth to groundwater in the overburden varies from 15 to 20 feet bgs, and the water-table surface maps generated for the overburden unit at the Site suggest that much of the overburden groundwater beneath the Site ultimately discharges to Quiggle Brook. While this groundwater flow direction is generally true for the shallow overburden soils, variations in the hydraulic conductivity of the different soil strata that make up the till at the intermediate and deep soil depths alter the groundwater flow pathways and rates of flow through the till. Preferential pathways exist in the till and follow the sandy tills across the Site. In addition, the increasing relative density of Site soil strata at depth provide a nearly impermeable barrier between the overburden aquifer and the underlying shallow bedrock aquifer under static conditions and acts as a leaky aquifer during higher relative flow conditions. In general, the shallow overburden is less dense than the deep overburden strata and has higher hydraulic conductivities and conducts the majority of groundwater flows. The varying content of sand, silt and clay in the intermediate and deep overburden till soils varies with depth and location which results in a variable hydraulic conductivity in the overburden. This heterogeneity of the till soils, combined with differences in groundwater elevation gradients (related to changes in Site topography), substantially affects groundwater flow. For much of the Site, the shallow saturated overburden soils are more transmissive than the intermediate saturated overburden soils. The intermediate saturated overburden soils are more transmissive than the deep saturated overburden soils, which are nearly impermeable.

Based on measurements of groundwater elevations, the median hydraulic gradients range from 0.02 to 0.07 feet/ foot in the overburden, and are dependent on seasonal variations in aquifer recharge. Under high recharge conditions, observed groundwater gradients range between 0.03 and 0.12 feet per foot. For the shallow overburden, the calculated minimum and maximum groundwater velocities range between 1.75 feet and 21.9 feet per year. For the intermediate overburden, the calculated minimum and maximum groundwater velocities range between 0.87 feet and 12.7 feet per year. For the deep overburden, the calculated minimum and maximum groundwater velocities range between 0.01 feet per year and 0.20 feet per year. Water-table surface maps constructed from the baseline 2005 pump test groundwater data in the overburden indicate that groundwater along the east side of the Site continues to discharge to Quiggle Brook. Along the central portion of the Site the overburden groundwater appears to flow in an east-southeasterly direction, ultimately discharging to Quiggle Brook within the Union Chemical property.

A general reduction in the hydraulic conductivity of the overburden was observed to occur with increasing depth, and altered by varying content of sand, clay and silt. The very dense basal till layers of the deep overburden strata were found to have properties of a confining layer. The variations in overburden strata type, density and hydraulic conductivity serve to impede and redirect groundwater flows to Quiggle Brook, and indicate that preferential pathways of groundwater flow exist in the till. In general, the overburden groundwater at the Site flows east toward Quiggle Brook. Though hydraulic gradients indicate a southeasterly component of flow, lenses and layers of very dense silty clay till and dense clay till that are in contact with the shallow bedrock on the southern portion of the Site have very low permeability and inhibit

groundwater flows in the overburden to the south and southeast. These low permeability soils also create minor mounding of groundwater, which creates an observed northeasterly gradient for groundwater flow.

Upward vertical gradients exist at the Site along the western banks of Quiggle Brook. Artesian effects have been observed in overburden and shallow bedrock wells at the Site. The artesian effects are enhanced by the significant hydraulic gradients produced by the steep slopes at the Site and the western ridge of the Quiggle Brook drainage area. The artesian or upwelling effect is further enhanced by a similar gradient and opposing groundwater flow from the eastern ridge that forms the other side of the Quiggle Brook drainage area. Though downward vertical hydraulic gradients exist in the saturated overburden, the decreasing permeability of the saturated tills inhibits the downward vertical migration of groundwater to the shallow bedrock aquifer below. Limited vertical conduits are available for downward flow due to the presence of a number of Site wells that are screened across the overburden and into the weathered bedrock and shallow bedrock at the Site.

Results from the 2005 pump test indicated that the overburden aquifer and the bedrock aquifer act as separate aquifers with little if any vertical connection to the shallow bedrock. In addition, the westerly groundwater flow from the east side of Quiggle Brook opposes the easterly groundwater flow from the Site and the west side of Quiggle Brook and therefore provides an additional barrier to significant groundwater movement from the Site beyond Quiggle Brook and enhances the upwelling of both the overburden and bedrock (weathered and shallow) groundwater to discharge to Quiggle Brook.

Hydrogeology – Bedrock

The bedrock aquifer at the Site consists of a weathered bedrock zone, a shallow bedrock zone and a deep bedrock zone. Groundwater flow in the upper weathered portion of the bedrock is likely similar to that of a well sorted unconsolidated granular deposit. Results from the 2005 pump test indicated that the deep overburden till located above the weathered bedrock acts as a confining layer with very little if any communication between the overburden and bedrock strata. In addition, opposing westerly flow from the watershed located east of Quiggle Brook opposes the easterly flow from the Site in the weathered bedrock, enhancing artesian groundwater flow from the weathered bedrock upward to Quiggle Brook. The boring logs indicated that the granite and schist encountered in the shallow bedrock in several of the borings showed varying degrees of weathering, were more highly fractured, and were structurally folded. The folding combined with the higher relative degree of fracturing and differential weathering likely results in a higher hydraulic conductivity within the shallow bedrock at the Site. The weathered bedrock is the primary bedrock water bearing zone with comparatively appreciable flows of groundwater (relative to the substantially less fractured shallow bedrock groundwater flows).

Bedrock characterized as shallow bedrock is located at depths above 225 feet bgs; lies below the weathered bedrock; is overlain by a confining layer of dense tills and clays; and has significantly fewer fractures than the weathered bedrock. Artesian conditions in the shallow bedrock are

strongest where the screens of bedrock wells are set at significant depths below the confining silt and clay tills or granite bedrock. Groundwater gauging results suggest that groundwater flow in the shallow bedrock at the Site generally follows the topography of the bedrock surface and flows in an easterly and southeasterly direction towards Quiggle Brook. Constructed potentiometric surface maps of the bedrock indicate that groundwater along the east side of the Site continues to discharge to Quiggle Brook. Along the south/central side of the Site, groundwater flows in a more east/southeasterly direction in the shallow bedrock toward Quiggle Brook.

Based on the geology of the Site, the primary conduits for groundwater flow in the bedrock appear to be along geologic contacts and foliation fractures located primarily within the weathered granite and schist related to the Site synform fold. In the deeper bedrock beneath the structural fold, groundwater flow is anticipated to occur within water bearing fractures related to the geologic contacts between the gneiss and the intruded granite pegmatite at the Site. In these deeper basement rocks, fractures were recorded to be less frequent. Geophysical logging of the shallow bedrock in the well borings at the Site identified a predominant northeast-southwest trend in the strike of fractures, with the southeasterly dip perpendicular to the strike of the fractures. This observation is applicable to bedrock at depths ranging from the bedrock surface to depths above 175 feet bgs. The resulting groundwater flow direction in bedrock above the 175 foot bgs depth would be anticipated to be southeasterly. Potentiometric surface maps generated from bedrock well groundwater elevations that are screened above this depth also infer that the bedrock groundwater flow would trend southeasterly. At shallow depths, the groundwater flow will be dominated by the hydraulic gradient which is southeasterly toward Quiggle Brook.

The northeast-southwest trending fractures in the folded granite and schist are fractures likely related to the metamorphism, folding and resultant foliation of the rocks. The folded granite and schists in the shallow bedrock at the Site are believed to make up the primary water bearing unit of bedrock. Where the bedrock fold transitions to a basement gneiss that is intruded by granite pegmatite to the west and southwest, the fracture connectivity appears to decrease and is likely related to the lack of schistosity in the gneiss and granite pegmatite. Where this transition in rock type occurs, fracture continuity will decrease and where the continuity exists it is likely related to changes in bedrock lithology (gneiss to granite pegmatite and vice versa).

Geophysical logging of wells drilled into the deeper bedrock at the Site identified a predominant northwest-southeast trend in the strike with a perpendicular dip to the southwest of the fractures at depths deeper than approximately 175 feet. The strike and dip of the deep bedrock fractures are 90 degrees out of phase with the shallow bedrock fractures. These fractures in the deeper bedrock at the Site are located predominantly in the gneiss which is intruded by granite pegmatites. Geophysical logging identified these fractures as being tiny, non-porous and associated with changes in lithology. Although fractures were observed during the logging of the deeper bedrock wells, the ability of these deep bedrock fractures to transmit water was observed to be limited during high pressure flow meter stress testing and may be minimal due to the fractures not being connected (dead end) and the compressive weight of the overlying rock

and overburden which tends to decrease fracture aperture and yield. This finding is similar to other investigations reported in the literature that have shown that the average permeability of metamorphic and plutonic igneous rocks decreases rapidly with depth. Bromide tracer tests performed on well ODW at screened intervals of 225 feet to 245 feet bgs suggested groundwater flows at these depths were below 0.8 feet/year. The combination of rock type change at depth (gneiss and granite pegmatite instead of quartz mica schist and granite), decreased number of fractures, opposing fracture orientations (predominant strike and dip to the southwest), smaller fracture aperture and lower fracture frequency suggests that a connection(s) between the shallow bedrock fractures and the deeper bedrock fractures is minimal.

Groundwater velocities derived from the 2005 B-6A-D pump test in the shallow bedrock portion of the aquifer indicated that groundwater flows at 1.8 feet/year and is believed to be indicative of the likely Site bedrock groundwater velocity.

Nature and Extent of Contaminants in Groundwater

The Conceptual Site Model for the contaminant plumes has been developed for the separate overburden and bedrock aquifers using contaminant distribution maps, hydrogeologic characteristic data, and Site geologic data in addition to the results of literature research. Contaminants in the overburden have separate fate and transport characteristics from those of the bedrock as both aquifer units are separated by a very dense silty sand till and very dense clay till layer. However, natural attenuation mechanisms apply to both the overburden and bedrock aquifers and include dilution from recharge and volatilization.

Though the investigations and results of the remedial actions have focused on the four major contaminants, 1,1 DCA, TCE, DCE and DMF, the other contaminants that have been detected at the Site have been observed to be generally contained within the 1,1 DCA plume extent in both overburden and bedrock. Given this relationship, the observations, fate, transport and conclusions for the four major contaminants can also be expected for the other contaminants at the Site.

Overburden

The results of numerous gauging rounds at the Site have demonstrated that the inferred groundwater flow in the till generally flows from west-northwest to east-southeast across the Site and follows preferential pathways. As groundwater migrates east across the Site, groundwater flow is retarded by the increasingly fine-grained and consolidated nature of the till, and begins to follow preferential pathways associated with changes in the relative contents of boulders, silts and clays. Downward gradients in this area and the slowing of groundwater may cause VOCs/SVOCs to sorb to the organic rich silts and clays of the tills. Groundwater migration in the overburden eventually discharges to Quiggle Brook due to opposing gradients from the eastern ridge and is retarded from moving past Quiggle Brook by the very dense clays of the till in central portion of the Site. Due to the very fine-grained and dense nature of the till in this area, VOC/SVOC contaminants are likely to remain, in part, sorbed to the till matrix. Upward

gradients observed in monitoring wells likely reflect the confining nature of the till and the head provided by the western ridge, the eastern ridge and Fish Pond.

The groundwater flow paths defined above describe groundwater movement and provide a narrative for describing advective transport of contaminants with groundwater flow. However, in the areas of the Site with the lowest groundwater flow velocities (till with clays and silts), sorption may be strong enough to negate advective transport entirely and slow the diffusion and partitioning of the VOCs into the groundwater from the soil matrix. Though this condition mitigates the migration of the VOC/SVOC contaminant plumes, these sorptive properties of the overburden soils will likely extend the amount of time required to flush the VOC/SVOC contaminants from the overburden aquifer and thereby extend the amount of time to achieve the Performance Standards for the Site. It is likely that the soils upon reaching a maximum concentration of sorption will undergo desorption as the effects of dilution change the equilibrium concentrations in the groundwater. Under these conditions, dilution and localized areas of microbial degradation of the VOC/SVOC contaminants become the most important attenuation mechanism for pollutants after they reach the water table. Pollutants in groundwater flowing through porous media tend to become diluted in concentration due to hydrodynamic dispersion occurring on both microscopic and macroscopic scales. These mechanisms produce a longitudinal and lateral spreading of a pollutant within the groundwater so that the volume of groundwater affected increases and the contaminant concentration decreases with distance traveled.

The CSM evaluated the effects of uncontaminated groundwater diluting the VOC/SVOC contaminant concentrations in the groundwater for time periods between Quarter 1 (Summer 1992) through Q39 (Fall 2008). It was determined that concentrations of dissolved groundwater VOCs/SVOCs fluctuated by dilution around a central VOC/SVOC value that represented groundwater VOC/SVOC concentrations in equilibrium with soil (a generally stable plume), regardless of soil type. The central VOC/SVOC equilibrium concentration value varied by well location and period of time as a direct result of the remediation efforts. The active remediation reduced the maximum observed groundwater equilibrium contaminant concentrations over time. While dilution rates generally should differ for soil type, the dilution rate differences between soil types was observed to be small as a result of the overall low groundwater flow rate of the aquifer. These observed similar dilution effect results remained consistent during the pre-remediation and post-remediation periods which indicates that a representation of the maximum dissolved contaminant concentration in groundwater in equilibrium with soil can be achieved over long contact periods and that these long contact periods occur during periods of seasonal stagnant groundwater flows or in an aquifer that has consistent low flow conditions. The observed limited effects of dilution suggest that though the concentrations of VOC/SVOC contaminants at the Site can be affected by the seasonal variations of recharge in the overburden aquifer, the resultant overall reduction if any in the observed groundwater equilibrium concentrations indicate that transport of the contaminants by advective flow is intermittent. A review of the effects of dilution indicated that the dissolved VOC/SVOC plume in the overburden is stable and is neither expanding nor contracting at this time.

Overburden groundwater velocities were calculated using the range of historical seasonal hydraulic gradient values and the hydraulic conductivity values derived from the 2007 overburden slug tests. Groundwater velocities for the shallow overburden ranged from 4.3 feet/year to 21.9 feet/year; for the intermediate overburden 0.87 feet/year to 12.7 feet/year; and for the deep overburden 0.04 feet/year to 0.20 feet/year. The range in calculated velocities decreasing with depth indicates a variable nature of groundwater flows related to Site geology with likely preferential flow pathways for groundwater in the overburden.

