DECLARATION FOR THE EXPLANATION OF SIGNIFICANT DIFFERENCES

SITE NAME AND LOCATION

Union Chemical Company Inc. Superfund Site
South Hope, Maine

STATEMENT OF PURPOSE

This decision document sets forth the basis for the determination to issue the attached Explanation of Significant Differences (ESD) for the Union Chemical Inc. Superfund Site in South Hope, Maine.

STATUTORY BASIS FOR ISSUANCE OF THE ESD

Under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), if EPA determines that the remedial action at a Site differs significantly from the Record of Decision (ROD) for that Site, EPA shall publish an explanation of the significant differences between the remedial action being undertaken and the remedial action set forth in the ROD and the reasons such changes are being made. Section 300.435(c) of the National Contingency Plan (NCP), and EPA guidance (OSWER Directive 9355.3-02), indicate that an ESD, rather than a Record of Decision (ROD) amendment, is appropriate where the changes in issue do not fundamentally alter the overall remedy with respect to scope, performance, or cost. Because the adjustments to the remedial action do not fundamentally alter the overall remedy for the Site with respect to scope, performance or cost, this ESD is properly being issued.

In accordance with Section 300.825(a) of the NCP, this ESD will become part of the Administrative Record which is available for public review at both the EPA Region I Record Center in Boston, Massachusetts and the Hope Town Hall in Hope, Maine. In addition, a notice that briefly summarizes this ESD will be published in a major local newspaper of general circulation.

OVERVIEW OF THE ESD

The 1990 ROD required that the contaminated groundwater would be extracted and treated using ultraviolet (UV)/oxidation and other appropriate technology and the treated groundwater would be discharged to Quiggle Brook. The vacuum-extracted contaminated soil gases would be collected and treated prior to discharge to the atmosphere. The ROD stated that EPA and Maine DEP believed cleanup levels would be achieved within 15 to 30 years of full-scale implementation of this management of migration component. However, it also provided that should the contaminant levels cease to decline and remain above the cleanup levels, the management of migration component may require reevaluation. (page 55 of the ROD)

By this ESD, EPA is enhancing the groundwater treatment approach and changing the discharge location for treated groundwater. Rather than rely on standard pump-and-treat with its decreasing effectiveness in extracting contaminants as the contaminant mass decreases and approaches equilibrium above the performance standards, the cleanup approach has been enhanced by several innovative technologies which EPA believes gives the opportunity to achieve attainment of the cleanup levels within ~~six to eight years after~~ the initial full-scale implementation of the groundwater extraction system, which began in February 1997. Additionally, as the areal extent of the contaminant plume has been reduced by these innovative technologies, the amount of groundwater needed to be pumped to main hydraulic control at the Site has decreased, and therefore it was possible to change from a surface water discharge to a reinjection into the groundwater, an approach originally favored by Maine DEP for the 1990 ROD.

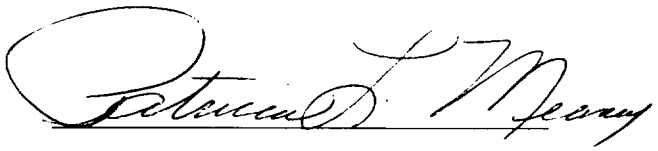
These adjustments to the remedial action do not fundamentally alter the overall remedy for the Site with respect to scope, performance or cost.

PUBLIC COMMENT

The changes in the approach to the groundwater remediation were discussed in a series of meetings with the Hope Committee for a Clean Environment (HCCE), Maine Department of Environmental Protection (Maine DEP), and the Settling Defendants' coordinator. All parties agreed to these changes provided that precautions were added to protect Quiggle Brook and the groundwater in the subsurface soils and bedrock.

DECLARATION

For the foregoing reasons, by my signature below, I approve the issuance of an Explanation of Significant Differences for the Union Chemical Company, Inc. Superfund Site in South Hope, Maine and the changes stated therein.



9/28/01

Patricia L. Meaney, Director
Office of Site Remediation and Restoration
Environmental Protection Agency - Region I

Date

EXPLANATION OF SIGNIFICANT DIFFERENCES
UNION CHEMICAL COMPANY, INC. SUPERFUND SITE
SOUTH HOPE, MAINE

I. INTRODUCTION and STATEMENT of PURPOSE

A. Site Name and Location

Site Name: Union Chemical Company, Inc. Superfund Site

Site Location: South Hope, Knox County, Maine

B. Lead and Support Agencies

Lead Agency: United States Environmental Protection Agency (EPA)

Support Agency: Maine Department of Environmental Protection (Maine DEP)

C. Legal Authority

Under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and Section 300.435(c) of the National Contingency Plan (NCP), if EPA determines that differences in the remedial action significantly change but do not fundamentally alter the remedy selected in the Record of Decision (ROD) with respect to scope, performance, or cost, EPA shall publish an explanation of the significant differences between the remedial action being undertaken and the remedial action set forth in the ROD and the reasons such changes are being made.

D. Summary of this Explanation of Significant Differences (ESD)

The 1990 ROD required that the contaminated groundwater would be extracted and treated using ultraviolet (UV)/oxidation and other appropriate technology and the treated groundwater would be discharged to Quiggle Brook. The vacuum-extracted contaminated soil gases would be collected and treated prior to discharge to the atmosphere. The ROD stated that EPA and Maine DEP believed cleanup levels would be achieved within 15 to 30 years of full-scale implementation of this management of migration component. However, it also provided that should the contaminant levels cease to decline and remain above the cleanup levels, the management of migration component may require reevaluation. (page 55 of the ROD)

By this ESD, EPA is enhancing the groundwater treatment approach and changing the discharge location for treated groundwater. Rather than rely on standard pump-and-treat with its decreasing effectiveness in extracting contaminants as the contaminant mass decreases and approaches equilibrium while still above the performance standards, the cleanup approach has

been enhanced by several innovative technologies which EPA believes gives the opportunity to achieve attainment of the cleanup levels within six to eight years after the initial full-scale implementation of the groundwater extraction system, which began in February 1997. Additionally, as the areal extent of the contaminant plume has been reduced by these innovative technologies, the amount of groundwater needed to be pumped to main hydraulic control at the Site has decreased, and therefore it was possible to change from a surface water discharge to a reinjection into the groundwater, an approach originally favored by Maine DEP for the 1990 ROD.

E. Availability of Documents

This ESD shall become part of the administrative record for the Site. Documents which support the issuance of this ESD may be found in the Supplement to the Administrative Record. Both the ESD and the administrative record are available to the public at the following locations and may be reviewed at the times listed:

U.S. Environmental Protection Agency
Records Center
One Congress Street, Suite 1100
Boston, MA 02114
Weekdays: 10:00 a.m. - 1:00 p.m., 2:00 - 5:00 p.m.

Hope Town Hall
Hope, Maine 04072
Tuesdays 8:30 a.m. - 6:00 p.m.
Wednesdays and Fridays: 7:30 a.m. - 4:30 p.m.

II. SUMMARY OF SITE HISTORY, CONTAMINATION, and SELECTED REMEDY

A. Site History

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

Groundwater contamination beneath the Site and contamination of Quiggle Brook were first discovered by Maine DEP in late 1979. A study conducted for the Union Chemical Company in 1981 found that two contaminated groundwater plumes were present in the area between the facilities and Quiggle Brook. Volatile organic compounds (VOCs), similar to those processed by

Union Chemical Company, were the principal contaminants observed in the plumes and Quiggle Brook.

Maine DEP closed the hazardous waste treatment operations at the Site in June 1984, at which time approximately 2,000 - 2,500 55-gallon drums and thirty liquid storage tanks were found on the Site. All of these drums, all but two of the tanks, and their contents were removed by EPA and Maine DEP by the end of November 1984.

A Remedial Investigation/Feasibility Study (RI/FS) and Human Health Risk Assessment were performed by the responsible parties under an EPA order. The risk assessment indicated that there would be unacceptable carcinogenic and non-carcinogenic risks from future ingestion of the groundwater at the Site. The results of the RI and risk assessment were used to evaluate potential cleanup alternatives in the FS. The EPA preferred cleanup approach was proposed to the public in the summer of 1990 and a Record of Decision (ROD) was signed in December 1990. In 1994 and 1997, EPA issued ESDs which modified the selected remedies for on-site soils and for off-site soils. These ESDs are summarized below in Section II.D.

B. Enforcement History

Between 1979 and 1984, MEDEP cited the plant for deficiencies in and/or violations of several operating licenses. A state court ordered that the Union Chemical Company be evicted from the Site in 1986, and appointed MEDEP as the receiver of the property. All site operations ceased at that time.

The Site was first proposed in April 1985 for inclusion on EPA's Superfund National Priorities List (NPL), the roster of sites eligible for long-term cleanup funds. The Site was later re-proposed in June 1988 and formally included on the NPL in October 1989.

In the fall of 1987, EPA and MEDEP reached agreements with approximately 290 PRPs in the form of two Administrative Orders by Consent which required the PRPs to begin investigations aimed at identifying remedial alternatives for the Site and reimburse EPA and MEDEP for past costs. In August 1989, several additional PRPs signed a Consent Decree by which EPA was reimbursed for all remaining past response costs incurred at the Site through May 1987, plus interest and enforcement costs.

Following the signing of the ROD, EPA negotiated with 375 PRPs for the performance of the selected remedy. EPA reached two settlements as a result of these negotiations. The first was a De Minimis settlement with 267 parties who had contributed less than 10% of the waste at the Site. The second settlement was with sixty-seven De Maximis parties. This second settlement required the Settling Defendants to perform the selected remedy and to reimburse EPA for $2.8 million in past and future costs.

C. Site Contamination

Cleanup levels in on-site soils were established in the ROD for the four most prevalent contaminants in order to prevent further leaching of contaminants into the groundwater. The four contaminants were selected based on their wide lateral distribution on the Site, their high concentrations relative to MCLs and non-zero MCLGs, their co-location with other soil contaminants within the principal source locations, and their range of organic carbon partitioning coefficients (1990 ROD, page 56). These four contaminants were 1,1-dichloroethene (1,1-DCE), tetrachloroethene (PCE), trichloroethene (TCE), and total xylenes.

Cleanup levels in groundwater were established for those contaminants identified as contaminants of concern in the Baseline Risk Assessment. These included 1,1-dichloroethane (1,1-DCA), tetrachloroethene (PCE), trichloroethene (TCE), cis 1,2-dichloroethene (cis-DCE), and dimethylformamide (DMF). See Figures 1 - 8 for overburden and bedrock plume configurations of these four contaminants prior to the start-up of the management of migration component. In addition, while arsenic and lead were not measured above their respective MCL during the RI, the ROD identified them as contaminants of concern.

D. Remedy Selected in the 1990 ROD

The remedial action selected in the 1990 ROD was intended to serve as a comprehensive approach for overall remediation of the site and was to address four areas: facilities, on-site source soils, groundwater, and an evaluation of off-site soils surrounding the Site. The approach for each area is briefly described below.

Facilities Decontamination and Demolition, and Off-Site Disposal of Debris

The ROD called for the facilities to be decontaminated, concrete structures crushed, asbestos in the still building containerized, and then all material to be disposed appropriately offsite. These facilities included a former church, which had been converted to offices and a laboratory, warehouse building with loading dock, the still building with multiple tanks for separating spent solvents, an incinerator, underground piping and vaults, as well as many other smaller containers. The facilities decontamination and demolition activities were determined to be completed in May 1994, and the debris was shipped offsite.

Soil Excavation and On-Site Low-Temperature Soil Aeration Treatment

The ROD provided that the contaminated soils were to be excavated and treated on-site using a low-temperature soil aeration or equivalent process. Treated soils were to be backfilled on the Site, and the Site regraded and seeded.

In 1994, EPA, after receiving comment from Maine DEP and the citizen's group, Hope Committee for a Clean Environment (HCCE), changed the soil clean-up technology from low-temperature aeration to soil vapor extraction (see June 1994 ESD detailing this change).

Clean up of the soils began in the fall 1994 with the excavation of four outlying areas of contaminated soils and subsequent consolidation within the central portion of the Site. The following summer, a soil vapor extraction system (SVE) consisting of ninety-one hot air injection points, thirty-three vapor extraction points, and a thermal oxidizer treatment system were constructed. Start up of the SVE system began in February 1996, going on-line full-time in October 1996. Following a shut down of these systems in March 1998 to allow for the soils to return to equilibrium, compliance sampling was performed in September 1998. Following review of the compliance sampling data, the attainment of the soil performance standards using the soil vapor extraction was determined to be completed in December 1998.

Vacuum-Enhanced Groundwater Extraction, On-Site Groundwater Treatment, and On-Site Discharge of Treated Groundwater into Quiggle Brook

The ROD required that the contaminated groundwater would be extracted and treated using ultraviolet (UV)/oxidation and other appropriate technology and the treated groundwater would be discharged to Quiggle Brook. In addition to treating the extracted groundwater, water that had condensed in the SVE system was also pumped through the groundwater treatment system.

Monitoring for Off-Site Soils

The ROD required that on-site meteorological data be collected for five years and modeled. After five years of meteorological data collection from the Site, additional air modeling simulations would be performed and the need for additional soil sampling evaluated. Throughout all phases of this data collection and analysis effort, EPA would determine if additional remedial actions are required for off-site soils.

In 1996, EPA, after receiving comment from Maine DEP and the citizens' group, HCCE, changed the length of time for meteorological data collection and the time table for sampling and analysis of off-site soils. Satisfied that the on-site meteorological data collected for three years was representative of local conditions, rather than waiting for five years of data as specified in the 1990 ROD before conducting off-site soil sampling, EPA directed the Settling Defendants in July 1996 to collect soil samples from twenty-five locations which had been agreed upon by all parties. This sampling indicated two locations with elevated lead. Consequently, a joint effort between EPA and the Settling Defendants' consultant was performed in September 1996, collecting over 110 samples. The results of this were presented to all parties by EPA in October 1996. The parties concurred that the data did not suggest any measurable off-site deposition from the Union Chemical Company incinerator. The off-site soils activities were determined to be completed in 1997 (see September 1997 ESD detailing this change).

Five-year Review

The Superfund law requires that sites which have hazardous substances, pollutants or contaminants left on site undergo a review once every five years after the initiation of remedial action to assure that the remedial action continued to protect human health and the environment.

EPA recognizes this oversight and will complete a five-year review by the end of 2001. EPA will also evaluate the risks posed by the Site at five-year intervals until the completion of the remedial action (i.e., before the Site is proposed for deletion from the NPL).

III. BASIS FOR THE DOCUMENT

The vacuum-enhanced pump-and-treat groundwater system required by the 1990 ROD became operational and functional in February 1997 after one year of start-up and several adjustments (such as replacement of the ion-exchange component in the treatment system with a metal removal component which used pH adjustment and flocculation to remove metals from the extracted groundwater). The mass of contaminants extracted from the groundwater on a monthly basis dropped from 142 pounds in December 1996 to 48 pounds in July 1997 then to 10 pounds in August 1998 and to 5 pounds in June 1999. This decreasing removal of mass is typical of pump-and-treat systems, with the decreasing effectiveness in extracting contaminants as the contaminant mass decreases and the groundwater system approaches equilibrium between dissolved contaminants and adsorbed contaminants, while still above the performance standards. While the mass of VOCs removed from the groundwater followed an asymptotic curve, VOC concentrations did not show a similar decrease and remained elevated.

After receiving approval from EPA, the Settling Defendants' contractor performed a potassium permanganate pilot study in a limited area in the center of the source area in October 1997. The purpose of this pilot study was to assess the viability of precipitating out in the soils iron and other metals which were negatively impacting several components of the groundwater treatment system. Permanganate, because it is a strong oxidizer, has been commonly used for this purpose in public water systems but in above-ground conditions. At the conclusion of the pilot study, it was found that the permanganate had no discernible affect on the iron concentrations in the extracted groundwater. However, the study instead suggested that the addition of permanganate into the subsurface had caused a beneficial decrease on contaminant concentrations. Since this was conceptually logical as it was known that destruction of chlorinated compounds can occur in the presence of a strong oxidizer, which can create aerobic conditions, it was agreed to expand the area to be treated during the summer of 1998, and then again in 1999. These two summer applications of permanganate expanded the coverage of the Site so that permanganate was added to the groundwater beneath the entire source area. While these applications were made, the groundwater extraction system continued operation, assuring that hydraulic control was maintained so that neither the contaminant plume or permanganate migrated to Quiggle Brook.

