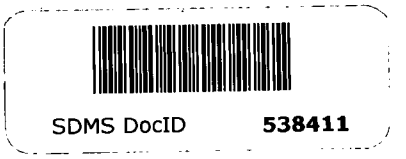

2012 Work Plan

Union Chemical Trust

Former Union Chemical Company Superfund Site

214 Main Street

Hope, Maine

Submitted to:
United States Environmental Protection Agency

May 10, 2012

TETRA TECH

May 10, 2012

Mr. Terry Connelly
U.S. Environmental Protection Agency
Region 1
One Congress Street, Suite 1100 (HBT)
Boston, MA 02114-2023

Ms. Rebecca Hewett
Maine Department of Environmental Protection
State House Station 17
Augusta, ME 04333

Re: 2012 Work Plan
Union Chemical RD/RA Trust
Former Union Chemical Company Superfund Site
214 Main Street
Hope, Maine

Dear Mr. Connelly and Ms. Hewett:

Attached is Tetra Tech Inc. d/b/a Tetra Tech Rizzo (TTRizzo) 2012 Work Plan detailing the proposed site maintenance/decommissioning activities, assessment, sampling and monitoring activities for the above mentioned site (the Site). This work plan is for proposed activities at the Site during the period of June 2012 through December 2012.

Please contact me at (508) 903-2415, if you have any questions.

Very truly yours,

Robert J. Ankstitus, P.E.
Senior Project Manager

C: R. Smith, AEC, Union Chemical RD/RA Authorized Trust Representative File

P:\2000\2420\2007 - CSM\2007 work plan.doc

One Grant Street
Framingham, MA 01701
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Appendix A Low Flow Sampling Methodology (correspondence dated March 24, 2000, Rev. 1)

Appendix B Draft Long Term Monitoring Plan

1.0 Introduction

IT Corporation (IT) and later Tetra Tech Rizzo (TTRizzo) sequentially implemented a number of remediation technologies at the former Union Chemical Company (UCC) Superfund Site (the Site) in Hope, Maine. These technologies (and their approximate time of use) include:

- Soil vapor extraction (SVE) (1996 through 1998)
- Groundwater recovery (1996 through 2000)
- Chemical oxidation (1997 through 2001 and 2005)
- Carbon source additions (2001 through 2002)

In combination, these technologies have significantly reduced volatile organic compound (VOC) concentrations in both soil and groundwater at the Site. The Source Control (SC) remediation (i.e., the soil treatment component) was completed in 1998, whereupon the SVE system was deactivated. Following a rebound assessment period and completion closure sampling, regulatory closure for the SC component was granted in correspondence dated December 17, 1999. In an attempt to accelerate the overall objectives of the Management of Migration (MOM) component (i.e., the groundwater treatment component), the installed remedial system(s) were enhanced through the field application of permanganate solutions to groundwater to directly oxidize chemical constituents followed by the application of carbon source solutions to transition the subsurface to a reducing environment and potentially accelerate the natural reductive dechlorination process. The groundwater pump and treat system was shut down in the fall of 2000 and is no longer actively operated. The MOM component of remedial activities remains ongoing at the present time although the groundwater pump and treat, chemical oxidation, and carbon source addition activities have been terminated.

In Spring 2002, Rizzo Associates, Inc. (now TTRizzo) replaced IT as the contractor for the Site and was retained to conduct Site monitoring activities, implement the carbon addition program, and begin preparation of a site conceptual model. Bi-annual groundwater sampling and monitoring events were conducted by TT Rizzo between 2002 and 2004. In 2004, TTRizzo and the Trust proposed a transition of the Site to a long term monitoring program with annual groundwater sampling and monitoring events. The long term monitoring program was conditionally accepted by the agencies with the first LTM sampling event in Fall 2004. Since that time the LTM sampling events have indicated a stable dissolved phase contaminant plume through the latest sampling that was conducted in the Fall 2008 (LTM-4).

This work plan presents the proposed site maintenance activities to be conducted in 2012 and the proposed groundwater sampling and monitoring activities to be conducted during the Summer of 2012 which will be groundwater sampling and monitoring event (Q41/LTM-6).

1.1 Purpose of Work Plan

The primary purpose of this work plan is to outline the site maintenance activities that will be conducted during 2012. As part of this work plan, our intent is to perform general Site maintenance activities including the winterization of the Site, decommissioning of the carbon units and checking/securing the remaining site monitoring wells. In addition, the work plan contains the proposed assessment activities to conduct requisite groundwater sampling and monitoring of the Site as part of the Management of Migration under the conditionally approved long term monitoring program. Information obtained from these site assessment activities combined with previous monitoring and analytical data, will be used to evaluate the migration and limits of the Site's groundwater contaminant plumes.

1.2 Work Plan Concept

In this plan, TTRizzo is proposing site maintenance and decommissioning of the activated carbon vessels. The media contained within the vessels will be removed and disposed; vegetation and brush will be trimmed and the remaining Site wells will be inspected for security.

TTRizzo is proposing continued monitoring and sampling of groundwater (Q41/LTM-6) during late-June/July 2012 in order to provide current information to be used as part of the five year review for the site and the long term monitoring plan. The wells to be sampled provide general coverage of the bedrock and overburden contaminant plumes as well as downgradient Site areas in order to assess contaminant plume migration.

1.3 Objectives

The objectives of this work plan are as follows:

- Perform general site maintenance activities and removal of equipment from the treatment building.
- Perform monitoring and sampling of the Long Term Monitoring Plan wells (Q41/LTM-6) in the June/July 2012.

A description of the site maintenance and well closure activities is provided in Section 2.0. A description of the proposed Long Term Monitoring Activities for 2012 is provided in Section 3.0. The proposed schedule and regulatory reporting associated with the activities described in this work plan is discussed in Section 4.0.

2.0 Site Maintenance & Decommissioning Activities

As part of the monitoring activities, wells and the Site building will be inspected and winterized for the year 2012. Gates and locks will be inspected and treated with lubricant for freeze prevention and ease of operation. Wells outside of the fenced area will be inspected and locked

or shrink-wrapped as appropriate. Wells within the fenced area will be inspected and covers will be repaired or shrink-wrap will be applied to mitigate potential precipitation intrusion.

Vegetation and brush will be cut and trimmed to facilitate access to the Site wells and the Site building. Cut vegetation and brush will remain on the site and allowed to degrade as mulch.

The fence line will be inspected and damaged sections of fencing (if any) will be repaired.

The activated carbon units will also be inspected to evaluate proper level of decontamination. These units were last used during the pump tests conducted in 2005. Upon completion of the 2005 pump test, the vessels were taken off-line and drained. The vessels have been allowed to air dry since that time. The remaining carbon media will be sampled for TCLP VOCs and TCLP metals for waste characterization. Upon receipt of facility acceptance, the carbon media will be removed from each vessel via vacuum equipment, drummed or placed into a bulk container(s) and transported to a licensed facility for reuse or disposal. The remaining structural unit carbon units will be cleaned for industrial re-use and recycled. If re-use/recycling of the units is not possible, the units will be disassembled or cut via an appropriate cutting method and disposed as non-hazardous solid waste.

3.0 Long Term Monitoring Groundwater Sampling and Monitoring Event

The Draft Long Term Monitoring Plan (LTMP) for the Site prepared by Rizzo Associates (now TTRizzo) dated September 10, 2004 was used for the Q36/LTM-1 groundwater sampling and monitoring event in the Fall of 2004. TT Rizzo proposes to implement the proposed 2004 LTMP for the Q41/LTM-6 monitoring event. A copy of the draft LTMP and low flow sampling methodology are included in Appendices A & B. The following section describes the monitoring and sampling locations selected in the LTMP and gives a brief rationale for why these locations were selected. Our rationale and selection criteria in the LTMP included historical residual contaminant concentrations; potential receptor monitoring at Quiggle Brook; downgradient monitoring; and assessment of the residual groundwater plumes in the bedrock and overburden. Further details on Site gauging, sampling procedures, and laboratory analytical methods are described in the conditionally approved Draft LTMP.

3.1 Selected Monitoring Points Rationale

Four LTM monitoring points are screened in the overburden aquifer. Of the overburden wells, there are two wells in or near the VOC/SVOC contaminant source area with the most elevated VOC/SVOC concentrations (B-9A-I and P-20) and two locations east of the VOC/SVOC contaminant source area within the identified downgradient portions of the VOC/SVOC contaminant plume adjacent to Quiggle Brook (B-5D-I and B-12B-I). Four LTM monitoring points are screened in the shallow bedrock aquifer: one well to the southeast of the VOC/SVOC contaminant source area (B-6A-D), two wells south of the VOC/SVOC contaminant source area (B-8A-D and ODW-U) and one well to the south west of the VOC/SVOC contaminant source

area (NBW-U). Two LTM monitoring points are screened in the deep bedrock aquifer: one well to the southwest of the VOC/SVOC contaminant source area (NBW-L) and one well south of the VOC/SVOC contaminant source area (ODW-L). Also, LTM monitoring includes one surface water monitoring point (QB-4) which is located in Quiggle Brook and downstream from the highest detected VOC plume concentrations. The LTM monitoring points and the rationale for each selection is discussed below.

The following monitoring locations have been sampled as part of the LTM program since 2004.

Overburden Wells

B-5D(I) – Well B-5D-I is a replacement well located near the south eastern edge of the VOC/SVOC contaminant plume area. This places the well near the downgradient edge of the VOC/SVOC contaminant plume present in the overburden unit. It is screened from 31 to 36 feet (ft) below the ground surface (bgs). This well screen interval has historically had the highest reported VOC concentrations of the B-5 series wells. Well B-5D-I was installed to replace well B-5B-I in 2003, when the validity of reported results from the B-5 series wells were questioned due to the design of these small diameter "micro"-wells. Due to the relatively recent installation of B-5D-I there is not a large amount of historical Site data available for this well. No exceedances of the Performance Standards were reported in groundwater from well B-5D-I during Q40/LTM-5 except for a reported concentration 1,1-DCA of 284 ug/L which exceeds the site specific Performance Standard for 1,1-DCA of 5 ug/L. No exceedances of the Performance Standards were reported in groundwater from well B-5D-I during the Q36/LTM-1 through Q40/LTM-5 monitoring period except for reported concentrations 1,1-DCA ranging from 22.6 ug/L to 300 ug/L.

Monitoring well B-5D-I covers the southeast downgradient area to the south of well B-12B-I and is co-located at approximately the same latitude as the QB-4 surface water monitoring point. The B-5D-I well point will be used to assess whether a southeastern migration of the VOC plume from Zones 2 and 3 of the overburden is likely to significantly impact Quiggle Brook downstream of QB-4.

B-9A(I) – Well B-9A-I is located to the west of the VOC/.SVOC contaminant plume center and represents a DCA "hot spot" in the contaminant source area. It is screened from 35 to 40 ft bgs. Reported exceedances of the Performance Standards in well B-9A-I during Q40/LTM-5 included: 1,1-DCA (161 ug/L); TCE (U20 ug/L), and 2-butanone was detected at (1,190 ug/L). Additional compounds detected in the well were: chloroethane (221 ug/L); acetone (1,030 ug/L); toluene (53.8 ug/L); and ethyl benzene (22.8 ug/L). Of these concentrations, 2-butanone, chloroethane, acetone, and toluene represented the maximum reported concentration for that compound in the overburden wells during the Q40/LTM-5 monitoring event. Reported exceedances of the Performance Standards in well B-9A-I during Q39/LTM-4 included: 1,1-DCA (168 ug/L); TCE (5.6 ug/L), and 2-butanone was detected at (1,280 ug/L). Additional compounds detected in the well were: chloroethane (300 ug/L); acetone (1,740 ug/L) methyl isobutyl ketone (95.6 ug/L); toluene (41.6 ug/L); ethyl benzene (22.7 ug/L); total xylenes (36.8 ug/L) and cis1,2 dichloroethene (6.4 ug/L). Of these concentrations, 2-butanone, chloroethane,

acetone, methyl isobutyl ketone and toluene represented the maximum reported concentration for that compound in the overburden wells during the Q39/LTM-4 monitoring event.Reported exceedances of the Performance Standards detected in well B-9A-I during Q38/LTM-3 included: 1,1-DCA (360 ug/L); TCE (20 ug/L), and 2-butanone (2,600 ug/L). Of these concentrations, 2-butanone represented the maximum reported concentration for that compound in the overburden wells during the Q38/LTM-3 monitoring event. Reported exceedances of the Performance Standards in well B-9A-I during Q37/LTM-2 included: 1,1-DCA (570 ug/L); TCE (17 ug/L); and 2-butanone (1,000 ug/L).

Well B-9A-I was selected to assess the source area concentrations in a region of the Site with low rates of groundwater flow and to provide environmental data from source area to assess the achievement of the Performance Standards. Located in Zone 5 of the overburden, the contaminated groundwater at well B-9A-I has the potential to impact the southeast portion of Zone 3 (up-gradient of B-5D-I) as well as Zone 4 (north of the B-8 well series). (TTRizzo, Revised Conceptual Site Model Report, October 2007)

B-12B(I) - Well B-12B-I is located adjacent to Quiggle Brook near the eastern (downgradient) edge of the VOC/SVOC contaminant plume. Groundwater gauging data from the B-12 well triplet typically shows an upward vertical gradient, indicating that the groundwater flow in this overburden well is artesian and is likely the result of groundwater flow produced by the relatively steep gradient through the overburden tills (to the west of this well) and the weathered bedrock/shallow bedrock that was confined by the dense tills (to the west of this well) being released to the shallow sandy till soil at this location. The highest total VOC concentrations in the B-12 triplet have consistently been observed in well B-12B-I. The most elevated concentrations of 1,1-DCE (57 ug/L); 1,1-DCA (1,670 ug/L); tetrachloroethene (50U ug/L); ethyl benzene (120 ug/L); xylenes (100U ug/L) and DMF (121J ug/L) in the overburden aquifer (reported for Q40/LTM-5) were observed in well B-12B-I. Additional compounds were also reported with exceedances of the Performance Standards in well B-12B-I during Q40/LTM-5: vinyl chloride (50U ug/L), cis-1,2-DCE (216 ug/L) and TCE (50U ug/L). The most elevated concentrations of 1,1-DCE (114 ug/L); 1,1-DCA (2,210 ug/L); tetrachloroethene (10 ug/L); ethyl benzene (480 ug/L); xylenes (250 ug/L) and DMF (1,400 ug/L) in the overburden aquifer (reported for Q39/LTM-4) were observed in well B-12B-I. Additional compounds were also reported with exceedances of the Performance Standards in well B-12B-I during Q39/LTM-4: vinyl chloride (32 ug/L), cis-1,2-DCE (376 ug/L) and TCE (28.8 ug/L). The most elevated concentrations of 1,1-DCE (140 ug/L); 1,1-DCA (2,400 ug/L) and DMF (1,400 ug/L) in the overburden aquifer (reported for Q38/LTM-3) were also observed in well B-12B-I. Additional compounds were also reported with exceedances of the Performance Standards in well B-12B-I during Q38/LTM-3: vinyl chloride (35 ug/L), cis-1,2-DCE (470 ug/L) and TCE (25 ug/L). The most elevated concentrations of 1,1-DCE (250 ug/L); 1,1-DCA (2,800 ug/L) and DMF (1,500 ug/L) in the overburden aquifer (reported for Q37/LTM-2) were also observed in well B-12B-I. Additional compounds were also reported with exceedances of the Performance Standards in well B-12B-I during Q37/LTM-2: vinyl chloride (44 ug/L), cis-1,2-DCE (800 ug/L) and TCE (34 ug/L).

Well B-12B-I is located adjacent to Quiggle Brook and upgradient of the QB-4 surface water monitoring point. This well will be used to assess the movement of the VOC plume to Quiggle Brook from Zones 2 and 3 (TTRizzo, Revised Conceptual Site Model Report, October 2007) where an easterly flow of groundwater was inferred and to assess potential contaminant loading to Quiggle Brook.

P-20 – Well P-20 is located in the northeastern portion of the cap area near the northern edge of the DCA, TCE and DCE plumes within Zone 2. This well was originally installed as a pumping well for the MOM/SCR treatment system and is screened from 39 to 67 ft bgs into the shallow bedrock and weathered bedrock. Well P-20 had the most elevated reported concentration of vinyl chloride (50U ug/L), trans-1,2 DCE (670 ug/L), cis-1,2 DCE (1,830 ug/L), MIBK (500U) PCE (50U) and TCE (108 ug/L) in the overburden for Q40/LTM-5. Well P-20 had the most elevated reported concentration of vinyl chloride (103 ug/L), trans-1,2 DCE (920 ug/L), cis-1,2 DCE (2,600 ug/L), and TCE (438 ug/L) in the overburden for Q39/LTM-4. Well P-20 had the most elevated reported concentration of vinyl chloride (170 ug/L), trans-1,2 DCE (1,400 ug/L), cis-1,2 DCE (3,200 ug/L), and TCE (1,000 ug/L) in the overburden for Q38/LTM-3. Well P-20 had the most elevated reported concentration of vinyl chloride (110 ug/L), trans-1,2 DCE (570 ug/L), cis-1,2 DCE (1,500 ug/L), and TCE (570 ug/L) in the overburden for Q37/LTM-2. Each of these reported concentrations exceeds the respective Performance Standard for the compound.