To determine the rate of horizontal advective flow through overburden soils, retardation factors were developed in the CSM for the four primary Site VOCs/SVOCs that included DMF (1.26), 1,1 DCA (2.75), DCE (2.59), and TCE (5.24). Calculated contaminant flows by advection through the shallow overburden ranged between 0.2 feet/year and 12.0 feet/year; through the intermediate overburden 0.1 feet/year and 10.1 feet/year and through the deep overburden less than 0.03 feet/year. The range in flow velocities were contaminant dependent and were generally slower with increasing depths and in areas where the very dense and dense silt and clay tills are located. In addition to the calculated minimum and maximum advective flows by contaminant type, the time for transport to the discharge point (Quiggle Brook) was also calculated and varied by the distance from Quiggle Brook. Times for contaminant travel to the discharge point in the overburden ranged between 4-22 years for DMF; 10-53 years for 1,1 DCA; 9-48 years for DCE; and 18-97 years for TCE.

A biodegradation screening was also conducted from natural attenuation data collected since Q31. The central and eastern portions of the remediation area showed limited to adequate evidence of biodegradation. Areas with evidence of biodegradation typically had higher dissolved concentrations of VOCs/SVOCs, lower hydraulic conductivities, and were located in areas with relatively more dense silt and clay tills.

In addition to an evaluation of the advective transport mechanisms at the Site, rates of decay were calculated for the attenuation mechanisms using a first order rate equation and data from Q28 to Q37 and Q39 for overburden. Q39 VOC/SVOC dissolved groundwater contaminant concentrations were combined with the sorption coefficients to determine the total amounts of VOC/SVOCs at the Site. The calculations were based on the average concentrations of VOCs/SVOCs that can be left in the soils and still meet the groundwater cleanup levels. While the concentrations of VOCs/SVOCs remaining in the soils for purposes of this calculation also meet the soil cleanup levels, these concentrations are assumed to represent the concentration of VOCs/SVOCs remaining in the soils that will be available to groundwater (water-soil contact) and still have the ability to desorb or partition to groundwater. Due to the dense nature of the silty sand and clay tills to which most of the VOCs/SVOCs are likely sorbed at the Site, there may be volumes of overburden soils in which there are concentrations of VOCs/SVOCs that are not available to groundwater and therefore permanently sorbed. This is based on the hypothesis that most low solubility organic contaminants can never be completely flushed from a soil matrix because some volume of the contaminant becomes almost irreversibly bound to the organic matter in soil. The longer a contaminant has been surface-adsorbed within a soil matrix, the more the contaminant will diffuse into the micropores of the soil surface, moving away from the

surface and into the particle interior. This aging process retains the contaminant molecules in remote sites within the solid particle rendering it less accessible to biological, chemical and physical changes and leaving the compound less available for desorption and partitioning to groundwater. Some literature indicates that after as little as 1 to 10 years a fraction of the contaminant mass will no longer be available for desorption from soil (for example, see Eugene Weiner's Application of Environmental Chemistry, 2000).

The decay rates calculated were used to determine the length of time required to meet groundwater cleanup levels. Decay rates for the overburden were 14 years for DMF; 107 years for 1,1 DCA; 20 years for DCE; and 13 years for TCE. Differences between the times for contaminants to arrive at the discharge point (Quiggle Brook) through advective flow and the calculated rates of decay are attributed to the other primary attenuation mechanisms of biodegradation and dilution.

Bedrock

Weathered bedrock overlies the surface of the shallow bedrock with a maximum thickness of approximately five feet below the confining layer of overburden dense silt and clay tills. The highly weathered horizon has been categorized as a fine to medium sand in some of the boring logs, providing a comparatively more porous transport pathway relative to the underlying bedrock. Groundwater flow in the weathered rock is anticipated to follow the slope of the bedrock surface and migrate east and southeast towards Quiggle Brook. The upward gradient conditions observed on the eastern portion of the Site will likely cause a corresponding upward migration of VOC/SVOC contaminants from the weathered bedrock to the discharge point, Quiggle Brook.

Shallow bedrock is defined as being below the weathered bedrock and approximately 110 to 225 feet bgs. Core logs from several of the shallow bedrock wells indicate that the upper 15 to 50 feet of the bedrock is moderately fractured. Numerous horizontal to subhorizontal fractures were noted in the upper cores, with a general decrease in fracture frequency and aperture with depth. Steeper dips and joints were observed in deeper core samples, such that groundwater migrating under downward gradients on the western and central portions of the Site would likely move through the weathered bedrock layer and would likely flow down dip and to a lesser degree along the strike of the fractures. As with the overburden and weathered bedrock, the upward gradients that occur along the eastern portion of the Site, adjacent to Quiggle Brook, will limit the downward and eastward migration of the contaminants in the shallow bedrock. Evidence of artesian conditions is commonly observed in shallow bedrock monitoring well B-12A-D, located adjacent to the brook. These artesian conditions are likely the result of the steep hydraulic gradient from the western ridge opposing groundwater flows from the eastern ridge and the confining nature of the clayey till overlying the bedrock. Water from Fish Pond is likely hydraulically connected with the bedrock at the Site via the same small aperture fractures observed in the Site bedrock and may result in further dilution of the VOC/SVOC contaminants as they discharge to Quiggle Brook.

Based on available cross sections and boring logs, bedrock wells B-6A-D and B-8A-D are screened within, or adjacent to, the weathered quartz mica schist bedrock and are hydraulically connected within the boundaries of a structural fold. The comparatively transmissive layers of weathered bedrock and the screening of well B-6AD within the lower base of the fold in particular make the area around well B-6A-D a natural pooling location for VOC and SVOC contaminants. While the geological fold is likely to have provided an area for the accumulation of VOCs/SVOCs in the Site bedrock aquifer, the fold appears to pinch out to the west and south from well B-6AD. The structural fold likely terminates between well NBW and well B-8A-D to the west and in close proximity to well B-8AD. The effect of this pinching out has been that dispersion of contaminants has occurred within this fold while nearly precluding the migration of the VOC/SVOC contaminants to the south and west outside of the folded region. The pinch out has created a dead end for groundwater flow within the fold with very slow VOC/SVOC concentration reductions in wells B-6A-D and B-8A-D as groundwater flows are limited to these wells (between 0.6 feet/year and 1.8 feet/year). The dead end effect of the pinch out has also inhibited significantly elevated concentrations of VOCs/SVOCs (greater than 10 to 100 times the cleanup levels) from migrating in the bedrock down-gradient to the south and west of this area.

While preferred pathways in the bedrock fractures may provide conduits for small volumes of VOC/SVOC contaminated groundwater to migrate from the contaminated areas of the weathered bedrock and the quartz mica schist structural fold to down-gradient portions of the bedrock, the Q30 through Q39 data do not indicate that the bedrock aquifer contaminant plume(s) as a whole have migrated vertically into the bedrock or horizontally beyond their respective inferred plume area(s) over the seven year time period since Q30. Therefore, the dissolved VOC/SVOC bedrock contaminant plume is considered stable and neither expanding nor contracting. The installation of additional bedrock monitoring points (NBW-U and NBW-L) has expanded knowledge of the plume area(s) and therefore the inferred plume area(s) that were shown on figures presented in the Q30 through Q39 reports changed, however these changes are the result of additional cross gradient well coverage and not likely attributable to an actual expansion of the contaminant plume area.

Sorption in bedrock plays a smaller role in contaminant transport processes than in the overburden but the effects of dilution on contaminant equilibrium concentrations in the bedrock aquifer are similar to those observed in the overburden. Dilution factors in bedrock were found to be similar to those in the overburden (between 1.2 and 2.6). It was also observed that concentrations of dissolved groundwater VOCs/SVOCs fluctuated by dilution around a central VOC/SVOC value that represented groundwater VOC/SVOC concentrations in equilibrium with soil (a generally stable plume), regardless of the rock type. For the Site the central VOC/SVOC equilibrium concentration value varied by well location and period of time as a direct result of active remediation which reduced the maximum observed groundwater equilibrium contaminant concentrations over time. Although dilution rates generally should differ in the rock due to the number of fractures, fracture size, apertures etc., the dilution rate differences between Site rock types was observed to be small as a result of the overall low groundwater flows in the bedrock due to the small number, size and poor connectivity of the fractures in the bedrock aquifer. The observed limited effects of dilution suggest that though the concentrations of VOC/SVOC

contaminants in the bedrock at the Site can be affected by the seasonal variations of recharge, however the resultant overall reduction, if any, in the observed groundwater equilibrium concentrations indicate that transport of the contaminants by advective flow in the bedrock aquifer is minimal. A review of the effects of dilution indicated that the dissolved VOC/SVOC plume in the bedrock aquifer is stable and is neither expanding nor contracting.

Groundwater velocities were calculated using the range of historical seasonal hydraulic gradient values and the hydraulic conductivity values derived from the 2005 pump tests and from the 1989 pump test. Calculated bedrock groundwater velocities were found to be very low and ranged from 0.6 feet/year within the fold to 15 feet/year outside of the fold. The range in calculated velocities shows the variable nature of potential groundwater flows through the bedrock, however these slow groundwater velocities help to explain the observed effect that the structural fold beneath the Site has had on trapping and slowing contaminant migration in the shallow bedrock.

The rate of advective flow through the bedrock was estimated conservatively and therefore was not related to retardation factors. Due to the effects of dispersion, maximum calculated contaminant flows by advection through the bedrock are believed to be at half the rate of the above calculated maximum groundwater flows and range between 0.3 feet/year in the fold to 7 feet/year outside of the fold, with an average of 3.5 feet/year. During periods of slower groundwater flow in the bedrock aquifer, diffusion is expected to play a more important role in contaminant transport than advective flow with resultant slower contaminant migration velocities.

A bioattenuation screening was conducted using groundwater data collected from Site bedrock wells. The screening indicated that evidence of reductive dechlorination was adequate for well B-6-AD, limited for wells B-5-AD, B-12-AD, B-8-AD, and B-15-D, and inadequate for well B-4BD. Areas with evidence of biodegradation typically had higher dissolved concentrations of VOCs/SVOCs, lower hydraulic conductivities, and were located within the structural fold.

In addition to an evaluation of the advective transport mechanisms at the Site, rates of decay were calculated for the applicable attenuation mechanisms using a first order rate equation and data from Q14, Q24, and Q 34 for the bedrock. The decay rates calculated were then used to determine the length of time required to meet the cleanup levels for the Site. Decay rates for the shallow bedrock were 7 years for DMF; 345 years for 1,1 DCA; 30 years for DCE and 12 years for TCE.

Deep bedrock is defined as the bedrock located greater than 225 feet bgs and consists of gneiss that is intruded by granite pegmatites. Geophysical logs have also indicated that limited groundwater flow exists at these depths and that fracture frequency of (7.1/ 100 feet) and aperture size decrease due to overlying lithostatic pressures. Fractures related to the intrusions in this rock are likely more discontinuous and not interconnected, and thus limit the ability of the rock to transmit significant volumes of groundwater.

A tracer test performed at well ODW-L was used to determine the transmissivity and flow of the deep bedrock. The results indicated that groundwater flows at a rate of 0.03 feet/year to 0.2 feet/year in the deeper bedrock. Thus, under non-pumping conditions migration of the VOC/SVOC contaminant plume is believed to be limited by the number, size and transmissivity of fractures in the deep bedrock. Very limited migration of contaminants is likely to occur in the deep bedrock where very little connection exists (if any) to the shallow bedrock.

The presence of low concentrations of VOCs in well ODW-L indicates that this well was minimally connected to the contaminant plume at the Site under pumping conditions where groundwater with a high concentration of VOCs was able to provide dissolved concentrations for migration under a strong gradient; however, it is more likely that the detected contaminants in this well are the result of a connection to the fractures where ODW-U is screened via the well annulus. Well ODW was used as a water supply well for the former Union Chemical Company facility up until 1985. The ODW well was constructed by the facility as an open borehole (approx 6 inches in diameter) in the bedrock from a depth of approximately 69 feet bgs to 300 feet bgs. Wells ODW-U and ODW-L were installed within the open borehole of well ODW in June 1992 using PVC well materials and grout to create two separate sampling wells with well screens at two separate fracture zones separated by the injected grout within the open borehole of well ODW. Contaminants drawn into the fracture zone of shallow bedrock fractures (the well screen for ODW-U is located at approximately 175 feet bgs) during pumping for the historical facility operations could have been sufficient to also draw low concentrations of VOCs into the vicinity of the deep bedrock fractures represented by well ODW-L or via leaks between the annulus and casing of well ODW. If there is a hydraulic connection present between shallow and deep bedrock, it is likely a direct connection to the fractures at shallow depths (well ODW-U) or to discontinuous fractures in the vicinity of ODW-U that were impacted by dilute VOC concentrations resulting from the historical pumping activities of the facility which were conducted over the full depth (300 feet) of well ODW up until 1985. It is believed that the pumping of groundwater from well ODW by the former facility concurrently with a condenser leak and deep well injection (also from the facility) which released high concentration VOCs/SVOCs to well OPW is the cause of the VOC contamination in the bedrock aquifer and the fractures of the bedrock at the Site. A hydraulic connection from well OPW to well ODW was confirmed by the 2005 pump test. It is likely that under static low groundwater flow conditions the groundwater flow traveling south-southeast through bedrock will not transmit high concentrations of VOCs. This is likely due to the limited ability of the rock to transmit significant volumes of water and poor hydraulic connectivity of the shallow and deep bedrock fractures to the high concentration VOC/SVOC source areas.

Given the strong role that diffusion plays over other contaminant transport mechanisms under very slow groundwater velocities, it is expected that the southernmost concentrations of VOCs/SVOCs dissolved in the bedrock groundwater would meet the VOC/SVOC groundwater cleanup level for DCA (5 ppb) established for the Site within approximately 35 feet to 50 feet horizontally down-gradient of well ODW. The horizontal distance from well ODW to the down-gradient property line is approximately 250 feet to the South.