Upon review of the April 2000 water quality data, it appeared that the remaining contamination was no longer beneath the source area (the center of the Site) but was now located between the source area and Quiggle Brook. To address this, EPA acknowledged that permanganate would need to be applied to the area where pumping for hydraulic control had been performed during the 1998 and 1999 additions. In order to minimize the possibility that permanganate would reach Quiggle Brook, several steps were agreed upon by EPA, Maine DEP, and the Settling Defendants. First, sodium permanganate would be used rather than potassium permanganate as

the sodium permanganate could be applied at a higher concentration, 20% versus 2-3% than potassium permanganate. By using sodium permanganate, this decreased the volume of permanganate solution added into the subsurface in the locations closest to Quiggle Brook. Second, pumping of the extraction wells would continue until permanganate was observed in the extracted groundwater. And third, it was agreed to change the discharge location for the treated groundwater from Quiggle Brook to reinjection into the soils upgradient of the pumping wells. In this manner, should permanganate be in the extracted groundwater, then following treatment to remove VOC contaminants, it would be reapplied into the subsurface (using inactive wells) rather than being discharged to Quiggle Brook.

The permanganate additions resulted in substantial reduction in the concentrations of the ethene compounds (double carbon bond compounds, such as trichloroethene and 1,2-dichloroethene) and DMF. With the conclusion of the third year of permanganate addition, concentrations of these ethene compounds were approaching their respective performance standards and their areal extent was also reduced. This produced an environment where the principal remaining groundwater contaminant is 1,1-dichloroethane (1,1-DCA), and to a lesser extent, 1,1,1-trichloroethane (1,1,1-TCA). Both of these are single carbon bond compounds, referred to as ethanes. These compounds have been resistant to degradation by permanganate as it not only preferentially interacts with native carbon sources, organic materials in the soil, and the ethene compounds first, but it was found that permanganate had little affect on single carbon bond compounds. This finding was borne out by studies elsewhere and which were summarized in the permanganate reports and Summer 2001 Work Plan. As these ethane compounds remained the major obstacle to meeting the ROD performance standards, alternative technologies were evaluated to break down these compounds. Based on studies being performed on sites elsewhere (see the Summer 2001 Work Plan and Technology Demonstration: In-Situ Substrate Addition to Create Reactive Zones for Treatment of Chlorinated Alphatic Hydrocarbons), it appears that by adding a carbon source to the subsurface, the groundwater can be driven to anaerobic conditions and thereby promote reductive dechlorination of ethane compounds. Therefore, by modifying the groundwater remedy to enhance anaerobic degradation, EPA believes this can considerably quicken the time needed to achieve the performance standards for 1,1-DCA and 1,1,1-TCA.

The use of permanganate and the carbon sources were based upon a substantial amount of information that was collected since the 1990 ROD. The information includes:

- Construction Completion Report, Management of Migration/Source Control, Union Chemical Company Superfund Site, South Hope, Maine Fluor Daniel GTI October 1997

- Quarterly Sampling Reports, IT Corporation, 1997 - 2001

- Potassium Permanganate Field Test Report, January 13, 1998 Fluor Daniel GTI, Inc. (and January 14, 1998 cover letter "Future Potassium Permanganate Activities")

- Test Results for Potassium Permanganate Additions - Summer 1998, Union Chemical Company Superfund Site, South Hope, Maine, IT Corporation, February 28, 2000

- Test Results for Permanganate (PermOX-IT^{SM}) - 1999, Union Chemical Company Superfund Site, South Hope, Maine, IT Corporation, August 22, 2000

- Report Summarizing Hydrogen Peroxide Pilot Test Activities - Summer 2000, Union Chemical Company Superfund Site, South Hope, Maine IT Corporation, September 27, 2000

- Well B-8A-D Potassium Permanganate Closure Report, Union Chemical Company Superfund Site, South Hope, Maine B-8A-D Results, Rizzo Associates, April 30, 2000

- Compilation of Additional Permanganate Information Collected During Q29, Revision 1, Union Chemical Company Superfund Site, South Hope, Maine, IT Corporation, June 14, 2001

- Summer 2001 Work Plan, Revision 4, Union Chemical Company Superfund Site, South Hope, Maine, IT Corporation, July 25, 2001

- Volatile Organics Analysis of Aqueous Samples, Union Chemical, South Hope, Maine Memorandum, US EPA Office of Environmental Measurement & Evaluation, May 30, 2001

- Technology Demonstration: In-Situ Substrate Addition to Create Reactive Zones for Treatment of Chlorinated Alphatic Hydrocarbons, ARCADIS Geraghty & Miller, March 2, 2000

These documents have been added to the Supplement of the Administrative Record. In addition to these records, Maine DEP has requested that its comment letters on these documents be included in the Supplement of the Administrative Record and EPA has agreed to do this.

IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

Background

The 1990 ROD selected vacuum-enhanced groundwater extraction and treatment to restore the contaminated groundwater in the overburden soils and shallow bedrock. The vacuum-enhanced wells were to be installed in areas where the soil cleanup standards were exceeded but were outside the central soil source area which was to be excavated and treated onsite. The actual configuration of the extraction system, consisting of extraction wells of various depths, spacing,

and location, as well as any additional monitoring wells, was to be determined during the remedial design phase. The 1990 ROD also anticipated that refinements to the extraction system could be made during the remedial action phase.

In June 1994, EPA issued an ESD which documented the change in the source control from excavation and onsite treatment using low-temperature soil aeration to in-situ soil vapor extraction. In agreeing to this change, EPA and Maine DEP required the installation of the groundwater extraction system through the source control area at that time. This allowed for concurrent treatment of the contaminated groundwater while the soils were being remediated, whereas if the source control remedy had remained unchanged, it would not have been possible to begin groundwater remediation in this area until the excavation, on-site treatment, and backfilling of the soils were completed. In this way, groundwater remediation in the central soil source area began several years ahead of what was originally anticipated.

The enhancements described in this ESD to the groundwater remediation system are a continuation of the 1994 change. The 1990 ROD recognized that pump-and-treat technology may fail to achieve performance standards within 15 to 30 years of full-scale implementation, and therefore, the groundwater extraction and treatment system, the performance standards, and/ or the management of migration component may require reevaluation (ROD, page55).

As directed by the ROD, the configuration of the groundwater extraction system was developed during the remedial design phase. The configuration was based on computer modeling of the groundwater, which in turn was based on previous pump tests, piezometric data, hydraulic gradients, knowledge of the soils comprising the subsurface, and the identification of the contaminant plume in the overburden soils and shallow bedrock. As a result, a twenty-eight well groundwater extraction system was installed, chiefly in the source control area, with sufficient wells located between the source area and Quiggle Brook to prevent migration into the brook. This groundwater extraction and treatment system began its start-up phase in February 1996 and became fully operational a year later.

Description of Changes

After the groundwater extraction and treatment system came into operation, monthly progress reports documented the contaminant mass being removed by the soil vapor and groundwater extraction systems (approximately 90% of the total mass removed came from the SVE system, see Figures 9 and 10). By spring 1998, with both the mass being removed from the soils and the vapor concentrations decreasing, it appeared that the soil performance standards were being approached. However, while the mass being removed from the groundwater also decreased, there was not a concurrent decrease in contaminant concentrations in the groundwater. As the groundwater extraction system was already comprised of tightly-spaced wells, extracting about one-quarter of a gallon per minute per well from the low-yield soils and shallow bedrock, the possible refinements to the system as listed in the 1990 ROD did not appear to be viable alternatives. Consequently, in-situ enhancements through permanganate additions, based on the fall 1997 pilot study, were implemented during the summer of 1998.

The summer 1998 addition of potassium permanganate correlated with a decrease in VOC concentrations, ranging from 30 - 50% from the previous sampling period, April 1998 to October 1998. Follow-up sampling in the spring 1999 indicated slight rebound of VOC concentrations from the October 1998 levels. Encouraged by this progress, EPA approved expansion of the area where permanganate addition was applied to the Site. Operation of the groundwater extraction and treatment system continued to maintain hydraulic control. Sampling in the spring 2000 showed similar results, such that addition of permanganate in the summer 2000 was focused on the area around the three wells which had been used for maintaining hydraulic control the previous two years, and three remaining hot spot areas. Due to the proximity to Quiggle Brook, sodium permanganate was added in the locations near the pumping wells. Sodium permanganate was used because it could provide permanganate in more concentrated solution and minimize the amount of liquid being introduced to the subsurface in the general vicinity of the brook. Post-addition sampling in October 2000 and May 2001 confirmed the significant decrease in ethene compounds, xylenes, and DMF. However, the ethane compounds remained at levels two to four orders of magnitude greater than the ethene compounds.

EPA concurred with the Settling Defendants' consultant, IT Corporation, that the additions of permanganate were approaching their limit of effectiveness. The permanganate additions had substantially decreased the concentrations of the ethene compounds to levels where through natural attenuation processes such as dispersion and biodegradation, the ROD performance standards could be achieved within two to three half-life cycles. Consequently, if all of the groundwater was to be restored within the same time frame, focus had to be turned toward the destruction of the ethane compounds. Whereas permanganate pushed the groundwater toward aerobic conditions which are conducive to destruction of ethene compounds, remediation literature indicated anaerobic conditions were more conducive for the destruction of ethane compounds.

In order to push the groundwater system to anaerobic conditions, IT Corporation proposed adding carbon sources, in the form of molasses and sodium lactate, into the subsurface. These carbon sources serve as food for microorganisms, which also consume the oxygen dissolved in the groundwater. With the consumption of dissolved oxygen, this changes the subsurface conditions to anaerobic. Under anaerobic conditions, a process known as reductive dechlorination occurs. For example, 1,1,1-TCA loses a chlorine molecule and becomes 1,1-DCA, which in turn loses another chlorine molecule to become vinyl chloride, and which ultimately, becomes water, carbon dioxide, and chlorine salts.

As explained in the Summer 2001 Work Plan, and discussed with Maine DEP and HCCE, this use of common and innocuous materials (and of food quality) as a method to destroy hazardous substances is a newly-emerging technology, and which has yet to be applied on sites with predominately ethane compounds. Therefore, additional precautions were included in the work plan to address Maine DEP's concerns about possible impact to Quiggle Brook from the addition of molasses. These included limiting its use to locations more than sixty feet from Quiggle Brook, increasing the monitoring locations, and development of a contingency plan should there be indications that molasses was moving faster than expected in the groundwater, and without

significant biodegradation. With these modifications to the work plan, on July 24, 2001, Maine DEP acquiesced to the molasses addition and EPA approved the addition of molasses.

As noted above, the use of carbon sources as a clean-up technology is a newly-emerging field. It is also a rapidly developing field. As the Settling Defendants' consultant discussed molasses addition with EPA and Maine DEP in June 2001, they received information regarding the use of sodium lactate at another of their projects which suggested that sodium lactate could accomplish the reductive dechlorination of ethane compounds in a shorter time frame than molasses. Consequently, the Settling Defendants' consultant proposed amending the Summer 2001 Work Plan, even as the Work Plan was under review, to allow for the addition of sodium lactate in hot spot areas away from Quiggle Brook and separated from the area where molasses would be applied. Following further discussions and review of the additional information from the IT Corporation's other project, on August 23, 2001, Maine DEP acquiesced to the sodium lactate addition and EPA approved the addition of sodium lactate to the three isolated hot spot areas.

See the attached figures 11 - 14 for the 1998 - 2000 permanganate addition locations and the 2001 carbon source addition locations.

Changes in Expected Outcomes

Over the course of the groundwater remediation at the Site, groundwater contamination levels have been impacted by several processes, including the Soil Vapor Extraction system, the groundwater extraction system, natural attenuation, and the addition of permanganate. While the impact of permanganate cannot be precisely separated from these other processes, it appears that the addition of permanganate has produced a one to two order of magnitude decrease (i.e., for the ethene compounds in groundwater contamination from a few thousand parts per billion to a few hundred parts per billion or less) across the site, and in both the overburden soils and shallow bedrock. Concentrations of DMF have decreased below the performance standard in the bedrock groundwater and are approaching the standard in the saturated overburden soils. See figures 15 - 22 for contaminant plume configurations after the permanganate additions.

Addition of reductants, sodium lactate and molasses, is being directed toward the remaining hot spots at the Site. Should these reductants result in reductions of the ethane compounds and remaining ethene compounds, then EPA believes that by 2003 to 2005 the performance standards could be reached. This would mean that the performance standards would be attained within six to eight years of full-time operation of groundwater treatment rather than the fifteen to thirty years (2012 to 2027) projected in the 1990 ROD. As discussed with the agencies and HCCE, the use of carbon sources as a clean-up tool is an emerging technology. Hence, while it is agreed by all parties that conceptually it should work, that is, reductive dechlorination occurs in strongly anaerobic conditions, and that introducing a food source will spur the consumption of dissolved oxygen by microorganisms within the soils, nevertheless, this technology has not been demonstrated at any other site with ethane compound contamination. EPA acknowledges this. However, as the other active remedial efforts, groundwater extraction and permanganate, appear to have reached their limits of effectiveness, and as there does not appear to be other active

technologies appropriate for the Site, EPA believes the use of food-quality sodium lactate and molasses in areas safely away from Quiggle Brook provides a viable active remedial opportunity to restore the groundwater within a reasonable time frame.

Attainment of the performance standards will be first indicated by the ongoing semi-annual management of migration monitoring. Presently, twenty-three sampling locations in the overburden and bedrock are sampled on a semi-annual basis, and each sampling event is typically augmented with six to ten additional sampling locations. Once the semi-annual sampling indicates that the performance standards have been or are close to being achieved, and the monitoring shows there is no residual permanganate, molasses, or sodium lactate, then a period of compliance monitoring will follow (also a part of the original remedy) to demonstrate that the performance standards have been achieved and continue to be achieved throughout the Site.

V. SUPPORT AGENCY COMMENTS

The State of Maine has participated with EPA in developing the changes to the 1990 ROD which are described in this ESD. Maine DEP supported the permanganate additions in the central source area and the change in the discharge location for the treated groundwater. Maine DEP agreed under protest to the permanganate additions closer to Quiggle Brook and the addition of molasses and sodium lactate. Some of their concerns were satisfied with the conditions that these changes have no impact on Quiggle Brook and that any adverse impacts to the subsurface or groundwater will be addressed, but Maine DEP felt that the approach should have been a smaller-scale application with additional monitoring and more oversight. The agreed-upon changes have allowed EPA to accelerate the cleanup of the groundwater beneath the Site, and continue to be protective of human health and the environment.

VI. STATUTORY DETERMINATIONS

Considering the above-described adjustments to the selected remedy set forth in the 1990 ROD, EPA believes that the remedy remains protective of human health and the environment.

Since this ESD results in the addition of new components to the selected remedy, any Federal or State requirement that are applicable or relevant and appropriate (ARARs) that apply to the change need to be identified and determined whether they are met or need to be waived. One new ARAR and one already identified ARAR, but in a different context, were first identified during the discussions on permanganate additions and re-injection of treated groundwater, and later with the addition of molasses and sodium lactate.

The State of Maine's Underground Injection Control Program regulations, 38 MSRA §413(1-B), Chapter 543, is an applicable requirement. Maine has been granted primacy of this Safe Drinking Water Act program and the use of wells to inject substances into the subsurface is specifically addressed by this regulation. This regulation states "Beneficial Use Wells are used to

improve either the quality or flow of aquifers or to provide some other groundwater management benefit. They include ... injection wells used to help clean up contaminated groundwater, either by injecting solutions to neutralize contamination or to return previously contaminated groundwater that has been treated" and are defined as a Class V wells. Use of a Class V well may occur, provided it does not "cause or allow the movement of fluid into an underground source of drinking water that may result in a violation of any Maine Primary Drinking Water Standard, or which may otherwise adversely affect human health" As agreed by Maine DEP, there are no State Primary Drinking Water Standards for permanganate, molasses or sodium lactate. Therefore, these additions comply with this ARAR.

The 1990 ROD established that the Safe Drinking Water Act MCLs and the State of Maine MEGs were relevant and appropriate requirements for the groundwater restoration performance standards while the State of Maine's Ambient Water Quality Criteria for surface water were used to set the Quiggle Brook discharge requirements. With the change in discharge location of the treated groundwater from the groundwater extraction and treatment system from Quiggle Brook to reinjection to the subsurface, this triggered the MCLs and MEGs as discharge requirements (This also triggered the UIC ARAR). Analyses of the treated water demonstrated that MCLs and MEGs for VOCs were being met by the treatment system. In addition, the reinjection of the treated groundwater met the UIC Class V criteria. Therefore, the change in discharge location of the treated groundwater complies with these ARARs.

