

FIVE-YEAR REVIEW REPORT

FIVE-YEAR REVIEW

**UNION CHEMICAL COMPANY SITE
SOUTH HOPE, MAINE**

RESPONSE ACTION CONTRACT (RAC), REGION I

**For
U.S. Environmental Protection Agency**

**By
Tetra Tech NUS, Inc.**

**EPA Contract No. 68-W6-0045
EPA Work Assignment No. 124-FRFE-0165
TtNUS Project No. N4255**

September 2002



TETRA TECH NUS, INC.

FIVE-YEAR REVIEW REPORT

UNION CHEMICAL COMPANY SUPERFUND SITE

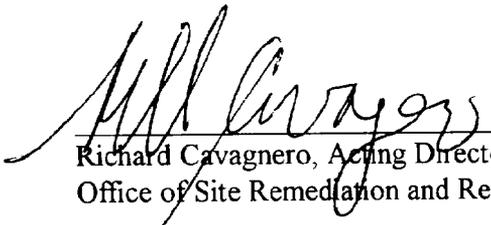
SOUTH HOPE, MAINE

Prepared by:

U.S. Environmental Protection Agency

Region I

Boston, Massachusetts


Richard Cavagnero, Acting Director
Office of Site Remediation and Restoration

9-18-02
Date



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

MEMORANDUM

DATE: September 18, 2002

SUBJ: Five-Year Review
Union Chemical Company Site

FROM: Nancy Smith
Terrence Connelly *Terrence Connelly*

THRU: Mary Jane O'Donnell, Chief *M. J. O'Donnell*
ME, VT, and CT Superfund Section

TO: Richard Cavagnero, Acting Director *Richard Cavagnero*
OSRR

Summary of Action

Attached for your review and signature is the first five-year review report for the Union Chemical Company Superfund Site, the ("Site") in South Hope, Maine. EPA Region I conducted this review pursuant to CERCLA section 121(c), National Oil and Hazardous Substances Pollution Contingency Plan (NCP) section 300.430(f)(4)(ii), and OSWER Directives 9355.7-02 (May 23, 1991), and 9355.7-02A (July 26, 1994). This is a statutory review, conducted for post-October 17, 1986 Remedial Actions. The purpose of a five-year review is to ensure that a remedial action remains protective of human health and the environment.

Major Issues

No major issues regarding the protectiveness of the remedy were identified in the five-year review process. Maine DEP voiced concern that EPA has been too aggressive with the cleanup efforts, particularly with the use of innovative technologies, and also voiced concern that there is a yet-to-be detected plume in the deep bedrock. Although EPA does not share the same level of concern regarding these issues, it has agreed to work with Maine DEP and the PRPs to address them.

The five-year review process revealed that all four remedy components have been implemented in accordance with the requirements of the 1990 ROD, as modified by the 1994, 1997, and 2001 ESDs.

The facilities decontamination and demolition activities were completed in May 1994, and the debris was sent offsite. These activities were carried out in accordance with the ROD, and this portion of the remedy remained protective of human health and the environment.

The off-site soil investigation was conducted in October 1996. It was determined that the lead concentrations in off-site soils were below federal and state guidelines for residential property, did not pose a threat to human health and the environment, were not related to Site activities, and therefore the off-site soils portion of the remedy was deemed complete in late 1996.

The on-site soils have been remediated in accordance with the requirements of the ROD as modified by the 1994 ESD. Soil closure samples were collected in 1998 and the results showed that the soil program had met the performance standards set in the ROD.

The management of migration component, upon completion, is expected to be protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Through the implementation of innovative technologies, EPA believes the groundwater performance standards can be achieved by 2005. Once the standards have been reached, a compliance monitoring program will be implemented to ensure that the standards are met throughout the Site and over an extended period of time.

Headquarters Perspective/Involvement

Headquarters provided comments on the draft five-year review report as part of its review of all five-year reviews following the June 2001 guidance document "Comprehensive Five-Year Guidance", OSWER No. 9355.7-03B-P. These comments have been addressed.

Public Involvement

EPA issued a press release on May 13, 2002 that was published in the Rockland Courier Gazette announcing EPA's review of the progress of the Union Chemical Company Site cleanup. The press release encouraged public participation. There is an established Community Group, HCCE, which has received support through a EPA technical assistance grant issued in 1990. As part of a regularly-scheduled meeting with HCCE on May 21, 2002, USEPA representatives described the five-year review process.

During a visit to the Hope Town Offices on May 21, 2002, representatives from EPA and TtNUS briefly described the five-year review process to the town officials. All site-related documents are available at the Hope Public Library in Hope. According to staff there has been limited interest in the documents. A notice which briefly summarizes this five-year review will be published in a major local newspaper of general circulation.

Media-Congressional Involvement

There has been no media or congressional involvement regarding the five-year review process.

State Coordination

Maine DEP has participated in the review process, including the site inspection, interviews, and has provided comments on the draft five-year review report. Maine DEP expressed concerns that the cleanup efforts were proceeding too quickly, that the institutional controls needed to be better defined, and that a yet-to-be detected deep bedrock plume exists which could threaten nearby properties. These concerns were incorporated in the final report and EPA has agreed to address these concerns with Maine DEP and the PRPs.

Recommendation

The selected remedy upon completion will be protective of human health and the environment. In the interim, possible exposure pathways are controlled. Therefore, we recommend you sign this five-year review.

Contact Persons

Nancy Smith, Work Assignment Manager, 918-1436
Terrence Connelly, Remedial Project Manager, 918-1373

Attachment: Five-Year Review Report

FIVE-YEAR REVIEW REPORT

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For
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By
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EPA Contract No. 68-W6-0045
EPA Work Assignment No. 124-FRFE-0165
TtNUS Project No. N4255

September 2002



Phoebe A. Call
Project Manager



George D. Gardner, P.E.
Program Manager

**TABLE OF CONTENTS
FIVE-YEAR REVIEW REPORT
UNION CHEMICAL COMPANY SITE
SOUTH HOPE, MAINE**

<u>SECTION</u>	<u>PAGE</u>
ES-1 EXECUTIVE SUMMARY	ES-1
1.0 INTRODUCTION.....	1-1
2.0 SITE CHRONOLOGY	2-1
3.0 BACKGROUND	3-1
3.1 Physical Characteristics	3-1
3.2 Land and Resource Use	3-5
3.3 History of Contamination.....	3-6
3.4 Initial Response	3-6
3.5 Basis for Taking Action	3-7
4.0 REMEDIAL ACTIONS	4-1
4.1 Remedy Selection	4-1
4.2 Remedy Implementation	4-5
4.2.1 Facilities Decontamination, Demolition, and Off-Site Disposal	4-5
4.2.2 SVE Phase I Activities	4-5
4.2.3 SVE Phase II Activities	4-7
4.2.4 Treatment System Startup.....	4-7
4.2.5 Source Control Activities.....	4-8
4.2.6 MOM Activities	4-9
4.2.7 Limited Action for Off-Site Soils	4-11
4.2.8 Institutional Controls	4-11
4.3 System Operations/O&M	4-14
5.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW	5-1
6.0 FIVE-YEAR REVIEW PROCESS	6-1
6.1 Administrative Components	6-1
6.2 Community Notification and Involvement.....	6-1
6.3 Document Review	6-2
6.4 Data Review.....	6-2
6.4.1 Facilities Decontamination and Demolition	6-2
6.4.2 Soil Vapor Extraction	6-2
6.4.3 Management of Migration	6-3
6.4.4 Limited Action for Off-Site Soils	6-6
6.5 Site Inspection	6-6
6.6 Interviews.....	6-7

**TABLE OF CONTENTS (cont.)
 FIVE-YEAR REVIEW REPORT
 UNION CHEMICAL COMPANY SITE
 SOUTH HOPE, MAINE**

<u>SECTION</u>	<u>PAGE</u>
7.0 TECHNICAL ASSESSMENT	7-1
7.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?	7-1
7.2 Question B: Are The Exposure Assumptions, Toxicity Data, Cleanup Levels And Remedial Action Objectives (Raos) Used At The Time Of Remedy Selection Still Valid?	7-3
7.3 Question C: Has Any Other Information Come To Light That Could Call Into Question The Protectiveness Of The Remedy?.....	7-8
7.4 Technical Assessment Summary.....	7-8
8.0 ISSUES	8-1
9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS	9-1
10.0 PROTECTIVENESS STATEMENTS	10-1
11.0 NEXT REVIEW.....	11-1

TABLES

<u>NUMBER</u>	<u>PAGE</u>
2-1 Chronology of Site Events.....	2-1
4-1 Soil Cleanup Levels.....	4-2
4-2 Groundwater Cleanup Levels.....	4-3
6-1 Groundwater Quality Comparison – Selected COCs	6-4
7-1 ROD Cleanup Goals and Maine MEGS	7-5

FIGURES

<u>NUMBER</u>	<u>PAGE</u>
3-1 Site Location Map.....	3-2
3-2 Site Plan – Former UCC Facilities.....	3-3
3-3 Site Plan – Current Conditions	3-4
4-1 Well Advisory Zone - 1992	4-12
4-2 Well Advisory Zone - 2001	4-13

**TABLE OF CONTENTS (cont.)
FIVE-YEAR REVIEW REPORT
UNION CHEMICAL COMPANY SITE
SOUTH HOPE, MAINE**

APPENDICES

- A Document Review List/References
- B Site Inspection Report
- C Interview List
- D ARARs and TBCs
- E MEDEP Review Comments on "Draft 5-Year Review Report for the Union Chemical Company Superfund Site, Hope, Maine," dated July 2002

ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criteria
BEHP	Bis-2(ethylhexyl) phthalate
COC	Contaminant of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMR	Code of Maine Rules
CSF	Cancer Slope Factor
CWA	Clean Water Act
DCA	Dichloroethane
DCE	Dichloroethene
DL	Detection Limit
DMF	N, N-Dimethylformamide
ESD	Explanation of Significant Differences
GAC	Granular Activated Carbon
GPA	Great ponds water classification
HAI	Hot Air Injection
HCCE	Hope Committee for a Clean Environment
IT	International Technology Corporation
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goals
MEDEP	Maine Department of Environmental Protection
MEGs	Maximum Exposure Guidelines
MEK	Methyl Ethyl Ketone
MOM	Management of Migration
MRSA	Maine Revised Statutes Annotated
ND	non detect
NPL	National Priorities List
O&M	Operations and Maintenance
PCE	Tetrachloroethene
ppb	parts per billion
ppm	parts per million
PRP	Potentially Responsible Party
RAG	Remedial Action Guideline
RAO	Remedial Action Objective
RD	Remedial Design

ACRONYMS (Cont'd)

RfDs	USEPA Risk Reference Doses
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SC	Source Control
SCRA	Source Control Remedial Action
SDWA	Safe Drinking Water Act
Site	Union Chemical Company Superfund Site
SOW	Statement of Work (appended to Consent Decree)
SWQC	State Water Quality Criteria
SVE	soil vapor extraction
TBC	To be Considered
TCA	Trichloroethane
TCE	Trichloroethene
THM	Trihalomethane
Trust	Union Chemical RD/RA Trust
TtNUS	Tetra Tech NUS, Inc.
µg/L	micrograms per liter
UCC	Union Chemical Company
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

EXECUTIVE SUMMARY

The December 27, 1990 ROD for the Site specified a multi-component remedy to address contaminated on-site soils, groundwater, and facilities, and to further evaluate potential off-site soil contamination. The risk assessment concluded that the current and future risks were through exposure to on-site groundwater as a drinking water supply. The remedy selected in the ROD specified:

- soil excavation with on-site low-temperature aeration;
- vacuum-enhanced groundwater extraction, on-site treatment and discharge of treated groundwater to Quiggle Brook;
- facilities decontamination and demolition and off-site disposal of debris; and
- limited action for off-site soils.

Facilities decontamination and demolition activities were completed in May 1994. The soil cleanup technology was changed by USEPA in a June 1994 ESD from low-temperature thermal aeration to soil vapor extraction. The soil treatment portion of the remedy was initiated on October 14, 1994 and was completed in December 1999 after acceptance by USEPA and MEDEP of the soil closure sampling findings.

Startup of the groundwater extraction and treatment systems occurred in January 1996 and system operations continued until October 2000. The extraction and treatment system has since been deactivated. Several modifications to the groundwater component have been carried out with the intent of both accelerating the clean up process and attaining the performance standards. These modifications have included the addition of potassium and sodium permanganate from 1997 to 2000, the reinjection of treated water into the subsurface, and the application of carbon sources in 2001-2002. The surface water and groundwater monitoring portion of the management of migration remedy continues, as does periodic additions of carbon sources to the groundwater to enhance degradation of the remaining contaminants. Groundwater compliance monitoring is expected to commence by 2005.

The groundwater component of the 1990 ROD focused on the shallow till and weathered, shallow bedrock aquifers underlying the site, while acknowledging the contamination present in one deep bedrock well and the need to ultimately reach clean up goals throughout the shallow

and bedrock aquifers. The Revised Statement of Work, Appendix II of the Consent Decree, states that after five years of groundwater extraction and treatment if contamination in the identified bedrock well continues to exceed the cleanup levels, the Settling Parties at the direction of EPA shall evaluate additional measures to address these conditions. As progress toward the cleanup levels continues in the till and shallow bedrock, EPA will work with Maine DEP and the Settling Parties to resolve the remaining issue of low levels of site contaminants present in the deep bedrock.

The limited action for off-site soils required collection of five years of meteorological data. In 1996 USEPA agreed that the three years of data that had been collected were representative of local conditions. In July 1996 and September 1996, soil samples were collected from off-site locations. Review of these data in October 1996 resulted in a concurrence by all parties that the data did not show measurable off site deposition from the Site incinerator. In September 1997 USEPA signed an ESD that documented the change to the remedy and certified that the off-site soil activities were complete.

According to data reviewed, observations from the site inspection, and interviews, the remedy is functioning as intended by the ROD, as modified by the ESDs. The source control portion of the remedy is complete. Soil closure samples were collected in 1998 and the results showed that the soil program met the intended objectives, therefore the soil remedy at the Site remained protective of human health and the environment through its completion. The MOM remedy is operating, as modified by the 2001 ESD. Surface water and groundwater monitoring continue as part of the MOM remedy. The effective implementation of institutional controls, including fencing and a local well advisory, have thus far ensured the integrity of the remedial measures conducted at the Site, and prevented exposure to Site soils and groundwater.

Five-Year Review Protectiveness Statement:

The remedy is expected to be or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Through the implementation of innovative technologies, USEPA expects the groundwater to achieve the ROD performance standards by 2005. Once the standards have been reached, a compliance monitoring program will be implemented to ensure that the standards are met throughout the Site and over an extended period of time. The threat of groundwater

contamination from soils was mitigated by the excavation and consolidation of outlying areas, capping of the soil treatment area, and then the successful treatment of the contaminated soils. Other threats posed by the Site have been addressed through institutional controls that are preventing exposure to, or the ingestion of, contaminated Site groundwater and the effort to sample all newly installed bedrock wells in the vicinity of the Site.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Union Chemical Co., Inc.		
EPA ID (from WasteLAN): MED042143883		
Region: 1	State: ME	City/County: Knox
SITE STATUS		
NPL status: Final		
Remediation status (choose all that apply): Operating		
Multiple OUs?* No	Construction completion date: 12/19/97 (EPA approval of CCR)	
Has site been put into reuse? NO		
REVIEW STATUS		
Lead agency: EPA		
Author name: Terrence Connelly		
Author title: Remedial Project Manager	Author affiliation: EPA Region I	
Review period:** 3/1/02 to 9/30/02		
Date(s) of site inspection: 5/21/02		
Type of review: <div style="text-align: center;">Post-SARA</div>		
Review number: 1 (first)		
Triggering action: Facilities decontamination, demolition and off-site disposal – November 29, 1993		
Triggering action date (from WasteLAN): <u>11 / 29 / 93***</u>		
Due date (five years after triggering action date): <u>11 / 29 / 98 ****</u>		

* "OU" refers to operable unit.

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

*** This date was not entered into WasteLAN.

**** The startup of SVE and MOM in 1996 was inadvertently entered into the database as the trigger date for the five-year review.

Five-Year Review Summary Form, cont'd.

Issues:

- Current analytical detection limits for some contaminants are higher than the respective performance standard.
- Some VOC concentrations in groundwater remain orders of magnitude higher than the performance standard for the MOM remedy.
- Update Site risk once performance standards are met.
- Deep bedrock contamination.

Recommendations and Follow-up Actions:

- Surface water and groundwater analytical detection limits should be evaluated and lowered as necessary to ensure limits are lower than contaminant performance standards, especially during the compliance monitoring period.
- If VOC concentrations in groundwater, which in Fall 2001 exceeded the performance standard at many locations, remain at concentrations greater than both the performance standard and current MCLS and MEGS, the MOM remedy will require reevaluation.
- Per the ROD, the site risk will be recalculated after completion of the remedial action.
- Evaluate the risks associated with contamination in deep bedrock.

Protectiveness Statement(s):

The remedy is expected to be or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Through the implementation of innovative technologies, USEPA expects the groundwater to achieve the ROD performance standards by 2005. Once the standards have been reached, a compliance monitoring program will be implemented to ensure that the standards are met throughout the Site and over an extended period of time. The threat of groundwater contamination from soils was mitigated by the excavation and consolidation of outlying areas, capping of the soil treatment area, and then the successful treatment of the contaminated soils. Other threats posed by the Site have been addressed through institutional controls that are preventing exposure to, or the ingestion of, contaminated Site groundwater and the effort to sample all newly installed bedrock wells in the vicinity of the Site.

Other Comments:

1.0 INTRODUCTION

The purpose of this five-year review is to determine if the remedy selected for the Union Chemical Company Superfund Site (Site) in South Hope, Maine, is protective of human health and the environment. This report summarizes the five-year review process, investigations and remedial actions undertaken at the Site; evaluates the monitoring data collected; reviews the Applicable or Relevant and Appropriate Requirements (ARARs) specified in the Record of Decision (ROD) for changes; discusses any issues identified during the review; and presents recommendations to address these issues.