Well P-20 represents a VOC/SVOC contaminant source area well that will be monitored to assess the achievement of the Performance Standards within the VOC/SVOC source area. Groundwater from well P-20 is expected to flow easterly toward Zone 3 (TTRizzo, Revised Conceptual Site Model Report, October 2007), well B-12B-I and Quiggle Brook.

Bedrock Wells

B-6A-D – Shallow bedrock well B-6A-D is located on the southeastern edge of the capped Site area and within the northern edge of the identified VOC/SVOC contaminant plume in the shallow bedrock. The most elevated concentrations in the shallow bedrock aquifer for 1,1 DCE (138 ug/L); tetrahydrofuran (200U ug/L); cis-1,2-DCE (867 ug/L), 1,1-DCA (2,970 ug/L), trans 1,2 DCE (100U ug/L), 2-butanone (1,000U ug/L), methyl isobutyl ketone (1,000 U ug/L), vinyl chloride (354 ug/L), xylenes (2,190 ug/L), and ethyl benzene (3,060 ug/L) for Q40/LTM-5 were reported in well B-6A-D. The most elevated concentrations in the shallow bedrock aquifer for 1,1 DCE (228 ug/L); tetrahydrofuran (250 ug/L); cis-1,2-DCE (1,380 ug/L), 1,1-DCA (3,630 ug/L), trans 1,2 DCE (25.8 ug/L), 2-butanone (250 ug/L), methyl isobutyl ketone (100 ug/L), vinyl chloride (729 ug/L), xylenes (2,060 ug/L), and ethyl benzene (3,120 ug/L) for Q39/LTM-4 were reported in well B-6A-D.With the exception of the xylenes concentration, each of these compound concentrations exceeded the Performance Standard.

The most elevated concentrations in the shallow bedrock aquifer for cis-1,2-DCE (620 ug/L), 1,1-DCA (1,200 ug/L), trans 1,2 DCE (67 ug/L), 2-butanone (100 ug/L), methyl isobutyl ketone (100 ug/L), vinyl chloride (130 ug/L), TCE (37 ug/L), xylenes (480 ug/L), and ethyl benzene (750 ug/L) for Q38/LTM-3 were reported in well B-6A-D. The most elevated concentrations in the shallow bedrock aquifer for cis-1,2-DCE (2,100 ug/L), 1,1-DCE (310 ug/L), 1,1-DCA (3,000

ug/L), vinyl chloride (220 ug/L), TCE (66 ug/L), and ethyl benzene (1,900 ug/L) for Q37/LTM-2 were reported in well B-6A-D. Each of these compound concentrations exceeded the Performance Standard. An additional reported exceedance of the Performance Standards for Q37/LTM-2 included DMF (410 ug/L and 480 ug/L respectively).

B-6A-D is located in Zone 2 (TTRizzo, Revised Conceptual Site Model Report, October 2007) and has historically had the highest concentrations of total VOCs in the bedrock aquifer. B-6A-D represents a VOC/SVOC source area well that will be monitored to assess the achievement of the Performance Standards. Although the predicted groundwater flow is toward Quiggle Brook, B-6A-D area groundwater has the potential to impact Zone 4 and Zone 3 down-strike fractures in the bedrock.

B-8A-D - Shallow bedrock well B-8A-D is located approximately 200 feet south of the Site cap area in Zone 4. The most elevated concentration of DMF (138J ug/L) and chloroethane (200U) in the bedrock aquifer during Q40/LTM-5 was reported in well B-8A-D. The most elevated concentration of DMF (556 ug/L); TCE (11 ug/L); methyl isobutyl ketone (100 ug/L); tetrachloroethene (10 ug/L) in the bedrock aquifer during Q39/LTM-4 was reported in well B-8A-D. The most elevated concentration of DMF (1,100 ug/L) in the bedrock aquifer during Q38/LTM-3 was reported in well B-8A-D. The most elevated concentrations of DMF (1,000 ug/L), and MIBK (340 ug/L) in the bedrock aquifer during Q37/LTM-2 were reported in well B-8A-D. These reported concentrations for DMF exceeded the Performance Standards. Additional reported exceedances of the Performance Standards in well B-8A-D for Q37 included 1,1-DCA (560 ug/L), 1,1-DCE (180 ug/L) and TCE (19 ug/L).

Although the predicted groundwater flow direction in the well B-8A-D area is toward Quiggle Brook, fractures in the bedrock are likely to induce groundwater flow to the south and southeast (down strike and down dip) to the limits of the bedrock fold within the UCC property line.

ODW(U) – Bedrock well ODW-U is located in the southern portion of the Site near the southern edge of the identified VOC contaminant plume area. It is a deep bedrock well that is screened from 154 to 174 ft bgs. The only reported exceedance of the Performance Standards in well ODW-U during Q40/LTM-5, Q39/LTM-4, Q 38/LTM-3, and Q37/LTM-2 was 1,1-DCA (6.4 ug/L, 8.6 ug/L, 14 ug/L, and 13 ug/L respectively).

This well will be used to monitor VOC/SVOC contaminant concentrations in bedrock near the southern edge of the bedrock plume area. ODW-U is the southernmost bedrock well at the Site. The well will be used to assess the potential off-site migration to downgradient properties and as a sentinel well (down-strike) for potential downgradient receptors.

NBW(U) - Bedrock well NBW-U is located in the southwestern portion of the Site near the southwestern fringe of the VOC/SVOC plume area. This well, along with well NBW-L, was installed in November 2003 to evaluate potential deep bedrock plume migration in the south/southwest direction. NBW-U is screened from 56 to 66 ft below the top of the well's casing (approximately 54.5 to 64.5 feet bgs). The only reported exceedance of the Performance Standards in well NBW-U during Q40/LTM-5, Q39/LTM-4, Q38/LTM-3 and Q37/LTM-2 was

1,1-DCA (12.4 ug/L, 12.7 ug/L, 14 ug/L, and 5 ug/L respectively). This well will be used to assess VOC/SVOC contaminant migration through shallow bedrock in the down dip direction by the VOC/SVOC contaminant plume.

ODW(L) - Bedrock well ODW-L is located in the southern portion of the Site near the southern edge of the VOC plume area, and is a deep bedrock well that is screened from 225 to 245 ft bgs. There were no exceedances of the Performance Standards in well ODW-L for Q40/LTM-5. The only reported exceedance of the Performance Standards for Q39/LTM-4 and Q38/LTM-3 in well ODW-L was 1,1 DCA (6.3 ug/L and 7 ug/L). There were no exceedances of the Performance Standards in well ODW-L for Q37/LTM-2.

This well will be used to monitor VOC/SVOC contaminant concentrations in deep bedrock near the southern edge of the VOC/SVOC plume area. ODW-L is the only deep bedrock well on the southern section of the property. The well will be used to assess the potential off-site migration to downgradient properties (down-strike) and as a sentinel well for downgradient receptors.

NBW(L) - Bedrock well NBW-L is located in the southwestern portion of the Site near the southwestern fringe of the VOC/SVOC plume area. This well, along with well NBW-U was installed in November 2003 to evaluate potential VOC/SVOC plume migration in the south/southwest direction within the bedrock. NBW-L is screened from 115 to 120 ft below the top of the wells casing. No exceedances of the Performance Standards were reported in monitoring well NBW-L during Q40/LTM-5, Q39/LTM-4, Q38/LTM-3 and Q37/LTM-2. This well will be used to assess VOC/SVOC contaminant migration through deep bedrock fractures in the down dip direction from the Site cap area.

Surface Water Monitoring Point

QB-4 - Surface water monitoring point QB-4 is located in Quiggle Brook, downstream from the highest reported contaminant concentrations in the overburden unit. This location is used to monitor the possible migration of VOC contaminants from the overburden into surface water. Quiggle Brook discharges into Crawford Pond which is used as a water supply. No exceedances of the Performance Standards were reported in surface water monitoring point QB-4 during Q40/LTM-5, Q39/LTM-4, Q38/LTM-3 and Q37/LTM-2.

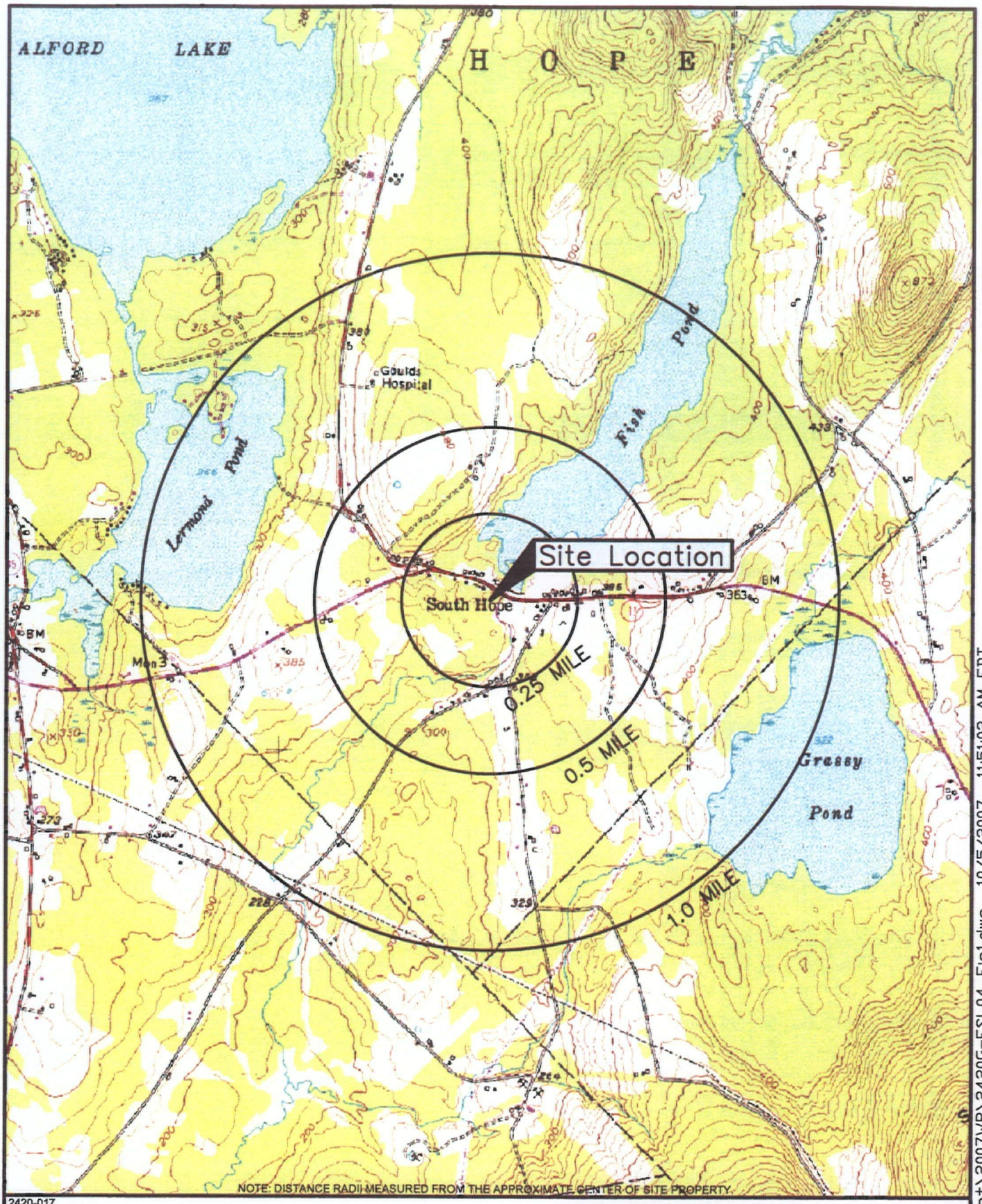
4.0 Schedule and Reports

Upon approval from the agencies, TTRizzo proposes to perform the following activities during the time periods listed. If TT Rizzo finds that deviations from this schedule will be necessary for any reason TTRizzo will provide a revised schedule in writing to the agencies as soon as possible. Upon approval from the agencies, the submitted revised schedule will supersede all previously submitted schedules and the affected work tasks will be executed.

Q41/LTM-6 Monitoring and Sampling Event – June/July 2012

Q41/LTM-6 Groundwater Monitoring and Sampling Event Report – August 2012

5 Year Review Assistance – August/September 2012



2420-017

Union Chemical Company
Hope, Maine

0 2,000 Feet

TETRA TECH RIZZO

Information obtained from
USGS Map of West Rockport, Maine
Quadrangle dated 1988

Site Locus Plan

Figure
1

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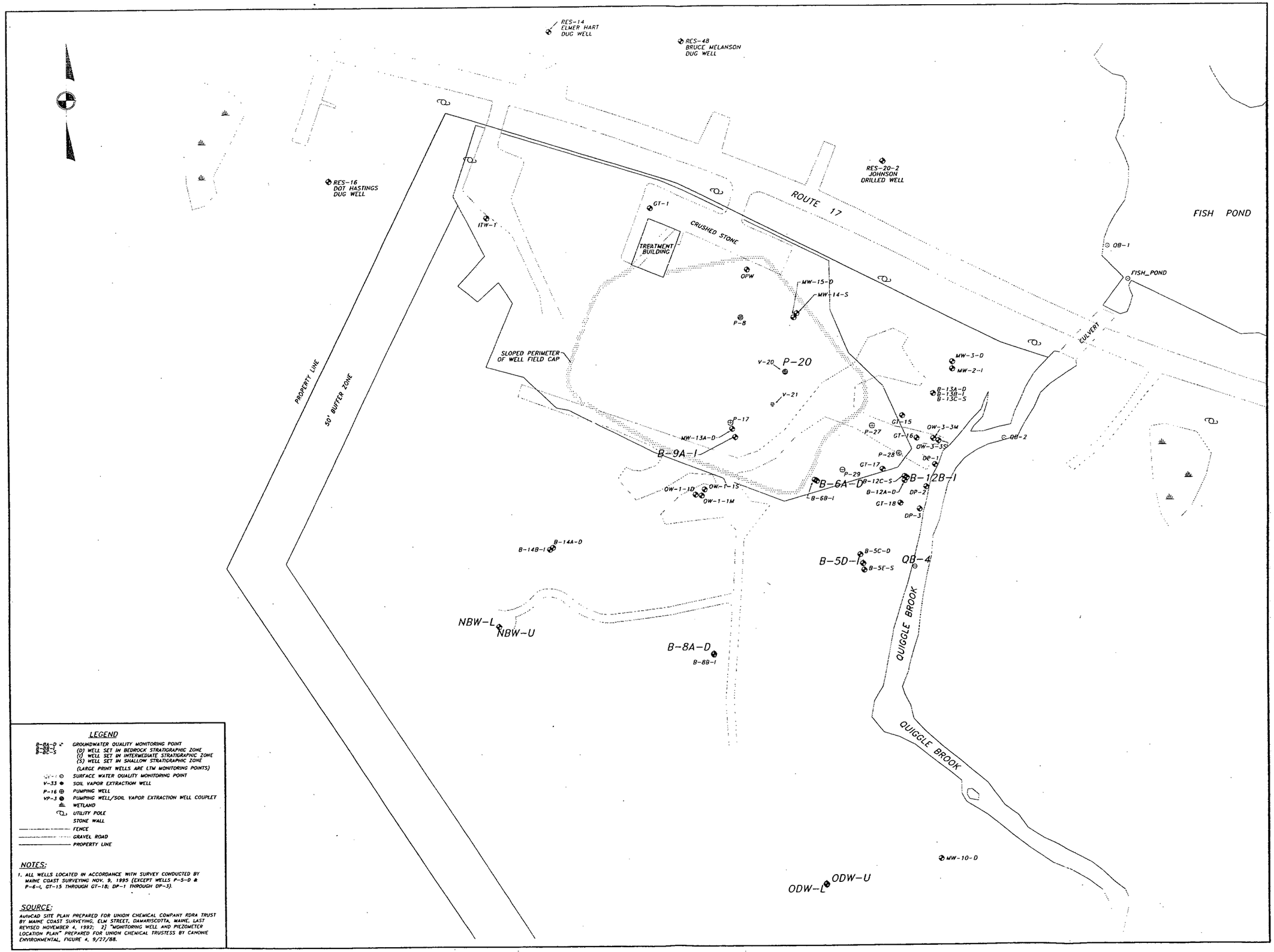

LEGEND

- B-8A-D, B-8B-I, B-8C-S — 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
  - (LARGE PRINT WELLS ARE LTM MONITORING POINTS)
- SURFACE WATER QUALITY MONITORING POINT
- V-33 — SOIL VAPOR EXTRACTION WELL
- P-16 — PUMPING WELL
- VP-3 — PUMPING WELL/SOIL VAPOR EXTRACTION WELL COUPLET
- WETLAND
- UTILITY POLE
- STONE WALL
- FENCE
- GRAVEL ROAD
- PROPERTY LINE

NOTES:

1. ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995 (EXCEPT WELLS P-5-D & P-6-I, GT-15 THROUGH GT-18; DP-1 THROUGH DP-3).