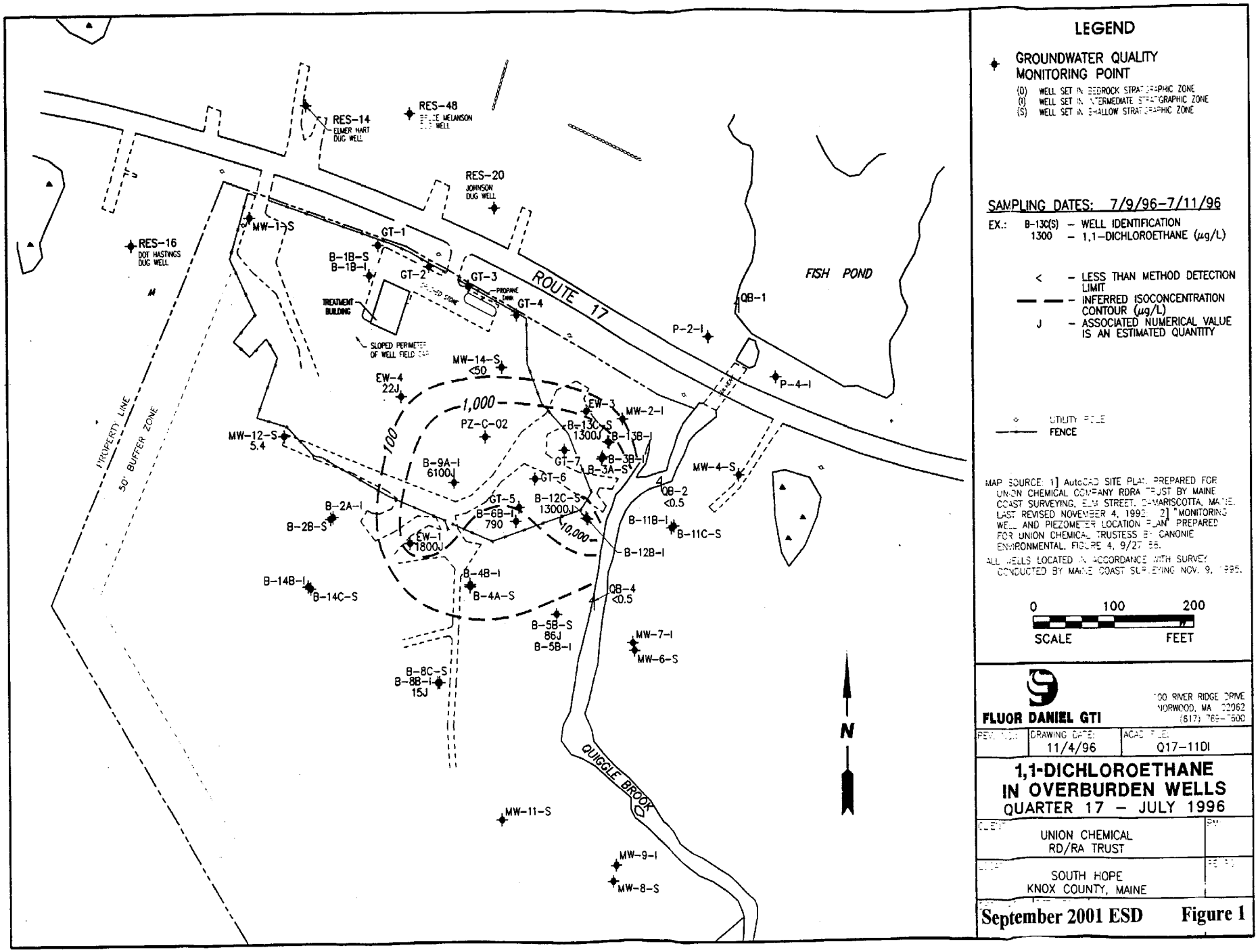
Therefore, EPA has determined that the revised remedy complies with Federal and State ARARs. In addition, by significantly decreasing the contaminant concentrations, the revised remedy greatly shortens the time frame to achieve groundwater restoration and is thereby cost-effective. Finally, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site. Therefore the modified remedy satisfies CERCLA Section 121(b).

VII. PUBLIC PARTICIPATION

This ESD, along with a Fact Sheet summarizing activities at the Site, are available for public review at the locations and times listed in Section I above. This Fact Sheet was sent to the South Hope community in May, 2001 and included a brief discussion of the permanganate additions and change in the discharge location for the treated groundwater. The local citizen group HCCE has participated in meetings with EPA, Maine DEP, and the Settling Defendants throughout this period where the work plans for these changes and the results of these changes to the ROD remedy have been discussed. HCCE agreed with the continuing enhancement of the groundwater restoration efforts. HCCE urged the Settling Defendants and the agencies to continue to explore new active clean-up technologies to bring the Site to restoration, and also expressed appreciation for the contingencies to ensure no impact to Quiggle Brook. Town officials were also pleased that active efforts were continuing to be made to restore the Site and they were looking forward to when the Site can be used productively again.

EXPLANATION OF SIGNIFICANT DIFFERENCES
UNION CHEMICAL COMPANY, INC. SUPERFUND SITE
SOUTH HOPE, MAINE

FIGURES



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

SAMPLING DATES: 7/9/96-7/11/96

EX.: B-13C(S) – WELL IDENTIFICATION
1300 – 1,1-DICHLOROETHANE (µg/L)

< – LESS THAN METHOD DETECTION LIMIT
– – – – INFERRED ISOCONCENTRATION CONTOUR (µg/L)
J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY

UTILITY POLE
FENCE

MAP SOURCE: 1] AutoCAD SITE PLAN, PREPARED FOR UNION CHEMICAL COMPANY RD/RA TRUST BY MAINE COAST SURVEYING, ELM STREET, CAMARISCOTTA, 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.

0 100 200
SCALE FEET

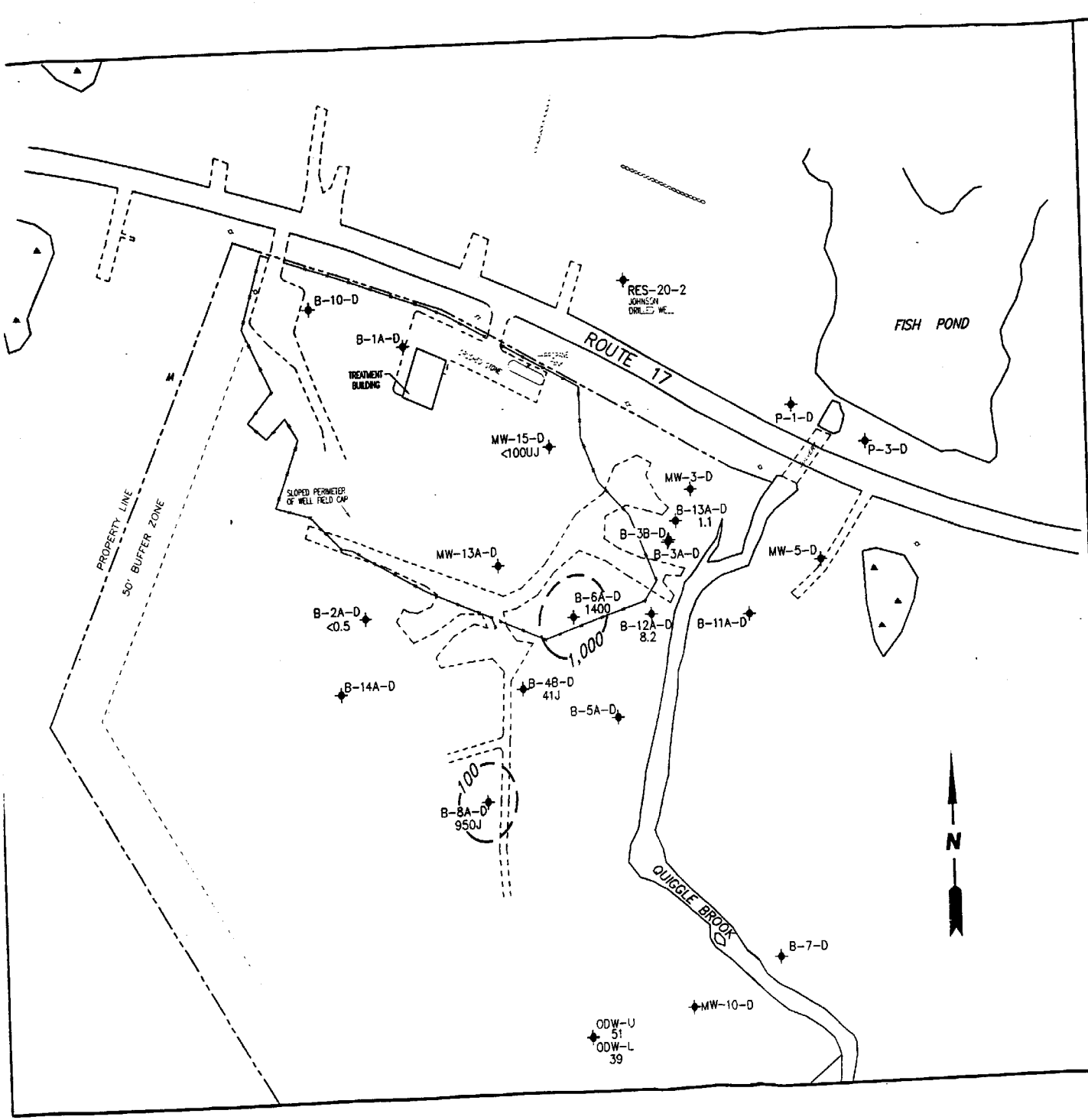
FLUOR DANIEL GTI
90 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(617) 769-7500

REV. NO.	DRAWING DATE:	ACAD FILE:
	11/4/96	Q17-11DI

1,1-DICHLOROETHANE IN OVERBURDEN WELLS
QUARTER 17 – JULY 1996

CLIENT	BY
UNION CHEMICAL RD/RA TRUST	
SITE	PROJECT NO.
SOUTH HOPE KNOX COUNTY, MAINE	

September 2001 ESD **Figure 1**



LEGEND

GROUNDWATER QUALITY MONITORING POINT

(D) WELL SET : BEDROCK STRATIGRAPHIC ZONE
(I) WELL SET : INTERMEDIATE STRATIGRAPHIC ZONE
(S) WELL SET : SHALLOW STRATIGRAPHIC ZONE

SAMPLING DATES: 7/9/96-7/11/96

EX.: B-4B-D – WELL IDENTIFICATION
41 – 1,1-DICHLOROETHANE (µg/L)

< or U – LESS THAN METHOD DETECTION LIMIT

– – – – INFERRED ISOCONCENTRATION CONTOUR (µg/L)

J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY

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

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995.

0 100 200
SCALE FEET

FLUOR DANIEL GTI
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(617) 769-7600

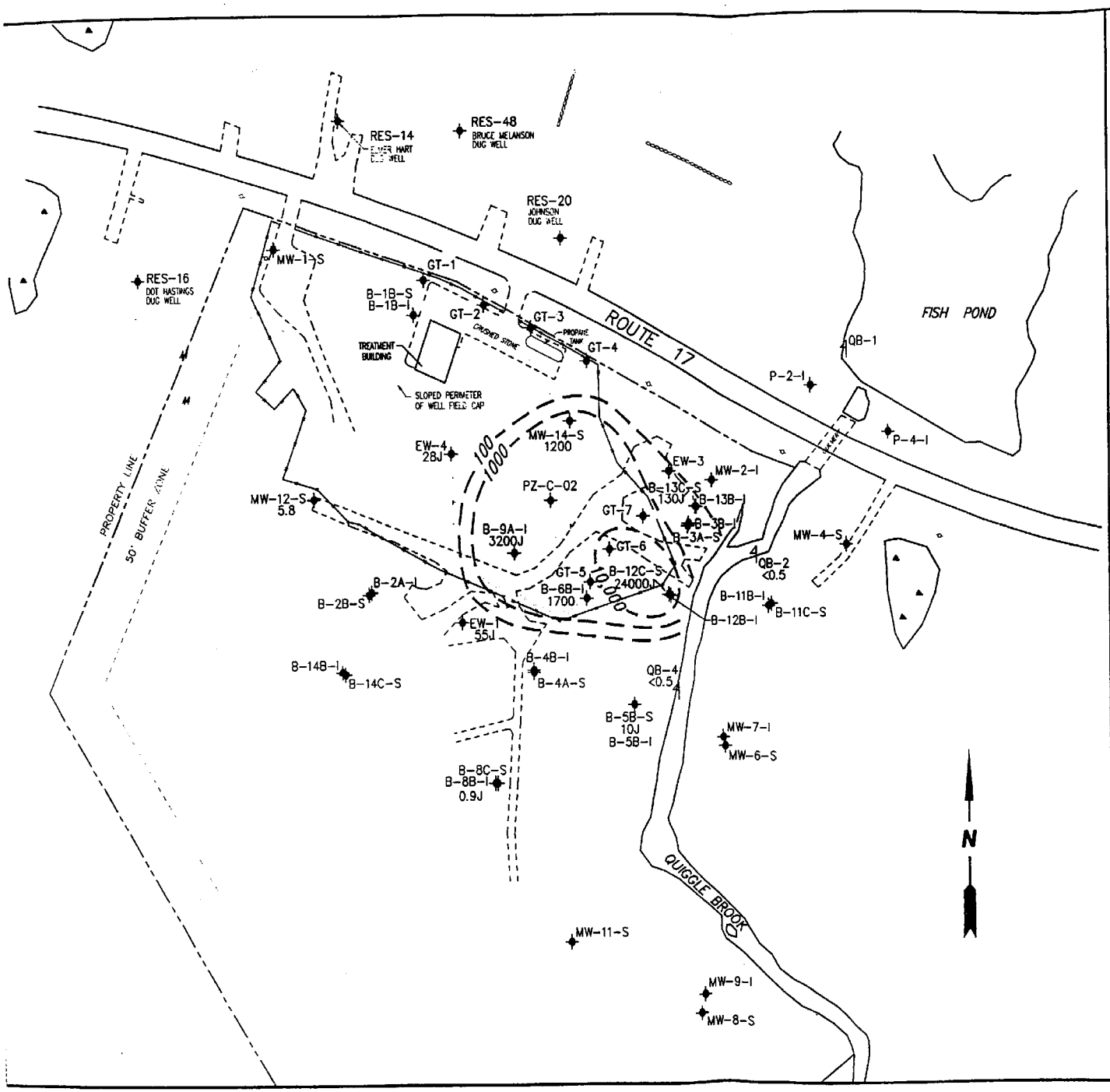
REV. NO.	DRAWING DATE	ACAD FILE
	11/4/96	Q17B11DC

1,1-DICHLOROETHANE IN BEDROCK WELLS
QUARTER 17 – JULY 1996

CLIENT	PM
UNION CHEMICAL RD/RA TRUST	
SOUTH HOPE KNOX COUNTY, MAINE	REVISED

September 2001 ESD

Figure 2



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

SAMPLING DATES: 7/9/96-7/11/96

EX.: MW-14(S) – WELL IDENTIFICATION
1200 – TRICHLOROETHENE (µg/L)

< – LESS THAN METHOD DETECTION LIMIT

— — – INFERRED ISOCONCENTRATION CONTOUR (µg/L)

J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY

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

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995.