The United States Environmental Protection Agency, Region 1 (USEPA) is preparing this five-year review pursuant to the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan. CERCLA §121 states:

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

The USEPA interpreted this requirement further in the National Contingency Plan; 40 CFR §300.430(f)(4)(ii) states:

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

This is the first five-year review for the Union Chemical Company (UCC) Site. The triggering action for this statutory review was the initiation of the decontamination, demolition, and off-site disposal of the Site facilities in November 1993. Collection of on-site meteorological data began in January 1994. Source control (SC) activities began in October 1994 with soil excavation and consolidation. Construction of the management of migration (MOM) portions of the remedy commenced in the summer of 1995. The startup of the soil vapor extraction (SVE) and MOM

systems in 1996 had inadvertently been placed in the data base as the trigger date for the five-year review.

This review covers all four parts of the multi-component remedy for the Site. The five-year review is required since hazardous contamination remains at the Site above levels that allow for unlimited use and unrestricted exposure.

USEPA has conducted this five-year review of the remedial actions implemented at the Union Chemical Company Site in South Hope, Maine. Tetra Tech NUS, Inc. (TtNUS) supported USEPA in completion of the review under RACI Contract No. 68-W6-0045, W.A. No. 124-FRFE-0165. Assistance was provided by Maine Department of Environmental Protection (MEDEP). Work on this review was undertaken between March and August 2002. The review was completed in accordance with USEPA Guidance OSWER NO. 9355.7-03B-P.

2.0

SITE CHRONOLOGY

**TABLE 2-1
CHRONOLOGY OF SITE EVENTS
FIVE-YEAR REVIEW REPORT
UNION CHEMICAL COMPANY SITE
SOUTH HOPE, MAINE**

The Union Chemical Company began paint stripping and solvent manufacturing operations	1967
Groundwater contamination discovered by MEDEP beneath the Site and in Quiggle Brook	November 1979
UCC-funded studies of soil and groundwater contamination	1981
MEDEP closed the hazardous waste treatment operations	June 1984
Removal of 2,000 – 2,500 55-gallon drums and 28 of 30 liquid storage tanks and their contents completed by EPA and MEDEP	November 1984
UCC evicted from the Site by state court order; MEDEP appointed as receiver of the property	1986
Under two Administrative Orders by Consent, the PRPs agree to reimburse EPA and MEDEP for response costs incurred prior to May 22, 1987 and perform an RI/FS	Fall 1987
Additional PRPs sign Consent Decree reimbursing EPA for past response costs	August 7, 1989
Final listing of the Site on the NPL	October 4, 1989
PRPs complete the RI/FS	December 27, 1990
ROD signed	December 27, 1990
PRPs complete a Focused Feasibility Study demonstrating SVE is a viable soil treatment technology	April 1993
USEPA approval of Facilities Remedial Design	October 23, 1993
USEPA approval of Facilities Remedial Action Work Plan	November 5, 1993
Explanation of Significant Differences (ESD) signed, changing Source Control remedy from excavation and low-thermal aeration to SVE	June 24, 1994
SC soil consolidation and site capping	October 1994 - May 1995
USEPA approves 100% SVE/MOM Remedial Design and Remedial Action Work Plan	April 5, 1995
Well drilling	June - July 1995
Construction of treatment plant	July - September 1995
Final cap installation	September 1995
Interior equipment installation	September - October 1995

**TABLE 2-1 (cont.)
 CHRONOLOGY OF SITE EVENTS
 FIVE-YEAR REVIEW REPORT
 UNION CHEMICAL COMPANY SITE
 SOUTH HOPE, MAINE
 PAGE 2 OF 2**

Interior and exterior piping installation	September - November 1995
Testing of equipment (cold start - using clean water)	November - December 1995
Original SVE/MOM Start-up Period	January - June 1996
Extended SVE/MOM Start-up Period	June 1996 - February 1997
Joint USEPA/Settling Defendant Off-Site Soils Investigation	October 1996
Operational & Functional Final Inspection for SVE/MOM systems	April 28, 1997
ESD signed documenting change to off-site soils remedy and certification of completion	September 1997
Permanganate Pilot Study	November 1997
USEPA approval of Construction Completion Report for SVE/MOM systems	December 19, 1997
Compliance sampling for soil performance standards	August - September 1998
First permanganate full-scale implementation	summer 1998
Second permanganate full-scale implementation	summer-fall 1999
USEPA approval of <u>Final Closure Action Plan for Soils, Findings and Summary</u>	December 17, 1999
Third permanganate full-scale implementation	summer-fall 2000
ESD signed documenting permanganate and carbon source in-situ enhancements	September 27, 2001
Carbon source implementation	summer-fall 2001
First Five-Year Review	summer 2002
Carbon source implementation	summer-fall 2002
Groundwater performance standards projected to be met	2003-2005
Groundwater compliance monitoring	2005-TBD

Source: USEPA, 1994, 2001c.

3.0 BACKGROUND

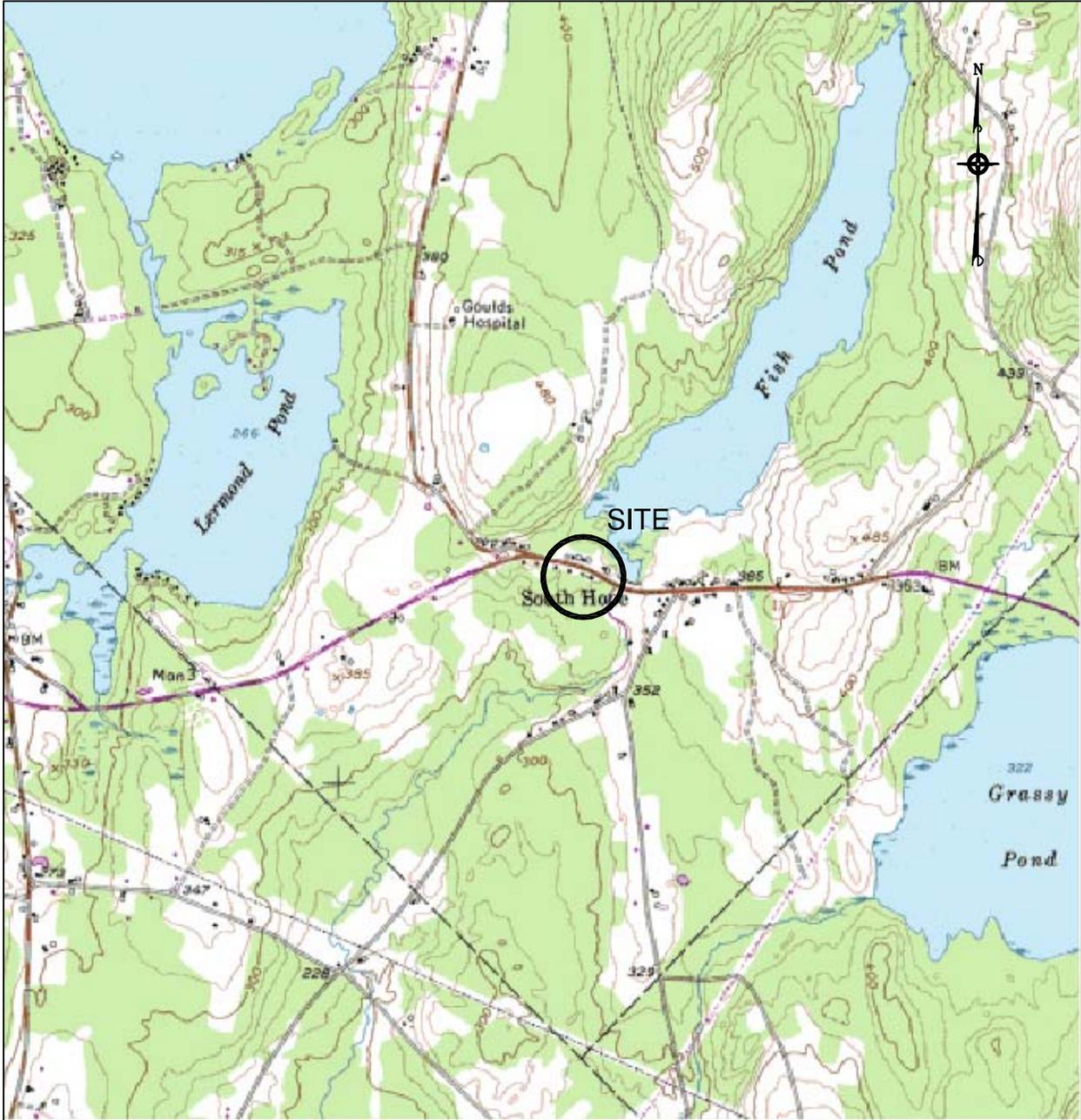
3.1 Physical Characteristics

The Site is located on Route 17 in a rural, residential area of South Hope, Maine (Figure 3-1). The Site occupies approximately 12.5 acres along the south side of Route 17. The majority of UCC's past operations were conducted within a fenced two-acre area. This fenced-in area enclosed most of the plant's former waste handling facilities including the Still Building, the Warehouse and concrete pad, the leach field, and the incinerator and associated equipment (Figure 3-2). These facilities were demolished and removed from the Site in 1993 and 1994. In 1995 and 1996, soil vapor and groundwater extraction systems and corresponding treatment equipment were installed within the fenced-in area. Apart from the fenced-in area, the Site is readily accessible. The extraction and treatment systems are no longer in operation. All of the piping has been removed from the SVE treatment area and the contents of the treatment building are being decontaminated and dismantled. Figure 3-3 shows current Site conditions, including the treatment building and monitoring well network.

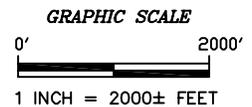
The current Site topography reflects changes made during the soil excavation and consolidation phase to the original surface grades. A high point (elevation 373 ft) was created in the vicinity of the former Still Building near the center of the Site where the SVE treatment area and cap were constructed. The property slopes in a southerly direction to a wetland area (elevation 361 ft) and in a southeasterly direction toward Quiggle Brook (elevation 344 ft). (IT, 1999).

The Site is bounded on the east and southeast by Quiggle Brook, which is a southerly flowing outlet stream of Fish Pond. A floodplain and wetland area exists along Quiggle Brook at the eastern portion of the Site, and intermittent wetland areas have been delineated in the northwest corner and immediately south of the fenced-in portion of the Site.

Previous investigations have indicated that the Site is underlain primarily by unconsolidated drift or glacial till, interspersed with discontinuous lenses of sand. Fractured bedrock was identified at the bedrock/till interface. Groundwater occurs both within the overburden and the fractured bedrock. Groundwater in the overburden flows east/southeast through the westerly-thickening glacial till soils. Shallow groundwater discharges to Quiggle Brook. Based on the available data, bedrock water flow is primarily in the upper five feet of fractured/weathered bedrock,



THIS MAP IS A PORTION OF THE WEST ROCKPORT, MAINE QUADRANGLE, 1955, PHOTOINSPECTED 1988, PHOTOREVISED 1973.



SITE LOCATION MAP

FIGURE 3-1

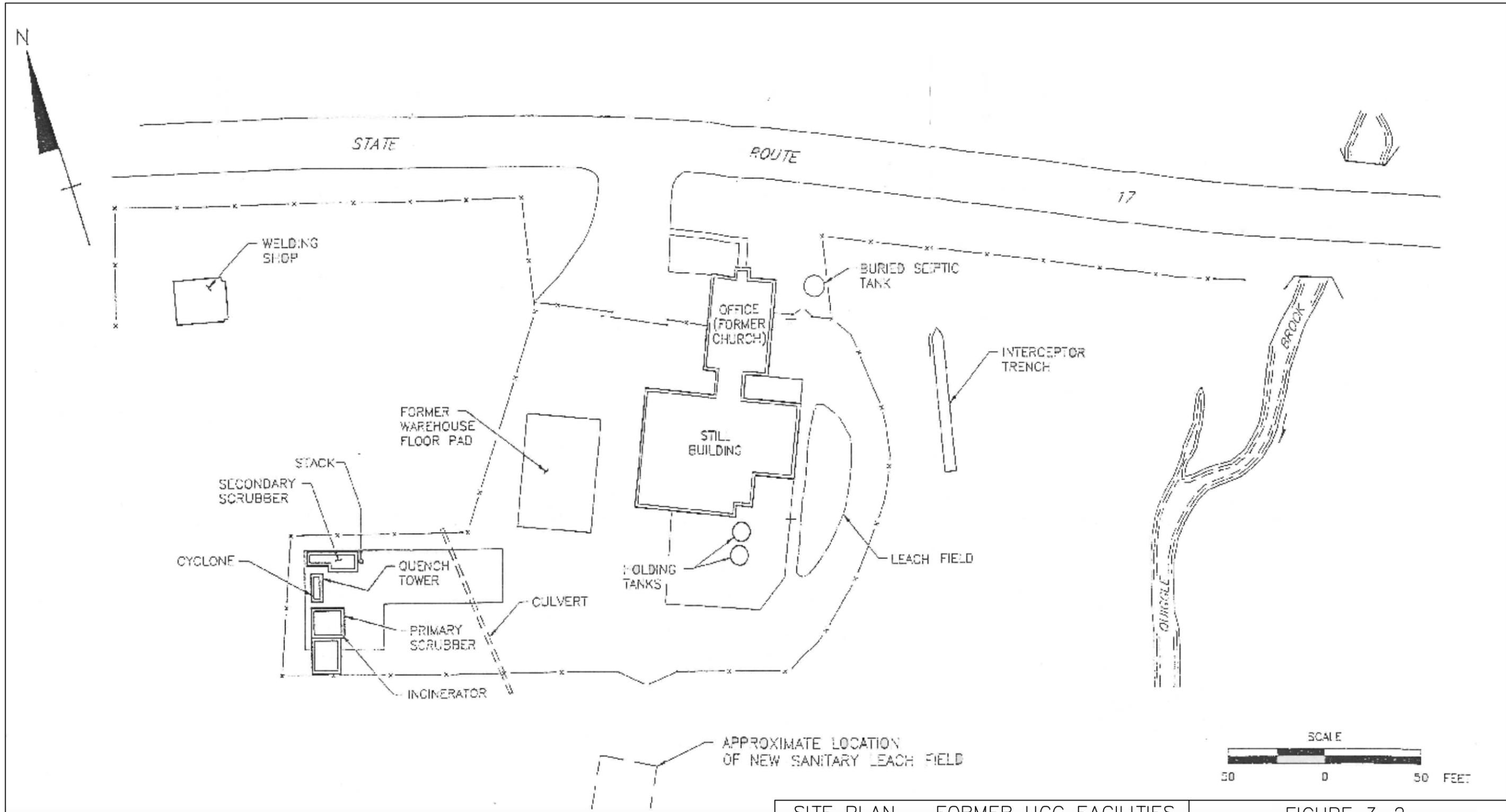
UNION CHEMICAL COMPANY SITE – FIVE YEAR REVIEW
SOUTH HOPE, MAINE



TETRA TECH NUS, INC.

DRAWN BY:	R.G. DEWSNAP	REV.:	0
CHECKED BY:	P. CALL	DATE:	JULY 9, 2002
SCALE:	1" = 2000 ±'	ACAD NAME:	\DWG\4255\0600\SITE_LOC.DWG

55 Jonspin Road Wilmington, MA 01887
(978)658-7899



NOTES:

1. PLAN ADAPTED FROM A PLAN BY CANONIE ENVIRONMENTAL, ENTITLED: "SITE PLAN REMEDIAL INVESTIGATION SOUTH HOPE, MAINE PREPARED UNION CHEMICAL TRUSTEES", DATED: 2-13-90, FIGURE 2, DRAWING NUMBER 87-072-B176.
2. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
3. PLAN NOT TO BE USED FOR DESIGN.