4. Restoration Potential

A number of remedial technologies have been aggressively implemented at the Site over the past 20 years including off-Site disposal of approximately 2,500 55-gallon drums and 28 tanks with their contents; the decontamination, demolition and off-Site disposal of the original Site buildings; and the operation of a soil and groundwater treatment plant that removed approximately 9,500 pounds of VOCs from the Site's subsurface. The most recently applied remedial technologies for Site groundwater were chemical oxidation treatment using permanganate (1998-2000); an attempt to enhance the biological degradation within a reducing environment via carbon additions to the subsurface (2001-2002); and chemical oxidation treatment using hydrogen peroxide (2005). Sufficient VOC/SVOC contaminant mass reduction has been achieved for closure of the unsaturated and upper strata saturated soils at the Site. Significant reductions in VOC/SVOC contaminant concentrations in groundwater have also been achieved.

The VOC/SVOC contaminant concentrations appear to have stabilized at the Site; however, seasonal patterns in the contaminant concentrations at individual wells have also been observed. VOC/SVOC concentrations have generally been observed to be comparatively higher in most areas of the Site during time periods when the groundwater table is depressed (during the fall season) and lower when the groundwater table is elevated (during the spring season). This well specific trend indicates that the overall volume of VOC/SVOC contaminants present in the groundwater and sorbed to the saturated soils is likely to be stable. The changes in the reported contaminant VOC/SVOC concentrations during the spring and fall seasons can be attributed to changes in the volume of available recharge water to the Site subsurface which has a fixed mass of VOC/SVOC contaminants.

Based on the observed declining trends in the VOC/SVOC contaminant concentrations at the Site, the VOC/SVOC contaminant plumes appear to have stabilized. The low permeability conditions in the subsurface and the resultant low groundwater velocities further limit or retard the movement of the residual VOCs/SVOCs at the Site. The limited VOC/SVOC plume migration that has been observed at the Site since the conclusion of the carbon additions in 2002 and over the assessment history of the Site (1982 to the present), indicates that such factors as advection and hydrodynamic dispersion are likely being retarded by the low permeability and low transmissivity of the clay, till, and bedrock formations at the Site. These subsurface properties will also result in a much greater time period required for the Site VOC/SVOC contaminants to reach Quiggle Brook, the receptor of primary concern, and will also result in additional time for natural attenuation of the VOC/SVOC contaminants to occur at the Site. As discussed above, VOCs have not been detected in Quiggle Brook since Fall 1998.

At this time it is estimated that approximately 420 pounds of the four primary contaminants (DCA, DCE, TCE, and DMF) remain in the subsurface at the Site. Attempts to further reduce VOC/SVOC contaminant concentrations at the remaining hot spots via chemical oxidation could not achieve the target cleanup levels due to the limited permeability of the overburden and weathered bedrock formations. Carbon source additions proved successful in creating and/or

returning the Site to a reducing environment; however, evidence that the reducing environment accelerated the biodegradation of the primary contaminants, to the extent that this technology could achieve a timely, near future cleanup of the Site were not observed. The 2005 bedrock pump test with subsequent hydrogen peroxide additions proved successful in gaining hydraulic control over the bedrock aquifer of the Site, confirming hydraulic connections that exist solely within the bedrock under pumping conditions, and reducing groundwater VOC/SVOC concentrations in individual bedrock monitoring wells. However, evidence that hydrogen peroxide and pumping can oxidize sufficient volumes of VOCs to the extent that this technology could achieve a timely, near future cleanup of the Site were not observed. The implementation of these *in-situ* chemical oxidation and enhanced biodegradation options combined with groundwater pump and treat further demonstrated the limited effectiveness of any fluid based remediation technology alternative at the Site to remediate the groundwater. Previous contractors also applied vacuum extraction, groundwater pump and treat and heated air injection based remediation technologies at the Site. These remedial approaches met the 1990 ROD cleanup levels set for the unsaturated soils. Groundwater pump and treat has been applied extensively to the overburden, weathered bedrock and bedrock aquifers with limited effectiveness.

Each of these remediation technologies were limited by the geology/hydrogeology of the Site. The very dense till units in the overburden with their substantial thicknesses have very low permeability and high sorptive capability. Therefore, the tills will not transmit very much water nor will the tills transmit much air through the available particle void spaces which are very small. Due to their high sorptive nature, the tills will be very slow to release adsorbed VOCs/SVOCs due to the strength of their surface area bonding potential. The presence of preferred pathways through the overburden will also reduce the effectiveness of any remedial technology since the application of mechanical, fluid and media driven technologies will also follow these paths of least resistance. The weathered bedrock and bedrock aquifers exhibit poor transmissivity and connectivity of bedrock fractures. In addition, the bedrock fractures are low in number and small in size. Therefore, adding treatment media or reversing groundwater flows is largely ineffective in the bedrock aquifer.

The calculated time it will take for the overburden to achieve the groundwater cleanup levels are as follows:

- Dimethylformamide (DMF) 14 years
- 1,1 dicholoroethane (1,1 DCA) 107 years
- Cis 1,2 dichloroethene (DCE) 20 years
- Trichlorothene (TCE) 13 years

The calculated time it will take for all areas of the bedrock to achieve the groundwater cleanup levels are as follows:

- Dimethylformamide (DMF) 7 years
- 1,1 dicholoroethane (1,1 DCA) 345 years
- Cis 1,2 dichloroethene (DCE) 30 years
- Trichloroethane 12 years

5. Cost Estimates

Cost estimates were developed for containment remedial alternatives as no alternatives were identified that could restore the groundwater within a reasonable timeframe. The cost estimates used EPA guidance that states that net present worth costs estimates are to be made for 30 years using a 7% discount rate. These costs are likely to be exceeded as aquifer restoration is likely to take approximately 345 years. At this time, there are no technologies that could potentially restore the bedrock and overburden aquifers within a reasonable time frame.

Estimated costs were developed for the retained remedial alternatives: long term monitoring; *in-situ* chemical oxidation with soil mixing; *in-situ* electrical resistance heating, and a no action alternative. The costs for both active alternatives included pre-design fieldwork, design, installation, and then operating each for thirty years.

The net present worth estimate for the long term monitoring was approximately $322,370 over a thirty year period. The net present worth estimate for *in-situ* chemical oxidation with soil mixing was approximately $9,340,000 over a thirty year period. The net present worth estimate for *in-situ* electrical resistance heating was approximately $15,960,000 over a thirty year period.

G. SUMMARY OF SITE RISKS

The Site is located on Route 17 in Hope Maine. The area along Route 17 is zoned Business Transition District 3, which allows business and service uses, as well as retail use of buildings smaller than 15,000 square feet that are consistent with the residential and rural character of the Town. All properties in the area around the Site rely on private water supply wells. With the significant reduction in contamination in the soils and groundwater, there have been discussions with the Town of Hope about redevelopment of the Site. It is therefore likely that the Site will be occupied for commercial or residential use at some time in the future. The following section provides an evaluation of risks to human and ecological receptors based on recent data collected and current and future use scenarios for the Site.

1. HUMAN HEALTH RISK

Human health and ecological risk assessments were prepared for the Site during EPA's initial investigation. The human health risk assessment considered risks associated with contaminants detected in groundwater, surface and subsurface soils and surface water. Both carcinogenic and non-carcinogenic risks were evaluated. At the time of the initial investigation, future residential consumption of groundwater at the Site was the only exposure pathway that represented a risk

above EPA target levels. Important contributors to this risk included the solvents TCE, 1,1-DCE, and 1,1-DCA. Cleanup goals were established in the 1990 ROD for all contaminants based upon federal and state drinking water standards. The most recent groundwater data shows that cleanup levels are exceeded for 1,1-DCA, cis-1,2-DCE, trans-1,2-DCE, TCE, 1,1-DCE, vinyl chloride, and MEK. The 2012 Five-Year Review reaffirmed that future ingestion of groundwater remained an unacceptable risk. Because the Site is undeveloped, no one is using the groundwater, and the Site property is held in receivership by the MEDEP, there is no present human health risk at the Site. The consumption of contaminated groundwater at the Site, however, continues to pose a future risk.

In 2002, EPA published guidance[2] on evaluating the vapor intrusion pathway from the volatilization of solvents adsorbed onto soil or dissolved in groundwater. In 2006, EPA's laboratory completed an analysis of shallow groundwater samples. Using the 2002 guidance, EPA could not rule out the potential for a vapor intrusion pathway and the 2007 Five-Year Review stated that prior to the property being redeveloped, the potential vapor intrusion pathway would need to be addressed.

More recently, EPA has issued new toxicity values for TCE and PCE, as well as new vapor intrusion screening levels for multiple chemicals. The vapor intrusion screening levels can now be calculated using EPA's Vapor Intrusion Screening Level (VISL) calculator spreadsheet[3]. This calculator considers the target cancer and non-cancer risk levels and the receptor type to either residential or commercial/industrial exposures. In addition, the groundwater temperature can be changed from the default 25 °C to a site-specific groundwater temperature. To update the screening levels for residents and workers, the VISL calculator was set to a cancer risk level of 10^{-4} (the maximum acceptable cancer risk level at Superfund sites), a Hazard Quotient (HQ) =1 (the maximum acceptable non-cancer risk at Superfund sites) and the site-specific groundwater temperature of 12 °C. Table 7 presents the maximum concentrations detected in the overburden in 2012 and the cancer and non-cancer risks via the vapor intrusion pathway.

[2] OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)", November 2002, EPA530-D-02-004
[3] The VISL calculator and other technical documents are available at http://www.epa.gov/oswer/vaporintrusion/

TABLE 7 UPDATED VAPOR INTRUSION PATHWAY SCREENING LEVELS

Contaminant	Maximum Concentration in 2012 (µg/L)	Monitoring Well	VI Carcinogenic Risk	VI Hazard Risk
1,1-DCE	58	B-12B-I	No IUR	0.18
trans-1,2-DCE	700	P-20	No IUR	1.1
cis-1,2-DCE	1220	P-20	No IUR	No RfC
1,1-DCA	1750	B-12B-I	1.5×10^{-4}	No RfC
MEK	1060	B-9A-I	No IUR	2.5×10^{-4}
TCE	98	P-20	4.7×10^{-5}	9.8
ethylbenzene	154	B-12B-I	2.3×10^{-5}	2.2×10^{-2}

IUR: Inhalation Unit Risk
RfC: Reference Concentration

The updated results indicate that the maximum detected concentrations exceed the vapor intrusion carcinogenic risk for residents for 1,1-DCA and non-carcinogenic risks for residents for trans-1,1-DCE and TCE at the maximum acceptable risks of 10^{-4} and HQ = 1, respectively. While there is no current residential risk because the Site is currently undeveloped, there is a potential future risk should structures be built on the property. Based on the updated TCE toxicity value, the maximum TCE concentration would also create risk for commercial workers. Future residential or commercial exposures will be prevented through the use of institutional controls that will require appropriate vapor barrier or remediation technology in any future buildings on the Site.

Screening levels are not presented for PCE, vinyl chloride, and total xylenes as these contaminants were not detected in the overburden groundwater which would act as the source for the vapor intrusion pathway.

2. RISK TO ENVIRONMENT

An environmental assessment was conducted in 1989 for the Site that incorporated the results of the wetlands assessment and RI field sampling activities performed. Overall, this environmental assessment concluded that, while significant hazards did not exist, potential impacts could occur to the wildlife population at the Site if they came in direct contact with the contaminated soils, sludge, and facilities. Finally, this assessment concluded that the organic and inorganic contaminants observed in Quiggle Brook would not adversely affect the benthic organisms in the Brook. With the removal of the facilities and the remediation of the soils and sludge in

accordance with the 1990 ROD implemented remedy, the risk to environmental receptors was further reduced.

As part of the Five-Year Review process, ARARs, exposure pathways, and changes in toxicity have been reviewed. Neither the 2007 nor the 2012 Five-Year Review identified any new ARAR or exposure pathway relative to environmental receptors. The change in the TCE toxicity value does not affect the environmental risk since it is not detected in Quiggle Brook (Additionally, there are no freshwater Maine Statewide Water Quality Criteria for the organic compounds present in the groundwater plume).

H. REMEDIATION OBJECTIVES

The 1990 ROD developed the following eight remedial action objectives to address contamination at the Site:

1. Prevent further leaching and migration into the groundwater of contaminants in the soils on the Site, by removal and treatment of contaminants above specific concentrations throughout the Site.
2. Provide rapid restoration of the contaminated groundwater throughout the Site, to concentrations that will protect current and future users, as well as natural resources (i.e., wildlife) that come into contact with the contaminants contained within the groundwater.
3. Protect off-site groundwater and surface waters (particularly Quiggle Brook) by preventing further migration of the contaminated on-site groundwater.
4. Prevent ingestion or absorption of contaminants (particularly dioxins) contained within the incinerator equipment remaining on the Site.
5. Prevent inhalation of friable asbestos from the Still Building.
6. Remove all existing structures located on the Site to allow for the cleanup of contaminated soils found throughout the Site.
7. Remove all other contaminated materials from the facilities so that the Site will be suitable for all potential future uses.
8. Further evaluate and, if necessary, minimize and/or mitigate any potential risks to public health and the environment from potential soil impacts due to contaminants which were previously emitted from the UCC Site incinerator.

All RAOs, except the second one above, have been achieved through the demolition of the facilities, implementation of the soil vapor extraction system, monitoring of off-site soils, and active remediation of the groundwater (thereby preventing migration of contaminants to Quiggle Brook). The remedial action objective not achieved was the rapid restoration of the contaminated groundwater throughout the Site. Because of the technical impracticability of restoring the groundwater (see Section F above for a discussion of the technical impracticability determination), the remedy will no longer require rapid restoration of contaminated groundwater throughout the Site; instead, EPA is replacing that remedial action objective with two new

objectives to address the remaining groundwater contamination and possible exposure pathways. These are as follows:

1. Prevent ingestion of groundwater from the overburden and bedrock aquifers that exceeds groundwater cleanup levels; and
2. Prevent exposure to contaminants that could pose an inhalation risk to future users of the Site.