0 100 200
SCALE FEET

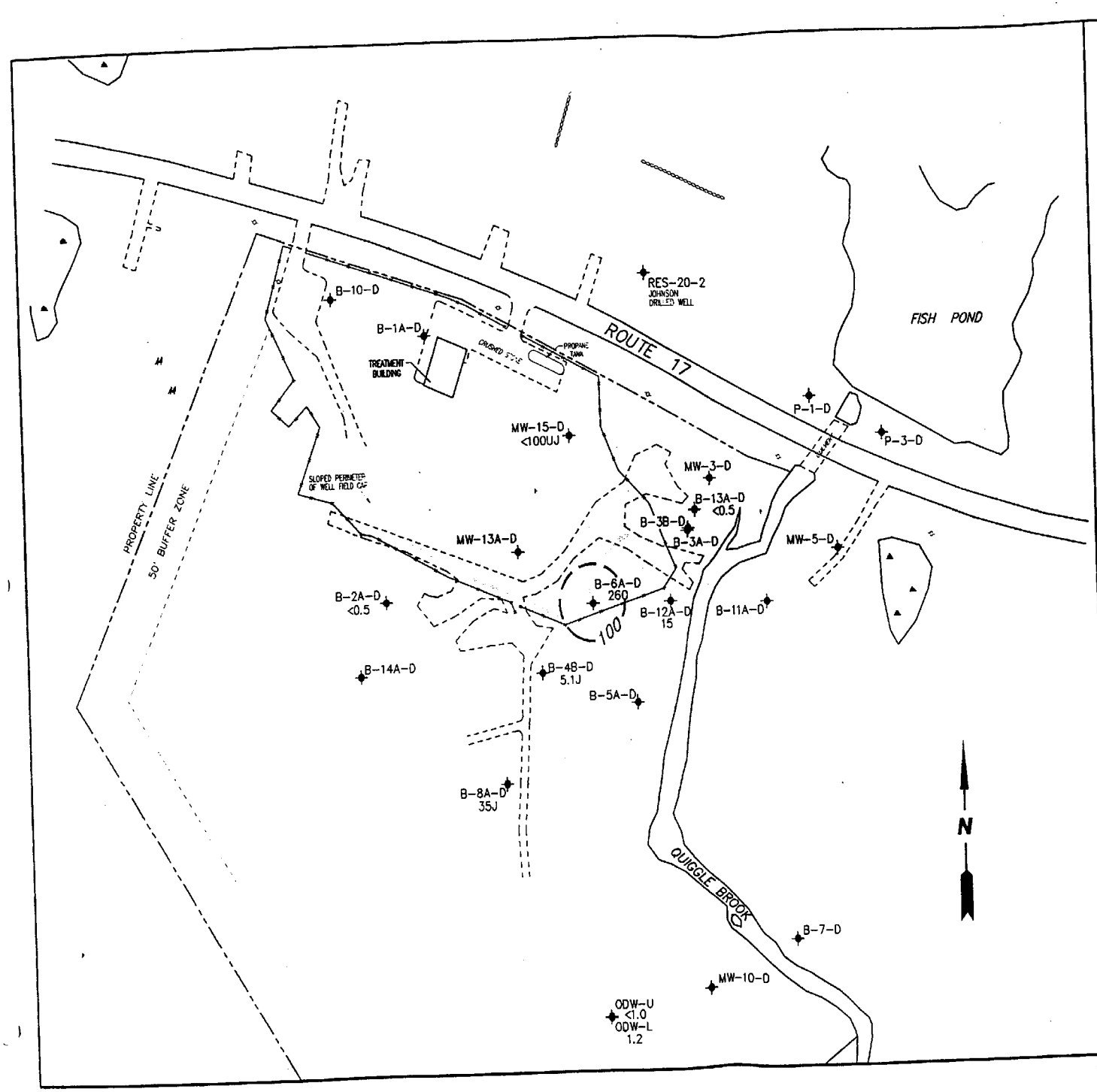
FLUOR DANIEL GTI
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(617) 769-7500

REV. NO.	DRAWING DATE:	ACAD FILE:
	11/4/96	Q17-TRI

TRICHLOROETHENE IN OVERBURDEN WELLS
QUARTER 17 – JULY 1996

CLIENT:	P/N:
UNION CHEMICAL RD/RA TRUST	
SOUTH HOPE KNOX COUNTY, MAINE	

September 2001 ESD **Figure 3**



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

SAMPLING DATES: 7/9/96–7/11/96

EX.: B-4B-D – WELL IDENTIFICATION
5.1 – TRICHLOROETHENE (µg/L)

< or U – LESS THAN METHOD DETECTION LIMIT

– – – – INFERRED ISOCONCENTRATION CONTOUR (µg/L)

J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY

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

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995.

0 100 200
SCALE FEET

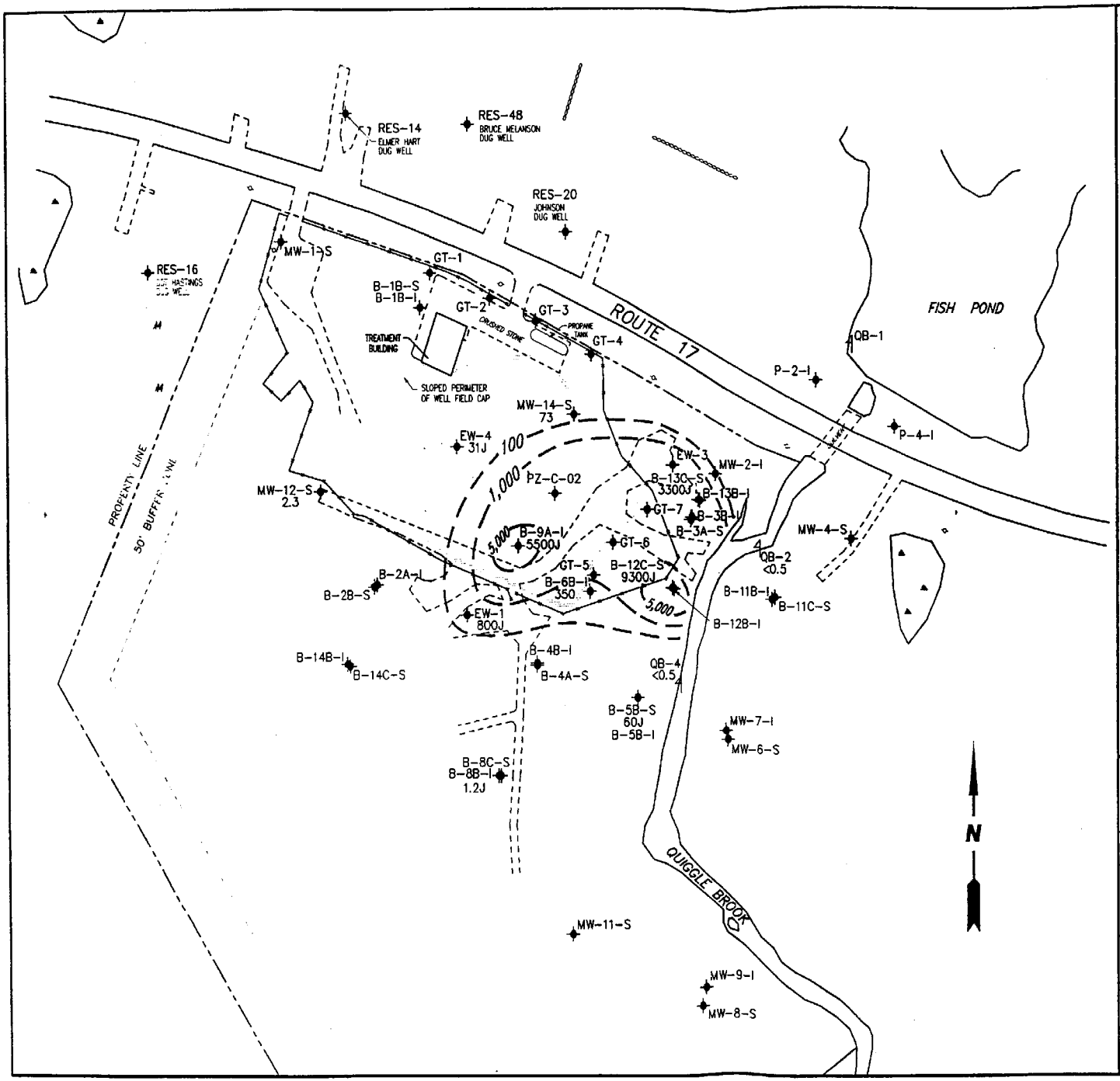
FLUOR DANIEL GTI
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(617) 769-7500

REV. NO.:	DRAWING DATE: 11/4/96	ACAD FILE: Q17BTCE

TRICHLOROETHENE IN BEDROCK WELLS QUARTER 17 – JULY 1996

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	
PROJECT: SOUTH HOPE KNOX COUNTY, MAINE	PE REG.

September 2001 ESD **Figure 4**



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

SAMPLING DATES: 7/9/96-7/11/96

EX.: B-13C(S) – WELL IDENTIFICATION
3300 – TOTAL 1,2-DICHLOROETHENE (µg/L)
< – LESS THAN METHOD DETECTION LIMIT
— — – INFERRED ISOCONCENTRATION CONTOUR (µg/L)
J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY

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

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995.

0 100 200
SCALE FEET

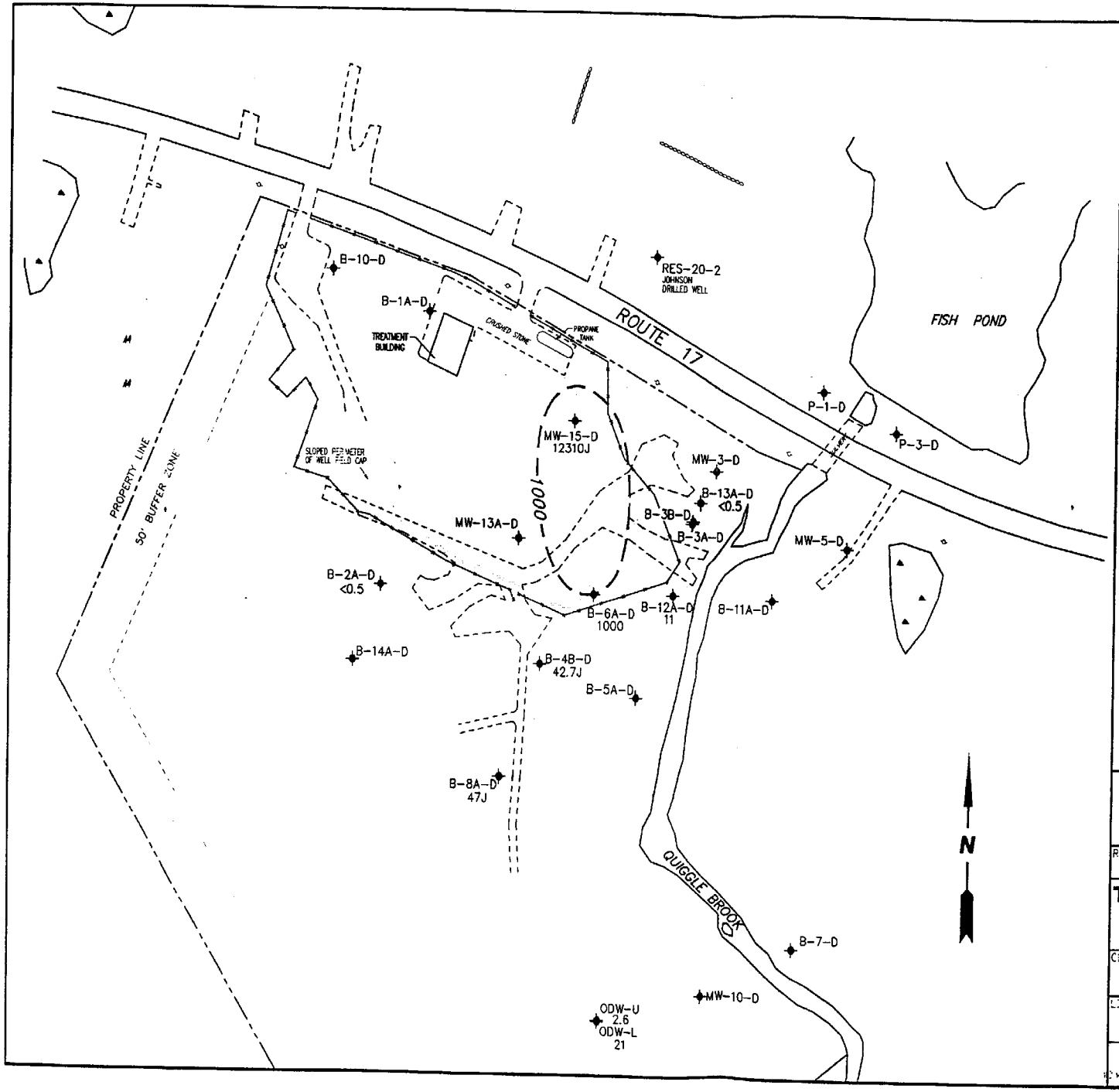
FLUOR DANIEL GTI
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(617) 769-7800

REV. NO.:	DRAWING DATE:	ACAD FILE:
	11/4/96	Q17-12DC

TOTAL 1,2-DICHLOROETHENE IN OVERBURDEN WELLS
QUARTER 17 – JULY 1996

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	REVISED:

September 2001 ESD **Figure 5**



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

SAMPLING DATES: 7/9/96-7/11/96

EX.: B-4B-D – WELL IDENTIFICATION
42.7 – TOTAL 1,2-DICHLOROETHENE (µg/L)

< – LESS THAN METHOD DETECTION LIMIT

— — – INFERRED ISOCONCENTRATION CONTOUR (µg/L)

J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY

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

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995.

0 100 200
SCALE FEET

FLUOR DANIEL GTI

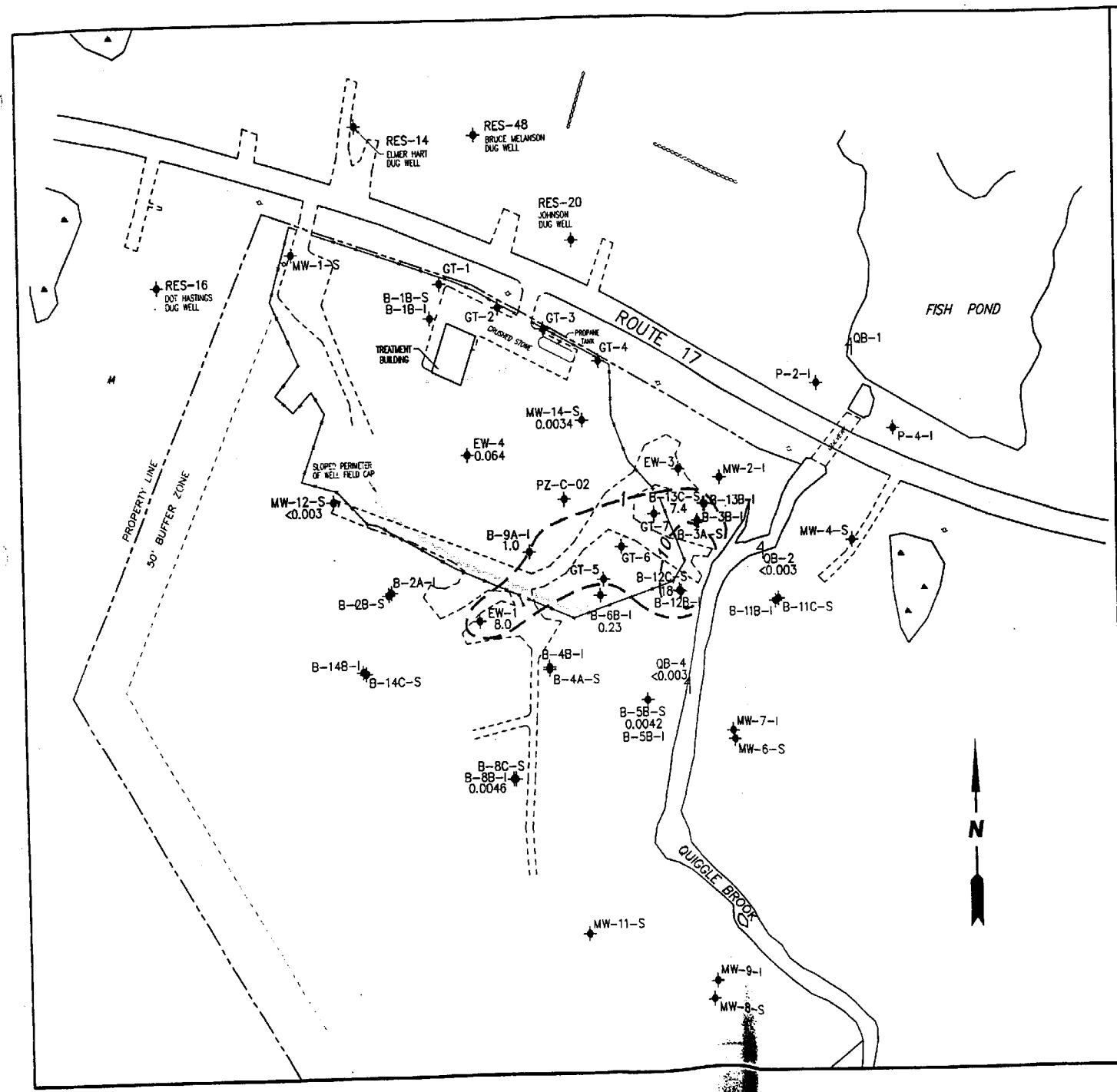
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 762-7600

REV. NO.:	DRAWING DATE:	ACAD FILE:
	11/4/96	Q17B12DC

TOTAL 1,2-DICHLOROETHENE IN BEDROCK WELLS
QUARTER 17 – JULY 1996

CLIENT:	BY:
UNION CHEMICAL RD/RA TRUST	
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	BE BY:

September 2001 ESD **Figure 6**



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

SAMPLING DATES: 7/9/96-7/11/96

EX.: B-13C(S) – WELL IDENTIFICATION
7.4 – DIMETHYLFORMAMIDE (mg/L)

< – LESS THAN METHOD DETECTION LIMIT

– – – – INFERRED ISOCONCENTRATION CONTOUR (m/L)

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

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995.