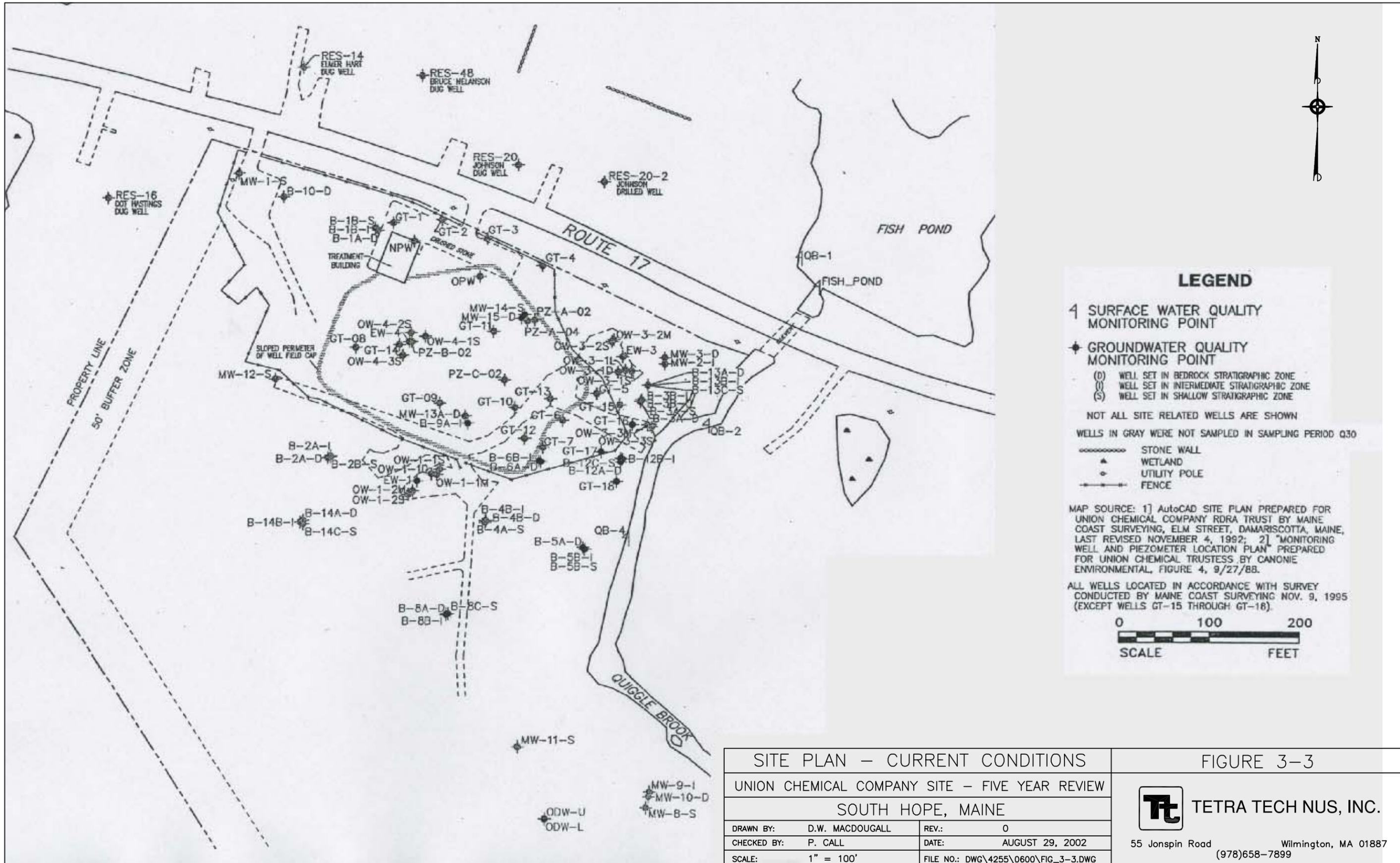
SITE PLAN – FORMER UCC FACILITIES
 UNION CHEMICAL COMPANY SITE – FIVE YEAR REVIEW
 SOUTH HOPE, MAINE

DRAWN BY:	R.G. DEWSNAP	REV.:	0
CHECKED BY:	P. CALL	DATE:	JULY 10, 2002
SCALE:	AS SHOWN	FILE NO.:	\DWG\4255\0600\SITE_PLAN.DWG

FIGURE 3-2



55 Jonspin Road Wilmington, MA 01887
 (978)658-7899



LEGEND

1 SURFACE WATER QUALITY MONITORING POINT
 ◆ GROUNDWATER QUALITY MONITORING POINT
 (D) WELL SET IN BEDROCK STRATIGRAPHIC ZONE
 (I) WELL SET IN INTERMEDIATE STRATIGRAPHIC ZONE
 (S) WELL SET IN SHALLOW STRATIGRAPHIC ZONE

NOT ALL SITE RELATED WELLS ARE SHOWN
 WELLS IN GRAY WERE NOT SAMPLED IN SAMPLING PERIOD Q30

----- STONE WALL
 ▲ WETLAND
 ○ UTILITY POLE
 --- FENCE

MAP SOURCE: 1) AutoCAD SITE PLAN PREPARED FOR UNION CHEMICAL COMPANY RDRA TRUST BY MAINE COAST SURVEYING, ELM STREET, DAMARISCOTTA, MAINE, LAST REVISED NOVEMBER 4, 1992; 2) "MONITORING WELL AND PIEZOMETER LOCATION PLAN" PREPARED FOR UNION CHEMICAL TRUSTEES BY CANONIE ENVIRONMENTAL, FIGURE 4, 9/27/88.

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995 (EXCEPT WELLS GT-15 THROUGH GT-18).

0 100 200
 SCALE FEET

SITE PLAN – CURRENT CONDITIONS		
UNION CHEMICAL COMPANY SITE – FIVE YEAR REVIEW		
SOUTH HOPE, MAINE		
DRAWN BY:	D.W. MACDOUGALL	REV.: 0
CHECKED BY:	P. CALL	DATE: AUGUST 29, 2002
SCALE:	1" = 100'	FILE NO.: DWG\4255\0600\FIG_3-3.DWG

FIGURE 3-3

TETRA TECH NUS, INC.

55 Jonspin Road Wilmington, MA 01887
 (978)658-7899

flowing east/southeast from the northern portion of the Site and southeasterly in the southern portion of the Site (IT, 2001d).

Shallow groundwater discharges to Quiggle Brook. Bedrock yield is highly variable throughout the Site. (IT, 2001d)

3.2 Land and Resource Use

The 12.5-acre site is mostly wooded, with 2.5-acres of open field where former operations were located. Surrounding land uses include low-density residential, small business, and forest. A review of the current Town of Hope zoning map located in the Hope Town Offices indicated that the area around the Site is zoned BT-3, or Business Transition District 3. This land use description allows business and service uses, as well as retail use of buildings smaller than 15,000 square feet, which are “consistent with the residential and rural character of the Town.” (Hope Land Use Ordinance, revised June 19, 2000).

The Site is in close proximity to several residential dwellings; there is one located 150 feet to the north along Route 17 and a second within 400 feet to the west along the south side of Route 17. Additional residential properties are located further to the east and southeast. There is no public water supply in the area, therefore all residential properties have private water supply wells. The private water supply wells closest to the Site, and which are in use, are upgradient of the Site contaminant plumes and therefore are not at risk of contamination by Site contaminants. The groundwater aquifers below and surrounding the Site are classified by USEPA as Class IIA and by MEDEP as GW-A. Such aquifers can be used for public water supplies.

Quiggle Brook is classified as a Class B water. Such waters are acceptable for fishing, recreation, habitat for fish and other aquatic life, and after treatment, use as a drinking water supply. Quiggle Brook is also classified as a tributary to a Class GPA water body, Crawford Pond. Class GPA waters are suitable for: drinking water use after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other aquatic life. (38 MRSA, § 465-A.1.A.)

There are several surface water bodies in the vicinity of the Site. Quiggle Brook flows southwest from the Site for approximately five miles before discharging into Crawford Pond, a drinking water source and recreational area. Fish Pond and Grassy Pond are smaller surface water bodies nearby the Site. Fish Pond is located approximately 300 feet to the northeast of the Site, along the northern side of Route 17. Alford Pond, northwest of the Site, is an active recreational area. A portion of the Site near Quiggle Brook lies within the 100-year floodplain. There are no known critical habitats on the Site.

3.3 History of Contamination

The UCC was incorporated as a paint stripping and solvent manufacturing business and began operations in South Hope, Maine in 1967. Initially, patented solvents were manufactured and utilized on the premises, and distributed nationally. The company expanded operations to include the recycling of used stripping compounds and solvents from other businesses. Operations were further expanded in 1982 to include a full-scale, fluidized-bed incinerator to treat waste solvents and other compounds.

Soil and groundwater contamination beneath the Site and surface water contamination in Quiggle Brook were first discovered by MEDEP in late 1979. A study conducted for the UCC in 1981 by Wright-Pierce Architects/Engineers found that two contaminated groundwater plumes were present in the area between the UCC facilities and Quiggle Brook. Volatile organic compounds (VOCs), similar to those processed by UCC, were the principal contaminants observed in the groundwater plumes and in the surface water of Quiggle Brook.

3.4 Initial Response

The study completed in 1981 discovered two groundwater plumes in the area between the UCC facilities and Quiggle Brook (see Figure 3-2). VOCs, typical of those used in the UCC's operations, were the primary contaminants found in the plumes and in Quiggle Brook. The source of contamination in the northern plume was the old leach field onsite. The contamination in the southern plume was believed to have come from a leaking storage tank in the former drum disposal area south of the plant buildings. MEDEP closed the hazardous waste treatment operations at the Site in June 1984. At that time approximately 2,000 - 2,500 55-gallon drums and 30 liquid storage tanks were found on the Site. All of these drums, all but two of the tanks,

and their contents, were removed by USEPA and MEDEP by the end of November 1984. In 1986, the state court evicted UCC from the site and appointed MEDEP as the receiver of the property. The Site was formally included on the National Priorities List (NPL) in October 1989.

3.5 Basis for Taking Action

The Potentially Responsible Parties (PRPs) under a USEPA order completed a Remedial Investigation/Feasibility Study (RI/FS) and Human Health Risk Assessment in 1990. The risk assessment indicated that the risk associated with exposure to site soils and facilities' residues was within EPA's acceptable risk range. However, as there was risk from ingestion of the groundwater, a remedial action objective (RAO) was set for site soils to prevent further leaching and migration into the groundwater of contaminants from the soil. RAOs were also set for the facilities. The risk assessment indicated that there would be unacceptable carcinogenic and non-carcinogenic risks from future ingestion of the groundwater at the Site due to concentrations of 23 contaminants of concern (COCs). The results of the RI and risk assessment were used to evaluate potential cleanup alternatives in the FS. The USEPA-preferred cleanup approach was proposed to the public in the summer of 1990 and a ROD was signed in December 1990.

Based on the results of the Human Health Risk Assessment, ARARs, and other guidance, target cleanup goals were established to protect human health and the environment from the identified risks. The ROD proposed a selected multi-component remedy for the Site that would meet these target cleanup goals. The primary contaminants of concern affecting the soil, groundwater and facilities debris at this time were tetrachloroethene (PCE), trichloroethene (TCE), toluene, xylenes, dioxin, arsenic, lead and asbestos.

4.0 REMEDIAL ACTIONS

This section describes the remedial actions selected for and implemented at the Site.

4.1 Remedy Selection

The December 27, 1990 ROD for the Site specified a multi-component remedy to address contaminated on-site soils, groundwater, and facilities, and to further evaluate potential off-site soil contamination. The risk assessment concluded that the current and future risks were through exposure to on-site groundwater as a drinking water supply. Based on the RI, the following remedial action objectives were identified for the Site:

- Prevent further migration of the contaminated on-site groundwater;
- Prevent further leaching of contaminants from Site soil to groundwater; and
- Provide for rapid restoration of the contaminated groundwater throughout the Site.

The remedy selected in the ROD specified:

- soil excavation with on-site low-temperature aeration;
- vacuum-enhanced groundwater extraction, on-site treatment and discharge of treated groundwater to Quiggle Brook;
- facilities decontamination and demolition, and off-site disposal of debris; and
- limited action for off-site soils.

USEPA established target cleanup levels for soils in the ROD to prevent migration of VOCs from unsaturated soils to Site groundwater and thus meet the remedial action objectives listed above. The cleanup standards for soil and groundwater are shown in Tables 4-1 and 4-2, respectively. The standards were established for carcinogenic as well as non-carcinogenic contaminants. Included in the non-carcinogenic list are contaminants that exhibit both carcinogenic and non-carcinogenic effects.

**TABLE 4-1
SOIL CLEANUP LEVELS
FIVE-YEAR REVIEW REPORT
UNION CHEMICAL COMPANY SITE
SOUTH HOPE, MAINE**

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

Source: ROD, 1990, Table B.1

**TABLE 4-2
GROUNDWATER CLEANUP LEVELS
FIVE-YEAR REVIEW REPORT
UNION CHEMICAL COMPANY SITE
SOUTH HOPE, MAINE**

Type	Contaminant	Cleanup Level (ppb)
Carcinogenic	Bis-2(ethylhexyl)phthalate (BEHP)	4
	Carbon tetrachloride	5
	Chloroform (as THM)	100
	1,1-Dichloroethane (DCA)	5
	1,2-DCA	5
	1,1-DCE	7
	Methylene chloride	5
	PCE	5
	TCE	5
	Vinyl chloride	2
	Non-Carcinogenic	BEHP
Carbon tetrachloride		5
Chloroform (as THM)		100
cis-1,2-DCE		70
Trans-1,2-DCE		100
1,1-DCA		5
1,1-DCE		7
Ethylbenzene		700
Methylene chloride		5
Methyl Ethyl Ketone (MEK)		170
PCE		5
Toluene		2,000
1,1,1-trichloroethane (TCA)		200
Total xylenes		10,000
Arsenic		50
Lead		50
DMF		390

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

The ROD also required institutional controls for the Site, including restricted access and use during the remedial action and restricted use of groundwater on the UCC property for drinking water purposes. Residential wells in the area of the Site were sampled during the RI. A pump test was conducted during the RI on residential well #20-2, a deep bedrock well located about 150 feet northeast of the Site, directly across Route 17. It found to be hydraulically connected to the Site and impacted by VOCs associated with Site operations. While site-related VOCs were found in this well during several sampling rounds, neither federal or state drinking water standards were exceeded. Regular sampling of residential wells surrounding the UCC property were performed from 1992 to 1997 (i.e., sampling began before soil remediation began and continued after hydraulic control was established). With the exception of well #20-2, no site-related contaminants were found in any of these wells. No other evidence was found that Site contaminants had migrated beyond the property boundary.

Institutional controls for surrounding properties were also specified in the ROD. Per the ROD, these controls may include, at a minimum:

- a restriction on the use of groundwater from existing bedrock wells that are hydraulically connected to the Site, specifically well #20-2, directly across Route 17 from the Site;
- restrictions on both the installation and use of new bedrock drinking water wells, on properties hydraulically connected to the Site;
- deed restrictions;
- advisory controls (e.g. well advisories); and
- other controls deemed necessary to protect public health.

In June 1994, after comment from MEDEP and the public, including a public hearing and thirty-day comment period, USEPA approved a request from the PRPs to change technologies for soil cleanup. USEPA issued an ESD which documented the change in technology for soil cleanup from low-temperature thermal aeration to soil vapor extraction. In addition to the change in technologies, USEPA also set a time period of five years for achieving the soil cleanup performance standards. This change in technology also provided for a more immediate and aggressive treatment of the groundwater than was originally planned in the ROD.

USEPA issued a second ESD for the Site in September 1997 that modified the remedy for off-site soils. The ESD changed the length of time specified in the ROD for meteorological data

collection from five years to three years, thus moving forward the time frame for collection of off-site soil samples to determine whether the operations of the former Site incinerator resulted in deposition of contaminants off-site.

A third ESD was issued in September 2001 which enhanced the technical approach taken for treatment of contaminated groundwater and changed the location for discharge of treated groundwater. Innovative treatment technologies, such as the addition of potassium permanganate, sodium permanganate, molasses and sodium lactate to groundwater in specific portions of the Site, were incorporated into the MOM remedy with the expectation of attaining groundwater cleanup levels by 2003 – 2005. In addition, a decrease in the areal extent of the plume resulted in a reduction in the volume of groundwater to be extracted to maintain hydraulic control. This in turn allowed for a change from surface water discharge of treated groundwater to reinjection upgradient of the pumping wells.

4.2 Remedy Implementation

This section describes the implementation of the four parts of the multi-component remedy specified in the ROD.

4.2.1 Facilities Decontamination, Demolition, and Off-Site Disposal

As specified in the ROD, the on-site facilities were decontaminated, concrete structures crushed, asbestos in the still building containerized, and all material was shipped off-site for disposal in appropriate facilities. The demolition debris was tested and characterized prior to off-site disposal. The facilities decontamination and demolition activities were completed in May 1994, and the debris was sent offsite.

4.2.2 SVE Phase I Activities

On September 21, 1994, USEPA gave approval for three specific actions described in the 100% Remedial Design. Approval for these three actions: soil consolidation, the excavation for and the construction of the SVE building foundation, clay cap installation, and their concurrent mobilization tasks, was given to allow for onsite activities to begin during the 1994 construction season and thereby improve the prospect of construction completion during the 1995 season.

Construction activities for the UCC remediation began with a pre-construction meeting on October 14, 1994. The contractor mobilized onsite, bringing in field offices, setting up a Contaminant Reduction Zone, relocating the site fencing to extend the site boundaries, installing erosion control measures, and then clearing and grubbing of all vegetation within the new fence line.

Consolidation of soil from four outlying hot spots to the SVE treatment area of the Site began in late October 1994. Following USEPA guidance, Methods for Evaluating the Attainment of Cleanup Standards, Volume I, Soils and Soil Media, USEPA 230/02-89-042, February 1989, samples were collected to verify that the hot spot excavations had met the performance standards set in the ROD. As sampling progressed with successive enlargements of the excavations, it became clear that contamination above the performance standards in three of the four areas extended considerably wider and deeper than had been estimated in the FS. In December 1994 further excavation of one of the hot spots was suspended for the winter. Backfilling of the other three areas was also postponed at the same time as the contractor determined successful compaction was uncertain. Excavation and backfilling commenced again in the spring of 1995 after water which had accumulated in the open excavations was removed and treated onsite by a mobile air stripper/GAC unit. Clean material was used to backfill the excavated areas following collection of confirmatory soil samples. The consolidation activities were completed in May 1995, removing approximately 2,260 cubic yards (compared to the FS estimate of 860 cubic yards). The soil consolidation and cap installation activities resulted in an increase in elevation of up to five feet in the active soil remediation area of the Site (IT, 1999).

Excavation for the SVE and groundwater treatment building was completed in the fall of 1994 in an area adjacent to the one hot spot that met performance standards during initial excavation.

The soil cap, consisting of eighteen inches of clay overlain by six inches of gravel, was installed over the entire treatment system area between October 1994 and May 1995. An area of about 40 feet x 100 feet was left uncapped for placement of soil cuttings from the drilling activities. At the conclusion of the drilling, this area was then capped.

4.2.3 SVE Phase II Activities

The 100% Remedial Design (RD) was revised and resubmitted on February 17, 1995 and approved by USEPA, after review and comment from MEDEP, on April 5, 1995.

Using the Rotasonic drilling method, installation of the 28 groundwater and 33 SVE wells and 91 hot air injection (HAI) points began on June 4, 1995 and was completed on July 30, 1995.

The treatment building foundation and floor slab were installed during July and August 1995. The treatment building was completed in September. Breaks in the foundation slab, attributed to uneven settling, occurred in December 1995 and were repaired within the same month.

Installation of the treatment equipment for the soil vapor and groundwater extraction systems was completed in the fall of 1995. The soil vapor extraction system consisted of a propane-fired thermal oxidizer, and a heat exchange unit which heated clean air for the hot air injection system. For the groundwater treatment, the system consisted of sand filters, equalization tank, tray-type air stripper, an advanced oxidation unit, two granulated activated carbon (GAC) filters, an ion exchange unit, and a 500-gallon effluent tank.

Interior and exterior piping was completed in November 1995; testing of individual pieces of equipment was performed in December 1995. USEPA and MEDEP conducted a pre-final inspection on December 6, 1995 followed by a final inspection on January 15, 1996. The final inspection confirmed that the punch list items identified during the previous inspection were completed and the six-month start-up period began.

