FINAL REPORT

SITE INVESTIGATION
WAITE ROAD SITE
CLIFTON PARK, NEW YORK

VOLUME I

Prepared for:

THE WAITE ROAD SITE PRP GROUP
c/o The General Electric Corp.
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December 1988

85C4337

TABLE OF CONTENTS

TABLE OF CONTENTS
continued)

PLATES

TABLE OF CONTENTS
(continued)

LIST OF TABLES

LIST OF FIGURES

APPENDICES

VOLUME II

VOLUME III

APPENDIX D (continued)

SECTION 1
INTRODUCTION

The Waite Road Site is located in Clifton Park, New York at the junction of Waite Road and the Boston and Maine railroad tracks (Figure 1)*. The site, the location of a former oil recovery operation (Albany Waste Oil), contained several above-ground storage tanks and a lagoon (Figure 2). In response to a reported oil spill in the fall of 1981, the New York State Department of Transportation (NYSDOT) contracted to have the free product and contaminated soil removed from the site. The State reported that during the final stages of the clean-up operation that petroleum products were located at the surface of the weathered bedrock underlying the site.

Use Figure 2

During late 1981 and early 1982 Dunn Geosciences Corporation, hydrogeologic consultants to Hanson Well Drilling Company under contract with NYSDOT, performed a field investigation to determine the type of petroleum product and the extent to which these substances may have affected the bedrock aquifer underlying the site. In late 1982, the NYS Department of Environmental Conservation (NYSDEC) collected and analyzed additional water and soil samples to further delineate the type and extent of contamination of the bedrock aquifer. NYSDEC conducted a second, but more limited, field investigation of the Waite Road Site in September 1984. No complete reports of the NYSDEC's investigations were prepared. The extent of contamination was not defined accurately or reliably, as a consequence of the limited sampling and lack of documented Quality Assurance/Quality Control (QA/QC) and sampling protocols during earlier investigations.

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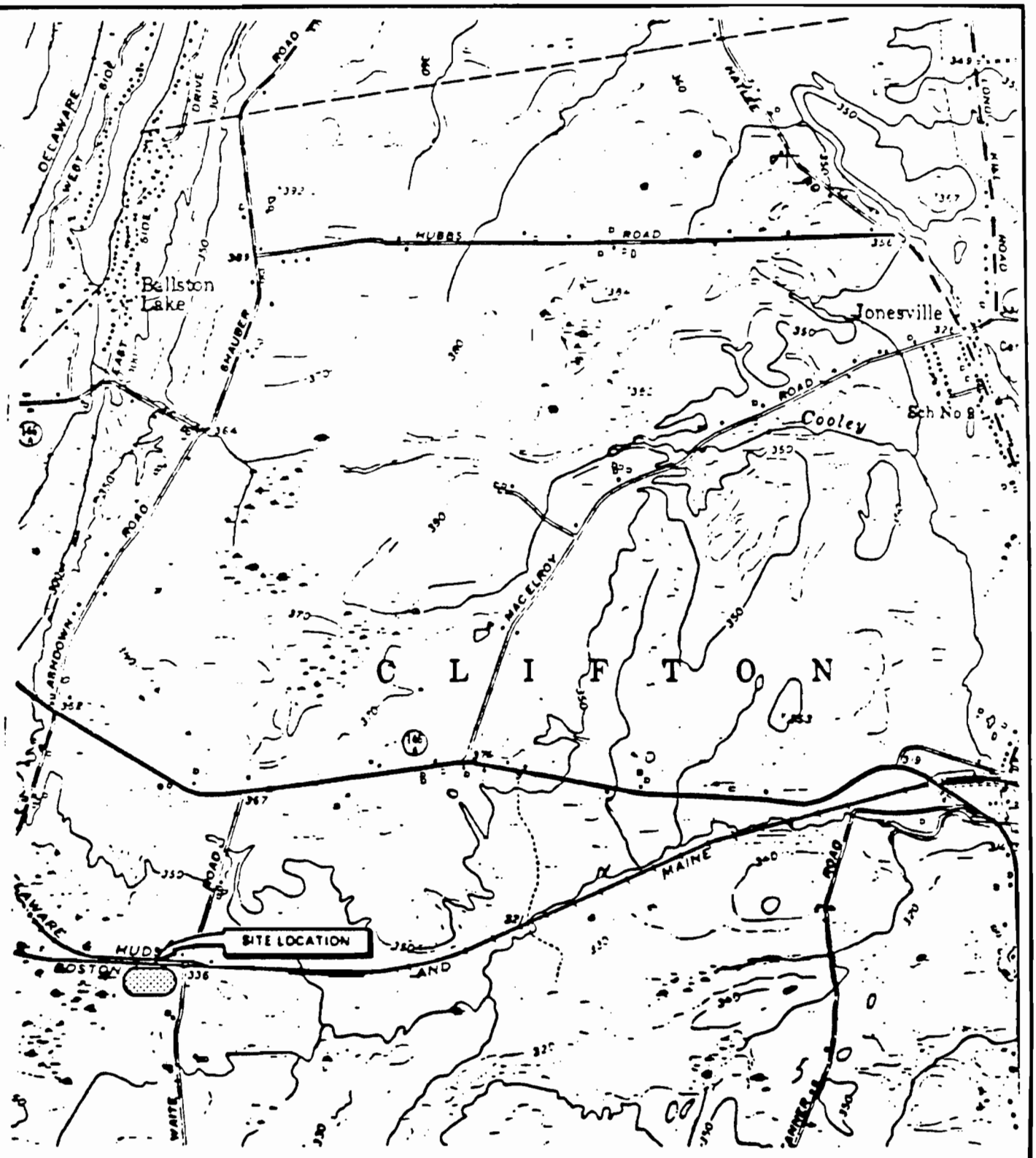
*This report contains figures and plates. Figures are integrated with the text, whereas plates are included in plastic pockets located in the back of this volume.