The December 2009 Conceptual Site Model Report concluded that contamination at the Site is generally stable and slowly declining with low migration potential off-site, and also provided an initial evaluation of the feasibility of *in-situ* and *ex-situ* technologies to address remaining groundwater contamination in light of specific conditions described above. The January 2011 Technical Impracticability Evaluation Report provided a more detailed description and analysis of three alternatives to reduce risks from exposure to contaminated groundwater and these alternatives are presented below.

I. DESCRIPTION OF REMEDIAL ALTERNATIVES EVALUATED

Three remedial alternatives were evaluated in the January 2011 Technical Impracticability Evaluation Report and are presented below as Alternatives 2, 3, and 4. Alternative 1, No Further Action, is required under CERCLA to be evaluated for comparison purposes and it was included in the June 2013 Proposed Plan that announced EPA's recommended approach for the Site.

Alternative 1: No Further Action

This alternative is developed as a baseline for comparison to other cleanup alternatives. The purpose of the No Further Action alternative is to evaluate the overall human health and environmental protection provided by the current remedy at the Site in its current state without any continued work at the Site. Under this alternative, no further active cleanup activities, periodic monitoring, environmental deed restriction, or Five-Year Reviews would be required. Reduction of toxicity and volume of groundwater contamination would continue through natural processes, including chemical degradation, dispersion, and adsorption. It would be unknown if, or when, cleanup objectives would be met under this alternative. The estimated total present value cost of this alternative is $0.

Alternative 2: Technical Impracticability Waiver, Long-Term Monitoring and Institutional Controls

Alternative 2, the selected alternative in this amended ROD, addresses the remaining contamination in groundwater and attains the RAOs as follows:

- The requirement for rapid restoration of contaminated groundwater throughout the entire Site through an active groundwater pump-and-treat system to attain groundwater cleanup levels within a reasonable timeframe is amended by invoking a technical impracticability waiver of the requirement to meet federal and state groundwater standards (identified above as the federal MCLs and non-zero MCLGs, Maine Primary Drinking Water Standards, and Maine MEGs) pursuant to CERCLA § 121(d)(4) because Site-specific hydrogeological and contaminant conditions limit the availability of an advantageous remedial technology. This waiver will be applied to the portion of the Site where groundwater contamination remains in the overburden and bedrock aquifers.

- Long-term monitoring, as required in the 1990 ROD, will be adjusted to support this technical impracticability waiver approach. Long-term monitoring will be used to track the location of groundwater contamination and confirm it remains within the TI Zone, and to track the continued reduction of toxicity and volume of contaminants through natural processes.

- Institutional controls, as required in the 1990 ROD, will be adjusted to support this technical impracticability approach by requiring: (A) an environmental deed restriction on the Site property to, at a minimum, (1) prohibit the use of groundwater, (2) ensure access for monitoring and oversight, (3) prohibit activities that interfere with the remedy and on-site monitoring equipment, and (4) require the application of appropriate vapor barrier or remediation technology in any future buildings on the Site property; and (B) an environmental deed restriction or other mechanism to limit the use of properties adjacent to the Site, as deemed necessary by EPA based on new information, including but not limited to the development of properties adjacent to the Site or movement of the leading edge of either plume.

Consistent with the 1990 ROD, the 2013 AROD will continue to require long-term operation and maintenance of the monitoring wells, and Five-Year Reviews.

Groundwater and surface water would be monitored at locations that would adequately represent overburden and bedrock aquifers and Quiggle Brook. The monitoring will enable EPA and MEDEP to track contaminant concentrations within the plumes and along the plume boundaries. Such tracking will help EPA and MEDEP to confirm the plumes are not expanding, and to monitor the primary ecological receptor, Quiggle Brook, for evidence of impacts from the plumes. EPA anticipates utilizing the existing well network at the Site for this long-term monitoring program. In the future, however, EPA will adjust the extent of the well network, as necessary, based on new information, including but not limited to the development of properties adjacent to the Site or movement of the leading edge of either plume, with new wells along the perimeter of the Site or any other location.

Although this alternative waives groundwater cleanup standards, it is expected that natural processes in the soils and bedrock will reduce concentrations of contaminants to cleanup levels

over time. Because it is projected that it will take more than 300 years for the bedrock to achieve the cleanup levels, environmental deed restrictions will be required to ensure that human health is protected.

The estimated total present value cost of implementing this alternative over 30 years is $322,370.

Alternative 3: *In-situ* Chemical Oxidation with Soil Mixing

In-situ chemical oxidation (ISCO) would be used to reduce the remaining contamination in four areas of the saturated soils and bedrock where contaminant concentrations are at least one order of magnitude greater than adjacent areas. A chemical oxidant, such as permanganate, would be introduced into the soils using soil mixing techniques. While previous ISCO attempts between 1997 and 2000 significantly decreased contamination levels, the efforts were unable to reduce contaminant concentrations down to cleanup levels in these areas because of the sorptive properties of the contaminants and the limited permeability and transmissivity of the soils and bedrock. To help overcome the limited permeability and transmissivity, soil mixing techniques would be used in the saturated soils to more effectively distribute the chemical oxidant. This soil mixing technique, however, is limited in that it cannot be applied to contaminated groundwater in the bedrock.

Because this alternative would not shorten the 300 plus year timeframe to restore the groundwater in bedrock to cleanup levels, this alternative would also require a technical impracticability waiver of groundwater cleanup standards (identified above as the federal MCLs and non-zero MCLGs, Maine Primary Drinking Water Standards, and Maine MEGs) and institutional controls to ensure that human health is protected. Five-Year Reviews would also be a required component of this alternative.

The estimated total present value cost of implementing this alternative over 30 years is $9,340,000.

Alternative 4: *In-Situ* Electric Resistance Heating

In-situ electric resistance heating (ERH) would be used to reduce the remaining contamination in the saturated soils. ERH consists of placing electrodes in the contaminated areas of the saturated soils and then applying an electric current to the electrodes to heat the soils to a temperature above the boiling points of the contaminants. Operation of the electrodes would promote evaporation, transformation via hydrolysis, and potential destruction of the volatilized contaminants. The volatilized contaminants and steam would be brought to the surface for treatment via a soil vapor extraction system, such as the one used previously at the Site from 1996 to 1998, to attain the cleanup levels in the unsaturated soils.

This technology is effective in any type of soil, but is not effective in the metamorphic and igneous bedrock present at the Site. Consequently, as with Alternative 3, ERH would not shorten the 300 plus year timeframe to restore the groundwater in bedrock to cleanup levels, and

therefore this alternative would also require a technical impracticability waiver of groundwater cleanup standards (identified above as the federal MCLs and non-zero MCLGs, Maine Primary Drinking Water Standards, and Maine MEGs) and require institutional controls to ensure that human health is protected. Five-Year Reviews would be a required component of this alternative.

The estimated total present value cost of implementing this alternative over 30 years is $15,960,000.

J. COMPARATIVE ANALYSIS OF THE REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of remedial options. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives. The nine criteria are summarized as follows:

THRESHOLD CRITERIA:

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

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

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

PRIMARY BALANCING CRITERIA:

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

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

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

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

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

7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present value costs.

MODIFYING CRITERIA:

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

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

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

Because this is an Amendment to the 1990 ROD, only the groundwater remediation component that is proposed for modification will be evaluated in this section. The other components of the 1990 ROD remedy (facilities, on-site soils, and further investigation of off-site soils) have been successfully completed.

COMPARATIVE ANALYSIS:

The following is a summary of the comparison of the strengths and weaknesses of each of the three Technical Impracticability alternatives plus the No Further Action alternative with respect to the nine evaluation criteria noted above.

1. **Overall Protection of Human Health and the Environment**

The No Further Action alternative would not be protective as no monitoring or evaluation of the contamination that remains in the saturated soils and bedrock would occur and no environmental deed restriction would be implemented to prevent exposure to groundwater and potential vapor intrusion risks. The other three alternatives would be protective as they would require an environmental deed restriction to prevent future exposure to groundwater and potential vapor intrusion. (Because the Site is undeveloped, no one is using the groundwater, and the Site property is held in receivership by the MEDEP, there is no present human health risk at the Site.) Monitoring and evaluation of the remedial progress every five years through Five-Year Reviews will help ensure that the remedy remains protective of human health and the environment over the long-term.

2. Compliance with ARARs

The No Further Action alternative would not comply with chemical-specific ARAR requirements related to groundwater or EPA guidance on vapor intrusion. Chemical-specific ARARs related to groundwater (identified above as the federal MCLs and non-zero MCLGs, Maine Primary Drinking Water Standards, and Maine MEGs) would be waived for the other three alternatives. Chemical-specific ARARs related to surface water would be met by all of the alternatives. Additionally, Alternatives 2, 3, and 4 would comply with location-specific and action-specific ARARs as well as EPA's guidance on vapor intrusion.

3. Long-Term Effectiveness and Permanence

Because there is no evaluation of conditions under the No Further Action alternative, attainment of cleanup levels would not be ascertained and the magnitude of the remaining residual risk would therefore also be unknown. In addition, under the No Further Action alternative, the lack of an environmental deed restriction to prevent exposure to contaminants creates the potential of future unacceptable risk.

Alternatives 3 and 4 offer the greatest potential of achieving long-term effectiveness most rapidly by using active remediation to address contaminated groundwater within the overburden aquifer. The active remediation technologies are limited, however, from addressing contamination within bedrock groundwater because of the unique hydrogeological and geochemical properties of the Site and the contaminants. Alternatives 3 and 4 therefore would not appreciably shorten the timeframe necessary to restore the groundwater as a whole to drinking water quality standards in comparison to Alternative 2. Alternatives 2, 3, and 4 achieve long-term effectiveness and permanence through the implementation and monitoring of an environmental deed restriction. The environmental deed restriction would prevent potential future unacceptable risks from exposure to the contaminated groundwater and vapor intrusion. EPA will use Five-Year Reviews to help monitor, maintain and enforce the environmental deed restriction. For all three of these alternatives, the timeframe for restoration of groundwater in the bedrock is estimated to be over 300 years.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

All four alternatives would gradually reduce the toxicity and volume of contamination through natural processes. Alternative 3 would actively reduce the toxicity, mobility and volume of remaining groundwater contaminants in the overburden aquifer through treatment by ISCO while relying on natural processes to reduce the toxicity, mobility, and volume of the contaminants in the bedrock. Similarly, Alternative 4 would actively reduce the toxicity, mobility and volume of remaining groundwater contaminants in the overburden aquifer through treatment by ERH heating while relying on natural processes to reduce the toxicity, mobility, and volume of the contaminants in the bedrock.

5. Short-Term Effectiveness

As no action would be taken under Alternative 1, there would be no short-term impacts to the community, workers, or the environment. No risk reduction would occur in the short term.

For Alternative 2, there would be minimal short-term risk to workers as the only Site activities would be the long-term monitoring and inspections necessary to ensure that the environmental deed restriction has been implemented and is being followed. No risks to community members or the environment are expected with Alternative 2.

For Alternatives 3 and 4, there would be minimal short-term risk to workers, the community, and the environment as the only Site construction activities would be the soil mixing and the installation of soil borings or groundwater monitoring wells. Standard engineering precautions would be followed to minimize short-term risks related to the handling and distribution of chemical oxidants during the ISCO work and the electrical hazards related to the operation and maintenance of the ERH system for the duration of its implementation.

From the groundwater modeling extrapolations, the timeframe for Alternatives 2, 3, and 4 for achieving groundwater drinking water standards in the bedrock is 345 years.

6. Implementability

The No Further Action alternative requires no implementation. For Alternative 2, there are no significant technical issues associated with groundwater monitoring and enforcement of the environmental deed restriction. The groundwater monitoring would continue the program that began in 1992. The environmental deed restriction would be created using a standardized model document that has been implemented state-wide and with the review of the Maine Attorney General's office.

Past application of ISCO at the Site demonstrates that Alternative 3 can be implemented. The materials and equipment needed for designing and constructing an oxidant addition system are readily available. The electrical service necessary for Alternative 4, ERH, is available at the Site. Because of the hydrogeological and geochemical conditions at the Site, before the implementation of ERH is begun, a pilot study would be needed in order to design the correct

spacing of the electrodes in the soil. Equipment and supplies needed for ERH are readily available.

7. Costs

Net present value costs based on a 30-year time period were developed for each of the alternatives. As noted previously, because of the hydrogeological properties of the saturated soils and bedrock and the geochemical properties of the contaminants, it is estimated that Alternatives 2, 3, and 4 will require more than 300 years to achieve drinking water cleanup standards for groundwater in the bedrock at the Site.

The costs for Alternatives 3 and 4 include pre-design fieldwork, design, installation, and operation for 30 years.

The estimated 30-year net present value costs for these alternatives are as follows:

Alternative 1, No Further Action:	$0
Alternative 2, LTM and ICs:	$322,370
Alternative 3, ISCO and ICs:	$9,340,000
Alternative 4, ERH and ICs:	$15, 960,000

8. State Acceptance

MEDEP has been involved with the Site since its discovery. MEDEP concurred with the 1990 ROD and concurs with this ROD Amendment. See Appendix C for the State's concurrence letter.

9. Community Acceptance

Community acceptance is a modifying criterion that allows for final evaluation and modification of the selected remedial approach following community review. EPA and MEDEP provided a general description of the proposed remedy to the Town of Hope selectmen in January 2013 as part of ongoing updates to the Town (previous updates were given annually 2008 through 2012).

EPA sent out hold-the-date postcards for general distribution in the Town of Hope on June 6, 2013. The postcard announced the public meeting and public hearing date and the availability of the Proposed Plan for this ROD Amendment on EPA's website. Additionally, EPA sent a press release on June 13, 2013 to the local newspapers announcing the Proposed Plan and upcoming public meeting and public hearing. Copies of the Proposed Plan were also sent to the Town of Hope office for distribution. EPA received a few calls from community members and the local press regarding the proposed remedy. In general, these callers had questions about the proposed

remedy, what restrictions were likely to be placed on the Site, and what types of reuse would be allowed.