4.2.4 Treatment System Startup

Following the testing of individual components with clean water in December 1995, hot start-up (using water pumped from the extraction wells) was initiated on January 16, 1996. Upon the receipt of laboratory data indicating the discharge standards had been met, the PRPs' contractor was allowed to begin discharging treated effluent to Quiggle Brook.

Start-up continued through June 1996. Throughout this period the treatment system experienced several shutdowns resulting from equipment failure inside and outside of the

treatment building and from winter conditions. Following the repair/replacement of several components, such as expansion loops for the hot air injection lines, the soil vapor system approached its objective of continuous operation. Sampling of thermal oxidizer effluent indicated that the Maine Ambient Air Guidelines were being met.

Sampling of the treated groundwater, however, indicated the Ambient Water Quality Criteria (AWQC), which the State of Maine has promulgated as standards for the discharge of water to the environment, were not being achieved for metals, particularly manganese and copper. Consequently, the PRP's contractor removed the ion exchange unit from the treatment process and began making other adjustments. USEPA and MEDEP agreed to extend the start-up period for the metals removal to February 1997 to allow time for the treatment system adjustments. A new metals removal system, using pH adjustment and flocculation, was installed in September-October 1996 and tested in the following months. On April 28, 1997, USEPA and MEDEP conducted a final inspection for the modified groundwater treatment system and determined the system was completed.

While this change to the treatment process decreased metals concentrations, there continued to be fluctuations in the concentrations of metals in the effluent. With the prospect of not meeting the AWQC standards for manganese and copper, the PRPs began preparations for setting a site-specific standard as allowed under the state law by performing total toxicity testing. The testing was terminated prior to completion for three reasons: the control group in two of the first three testing efforts experienced fatalities above the acceptable range, making the results from these two tests questionable; MEDEP changed their surface water assimilation policy; and once hydraulic control was achieved, it required a lower pumping rate which allowed for the successful reinjection of the treated groundwater back into the subsurface.

4.2.5 Source Control Activities

Following completion of startup activities in October 1996, the SVE system operated continuously until March 1998. Groundwater was pumped from the extraction wells to lower the water table and extend the depth to which the soils could be treated by the SVE system. Air was heated to approximately 775 degrees F and injected into the 91 HAI wells to enhance the volatilization of VOCs. Vapors were collected from SVE wells placed within the hexagonal grid of HAI wells. Soil samples were collected in late 1997 for an interim evaluation of the

performance of the SVE system. Based on the results of the interim evaluation, the PRP contractor began to prepare a soil closure-sampling program.

After agency approval in March 1998, operation of the HAI and SVE systems was discontinued to allow the soils to cool prior to the closure-sampling program. The groundwater extraction system continued to operate during this period. The closure-sampling plan was approved by the agencies in September 1998 and the closure soil sampling was completed in the fall of 1998. Following acceptance of the closure sampling findings, the PRP contractor decommissioned unused wells and piping in accordance with the Operations and Maintenance (O&M) Plan.

4.2.6 MOM Activities

After completion of the source control cleanup in March 1998, the 28-well groundwater extraction network was reduced to three pumping wells at the downgradient edge of the SVE treatment area. These three pumping wells were determined by modeling to be sufficient to control groundwater migration while MOM cleanup activities continued.

The rate of mass removal of VOCs decreased dramatically between 1996 and 1999, however the concentrations of VOCs in the groundwater did not show a similar decline. While the groundwater extraction system continued to operate to maintain hydraulic control of the plume, a number of innovative treatment options were employed at the Site to enhance the reduction of contaminant concentrations in the groundwater. The first innovative treatment involved the in-situ application of potassium permanganate. As a strong oxidizer, the permanganate was expected to accelerate the destruction of dissolved chlorinated VOCs. A potassium permanganate pilot study was completed in October 1997. Based on the results of this study, potassium permanganate was used on an expanded basis in the summers of 1998, 1999, and 2000 in an attempt to achieve further reductions in VOC concentrations.

Sodium permanganate was also used onsite in 2000 near the pumping wells and Quiggle Brook. Sodium permanganate was used in this sensitive area since it could be added in a greater concentration than potassium permanganate, and thereby require less overall solution fluid being added to the subsurface near Quiggle brook and consequently pose less of a threat to the brook. Also in 2000, the discharge location for treated groundwater was changed from

Quiggle Brook to upgradient reinjection. The groundwater extraction system operated during the permanganate additions in 2000, between July 6, 2000 and October 25, 2000.

Following groundwater sampling in the spring of 2001, EPA approved another innovative technology, the in-situ addition of carbon sources in the form of molasses and sodium lactate (this approval was not concurred with by MEDEP, but they agreed to acquiesce to EPA). EPA approved the change from an oxidizer to a reductant based on the following information: the concentrations of the predominant contaminants, TCE, DCE, and PCE had significantly decreased during the permanganate applications, but the concentrations of DCA and TCA had not. As a result, the DCA was now the most widespread VOC above the performance standards and was found at the highest concentrations, whereas prior to groundwater remediation, it had been the fifth most common VOC and its initial concentrations were well below the other compounds. As it appeared that the permanganate was having little impact on the DCA, EPA determined it was worthwhile to create a reducing environment. Food grade molasses and sodium lactate were added to the subsurface in separate locations. Molasses was added to groundwater at four wells in the eastern portion of the Site in August and November 2001. Sodium lactate was added to groundwater at three wells in the south central portion of the Site in 2001 (IT, 2002). Sodium lactate was added again in August 2002. The extraction system has not been operated since October 2000 and was not in operation during the carbon source additions in 2001. The extraction system has since been deactivated.

Quarterly groundwater and surface water monitoring began on January 1, 1996. The monitoring frequency was changed to semi-annual (spring/fall) in 1998. Surface water and groundwater samples are analyzed for VOCs and N, N-Dimethylformamide (DMF); a subset of the groundwater monitoring wells are also sampled for natural attenuation parameters. The monitoring well network includes wells in the source area, in areas with the highest groundwater concentrations, and near the downgradient boundaries of previously detectable concentrations (IT, 2002). Semi-annual groundwater monitoring will continue until the cleanup standards have been, or are close to being, achieved, and no residual permanganate or carbon sources are observed. At that time, compliance monitoring will begin to ensure cleanup levels continue to be achieved at the Site. The ROD also specifies that once cleanup standards are attained, the residual risk will be recalculated.

4.2.7 Limited Action for Off-Site Soils

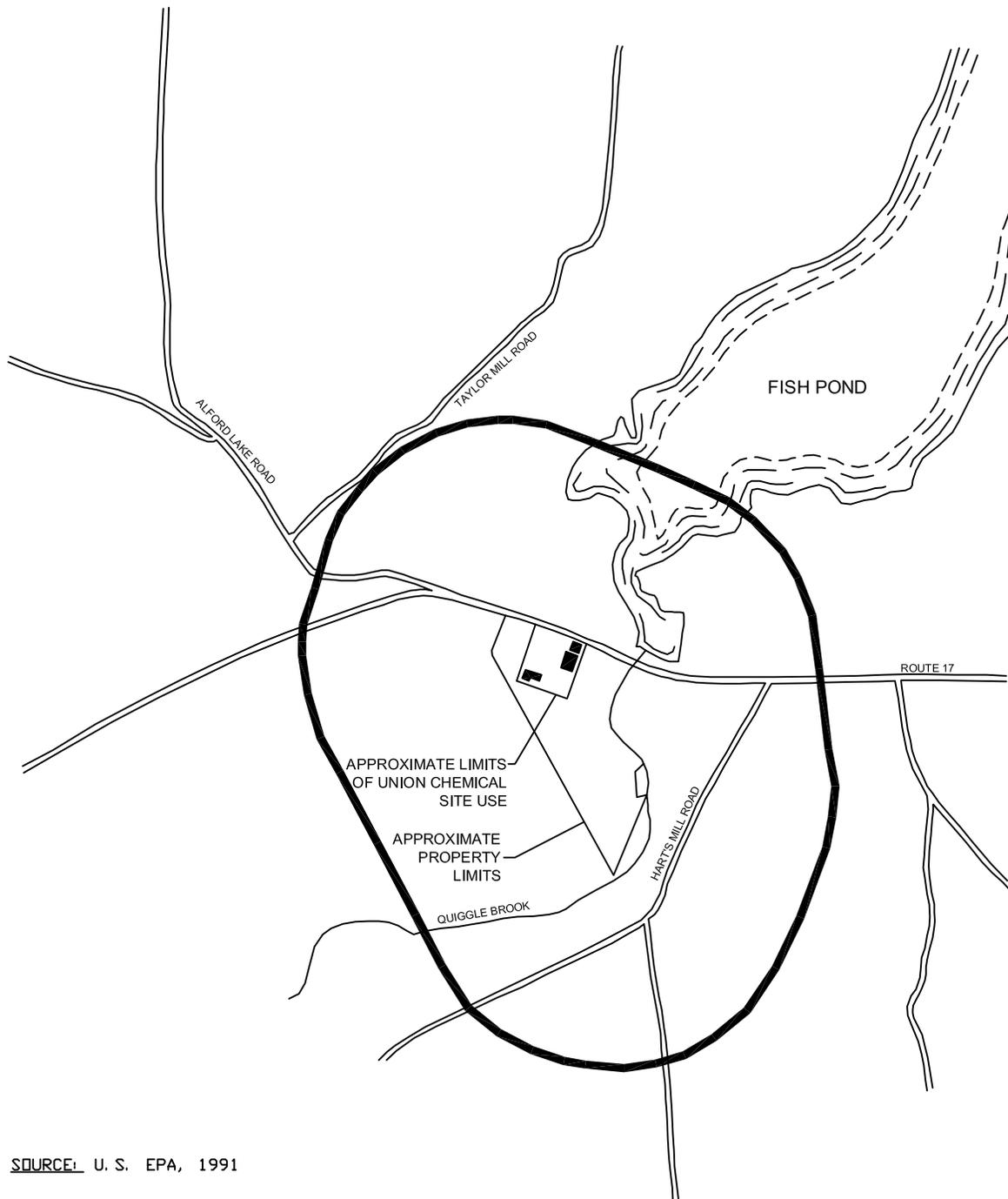
After collection of three of the five years of meteorological data specified in the ROD, in 1996 USEPA agreed that the three years of data were representative of local conditions. Working with the Union Chemical RD/RA Trust (Trust), MEDEP, and with input from the local community, off-site sampling locations were selected. EPA and the Trust collected soil samples in July and September 1996. Review of these data in October 1996 resulted in a concurrence by all parties that the data did not show measurable off site deposition from the Site incinerator. In 1997, as discussed in the 1997 ESD, off-site soil activities were determined to be complete.

4.2.8 Institutional Controls

As specified in the ROD, Consent Decree, and Statement of Work (SOW), the following institutional controls have been put in place at the Site. Site access is secured by fencing around the 2.5 acre active remediation area, a permanent restriction that runs with the property was placed on the use of residential well #20-2, and well advisories were issued. A well advisory zone was established in 1992 and, in accordance with procedures specified in the SOW, all 54 property owners within the zone were contacted and requested to notify USEPA, MEDEP or the Trust's Project Coordinator prior to installing any new bedrock wells. This zone encircled the Site and included properties on Town of Hope, Maine Tax Maps 1, 10 and 11 (see Figure 4-1). If notification was received from a property owner, the bedrock wells may be sampled and tested by the PRPs to enable the agencies to evaluate if use of the well could impact movement of groundwater at the Site.

The well advisory zone was most recently adjusted in May 2001. EPA made this adjustment following discussions with MEDEP and Hope Committee for a Clean Environment (HCCE). This adjustment was based on the successful remediation of the onsite soils, the continued progress in remediating the groundwater, and the absence of site compounds in any of the residential wells from 1992 to 1997. In May 2001, USEPA sent letters to 14 of the original 54 property owners notifying those individuals that their properties continued to be within the zone and requesting notification prior to installation of any new bedrock wells. The properties that remain within the advisory zone are on Town of Hope, Maine Tax Map 10 and are in close proximity to the Site (see Figure 4-2). In May 2001, USEPA also notified the remaining 40 of the original 54 property owners that their properties were no longer within the well advisory zone.

APPROXIMATION OF THE ZONE FOR
ESTABLISHMENT OF INSTITUTIONAL
CONTROLS ON SURROUNDING
PROPERTIES TO THE FORMER
UNION CHEMICAL PROPERTY



SOURCE: U. S. EPA, 1991

WELL ADVISORY ZONE – 1992

FIGURE 4-1

UNION CHEMICAL COMPANY SITE – FIVE YEAR REVIEW

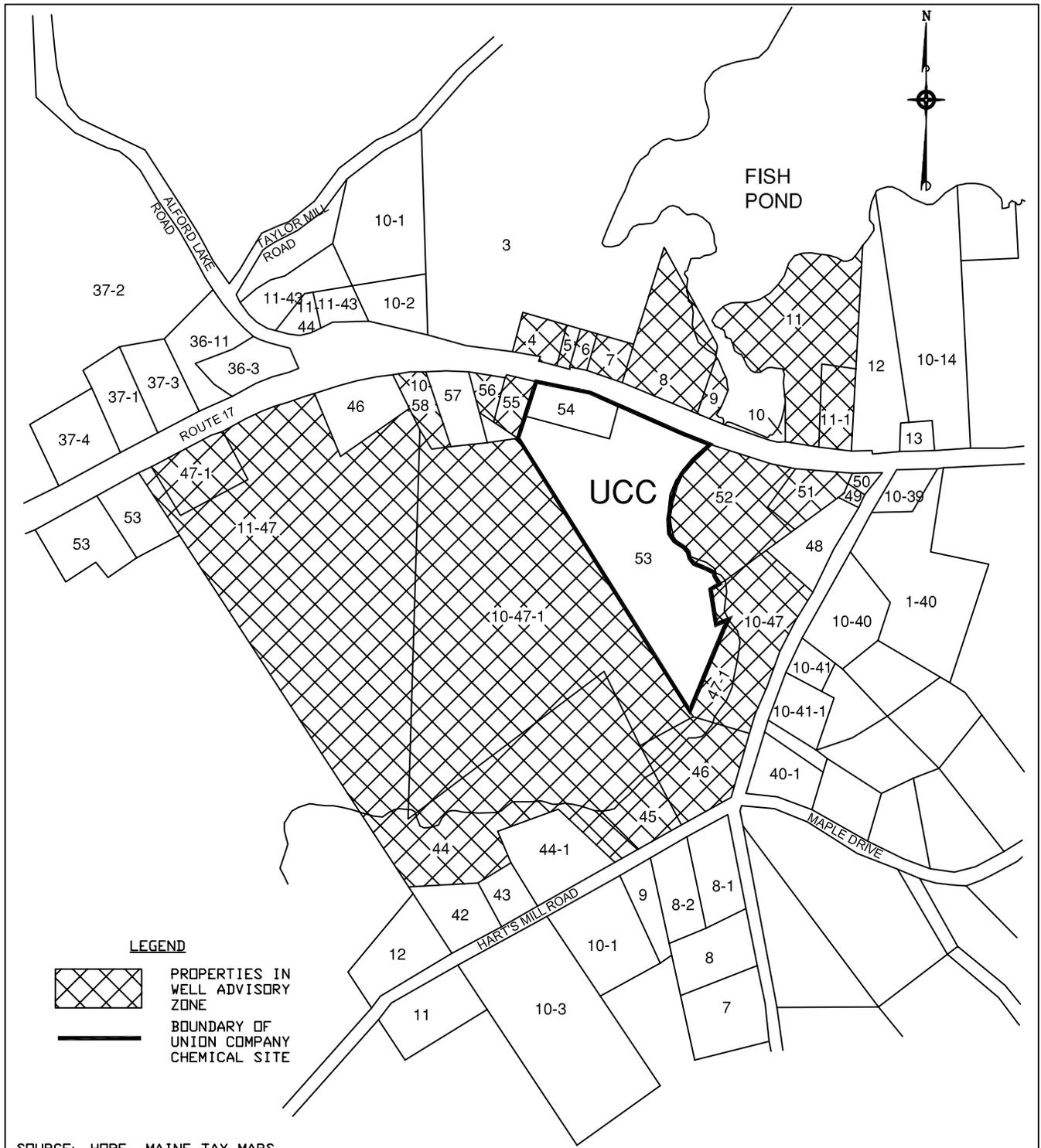
SOUTH HOPE, MAINE



TETRA TECH NUS, INC.

DRAWN BY:	D.W. MACDOUGALL	REV.:	0
CHECKED BY:	P. CALL	DATE:	AUGUST 29, 2002
SCALE:	NOT TO SCALE	ACAD NAME:	DWG\4255\0600\FIG_4-1.DWG

55 Jonspin Road
Wilmington, MA 01887
(978)658-7899



SOURCE: HOPE, MAINE TAX MAPS

WELL ADVISORY ZONE – 2001			FIGURE 4–2	
UNION COMPANY CHEMICAL SITE – FIVE YEAR REVIEW			 TETRA TECH NUS, INC. 55 Jonspin Road Wilmington, MA 01887 (978)658–7899	
SOUTH HOPE, MAINE				
DRAWN BY:	D.W. MACDOUGALL	REV.:		
CHECKED BY:	P. CALL	DATE:	AUGUST 29, 2002	
SCALE:	NOT TO SCALE	ACAD NAME:	DWG\4255\0600\FIG_4–2.DWG	

Since property owners were initially notified in 1992, USEPA and MEDEP have become aware of the installation of approximately 5 new bedrock wells within the zone. In a number of cases the agencies were notified after the installation of new wells. At the agencies' request, the PRPs, sampled some of the new wells to check for Site contaminants. No further actions or institutional controls have been required in response to the bedrock well testing and the advisory remains in place.