SOURCE:

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 TRUSTESS BY CANONIE ENVIRONMENTAL, FIGURE 4, 9/27/88.

NOT FOR CONSTRUCTION

THESE PLANS WERE PREPARED FOR THE PURPOSE OF OBTAINING STATE AND LOCAL APPROVALS AND ARE NOT INTENDED TO BE USED AS CONSTRUCTION DOCUMENTS.

No.	Date	Description

Revisions

Drawn By	Designed By	Checked By	Approved By

TETRA TECH

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Project Title

Union Chemical Company Hope, Maine

Sheet Title

Site Plan

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Sheet No. 2

Appendix A

Low Flow Sampling Methodology

(Correspondence dated March 24, 2000, Rev. 1)

Addendum
to
Management of Migration/Source Control
Final 100% Design
Union Chemical Company Site
South Hope, Maine

Volume V, Chapter 6 - Field Sampling Plan (Revision 1)

8.7.4 Low Flow Sampling Procedures

Low flow sampling procedures will be used to support groundwater closure monitoring in accordance with EPA Guidance, as follows:

> Ground Water Issue, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, Robert W. Puls and Michael J. Barcelona, EAP/540/S-95?504, April 1996.

In addition, the Maine Department of Environmental Protection (MEDEP) has developed guidelines based on practical field considerations when implementing low flow sampling. These guidelines will be used to guide the sampling effort where Site conditions limit the ability to meet all criteria for low flow sampling outlined in the EPA guidance document. Both the EPA guidance and the MEDEP practical considerations are attached to this addendum.

Low flow sampling will be conducted with a peristaltic pump, using dedicated tubing for each well being sampled. Flow-through cells will be used for measuring water quality parameters during sampling. Equipment probes and flow-through cells will be decontaminated between locations with a mix of detergent in water (e.g., Alkanox) followed by a rinse with de-ionized water, as necessary. This decontamination will be performed where "purple" water (due to the presence of permanganate) has entered the flow-through cell or there are any sample-specific conditions that the sampler determines can have a potential impact on readings at subsequent locations.

Tubing will be lowered in each well being sampled to a depth which is the midpoint of the screened interval for the well. The tubing will be lowered into the well slowly to minimize disruption of the water column. In addition, the tubing will be lowered at least 24 hours prior to the initiation of sampling. The procedures for collection of low flow samples vary slightly

between wells being sampled with low flow procedures for the first time versus wells being re-sampled using low flow procedures.

8.7.4.1 First-Time Low Flow Sampling at a Well

For wells not previously sampled using low flow techniques, follow these procedures:

1) Measure Groundwater Elevation

2) Establish Flow Rate for Sampling

   a) Start pump at rate between 100 and 500 milliliters per minute (initial pumping rate selected by sampler based on known or anticipated Site conditions)
   b) Monitor groundwater elevations in well

      i) If groundwater elevation is stable, increase pumping rate to highest possible flow (not to exceed 1 liter per minute) where the groundwater elevation remains stable
      ii) If groundwater elevation is not stable, reduce the groundwater flow until the groundwater elevation stabilizes

   c) Keep total drawdown at less than 0.3 feet

3) Purge Time

   a) Measure pH, redox potential (ORP), conductivity, DO and turbidity using flow-through cell and/or in-line meters [note: the sampler will also record temperature readings where the instruments being used provide this information.]

      i) The instruments used for making these measurements will be calibrated at the beginning of each day in accordance with manufacturer recommendations.
      ii) Backup equipment will be available on-Site to evaluate proper functioning of the equipment.

   b) Record measurements every 3 to 5 minutes on the attached form.

      i) The sampler will evaluate the recorded measurements to determine whether they are "reasonable" for the Site. This evaluation will be qualitative;

no specific ranges for each parameter is provided due to the range of conditions potentially encountered at the Site.

ii) Where recorded measurements appear inaccurate, the sampler will re-calibrate the equipment and/or check the readings with backup equipment.

iii) As a quality control check on sampling, following each day of sampling, the sampler will transmit a summary of the final readings for each well sampled to the sampling supervisor for review.

c) Sample when 3 consecutive readings are as follows:

i)	pH	+/- 0.1
ii)	ORP	+/- 10 millivolts
iii)	Conductivity	+/- 3%
iv)	DO	+/- 10%
v)	Turbidity	+/- 10% (or less than 1 NTU)

d) If greater than 90 minutes of purging has been conducted and the parameters have not stabilized as outlined above, contact the sampling supervisor. The supervisor will use the MEDEP guidelines to develop a well-specific protocol to support sample collection. Any deviations from the procedure outlined above will be noted and reported to EPA and MEDEP in both Site status reports and reports of sampling results.

4) Sampling
   a) Bypass the flow-through cells and/or in-line meters
   b) Sample for VOCs first

8.7.4.2 Repeat Low-Flow Sampling at a Well

The initial sampling of a well using low flow procedures establishes the flow rate for a well that allows for stabilization of groundwater parameters and collection of a representative groundwater sample. Repeat sampling of a well will be conducted using the same flow rate used for previous sampling. Where flow rates varied during the purging process, the sampling flow rate will be based on the final flow rate at the time of sampling. If previous low flow sampling of a well did not achieve stabilization of groundwater parameters prior to sampling, the low flow sampling will be conducted as if the well was being sampled for the first time, in an attempt to establish an appropriate flow rate for that well.

Repeat sampling should be conducted using the same purge time as was used in previous low flow sampling. Actual purge times may vary since variable flow rates may have been used during the initial low flow sampling to identify the optimum flow rates. However, over multiple rounds of sampling, the purge times should converge on a time representative for that well and the sampling flow rate. During purging, measurements will be recorded for DO, Conductivity, pH, ORP and turbidity. Temperature will also be recorded, if provided by the instrument being used.

The sampler will compare the water quality parameters with previous measurements for the well and evaluate whether the measurement devices are operating reliably. Equipment re-calibration and use of backup equipment for taking measurements are corrective actions to be implemented by the sampler if the water quality parameter measurements appear to be in error.

Appendix B

Long Term Monitoring Plan

DRAFT

DRAFT Long-Term Monitoring Plan Union Chemical Company Site Hope, Maine

Submitted to:
United States Environmental Protection Agency - Region I
and
Maine Department of Environmental Protection

September 10, 2004

September 10, 2004

Mr. Terry Connelly
U.S. Environmental Protection Agency
Region 1
1 Congress Street, Suite 1100 (HBT)
Boston, MA 02114-2023

Ms. Rebecca Hewett
Maine Department of Environmental Protection
State House Station 17
Augusta, ME 04333

Re: DRAFT Long-Term Monitoring Plan
Union Chemical Company Site
Hope, Maine

Dear Mr. Connelly and Ms. Hewett:

Attached is Rizzo Associates, Inc (Rizzo) DRAFT LongTerm Monitoring (LTM) Plan for the Union Chemical Company Site (the Site), in Hope, Maine. This LTM Plan includes a brief history of the Site and Rizzo's recommendations and proposal for transition to long-term monitoring.

Very truly yours,

Christopher K. Nitchie
Environmental Engineer

Robert J. Ankstitus, P.E.
Senior Project Manager

Raymond C. Johnson
Senior Vice President

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1.0 Introduction

This DRAFT Long Term Monitoring (LTM) Plan for the Union Chemical Company Site in Hope, Maine has been prepared by Rizzo Associates as a proposed work plan to address current and future groundwater monitoring at the Site. The following sections provide relevant Site information and Site background information along with the purpose and scope of this LTM Plan.

1.1 Site Location and Physical Description

The Union Chemical Company (UCC) Superfund site, located in Hope, Maine, was formerly a chemical manufacturing, solvent recovery, and hazardous waste treatment facility. The facility is situated on a 12.5-acre parcel in a rural area along the south side of State Route 17 (Figure LTM-1), approximately seven miles west of the town of Rockland, Maine and 32 miles east of Augusta, Maine.

A fence encloses 2.5-acres of the site. The former UCC facility layout included an office building (a former church), storage buildings, loading dock and warehouses, and former chemical processing units (an incinerator and distillation building). The former facility features are presented as an overlay on-top of a Site plan in Figure LTM-3. A separate contractor removed the site facilities (e.g., structures, pads, incinerator, storage tanks and secure areas) prior to initiation of Rizzo Associates or IT remedial activities, leaving the site essentially void of all Site structures with the exception of the existing monitoring wells. The current Site layout is shown on the Site plan, Figure LTM-2.

The Site is bounded on the east and southeast by a fence and Quiggle Brook, and includes parts of a flood plain and wetland area along the eastern boundary of the UCC property. The site is bounded on the north by Route 17 and on the southwest and west by a chain link fence and surrounded woodlands. Intermittent wet areas are present in the northwest corner and southern portion of the site. There are also several residences hydraulically and topographically upgradient of the site to the north and west, within 400 feet of the site.

1.2 Project Background

UCC was founded in 1967 as a commercial operation to produce and distribute a patented solvent for the removal of furniture finishes. Distillation equipment and a small solvent recovery unit were installed at the site in 1969. Distillation capacity was later expanded to provide

solvent reclamation and recycling services for other companies. These services subsequently developed into UCC's primary business. Several additional facilities and operations to support the solvent reclamation services were constructed at the site between 1967 and 1983, including: (1) a chemical processing and solvent recovery building, (2) an incinerator used for destruction of product residuals and still bottoms, (3) a warehouse used for drum storage, and (4) numerous storage tanks. The predominant operations performed at UCC during most of the operating life of the facility were handling, storage, recycling, repackaging, and destruction of industrial solvents and other organic chemicals.

Maine Department of Environmental Protection (MEDEP) initially discovered contaminant impacts in Site groundwater in 1979. Subsequently, investigations were conducted to assess the source, nature and extent of organic chemicals in soils and groundwater at the site. Between 1979 and 1984, MEDEP cited the Union Chemical facility for deficiencies and violations of several operating licenses.

In 1981, Wright-Pierce Architects/Engineers (W-P) conducted a subsurface investigation, during which two volatile organic compound (VOC) groundwater plumes were discovered in the area between Site facilities and Quiggle Brook (as noted in Canonie, 1990). In 1984, the Maine DEP closed the hazardous waste treatment operations at the site. Approximately 2,500 drums and twenty-eight liquid storage tanks and their contents were removed by EPA and MEDEP by the end of November 1984. Maine state court ordered that Union Chemical be evicted from the site in 1986 and appointed MEDEP as the receiver of the UCC properties. All site operations ceased at that time. The Site was proposed for inclusion on EPA's Superfund National Priorities List (NPL) in April 1985, but was not formally included on the NPL until October 1989.

In 1988 and 1989, a Remedial Investigation (RI) was performed under EPA order by Canonie Environmental to further characterize site conditions (Canonie, 1990). The results of the Canonie investigations indicated that organic chemicals were present in soils in the vicinity of the former site operations areas, including an old leach field, and organic chemicals were present in groundwater within both the overburden and underlying bedrock. The former UCC operations areas, including the old leach field, were identified as sources of this soil and groundwater contamination.

A baseline Risk Assessment (RA) was performed by Canonie to estimate current and potential future risks to human and wildlife populations in the absence of remediation. The excess cancer risks for the site soil and groundwater exposure pathways at that time were all within or less than

the National Contingency Plan (NCP) reference risk range of 1 x 10^{-4} to 1 x 10^{-6}. The excess cancer risk for the future site condition soil and groundwater exposure pathways were also within or less than the EPA's reference risk range, with the exception of exposure to on-site groundwater as a drinking water supply. The RA also indicated that the only significant non-carcinogenic effects were associated with the potential future use of on-site groundwater for drinking water.

Based upon the results of the RI, the following remedial action objectives were identified:

- 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.

A Feasibility Study (FS) was performed to develop and screen remedial alternatives that would attain the identified remedial objectives in a manner consistent with criteria presented in the NCP.

As presented in the Record of Decision (ROD) signed December 27, 1990, a comprehensive multi-component remedy was selected to address the contaminated on-site soils, groundwater and facilities and to further evaluate potential off-site soil contamination. The ROD specified soil excavation with low temperature thermal aeration, vacuum enhanced groundwater extraction, facilities demolition and limited action for off-site soils as the site remedy. The ROD was amended in 1994 to allow the implementation of a soil vapor extraction with hot air injection remedial approach.

During the initial phase of the remedial design, the Settling Defendants (SDs) designed and implemented a surface water and groundwater monitoring plan. This plan was reviewed and modified slightly during the MOM design process and approved by the Agencies. Quarterly monitoring was performed at the Site between 1992 and 1998 and biannual (spring/fall) monitoring has been performed since 1998.

IT Corporation (IT; formerly Fluor Daniel GTI and Groundwater Technology) was retained by SDs in 1995 to take over remedial activities at the UCC Site. The remediation system design and remediation program were implemented and developed by IT on behalf of the Union Chemical RD/RA Trust (Trust). The system was designed to treat contaminants in

overburden groundwater that underlies the source area (the Management of Migration (MOM) component) as well as to eliminate the source of these constituents entering the groundwater (the Source Control (SC) component).

Beginning January 1, 1996, IT Corporation (IT) implemented periodic Surface Water and Groundwater Monitoring for the Union Chemical Company (UCC) Site (Site) in Hope, Maine. IT conducted periodic (i.e., two or four times annually) sampling as enumerated in the sequential reports provided until the Fall 2001 sampling event (Q30). Beginning in Spring 2002 (Q31), sampling, monitoring and related activities were transferred to and conducted by Rizzo Associates, Inc of Framingham, Massachusetts.

The Surface Water and Groundwater Monitoring Program was established pursuant to the UCC Superfund Site Record of Decision (ROD), dated December 27, 1990; the ROD Statement of Work, dated July 26, 1991; and the Explanation of Significant Difference (ESD) dated June 30, 1994. Approval of the SC/MOM design documents, including the Surface Water and Groundwater Monitoring Work Plan (Work Plan), was received from the U.S. Environmental Protection Agency (EPA) in correspondence dated April 5, 1995. Amendments to the monitoring work plan are made periodically to implement changes in data requirements and quality assurance over time. Changes are not implemented until approved by the EPA and the State of Maine Department of Environmental Protection (MEDEP).

The Source Control (SC) remediation (i.e., the soil treatment component) was completed in 1998. Following the completion of closure sampling, regulatory closure for the SC component was granted in correspondence dated December 17, 1999.

From 1997 through 2000, in an attempt to accelerate the overall objectives of the Management of Migration (MOM), the remedial program incorporated field application of permanganate solution to groundwater to oxidize chemical constituents in the adsorbed or dissolved phase. A synopsis of the permanganate activities included:

- A small pilot test of a dilute permanganate solution was first conducted in the Fall of 1997;
- Wider application of permanganate was conducted from June 1998 through August 1998 within the source area;
- Re-treatment and expanded permanganate additions were then conducted during the Summer and early Fall of 1999; and,

- Additional treatment was conducted in areas identified during the Q26 and Q27 sampling during the Summer and Fall of 2000.
- Permanganate additions have not been conducted since Q27.

Following completion of permanganate additions (Q27), remedial actions have included the field addition of a carbon source solution to the Site groundwater. The carbon source additions served as a reduced substrate to assist in the depletion of residual permanganate and as an electron donor and carbon source to enhance anaerobic, reductive dechlorination of 1,1-dichloroethane (DCA) along with the remaining chlorinated ethenes and ethanes. A synopsis of the carbon source activities included:

- Approximately 200 gallons of molasses was added to four wells located within the eastern portion of the Site during two separate events in August 2001 and November 2001;
- Approximately 23 gallons of sodium lactate was added to three wells located within the south central portion of the Site in August/November 2001; and,
- The potential impact of carbon additions was evaluated during Q31 through sampling and analysis of target wells for VOCs and monitored natural attenuation (MNA) parameters for comparison to previous levels observed during Q28 through Q30.
- Sodium lactate was selected as the preferable carbon source at the Site based on an evaluation performed following the Q31 monitoring event.
- Rizzo Associates personnel performed sodium lactate additions to the designated pumping wells and monitoring wells throughout the Site in August of 2002. Stoichiometric requirements previously calculated by IT in their 2001 work plan were used to provide sufficient carbon source material to deplete (dissolved) oxygen, react with residual permanganate, and provide at least a 25- to 100- fold excess of carbon source concentrations in the groundwater versus detected volatile organic compound (VOC) concentrations in the wells.

The MOM component of the UC remedy remains ongoing at the present time. The Pump and Treat (P&T) groundwater extraction component of the MOM was last operated in the Fall of 2000 as part of the oxidant additions. The P&T system has remained inactive since the Fall of 2000, and portions of the P&T system have been decontaminated, dismantled, and demobilized from the Site.