0 100 200
SCALE FEET

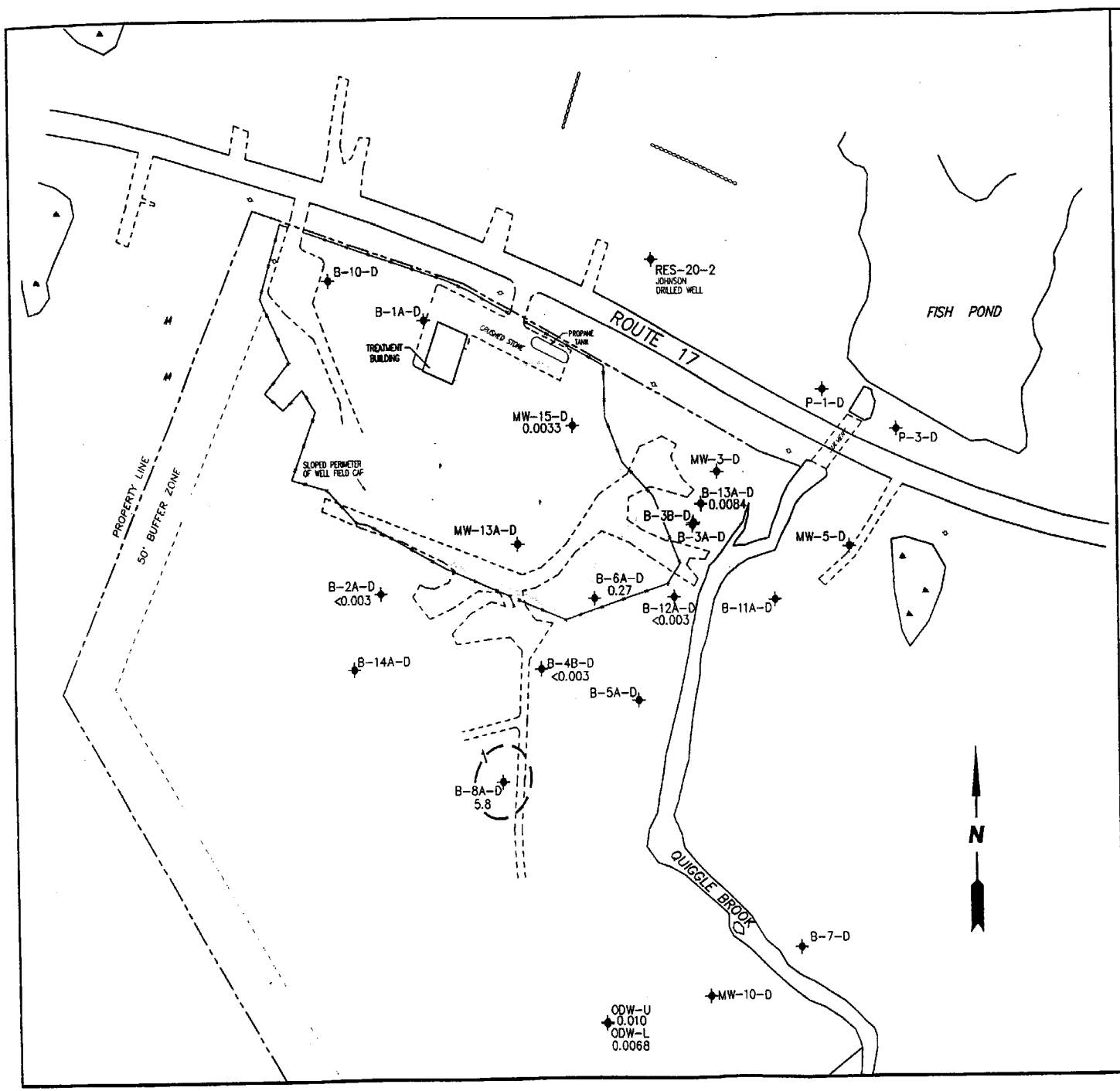
FLUOR DANIEL GTI
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(617) 769-7800

REV. NO.:	DRAWING DATE:	ACAD FILE:
	9/16/96	Q17-DMF

DIMETHYLFORMAMIDE (DMF) IN OVERBURDEN WELLS
QUARTER 17 – JULY 1996

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/RG:

September 2001 ESD **Figure 7**



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

SAMPLING DATES: 7/9/96-7/11/96

EX.: MW-15-D – WELL IDENTIFICATION
3.3 – DIMETHYLFORMAMIDE (mg/L)

< – LESS THAN METHOD DETECTION LIMIT

– – – – INFERRED ISOCONCENTRATION CONTOUR (mg/L)

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

ALL WELLS LOCATED IN ACCORDANCE WITH SURVEY CONDUCTED BY MAINE COAST SURVEYING NOV. 9, 1995.

0 100 200
SCALE FEET

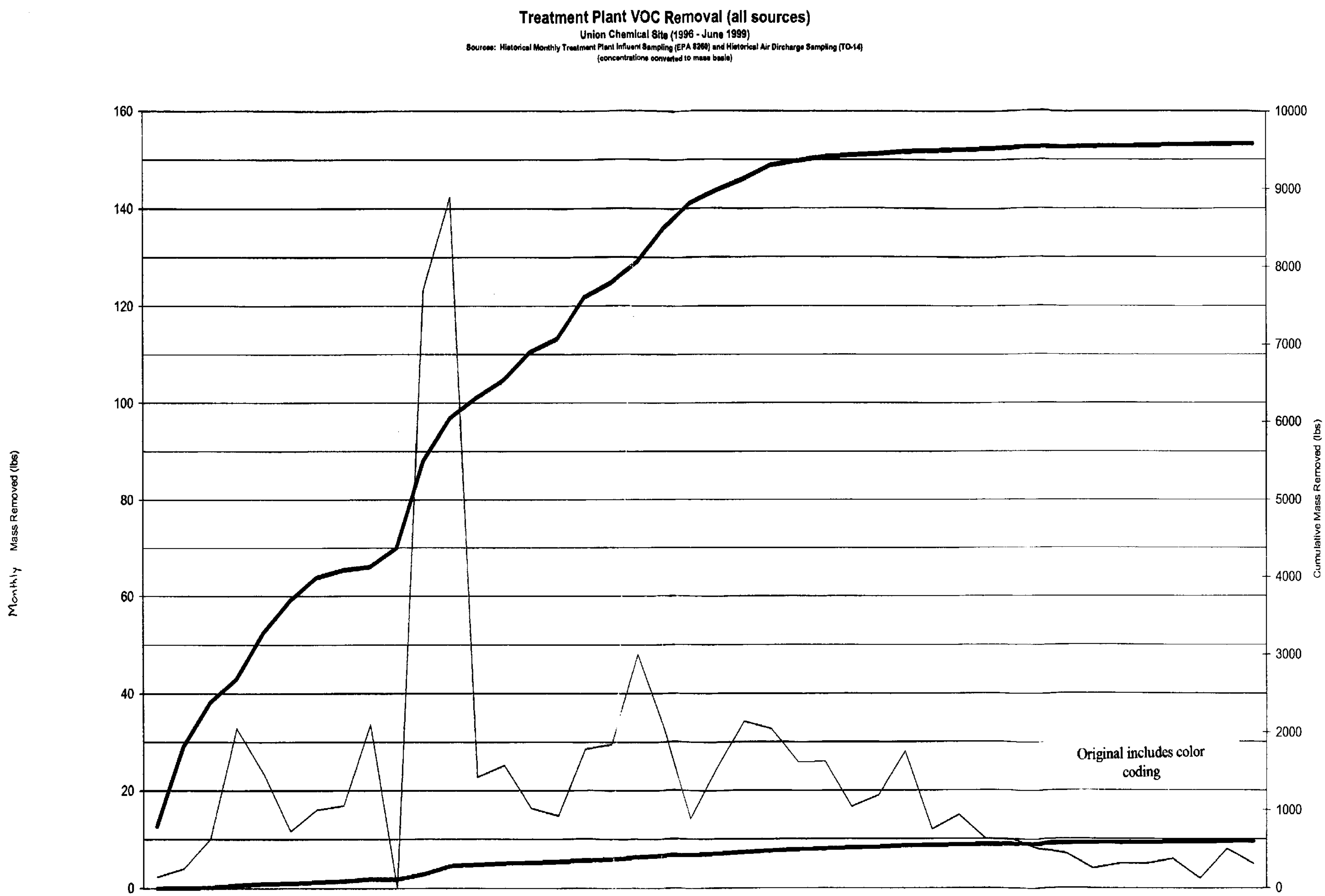
FLUOR DANIEL GTI
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(617) 769-7500

REV. NO.:	DRAWING DATE:	ACAD FILE:
	9/16/96	Q17BDMF

DIMETHYLFORMAMIDE (DMF) IN BEDROCK WELLS
QUARTER 17 – JULY 1996

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE. RG.

September 2001 ESD Figure 8

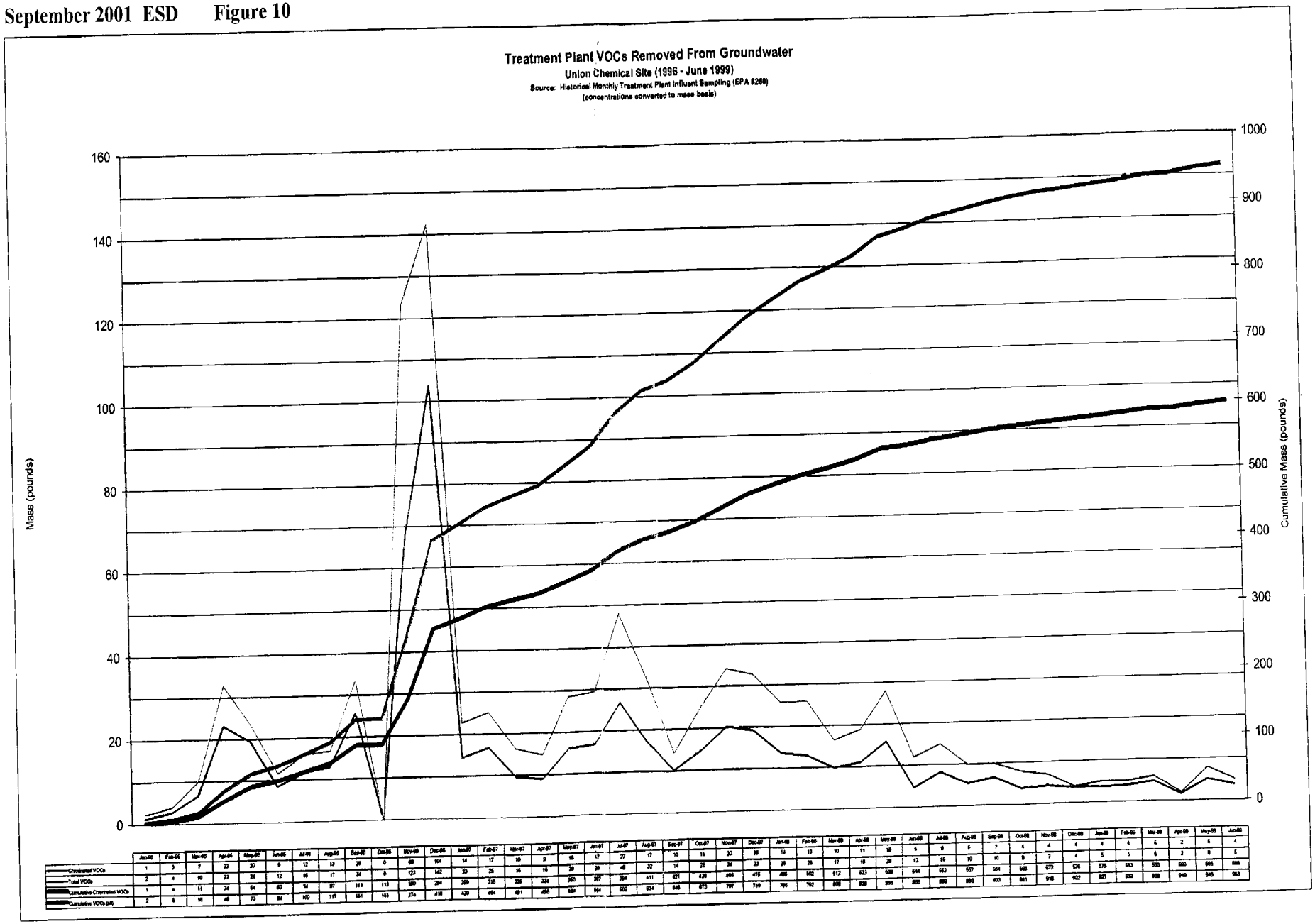


	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96	Jan-97	Feb-97
VOC Mass Removed from Groundwater	2	4	10	33	24	12	16	17	34	0	122	142	23	25
Cumulative Chlorinated VOCs in Groundwater	1	4	11	34	54	62	74	87	113	113	180	284	289	316
Cumulative Total Mass (all Sources)	791	1,848	2,384	2,687	3,280	3,696	3,980	4,080	4,131	4,389	5,488	6,049	6,312	6,538

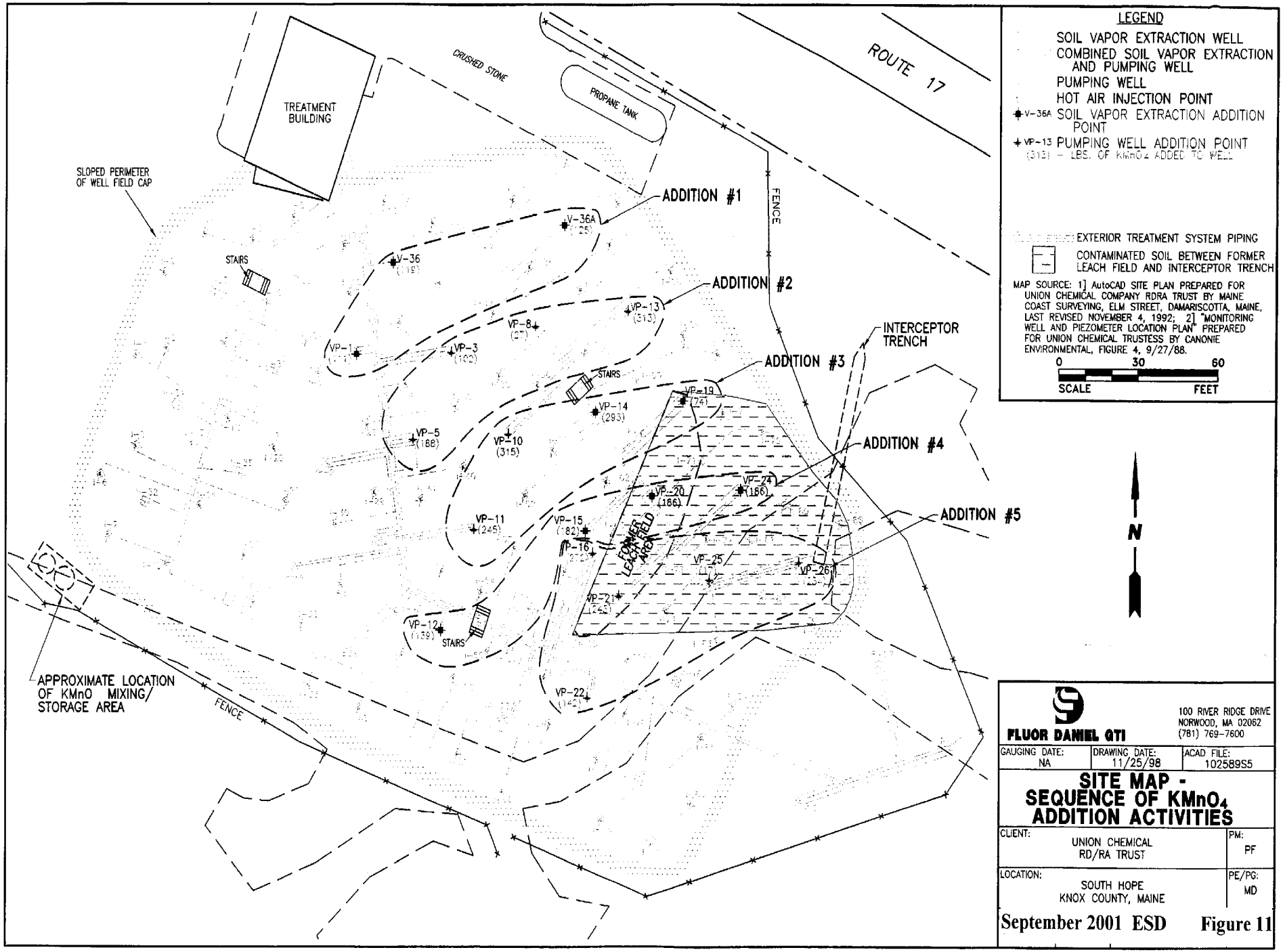
	Mar-97	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Jan-98	Feb-98	Mar-98	Apr-98
VOC Mass Removed from Groundwater	16	15	29	[illegible]	48	32	14	25	34	33	26	26	17	19
Cumulative Chlorinated VOCs in Groundwater	326	334	350	357	394	411	421	436	466	476	489	502	512	523
Cumulative Total Mass (all Sources)	6,906	7,080	7,612	7,796	8,087	8,505	8,817	8,986	9,132	9,303	9,380	9,416	9,436	9,454