4.3 System Operations/O&M

The UCC groundwater treatment system is currently deactivated. The system began start-up in February 1996 and was certified operational and functional on April 28, 1997. The system ran full-time from then until December 1999, when it was shut down to allow for a contaminant rebound evaluation. Operation of the system resumed in June 2000, and continued until October 2000 during a period of permanganate addition, when it was once again shut down. USEPA agreed, after comment from MEDEP, to approve in-situ treatment in the area of the pumping wells during the summer of 2001. The system remained off-line during the molasses addition activities in 2001.

During the period of operation, O&M activities included the continuous extraction and treatment of contaminated groundwater, facility maintenance, treatment system monitoring and sampling, and groundwater monitoring and sampling.

O&M costs include site inspections and semi-annual groundwater monitoring. According to the Trust's Project Coordinator, the O&M costs are approximately \$150,000 annually and the costs associated with molasses addition to date are approximately \$50,000 (Smith, personal communication).

5.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW

This is the first Five-Year review for the Site.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

USEPA, the lead agency for this five-year review, notified MEDEP and the Responsible Parties (RPs) in early 2002 that the five-year review would be completed. USEPA issued a scope of work, WAF No. 124-FRFE-0165, to TtNUS, under USEPA RAC1 contract 68-W6-0045, on March 1, 2002 to assist USEPA in performing the five-year review. The USEPA Work Assignment Manager was Nancy Smith; Terrence Connelly, the USEPA Remedial Project Manager, provided support for the UCC Site. Rebecca Hewett, Hank Andolsek and Denise Messier of the MEDEP were part of the review team. The Draft Five-Year Review Report was sent to MEDEP for review on July 17, 2002. MEDEP provided comments on August 16, 2002 (see Appendix E).

The schedule established by USEPA included completion of the review by August 2002.

6.2 Community Notification And Involvement

USEPA issued a press release in May 2002 that was published in the Rockland Courier Gazette announcing USEPA's review of the progress of the Union Chemical Company Site cleanup. The press release encouraged public participation. There is an established Community Group, HCCE, which has received support through a USEPA technical assistance grant issued in 1990. As part of a regularly-scheduled meeting with HCCE on May 21, 2002, USEPA representatives described the five-year review process. Beyond the continued involvement of two active members of the group, there has been little participation or involvement from the local community.

During a visit to the Hope Town Offices on May 21, 2002, representatives from EPA and TtNUS briefly described the five-year review process to the town officials. All site-related documents are available at the Hope Public Library in Hope. According to staff there has been limited interest in the documents.

6.3 Document Review

This five-year review consisted of a review of relevant documents including decision documents and monitoring reports, as specified in the USEPA SOW for this review (See Appendix A).

6.4 Data Review

A review was completed of various PRP-contractor plans and monitoring reports. A summary of relevant data regarding the components of the Site remedy is presented below.

6.4.1 Facilities Decontamination and Demolition

The on-site facilities, including the former church, warehouse building, still building, incinerator, underground piping and vaults and other containers, were decontaminated. Asbestos in the still building was containerized and concrete structures were crushed. The decontamination and demolition activities were determined to be completed in May 1994. At that time all of the demolition debris was shipped offsite for disposal as specified in the ROD.

6.4.2 Soil Vapor Extraction

The SVE treatment system operated from October 1996 through March 1998. Closure soil sampling was completed in September 1998 with 50 samples (42 soils and 8 duplicates) analyzed for the four target compounds (DCE, TCE, PCE and total xylenes). A statistical analysis of the data indicated that the soils had been remediated to below the ROD-specified cleanup levels. The results of the closure soil sample analyses are summarized below (IT, 1999). EPA approved the closure soil sampling findings and thus the soil treatment portion of the remedy was completed on December 17, 1999.

<u>Analyte</u>	<u>Analytical Results (ppb dry weight basis)</u>	<u>Cleanup Standard (ppb dry weight basis)</u>
DCE	None detected (ND)	100
TCE	2J – 14J (majority @ DL)	100
PCE	3J – 20J (one @ 140*)	100
Xylenes	3J – 243J (many @ DL)	100,000

* Sample collected from center of Site, surrounded by ND or low ppb results. This result was shown to not be statistically significant.

6.4.3 Management of Migration

The surface water and groundwater monitoring program was performed initially on a quarterly basis, and most recently semi-annually, to monitor the COCs at the Site, assess the progress of the MOM remedial action and evaluate the surface water and groundwater for potential impacts during the remedial activities. Groundwater quality results have shown the impact of adding permanganate, molasses, and sodium lactate following the periodic additions to the groundwater to enhance the progress of the MOM cleanup. Analytical results have shown decreases in groundwater concentrations from wells near a permanganate addition location in the monitoring event following the addition. The regular groundwater monitoring over the period of remediation has shown variations in contaminant concentrations, suggesting temporal and temporary rebound in some locations, but overall, the contaminant concentrations and extent of contamination have decreased.

All groundwater samples are analyzed for the 23 site-specific VOCs and N, N-Dimethylformamide (DMF). During Q28 (October 2000) the performance standards for 11 COCs (10 VOCs and DMF) were exceeded (IT, 2001). Permanganate was added during the summer of 2000. Based on the Q28 data additional hot spot treatment was performed in the fall of 2000. The groundwater results from Q29 (April/May 2001) indicated exceedances of the performance standard for nine COCs (8 VOCs and DMF) (IT, 2001a). The Q30 groundwater results showed exceedances for seven COCs (7 VOCs and DMF) (IT, 2002). Over the past three events (e.g. Q28 – Q30), 1,1-DCA, 1,1-DCE, TCE and cis-1,2-DCE were detected in the majority of the wells sampled in each of the three events, in many cases at concentrations that exceed the performance standard.

The most recent available groundwater monitoring results, from Q30 (October/November 2001), show average concentrations for 1,1-DCA, 1,1-DCE, TCE, vinyl chloride, cis-1,2-DCE and DMF between one and three orders of magnitude higher than their respective performance standard. Maximum and average concentrations from the 2001 monitoring events for COCs that have been consistently detected are shown in Table 6-1. In general the highest overburden concentrations were found along the central, eastern and southeastern portions of the Site and the highest bedrock concentrations were found in the southeastern portion. While MOM activities have resulted in reductions in concentrations of COCs, the quarterly results show much variability, likely in response to the 1998 – 2000 additions of permanganate to the groundwater.

**TABLE 6-1
GROUNDWATER QUALITY COMPARISON – SELECTED COCs
FIVE-YEAR REVIEW REPORT
UNION CHEMICAL COMPANY SITE
SOUTH HOPE, MAINE**

Constituent	1990 RI Max. Conc. (ppb)	Performance Standard (ppb)	Q30 – Max. Conc. (ppb) OB/BR*	Q30 - Avg. Conc. (ppb) OB/BR*	Q29 – Max. Conc. (ppb)	Q29 - Avg. Conc. (ppb)
1,1,1,-TCA	73,000	200	120	18	200	11
1,1-DCA	12,000	5	4400/3000D	1076/526	3300	476
1,1-DCE	2,700	7	320/240	78/55	270	28
MEK	NA	170	100	29	740	36
Ethylbenzene	2,700	700	750/37	87/7	270	18
PCE	150	5	27	7	13	3
TCE	84,000	5	470/39	94/9	230	29
Vinyl chloride	7.6	2	160/20	31/5	77	10
cis-1,2,-DCE	19,000	70	2000/1600D	367/228	1400	123
Trans-1,2-DCE	NA	100	50/12	8/2	31	6
DMF	NA	390	1270/3300	428/1273	500	112

Source: USEPA 1990, IT 2001a, IT 2002

* OB/BR = overburden well data/bedrock well data

Note: 1990 RI data as presented in the 1990 ROD; Q30 sampling occurred in late October 2001; Q29 sampling occurred in April/May 2001

As shown in Table 6-1, the maximum concentrations of COCs consistently detected during the monitoring events in 2001 range from 13 ppb (PCE) to 4400 ppb (1,1-DCA). When compared to the maximum concentrations for these COCs reported in the 1990 RI (150 ppb (PCE) and 12,000 ppb (1,1-DCA)), it is evident that the MOM remedy has reduced groundwater concentrations by 1 – 2 orders of magnitude since the extraction system has been in operation. The reduction in maximum concentrations of TCE and 1,1,1-TCA between 1990 and Q30 in 2001 is particularly significant. The decrease in PCE, TCE and cis-1,2-DCE concentrations and increase in vinyl chloride concentrations over this period are indicative of natural and enhanced reductive dechlorination. The 1,1-DCA plume remains the largest of the COC plumes plotted for both overburden and bedrock wells (IT, 2002). A comparison of the isoconcentration contours included in the ROD (presenting RI data) and in the Q30 report shows a decrease in the extent of individual VOC plumes in both overburden and bedrock systems.

The groundwater remedy described in the ROD focused on extraction of groundwater from wells located in till and fractured bedrock, initially excluding groundwater contamination present in deep bedrock well ODW. The most recent groundwater results for existing deep bedrock wells MW13A-D, MW15D, ODW-U, ODW-L and ITW-1 indicate that while the upgradient wells (ITW-1, MW15D) meet the performance standards, other wells routinely exceed the performance standard for 1,1-DCA (ODW-U @ 23 ppb, ODW-L @ 35 ppb). Other bedrock wells (B8A-D, B5A-D, B6A-D, B12A-D) exceed the performance standards for TCE, 1,1-DCA, cis-1,2-DCE and DMF. As noted in the ROD, additional extraction wells may be required due to contamination remaining in deep bedrock wells.

Two surface water locations in Quiggle Brook (QB-2 and QB-4) are included in each monitoring event. A review was completed of surface water sampling results for the thirty quarters reported to date. There have been sporadic detections of organic and inorganic compounds at both locations throughout the 30 quarters of surface water sampling and analysis.

Location QB-2 had detectable concentrations of inorganics (lead, arsenic), VOCs (TCE) and DMF in 4 of the 29 quarters (this location was not sampled during Q30). The most recent detections at this location were during Quarter 24 when arsenic was detected at 2.0 ppb and lead at 4.0 ppb. There have been no compounds detected at QB-2 since Q24. (IT, 2002).

Location QB-4 had detectable concentrations of inorganics (lead, arsenic), seven VOCs and DMF in 13 of the 30 quarters. VOCs were last detected in Q27 (1,1-DCA at 2 ppb and TCE at 0.6 ppb). Lead was also detected during this quarter at 2.0J ppb. Since that time there have been no detections of lead, VOCs or DMF at QB-4. No inorganic results have been reported since Q27. (IT, 2002).

Carbon source additions are planned for the summer of 2002 to treat hot spot areas to enhance reductive dechlorination in the groundwater. It is anticipated that following this addition the groundwater will be allowed to stabilize. Monitoring of groundwater and surface water will continue to check for contaminant rebound and/or continuing reductions in concentrations of those compounds at locations that currently exceed specified performance standards.

6.4.4 Limited Action for Off-Site Soils

After collection of three of the five years of meteorological data specified in the ROD, in 1996 USEPA agreed that the three years of data were representative of local conditions. In July 1996, soil samples were collected from off-site locations as specified in the ROD for this component of the remedy. Two locations showed elevated lead concentrations. An additional, more intensive, soil sampling program was completed in September 1996. Review of these data in October 1996 resulted in a concurrence by all parties that the data did not show measurable off site deposition from the Site incinerator. In 1997, as discussed in the 1997 ESD, off-site soil activities were determined to be complete.

6.5 Site Inspection

A site inspection was conducted on May 21, 2002 with representatives from USEPA, MEDEP, the Trust's Project Coordinator, USEPA's contractor and the Trust's contractor. The inspection included a site walkover, inspection of monitoring and injection wells both within and outside the Site fence, and a walkthrough of the former treatment building. A Site inspection report, including site photographs, is included in Appendix B.

The Site is secured by chain-link fencing around the 2.5-acre treatment area. Many of the site wells are not well secured with locks or other protective devices. MEDEP staff reported that one incident of vandalism occurred prior to the commencement of remedial activities, but none since

then. The site is checked on a non-routine basis. A full site inspection is performed as part of each semi-annual groundwater/surface water monitoring event. The SVE piping and other equipment have been removed. Contractors retained by the Trust are currently dismantling, decontaminating and preparing to remove the remaining process equipment from the former treatment building. A rolloff container, two stainless steel tanks (unused), empty 55 gallon drums and other miscellaneous piping materials were noted behind the building. Randy Smith of American Environmental Consultants, Inc., the Trust's Project Coordinator, noted that all those materials will be removed along with the process equipment.

The SVE treatment area has been capped with a top gravel layer. The cap was not seeded but now shows sparse naturally seeded vegetation. There is no active remediation on-going at the Site. The buried discharge line from the treatment building to the former discharge point at Quiggle Brook remains in place. There are plans to decommission this line in the near future. Semi-annual groundwater monitoring continues. There are plans for another round of carbon source addition to hot spot areas of the Site during the summer of 2002.

There are a number of residential dwellings to the north across Route 17 and to the west along the south side of Route 17. No development of surrounding areas is underway; only private water supply is available. As noted in Section 3.2, the local land use ordinance allows business, service and certain retail uses.

6.6 Interviews

General discussions and observations were documented during the site inspection on May 21, 2002. Telephone interviews were completed as a follow up to the site inspection. The list of individuals interviewed regarding this five-year review is shown in Appendix C.

Rebecca Hewett, MEDEP, stated that she has received calls from individuals planning to move to the area seeking information about the Site. The MEDEP has not had to respond to any complaints. While generally satisfied with progress to date, MEDEP feels data gaps remain concerning bedrock conditions. Decisions regarding future use of the Site (DEP holds the deed) and the need for permanent controls and/or restrictions will be made in the future. In spring of 2001, Denise Messier, MEDEP, received a complaint about rusty surface water on the western

boundary of the facility. In addition, she observed the rusty water and reported a potential failing septic system to the town Code Enforcement Officer.

Randy Smith, American Environmental Consultants, Inc., Project Coordinator for the Trust, commented on the excellent cooperation between all parties, e.g. USEPA, MEDEP, community representatives, throughout the cleanup. He stated that this cooperation has enabled the PRPs to achieve soil cleanup in a shorter time frame than initially envisioned and to employ innovative means to enhance the cleanup of the groundwater.

Florance Merrifield, Hope Municipal Clerk, commented that the public is generally well informed about the cleanup activities, primarily via the HCCE. She also indicated that there has been an increase in land transfers due to new industry (MBNA) in Camden and that the presence of the Site has not appeared to impact home sales. Current land use designations and local land use ordinances were obtained from the Hope Town Hall. Staff at the Hope Town Hall were familiar with the location of the UCC Site but did not express any concerns about the activities that have been completed. The administrative record and site documents are available at the Hope Public Library; few individuals have accessed the documents.

Lois Jensen and Brian Powers, the active members of HCCE, were interviewed during a regularly-scheduled meeting the evening of May 21, 2002. These meetings are held periodically with participants from the HCCE, USEPA, MEDEP and Trust's Project Coordinator. Site activities are discussed and plans for additional studies, such as the permanganate and molasses additions, are presented. Both members of the HCCE indicated that this process has worked very well over the past eight years. Mr. Powers commented that greater active involvement by the agencies is needed in the very early initial stages of a Superfund site investigation. He felt that the overall Superfund process, while not only long in duration, does not address immediate impacts to the community and neighbors who may be directly impacted by a site. The participation of the community representatives in working with the other parties to move the cleanup of the Site forward is an example of a well-developed agency/public partnership. Mr. Powers and Mrs. Jensen keep other community members apprised of Site activities in a very informal manner. Both commented that they do not encounter much community concern about the Site.

7.0 TECHNICAL ASSESSMENT

7.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

Remedial action performance and monitoring results. The facilities decontamination and demolition activities were completed in May 1994, and the debris was sent offsite. These activities were carried out in accordance with the ROD, and this portion of the remedy remained protective of human health and the environment.

The information presented in Closure Action Plan for Soils, Findings and Summary (IT, 1999) showed that the Site soils have been remediated in accordance with the requirements of the ROD as modified by the 1994 ESD. The source control consolidation and capping reduced the risk of further groundwater contamination at the Site. The source control remedy included the construction of HAI, SVE, pumping and monitoring wells along with the construction of a treatment building in 1996. Soil closure samples were collected in 1998 and the results showed that the soil program had met the intended objectives (IT, 1999).

The MOM remedy is still on-going. The most recent ESD was signed in 2001, documenting permanganate and carbon source in-situ enhancements to the remedy (USEPA, 2001b). The groundwater monitoring results indicate that concentrations of a number of COCs (1,1-DCA, 1,1-DCE, TCE, Vinyl chloride, cis 1,2-DCE) are greater than their performance standards. Long-term monitoring is planned to continue until performance standards have been achieved. The agencies and the Settling Parties trustee and consultant will review the spring 2003 water quality data to assess the progress of active remediation toward the performance standards.

After the time period for meteorological monitoring that had been set forth in the ROD was decreased, an off-site soil investigation was conducted in October 1996. It was determined that the lead concentrations in off-site soils were below federal and state guidelines for residential property, did not pose a threat to human health and the environment, were not related to Site activities, and therefore the off-site soils portion of the remedy was deemed complete in late 1996.

Two surface water locations on Quiggle Brook are included in each monitoring event. There have been no detections of any organic or inorganic contaminants in the surface water since the 27th quarter of monitoring (quarter 30 was the most recent).

Operations and Maintenance Costs. The UCC groundwater treatment system has been deactivated and is currently being dismantled. Since both soil and groundwater treatment systems are being dismantled, there are no longer any systems O&M costs.

O&M costs include site inspections and semi-annual groundwater monitoring. According to the Trust's Project Coordinator, the O&M costs are approximately \$150,000 annually and the costs associated with molasses addition to date are approximately \$50,000 (Smith, personal communication).

Opportunities for Optimization. A reduction in the groundwater monitoring well network should be considered based on a review of results from the prior events. The number of upgradient, "clean" wells will be evaluated over the next year for possible elimination from future monitoring events.

Indicators of Remedy Problems. Based on the results of periodic groundwater and surface water monitoring, groundwater concentrations remain above the ROD performance standards (MCLs/MEGs). The remaining contamination is primarily located in the overburden soils between the former leach field (see Figure 3-2) and Quiggle Brook. Concentrations in the underlying shallow bedrock are approaching and meet the performance standards.