1.3 Conclusions of Conceptual Site Model

Water quality, geological and hydrological data collected during the numerous subsurface investigations were utilized to develop a conceptual site model (CSM) for the former UCC Site. Active remediation by the MOM/SC remedy has effectively remediated the unsaturated soils at the Site that were the source area for the groundwater contamination observed in the overburden and bedrock units at the Site. The CSM demonstrates that site conditions have essentially reached equilibrium, and that migration of contaminants at detectable concentrations beyond the limits currently defined has not been observed in two and a half years. The CSM concluded the following:

- **Source Area Removal** Initial response actions implemented at the Site included the removal of 2,000-2,500 55-gallon drums and 28 liquid storage tanks. Asbestos containing Site-related buildings and structures have been demolished and removed from the Site. As a result of the source area removal, no ongoing and active sources of contamination are known to exist at the former UCC Site.

- **Successful MOM/SC Remedial Activities** Remedial activities, including the operation of the SVE and groundwater pump and treat systems, have reportedly removed approximately 10,000 lbs of VOCs from the subsurface at the Site. The SVE treatment of the soils has been performed sufficiently such that unsaturated soils at the Site are no longer considered an ongoing source of the dissolved phase VOC contamination. The operation of the groundwater treatment system and subsequent use of remedial additives has resulted in a substantial reduction in dissolved phase VOC contaminant concentrations at the Site. In the absence of the unsaturated zone soil contaminants, conditions at the Site have appeared to stabilize and reach equilibrium. Some residual VOC contaminants are likely sorbed to the fine-grained matrix of the till at the Site. However, based on the low groundwater transport velocities estimated for the till and bedrock, evidence of significant migration of the VOC contaminants has not been observed and is not anticipated to occur.

- **Stable Contaminant Distribution** VOC contaminant plume maps generated for the overburden and shallow bedrock units at the Site suggest that conditions at the Site have achieved equilibrium. Evidence of contaminant concentration "spiking" has not been generally observed in wells on the downgradient portion of the Site. The inferred VOC plume areas have stabilized or have been observed to be shrinking. Data generated from the most

current semi-annual monitoring events has suggested that VOC contaminant concentrations in the overburden and bedrock units are slowly declining.

- **Low Contaminant Migration Potential** Much of the discussion in the CSM focused on the migration of dissolved phase VOC contamination in the till and underlying bedrock. The overall conclusion of these discussions is that conditions at the Site are not conducive to significant migration of contaminants beyond the limits of the Site. The till at the Site has been shown to produce very little water under pumping conditions and therefore transmits very little water. Yields for wells screened in the till were observed to be only fractions of a gallon per minute. Similar low yields are generally observed in the bedrock. Contaminants that do migrate downgradient at the Site will be limited in volume and concentration due to the successful source removal reductions achieved at the Site. The limited mass of VOC contaminants that do migrate will likely flow in a east/southeast direction where they will eventually discharge to Quiggle Brook and be diluted to below detectable levels upon discharge via the assimilative capacity of the brook. Contaminant migration into deeper bedrock is not considered to be a significant transport pathway based on the low VOC concentrations detected and the limited pathways available for migration of the VOC contaminants in the deep bedrock.

Little contaminant migration beyond the Site source area has been documented by the groundwater data collected to date. A total of 35 rounds of sampling have been conducted since the initiation of assessment and response activities in 1987. Recent approximations of the extent of the contaminant plumes in the overburden and bedrock are generally similar to those previously generated for the Site and significant reductions in the VOC contaminant concentrations have been observed.

The same subsurface conditions that limit the VOC contaminant migration potential at the Site also make removal of the residual contaminants difficult. The low influent flow rates into the MOM system (less than 8 gpm total from approximately 30 separate recovery wells with less than 1000 pounds of VOCs removed) have demonstrated that active remediation of the dissolved phase contamination through conventional means is not feasible. Similar difficulties with permeabilities and transmissivity were observed during the implementation of the remedial additive technologies. Other than localized decreases in the wells, influence on contaminant concentrations Site wide and beyond the wells was generally not observed. To the extent practicable, the feasible remedial technologies have been successfully implemented at the Site. Further reduction of VOC concentrations via alternative technologies is

not considered feasible at this time. As a result, the implementation of comprehensive, long term monitoring program is proposed for the Site. In general the existing monitoring well network at the Site provides adequate coverage of the contaminant plumes, and offers the ability to monitor for downgradient migration of dissolved-phase contamination. The long term monitoring program may require modification or inclusion of additional monitoring points or a new well(s) to provide the environmental data necessary to evaluate future Site conditions. During periodic 5-year reviews, the long term monitoring data should be analyzed to evaluate the overall Site conditions and to evaluate any feasible new technologies that have the potential to decrease the time and costs to achieve the Performance Standards.

1.4 Long Term Monitoring Plan Purpose and Scope

Based upon information presented in the Revised Draft Conceptual Site Model report (CSM) prepared by Rizzo Associates (Rizzo) dated July 9, 2004, and with consideration of comments provided by the regulatory agencies, Rizzo believes that the most appropriate response action at this time is to implement a long-term monitoring (LTM) program for the Site. Based on the CSM the majority, but not all of the Site, appears to have returned to static conditions. Areas with the most dense overburden soil conditions have been slower to reach static conditions, and we estimate that these areas will reach static conditions in the near future. The CSM conclusions indicate that the contaminant plumes have been reduced in concentration to the extent feasible and the observed plume extents have exhibited relatively stable behavior over the last 3 years of semi-annual monitoring. The LTM program would be tailored to:

- assess the long-term effectiveness of the remediation measures implemented to date;
- monitor the re-establishment of static conditions in areas of the site affected by permanganate and/or carbon additions;
- track trends and movements of residual contaminant concentrations and locations over time;
- demonstrate that residual contaminant concentrations are not impacting potential receptors to the extent that human health or the environment might be negatively impacted; and
- provide data to assess the achievement of the Performance Standards and to determine whether closure sampling can be implemented.

The data collected during the proposed LTM program will also be used to evaluate whether additional remedial actions or installation of additional monitoring points are warranted at the site.

1.5 Groundwater Target Cleanup Levels

EPA has established groundwater target cleanup levels for the Site based on Maximum Contaminant Levels (MCLs) established under State and Federal laws and the State of Maine's Maximum Exposure Guidelines (MEGs). EPA has determined that MCLs are the Applicable or Relevant and Appropriate Requirements (ARARs) for this Site, and that the State MEGs are to be considered to establish additional groundwater cleanup levels for those constituents for which no MCL exists. Data results are presented within the context of these groundwater cleanup levels.

1.6 Regulatory Oversight

The Site is classified as a NPL Superfund site, therefore Site activities are under the jurisdiction of the EPA. As such, the EPA is the lead agency (Mr. Terry Connelly, EPA Project Manager) responsible for overseeing all aspects of the remediation and decision-making process.

The MEDEP (Ms. Rebecca Hewett, MEDEP Project Manager) is the state support agency involved in the decision-making process. The MEDEP is responsible for assisting the EPA with decisions on changes in design implementation, applicable, relevant and appropriate requirements (ARAR) achievement for QA/QC of the remedy and compliance with MEDEP regulations as applicable.

2.0 Site Conditions

The Site conditions have been described in detail in previous environmental reports including most recently in the CSM report prepared by Rizzo and dated September 10, 2004. The following sections provide a brief summary of the reported and observed Site subsurface conditions, with the most recent reported contaminant distributions at the Site.

2.1 Site Geology

The Site is underlain predominantly by unconsolidated drift or glacial till, which ranges in thickness from 25 feet at the western portion of the Site to 70 feet by Quiggle Brook. Historic soil profiles indicate the presence of sand, silt, silty clay, peat, cobbles, boulders, and gravel (Canonie, 1990).

Below the overburden, bedrock consists of lower Paleozoic rusty and non-rusty schist and gneiss, with small granitic intrusions. Previous site investigations indicate the presence of a weathered, fractured bedrock layer at the bedrock/till interface. A more detailed discussion of the Site geology is presented in Section 3.0 of the CSM.

2.2 Aquifer Characteristics

The depth to groundwater at the Site ranges from the ground surface (artesian conditions have been observed seasonally at well B-12A-D) to approximately 15 feet below the ground surface (bgs) at the Site, within the overburden and bedrock units.

For the overburden, piezometric data indicate that groundwater flows east-southeast and eventually discharges to Quiggle Brook. Groundwater conditions on the eastern (off-site) side of Quiggle Brook and the historical groundwater data suggest that Quiggle Brook acts as a discharge point and acts as a barrier to off-site groundwater migration (Canonie, 1990 and Rizzo, Revised Draft Site Conceptual Model, 2004). Past site investigations have concluded that only one water-bearing zone is present within the unconsolidated deposits comprising the overburden (Canonie, 1990). Calculated hydraulic conductivities of the overburden indicated that overall groundwater flow within the unconsolidated material is slow. Based on historical Site investigation data by Canonie and others, an assumed average flow velocity of 15ft/yr was used in the CSM, however the actual groundwater flow through the overburden likely varies considerably across the Site, with observed movements of groundwater being much slower than 15 feet per year in some areas of the Site where very dense tills are present. Historical yields from the pumping wells during the operation of the treatment system show only 2 out of 28 pumping wells had a flow rate greater than 1 gallon per minute (gpm) (P-28 at 2.25 gpm and P-29 at 1.43 gpm). The remaining 26 pumping wells had flow rates that ranged from 0.02 gpm to 0.60 gpm, and 11 of these wells had flow rates of 0.10 gpm or less. The individual well flow rates are presented in a memo prepared by Fluor Daniel GTI dated November 19, 1997 and included as Appendix B.

Groundwater flow through the bedrock under some areas of the site exhibits upward flow into the overlying weathered bedrock and till. The principal zone of groundwater flow appears to be through the upper five feet of fractured/weathered bedrock, with groundwater flowing east-southeast in the northern portion of the site, and southeasterly in the southern portion of the Site. Groundwater velocity in the bedrock has been estimated to be as high as 520 ft/yr (CSM, 2004); however groundwater flow in the bedrock is transmitted through a complex

network of small aperture fractures which has not been observed to transmit large volumes of groundwater. Tracer test results indicate that groundwater flow velocities through the bedrock are approximately 4.9 feet per year in the shallow bedrock and 2.1 feet per year in the deep bedrock. Due to the limited size and number of fractures available for groundwater flow in the bedrock, the transport of large volumes of contaminants from the source area to and through the bedrock has been limited based on our review of the most recent semi-annual monitoring data. The contaminant concentrations in bedrock are comparatively low and are isolated to a small number of wells.

Groundwater in the overburden and weathered bedrock at the site migrates towards and discharges to Quiggle Brook with small volumes of groundwater migrating vertically downward into the bedrock fracture network. Quiggle Brook receives waters from Fish and Hobbs Ponds, and eventually discharges into Crawford Pond, which is located approximately 3 miles southwest of the Site. Crawford Pond is used as a drinking water source as well as a recreational area.

A more detailed discussion of the groundwater hydrology in the overburden, weathered bedrock and bedrock is presented in the CSM.

2.3 Groundwater Quality Data

A Surface Water and Groundwater Monitoring Program was executed by the settling defendants and their contractors pursuant to the UCC Superfund Site Record of Decision (ROD- December 27, 1990), the ROD Statement of Work (July 26, 1991), and the 1994 Explanation of Significant Differences (ESD). The objectives of the Surface Water and Groundwater Monitoring Plan were: to obtain surface water and groundwater data to monitor the extent of contaminants of concern at the site; assess the progress of the remedial action; and monitor for potential impacts to surface water and groundwater during the remedial action(s).

Since 1979, numerous monitoring wells have been installed at the UCC site in both the overburden and bedrock units. Groundwater has been monitored through periodic sampling events conducted since 1990. Additionally, surface water samples from Quiggle Brook have been collected routinely since 1990.

Throughout these sampling events, both groundwater and surface water samples were analyzed for VOCs, and dimethylformamide (DMF). Early monitoring efforts also included analysis for priority pollutant metals, and cyanide. Additionally, measurements of physical parameters (including pH, specific conductance, dissolved oxygen (DO), turbidity, oxidation/reduction potential (ORP), and temperature) were recorded

periodically. Beginning with the October 2000 sampling event, groundwater sample collection was executed using low-flow sampling techniques.

Analytical results from the periodic (quarterly or bi-annual) sampling events are available in the thirty five Periodic Monitoring of Surface Water and Groundwater reports submitted to the EPA and the MEDEP. An evaluation and summary of the reported trends in groundwater contaminant concentrations during monitoring events since the MOM/SCR treatment system shut down is presented in the CSM and is briefly summarized below.

2.4 Contaminant Distribution

Chlorinated and non-chlorinated VOCs and DMF (a semi-volatile organic compound) have been detected in site groundwater as a result of past site releases from the former UCC facility. Data generated as a result of the most recent sampling event (Q35) indicate that 16 volatile compounds and DMF are still present in groundwater at concentrations equal to or greater than the analytical detection limit. Of the 16 compounds detected, only nine were present at concentrations exceeding their corresponding Performance Standards. DMF was also reported above it's respective Performance Standard. Analytical results from the April 2004 sampling event are presented in the Thirty-Fifth Periodic Monitoring of Surface Water and Groundwater (Q35) report prepared by Rizzo Associates and dated June 7, 2004. A summary of detected compounds from the Q35 monitoring event in both overburden and bedrock wells is provided below. Compounds that exceed Performance Standards are shown in ***bold and italicized text.***

1,1,1-Trichloroethane	Chloroethane	***Trichloroethene***
1,1-Dichloroethane	***Ethylbenzene***	***Vinyl Chloride***
1,1-Dichloroethene	***n,n-Dimethylformamide***	Xylenes
2-Butanone (MEK)	***Tetrachloroethene***	***cis-1,2-Dichloroethene***
4-Methyl-2-Pentanone	***Tetrahydrofuran (THF)***	
Acetone	Toluene	trans-1-2-Dichlroethene

Figure LTM-4 presents the inferred iso-concentration contours for the overburden from the most recent sampling event, Q35 (April 2004). Detected concentrations of the target analytes suggest that concentrations of DCA continue to represent the largest contaminant plume area for the four selected analytes in the overburden. The Q35 data suggests that the

DCA contaminant plume in the overburden extends through the central, south and east portions of the Site cap area and to the south/southeast of the Site cap. The TCE plume covers a smaller area primarily within the DCA plume located in the central and southeast areas of the Site cap and extending east of the capped area toward Quiggle Brook. The TCE plume does extend farther to the north (well MW-14-S) in the Site cap area than the DCA plume. The 1,2-DCE plume is now limited to the central and eastern portion of the Site cap and east of the capped area toward Quiggle Brook, and is located entirely within the DCA and TCE plumes. A comparatively smaller DMF plume area in the overburden was observed to the southeast of the capped area in the B-12 well couplet.

The shallow bedrock contaminant plume that was inferred from the Q35 data is presented as Figure LTM-5. Detected concentrations of the selected analytes suggest that the DCA plume extends from well B-12A-D on the western fringe of the Site to well B-8A-D, which is located in the south-central portion of the Site, with the majority of the contaminant mass located between wells B-6A-D and well B-8A-D. The detected concentrations of TCE, 1,2-DCE and DMF suggest that their respective groundwater plume areas cover a comparatively smaller area that is generally contained within the larger DCA plume area. The presented contaminant plumes may also be influenced by the construction of the monitoring wells. Several of the shallow bedrock wells are screened within the weathered portions of the bedrock, which likely provides a hydraulic connection with the overburden. Furthermore, the annular space above the well screen in several of the bedrock wells, including B-6A-D, B-8A-D and B-12A-D, was not sealed with grout to limit the potential for vertical migration of contaminants within the borehole. Rather, these wells were fitted with two-foot bentonite seals and the remainder of the annular space was backfilled with sand. Shallow bedrock well NBW-U was installed in November 2003 and has been sampled on only two occasions since its installation.

Monitoring well ODW-L is the only deep bedrock monitoring well that has been sampled consistently as a part of the bi-annual sampling rounds since the November 2000 treatment system shut down. An additional deep bedrock monitoring well, NBW-L, was installed in November 2003 and has been sampled on two occasions. One round of deep bedrock well sampling was performed by Rizzo Associates in November 2002 for the purpose of monitoring the deep bedrock conditions at the Site and gathering data for the Bedrock Conditions Discussion Paper (Rizzo, Bedrock Conditions Discussion Paper, March 20, 2003) and the conceptual site model (Rizzo, Revised Draft Conceptual Site Model Report, 2004)

The deep bedrock contaminant plume inferred from the November 2002 deep bedrock sampling round and Q35 data (ODW-L and NBW-L) is presented as Figure LTM-6. DCA is the only VOC that has been reported at concentrations greater than its Performance Standard in the deep bedrock. DCA has only been reported above its Performance Standard in wells ODW-U and ODW-L.

2.5 Surface Water Analytical Results

VOCs have not been detected at concentrations above the laboratory method detection limits in any of the surface water samples collected from Quiggle Brook since the treatment system and permanganate addition program was completed in the Fall of 2000.

2.6 Potential Receptors

Recent analytical results indicate that VOCs are present in site groundwater. Currently, the site is unoccupied and environmental impact is limited to the subsurface. Therefore, there is no current exposure potential to human receptors via direct contact or ingestion based on current Site uses. In the future, there is the potential for the site to be developed for either commercial or residential use. It is conservatively assumed that in the future the property will be used for residential purposes. Therefore, potential future receptors at the site could include adult and child residents. The Site groundwater is not currently used for drinking water and at this time there are no private drinking water wells down gradient of the Site. One well (ITW) exists at the Site and is currently used as a source of clean water for Site operations. No VOCs have been detected in the water samples collected from well ITW. It is not anticipated that terrestrial wildlife would be directly exposed to Site groundwater; therefore, there are no current or future ecological at the UCC Site.