On June 20, 2013, EPA held a public information meeting immediately followed by a public hearing at the Hope Elementary School. The meeting was attended by approximately twenty community members as well as representatives from MEDEP and the Settling Defendants. The information meeting generated many questions, again primarily on likely restrictions and reuse options, but also about the process moving the Site property out from state receivership and about liability concerns of the Town in taking ownership of the Site property. Regarding the proposed remedy, there were questions related to the vapor intrusion pathway but there were no questions about the technical impracticability waiver or the other aspects of the proposed remedy. MEDEP and a member of the HCCE offered oral comments during the hearing. No other comments were received during the public comment period which ended on July 12, 2013. The transcript of the Public Hearing and the Responsiveness Summary are provided in Appendix D. Table 8 summarizes this comparative analysis.

TABLE 8 COMPARISON OF ALTERNATIVES

Nine Criteria	Union Chemical Company Remedial Alternatives			
	Alt 1	Alt 2	Alt 3	Alt 4
Protects Human Health & Environment	N	Y	Y	Y
Meets Federal & State Requirements	N	Y, with TI waiver for groundwater	Y, with TI waiver for groundwater	Y, with TI waiver for groundwater
Provides Long-Term Protection	N	Y	Y	Y
Reduces Mobility, Toxicity & Volume through Treatment	N	N	Y	Y
Provides Short-Term Protection	N	Y	Y	Y
Implementable	Y	Y	Y	Y
Costs	0	$322,370	$9,340,000	$15,960,000
State Agency Acceptance	N	Supported	-	-
Community Acceptance	N	Supported	-	-

Alt 2 EPA's preferred alternative
Y Meets or exceeds criterion
N Does NOT meet criterion

K. THE SELECTED REMEDY

EPA has selected Alternative 2 (Technical Impracticability Waiver, Long-Term Monitoring and Institutional Controls) because EPA believes it achieves the best balance among EPA's nine criteria used to evaluate remedial alternatives. The selected remedy is (1) protective of human health and the environment; (2) complies with state and federal environmental laws and regulations that are applicable or relevant and appropriate to the remedial action, (with the exception of chemical-specific ARARs for groundwater due to the technical impracticability waiver); (3) is cost-effective ; and (4) utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable (although due to technical impracticability, no further technological treatment will be used). The selected remedy no longer satisfies EPA's preference for treatment that permanently and significantly reduces the toxicity, mobility or volume of the hazardous substances as a principal element of the remedy.

The components of the selected remedy are as follows:

- The requirement for rapid restoration of contaminated groundwater throughout the entire Site through an active groundwater pump-and-treat system to attain groundwater cleanup levels within a reasonable timeframe is amended by invoking a technical impracticability waiver of the requirement to meet federal and state groundwater standards (identified above as the federal MCLs and non-zero MCLGs, Maine Primary Drinking Water Standards, and Maine MEGs) pursuant to CERCLA § 121(d)(4) because Site-specific hydrogeological and contaminant conditions limit the availability of an advantageous remedial technology. This waiver will be applied to the portion of the Site where groundwater contamination remains in the overburden and bedrock aquifers.

- Long-term monitoring, as required in the 1990 ROD, will be adjusted to support this technical impracticability waiver approach. Long-term monitoring will be used to track the location of groundwater contamination and confirm it remains within the TI Zone, and to track the continued reduction of toxicity and volume of contaminants through natural processes.

- Institutional controls, as required in the 1990 ROD, will be adjusted to support this technical impracticability approach by requiring: (A) an environmental deed restriction on the Site property to, at a minimum, (1) prohibit the use of groundwater, (2) ensure access for monitoring and oversight, (3) prohibit activities that interfere with the remedy and on-site monitoring equipment, and (4) require the application of appropriate vapor barrier or remediation technology in any future buildings on the Site property; and (B) an environmental deed restriction or other mechanism to limit the use of properties adjacent to the Site, as deemed necessary by EPA based on new information, including but not limited to the development of properties adjacent to the Site or movement of the leading edge of either plume.

Consistent with the 1990 ROD, the 2013 AROD will continue to require long-term operation and maintenance of the monitoring wells, and Five-Year Reviews.

Groundwater and surface water would be monitored at locations that would adequately represent overburden and bedrock aquifers and Quiggle Brook. The monitoring will enable EPA and MEDEP to track contaminant concentrations within the plumes and along the plume boundaries. Such tracking will help EPA and MEDEP to confirm the plumes are not expanding, and to monitor the primary ecological receptor, Quiggle Brook, for evidence of impacts from the plumes. EPA anticipates utilizing the existing well network at the Site for this long-term monitoring program. In the future, however, EPA will adjust the extent of the well network, as necessary, based on new information, including but not limited to the development of properties adjacent to the Site or movement of the leading edge of either plume, with new wells along the perimeter of the Site or any other location.

While Alternatives 2, 3 and 4 are protective of human health and the environment, comply with ARARs with the TI waiver of chemical-specific ARARs, the costs of Alternatives 3 and 4 are 30 to 50 times greater than Alternative 2 without significantly shortening the timeframe needed to restore the groundwater. Current conditions at the Site limit the effectiveness of the *in-situ* activities for Alternatives 3 and 4.

The estimated 30-year net present value cost for Alternative 2 is $322,370.

L. STATUTORY DETERMINATIONS

CERCLA Section 121, 42 U.S.C. § 9621 and the NCP, 40 C.F.R. § 300.430 require that remedies selected for Superfund sites are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as a principal element.

EPA believes that the remedy, as amended herein, is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is (1) protective of human health and the environment; (2) complies with or meets the requirements for a waiver of state and federal environmental laws and regulations that are applicable or relevant and appropriate to the remedial action; (3) is cost-effective; and (4) utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable (although due to technical impracticability, no further technological treatment will be used). The selected remedy no longer satisfies EPA's preference for treatment which permanently and significantly reduces the toxicity, mobility or volume of the hazardous substances as a principal element of the remedy.

M. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Proposed Plan to amend the 1990 ROD was released for public comment in June 2013. The changes outlined in the Proposed Plan called for attaining protectiveness of human health and the environment through long-term monitoring and institutional controls.

Two comments were received during the public comment period which concluded on July 12, 2013. Both comments concurred with the proposed remedy. The two comments are included in the transcript of the Public Hearing (Appendix D). EPA has prepared a Responsiveness Summary acknowledging these comments and the Summary is Appendix E.

One clarification to the description of the preferred alternative in the Proposed Plan has been made in this 2013 AROD. The Proposed Plan stated that because of concerns that there is the potential for a vapor intrusion pathway to exist, MEDEP would require in the deed restriction the application of appropriate vapor barrier or remediation technology in any future buildings on the Site. Since the time the Proposed Plan was published, EPA has determined based on a risk screening evaluation in conformance with EPA guidance that the potential for a vapor pathway creates an unacceptable risk for future use of the Site. Therefore the application of appropriate vapor barrier or remediation technology will be included as a required measure within the environmental deed restriction to ensure the long-term protectiveness of the remedy. (As noted in the Proposed Plan, this requirement is consistent with the Maine Uniform Building Code for radon control options.) This clarification does not constitute a significant change from the preferred alternative presented in the Proposed Plan.

EPA has also added an additional clarification within this 2013 AROD that EPA anticipates utilizing the existing well network at the Site for this long-term monitoring program. In the future, however, EPA may adjust the extent of the well network, as necessary, based on new information, including but not limited to the development of properties adjacent to the Site or movement of the leading edge of either plume, with new wells along the perimeter of the Site or any other location. This clarification does not constitute a significant change from the preferred alternative presented in the Proposed Plan.

EPA has also clarified that the institutional controls, already required for properties adjacent to the Site under the 1990 ROD, will be adjusted to support the amended remedy under this AROD to require deed restrictions or other mechanisms, as deemed necessary by EPA based on new information.

N. STATE ROLE

MEDEP has reviewed the proposed remedy change for the Site and concurs with the selected remedy described in Section K of this ROD Amendment. A copy of the State concurrence letter is attached as Appendix C.

O. REFERENCES

Hope, Town of, 2007. Hope Land Use Ordinance, revised June 18

Maine Legislation, 2011. Revised Statute Title 38, Chapter 3; December 31

State of Maine, 1984. Consent Decree - State of Maine, Plaintiff v. Union Chemical Company, Inc., Defendant. CV-84-199, June 29

State of Maine, 1986. Consent Decree - State of Maine, Plaintiff v. Union Chemical Company, Defendant. CV-84-199, June 5

Tetra Tech Rizzo, 2008. Thirty-eighth/Third Long Term Monitoring of Surface Water and Groundwater (Fall 2007), Union Chemical Company Site; February 27

Tetra Tech Rizzo, 2009. Thirty-ninth/Fourth Long Term Monitoring of Surface Water and Groundwater (Fall 2008), Union Chemical Company Site; March 27

Tetra Tech Rizzo, 2009. Conceptual Site Model, Fourth Revision, Union Chemical Company Site; December 18

Tetra Tech Rizzo, 2011. Technical Impracticability Evaluation for the Union Chemical Company Site; January 20

Tetra Tech Rizzo, 2011. Fortieth/Fifth Long Term Monitoring of Surface Water and Groundwater (Fall 2010), Union Chemical Company Site; May 25

Tetra Tech Rizzo, 2012. 2012 Work Plan Union Chemical Trust Former Union Chemical Company Superfund Site; May 10

Tetra Tech Rizzo, 2013. Forty-First/Sixth Long Term Monitoring of Surface Water and Groundwater (Fall 2012), Union Chemical Company Site; March 26

USEPA, 1990. Record of Decision Summary, Union Chemical Company; U.S. Environmental Protection Agency, Region 1, Boston, Massachusetts; December.

USEPA, 1991. Consent Decree – United States of America, Plaintiff v. PRP List, Defendant; August

USEPA, 1994. Explanation of Significant Differences, Union Chemical Company Site; June

USEPA, 1997. Explanation of Significant Differences, Union Chemical Company Site; June

USEPA, 2001. *Comprehensive Five-Year Review Guidance, USEPA 540-R-01-0*, June

USEPA, 2001. Explanation of Significant Differences, Union Chemical Company Site; September

USEPA, 2002, Five-Year Review, Union Chemical Company Site, Hope, Maine, September

USEPA, 2007, Five-Year Review, Union Chemical Company Site, Hope, Maine, September

USEPA, 2012, Five-Year Review, Union Chemical Company Site, Hope, Maine, September

USEPA, 2013, Proposed Plan, Union Chemical Company Site, Hope, Maine, September

APPENDIX A
Applicable or Relevant and Appropriate Requirements
Union Chemical ROD Amendment

The pertinent ARARs affected by this ROD Amendment are identified in the chart below. All other ARARs identified in the 1990 ROD remain in effect.

REQUIREMENT/GUIDANCE	STATUS	SYNOPSIS
GROUNDWATER		
Federal Regulatory Requirements and Guidance		
SDWA- Section 1412 (MCLs) 40CFR141.11 -141.16	Relevant and appropriate, but waived within TI Zone.	MCLs have been promulgated for several organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered for groundwater aquifers uses for drinking water. Pursuant to CERCLA § 121(d)(4), EPA has waived the requirement to meet this ARAR in the identified TI Zone due to technical impracticability.
SDWA- Section 1412 (MCLGs) 40CFR 141.50-141.51	Relevant and appropriate, but waived within TI Zone.	MCLGs are health-based criteria established for a number of organic and inorganic contaminants as water quality goals for drinking water supplies. Pursuant to CERCLA § 121(d)(4), EPA has waived the requirement to meet this ARAR in the identified TI Zone due to technical impracticability.
State of Maine Regulatory Requirements and Guidance		
1992 Maximum Exposure Guidelines (MEGs) for Drinking Water (Bureau of Health)	To the extent they were identified as TBC or relevant and appropriate in the ROD, an ESD or a five-year review, these standards are waived within the TI Zone.	MEGs are the Bureau of Health's recommendations for concentrations of chemical contaminants in drinking water. The 1992 MEGs were promulgated by reference in Rule 10-144A CMR Chapter 233. Pursuant to CERCLA § 121(d)(4), EPA has waived the requirement to meet this ARAR in the identified TI Zone due to technical impracticability.
Drinking Water Rules (10-144A CMR Chapter 231-233	To the extent they were identified as TBC or relevant and appropriate in the ROD, an ESD or a five-year review, these standards are waived within the TI Zone.	Maine's Primary Drinking Water Standards are equivalent to federal MCLs. Pursuant to CERCLA § 121(d)(4), EPA has waived the requirement to meet this ARAR in the identified TI Zone due to technical impracticability.

APPENDIX B

Union Chemical Co., Inc.

NPL Site Administrative Record File

Record of Decision (ROD) Amendment

Operable Unit One (OU1) - Sitewide

Index

ROD Amendment Dated: **November** 2013

Released: November 2013

Prepared by

EPA New England

Office of Site Remediation and Restoration

With Assistance from

ASRC Primus

6301 Ivy Lane, Suite 300

Greenbelt, MD 20770

UNION CHEMICAL COMPANY SUPERFUND SITE - RECORD OF DECISION AMENDMENT
PART 2: THE DECISION SUMMARY

INTRODUCTION

This is the Administrative Record Index for the Record of Decision (ROD) Amendment to the Union Chemical Co., Inc. Superfund Site (Site) in South Hope, Maine, Operable Unit One (OU 1) – Entire Site. The Record of Decision (ROD) Amendment was released September 2013. Section I of the Index cites site-specific documents.

This Administrative Record Index includes, by reference, the following Administrative Records issued on the dates indicated: the Record of Decision (ROD), issued on December 27, 1990; the Remedial Design/Remedial Action (RD/RA), issued on December 4, 1991; the De Minimis Settlement, issued on January 24, 1992; the Explanation of Significant Differences (ESD), issued on June 30, 1994; the Explanation of Significant Differences (ESD), issued September 1997; and the Explanation of Significant Differences, issued on October 1, 2001.

The Record of Decision (ROD) Amendment Administrative Record File is available for public review at:

EPA New England
OSRR Records & Information Center
5 Post Office Square
Suite 100 (OSRR 02-3)
Boston, MA 02109 - 3912
(By appointment)
(617) 918-1440 (phone)
(617) 918-0440 (fax)
http://www.epa.gov/region01/superfund/resource/records.htm

Hope Town Office
441 Camden Road
Hope, ME 04847
Phone: 207-763-4199
Fax: 207-763-4195
http://www.hopemaine.org/

An Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Please note that the compact disc(s) (CD) containing this Administrative Record may include index data and other metadata (hereinafter collectively referred to as metadata) to allow the user to conduct index searches and key word searches across all the files contained on the CD. All the information that appears in the metadata, including any dates associated with creation of the indexing data, is not part of the Administrative Record for the Site under CERCLA and shall not be construed as relevant to the documents that comprise the Administrative Record. This metadata is provided as a convenience for the user and is not part of the Administrative Record.