	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
VOC Mass Removed from Groundwater	28	12	15	10	10	8	7	4	5	5	6	2	8	5
Cumulative Chlorinated VOCs in Groundwater	539	544	552	567	564	568	572	576	579	583	588	590	596	598
Cumulative Total Mass (all Sources)	9,482	9,494	9,509	9,518	9,529	9,537	9,544	9,548	9,553	9,558	9,564	9,565	9,574	9,579

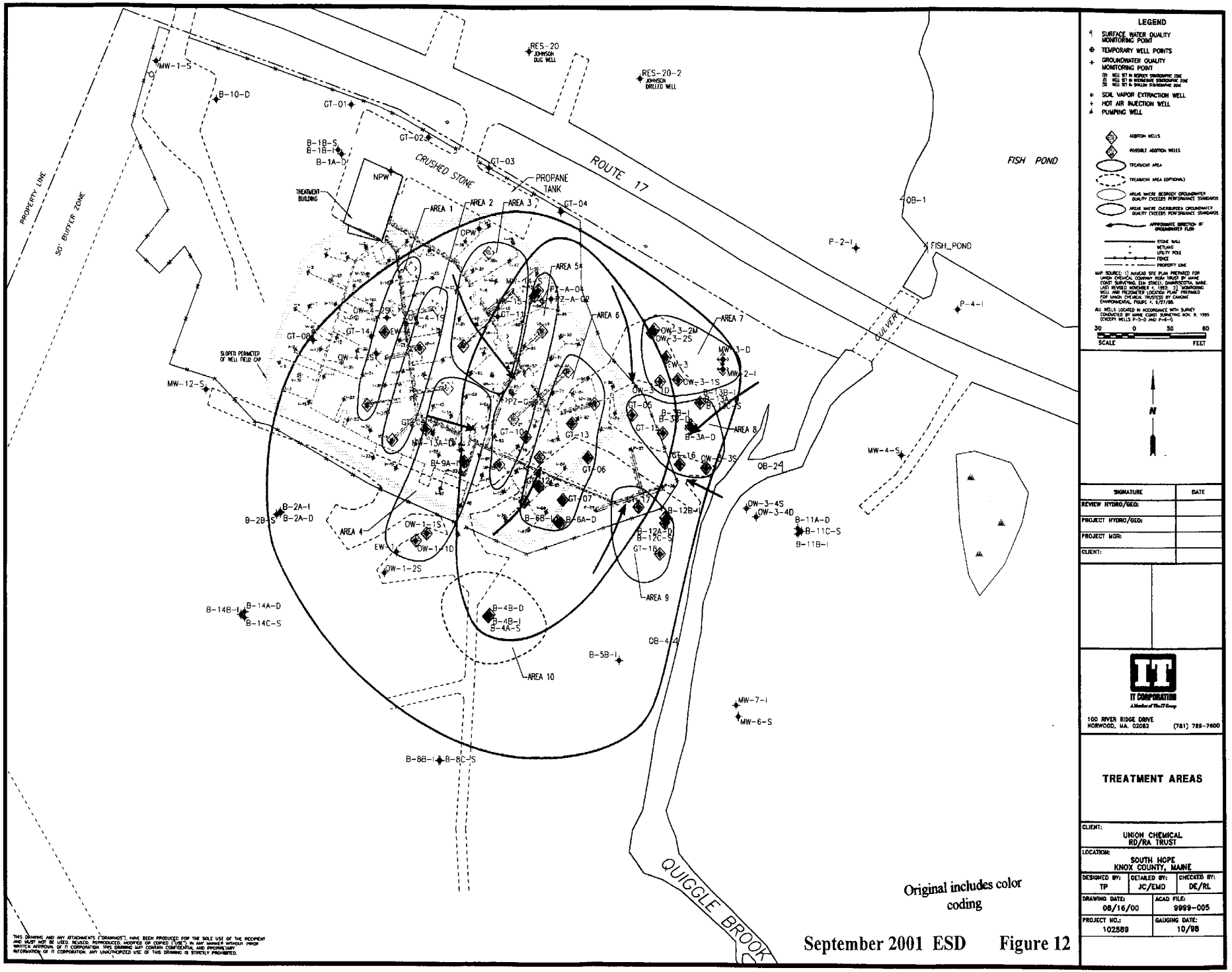
September 2001 ESD **Figure 10**



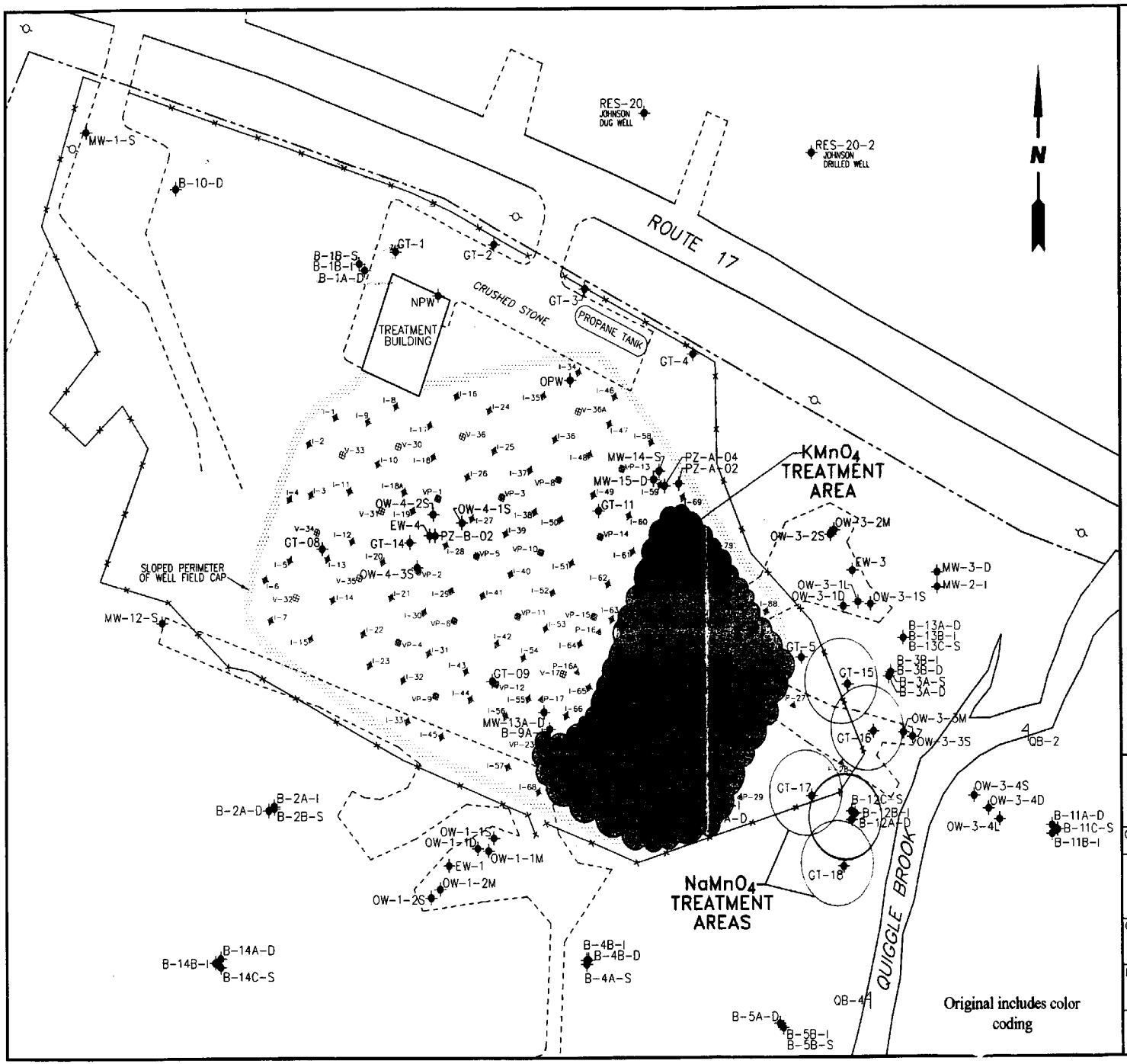
Original includes color coding



Original includes color coding



Original includes color coding



Original includes color coding

LEGEND

- SOIL VAPOR EXTRACTION WELL
- PUMPING WELL/SOIL VAPOR EXTRACTION WELL COUPLET
- HOT AIR INJECTION WELL
- PUMPING WELL
- 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

- WETLAND
- UTILITY POLE
- STONE WALL
- FENCE
- GRAVEL ROAD
- PROPERTY LINE

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 TRUSTESS 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 P-5-D & P-6-I, GT-15 THROUGH GT-18).

0 50 100

SCALE FEET

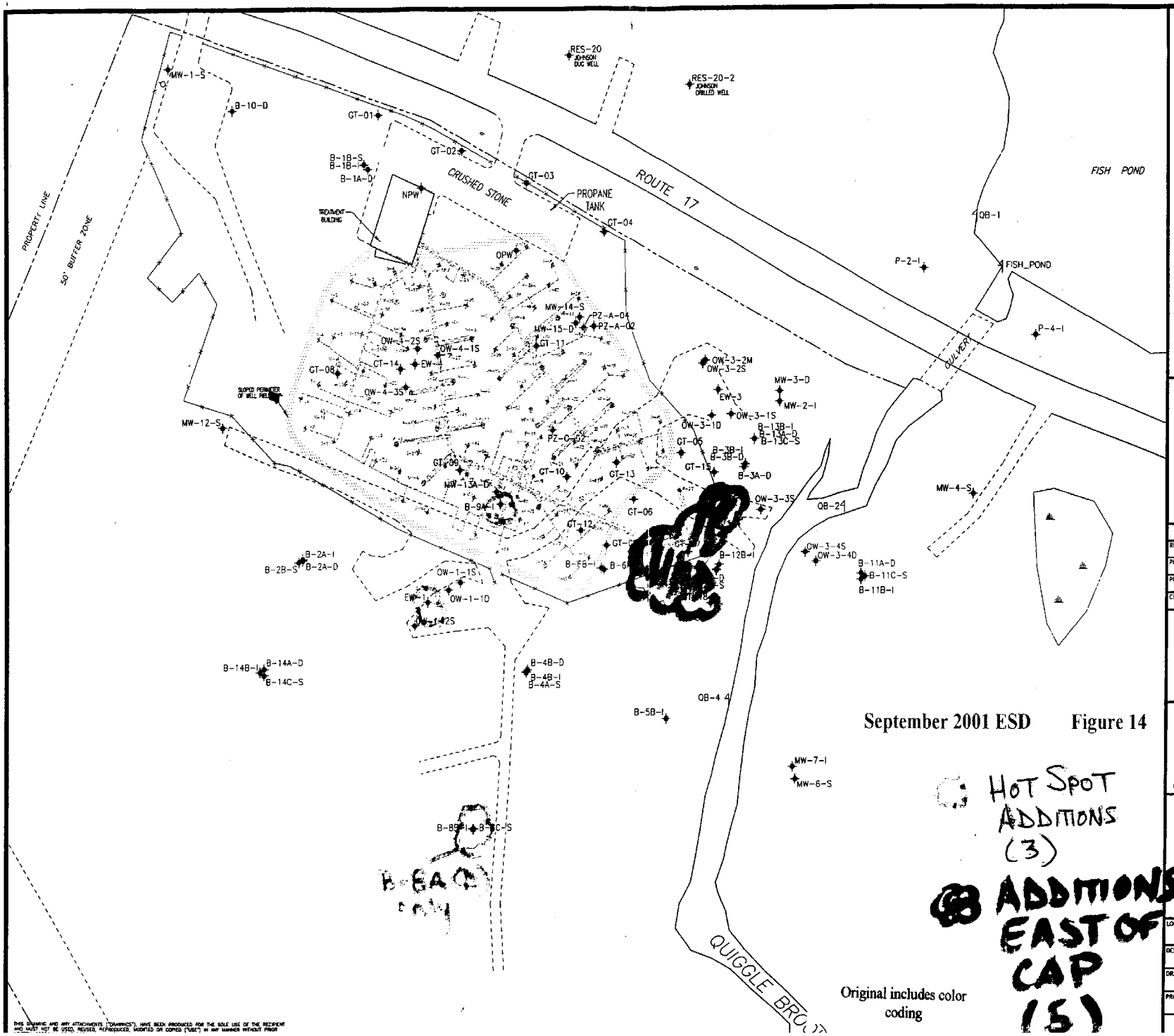
IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

GAUGING DATE:	DRAWING DATE:	ACAD FILE: 9999-SITE_5-00
NA	05/24/00	DWG. TAB: 2000-ACTIVITIES

TREATMENT AREAS 2000 ACTIVITIES

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	DE
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP

September 2001 ESD **Figure 13**

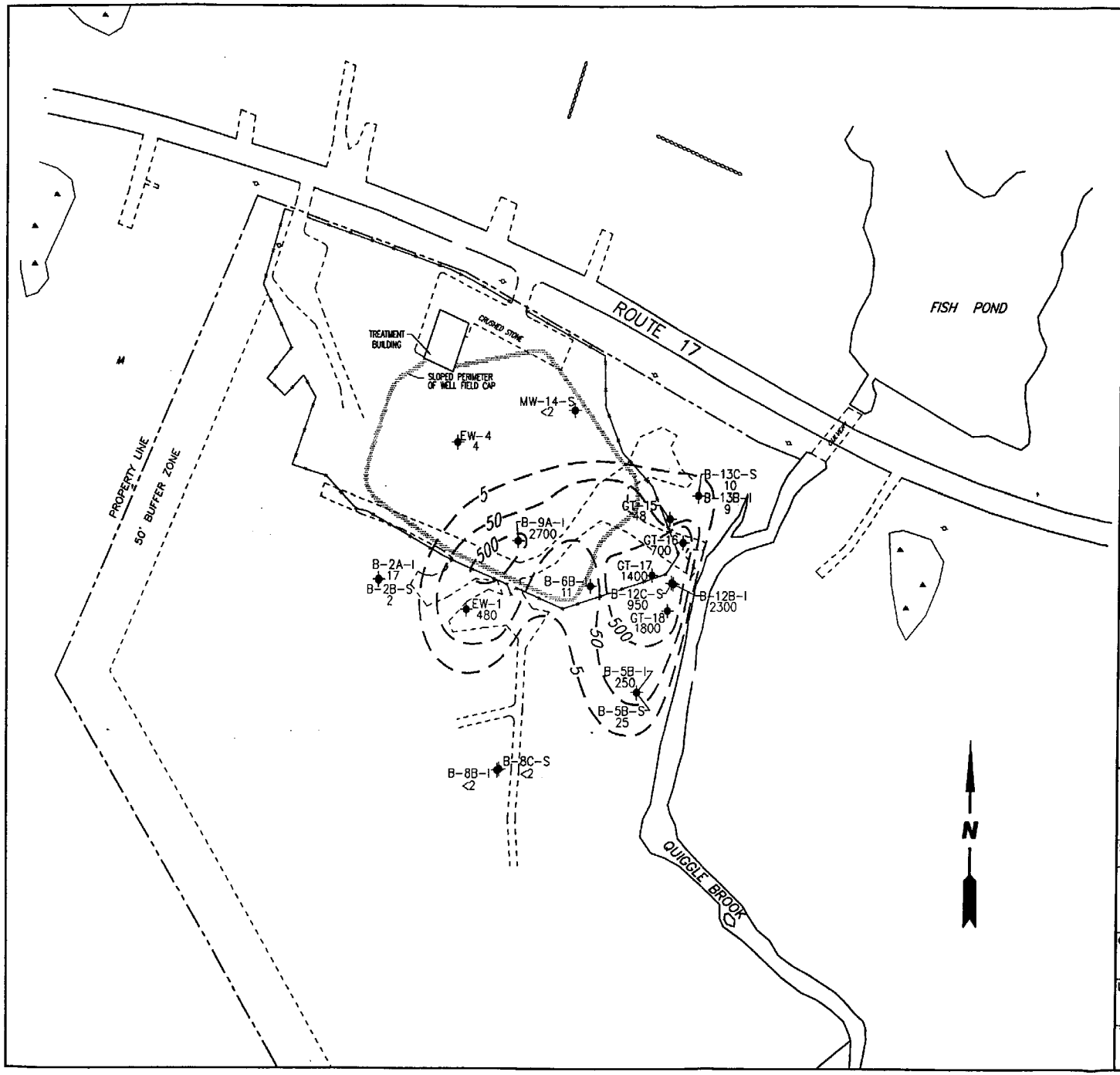


September 2001 ESD Figure 14

HOT SPOT ADDITIONS (3)

6 ADDITIONS EAST OF CAP (5)

Original includes color coding



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: 04/30/01-05/04/01

EX.: B-13C-S – WELL IDENTIFICATION
10 – 1,1-DICHLOROETHANE (µg/L)