The overburden and most of the shallow bedrock groundwater at the site flows to the east/southeast and discharges to Quiggle Brook. Pre-remediation surface water data indicate that VOCs were discharged into Quiggle Brook from site groundwater. Recent analytical data suggests that Quiggle Brook is not currently impacted. Potential human receptors to impacted surface water include downgradient residents, Trust contractors and representatives, regulator personnel and trespassers that may visit Quiggle Brook. Potential ecological receptors include both terrestrial and aquatic organisms that use or live in and along Quiggle Brook.

Quiggle Brook receives waters from Fish and Hobbs Ponds, eventually discharging into Crawford Pond which is located approximately 3 miles southeast of the Site. Crawford Pond is used as a drinking water source as well as a recreational area.

3.0 Long-Term Monitoring

As described in Section 1.2, the settling defendants and their contractors have aggressively implemented a number of remedial technologies at the Site. As a result, a significant contaminant mass reduction has been demonstrated to achieve closure for the unsaturated and upper saturated soils at the site. These efforts have also resulted in significant reductions in contaminant concentrations in groundwater.

This long-term monitoring (LTM) plan is designed to replace the current and ongoing semi-annual monitoring activities by providing groundwater analytical data, groundwater gauging information, and field measurements from a set of monitoring points. These data will be used to assess the long-term effectiveness of the remediation efforts; monitor the re-establishment of static conditions in the area of the Site affected by permanganate and/or carbon additions; track trends in residual contaminant concentrations and locations over time; and to demonstrate that residual contaminant concentrations are not impacting potential receptors to the extent that human health or the environment might be negatively affected. The LTM data will also be used to evaluate whether additional remedial actions are warranted at the Site, and will serve as the basis for determining the achievement of closure for groundwater. If the achievement of closure is apparent, a separate groundwater closure sampling plan will be submitted to the regulatory agencies for approval. Upon approval, the closure sampling plan will be implemented to confirm that groundwater standards have been achieved.

Consistent with historical periodic monitoring, annual groundwater monitoring for VOCs, DMF, and field aqueous measurements is proposed during the fall season each year. Monitoring is proposed on an annual basis to reduce the seasonal fluctuations in reported VOC concentrations that may be partially attributable to fluctuations in the water table, to reduce the sampling frequency as appropriate based on the slow groundwater velocities at the Site (as outlined in the CSM) and to establish sampling in the season that has historically produced the most elevated VOC concentrations on the Site. All proposed LTM wells, parameters and methods are shown on Table LTM-1. Following regulatory approval, this LTM plan will supercede and replace the semi-annual monitoring events previously conducted by Rizzo Associates.

3.1 Groundwater Elevation Gauging

Depth to groundwater will be gauged in approximately 57 wells during each annual monitoring event as shown in Table LTM-2. The gauging points may be modified over time if some wells are closed, become damaged or are found to be inaccessible during some monitoring events. Gauging data will be recorded in the Site field book or on Site field data sheets and will be used to evaluate the direction of groundwater flow at the time of the monitoring event and to compare groundwater elevations in sampled wells to historical groundwater elevations.

3.2 Monitoring Points and Rationale

Based on an evaluation of the data generated in quarterly and bi-annual sampling events between 1992 and 2004, eleven LTM monitoring points are proposed. Our rational and selection criteria includes historical residual contaminant concentrations; proximity to Quiggle Brook; downgradient coverage; and location relative to the residual overburden groundwater plume.

Four proposed LTM monitoring points are screened in the overburden. Of the proposed overburden wells there are two points in or near the source area (B-9A-I and P-20) and two locations east of the source area within the downgradient portions of the plume adjacent to Quiggle Brook (B-5D-I and B-12B-I). Four proposed LTM monitoring points are screened in the shallow bedrock, one southeast of the source area (B-6A-D), two south of the source area (B-8A-D and ODW-U) and one south west of the source area (NBW-U). Two proposed LTM monitoring points are screened in the deep bedrock, one southwest of the source area (NBW-L) and one south of the source area (ODW-L). Also, one surface water monitoring point is proposed for LTM monitoring (QB-4) which is located in Quiggle Brook and downstream from the highest detected VOC plume concentrations. The proposed monitoring points and the rationale for each selection is discussed below and summarized in Table LTM-1.The number and location of monitoring points will be amended as necessary in response to changes in Site conditions, well coverage, and progress of the Site toward achieving the Performance Standards.

The following monitoring locations are proposed for the LTM program:

Overburden Wells

B-5D(I) – Well B-5D-I is located near the south eastern edge of the UCC plume area. This places the well near the downgradient edge of the UCC plumes present in the overburden unit. It is screened from 31 to 36 feet (ft) below the ground surface (bgs). Exceedences were noted only for

1,1-DCA (120 ug/L) during the Q35 sampling event. Well B-5D-I was installed to replace well B-5B-I in 2003, when the validity of reported results from the B-5 series wells were questioned due to the design of these small diameter "micro"-wells. Due to the relatively recent installation of B-5D-I there is not a large amount of historical Site data available for this well. Well B-5D-I is the only B5 series well with a reported Performance Standard exceedence in the most recent sampling round (Q35).

Monitoring well B-5D-I covers the southeast downgradient area below B-12B-I and is co-located at approximately the same latitude as the QB-4 surface water monitoring point. The B-5D-I well point will be used to assess whether southeast movement of the VOC plume from Zones 2 and 3 of the overburden is likely to significantly impact Quiggle Brook downstream of QB-4.

B-9A(I) – Well B-9A-I is located west of the plume center and represents a DCA "hot spot" in the source area. It is screened from 35 to 40 ft bgs. Reported exceedences of the Performance Standards in well B-9A-I during Q35 included 1,1-DCA (3,100 ug/L), and 2-butanone (2,900 ug/L). Analysis for DMF in groundwater collected from well B-9A-I has not been performed since October 1998 (Q28) when the reported concentration (470 ug/L) exceeded the Performance Standard.

Well B-9A-I was selected to assess the source area concentrations in a region of the Site with low rates of groundwater flow and to provide environmental data from source area to assess the achievement of the Performance Standards. Located in Zone 5 of the overburden, B-9A-I has the potential to impact the southeast portion of Zone 3 up-gradient of B-5D-I as well as Zone 4 north of the B-8 well series.

B-12B(I) – Well B-12B-I is located adjacent to Quiggle Brook near the eastern (downgradient) edge of the plume. Groundwater gauging data from the B-12 well triplet shows an upward vertical gradient, indicating that the shallow bedrock is providing recharge to the overburden in this area. The highest total VOC concentrations in the B-12 triplet have consistently been observed in well B-12B-I. The maximum observed concentrations of cis-1,2-DCE (740 ug/L), 1,1-DCE (2,300 ug/L), 4-methyl-2-pentanone (MIBK) (310 ug/L), vinyl chloride (50 ug/L), chloroethane (200 ug/L) and DMF (1,400) in the overburden during Q35 were reported in well B-12B-I. Additional reported exceedences of the Performance Standards in well B-12B-I during Q35 included 2-butanone (570 ug/L), Toluene (70 ug/L), TCE (30 ug/L), and 1,1, DCA (2,300 ug/L).

Well B-12B-I is located adjacent to Quiggle Brook and upgradient of the QB-4 surface water monitoring point. This well will be used to assess the movement of the VOC plume to Quiggle Brook from Zones 2 and 3 (Rizzo, Revised Draft Conceptual Site Model Report, 2004) where an easterly flow of groundwater was observed and assess the potential contaminant loading to this receptor.

P-20 – Well P-20 is located in the northeastern portion of the cap area near the northern edge of the DCA, TCE and DCE plumes and within Zone 2. This well was originally installed as a pumping well for the Site treatment system and is screened from 39 to 67 ft bgs. Well P-20 has not been sampled since Q33, however, at that time well P-20 represented the maximum reported concentration of trans-1,2-DCE (480 ug/L), cis-1,2-DCE (2,000 ug/L), and TCE (1,300 ug/L). Additional reported exceedences of the Performance Standards in well P-20 during Q33 included vinyl chloride (60 ug/L).

Well P-20 represents a source area well that will be monitored to assess the achievement of the Performance Standards. Groundwater from well P-20 is expected to flow easterly toward Zone 3, B-12B-I and Quiggle Brook.

Bedrock Wells

B-6A-D – Shallow bedrock well B-6A-D is located on the southeastern edge of the capped area of the Site and within the northern edge of the shallow bedrock plume. The maximum concentrations of cis-1,2-DCE (2,200 ug/L), 1,1-DCE (370 ug/L), 1,1-DCA (3,300 ug/L), vinyl chloride (70 ug/L), TCE (60 ug/L), toluene (20 ug/L), ethylbenzene (1300 ug/L) and total xylenes (870 ug/L) in the bedrock aquifer during Q35 were reported in well B-6A-D.

B-6A-D is located in Zone 2 and has historically had the highest concentrations of total VOCs in the bedrock aquifer. B-6A-D represents a source area well that will be monitored to assess the achievement of the Performance Standards. Although the predicted groundwater flow is toward Quiggle Brook, B-6A-D area groundwater has the potential to impact Zone 4 via fractures in the bedrock.

B-8A-D – Shallow bedrock well B-8A-D is located approximately 200 feet south of the capped area of the site in Zone 4. The maximum concentrations of DMF (770 ug/L), MIBK (810 ug/L) and tetrahydrofuran (THF) (50 ug/L) in the bedrock aquifer during Q35 were reported in well B-8A-D. Additional reported excedences of the Performance Standards in well B-8A-D during Q35 included 1,1-DCA (280 ug/L) and 1,1-DCE (110 ug/L).

Although the predicted groundwater flow direction in the B-8A-D area is toward Quiggle Brook, fractures in the bedrock are likely to induce groundwater flow to the south and southeast (down strike and down dip) toward the UCC property line and off-site areas. Likewise B-8A-D has the potential to impact the NBW well couplet via similar bedrock fractures.

ODW(U) – Bedrock well ODW-U is located in the southern portion of the Site near the southern edge of the plume area. It is a shallow bedrock well that is screened from 154 to 174 ft bgs. Monitoring well EW-1 has not been sampled since Q32, and at that time reported the only reported exceedence of the Performance Standards in the well was1,1-DCA (19 ug/L).

This proposed LTM well will be used to monitor contaminant concentrations in shallow bedrock near the southern edge of the bedrock plume area. ODW-U is the southernmost shallow bedrock well at the Site. The well will be used to assess the potential off-site migration to downgradient properties and as a sentinel well for potential downgradient receptors.

NBW(U) - Bedrock well NBW-U is located in the southwestern portion of the Site near the southwestern fringe of the UCC plume area. This well, along with well NBW-L, was installed in November 2003 to evaluate potential deep bedrock plume migration in the south/southwest direction. NBW-U is screened from 56 to 66 ft below the top of the wells casing. (approximately 54.5 to 64.5 feet bgs) No exceedences of the Performance Standards were reported in monitoring well NBW-U during Q34 which is the only sampling event in which this well has been sampled. However, 1,1-DCA was reported at a concentration of 2 ug/L in NBW-U at that time. This proposed LTM well will be used to assess contaminant migration through shallow bedrock in the down dip direction from the source area contaminant plume.

ODW(L) - Bedrock well ODW-L is located in the southern portion of the Site near the southern edge of the plume area, and is a deep bedrock well that is screened from 225 to 245 ft bgs. The only reported exceedence of the Performance Standards in well ODW-L during Q35 was 1,1-DCA (23 ug/L). The data for this well has shown a decreasing trend of VOC concentrations over the most recent monitoring periods.

This proposed LTM well will be used to monitor contaminant concentrations in deep bedrock near the southern edge of the bedrock plume area. ODW-L is the only deep bedrock well on the southern section of the property. The well will be used to assess the potential off-site

migration to downgradient properties and as a sentinel well for downgradient receptors.

NBW(L) - Bedrock well NBW-L is located in the southwestern portion of the Site near the southwestern fringe of the UCC plume area. This well; along with well NBW-U was installed in November 2003 to evaluate potential deep bedrock plume migration in the south/southwest direction. NBW-L is screened from 115 to 120 ft below the top of the wells casing. No exceedences of the Performance Standards were reported in monitoring well NBW-L during Q35. This proposed LTM well will be used to assess contaminant migration through deep bedrock fractures in the down dip direction from the source area contaminant plume.

Surface Water Monitoring Point

QB-4 - Surface water monitoring point QB-4 is located in Quiggle Brook, downstream from the highest observed contaminant concentrations in the overburden unit. This proposed location would be used to monitor the possible migration of VOC contaminants from the overburden into surface water. Quiggle Brook discharges into Crawford Pond which is used as a water supply.

3.3 Monitoring Parameters

The following proposed field screening and laboratory analytical measurements are consistent with those utilized during past periodic surface water and groundwater monitoring events conducted by Rizzo Associates and other Site contractors. Specific measurements and analytical methods to be implemented are presented on Table LTM-1.

The groundwater and surface water monitoring parameters have been selected based on previous sampling results. The monitoring parameters were chosen to monitor site-wide changes in the overburden as static conditions are restored and to evaluate natural attenuation parameters in groundwater.

3.3.1 Groundwater Monitoring Program

Consistent with groundwater monitoring performed for recent periodic sampling events at the Site, field water quality measurements including temperature, pH, specific conductance, dissolved oxygen, oxidation reduction potential and turbidity will be measured and recorded and groundwater samples will be collected and analyzed for VOCs annually at each proposed groundwater monitoring location. Selected monitoring points as described in Table LTM-1 will also be analyzed for DMF.

3.3.2 Surface Water Monitoring Program

Consistent with surface water monitoring performed for recent periodic sampling events at the Site, field water quality measurements including temperature, pH, specific conductance, dissolved oxygen, and oxidation reduction potential and a surface water sample will be collected and analyzed at QB-4 annually. Quiggle Brook will also be visually inspected for discoloration, staining, ecological impact, the presence of oxidized metals (e.g. iron or manganese), foaming and odors.

4.0 Environmental Sampling Procedure

In general, the overall goal of the LTM program is to collect and analyze water samples that retain, to the extent possible, their in-situ characteristics. The traditional method for groundwater purging and sampling has been to purge a well using bailers or high speed pumps to remove three to five casing volumes followed by sample collection. More recently, low-flow purging and sampling has been implemented at the Site due to concerns that the traditional method can cause adverse impacts on sample quality as a result of a higher level of turbidity in the sample. The low flow sampling method is the sampling method that has been implemented since year 2000 at the Site and was selected for the LTM.

Surface water samples will be collected by submerging a dedicated sample container and transferring the water to the appropriate containers. All procedures applicable to environmental sampling, sample handling, and decontamination that are fully described in Section 7.0 of the Addendum to the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) will also be implemented for the LTM.

5.0 Field Measurements

In addition to laboratory analysis for contaminants, groundwater and surface water samples will be analyzed in the field for pH, conductivity, temperature, turbidity, dissolved oxygen (DO) and oxidation-reduction potential (ORP). These parameters will be measured using a YSI 600XL multi-parameter probe with flow through cell or an equivalent instrument. Additionally, color of aqueous samples will be recorded based on visual observations. Specific procedures applicable to field measurements will be conducted in accordance with Section 9.0 of the Addendum to the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) which were previously submitted to and approved by the agencies.

6.0 Inspection and Maintenance

During each annual monitoring event personnel will inspect the Site conditions and perform necessary maintenance as described below.

6.1 Site Inspections

The site will be inspected during each sampling event. Rizzo personnel will assess whether there is evidence that tampering and/or damage to Site installations (e.g., treatment building, wells and piezometers, stream gauging stations, etc.), vandalism, or theft has occurred. Personnel will also inspect the site for signs of unauthorized entry, dumping, or waste disposal. All observations will be recorded and reported to the Rizzo Project Manager.

6.2 Maintenance of Site Structures

Site structures consist of a metal-framed treatment building, a wooden shed, and a steel storage container. During each sampling event, the exterior of the treatment building and storage container will be inspected. The exterior inspection will note the general condition of the structures and ensure that they are maintained in a weather-tight condition. The interior of the treatment building will be inspected along with installed features such as fans, louvers, heaters, sanitary facilities, etc. All observations will be recorded and reported to the Rizzo Project Manager.

6.3 Maintenance of Monitoring Points

Well and piezometer installations will be inspected when water levels are measured to determine if the well has been damaged, tampered with, or otherwise impaired to an extent that valid data cannot be obtained without repairs or maintenance. The condition of each well and piezometer, involved in the sampling event will be inspected with respect to security (locking mechanism), identification markings, condition of protective casing, riser pipe, and surface seal. In addition, measurements of depth to groundwater and depth to the bottom of the well will be made and recorded. The condition of each well and piezometer will be recorded and wells or piezometers that require maintenance will be identified along with the nature of the maintenance to be performed.