Implementation of Institutional Controls. The ROD set forth examples of institutional controls which could be implemented for the UCC property and nearby properties to protect human health and the environment. Institutional controls implemented on the property included a fence around the 2.5 acre area where the facility operations took place, and the UCC property was placed in State receivership. Beyond the property, a permanent water use restriction was placed on residential well #20-2, located across Route 17 from the UCC property, and a well advisory zone was established. In 2001 USEPA reduced the well advisory zone and notified all affected residents of the change. Property owners within the zone have been requested to notify USEPA, MEDEP and/or the Trust prior to installation of any new bedrock wells. Throughout the source control remediation, residential wells were monitored and no violations of

the Maine Drinking Water Standards were found (USEPA Conference call, 6/13/02). The effective implementation of institutional controls thus far has ensured the integrity of the remedial measures conducted at the Site and has prevented exposure to Site soils and groundwater. No activities have been observed on the Site that would have violated the institutional controls.

7.2 Question B: Are The Exposure Assumptions, Toxicity Data, Cleanup Levels And Remedial Action Objectives (RAOs) Used At The Time Of Remedy Selection Still Valid?

Changes in Standards and TBCs. As part of this five-year review, Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC) guidance for the Site presented in the ROD were reviewed, and a review of current ARARs was conducted. Due to the fact that soil remedy has been completed, the soil-specific ARARs cited in the ROD have been met. ARARs identified in the 1990 ROD and current ARARs and TBCs that are applicable to this five-year review are provided in Appendix D of this Report for reference.

There are no current chemical-specific ARARs that apply to soil contaminants at the Site. TBC guidance that was written following the 1990 ROD include the 1997 Maine Remedial Action Guidelines (RAGs) and the 1994 USEPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. It was determined that the lead concentrations in off-site soils were below federal and state guidelines for residential property, did not pose a threat to human health and the environment, were not related to Site activities, and therefore the off-site soils portion of the remedy was deemed complete in late 1996.

The Maine RAGs for 1,1-DCE range from 0.2 to 3.0 ppm for residential, trespasser and adult worker guidelines. TCE RAGs range from 19 to 400 ppm, and PCE RAGs range from 3 to 65 ppm. Xylene was the fourth contaminant for which a soil remediation goal was set; its RAG is 10,000 ppm. These values are above the performance standards set (and attained) for soils in the 1990 ROD.

In 1999, IT Corporation, as part of the Closure Action Plan for Soils, Findings and Summary Report, compared the current Site data, the ROD clean-up goals and the Maine RAGs to ensure that the initial risk assessment from the RI/FS remained valid. The evaluation concluded that the most recent Site soil concentrations available indicated that clean up goals had been met and

that the “ROD defined site-specific clean-up goals are largely consistent with the State of Maine Remedial Action Guidelines” (IT, 1999).

The primary change to the ARARs list for groundwater is the addition of the 1992 Maine Maximum Exposure Guidelines for Drinking Water (MEGs). Some of the 1992 MEGs are lower than the 1990 ROD target cleanup standards, while others are less conservative. Most of the ROD target cleanup standards for groundwater are MCLs. These MEGs were revised in 2000, but these revisions have not been promulgated. According to the MEDEP, the 1992 MEGs were referenced in the Maine hazardous waste regulations, and thus are enforceable and are applicable. Therefore, for the purpose of this five-year review, the MEGs for Site groundwater are shown in Table 7-1.

Most of the clean-up standards remain below their respective MEGs and therefore remain protective. However, several contaminants have clean-up standards higher than the 1992 MEGs. The clean up standards for xylene, PCE and trans-1,2 DCE are all higher than the 1992 MEG, which are appropriate and relevant standards. However, the revised 2000 MEGs (which are TBCs) for these contaminants decreased the guidelines so that the clean-up levels would be lower than the Maine standards. Although the 1992 MEGs are promulgated, the clean-up goals for xylene, PCE and trans- 1,2 DCE do not affect the overall remedy.

Three other contaminants, carbon tetrachloride, toluene and vinyl chloride all have clean-up goals higher than both the 1992 MEGs and revised 2000 MEGs. The most recent surface and groundwater sampling round in Fall 2001 did not detect carbon tetrachloride in any samples (IT, 2002). The maximum concentration of toluene detected was 40 ppb, which is below both the MEGs and the clean-up goal (1400 ppb and 2000 ppb, respectively). Vinyl chloride was detected in nine of 16 samples at concentrations higher than the cleanup goal and therefore exceeding the MEGs. Although overall, the remedy still remains protective, concentrations of this contaminant should continue to be monitored closely to ensure the continued protectiveness of the remedy.

**TABLE 7-1
 ROD CLEAN-UP GOALS AND MAINE MEGS
 FIVE-YEAR REVIEW REPORT
 UNION CHEMICAL COMPANY SITE
 SOUTH HOPE, MAINE**

<u>Contaminant</u>	<u>ROD Clean-up Goal (ppb)</u>	<u>1992 MEG (Applicable) (ppb)</u>	<u>2000 MEG (TBC) (ppb)</u>
BEHP	4	NS	NS
Carbon Tetrachloride	5	2.7	3
Chloroform	100	NS	57
1,1- DCE	7	7	0.6
1,2- DCA	5	5	4
1,1- DCA	5	5	70
Methylene Chloride	5	NS	NS
PCE	5	3	7
TCE	5	5	32
Vinyl Chloride	2	0.15	0.2
1,2- DCE (cis/trans)	70/100	70/70	70/140
Ethylbenzene	700	700	70
MEK	170	170	1440
Toluene	2000	1400	1400
1,1,1- TCA	200	200	200
Xylene	10000	600	14000

NS- No Standard

A new ARAR was added when the 2001 ESD was issued. This ESD changed the discharge location for treated groundwater from surface water discharge to Quiggle Brook to underground injection upgradient of the pumping wells. Maine's Underground Injection Control Program regulations, 38 MSRA 413(1-B), Chapter 543 is an applicable requirement. Injection wells used for previously contaminated groundwater that has been treated are defined as Class V wells. Class V wells may be used provided injection does not "result in a violation of any Maine Primary Drinking Water Standard, or which may otherwise adversely affect human health" (USEPA, 2001b). There are no applicable drinking water standards for permanganate, molasses, or sodium lactate, thus this remedy change complies with this ARAR.

The change in discharge location from Quiggle Brook to reinjection triggered a change in MCLs and MEGs from relevant and appropriate requirements to applicable discharge requirements. Analyses of treated groundwater indicated that the treatment system was meeting the MCLs and MEGs for VOCs. Therefore this change in discharge location complies with this ARAR.

Guidance applicable to surface water monitoring at the Site introduced since the ROD is the 1998 National Recommended Water Quality Criteria. This guidance sets forth criteria, but is not promulgated and therefore not enforceable. On the State level, the Maine Statewide Water Quality Criteria (SWQC) are enforceable requirements that are by and large the same as the Federal guidelines.

Contaminants detected in Quiggle Brook during previous surface water monitoring rounds include lead, arsenic, and DMF. In total, seven VOCs have been detected in past rounds, but the most recent detections were during Q27, when 1,1-DCA was detected at 2 ppb, and TCE was detected at 0.6 ppb (IT, 2002). There is no criterion set forth for either of these two detected contaminants in the Federal guidelines or SWQC. Since there have not been any exceedances in the last three quarters of monitoring, the surface water in Quiggle Brook does not appear to be threatened by the Site. However, it is important that periodic monitoring continues to ensure the protectiveness of the remedy.

Changes in Exposure Pathways. Nineteen exposure scenarios were identified in Baseline Risk Assessment (ROD, 1990), including thirteen potential current exposures and three potential future exposures. These exposures include ingestion and absorption of on-site and off-site soils,

sediments and groundwater. Land use at the Site has not changed and is not expected to change, and there are no additional routes of exposure.

Changes in Toxicity and Other Contaminant Characteristics. Although toxicity factors have changed for some of the chemicals, the cancer slope factors (CSFs) (formerly potency factors) have, in general, decreased. A decrease in a cancer slope factor for a chemical indicates that the risk posed by that chemical is lower than previously thought. The major contaminants of concern that contribute most to the cancer risk potential at the Site were 1,1-DCE, 1,1-DCA and TCE. The current CSF and Risk Reference Dose (RfD) for 1,1-DCE are $6.00 \text{ E-1 (mg/kg/d)}^{-1}$ and $9.00 \text{ E-3 (mg/kg/d)}^{-1}$ respectively. For 1,1-DCA, there is no listed CSF, but the RfD is $1.0 \text{ E-1 (mg/kg/d)}^{-1}$. TCE has values listed as 1.1 E-2 and 6.0 E-3 for CSFs and RfDs, respectively (USEPA, 1997).

Review of ARARs and other research could not ascertain the previous CSFs used in the RI/FS and subsequently the ROD to calculate risk, and therefore a conclusion can not be drawn as to whether the current risk assessment remains protective of human health and the environment. However, as CSFs have, in general decreased, the original risk assessment can be considered to be even more conservative. The ROD states that “USEPA will also evaluate risk posed by the Site at the completion of the remedial action (i.e., before the Site is proposed for deletion from the NPL)...If at that point the cumulative risk posed by remaining contaminants falls outside the 10^{-4} to 10^{-6} incremental cancer risk range, then further remedial action will be taken to bring the cumulative risk within the acceptable range.” (USEPA, 1990). Therefore, it is imperative that this recalculation of risk be conducted to ensure that the remedy, upon completion, is protective.

Changes in Risk Assessment Methods. The only changes in risk assessment methods include the way in which risk to constituents in air is estimated, and the use of certain exposure estimates. None of these changes affect the protectiveness of the remedy.

The methods used to assess risk to constituents in air have changed. In addition, some of the default exposure assumptions have changed, specifically for dermal exposure, based on studies reviewed by USEPA. While these changes would affect the risks in minor ways, the soils have been capped and therefore are not accessible so there is no potential for exposure. The target

cleanup goals set in the ROD remain protective of the exposures and receptors identified for the Site.

Expected Progress Towards Meeting RAOs. The soil remedy was completed and met the remedial action goals. The MOM remedy is still on-going, with the most recent innovative technology in use being the addition of molasses and sodium lactate as carbon sources. Overall, the groundwater remedy is functioning within the limits of the ROD and 2001 ESD. The ROD estimated it would take 15 to 30 years of full-scale implementation of the groundwater remedy (i.e., 2011 to 2026) to attain the performance standards, while acknowledging the possibility that the standards may not be achieved. With the aggressive clean-up of the Site soils and use of innovative technologies, USEPA anticipates that the performance standards will be attained well ahead of that schedule.

7.3 Question C: Has Any Other Information Come To Light That Could Call Into Question The Protectiveness Of The Remedy?

Since no new ecological targets were identified during the five-year review, the monitoring of ecological targets is not necessary. No other information has been discovered that would call into question the protectiveness of the remedy.

7.4 Technical Assessment Summary

According to data reviewed, observations from the site inspection, and interviews, the remedy is functioning as intended by the ROD, as modified by the ESDs. The source control portion of the remedy is complete. Soil closure samples were collected in 1998 and the results showed that the soil program met the intended objectives, therefore the soil remedy at the Site remained protective of human health and the environment through its completion. The MOM remedy is operating, as modified by the 2001 ESD. Surface water and groundwater monitoring continue as part of the MOM remedy. The effective implementation of institutional controls, including fencing and a local well advisory, have thus far ensured the integrity of the remedial measures conducted at the Site, and prevented exposure to Site soils and groundwater.

The primary ARAR for soils on-site are the Maine RAGs. A 1999 evaluation of Site soils concluded that clean up goals had been met and that the site-specific clean-up goals were largely consistent with the RAGs (IT, 1999). For groundwater, the Maine MEGs are the primary

ARAR. Most of the clean-up standards remain below their respective MEGs and therefore remain protective. However, several contaminants have clean-up levels higher than the 1992 MEGs, including xylene, PCE, trans-1,2 DCE, carbon tetrachloride, toluene and vinyl chloride. Of these, only vinyl chloride was detected on-site at concentrations higher than both the standards and the site clean-up goals.

Guidance applicable to surface water monitoring at the Site introduced since the ROD is the 1998 National Recommended Water Quality Criteria. On the State level, the Maine SWQCs are enforceable requirements that are by and large the same as the Federal guidelines. Neither of the two most recently detected contaminants have water quality standards set forth in either document. Quiggle Brook should continue to be routinely monitored.

Land use at the Site has not changed and is not expected to change, and there are no additional routes of exposure. In the ROD, cancer potency factors were used to calculate risk. Those values were not located during this review and therefore could not be compared to recent values in order to evaluate any changes in risk. It is therefore imperative that risk be recalculated upon completion of the remedy.

8.0 ISSUES

Surface water and groundwater monitoring on-site should continue as scheduled to ensure that no contaminants are migrating off-site. Additionally, surface and groundwater sample analytical detection limits should be reviewed prior to upcoming monitoring rounds. For the last several quarters of monitoring, detection limits for some contaminants were higher than the respective performance standards. Although the MOM remedy is still on-going at the Site, during compliance monitoring after remedy completion, the concentrations in surface and groundwater will be required to remain below performance standards.

Concentrations of several VOCs (vinyl chloride, 1,1-DCA, 1,1-DCE, TCE, cis-1,2-DCE) in groundwater remain orders of magnitude higher than the current cleanup goal. Continuing groundwater monitoring over the next several years will establish whether all standards can be achieved. Should groundwater concentrations not approach the cleanup standards, EPA and MEDEP will reevaluate the cleanup goal and MOM remedy using MCLs and MEGs in effect at that time.

The CSFs used in the Baseline Risk Assessment, on which the ROD clean-up goals were partly based, were not available during this review. However, as CSFs have, in general, decreased, the original risk assessment can be considered to be even more conservative. As part of the recalculation of the overall Site risks once the Site cleanup goals are met, as required by the ROD, the original CSFs will be compared with current CSFs.

MEDEP has provided comments on the draft five-year review (see Appendix E). In their comments, MEDEP has expressed concerns over three Site issues: the deep bedrock water quality; the effectiveness of the innovative technologies implemented (and consequently, believes that these clean up efforts are taking place too quickly) and the efficacy of the institutional controls. MEDEP did not comment on the overall protectiveness statement in Section 10.

The groundwater component of the 1990 ROD remedy focused on the shallow till and weathered, shallow bedrock aquifers underlying the site, while acknowledging the contamination present in one deep bedrock well and the need to ultimately reach clean up goals throughout the shallow and bedrock aquifers. The Revised Statement of Work, Appendix II of the Consent

Decree, states that after five years of groundwater extraction and treatment and if contamination in the identified bedrock well continues to exceed the cleanup levels, the Settling Parties at the direction of USEPA are to evaluate additional measures to address these conditions. MEDEP is concerned that contamination remains undetected in the bedrock, particularly in the area south-southwest of the site. USEPA does not share this concern, but has agreed to work with MEDEP and the Settling Parties to resolve the remaining issue of low levels of site contaminants present in the deep bedrock.

Quarterly monitoring of the groundwater began in the summer of 1992 and continued until fall 1997 when it was changed to semi-annual monitoring. The groundwater restoration has included multiple approaches: lowering the water table to increase the SVE system's range; groundwater extraction using 28 wells; the addition of potassium and sodium permanganate; and the addition of carbon sources. In addition to these active efforts, natural attenuation is occurring as demonstrated by the decreasing concentrations in groundwater outside the areas of active remediation. The water quality data has shown variation, prior to, and during active remediation. Consequently, USEPA has not attempted to attribute specific decreases in contaminant levels to a particular component. USEPA agrees with MEDEP that the post-carbon source addition results have not yet shown an accelerated decrease of VOCs levels. However, as demonstrated by ten rounds of sampling from October 1997 to the present, the overall trend has been significantly downward, and thus USEPA believes the concerns about limited penetration of the permanganate into the soils and bedrock and contaminant rebound are lessened. USEPA remains optimistic that the prospect of attaining the performance standards through these technologies is much more viable than the ROD's original remedial approach and its concurrent estimate of 15 - 30 years.

The 1990 ROD listed several examples of institutional controls that could be implemented for the UCC facility and surrounding properties. MEDEP believes that the controls selected have not been rigorously updated or maintained and it was at their formal request that the well advisory zone was updated in 2001. USEPA believes the controls have been appropriate for the Site, in part because of the Site's location in a rural area with little developmental pressure, in part due to the progress made toward site restoration and thereby lessening the possibility of site contamination impacting other properties, but also due in large part to the regular communication for the past eight years with the local community. It was for these reasons, plus the absence of Site contaminants in the residential wells, as well as a better understanding of

site hydrology, that USEPA significantly reduced the size of the well advisory zone in 2001. Should conditions in the surrounding areas change, then USEPA will reevaluate the level of institutional controls.

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Of the four-part multi-component remedy for the Site, only the MOM portion remains to be completed. Thus the issues and recommendations below all deal with the MOM remedy.

Issue	Recommendations /Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Analytical detection limits	Analytical methods with DL lower than performance standards must be used.	Trust	EPA/State	Prior to the start of compliance monitoring, projected to begin in 2005	N	N
VOC MCLs/MEGs	Reevaluate the MOM remedy if concentrations below MCLs/MEGs aren't achieved.	Trust	EPA/State	TBD following the 2003 sampling event	N	N
Site risk	Recalculate site risk per ROD	Trust	EPA/State	After cleanup levels met through compliance monitoring	N	N
Deep Bedrock	Evaluate the risks associated with contamination	Trust	EPA/State	2004	N	N

10.0 PROTECTIVENESS STATEMENTS

The remedy is expected to be or is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Through the implementation of innovative technologies, USEPA expects the groundwater to achieve the ROD performance standards by 2005. Once the standards have been reached, a compliance monitoring program will be implemented to ensure that the standards are met throughout the Site and over an extended period of time. The threat of groundwater contamination from soils was mitigated by the excavation and consolidation of outlying areas, capping of the soil treatment area, and then the successful treatment of the contaminated soils. Other threats posed by the Site have been addressed through institutional controls that are preventing exposure to, or the ingestion of, contaminated Site groundwater and the effort to sample all newly installed bedrock wells in the vicinity of the Site.