NOTE: ISOCONCENTRATION CONTOURS BASED ON ALL GROUNDWATER SAMPLES COLLECTED DURING Q29. 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
U – NOT DETECTED
B – CONSTITUENT IDENTIFIED IN TRIP BLANK
( ) – CONCENTRATION NOT USED IN CONTOURING

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

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

0 100 200
SCALE FEET

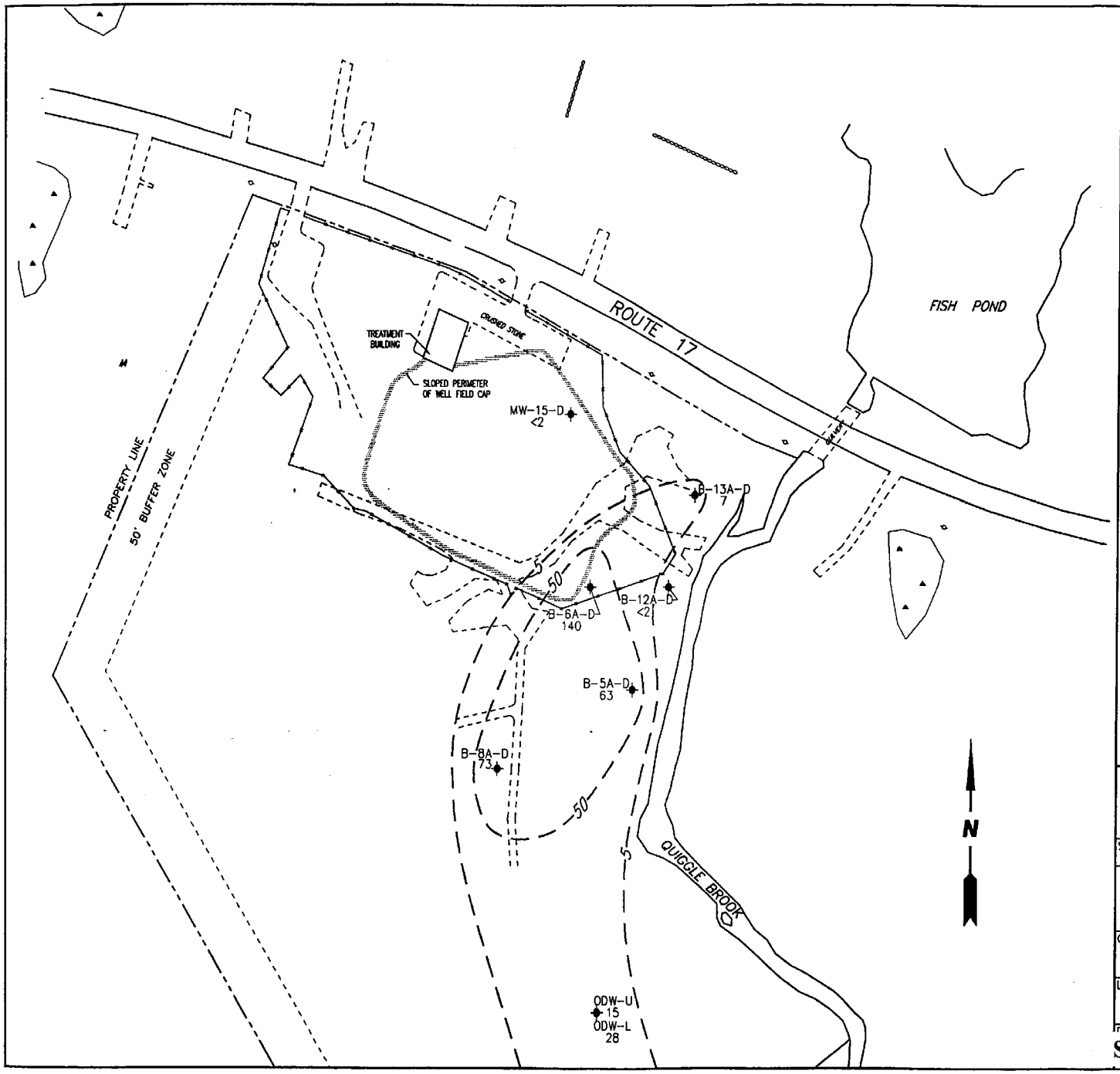
IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

SAMPLING DATES:	DRAWING DATE:	ACAD FILE:
04/30/01-05/04/01	06/25/01	Q29-11di

1,1-DICHLOROETHANE IN OVERBURDEN WELLS
Q29 – APRIL/MAY 2001

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	TP
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP

September 2001 ESD **Figure 15**



LEGEND

4 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: 04/30/01-05/04/01

EX.: B-13A-D – WELL IDENTIFICATION
7 – 1,1-DICHLOROETHANE (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

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

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

0 100 200
SCALE FEET

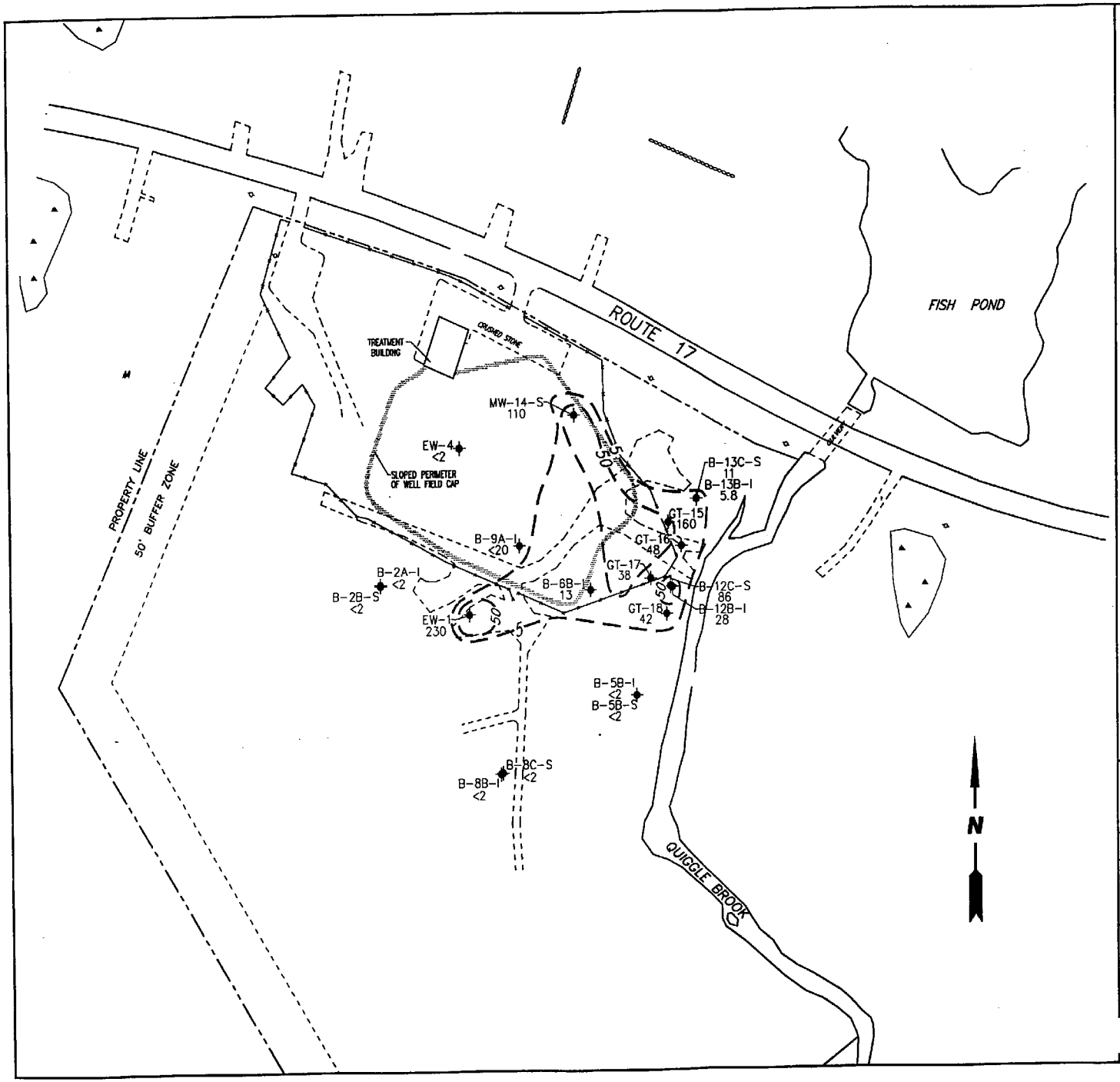
IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

SAMPLING DATES:	DRAWING DATE:	ACAD FILE:
04/30/01-05/04/01	06/14/01	Q29B11DI

1,1-DICHLOROETHANE IN BEDROCK WELLS
Q29 – APRIL/MAY 2001

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	TP
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP
DESIGNED: DETAILED: PROJECT NO.:	FIGURE:

September 2001 ESD Figure 16



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: 04/30/01-05/04/01

EX.: B-13C-S – WELL IDENTIFICATION
11 – TRICHLOROETHENE (µg/L)

NOTE: ISOCONCENTRATION CONTOURS BASED ON ALL GROUNDWATER SAMPLES COLLECTED DURING Q29. 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
- U – NOT DETECTED
- B – CONSTITUENT IDENTIFIED IN TRIP BLANK
- ( ) – CONCENTRATION NOT USED IN CONTOURING

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

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

0 100 200
SCALE FEET

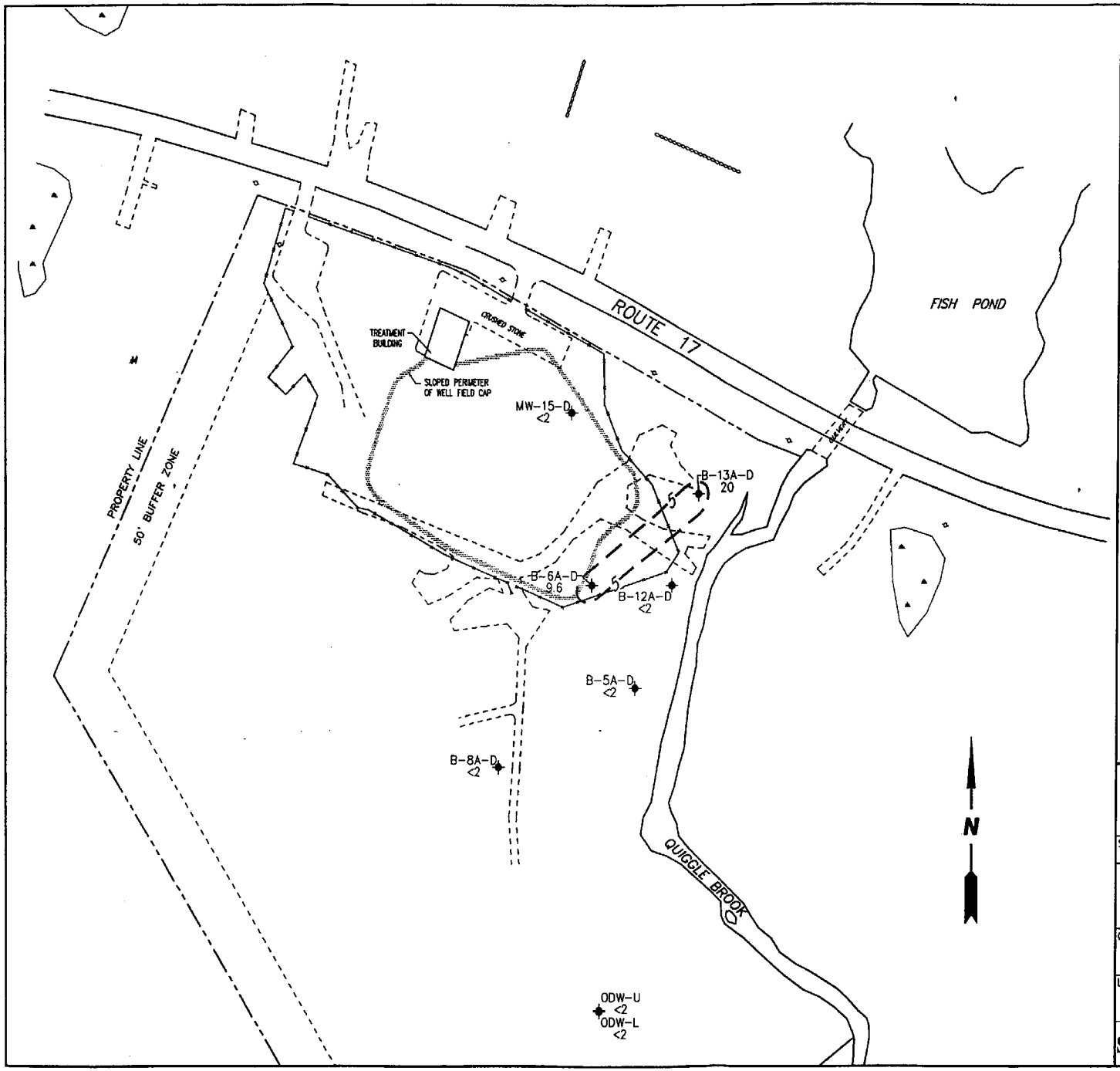
IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

SAMPLING DATES:	DRAWING DATE:	ACAD FILE:
04/30/01-05/04/01	06/25/01	Q29-TCE

TRICHLOROETHENE IN OVERBURDEN WELLS
Q29 – APRIL/MAY 2001

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	TP
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP

September 2001 ESD **Figure 17**



LEGEND

4 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: 04/30/01-05/04/01

EX.: B-13A-D – WELL IDENTIFICATION
20 – TRICHLOROETHENE (µg/L)

< or U – LESS THAN METHOD DETECTION LIMIT

– – – – INFERRED ISOCONCENTRATION CONTOUR (µg/L)

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

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

0 100 200
SCALE FEET

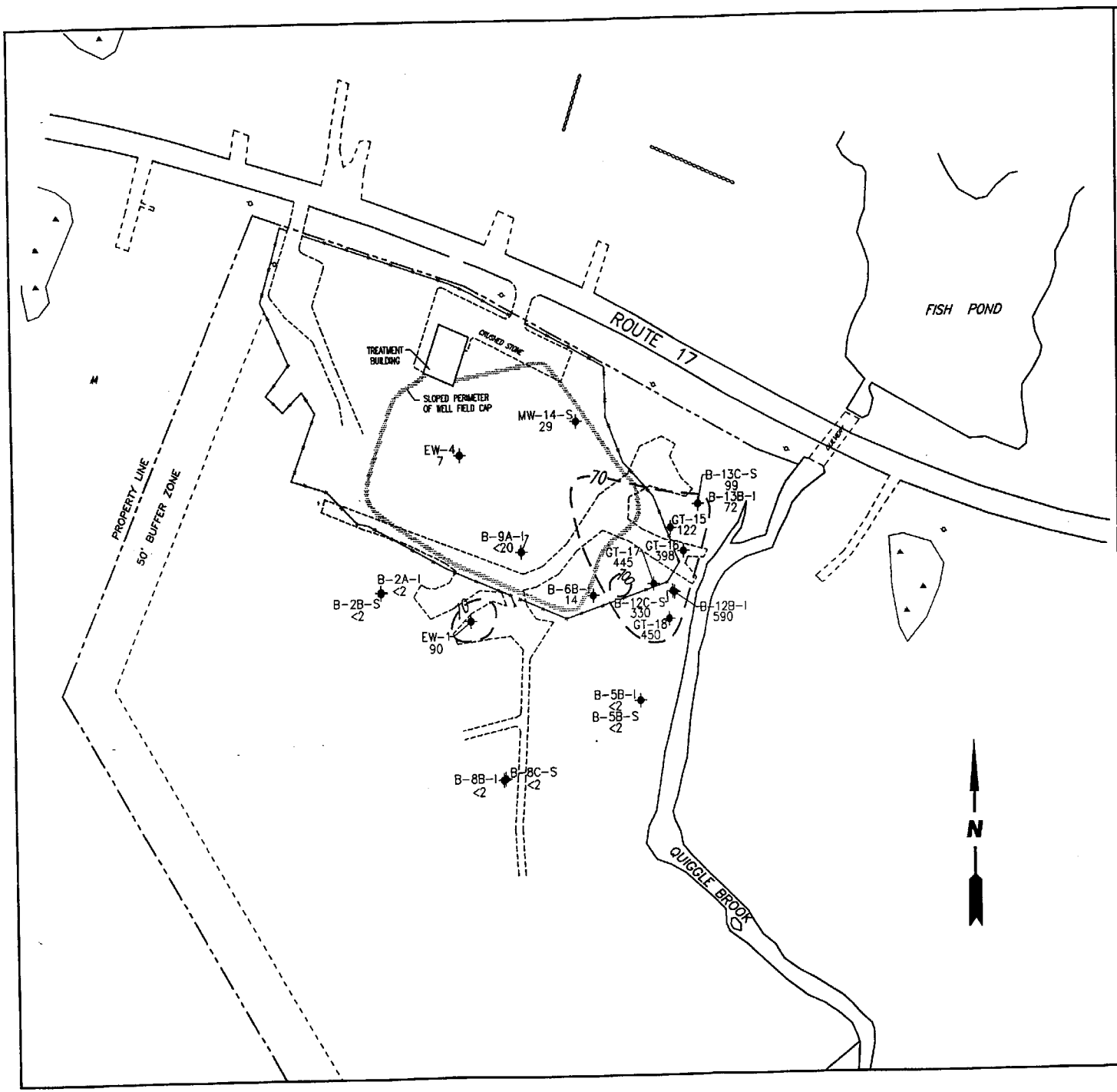
IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