If required, well and piezometer maintenance will be performed and may include:

- replacing the locking mechanism or cap;

- replacing the protective casing;
- painting protective casing re-stamping/replacing identification numbers;
- riser pipe repair;
- replacing or repairing surface seal; and,
- sediment removal or well development.

If maintenance or repairs affect the elevation of the reference point established for measuring the depth to groundwater, the well or piezometer will be re-surveyed to re-establish a reference elevation point. The nature and extent of well and piezometer maintenance and repairs will be documented in the Site field book.

6.4 Well and Piezometer Decommissioning Procedures

Wells or piezometers that cannot be maintained or repaired, or are no longer suitable for the intended use, will be promptly reported to the regulatory agencies with recommendations for decommissioning. Monitoring Well Decommissioning Plans will be submitted for approval prior to decommissioning any wells, and well decommissioning procedures will follow those previously used at the Site as outlined in the Off-Site Monitoring Well Closure Plan included in Appendix A.

6.5 Site Security

Site security features will be inspected during each sampling event. Site facilities will be secured between sampling events to prevent tampering and/or damage to equipment, vandalism, theft or unauthorized entry.

Physical security is provided by:

- a fenced site area with adequate warning signs and four lockable gates.
- a fully enclosed treatment building with lockable doors,
- exterior lighting at all entrances, and,
- Limited access to wells and piezometers.

Security shall be maintained by:

- inspecting and assessing the integrity of security fences, site entrances, locks, doors, and windows;
- inspecting the site to assess whether unauthorized entry has occurred;
- alerting appropriate local authorities and requesting regular drive-by surveillance of the site;
- maintaining illumination of the building exterior at night; and
- documenting each inspection.

All observations shall be recorded and reported to the Rizzo Project Manager.

7.0 Quality Assurance

The project data quality objectives will be consistent with past Quarterly events and will implement the quality control (QC) and assurance (QA) measures, from field sampling efforts through laboratory analytical procedures of the 100% Final Design of the MOM/SCR and applicable amendments. Data QA/QC objectives, as well as all QA/QC controls for sampling and analytical methods and procedures are fully described in the FSP/QAPP addendum.

8.0 Data Reduction, Validation, and Reporting

Data reduction includes the identification and calculations will be necessary to convert the raw instrument reading to the final reported compounds and their respective concentrations. Data calculation and reduction will be performed as described in the individual approved methods and laboratory-specific Standard Operating Procedures (SOPs) presented in the FSP. All data generated within the laboratory will be checked for accuracy and completeness.

Final data for environmental samples will be provided by the laboratory in electronic format for easy input into the Rizzo Associates database. The electronic deliverable will be updated to incorporate data validation qualifiers for data requiring formal validation. Non-validated parameters, such as water chemistry parameters and gauging results, will also be incorporated into the database.

9.0 Evaluation of Monitoring Results

Results of the groundwater and surface water sampling conducted during each monitoring event during the LTM process will be reviewed and summarized in a brief report following completion of the work as described below.

9.1 Groundwater Analytical Results

The annual LTM report will include a description of the tasks performed, analytical data summary tables, and a comparison of these data to groundwater cleanup criteria (discussed in Section 10.1). Groundwater (overburden shallow bedrock and deep bedrock) VOC and DMF concentration maps will be prepared for the four compounds of primary concern (DCA, DCE, TCE and DMF). Shallow and deep groundwater iso-concentration maps will be used to assess delineation of contaminants exceeding cleanup criteria in the study area; track migration of the VOC plumes; evaluate the need for additional remedial actions; monitor for indications of steady-state conditions and achievement of the Performance Standards.

9.2 Surface Water Analytical Results

Quiggle Brook is the primary receptor of concern for the Site as identified in the CSM. Results of surface water sampling conducted in Quiggle Brook during each monitoring event of the LTM process will be reviewed and summarized in the annual LTM report following completion of the work. The LTM report will include a description of the tasks performed, analytical data summary tables, an evaluation of potential impacts of VOCs to Quiggle Brook and a comparison of these data to cleanup criteria (discussed in Sections 1.4 and 10.2).

9.3 Changes in Natural Attenuation Parameters

Changes in select natural attenuation parameters (DO, ORP) rates over time will be monitored and evaluated as a part of each annual monitoring report. Significant shifts in these parameters may require the gathering additional Site data or amendment of the LTM Plan.

10.0 Conditions for Site Closure

Long term monitoring will continue at the Site until groundwater conditions for closure have been met or until an alternative work plan is

approved by the EPA and MEDEP. The following sections outline the conditions that will warrant the conclusion of long term monitoring at the Site and the preparation of a closure sampling plan.

10.1 Groundwater Cleanup Criteria

As previously discussed in Section 1.4, the EPA has set groundwater target cleanup criteria for the source and MOM area based on Maximum Contaminant Levels (MCLs) established under State and Federal laws and the State of Maine's Maximum Exposure Guidelines (MEGs). A summary of groundwater cleanup levels for the Site is presented in Table LTM-3.

10.2 Surface Water Cleanup Criteria

Specific cleanup levels have not been designated for surface water at the Site. As specified in the ROD, one of the groundwater Remedial Action Objectives is to protect off-site groundwater and the surface waters (particularly Quiggle Brook) into which contaminated groundwater discharges, by preventing further migration of contaminated groundwater off-site. Based on current Site data, no VOCs have been detected in Quiggle Brook therefore, remedial actions were not conducted (warranted) for this receptor.

10.3 Conclusion of Monitoring Period

Monitoring at the site will be conducted annually for the LTM process, and monitoring is geared towards assessing contaminant concentrations at the Site relative to the achievement of the respective contaminant Performance Standards under static conditions. Static condition monitoring will include consistent measurements (taking into account seasonal variability) of chemical and physical parameters, such as:

- Water levels and water flows (subject to season fluctuations);
- General field physical parameter indicators (color, conductivity, DO, ORP, pH, and turbidity);
- Contaminant concentrations statistically shown to be static or decreasing.

Generally, chemical and physical characteristics of groundwater should be the same or similar to those present in Site wells not impacted by the UCC contaminant releases at or near the Site prior to remedial efforts (EPA, 1992). Long-term monitoring will be concluded and a transition to closure

sampling will be implemented when contaminant concentrations are observed to be at or below Performance Standards, and there is evidence that steady-state conditions exist at the Site. Closure sampling will be conducted in accordance with an agency approved plan. The long term monitoring period may also be terminated with the approval of the agencies if a change in Site conditions warrants alternative response or remedial actions.

11.0 Contingency Plans

The following contingency plans are proposed as a part of this LTM Plan.

11.1 Private Water Supply Degradation

All nearby private water supply wells are currently upgradient of the groundwater plume area. Based on past site experience and previous sampling results, Rizzo does not expect that water quality in these private water supply wells will be impacted by proposed Site activities.

11.2 Plume Migration

Based on the CSM, significant changes to plume configurations in a short period of time (one month to one year) are not anticipated due to the observed low groundwater velocities, small number and aperture of fractures in the bedrock, and the low permeability of the soil on Site. Possible discharge of groundwater to surface water (e.g., Quiggle Brook) will be monitored at surface water sampling location QB-4. If it is determined that significant increases in surface water contaminant concentrations are occurring, or that other site conditions require additional response actions, Rizzo Associates will conduct the following activities:

- The incident will be reported to all parties involved at the site (or their designees) including the following:
  - EPA Project Manager – Mr. Terry Connelly;
  - MEDEP Project Manager – Ms. Rebecca Hewett;
  - Trust Representative – Mr. Randy Smith; and,
  - Rizzo Associates Project Manager – Mr. Robert Ankstitus.

- Upon receiving notification, the Rizzo Associates Project Manager, or his designee, will immediately mobilize a full-time staff person to the Site.
- Daily communication will be initiated among the parties to provide updates on observations and response actions.
- Photographs and written notes describing the conditions will be obtained and forwarded to the parties.
- Measurements of physical parameters (pH, ORP, DO) will be conducted in the stream immediately and will be continued daily while emergency conditions are determined to exist.
- Additional inspection sampling and reconnaissance will also be conducted noting any additional observations.
- Groundwater pumping may be initiated in wells close to Quiggle Brook nearest to the release location. Manual bailing may also be initiated in the smaller diameter wells within the vicinity.
- All liquids recovered by pumping will be secured at the site in sealed vessels or temporary containers pending treatment and/or disposal.
- If the anticipated volume of recovered water will exceed the liquid holding capacity at the site, additional storage containers (e.g., polyethylene tanks and/or drums) will be obtained.

These activities will continue until the appropriate response action is agreed upon by all parties involved (as listed above) or their designees.

11.3 Fire or Other Emergency Condition

An Emergency Response and Contingency Plan (ERCP) has been developed for the Union Chemical Site that establishes the emergency response procedures required to minimize potential health and safety risks to site personnel, the general public and the environment, and also comply with OSHA 29 CFR 1910.120(q), EPA 40 CFR 264 Subpart D, and applicable State regulations. This document is included in the 100% Design Health and Safety Plan Appendix O (GTI, 1994). A copy of this plan is maintained onsite at all times.

If the event of an emergency equipment, supplies and personnel will be mobilized to the site as required to stabilize site conditions (e.g., temporary water storage tanks).

Rizzo site personnel conducting the monitoring will fulfill the role of Emergency Coordinator (EC). The EC will be the lead person conducting the monitoring (who would also be the first to detect the emergency conditions), supplemented by the Project Manager. A cellular telephone will be maintained on-Site during all Site monitoring activities for the purpose of emergency contact.

Rizzo anticipates that representatives of the Agencies may be on-site during, or prior to all monitoring activities. Rizzo must note that all persons on the site have full work stoppage authority to halt activities at any time.

The Emergency Coordinator (EC) will determine the immediate emergency procedures and follow-up procedures will be developed in coordination with the Rizzo project team and all involved parties including the agencies. The specific procedures will depend on the nature of the emergency, the experience and judgment of the EC, and the available resource, equipment and emergency response personnel. Due to many factors that could affect an emergency situation, the EC will carefully consider the direct and indirect consequence of each action taken and a trust representative and the agencies will be consulted if possible.

11.4 Vandalism

All site facilities will be inspected during each monitoring event to document their condition. If vandalism is suspected, the Police Department will be notified. Damage to site facilities will be documented and emergency repairs will be completed as required. The Rizzo Associates Project Manager will evaluate the extent of damage and determine an appropriate course of action. The course of action will be proposed to the agencies and implemented upon their approval.

11.5 Unauthorized Dumping or Disposal

The site will be inspected during each monitoring event to determine if unauthorized dumping or disposal has occurred. If wastes are discovered, on-site personnel will immediately assess the nature of the wastes visually (e.g., container types and conditions, presence of labels or placards, solid or liquid waste, leaking or fuming, etc.) and estimate the potential impact to worker safety and the environment. If leaking waste containers are present, on-site personnel will screen the waste and surrounding atmosphere using hand-held direct reading meters (e.g., PID), don appropriate personal protective equipment, and use supplies available on-site to contain the leak, if possible. The Rizzo Associates Project Manager will then be notified and provided with available information concerning

the waste. Site personnel will then notify the agencies, a trust representative and the Police Department to file a report and, if appropriate, may also contact the Fire Department If potential hazards to the community are suspected, the Rizzo Associates Project Manager or site personnel will contact the Local Emergency Planning Committee.

Solid waste may be collected and staged onsite for local disposal. Hazardous wastes discovered onsite will be appropriately containerized, characterized, labeled, and properly disposed of at a licensed/permitted facility.

12.0 References

Canonie, 1990, Remedial Investigation/Feasibility Study, Volume 1 of 4, Union Chemical Company Superfund Site, Hope, ME: Canonie Environmental, June.

EPA, 1994, DNAPL Site Characterization: U.S. Environmental Protection Agency, Hazardous Site Control Division (5203G)/Office of Emergency and Remedial Response/Office of Research and Development, Publication 9355.4-16FS, EPA/540/F-94/049, September.

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Rizzo, 2003, Bedrock Conditions Discussion Paper Union Chemical Company Site. March 20, 2003.

Rizzo, 2004, Bedrock Well Installation and Geophysical Evaluation Union Chemical Company Site 214 Main Street South Hope, Maine. April 30, 2004.

Rizzo, 2004, Revised Draft Conceptual Site Model Report Union Chemical Company Site 214 Main Street South Hope, Maine. July 9, 2004.

Rizzo Associates, IT Corporation, Fluor Daniel GTI and GEI Consultants Inc. Quarterly (Periodic) Surface Water and Ground water Monitoring Reports Q1 through Q35, 1992 -2004.

Table LTM-1 - Wells to be Sampled

Long Term Monitoring Plan
Wells to be Sampled
Union Chemical Company Superfund Site
Hope, Maine

Well Location	Zone	Parameter / Method	VOCs 8260B	DMF 8270	Temp. (°C) Field Probe	Cond. (uS/cm) Field Probe	ph Field Probe	ORP (mV) Field Probe	DO (mg/l) Field Probe	Turbidity (ntu) Field Turbidimeter	Justification for inclusion as LTM Well
B-5D-I	3		X	X	X	X	X	X	X	X	Near southeast (downgradient) edge of plume. Intermediate wells in this area have historically had the greatest contaminant concnetrations.
B-6A-D	2		X	X	X	X	X	X	X	X	Near northern edge of shallow bedrock plume. Maximum concnetrations of DCE, DCA and TCE in bedrock in recent sampling evnets.
B-8A-D	4		X	X	X	X	X	X	X	X	Most down-gradient shallow bedrock well available. Maximum concentration of DMF in shallow bedrock in recent sampling events.
B-9A-I	5		X	X	X	X	X	X	X	X	Represents a DCA "hot spot" in the source control area. In extreamly low permeability zone.
B-12B-I	3		X	X	X	X	X	X	X	X	Near eastern (downgradient) edge of plume. Maximum concentrations of DCE and DMF in overburden in recent sampling evnets.
NBW-U	4		X	X	X	X	X	X	X	X	South/southwest of source area. Used to assess shallow bedrock contaminant migration in the down dip direction from contaminant plume.
NBW-L	4		X	X	X	X	X	X	X	X	South/southwest of source area. Used to assess deep bedrock contaminant migration in the down dip direction from contaminant plume.
ODW-L	4		X	X	X	X	X	X	X	X	Near southern edge of the deep bedrock plume. Maximum DCA concentration in deep bedrock in recent sampling events.
ODW-U	4		X	X	X	X	X	X	X	X	
P-20	2		X	X	X	X	X	X	X	X	Near northeastern edge of plume. Maximum DCE and TCE overburden concentrations the last time it was sampled (Q33).
QB-4			X		X	X	X	X	X	X	Brook monitoring point downstream from highest observed overburden contaminant concentrations.