Questions about this Administrative Record file should be directed to the EPA New England site manager.

Phase 04: FEASIBILITY STUDY (FS)

538573 PROPOSED PLAN

# of Pages: 13
Doc Date: 06/01/2013

Author: US EPA REGION 1

Addressee:

Doc Type: PROPOSED PLAN
PUBLIC INFORMATION
REPORT

File Break: 04.09

Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

27137 **EXPLANATION OF SIGNIFICANT DIFFERENCES, WITH DECLARATION.**

# of Pages: 10
Doc Date: 09/25/1997

Author:	Addressee:	Doc Type:	File Break:
US EPA REGION 1		DECISION DOCUMENT EXP SIGNFICANT DIFF (ESD) REPORT	05.04

Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

35789 FIRST FIVE-YEAR REVIEW REPORT — # of Pages: 91 — Doc Date: 09/18/2002

Author: , TETRA TECH NUS INC
, US EPA REGION 1

Addressee:

Doc Type: FIVE YEAR REVIEW RPT & AP REPORT

File Break: 08.03

Access Type(s): REL

257490 BEDROCK WELL INSTALLATION AND GEOPHYSICAL EVALUATION — # of Pages: 64 — Doc Date: 04/30/2004

Author: , RIZZO ASSOCIATES INC

Addressee: , MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Doc Type: REPORT

File Break: 08.03

Access Type(s): REL

260700 CONCEPTUAL SITE MODEL REPORT — # of Pages: 132 — Doc Date: 09/10/2004

Author: ROBERT ANKSTITUS, RIZZO ASSOCIATES
RAYMOND C JOHNSON, RIZZO ASSOCIATES
CHRISTOPHER NITCHIE, RIZZO ASSOCIATES
WILLIAM PHELPS, RIZZO ASSOCIATES

Addressee: TERRY CONNELLY, US EPA REGION 1
REBECCA HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION

Doc Type: REPORT

File Break: 08.03

Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

277804 BEDROCK WELL PUMP TESTS / BEDROCK AQUIFER DRAWDOWN REPORT
# of Pages: 448
Doc Date: 02/06/2006

Author: , RIZZO ASSOCIATES INC
Addressee: , MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: GROUNDWATER MONITORNG
REPORT
File Break: 08.03
Access Type(s): REL

277805 THIRTY-SEVENTH (37TH) PERIODIC /SECOND LONG TERM MONITORING OF SURFACE WATER AND GROUNDWATER (FALL 2006)
# of Pages: 185
Doc Date: 03/30/2007

Author: , RIZZO ASSOCIATES INC
Addressee: , MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: GROUNDWATER MONITORNG
REPORT
File Break: 08.04
Access Type(s): REL

277806 2006 WELL DECOMMISSIONING REPORT
# of Pages: 70
Doc Date: 02/12/2007

Author:
Addressee: , MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
File Break: 08.03
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

278336 SECOND FIVE-YEAR REVIEW REPORT — # of Pages: 78 — Doc Date: 09/28/2007

Author:	Addressee:	Doc Type:	File Break:
, US EPA REGION 1		FIVE YEAR REVIEW RPT & AP REPORT	08.03 Access Type(s): REL

522178 THIRD FIVE-YEAR REVIEW REPORT — # of Pages: 67 — Doc Date: 09/27/2012

Author:	Addressee:	Doc Type:	File Break:
, US EPA REGION 1		FIVE YEAR REVIEW RPT & AP REPORT	08.03 Access Type(s): REL

534248 2005 STATUS REPORT — # of Pages: 5 — Doc Date: 04/10/2006

Author:	Addressee:	Doc Type:	File Break:
RANDY C SMITH, AMERICAN ENVIRONMENTAL CONSULTANTS	TERRENCE CONNELLY, US EPA REGION 1 REBECCA HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION	LETTER REPORT	08.05 Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

534249 LABORATORY REPORT FOR SAMPLES RECEIVED 05/11/2006
# of Pages: 28
Doc Date: 05/30/2006

Author: SUSAN SYLVESTER, RESOURCE LABORATORIES LLC
Addressee: CHRISTOPHER NITCHIE, RIZZO ASSOCIATES
Doc Type: LETTER
REPORT
SAMPLING DATA
File Break: 08.04
Access Type(s): REL

534250 SITE EVALUATION AND REUSE STRATEGY
# of Pages: 48
Doc Date: 04/12/2006

Author: , US EPA REGION 1
, VITA NUOVA LLC
Addressee:
Doc Type: REPORT
File Break: 08.09
Access Type(s): REL

534251 THIRTY-NINTH PERIODIC, FOURTH LONG TERM MONITORING REPORT
# of Pages: 207
Doc Date: 03/27/2009

Author: , TETRA TECH RIZZO
Addressee: , ME DEPT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
File Break: 08.04
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

534252 FORTIETH PERIODIC, FIFTH LONG TERM MONITORING REPORT
# of Pages: 187
Doc Date: 05/25/2011

Author: , TETRA TECH RIZZO
Addressee: , ME DEPT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
File Break: 08.04
Access Type(s): REL

534253 TECHNICAL IMPRACTICABILITY (TI) EVALUATION
# of Pages: 68
Doc Date: 01/18/2011

Author: , TETRA TECH RIZZO
Addressee: TERRENCE CONNELLY, US EPA REGION 1
REBECCA HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION
Doc Type: REPORT
File Break: 08.03
Access Type(s): REL

534254 MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION (ME DEP) COMMENTS ON THE TECHNICAL IMPRACTICABILITY (TI) EVALUATION
# of Pages: 3
Doc Date: 03/14/2011

Author: REBECCA L HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION
Addressee: TERRENCE CONNELLY, US EPA REGION 1
Doc Type: LETTER
PUBLIC (AND OTHER) COMME
File Break: 08.03
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

534255 TOWN OF HOPE (ME) COMMENTS ON DRAFT DECLARATION OF ENVIRONMENTAL COVENANT AND INDENTURE

# of Pages: 14
Doc Date: 04/02/2012

Author: , HOPE (ME) TOWN OF
Addressee:
Doc Type: INSTITUTIONAL CONTROL(S)
File Break: 08.07
Access Type(s): REL

536011 EPA APPROVAL OF 2009/2010 WORK PLAN REVISION 1

# of Pages: 1
Doc Date: 09/03/2009

Author: TERRY CONNELLY, US EPA REGION 1
Addressee: RANDY C SMITH, AMERICAN ENVIRONMENTAL CONSULTANTS
, UNION CHEMICAL SITE GROUP
Doc Type: CORRESPONDENCE
LETTER
File Break: 08.05
Access Type(s): REL

536012 EPA APPROVAL WITH COMMENTS OF 2008 WORK PLAN

# of Pages: 1
Doc Date: 10/10/2008

Author: TERRY CONNELLY, US EPA REGION 1
Addressee: RANDY C SMITH, AMERICAN ENVIRONMENTAL CONSULTANTS
, UNION CHEMICAL SITE GROUP
Doc Type: CORRESPONDENCE
LETTER
File Break: 08.05
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

536013 EPA CONFIRMATION OF ADJUSTMENT IN LONG-TERM MONITORING FREQUENCY
# of Pages: 1
Doc Date: 09/21/2009

Author: TERRY CONNELLY, US EPA REGION 1
Addressee: RANDY C SMITH, AMERICAN ENVIRONMENTAL CONSULTANTS
, UNION CHEMICAL SITE GROUP
Doc Type: CORRESPONDENCE
LETTER
File Break: 08.04
Access Type(s): REL

536014 EPA APPROVAL OF REVISED 2007 WORK PLAN
# of Pages: 1
Doc Date: 11/02/2007

Author: TERRY CONNELLY, US EPA REGION 1
Addressee: RANDY C SMITH, AMERICAN ENVIRONMENTAL CONSULTANTS
, UNION CHEMICAL SITE GROUP
Doc Type: CORRESPONDENCE
LETTER
File Break: 08.05
Access Type(s): REL

536053 2009 WORK PLAN (TRANSMITTAL LETTER ATTACHED)
# of Pages: 63
Doc Date: 04/24/2009

Author: , TETRA TECH RIZZO
Addressee: , ME DEPT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: WORK PLAN
File Break: 08.05
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

536592 **2005 WELL DECOMMISSIONING REPORT (12/15/2005 TRANSMITTAL LETTER ATTACHED)**
# of Pages: 54
Doc Date: 12/15/2005

Author: , RIZZO ASSOCIATES
Addressee: , US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
File Break: 08.03
Access Type(s): REL

536593 **HYDROGEN PEROXIDE ADDITIONS REPORT - 2005 (04/18/2007 TRANSMITTAL LETTER ATTACHED)**
# of Pages: 37
Doc Date: 04/18/2007

Author: , RIZZO ASSOCIATES
Addressee: , ME DEPT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
File Break: 08.03
Access Type(s): REL

536594 **THIRTY-FIRST PERIODIC MONITORING OF SURFACE WATER AND GROUNDWATER (SPRING 2002) (09/04/2002 TRANSMITTAL LETTER ATTACHED)**
# of Pages: 144
Doc Date: 09/04/2002

Author: , RIZZO ASSOCIATES
Addressee: , ME DEPT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
File Break: 08.04
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

536599 CONCEPTUAL SITE MODEL REPORT WITH ATTACHMENTS
# of Pages: 672
Doc Date: 12/18/2009

Author: , TETRA TECH RIZZO
Addressee: , ME DEPT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: REPORT
File Break: 08.03
Access Type(s): REL

538400 FIGURE 1: SITE MAP FROM UNNAMED DOCUMENT [MARGINALIA]
# of Pages: 2
Doc Date: 05/24/2000

Author: , IT CORP
Addressee: , UNION CHEMICAL TRUST
Doc Type: MAP
File Break: 08.03
Access Type(s): REL

538401 LETTER COMMENTING ON RIZZO ASSOCIATES' 04/30/2004 BEDROCK WELL INSTALLATION AND GEOPHYSICAL EVALUATION
# of Pages: 4
Doc Date: 07/13/2004

Author: TERRENCE CONNELLY, US EPA REGION 1
Addressee: , AMERICAN ENVIRONMENTAL CONSULTANTS
, UNION CHEMICAL SITE GROUP
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMME
File Break: 08.01
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

538402 MEMO REGARDING ATTACHED RESULTS OF VOLATILE ORGANICS (VOC) ANALYSIS OF AQUEOUS SAMPLES
# of Pages: 6
Doc Date: 06/12/2006

Author: SCOTT CLIFFORD, US EPA REGION 1
Addressee: TERRY CONNELLY, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO
SAMPLING DATA
File Break: 08.04
Access Type(s): REL

538403 LETTER REGARDING ATTACHED MEMORANDUM - A REVIEW OF THE PAST TWO YEARS OF CARBON ADDITION DATED 01/29/2003
# of Pages: 30
Doc Date: 01/30/2003

Author: REBECCA L HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION
Addressee: TERRY CONNELLY, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
File Break: 08.03
Access Type(s): REL

538404 LETTER COMMENTING ON RIZZO'S 'BEDROCK WELL INSTALLATION AND GEOPHYSICAL EVALUATION' DATED 04/30/2004
# of Pages: 3
Doc Date: 05/06/2004

Author: REBECCA L HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION
Addressee: TERRY CONNELLY, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMME
File Break: 08.01
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

538405 LETTER COMMENTING ON RIZZO'S 'BEDROCK WELL PUMP TEST/BEDROCK AQUIFER DRAWDOWN REPORT' DATED 02/06/2006

# of Pages: 3
Doc Date: 03/23/2006

Author: REBECCA L HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION

Addressee: TERRY CONNELLY, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMME

File Break: 08.01
Access Type(s): REL

538406 LETTER COMMENTING ON TETRA TECH RIZZO'S 'HUMAN HEALTH RISK EVALUATION USING THE JOHNSON AND ETTINGER VAPOR INTRUSIONS INTO INDOOR AIR MODEL' DATED 03/30/2007

# of Pages: 3
Doc Date: 07/24/2007

Author: REBECCA L HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION

Addressee: TERRY CONNELLY, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMME

File Break: 08.01
Access Type(s): REL

538407 LETTER COMMENTING ON TETRA TECH RIZZO'S 'CONCEPTUAL SITE MODEL REPORT' FOURTH REVISION, DATED 12/18/2009

# of Pages: 2
Doc Date: 11/30/2010

Author: REBECCA L HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION

Addressee: TERRY CONNELLY, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMME

File Break: 08.01
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

538408 LETTER COMMENTING ON THE 2012 WORK PLAN DATED 05/10/2012

# of Pages: 2
Doc Date: 06/06/2012

Author: REBECCA L HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION

Addressee: TERRY CONNELLY, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMME

File Break: 08.01
Access Type(s): REL

538409 MEMO REGARDING CONTAMINANT CONTOUR MAPS USING THE EPA SCREENING DATA (MAPS ATTACHED)

# of Pages: 18
Doc Date: 10/04/2006

Author: ROBERT ANKSTITUS, RIZZO ASSOCIATES

Addressee: TERRY CONNELLY, US EPA REGION 1
REBECCA HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION
RANDY C SMITH, AMERICAN ENVIRONMENTAL CONSULTANTS

Doc Type: CORRESPONDENCE
MEMO

File Break: 08.01
Access Type(s): REL

538410 MEMO REGARDING EVALUATION OF HUMAN HEALTH RISK USING JOHNSON AND ETTINGER VAPOR INTRUSION INTO INDOOR AIR MODEL

# of Pages: 44
Doc Date: 03/30/2007

Author: ROBERT J ANKSTITUS, TETRA TECH RIZZO
HAWANI BERHANU, TETRA TECH RIZZO
CHRISTOPHER K NITCHIE, TETRA TECH RIZZO

Addressee: TERRY CONNELLY, US EPA REGION 1
REBECCA HEWETT, ME DEPT OF ENVIRONMENTAL PROTECTION

Doc Type: CORRESPONDENCE
LETTER
REPORT

File Break: 08.03
Access Type(s): REL

Phase 08: POST REMEDIAL ACTION

538411 **2012 WORK PLAN (05/10/2012 TRANSMITTAL MEMO ATTACHED)**
# of Pages: 69
Doc Date: 05/10/2012