Long-term protectiveness of the remedial action will be verified by the collection and analysis of groundwater and surface water samples during compliance monitoring to fully evaluate potential migration of the contaminant plume. Current data indicates that the groundwater contaminant plume has not migrated offsite. Monitoring data indicates that the remedy is functioning as required to achieve groundwater cleanup goals.

11.0 NEXT REVIEW

A second five-year review for the Union Chemical Company Site will be conducted in 2007.

APPENDIX A

DOCUMENT REVIEW LIST/REFERENCES

DOCUMENTS REVIEWED/REFERENCES CITED

- GTI, 1998. *Closure Action Plan (CAP) Soils, Management of Migration/Source Control*, Union Chemical Trust, South Hope, Maine, Fluor Daniel GTI, September 2, 1998.
- Hope, 2000. *Hope Land Use Ordinance*, revised June 19, 2000.
- IT, 1999. *Closure Action Plan for Soils, Findings, & Summary (CAP-SFS), Source Control/Management of Migration*, Union Chemical Trust, South Hope, Maine, IT Corporation, February 15, 1999.
- IT, 2001. *Twenty-eighth Periodic Monitoring of Surface Water and Groundwater (October 2000)*, Union Chemical Company Site, Hope, Maine, IT Corporation, February 15, 2001.
- IT, 2001a. *Compilation of Additional Permanganate Information Collected During Q29, Revision 1*, Union Chemical Company Superfund Site, South Hope, Maine, IT Corporation, June 14, 2001.
- IT, 2001b. *Twenty-ninth Periodic Monitoring of Surface Water and Groundwater (April/May 2001)*, Union Chemical Company Site, Hope, Maine, IT Corporation, July 31, 2001.
- IT, 2001c. *Test Results for Permanganate (PermOX-ITSM) Additions – 2000*. Union Chemical Company Superfund Site, South Hope, Maine, IT Corporation, October 31, 2001.
- IT, 2001d. *Long-Term Monitoring Plan, Union Chemical Company Superfund Site, Hope, Maine*, IT Corporation, December 5, 2001.
- IT, 2002. *Thirtieth Periodic Monitoring of Surface Water and Groundwater (Fall 2001)*, Union Chemical Company Site, Hope, Maine, IT Corporation, February 13, 2002.
- Rizzo, 2001. *Well B-8A-D Potassium Permanganate Closure Report*, Union Chemical Company Superfund Site, South Hope, Maine, Rizzo Associates, April 30, 2001.
- Smith, personal communication. Telephone call on June 10, 2002, Randy Smith, Trust Project Coordinator.
- USEPA, 1990. *Record of Decision, Union Chemical Company*, U.S. Environmental Protection Agency, Region 1, Boston, Massachusetts, December 27, 1990.
- USEPA, 1991. “*Consent Decree – United States of America, Plaintiff v. PRP List, Defendant.*” Civil Action No. 91-0392-P-C, August 7, 1991.
- USEPA, 1994. *Declaration for the Explanation of Significant Differences*, Union Chemical Company, Inc. Superfund Site, South Hope, Maine, June 24, 1994.
- USEPA, 2001. *Volatile Organics Analysis of Aqueous Samples*, Union Chemical, South Hope, Maine Memorandum, US EPA Office of Environmental Measurement & Evaluation, May 30, 2001.

USEPA, 2001a. Correspondence approving Rizzo's Potassium Permanganate Closure Report, June 22, 2001.

USEPA, 2001b. *Declaration for the Explanation of Significant Differences*, Union Chemical Company, Inc. Superfund Site, South Hope, Maine, September 28, 2001.

USEPA, 2001c. *Interim Remedial Action Report*, Union Chemical Company Superfund Site, South Hope, Maine, September 28, 2001.

USEPA, 2001d. *Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P*. June 2001.

APPENDIX B
SITE INSPECTION REPORT

**Union Chemical Company Site Inspection – May 21, 2002
Five Year Review, WA# 124-FRFE-0165**

Attendees:

Nancy Smith – EPA WAM
Terry Connelly – EPA RPM
Becky Hewett – MEDEP, Project Manager
Hank Andolsek – MEDEP, Geologist
Phoebe Call – TtNUS, EPA Contractor, Project Manager
Katie Lang – TtNUS, EPA Contractor, Project Scientist
Randy Smith – Project Coordinator, Union Chemical Trustees
Robert Ankstius – Rizzo Associates, RP Contractor

The Site Inspection commenced at approximately 1:00 PM and concluded approximately 3:45 PM. Weather was slightly overcast, intermittent sun and showers, temperature approximately 60 degrees. Observations made by the EPA contractor and other participants are noted below. Follow up interviews with site inspection participants will be made at a later date.

Field Notes:

There is a site fence in place, with two road gates and other access gates surrounding the active 2.5-acre treatment area. In general the fence is in good shape except for one area that was reported damaged from trees that fell in an ice storm. At this location the top rail is missing and the fence is sagging, however there is no break in the chain link.

One no trespassing sign was observed attached to the fence.

There has been no documented vandalism of any monitoring/injection wells or in any site structures, fence, etc. Outdoor lighting that was functional during active site cleanup operations is no longer used.

There is a gravel parking area behind the main road gate. There is a small storage shed and the structure that housed the treatment process equipment and site office. Groundwater monitoring wells and hot air injection wells remain in place; some wells are within protective wooden boxes.

The SVE piping and other equipment has been removed. RP contractors are currently dismantling, decontaminating and preparing to sell and/or remove the remaining process equipment from the building. A new bedrock well (~300 ft.) has been installed near the upper road gate to provide makeup water for site activities, cleaning, etc. It is not known if the groundwater is of potable quality.

A rolloff container, two stainless steel tanks (unused), and empty 55 gal. drums are stored at the rear of the Site. There are also some materials stored behind the building. The Project Coordinator stated that once the decontamination of equipment in the building is completed all inside and outside surplus materials will be removed from the Site.

There is no active remediation ongoing and thus no treatment equipment in routine use. There are no hazardous materials stored on site. There are no records stored on site. The site is generally unattended.

A mounded area was created as other "hot spot" areas of the site were excavated and the soils moved to the area for SVE treatment. This raised the former site grade in the SVE area. The area has been capped.

The capped area has a top gravel layer, not seeded. There is some sparse vegetation that has naturally seeded; thick in areas on slopes where hay bales were placed. There were no erosion channels evident.

There is a buried discharge line that runs across the site from the building that housed the process equipment to Quiggle Brook. At the discharge point a concrete vault, with a manhole cover, remains. It was noted during the site inspection that there are plans to remove the structure from the edge of the Brook and plug the line at both ends after filling the line with grout or other material to eliminate a potential preferential subsurface pathway.

Iron fouling in the treatment process led to the use of potassium permanganate, which was found to have a positive effect on destruction of the organic compounds due to its oxidizing properties.

A number of groundwater monitoring wells were decommissioned in areas where soil was excavated during source control activities. Many of the remaining wells on site within the fenced area are not well secured. The security on wells outside the fence is poor.

There is no set inspection schedule of the site. Inspections are completed during the semi-annual groundwater monitoring events and when a contractor is on site or in the area for other activities.

Planned MOM activities for this year include molasses addition and a groundwater monitoring round during the summer.

Residential wells in the area were routinely sampled until approximately 1997. Sampling was discontinued since there was no observed impact from site contaminants. Well #20-2 at the house directly across Route 17 from the main gate has been shown to be hydraulically connected to the Site. It has not been sampled since 1994. Prior samples showed concentrations below MCLs. There is a well advisory notice concerning this well in the ROD that prohibits use of the groundwater as a private water supply (for hydraulic rather than quality reasons). There has been a zone around the Site where reporting to EPA and/or MEDEP of new bedrock water supply wells was requested.

The Town of Hope does not require permits for installation of new water supply wells. Well logs however are required.

The State currently holds the title to the Site. Future plans may involve donation of the property to the Town of Hope, including the onsite building. There is no recreation potential given the topography of the site and lack of demand given the availability of other existing recreational areas nearby.

The need for permanent institutional controls has not yet been determined.

O&M cost information has been requested.

There have been no public meetings recently. Meetings held when the 1994 ESD was issued were sparsely attended. There is a TAG group that has been active for approximately 8 years; there are two very active members.

The Trust's Project Coordinator reported that on one occasion a compound, not a site COC, was observed in one well during a monitoring event. There have been no further incidents of unusual constituents in the groundwater.

There has been no development or new construction in the immediate area of the Site, with the exception of a replacement residential structure across Route 17 from the Site gate.

There are 4-5 buildings/residences across Route 17 from the Site.

Site photographs taken during the Site inspection follow this report.

VISIT TO HOPE TOWN OFFICES

The Site is in a BT-3 zone based on a 1991 zoning map.

The Town Clerk was not familiar with any well advisories.

Clerk confirmed that permits are not required for new wells; a building permit is required, once septic system is installed a well must be located a specific distance from it.

Obtained a copy of the Hope Land Use Ordinance, adopted June 22, 1987, last revised June 19, 2000.

The Town Clerk confirmed that the administrative record documents for the Site are stored in the Hope Library.

**UNION CHEMICAL SITE INSPECTION
PHOTOGRAPHIC RECORD**



Photo No.: 1

Date: 5/21/02

Comments: Standing at entrance driveway, looking East/Southeast toward Quiggle Brook



Photo No.: 2

Date: 5/21/02

Comments: At high point of capped area, looking east toward Quiggle Brook.

**UNION CHEMICAL SITE INSPECTION
PHOTOGRAPHIC RECORD**



Photo No.: 3

Date: 5/21/02

Comments: At gate near Brook, looking west up the back side of the Site.



Photo No.: 4

Date: 5/21/02

Comments: Outside fence looking toward the former treated effluent discharge point to Quiggle Brook.

**UNION CHEMICAL SITE INSPECTION
PHOTOGRAPHIC RECORD**



Photo No.: 5

Date: 5/21/02

Comments: At the southwest back corner of the Site looking toward Route 17. Note building housing treatment equipment and field office.



Photo No.: 6

Date: 5/21/02

Comments: With back to building, looking toward southwest corner of Site. Note rolloff and drums, damaged fence.

APPENDIX C
INTERVIEW LIST

INDIVIDUALS INTERVIEWED FOR THE UNION CHEMICAL COMPANY
FIVE-YEAR REVIEW

Name/Position	Organization/Location	Date
Terrence Connelly/EPA RPM	USEPA/Boston, MA	May 21, 2002 June 2002
Rebecca Hewett, Project Manager	Maine DEP/Augusta, ME	May 21, 2002 June 2002
Lois Jensen/neighbor	HCCE/Hope, ME	May 21, 2002
Florance Merrifield/ Municipal Clerk	Town of Hope, ME	May 21, 2002
Brian Powers/neighbor	HCCE/Hope, ME	May 21, 2002
Randy Smith/Project Coordinator	Union Chemical RD/RA Trust/ C/o American Environmental Consultants Mount Vernon, NH	May 21, 2002 June 10, 2002

APPENDIX D
ARARS AND TBCS

IDENTIFICATION OF PROBABLE CHEMICAL-SPECIFIC ARARS AND TO-BE-CONSIDERED CRITERIA, ADVISORIES, AND GUIDANCE

REQUIREMENT/GUIDANCE	STATUS	REQUIREMENT/GUIDANCE SYNOPSIS
GROUNDWATER		
<i>Federal Regulatory Requirements and Guidance</i>		
SDWA – Section 1412 –MCLs (40 CFR 141.11-141.16)	Applicable	MCLs have been promulgated for several common organic and inorganic contaminants. MCLs regulate the concentration of contaminants in public drinking water supplies, but are also considered applicable as discharge requirements for reinjection of treated groundwater.
USEPA Risk Reference Doses (RfDs) (USEPA, November 1999, Integrated Risk Information System)	To be considered	RfDs are an estimate of a daily exposure concentration that is likely to be without appreciable risk of deleterious effects during a lifetime exposure.
USEPA Carcinogen Assessment Group Carcinogenic Potency Factors (CPFs) (USEPA, RAGs, March 1995)	To be considered	The CSF is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.
Proposed MCLs and MCLGs	To be considered	Proposed MCLs and proposed non-zero MCLGs were considered in establishing the groundwater cleanup goals.
<i>State of Maine Regulatory Requirements and Guidance</i>		
Hazardous Waste Management Rules (06-096 CMR Chapter 800-802, 850-851, 854, 856-857)	Applicable	These rules incorporate RCRA hazardous waste regulations, including standards for hazardous waste facilities and manifesting requirements. “No hazardous waste or constituent or derivative thereof shall appear in ground or surface waters at a concentration above background level, or above current public health drinking water standards for Maine, including the Maximum Exposure Guidelines, or standards for aquatic toxicity, whichever is more stringent (Chapter 854, 58(A)(3)(a)). [Note: Per MEDEP, the 1992 MEGs are incorporated by reference in these rules.]
Maine Drinking Water Rules (10-144A CMR Chapters 231-233)	Relevant and Appropriate	Maine’s Primary Drinking Water Standards are equivalent to federal MCLs.

IDENTIFICATION OF PROBABLE CHEMICAL-SPECIFIC ARARS AND TO-BE-CONSIDERED CRITERIA, ADVISORIES, AND GUIDANCE (CONTINUED)

REQUIREMENT/GUIDANCE	STATUS	REQUIREMENT/GUIDANCE SYNOPSIS
GROUNDWATER		
<i>State of Maine Regulatory Requirements and Guidance (cont'd.)</i>		
Rules Relating to Testing of Private Water systems for Potentially Hazardous Contaminants (10-144A CMR Chapter 233)	To be considered	These rules establish MEGs used in determining whether to waive fees for testing for potentially hazardous contaminants in private wells.
Maximum Exposure Guidelines (MEGs) for Drinking Water (Bureau of Health, Maine Department of Human Services, January 20, 2000)	To be considered	MEGs are the Bureau of Health's most recent recommendations for concentrations of chemical contaminants in drinking water. MEGs are health-based guidelines and are not legally enforceable.
SOIL		
<i>Federal Guidance</i>		
USEPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, (OSWER Directive 9355.4-12, August, 1994)	To be considered	This interim directive establishes a streamlined approach for determining protective levels for lead in soil at CERCLA sites and RCRA facilities that are subject to corrective action.
<i>State of Maine Regulatory Requirements and Guidance</i>		
Implementation of Remedial Action Guidelines (MEDEP, Updated May 20, 1997)	To be considered	The guidance provides concentration levels for direct contact exposure levels for contaminants that are protective of residential, trespasser, and adult worker populations.
SURFACE WATER		
<i>Federal Guidance</i>		
National Recommended Water Quality Criteria (Federal Register, Part IV, FRL-OW-6186-6a, December, 1998)	To be considered	This guidance describes the recommended criteria for 157 pollutants used in implementing environmental programs.

IDENTIFICATION OF PROBABLE CHEMICAL-SPECIFIC ARARS AND TO-BE-CONSIDERED CRITERIA, ADVISORIES, AND GUIDANCE (CONTINUED)

REQUIREMENT/GUIDANCE	STATUS	REQUIREMENT/GUIDANCE SYNOPSIS
SURFACE WATER (Cont.)		
<i>State of Maine Regulatory Requirements</i>		
Maine Water Pollution Control Law, 38 MRSA § 411, et seq, and regulations at Chapter 580, 584, 581	Applicable	This law regulates the discharge of waste to surface water bodies. Treated groundwater discharged to Quiggle Brook must achieve federal ambient water quality criteria for the beneficial uses of the brook, or site specific numerical criteria.
Maine Statewide Water Quality Criteria (SWQC) 38 MRSA § 361-A 06-096 CMR Ch. 530.5	Applicable	These standards pertain to water quality statutes for the State of Maine.

IDENTIFICATION OF PROBABLE ACTION-SPECIFIC ARARS AND TO-BE-CONSIDERED CRITERIA, ADVISORIES, AND GUIDANCE

REQUIREMENT/GUIDANCE	STATUS	REQUIREMENT/GUIDANCE SYNOPSIS
GROUNDWATER		
<i>State of Maine Regulatory Requirements</i>		
Maine Underground Injection Control Program regulations, 38 MSRA § 413(1-B), Chapter 543	Applicable	These rules regulate the use of wells to inject substances into the subsurface, specifically “injection wells used to help clean up contaminated groundwater, either by injecting solutions to neutralize contamination or to return previously contaminated groundwater that has been treated.”

IDENTIFICATION OF PROBABLE LOCATION-SPECIFIC ARARs AND TO-BE-CONSIDERED CRITERIA, ADVISORIES, AND GUIDANCE

REQUIREMENT/GUIDANCE	STATUS	REQUIREMENT/GUIDANCE SYNOPSIS
GROUNDWATER		
<i>State of Maine Regulatory Requirements</i>		
Maine Standards for Classification of Groundwater (38 MRSA., Chapter 3, Section 470)	Applicable	Groundwater is classified under the Maine Standards. The groundwater at the UCC Site is classified as GW-A (i.e., water shall be of such quality that it can be used for domestic purposes.
SURFACE WATER		
<i>State of Maine Regulatory Requirements</i>		
Maine Standards for Classification of Fresh Surface Waters, 38 MRSA, § 468	Applicable	Quiggle Brook is classified as a tributary to a Class GPA water (and as Class B water) under state water quality standards.
WETLANDS/FLOODPLAINS		
<i>Federal Regulatory Requirements</i>		
Executive Order 11990, Protection of Wetlands (40 CFR Part 6, Appendix A)	Applicable	The Wetlands Executive Order requires federal agencies to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands.
Executive Order 11988, Floodplain Management (40 CFR Part 6, Appendix A)	Applicable	This Executive Order requires that a remedial action must reduce the risk of flood loss, and restore and preserve the natural and beneficial values served by floodplains.
<i>State of Maine Regulatory Requirements</i>		
Maine Natural Resources Protection Act (NRPA, 38 MRSA § 480-A) and regulations at Chapters 305, 310	Relevant and Appropriate	This law and its regulations prohibit the degradation or destruction of streams and brooks by prohibiting alterations in or adjacent to protected natural areas without a permit. At the UCC Site, removal of soil or alteration of structures next to streams must not cause unreasonable soil erosion, and must meet other standards.
OTHER NATURAL RESOURCES		
<i>State of Maine Regulatory Requirements</i>		
Maine Solid Waste Management Rules, Chapters 404, 405	Applicable	These rules regulate the disposal of construction/demolition debris, and disposal of special waste.