Table LTM-2 - Monitoring Points to be Gauged

Long Term Monitoring Plan

Union Chemical Company Superfund Site

Hope, Maine

Well Location	Monitored Stratigraphic Zone	Reference Elevation (Ft. MSL)	Reference Point
B-2A-D	Bedrock	361.24	Steel
B-2A-I	Intermediate	361.24	Steel
B-2B-S	Shallow	361.01	Steel
B-5C-D	Bedrock	352.11	Steel
B-5D-I	Intermediate	352.66	Steel
B-5E-S	Shallow	352.38	Steel
B-6A-D	Bedrock	355.51	PVC
B-6B-I	Intermediate	355.06	PVC
B-8A-D	Bedrock	359.98	PVC
B-8B-I	Intermediate	359.68	PVC
B-8C-S	Shallow	359.78	PVC
B-9A-I	Intermediate	371.94	PVC
B-12A-D	Bedrock	348.59	Steel
B-12B-I	Intermediate	349.51	Steel
B-12C-S	Shallow	348.8	Steel
DP-1	Shallow	350.19	Steel
DP-2	Shallow	349.21	Steel
DP-3	Shallow	349.89	Steel
EW-1	Intermediate	362.22	Steel
EW-4	Intermediate	373.22	Steel
GT-15	Shallow	352.66	PVC
GT-16	Shallow	353.04	PVC
GT-17	Shallow	350.69	PVC
GT-18	Shallow	351.69	PVC
MW-13A-D	Bedrock	371.12	Steel
MW-14-S	Shallow	373.46	Steel
MW-15-D	Bedrock	371.67	Steel
NBW-L	Bedrock	358.58	Steel
NBW-U	Bedrock	358.58	Steel
ODW-L	Bedrock	356.92	Steel
ODW-U	Bedrock	356.92	Steel
OPW	Bedrock	372.82	PVC

Table LTM-2 - Monitoring Points to be Gauged

Long Term Monitoring Plan

Union Chemical Company Superfund Site

Hope, Maine

Well Location	Monitored Stratigraphic Zone	Reference Elevation (Ft MSL)	Reference Point
OW-1-1D	Bedrock	362.08	Steel
OW-1-1M	Intermediate	362.44	Steel
OW-1-1S	Shallow	363.16	Steel
OW-1-2M	Intermediate	362.24	Steel
OW-1-2S	Shallow	361.94	Steel
OW-3-3M	Intermediate	349.97	PVC
OW-3-3S	Shallow	349.96	PVC
P-9	Intermediate	370.45	Steel
P-12	Intermediate	373.72	Steel
P-15	Intermediate	374.57	Steel
P-16	Intermediate	372.42	Steel
P-16A	Intermediate	372.05	Steel
P-17	Intermediate	371.5	Steel
P-19	Intermediate	371.41	Steel
P-20	Intermediate	370.32	Steel
P-21	Intermediate	369.9	Steel
P-22	Intermediate	367.66	Steel
P-23	Intermediate	369.66	Steel
P-24	Intermediate	365.11	Steel
P-25	Intermediate	365.94	Steel
P-26	Intermediate	359.9	Steel
P-27	Intermediate	359.9	Steel
P-28	Intermediate	351.37	Steel
P-29	Intermediate	354.19	Steel
PZ-C-02	Shallow	371.35	PVC

TABLE LTM-3 - GROUNDWATER PERFORMANCE STANDARDS

Long Term Monitoring Plan

Union Chemical Company Superfund Site

Hope, Maine

Constituent	Performance Standard (ug/L)
bis (2-ethylhexyl) phthalate	4
carbon tetrachloride	5
chloroform (as Total THM)	100
methylene chloride	5
1,1-dichloroethene	7
trans-1,2-dichloroethene	100
1,1-dichloroethane	5
1,2-dichloroethane	5
2-butanone (MEK)	170
cis-1,2-dichloroethene	70
tetrahydrofuran (THF)	70
1,1,1-trichloroethane	200
trichloroethene	5
vinyl chloride	2
toluene	70
tetrachloroethene	5
ethylbenzene	700
total xylenes	10000
Dimethylformamide	390

NOTES:

Project No. 2420.13

Union Chemical Company
Hope, Maine

0 2,000 Feet

Information obtained from
USGS Map of West Rockport, Massachusetts
Quadrangle dated 1988

RIZZO ASSOCIATES
A TETRA TECH COMPANY

Figure

Site Locus Plan

LTM-1

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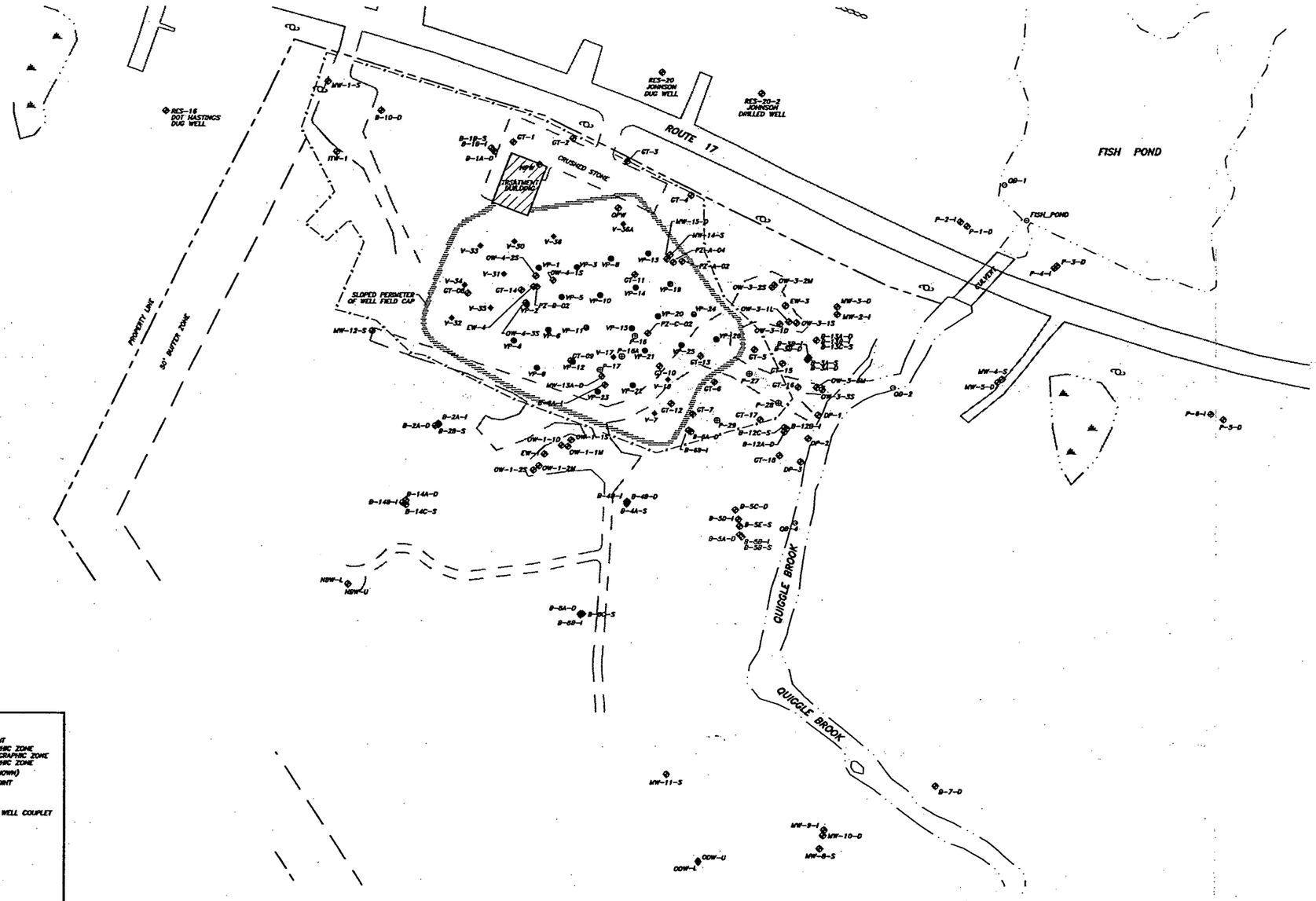

LEGEND

- 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)
- SURFACE WATER QUALITY MONITORING POINT
- SOIL VAPOR EXTRACTION WELL
- PUMPING WELL
- PUMPING WELL/SOIL VAPOR EXTRACTION WELL COUPLET
- WETLAND
- UTILITY POLE
- STONE WALL
- FENCE
- GRAVEL ROAD
- PROPERTY LINE

NOTES:

1. ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 8, 1995 (EXCEPT WELLS P-5-D & P-8-I, GT-13 THROUGH GT-16; DP-1 THROUGH DP-3).

SOURCE:

AutoCAD SITE PLAN PREPARED FOR UNION CHEMICAL COMPANY RORA TRUST BY MAINE COAST SURVEYING, ELM STREET, CAMDEN/ROCKPORT, 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.

NOT FOR CONSTRUCTION

THESE PLANS WERE PREPARED FOR THE PURPOSE OF OBTAINING STATE AND LOCAL APPROVALS AND ARE NOT INTENDED TO BE USED AS CONSTRUCTION DOCUMENTS.

No.	Date	Description

Revisions

Drawn By	Designed By	Checked By	Approved By
—	—	—	—

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Project Title

Union Chemical Company Hope, Maine

Sheet Title

Site Plan
DRAFT

Scale: 1"=50'
Job No.: 2420.13
File Name: ESP05
Date: 07/02/04

Sheet No.

LTM-2

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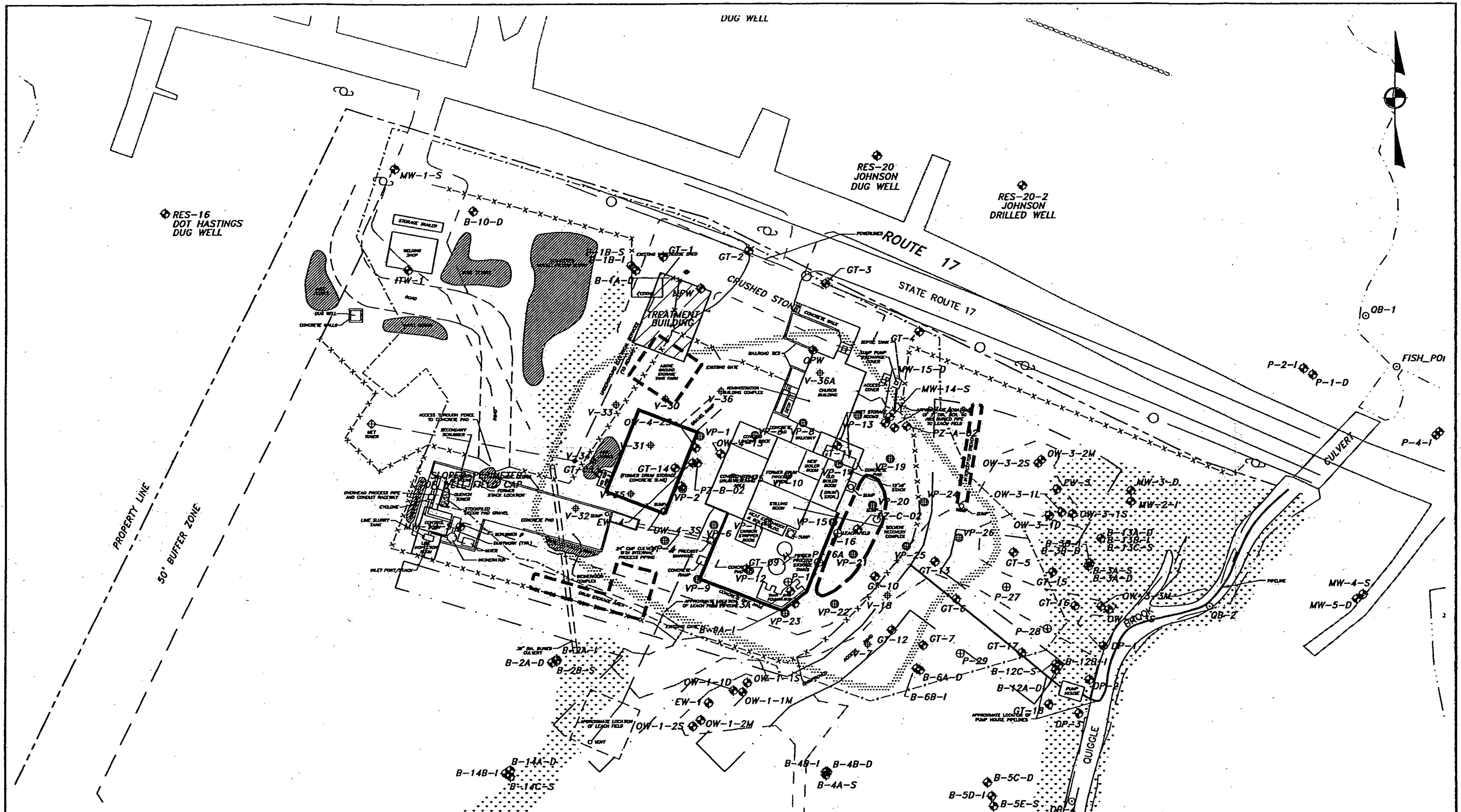

LEGEND

B-8A-D ◈ 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)

QB-1 ⊖ SURFACE WATER QUALITY MONITORING POINT

V-33 ◆ SOIL VAPOR EXTRACTION WELL

P-16 ⊕ PUMPING WELL

VP-3 ● PUMPING WELL/SOIL VAPOR EXTRACTION WELL COUPLET

WETLAND

UTILITY POLE

STONE WALL

FENCE

GRAVEL ROAD

PROPERTY LINE

NOTES:

1. ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 8, 1995 (EXCEPT WELLS P-5-D & P-6-I, GT-15 THROUGH GT-18; DP-1 THROUGH DP-3).

SOURCE:

AutoCAD SITE PLAN PREPARED FOR UNION CHEMICAL COMPANY RCRA 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 TRUSTESS BY CANONIE ENVIRONMENTAL, FIGURE 4, 9/27/88.

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No.	Date	Description

Revisions

Drawn By | Designed By | Checked By | Approved By

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Project Title

Union Chemical Company Hope, Maine

Sheet Title

Former Site Plan Overlay

Scale: 1"=30'
Job No.: 2420.13
File Name: ESP06
Date: 07/02/04

Sheet No.
LTM-3

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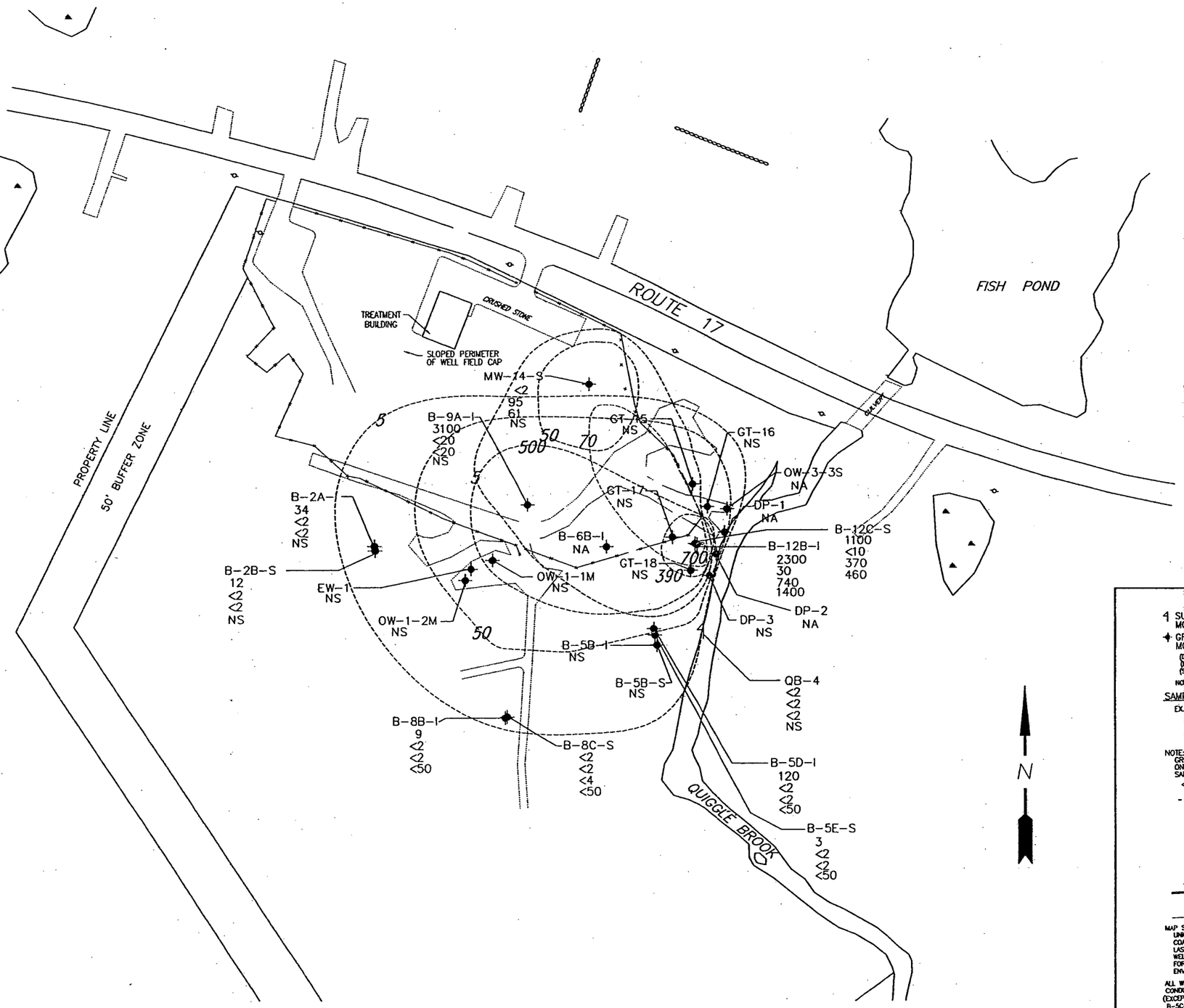

LEGEND

- SURFACE WATER QUALITY MONITORING POINT
- GROUNDWATER QUALITY MONITORING POINT
  - (B) 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

SAMPLING DATES: 4/13/04 – 4/14/04

EX: B-12C-S – WELL IDENTIFICATION
- 1100 – 1,1-DICHLOROETHANE (µg/L)
- 20 – TRICHLOROETHENE (µg/L)
- 530 – CIS 1,2-DICHLOROETHENE (µg/L)
- 200 – DIMETHYLFORMAMIDE (µg/L)

NOTE: ISOCONCENTRATION CONTOURS BASED ON ALL GROUNDWATER SAMPLES COLLECTED DURING Q3'S. ONLY DATA FROM WELLS IN FSP FOR QUARTERLY SAMPLING ARE POSTED.

- < or U – LESS THAN METHOD DETECTION LIMIT
- ------ – INFERRED ISOCONCENTRATION CONTOUR (µg/L)
- J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
- D – CONSTITUENT IDENTIFIED IN DILUTED SAMPLE
- B – CONSTITUENT IDENTIFIED IN TRIP BLANK
- ( ) – CONCENTRATION NOT USED IN CONTOURING
- NA – NOT ANALYZED
- NS – NOT SAMPLED
- 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; DP-1, DP-2, DP-3, B-5C-D, B-5D-I, B-5E-S, NBW-U, NBW-L).