Author: , TETRA TECH RIZZO
Addressee: , ME DEPT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: WORK PLAN
File Break: 08.05
Access Type(s): REL

538412 **FORTY-FIRST PERIODIC / SIXTH LONG TERM MONITORING OF SURFACE WATER AND GROUNDWATER (SUMMER/FALL 2012)**
# of Pages: 168
Doc Date: 03/26/2013

Author: , TETRA TECH
Addressee: , ME DEPT OF ENVIRONMENTAL PROTECTION
, US EPA REGION 1
Doc Type: REPORT
SAMPLING DATA
File Break: 08.04
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

535518 FIELD RESPOSITORY LETTER FOR ADMINISTRATIVE RECORDS (AR)

# of Pages: 1
Doc Date: 04/22/2013

Author: HOLLY INGLIS, US EPA REGION 1
Addressee: , HOPE (ME) TOWN OFFICE
Doc Type: CORRESPONDENCE
LETTER
REPOSITORY LETTER
File Break: 13.01
Access Type(s): REL

536007 NEWSPAPER ARTICLE: HOPE, STATE CONSIDER FUTURE OF PARCEL THAT WAS SITE OF ONE OF MAINE'S WORST POLLUTION CASES

# of Pages: 2
Doc Date: 03/27/2012

Author: , BANGOR DAILY NEWS
Addressee:
Doc Type: ARTICLE - NEWS/PERIODICAL
PRESS RELEASE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

536008 PRESS RELEASE: SECOND MEETING SCHEDULED TO DISCUSS CLEANUP AND REDEVELOPMENT OF UNION CHEMICAL SITE, MEETING WILL BE HELD ON SATURDAY 02/18/2006

# of Pages: 1
Doc Date: 02/14/2006

Author: , US EPA REGION 1
Addressee:
Doc Type: ARTICLE - NEWS/PERIODICAL
PRESS RELEASE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

536595 LETTER WITH ATTACHED RESIDENTIAL WELL SAMPLING RESULTS
# of Pages: 2
Doc Date: 10/16/2004

Author: RANDY C SMITH, AMERICAN ENVIRONMENTAL CONSULTANTS
Addressee: LESLIE ROBINSON, HOPE (ME) RESIDENT
Doc Type: CORRESPONDENCE
LETTER
File Break: 13.01
Access Type(s): REL

536596 UNION CHEMICAL COMMITTEE REPORT AND RECOMENDATIONS
# of Pages: 2
Doc Date: 04/10/2007

Author: , UNION CHEMICAL COMMITTEE
Addressee:
Doc Type: REPORT
File Break: 13.01
Access Type(s): REL

536597 UPDATE ON THE UNION CHEMICAL COMPANY SUPERFUND SITE FOR THE TOWN OF HOPE (ME) SELECTMEN
# of Pages: 5
Doc Date: 06/09/2009

Author: , US EPA REGION 1
Addressee:
Doc Type: REPORT
File Break: 13.01
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

536598 **LETTER OF THANKS FOR ATTENDING THE BOARD OF SELECTMEN'S MEETING ON 01/08/2013**
# of Pages: 1
Doc Date: 01/30/2013

Author: JONATHAN DUKE, HOPE (ME) TOWN OFFICE
Addressee: MS HEWITT, NONE
Doc Type: CORRESPONDENCE
LETTER
File Break: 13.01
Access Type(s): REL

538580 **LETTER TRANSMITTING RECORD OF DECISION (ROD) AMENDMENT PROPOSED PLAN ADMINISTRATIVE RECORD (AR) FILE TO REPOSITORY**
# of Pages: 1
Doc Date: 06/05/2013

Author: HOLLY INGLIS, US EPA REGION 1
Addressee: , HOPE (ME) TOWN OF
Doc Type: CORRESPONDENCE
LETTER
REPOSITORY LETTER
File Break: 13.01
Access Type(s): REL

548408 **PUBLIC HEARING TRANSCRIPT**
# of Pages: 18
Doc Date: 06/20/2013

Author: , ALLEY & MORRISETTE REPORTING SERVICE
Addressee:
Doc Type: MEETING RECORD
PUBLIC INFORMATION
File Break: 13.04
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

548951 NEWS CLIPPING: EPA, DEPT. OF ENVIRONMENTAL PROTECTION (DEP) TO PRESENT PLAN FOR UNION CHEMICAL SITE

# of Pages: 4
Doc Date: 06/12/2013

Author: SARAH E REYNOLDS, CAMDEN (ME) HERALD
Addressee:
Doc Type: ARTICLE - NEWS/PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

549634 PUBLIC MEETING / HEARING SIGN-IN LIST

# of Pages: 1
Doc Date: 06/20/2013

Author: , US EPA REGION 1
Addressee:
Doc Type: LIST
File Break: 13.04
Access Type(s): REL

549635 PRESS RELEASE: EPA PROPOSES AMENDMENT TO CLEANUP PLAN

# of Pages: 1
Doc Date: 06/19/2013

Author: , US EPA REGION 1
Addressee:
Doc Type: PRESS RELEASE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

536009 SITE SUMMARY IN PREPARATION FOR SELECTMEN'S MEETING, 01/08/2013
# of Pages: 2
Doc Date: 01/04/2013

Author: TERRY CONNELLY, US EPA REGION 1
Addressee: JON DUKE, HOPE (ME) TOWN OFFICE
Doc Type: CORRESPONDENCE
LETTER
File Break: 13.03
Access Type(s): REL

536010 SITE SUMMARY IN PREPARATION FOR SELECTMEN'S MEETING, 10/12/2010
# of Pages: 2
Doc Date: 10/08/2010

Author: TERRY CONNELLY, US EPA REGION 1
Addressee: JON DUKE, HOPE (ME) TOWN OFFICE
Doc Type: CORRESPONDENCE
LETTER
File Break: 13.03
Access Type(s): REL

548482 SURVEY MAP: PROPERTY PLAN OF LAND OF UNION CHEMICAL COMPANY INC. HOPE, KNOX COUNTY, MAINE
# of Pages: 1
Doc Date: 09/20/1979

Author: RODERICK H CRAIB JR, MAINE COAST SURVEYING
Addressee:
Doc Type: MAP
File Break: 17.04
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

548484 REPORT OF BOUNDARY OPINION

# of Pages: 24
Doc Date: 06/15/1992

Author: , WOODARD & CURRAN INC

Addressee: , AMERICAN ENVIRONMENTAL CONSULTANTS

Doc Type: REPORT

File Break: 17.05

Access Type(s): REL

Number of Documents in Administrative Record: 56

Selected Key Guidance Documents

EPA Guidance Documents may be reviewed at the OSRR Records and Information Center in Boston, MA

DOCNUMBER	DOCDATE	TITLE	OSWEREPAID
5009		INTEGRATED RISK INFORMATION SYSTEM (IRIS) [A COMPUTER-BASED HEALTH RISK INFORMATION SYSTEM AVAILABLE THROUGH E-MAIL--BROCHURE ON ACCESS IS INCLUDED]	
C018	17-Oct-86	COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980. AMENDED BY PL 99-499, 10/17/86.	
C063	01-Jan-92	NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN.	OSWER 9200.2-14
C145	01-Feb-90	CERCLA COMPLIANCE WITH OTHER LAWS MANUAL. CERCLA COMPLIANCE WITH THE CWA AND SDWA.	OSWER 9234.2-06/FS
C147	01-Apr-90	CERCLA COMPLIANCE WITH OTHER LAWS MANUAL. SUMMARY OF PART II. CAA, TSCA, AND OTHER STATUTES.	OSWER 9234.2-07/FS
C158	04-Oct-93	GUIDANCE FOR EVALUATING THE TECHNICAL IMPRACTICABILITY OF GROUND WATER RESTORATION.	OSWER 9234.2-25
C213	19-Jan-95	CONSISTENT IMPLEMENTATION OF THE FY 1993 GUIDANCE ON TECHNICAL IMPRACTICABILITY OF GROUND-WATER RESTORATION AT SUPERFUND SITES.	OSWER 9200.4-14
C527	01-Jul-99	GUIDE TO PREPARING SUPERFUND PROPOSED PLANS RECORDS OF DECISION AND OTHER REMEDY SELECTION DECISION DOCUMENTS	OSWER 9200.1-23P
C576	20-Oct-02	DRAFT GUIDANCE FOR EVALUATING THE VAPOR INTRUSION TO INDOOR AIR PATHWAY FROM GROUNDWATER AND SOILS (SUBSURFACE VAPOR INTRUSION GUIDANCE)	
C742	10-Nov-98	RETRANSMITTAL OF THE LATEST SUPERFUND REMOVAL ACTION LEVELS	
C923	19-Sep-11	CLARIFICATION OF OSWER'S 1995 TECHNICAL IMPRACTICABILITY WAIVER POLICY	OSWER 9355.5-32

APPENDIX C

Maine Department of Environmental Protection Concurrence Letter

Union Chemical ROD Amendment

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
COMMISSIONER

September 18, 2013

Mr. James T. Owens, III, Director
Office of Site Remediation and Restoration
EPA New England
5 Post Office Square
Suite 100, mailcode: OSRR07-5
Boston, MA 02109-3912

Re: State Concurrence with EPA's Record of Decision Amendment, Union Chemical Company Superfund Site, Hope, Maine

Dear Mr. Owens:

The Maine Department of Environmental Protection ("MEDEP") has reviewed the draft September 2013 Record of Decision Amendment (ROD Amendment) for the Union Chemical Company Superfund Site located in Hope, Maine ("Site"). Based on that review, the MEDEP concurs with the ROD Amendment, which changes only the remedy for the groundwater component from the 1990 Record of Decision. The major components of the ROD Amendment are:

1. A technical impracticability waiver of the requirement to meet federal and state groundwater standards is invoked pursuant to CERCLA §121(d)(4) because Site-specific hydrogeological and contaminant conditions render attainment of the standards technically impracticable from an engineering perspective. This waiver will be applied to the portion of the Site where groundwater contamination in the overburden and bedrock aquifers remains above federal Maximum Contaminant Levels, non-zero Maximum Contaminant Level Goals, and Maine Maximum Exposure Guidelines.

2. The active groundwater pump-and-treat system is replaced with natural attenuation, a long-term monitoring program, and institutional controls to prevent exposure to site contaminants. Specifically:

   a. Long-Term Monitoring will continue, including operation and maintenance of the monitoring well network. The monitoring will be modified as appropriate based on the results of the monitoring and Five-Year Reviews.

b. Institutional Controls will be required on the Site property in the form of deed restrictions to (1) prohibit the use of groundwater, (2) ensure Site access for monitoring and oversight, (3) prohibit activities that interfere with the remedy and on-site monitoring equipment, and (4) require the application of appropriate vapor barrier or vapor mitigation system in any future buildings on the Site.

All MEDEP's understandings related to the components of the Site remedy still apply as enumerated in MEDEP's December 19, 1990 ROD concurrence letter.

We look forward to continuing our collaborative approach on this and other Superfund sites in the State. Meanwhile, if you need additional information, do not hesitate to contact myself or Rebecca Hewett of my staff at (207) 287-2651.

Respectfully,

Melanie Loyzim, Director
Bureau of Remediation & Waste Management

cc: Mike Iasinski, EPA
Terry Connelly, EPA
Rebecca Hewett, MEDEP
David Wright, MEDEP

APPENDIX D

Transcript of Public Hearing and Responsiveness Summary

Union Chemical ROD Amendment

PREFACE

The purpose of this Responsiveness Summary is to document EPA's responses to the comments received during the public comment period on the June 2013 Proposed Plan for the Union Chemical Company Superfund Site in Hope, Maine. EPA considered all of the comments summarized in this document before selecting the final remedy to address the remaining contaminated groundwater at the Site.

The public hearing was held on June 20, 2013 in the Hope Elementary School at 34 Highfield Road, Hope, Maine and a copy of the transcript from the hearing is presented below. The transcript contains the comments submitted by Maine Department of Environmental Protection and a member of the Hope Committee for a Clean Environment. These documents are included in the Administrative Record.

This Responsiveness Summary acknowledges and responds to the two comments pertaining to the changes proposed in the June 2013 Proposed Plan to the 1990 Record of Decision remedy. No other comments were received during the public comment period from June 12 to July 12, 2013.

SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

Maine Department of Environmental Protection

David Wright, Director of Division of Remediation for MEDEP, presented testimony on behalf of the Commissioner of MEDEP. MEDEP has been involved with the cleanup activities conducted in accordance with the 1990 Record of Decision and MEDEP concurs with the changes presented in the Proposed Plan.

EPA Response: EPA has worked closely with MEDEP since the mid-1980s when the agencies conducted removal actions to address immediate risks posed by the Site. EPA appreciates the cooperation of MEDEP in the years after the removal actions in moving the Site closer to complete cleanup and reuse. Together, the agencies have worked with the Settling Parties on the investigation of the Site, the selection of the remedy that was documented in the 1990 ROD, the implementation of that remedy, the successful completion of three of the four cleanup components (demolition and removal of the facility's structure, on-site soils, and investigation of impact to off-site soils), and the implementation of innovative technologies that have

significantly reduced contamination levels in the groundwater. This close cooperation continued with the development of the Conceptual Site Model, the concurrence of a technical impracticability waiver for the residual groundwater contamination and the June 2013 Proposed Plan that summarized the remedy changes that EPA recommended.

Hope Committee for a Clean Environment

Brian Powers, a member of the HCCE, reviewed the history of the Site, the cleanup efforts to date, and the involvement of the community in the process. He described the cleanup efforts and said that the cleanup had progressed as far as the science allows and that the Site, with certain restrictions, is now safe for reuse. Consequently, he saw the amendment to the ROD as just another step in moving the Site toward productive reuse for the Town.