APPENDIX E

**MEDEP REVIEW COMMENTS ON
“DRAFT 5-YEAR REVIEW REPORT
FOR THE UNION CHEMICAL COMPANY SUPERFUND SITE, HOPE, MAINE,”
DATED JULY 2002**

August 16, 2002

Ms. Nancy Smith
U.S. EPA, Reg. 1
1 Congress Street
Suite 1100 (HBS)
Boston, MA 02114

**Re: Review Comments on "Draft 5-Year Review Report" for the Union
Chemical Company Superfund Site, Hope, Maine" dated July 2002**

Dear Ms. Smith:

The Maine Department of Environmental Protection has reviewed Draft 5-Year Review Report" document dated July 2002, for the Union Chemical Company Superfund Site, South Hope, Maine. This document was prepared for the U.S. Environmental Protection Agency (EPA) by Tetra Tech NUS, Inc. (TtNUS).

The MEDEP's review comments are presented in Attachment A to this letter.

If you have any questions or concerns regarding this letter, please contact me directly at (207) 287-8554 or at (207) 287-2651.

Sincerely,

Rebecca L. Hewett, Project Coordinator
Division of Remediation
Bureau Remediation & Waste Management

pc: Denise Messier, MEDEP
Hank Andolsek, MEDEP
Terry Connelly, EPA
Mary Jane O'Donnell, EPA

Attachment A

Specific Comments

1. Page i, Acronyms: Please list & define all acronyms used in the document text. On Page 3-4, the acronym GPA is used and neither defined neither in the text nor in the acronym list.
2. Pages ES-1 through ES-4: Little has been done to define or address the bedrock groundwater contamination. This report makes no mention of this problem and the lack of a defined remedy.
3. Page ES-1, 3rd bullet: Amend the text to read "facilities decontamination and demolition, and off-site disposal of debris; and".
4. Page ES-1, 3rd paragraph: Include a reference to potassium and sodium permanganate addition activities that were conducted in the source area from 1997 - 2000.
5. Page ES-1, last paragraph: In 1996, after comparing the 3 years of site specific meteorological data to the 5 years of meteorological data collected in Augusta, Maine for the years that the on-site incinerator operated, the EPA, MEDEP, Trust and citizens group all agreed that the 3 years of site-specific meteorological data collected was representative of local average conditions.
6. Page ES-4, 5th bullet: What does "current MEGS" refer to? The promulgated 1992 MEGS or the 2000 MEGS? As the 1992 MEGS are promulgated, shouldn't the text refer to the 1992 MEGS and not "current MEGS"?
7. Page 1-1, Section 1.0, last paragraph: The text states that the triggering action for this 5 year review is the October 1994 initiation of source control activities. The 5-year review is apparently overdue. Some explanation is needed - even just an acknowledgement that the review is overdue.
8. Page 3-1, Section 3.1, 1st paragraph: The text lists both the UCC process facilities and a number of remedial facilities, but the report has not yet introduced the reader to either the selected remedy or the past history of the company. The report relies on the reader knowing a lot about the history of the site and the cleanup. The report needs to provide the right information at the right level of detail and in a logical fashion.

Also, a site sketch or figure presenting the details of the site during the 5-year review site inspection would be helpful in Section 3. This would also help the reader place the photos from Appendix B in the proper context.
9. Page 3-1, Section 3.1, last paragraph: What is the flow direction of the groundwater in the bedrock? If this is not known, it represents a gap in the site data and for evaluating the protectiveness of the remedy.
10. Page 3-4, Section 3.1, top of page, last sentence: This statement is based on limited bedrock information at the site. As stated in the past, the MEDEP's opinion is that additional bedrock information, particularly on the south and southwest sides of the site, is needed.

11. Page 3-4, Section 3.2, 2nd paragraph: The statement "the private wells near the Site are upgradient of the Site contaminant plumes and therefore are not at risk..." is somewhat misleading. Little is known regarding the bedrock groundwater flow, particularly in the south and southwest areas of the site. The MEDEP's opinion is that further bedrock information on the site is needed to characterize the bedrock flow, the boundaries of the bedrock contamination plume and possible downgradient receptors.

Additionally, characterizing the residential wells in close proximity to the site as "upgradient and not at risk" is also misleading in that the bedrock residential well #20-2 is hydraulically connected to the site groundwater and pulled site contamination to it through pumping. As long as a site contamination plume is present at the site, the possibility exists that this could occur again if upgradient residential bedrock wells are installed in the future. Also, this contradicts other statements in the report about institutional controls and the well advisory zone. If institutional controls are employed effectively, the purpose, area affected, the mechanisms and the means of notifying the public needs to be specified.

12. Page 3-4, Section 3.2, 3rd paragraph, 2nd sentence. Change the word "as" to "are".
13. Page 3-5, Section 3.3: Based on reviewers memory, contaminants were detected in surface water while UCC was still operating but at the time of the ROD there were no detections of organic solvents. This section may be misleading by not clarifying this point. Additionally, this brief synopsis fails to mention soil contamination, this needs to be corrected. Also, identify the author of the 1981 study referenced in the paragraph.
14. Page 3-5, Section 3.4, 7th sentence: Insert the word "and" after "drums".
15. Page 3-6, Section 3.5: This section needs to be expanded in order for the reader to fully understand the basis for subsequent actions taken by EPA. In particular, the section should describe that on-site soils were contaminated at levels that would continue to leach to groundwater. Also, some questions remained about off-site contamination at the time of the ROD, and some residuals remained in the site facilities.
16. Page 4-1, Section 4.1, 6th bullet: Amend the text to read "facilities decontamination and demolition, and off-site disposal of debris; and".
17. Page 4-4, Section 4.1, 1st paragraph: Strictly speaking, the term "Site" includes not only the facility but also any area where hazardous substances have migrated or may migrate. This paragraph talks about institutional controls for the Site, and the institutional controls include a well advisory zone around the Site. Yet earlier in the document, it stated that the private wells are not at risk because they are upgradient. This contradiction needs to be addressed. It may help to be very clear about what is meant by Site and by Off-Site. MEDEP suggests using the term "facility" instead of Site for the UCC property proper.

Assuming the top paragraph on Page 4-4 is intended to deal only with the facility; why is mention made of Residential Well 20-2? Please clarify. Also, specify what institutional controls were placed on the facility property, the exact mechanisms for establishing controls, and an assessment of how the mechanisms are operating.

18. Page 4-4, Section 4.1, 1st paragraph, last sentence: The extent of the bedrock groundwater plume has not been determined. As a result, it is possible that bedrock groundwater contaminants may have migrated beyond the property boundary.
19. Page 4-4, Section 4.1, 2nd paragraph: The presentation of the list of institutional controls for surrounding properties gives the reader the impression that the ROD required all of these measures. As MEDEP recalls, the only residential well connected to the site was residential well #20-2. The concern for the well advisory zone was the potential for contamination to spread in the interval before hydraulic control could be achieved. The factors need to be presented in more detail, and the report should describe the basis for the area ultimately included in the advisory zone. Tetra Tech or EPA should check the ROD again - MEDEP believes it doesn't specify all the measures on this list, it suggests that these mechanisms "may include" certain items.
20. Page 4-8, Section 4.2.4, 2nd paragraph, last sentence: The text states, "...the PRPs began preparing for setting a site specific standard as allowed under state law by performing total toxicity testing". Identify the outcome of this issue.
21. Page 4-9, Section 4.2.6, 2nd paragraph, 4th sentence: This sentence is grammatically incorrect and - more important - ineffective at giving the reader useful information. Briefly describe the theory behind permanganate addition and the results of the additions, including any confounding factors such as the question about how far into the formation the permanganate migrated. Identify the basis for the conclusion that higher doses of sodium permanganate could be added. Prove the theory and basis for adding carbon sources in 2001 to create a reducing environment. The document switches from describing adding oxidant to adding carbon sources to create a reducing environment, with no rationale provided for either one or for switching. This issue has consumed the project team for two years and there are still unresolved issues. More detail is needed if the objective of the 5-year review is to describe the present status of the site and support a conclusion about protectiveness. Describe the rationale for changing the discharge arrangements for treated water and how protection of Quiggle Brook is achieved under the reinjection scenario.
22. Page 4-9, Section 4.2.6, last paragraph, 4th sentence: Change the word "molasses" to "lactate".
23. Page 4-9, Section 4.2.6, last paragraph, last sentence: The extraction system is kept on-site as a component of the contingency plan during future groundwater treatment activities (such as carbon source addition activities).
24. Page 4-10, Section 4.2.6, top paragraph: Please define compliance monitoring and explain how it differs from the regular semiannual monitoring.
25. Page 4-10, Section 4.2.7: In 1996, after comparing the 3 years of site specific meteorological data to the 5 years of meteorological data collected in Augusta, Maine for the years that the on-site incinerator operated, the EPA, MEDEP, Trust and citizens group all agreed that the 3 years of site-specific meteorological data collected was representative of local average conditions.
26. Page 4-10, Section 4.2.8: Provide more specific information regarding the "permanent restriction that runs with the property" regarding the use of Well 20-2. Ideally, an executed copy should be attached to the 5-year review. At a minimum,

provide the date executed, title of the document, identify the signatories and cite the book and page where the document can be found at the Knox County Registry of Deeds.

Also, attach a figure showing the well advisory zone and at least a minimal description of the basis for including the 54 properties. Describe how the well advisory zone was implemented. Provide a figure of the revised well advisory zone (citing Tax Map 10 is not enough - how does the reader know where Tax Map 10 is?) and the basis for this change. Provide an assessment of how the advisory zone worked - not well, since 5 bedrock wells were installed with no notice - and describe any changes to address this failure and/or the basis for not addressing it.

27. Page 4-11, Section 4.2.8, 2nd paragraph: How was hydraulic connection of the "approximately 5 new bedrock wells within the zone" tested? Were pump tests run? Explain.
28. Page 4-11, Section 4.3, 1st paragraph, 4th sentence: Change "November" to "October".
29. Page 6-1, Section 6.1, last sentence: Add Denise Messier as a reviewer.
30. Page 6-3, Section 6.4.3, 1st paragraph, 2nd sentence: What exactly does "Groundwater results have shown the impact of adding permanganate, molasses and sodium lactate following the periodic additions to the groundwater to enhance the progress of the MOM cleanup" mean? Does it mean we can now detect permanganate, molasses and lactate in the groundwater or that VOCs have dropped as a result of these additions, or both? If it means the latter, the next paragraph cites data about exceedances of VOCs, so exactly how well did all this material work? Please clarify.

Also, the data regarding the effectiveness of molasses and lactate addition is inconclusive. Contaminant concentrations tend to rebound after the application suggesting the initial decline may possibly be due to dilution, and not reductive dechlorination.

31. Page 6-3: What is the reduction of groundwater contamination since remediation activities started at the site?
32. Page 6-4, Section 6.4.3: Is there any evidence that reductive dechlorination has been achieved? Please cite the specific evidence clearly.
33. Page 6-5, Section 6.4.4: In 1996, after comparing the 3 years of site specific meteorological data to the 5 years of meteorological data collected in Augusta, Maine for the years that the on-site incinerator operated, the EPA, MEDEP, Trust and citizens group all agreed that the 3 years of site-specific meteorological data collected was representative of local average conditions.
34. Page 6-5, Section 6.5, last paragraph, 2nd sentence: Readers recollection is that an on-site well was tampered with early on in the remediation activities. Please check into this and amend the text as appropriate.
35. Page 6-5, Section 6.5, last paragraph, last sentence: The report should cite American Environmental Consultants, not just Randy Smith.
36. Page 6-6, Section 6.5, top paragraph, last sentence: Amend the word "molasses" to read "carbon source".
37. Page 6-6, Section 6.6: In spring of 2001, Denise Messier (MEDEP) received a complaint about rusty surface water on the western boundary of the facility. In addition, she observed the rusty water and reported a potential failing septic system to the town Code Enforcement Officer. Please add this incident to the text.

38. Page 7-1, Section 7.1: Cite the final approved report for facilities decontamination and demolition.
39. Page 7-1, Section 7.1, 2nd paragraph: Please correct the tense in the second paragraph. If the Closure Action Plan for Soils is fully implemented, then the soils have been remediated.
40. Page 7-1, Section 7.1, 3rd paragraph: Earlier in the document the text stated that the injection of various chemicals was expected to attain clean up standards by 2003 to 2005. Provide an assessment for whether or not this is on track.
41. Page 7-1, Section 7.1, last paragraph: Cite the final closure document for the Off Site component of the remedy, including title and date.
42. Page 7-2, Section 7.1, Opportunities for Optimization: Provide the basis for the recommendations; MEDEP has been specifically concerned about the need for stabilization of the aquifer before any findings can be made about the effectiveness of the injected chemicals. What is the rationale for eliminating monitoring wells before this evaluation is completed?
43. Page 7-2, Section 7.1, Indicators of Remedy Problems: This section needs more detail. The report should describe what areas exceed MEGs and performance standards and describe the extent of contamination.
44. Page 7-2, Section 7.1, Implementation of Institutional Controls: While the ROD did label the fencing requirement an institutional control, in the decade plus years since the ROD we have redefined a fence as an engineering control. If the goal of the 5-year review is to update and review the status of the remedy, this should be mentioned.
45. Page 7-2, Section 7.1, Implementation of Institutional Controls: Please identify the property subject to deed restrictions, the date the restrictions were executed, the title of the document that established deed restrictions and the book and page where the restrictions were filed at the Knox County Registry of Deeds. Ideally a copy of the restrictions would be appended to the 5-year review.

Please identify the document that established the permanent water use restriction on Well #20-2, and the book and page where the restrictions were filed at the Knox County Registry of Deeds. Ideally a copy of the restriction would be appended to the 5-year review.

Please provide a map showing the current well advisory zone, the format for notifying residents that their property or residence is within the zone, the plan for updating the notice periodically and the procedure should the advisory fail.

Please provide the rationale for monitoring residential wells during the source control component and the rationale for discontinuing the sampling. The residential well monitoring should be mentioned earlier in the text when the source control is described.

The document does not provide a basis for the conclusion that the institutional controls have been effective. A number of wells were installed with no prior notice to EPA or MEDEP. The document does not provide enough backup to assure the reader that the institutional controls have ever been finalized. If no exposure to contaminated groundwater has occurred it is due to the limited extent of groundwater contamination, the aggressive initial MOM/SC remedy, and happenstance. Strike this conclusion or provide the backup for it.

46. Page 7-3, Section 7.2, discussion of Maine RAGS: Compare the RAGS to the cleanup levels cited in the ROD. Stating that the RAGS are higher, therefore the cleanup levels were protective, will suffice.

47. Page 7-5, Section 7.2: The text states, "Vinyl chloride was detected in nine of 16 samples at concentrations higher than the cleanup goal and therefore exceeding the MEGs. Although overall, the remedy still remains protective, concentrations of this contaminant should continue to be monitored closely to ensure the continued protectiveness of the remedy". Please explain how and why, if vinyl chloride exceeds its standard, the remedy remains protective. Also, the text should mention somewhere that MEDEP never approved of the cleanup standard for vinyl chloride and our concurrence remains conditional on a recalculation of total site risk once all remedial efforts have ceased.
48. Page 7-5, Section 7.2: The addition of permanganate, lactate and molasses to the aquifer complies with 38 MRSA 413(1-B) only if these chemicals would not "otherwise adversely affect human health". Please verify that this is the case.
49. Page 7-6, Section 7.2, 5th paragraph: The CSFs used in the RI/FS should be included in the appendices to the RI/FS. The RI/FS does not appear to one of the reference documents cited (Appendix A) during the preparation of this report.
50. Page 7-7, Section 7.2, top of page: Please recheck the initial concurrence letter from MEDEP. The risk evaluation at the completion of the remedial action is a condition of MEDEP's concurrence.
51. Page 7-7, Section 7.2, 4th paragraph, 2nd sentence: Add the words "and lactate" after "molasses".
52. Page 7-7, Section 7.2, 4th paragraph 3rd sentence: Please identify the schedule in question. Does EPA mean the 2003-2005 timeframe identified for the permanganate addition? Provide the basis for this conclusion. Also, based on the preliminary results of the carbon addition pilot test, it is premature to suggest the RAOs will be attained ahead of schedule.
53. Page 7-8, Section 7.4, top paragraph: Please justify the statement that the effective implementation of institutional controls was a factor in protectiveness, in the light of the fact that 5 bedrock wells were installed in the well use advisory are and no notice was given to the agencies. If no one has been exposed, it is due to other factors (limited extent of groundwater contamination, the aggressive initial MOM/SC remedy, and happenstance) not too effective institutional controls.
54. Page 10-1, Section 10.0, top paragraph: What data were used for determining the expected compliance date of 2005?
55. Page 10-1, Section 10.0, 2nd paragraph: The extent of the bedrock groundwater plume has not been determined. As a result, it is possible that bedrock groundwater contaminants may have migrated beyond the property boundary.

Appendix D -- ARARs

56. There is no table of action specific ARARs. Given that there is ongoing treatment involving subsurface injection, the Maine Underground Injection Control Program Regulations would seem to apply. These rules are currently presented as chemical specific ARARs, but the reader does not understand why.
57. The table of chemical specific ARARs presents the Maine Underground Injection Control Program Regulations as federal, not state, ARARs. Please correct.
58. Strike the term "landfilled" in the requirement synopsis for the Hazardous Waste Management Rules.
59. Please note that the Maine Remedial action Guidelines are currently presented with federal guidance on soils. The RAGS should be cited as state guidance.

60. Provide the citation for the Maine statewide water quality criteria - 38 MRSA
Section 361-A 06 096 CMR Chapter 530.5