SAMPLING DATES:	DRAWING DATE:	ACAD FILE:
04/30/01-05/04/01	06/14/01	Q29BTCE

TRICHLOROETHENE IN BEDROCK WELLS
Q29 – APRIL/MAY 2001

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	TP
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP

September 2001 ESD **Figure 18**



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: 04/30/01-05/04/01

EX.: B-13C-S- WELL IDENTIFICATION
99 - TOTAL 1,2-DICHLOROETHENE (µg/L)

NOTE: ISOCONCENTRATION CONTOURS BASED ON ALL GROUNDWATER SAMPLES COLLECTED DURING Q29. 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
- U - NOT DETECTED
- B - CONSTITUENT IDENTIFIED IN TRIP BLANK
- ( ) - CONCENTRATION NOT USED IN CONTOURING

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

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

0 100 200
SCALE FEET

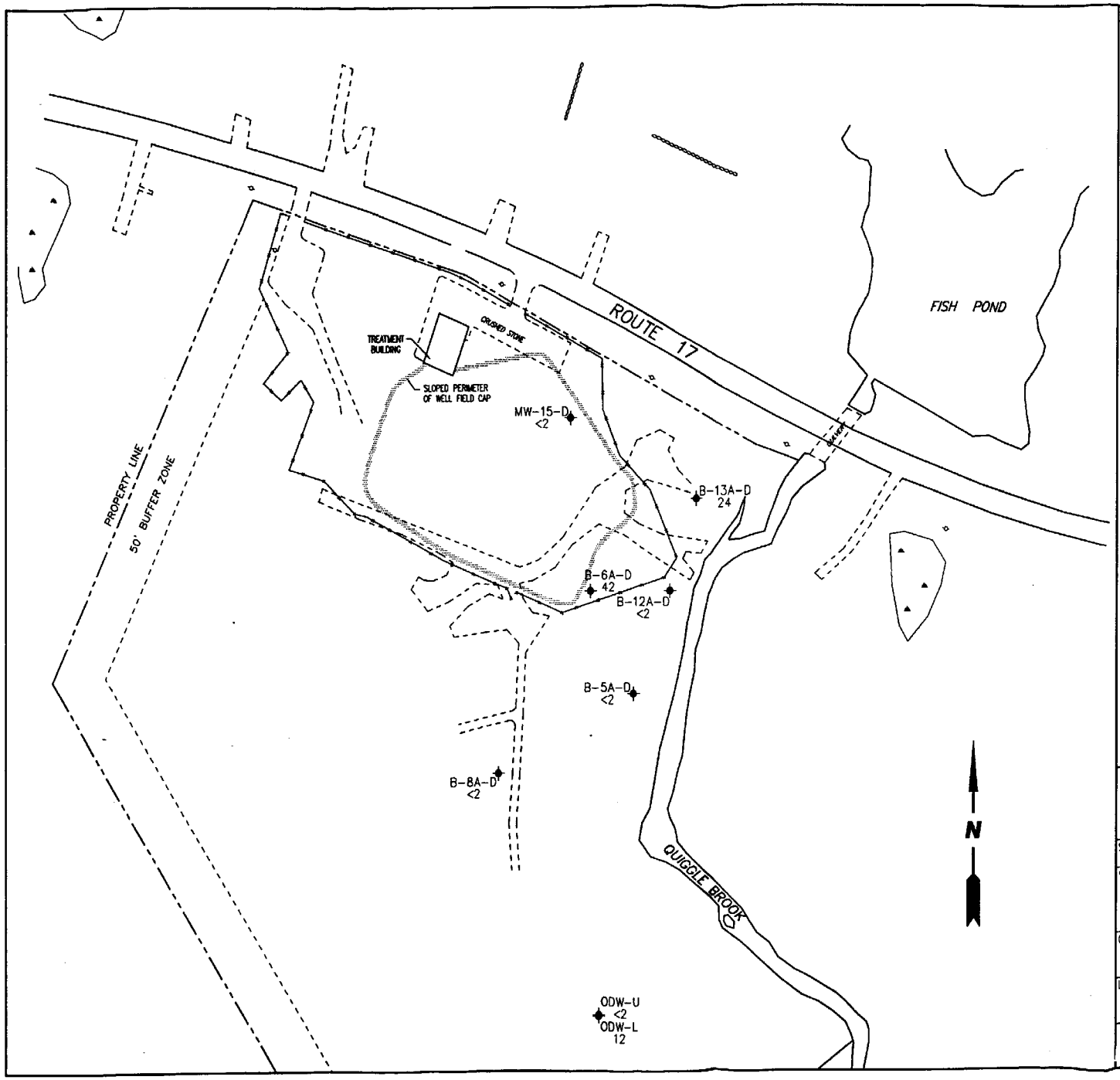
IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

SAMPLING DATES:	DRAWING DATE:	ACAD FILE:
04/30/01-05/04/01	06/25/01	Q29-12DC

TOTAL 1,2-DICHLOROETHENE IN OVERBURDEN WELLS
Q29 - APRIL/MAY 2001

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	TP
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP

September 2001 ESD Figure 19



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: 04/30/01-05/04/01

EX.: B-13A-D - WELL IDENTIFICATION
24 - TOTAL 1,2-DICHLOROETHENE (µg/L)

< or U - LESS THAN METHOD DETECTION LIMIT

NOTE: ISOCONCENTRATION CONTOURS NOT DRAWN SINCE ALL DETECTED VALUES ARE BELOW THE GROUNDWATER CLEANUP LEVEL (70 µg/L).

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

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

0 100 200
SCALE FEET

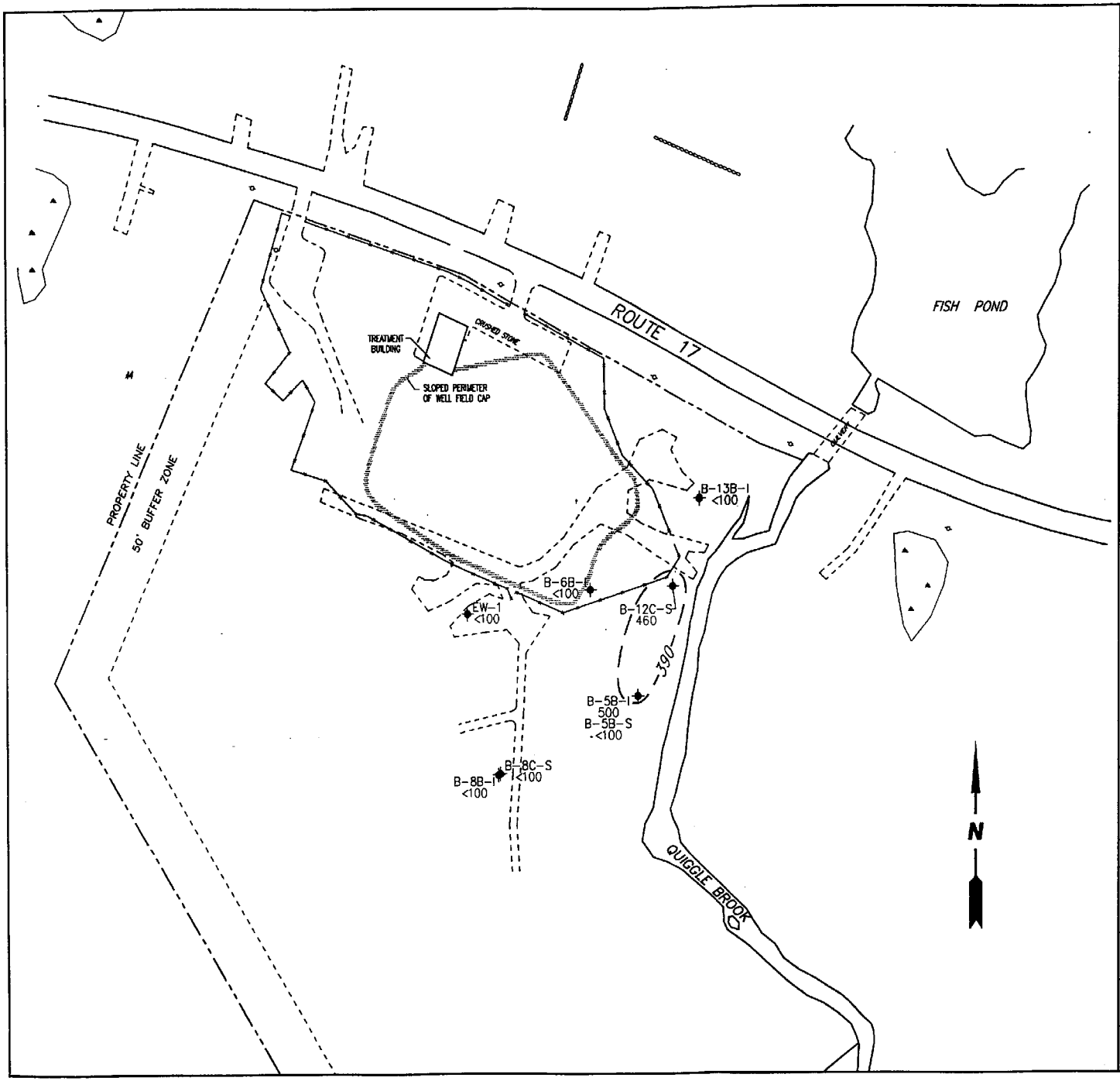
IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

SAMPLING DATES:	DRAWING DATE:	ACAD FILE:
04/30/01-05/04/01	06/14/01	Q29B12DC

TOTAL 1,2-DICHLOROETHENE IN BEDROCK WELLS
Q29 - APRIL/MAY 2001

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	TP
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP

September 2001 ESD **Figure 20**



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: 04/30/01-05/04/01

EX.: B-12C-S – WELL IDENTIFICATION
460 – DIMETHYLFORMAMIDE (µg/L)

NOTE: ISOCONCENTRATION CONTOURS BASED ON ALL GROUNDWATER SAMPLES COLLECTED DURING Q29. ONLY DATA FROM WELLS IN FSP FOR QUARTERLY SAMPLING ARE POSTED.

- < or U – LESS THAN METHOD DETECTION LIMIT
- — — – INFERRED ISOCONCENTRATION CONTOUR (mg/L)
- J – ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
- D – CONSTITUENT IDENTIFIED IN DILUTED SAMPLE
- U – NOT DETECTED
- B – CONSTITUENT IDENTIFIED IN TRIP BLANK
- ( ) – CONCENTRATION NOT USED IN CONTOURING

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

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

0 100 200
SCALE FEET

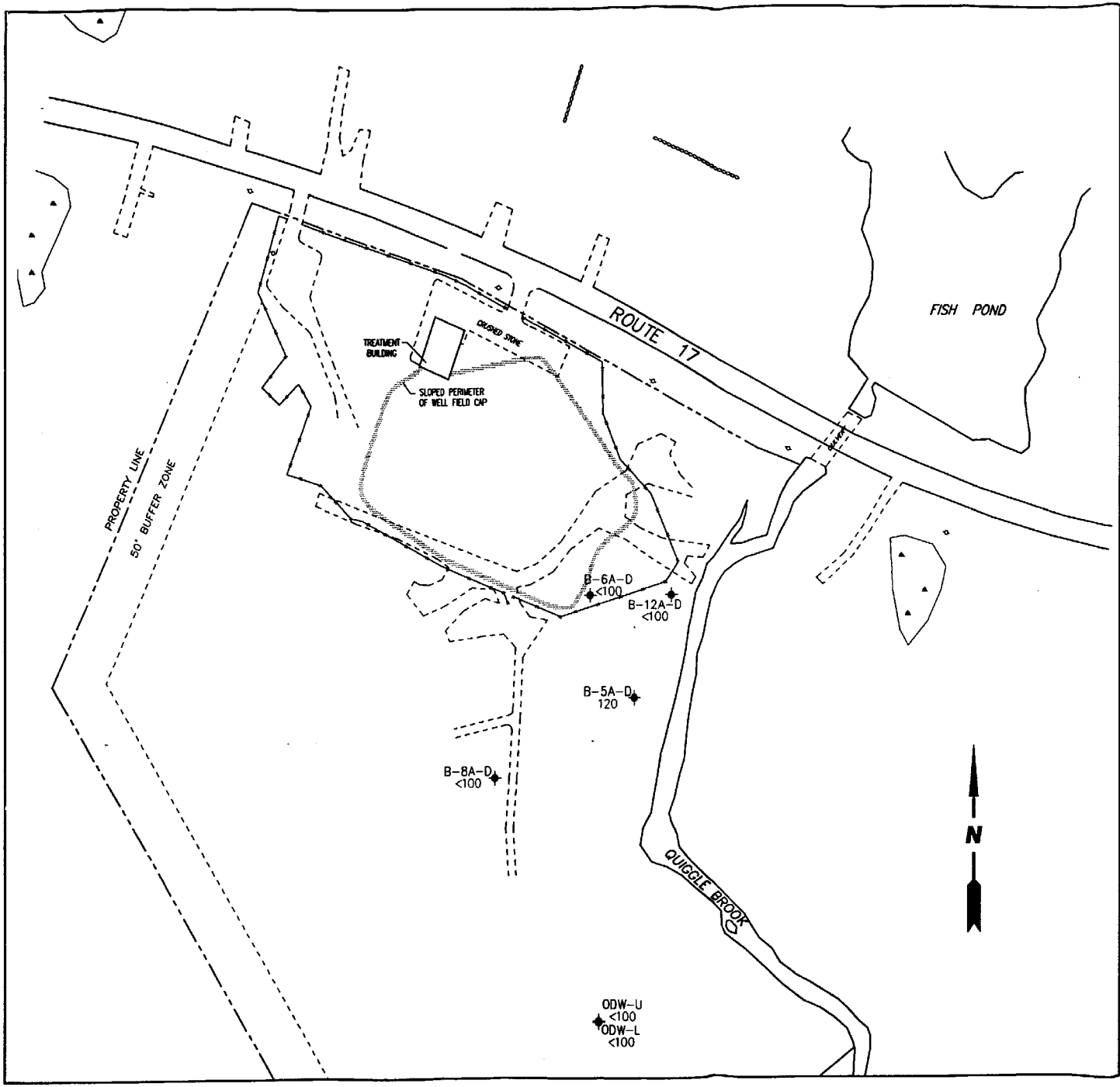
IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

SAMPLING DATES:	DRAWING DATE:	ACAD FILE:
04/30/01-05/04/01	07/30/01	Q29-DMF

DIMETHYLFORMAMIDE (DMF) IN OVERBURDEN WELLS
Q29 – APRIL/MAY 2001

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	TP
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP

September 2001 ESD **Figure 21**



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: 04/30/01-05/04/01

EX.: B-12A-D - WELL IDENTIFICATION
<100 - DIMETHYLFORMAMIDE (µg/L)

- < or U - LESS THAN METHOD DETECTION LIMIT
- J - ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
- D - CONSTITUENT IDENTIFIED IN DILUTED SAMPLE
- U - NOT DETECTED
- B - CONSTITUENT IDENTIFIED IN TRIP BLANK

NOTE: ISOCONCENTRATION CONTOURS NOT DRAWN SINCE ALL DETECTED VALUES ARE BELOW THE GROUNDWATER CLEANUP LEVEL (390 µg/L).

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

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

0 100 200
SCALE FEET

IT CORPORATION
100 RIVER RIDGE DRIVE
NORWOOD, MA 02062
(781) 769-7600

SAMPLING DATES:	DRAWING DATE:	ACAD FILE:
04/30/01-05/04/01	07/30/01	Q29BDMF

DIMETHYLFORMAMIDE (DMF) IN BEDROCK WELLS
Q29 - APRIL/MAY 2001

CLIENT:	PM:
UNION CHEMICAL RD/RA TRUST	TP
LOCATION: SOUTH HOPE KNOX COUNTY, MAINE	PE/PG: TP

September 2001 ESD **Figure 22**