GRAPHIC SCALE

50 0 25 50 100 200

NOT FOR CONSTRUCTION

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No.	Date	Description

Revisions

Drawn By	Designed By	Checked By	Approved By

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Project Title

Union Chemical Company Hope, Maine

Sheet Title

Overburden Plume Extents April 2004 DRAFT

Scale: 1"=50'

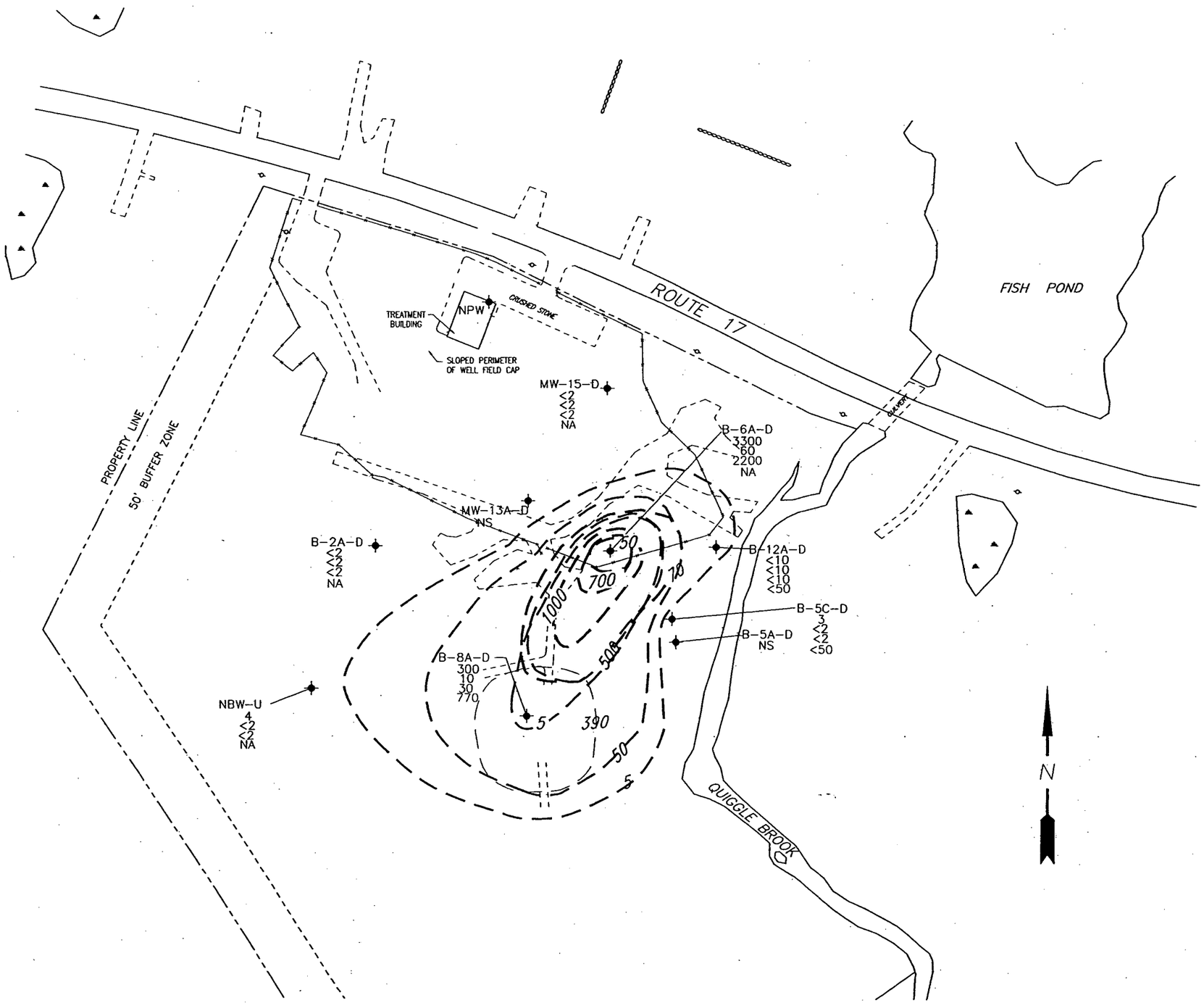
Job No.: 2420.13

File Name: EOPM03

Date: 07/02/04

Sheet No.

LTM-4



LEGEND

- 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

SAMPLING DATES: 4/13/04 – 4/14/04

EX.: B-12A-D – WELL IDENTIFICATION
- 300 – 1,1-DICHLOROETHANE (µg/L)
- <2 – TRICHLOROETHENE (µg/L)
- 80 – CIS 1,2-DICHLOROETHENE (µg/L)
- 240 – DIMETHYLFORMAMIDE (µg/L)
- < or U – LESS THAN METHOD DETECTION LIMIT
- ------ – INFERRED ISOCONCENTRATION CONTOUR (µg/L)
- J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
- D – CONSTITUENT IDENTIFIED IN DILUTED SAMPLE
- U – NOT DETECTED
- B – CONSTITUENT IDENTIFIED IN TRIP BLANK
- NS – NOT SAMPLED
- 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 TRUSTEESS BY CANONIE ENVIRONMENTAL, FIGURE 4, 9/27/88.

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995 (EXCEPT WELL ITW-1).

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)

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No.	Date	Description

Revisions

Drawn By	Designed By	Checked By	Approved By
—	—	—	—

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Project Title

Union Chemical Company Hope, Maine

Sheet Title

Shallow Bedrock Plume Extents April 2004 DRAFT

Scale: 1"=50'
Job No.: 2420.13
File Name: EBGW603
Date: 07/02/04

Sheet No.

LTM-5

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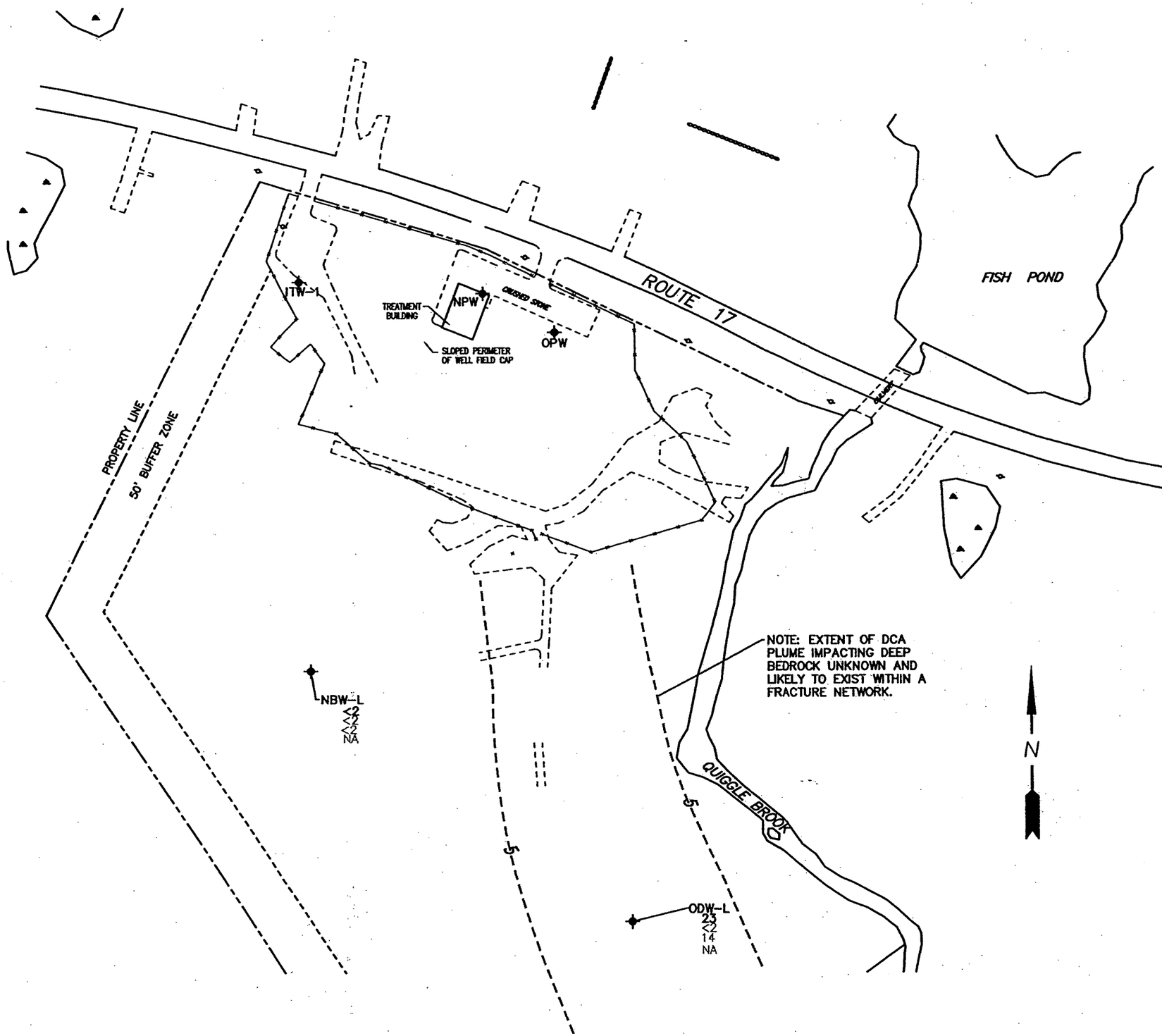

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No.	Date	Description

Revisions

Drawn By — Designed By — Checked By — Approved By

LEGEND

- SURFACE WATER QUALITY MONITORING POINT
- GROUNDWATER QUALITY MONITORING POINT
  - DBW — WELL SET IN BEDROCK GROUNDWATER ZONE
  - IW — WELL SET IN INTERMEDIATE GROUNDWATER ZONE
  - OW — WELL SET IN SHALLOW GROUNDWATER ZONE

NOT ALL SITE RELATED WELLS ARE SHOWN

SAMPLING DATES: 4/13/04 – 4/14/04

EX: B-124-0 – WELL IDENTIFICATION
- 300 – 1,1–DICHLOROETHANE (µg/L)
- <2 – TRICHLOROETHENE (µg/L)
- 80 – CIS 1,2–DICHLOROETHENE (µg/L)
- 240 – DIMETHYLFORMAMIDE (µg/L)
- < or U – LESS THAN METHOD DETECTION LIMIT
- ------ INFERRED ISOCONCENTRATION CONTOUR (µg/L)
- J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
- D – CONSTITUENT IDENTIFIED IN DILUTED SAMPLE
- U – NOT DETECTED
- B – CONSTITUENT IDENTIFIED IN TRIP BLANK
- NS – NOT SAMPLED
- STONE WALL
- WETLAND
- UTILITY POLE
- FENCE

MAP SOURCE: 1) AUTOCAD SITE PLAN PREPARED FOR UNION CHEMICAL COMPANY, BOSTA TRUST BY MAINE COAST SURVEYING, ELM STREET, CAMDEN, MAINE, LAST REVISED NOVEMBER 4, 1985; 2) "MONITORING WELL AND PIEZOMETER LOCATION PLAN" PREPARED FOR UNION CHEMICAL, TRUSTEE BY CANDEE ENVIRONMENTAL, FIGURE 4, 9/27/88.

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 8, 1985 (EXCEPT WELL MW-1).

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

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Framingham, MA 01701-9005
508.903.2000
www.rizzo.com

Project Title
Union Chemical Company Hope, Maine

Sheet Title
Deep Bedrock Plume Extents April 2004 DRAFT

Scale: 1"=50'
Job No.: 2420.13
File Name: EDGW703
Date: 07/02/04

Sheet No.
LTM-6

n:\jobs\2420\Project\2420-EDGW703.dwg 07/30/2004 11:44:06 AM EDT

Q33–SAMPLING DATES: 4/1/02–4/8/02

------ 1100 – 1,1–DICHLOROETHANE (g/L)

Q34–SAMPLING DATES: 11/11/03–11/26/03

------ 1100 – 1,1–DICHLOROETHANE (g/L)

Q35–SAMPLING DATES: 4/13/04 – 4/14/04

------ 1100 – 1,1–DICHLOROETHANE (g/L)

ROUTE 17

FISH POND

TREATMENT BUILDING

CRUSHED STONE

SLOPED PERIMETER OF WELL FIELD CAP

PROPERTY LINE

50' BUFFER ZONE

500

1000

50

CULVERT

QUIGGLE BROOK

N

RIZZO ASSOCIATES

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Project Title

Union Chemical Company
Hope, Maine

Sheet Title

OVERBURDEN
PLUME MIGRATION
Q33-Q35

0 100

Scale in Feet

Job No.: 2420-13

Sheet No.

Date: 08/01/04

LTM-7

Q33–SAMPLING DATES: 4/1/02–4/8/02

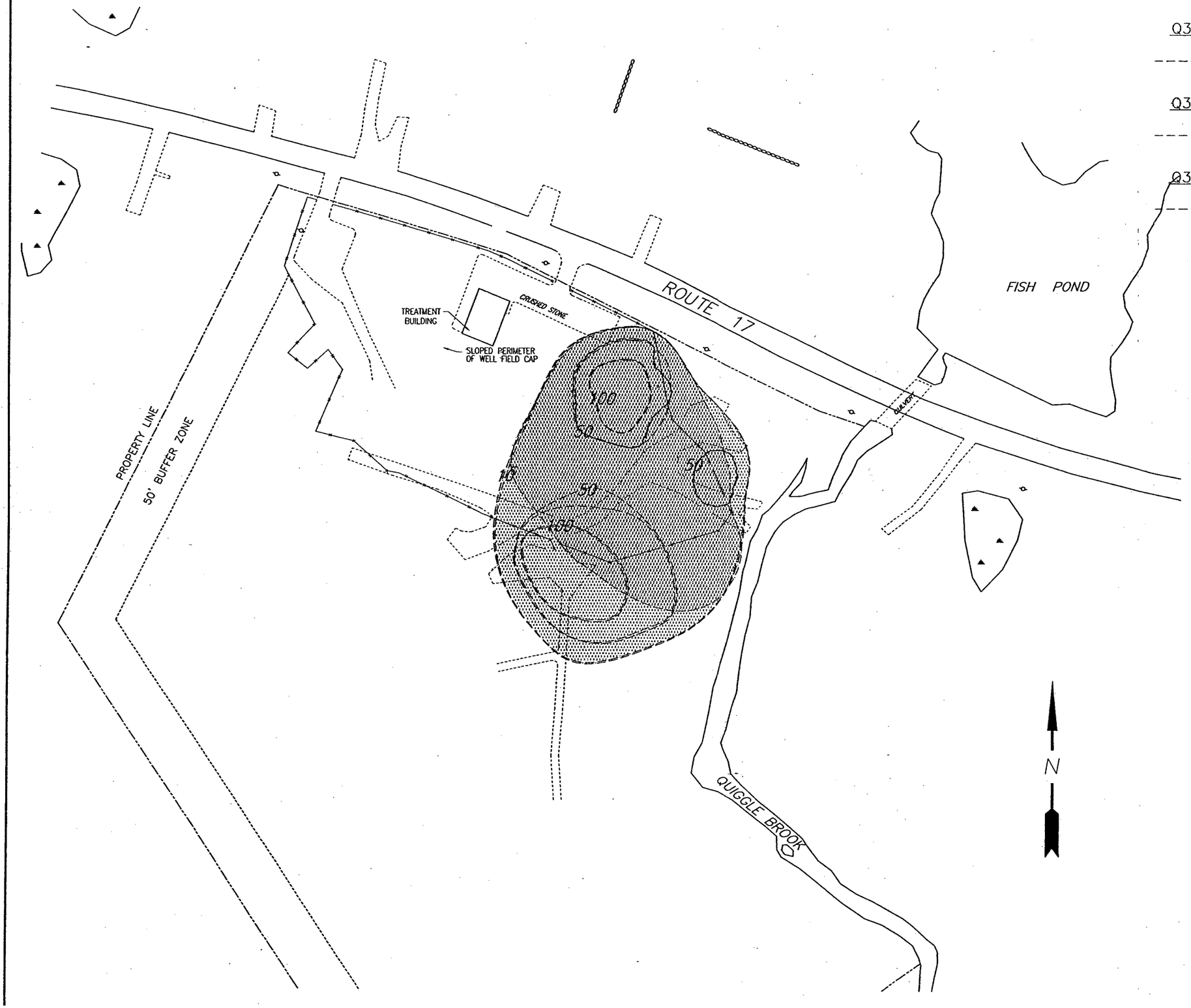
------ 20 – TRICHLOROETHENE (g/L)

Q34–SAMPLING DATES: 11/11/03–11/26/03

------ 20 – TRICHLOROETHENE (g/L)

Q35–SAMPLING DATES: 4/13/04 – 4/14/04

------ 20 – TRICHLOROETHENE (g/L)



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Sheet Title

OVERBURDEN
PLUME MIGRATION
Q33-Q35

0 100

Scale in Feet

Job No.: 2420-13 Sheet No.

Date: 09/01/04 LTM-8