EPA Response: EPA's and MEDEP's project managers have worked on this Site since 1993 and 1996, respectively. As Mr. Powers noted in his comments, the agencies and the Settling Parties representative met with the HCCE on a regular basis, monthly during the period leading up to and through the active cleanup efforts. In fact, after a period of time meeting at the elementary school, these meetings were held in a HCCE member's home. EPA believes this close and open communication with representatives of the community improved the decisions made for the Site. EPA notes that the value of this communication is demonstrated by the concurrence of the community to previous changes to the 1990 ROD that were memorialized in three Explanation of Significant Differences documents. In all three instances, the proposed changes were discussed with the community, and modified, prior to implementation. EPA and MEDEP agree with Mr. Powers' perspective that the ROD Amendment is the next step moving the Site toward reuse and the agencies look forward to continuing to work with the community and the Town as they determine the future use of the Site.

Superfund Records Center
SITE: Union Chemical
BREAK: 13.4
OTHER: 548408

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SDMS DocID 548408

ORIGINAL

* *

IN RE: UNION CHEMICAL COMPANY SITE
HOPE, MAINE

* *

Taken before Debra J. Fusco, a Notary Public in and for the State of Maine, at the Hope Elementary School, 34 Highfield Road, Hope, Maine on June 20, 2013, beginning at 7:00 p.m., pursuant to notice given.

1 * * * * *

2 HEARING OFFICER CHOW: It's now 8:32, and
3 let's go ahead and begin the public hearing.
4 So just, again, my name is James Chow. I'm
5 the section chief for the Maine, Vermont and Connecticut
6 Superfund Section at EPA New England, and I'll be the
7 hearing officer for tonight's hearing.
8 I just want to start by explaining the
9 purpose of tonight's hearing which is to ask the public
10 for their comments on our proposed modification for the
11 cleanup plan that Terry just outlined.
12 If you have any doubt about making a
13 comment, please don't hesitate to come forward. We take
14 all comments seriously and often make changes to our
15 cleanup plan based on the comments we receive. We're
16 anxious to hear your comments and value everybody's
17 different perspectives.
18 In terms of grounds rules, this is a formal
19 public hearing. If you would like to comment, I ask you
20 to come forward, state your name, spell your last name
21 if needed and your affiliation, whether you're a
22 resident or you're from the Town of Hope.
23 Because this is a formal public hearing, we
24 won't be responding to your comments and questions at
25 this time. Your comments will be recorded by a court

1 reporter, and we'll take the comments we receive tonight
2 along with any written comments we receive, we'll
3 evaluate them and make changes to our plan as
4 appropriate. All of the comments we receive both oral
5 and in writing will be summarized along with our
6 official response in writing in what is known as a
7 responsiveness summary that will be included with our
8 final decision package and will be made available in the
9 information repositories for this site. I believe one
10 of the information repositories is the local library --
11 Town Hall, and the other one is at EPA New England. And
12 documents can also be made available by contacting
13 Terry, and he'll be happy to send you documents by
14 e-mail or by compact disk.
15 After all of the comments have been recorded
16 tonight, I'll close the hearing. After tonight if you'd
17 like to submit comments, you can still do so in writing
18 by either sending Terry an e-mail or, again, by sending
19 in your written comments postmarked no later than
20 July 12th.
21 You should also know that after we close the
22 formal hearing, we'll be happy to stick around and speak
23 with folks one-on-one after the hearing.
24 So with that, does anybody wish to make any
25 formal comments at this time?

1 MR. WRIGHT: Yes.

2 My name is David Wright, W-R-I-G-H-T, and I
3 am the director of the Division of Remediation at the
4 Maine Department of Environmental Protection.

5 I will be presenting the testimony on behalf
6 of Patricia Aho, Commissioner of the Maine Department of
7 Environmental Protection concerning the U.S.
8 Environmental Protection Agency's proposed change to the
9 cleanup remedy for the Union Chemical Company Superfund
10 Site. The following is the Maine Department of
11 Environmental protection's testimony on the
12 Environmental Protection Agency's proposed plan that
13 amends the 1990 cleanup plan for the Union Chemical
14 Company Superfund Site.

15 The Maine Department of Environmental
16 Protection has been involved in the cleanup activities
17 conducted at Union Chemical Company Superfund Site which
18 are presented in the 1990 cleanup plan.

19 The Maine Department of Environmental
20 Protection concurs with the proposed changes to the
21 Union Chemical Superfund Site cleanup plan as proposed
22 by the Environmental Protection Agency. The proposed
23 plan that the Maine Department of Environmental
24 Protection concurs with consists of the following two
25 elements:

The first element is a technical impracticability waiver or a TI waiver of the requirement to meet federal and state ground water standards. This TI waiver applies to the portion of the site where groundwater contamination still remains above groundwater cleanup levels specified in the 1990 record of decision or ROD. The TI waiver is necessary and appropriate because the site's hydrogeological conditions and contaminant properties prevent currently available treatment technology from effectively remediating groundwater to the ROD groundwater cleanup levels.

The second element of the proposed plan are measures to ensure that the amended cleanup approach continues to be protected of human health and the environment. These measures are: A, long-term monitoring of the remaining contaminants in groundwater. B, an environmental deed restriction on the site property to prohibit the use of groundwater, ensure access for monitoring and oversight and prohibit activities that interfere with the remedy and monitoring equipment on-site. And C, five-year reviews to assure that the amended cleanup approach remains effective.

Additionally, because vapor mitigation systems for buildings add low marginal costs to that

building and are considered best building practices in Maine for a host of reasons and because there is a small potential for a vapor intrusion pathway to exist for site contaminants, in the deed restrictions, Maine Department of Environmental Protection will require the application of standard vapor mitigation systems in any future buildings on the site.

Lastly, the Maine Department of Environmental Protection understands that with the exception of those federal and state applicable or relevant and appropriate requirements commonly known as ARARs which are specifically identified and waived by EPA, the amended cleanup plan will comply with federal and state ARARs.

Thank you.

HEARING OFFICER CHOW: Anyone else?

MR. POWERS: Good evening. My name is Brian Powers, and I live in the Village of South Hope.

I'm not sure what the date was, but from a very early point in the evolution of Union Chemical, neighbors in that area have been involved. And I'm not sure of the date, but at some point in time we formed a nonprofit committee called Hope Committee For a Clean Environment to address the community's concerns with regard to the type and level and exposure to

1 contamination on the site.
2 In the formation of that committee, the
3 primary purpose was to apply for a grant from the EPA
4 called a TAG grant, a technical assistance grant that
5 made money available to community organizations. Not
6 the municipality but private nonprofit community
7 organizations to hire independent consultants so that
8 they could advise the committee and the community on
9 technical matters with regard to the findings of the
10 record of decision which was a preliminary investigation
11 to determine what the contamination was, and to develop
12 remedies for the cleanup of that contamination.
13 As Terry said, there were three factors.
14 One was air pollution, soil and ground water. Anybody
15 that lives in the neighborhood obviously was concerned
16 about air pollution initially. Because of the operation
17 of Union Chemical, there was a lot of smoke that went
18 into the air and so that was the first concern. And
19 then the second concern, the second major concern, was
20 groundwater. We didn't have the expertise so we did get
21 a grant of -- a substantial grant actually, and we hired
22 three professionals from different places around the
23 country. One was Hydrogeologists from Washington DC who
24 was, at the time anyway and may still be, one of the
25 most qualified people in the country on hydrogeology.

1 And the other was a toxicologist called Ben Lepay -- no,
2 Dr. Lepay. I can't remember what his first name was,
3 but he was with the University of Chicago. He was
4 involved with the medfly problem in California. And
5 then the third person we hired was an epidemiologist
6 called Dr. Beverly Pagan. And she was instrumental in
7 the Love Canal contamination problem. So we had what we
8 felt was an incredibly qualified group of people to
9 advise us. They worked with us for a number of years in
10 reviewing information. It was developed on the site by
11 professionals working for the DEP and the EPA, and paid
12 for by the principally responsible parties. Anyway,
13 that's a little bit of the history. And during that
14 evolution, there's been a number of remedies to take
15 care of the problems. First of all, as far as the air
16 pollution, as Terry said, they did monitoring. They put
17 up a meteorological tower there to determine weather
18 patterns over a period of time, and the monitoring was
19 predicated on those findings, they didn't find anything.
20 Off-site soil investigations in the neighborhood. Many
21 residents had soil samples taken. Those were analyzed
22 and nothing was found. Wells were monitored on a fairly
23 ongoing basis over a period of years. Nothing off-site
24 except for on the opposite side of the road on the
25 Melanson's property, and Terry explained how that

1 happened. So there didn't appear to be any concern
2 about air pollution and any concern about groundwater
3 pollution migrating off-site.
4 The -- at the time that a decision was made
5 on how the site contamination was to be dealt with,
6 there were several different remedies that were
7 reviewed, and the one that was chosen was on-site vapor
8 extraction. Another alternative would have been to
9 truck basically all of the soil off-site which is --
10 would be astronomical and put it through an incinerator
11 of some type and either bring it back to the site or
12 replace it with new soil on the site. It was decided to
13 consolidate the soil contamination into a controllable
14 area and use a vapor extraction system which injected
15 steam into the soil. Most of the substances we're
16 talking about -- and there aren't a lot of them now left
17 that are detectable -- volatilize very readily. It's
18 like the vapor from gasoline, you can smell that. So by
19 injecting steam in there, the technology was to
20 volatilize these, recollect the steam through a vacuum
21 system, put it into the treatment facility, take out the
22 dirty stuff and then put the clean water back in. That
23 was done for a period of time. And, as Terry said, I'm
24 not sure -- again, I don't know an accurate chronology
25 of the testing that was done, but it was a fairly

1 regular profile of testing that was done on all of these
2 substances during that period including monitoring
3 ground water. Most of the wells on this site are in the
4 overburden. There are deep wells that do go down into
5 the groundwater for the purpose of monitoring that. But
6 the extraction wells were all in the overburden. They
7 reached a level that they felt was as far as they could
8 go with the current science. And, again, we're talking
9 about parts per billion here. When this first surfaced,
10 the ability to detect beyond parts per million for some
11 substances haven't been developed. So the science has
12 evolved along with the cleanup protocol that's been used
13 on this site. And remedies that were not available when
14 the contamination was first developed -- discovered had
15 been developed since. And everything including the
16 molasses and the lactate, putting sugar into the ground,
17 basically were experimental. The potassium permanganate
18 I think was one of the first sites it was ever tried on.
19 So I think that the -- in my opinion -- and I've been
20 with this since the begin, Lois and I have. As a matter
21 of fact, we had monthly meetings and met with
22 representatives from the DEP and the EPA on a regular
23 basis to discuss the progress and to review their
24 findings with our experts and get independent
25 information from them or feedback from them. They did

1 have impact on the record of decision. I believe that
2 they all responded to different segments and -- so they
3 were working on the community's behalf. They had no
4 obligation to any government agency. They were strictly
5 working for us and giving us independent information.
6 The current situation has been pretty static
7 for the last few years. They went as far as they felt
8 they could go with the science that's available. The
9 level of contamination is -- does not meet drinking
10 water standards, and I don't think that that necessarily
11 is unique. Probably in a lot of places if you checked
12 the ground water, it wouldn't meet the drinking water
13 standards. As a matter of fact, it's my understanding
14 if we took a bottle of Poland Spring water and dumped it
15 on the site, it probably wouldn't meet the current
16 drinking water standards.
17 So there's a range of concern here. In my
18 experience, and I believe in Lois's, we've just gotten
19 to a point where the site is safe for reuse. And the
20 restrictions that they propose to place on it really
21 doesn't put any severe limitations insofar as most uses.
22 The biggest problem is the lack of drinking water. But
23 the other issues I think can be readily addressed. And
24 we had met numerous times. This has been a long
25 process. We met numerous times with regard to

1 developing a reuse plan for the site, and a number of
2 things were proposed. We presented to the selectmen a
3 number of years ago. So we're anxious to get this site
4 off the Superfund list and into a usable, functioning
5 tax-paying piece of property. It's an asset -- it can
6 be an asset to the town. Right now it's a liability.
7 It's an eyesore. It's a blemish we don't need. So the
8 sooner we get on with this process, the better it will
9 be for everybody.
10 I'm convinced that all of the parties
11 involved, the DEP and the EPA and the governments that
12 they represent are interested in creating a relationship
13 that will hold the community harmless, and they'll put
14 restrictions on the use of the site which should prevent
15 any individual from becoming harmed.
16 So I think the amendment to the plan
17 basically just moves the process along another step.
18 There will be long-term ongoing monitoring. I think
19 they can define the wells that they need to have access
20 to, and I believe they will work with whoever ends up
21 with the property to enable them to use it for a useful
22 and functioning purpose. That's all I have to say.
23 HEARING OFFICER CHOW: Thank you.
24 Any other comments?
25 All right. Well, I just want to remind

everybody again that you have the opportunity to submit comments in writing either in e-mail to Terry, and Terry's e-mail address is on the front page of the proposed plan. Or if you want to send him a letter, that's fine also. Just make sure it's postmarked by the end of the comment period which is July 12th.

So with that, seeing that there are no other comments or questions, the hearing is now closed. It is 8:51. Thank you again. And just a reminder that we'll stick around one-on-one if you would like to speak to any of us.

(Whereupon, the above-named hearing was concluded at 8:51 p.m.)

1 C E R T I F I C A T E

2

3 I, Debra J. Fusco, a Notary Public in and for the
4 State of Maine, hereby certify that on the 20th day of
5 June, 2013, personally appeared before me the
6 within-named persons to testify to the truth, the whole
7 truth, and nothing but the truth in the aforementioned
8 cause of action and that the foregoing is a true and
9 accurate record as taken by me, by means of
10 computer-aided machine shorthand.

11

12 I further certify that I am a disinterested person in
13 the event or outcome of the aforementioned cause of
14 action.

15

16 IN WITNESS WHEREOF, I have hereunto set my hand this
17 1st day of July, 2013.

18

19 Debra J. Fusco

20 Debra J. Fusco

21 Court Reporter/Notary Public

22

23 My Commission expires: February 23, 2016

24

25

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