SOURCE: ROUND LAKE QUADRANGLE

LOCATION MAP WAITE ROAD SITE
CLIFTON PARK, N.Y.

WOODWARD—CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY: TJD	SCALE: AS SHOWN	PROJ. NO.: 86C4337
CK'D. BY: MN	DATE: 20 JUNE 1986	FIG. NO.: 1

In 1987, six potentially responsible parties (PRP's) entered into an Interim Consent Order (ICO) with the New York State Attorney General. The ICO required that the PRP's undertake a field investigation to evaluate the extent of contamination at the site, and recommend an approach to site remediation. The work plan for conducting the field investigation was prepared by Woodward-Clyde Consultants (WCC) in December 1986, approved by NYSDEC, and incorporated into the ICO.

WCC's work plan was based on data provided to WCC by NYSDOT and NYSDEC. Data available when the Work Plan was prepared indicated concern for the following substances: petroleum hydrocarbons, chlorinated solvent residues, metals, and PCBs. The objectives of this study were to perform an independent review of existing data, to generate new reliable data by collecting and analyzing samples according to established protocols, to evaluate the need for site remediation, and identify feasible remedial alternatives for the site. Specifically, the Work Plan called for:

- an evaluation of the extent of ground-water contamination by volatile organic compounds in the overburden and weathered bedrock water bearing zones;

- an evaluation of the impact of site activities on the non-weathered bedrock water bearing zone;

- an investigation of possible free petroleum product accumulated in soils adjacent to monitoring wells H-3 and S-9; and

- an evaluation of the areal extent of soil contaminated by petroleum hydrocarbons and PCBs.

The conclusions and recommendations presented in this report are based entirely on the results of the field investigation conducted by WCC.

WCC's work has been accomplished in accordance with our understanding of professional practice and environmental standards existing at the time the work was performed. Methods are constantly changing and it is recognized that standards may subsequently change because of improvements in the state of the practice.

The information used for this work and presented in this report includes: boring logs, water level elevations, and soil and water quality analyses. Boring logs reflect subsurface conditions at the indicated locations on the dates of the investigation. We have collected soil and water samples that we believe are representative of site conditions. As is the case in any subsurface investigation, the interpretations made in this report are based on the assumption that subsurface conditions do not deviate appreciably from those found during our field investigations.

WCC assumes no responsibility for conditions which did not come to its actual knowledge or for conditions not recognized as environmentally unacceptable at the time this report was prepared.

SECTION 2
SITE HISTORY

2.1 PRELIMINARY SITE REMEDIATION

In November of 1981, NYSDOT contracted to remediate the Waite Road site. By December 1981, all materials had been removed from the tanks on site and the tanks were cleaned. Remediation activities conducted by the State included the relocation of some 20 tanks to the area of the site shown on Figure 2. As reported in NYSDEC's 1987 Request for Proposal, some of these tanks had been punctured, and were rusted and unsecured.

Subsequent to the initial remediation, a series of unauthorized disposal events occurred at the site from early 1982 through the summer of 1982. At least seven tanks were filled with hazardous waste liquid and sludge, necessitating further site remediation in 1987.

2.2 NYSDOT FIELD INVESTIGATION

Several field investigations were conducted on the Waite Road site, under the direction of NYSDOT and NYSDEC. The most extensive of these was conducted by Dunn Geosciences Corporation of Latham, New York, in 1982. Dunn Geosciences was the consultant to Hanson Well Drilling Company of Nassau, New York, under contract to NYSDOT. The main objective of the study was to determine the nature and extent of ground-water contamination at the Waite Road Site.

Between January and September 1982, Dunn Geosciences excavated 6 test pits, installed 21 monitoring wells at the site, and collected and analyzed ground-water samples. The following summary of Dunn Geosciences' investigation is drawn from their report to Hanson Well Drilling, dated 6 October 1982.

Test Pits

In January 1982, Dunn excavated 6 test pits at the site. In four test pits located around the pond (Figure 2), petroleum odors and products were detected in the thin glacial deposits or fill material overlying the bedrock, which was encountered between 3 and 10 feet below grade. No visible evidence of petroleum products was observed in test pits 5 and 6 located east of the pond.

Monitoring Wells

In January and February 1982, 10 monitoring wells (H1 through H10) were drilled and installed by Hanson. Four pairs of wells, each consisting of a shallow and deep well, were located around the pond (Figure 2). The shallow wells were drilled to a depth approximately 20 feet below grade and were equipped with 17 feet of 3 inch O.D. PVC screen. The screened interval extended across overburden and shallow bedrock. The deep wells (H2, 4, 6, 8) reached depths of 53 to 55 feet below grade. They were cased and sealed with 6-inch O.D. steel casing to a depth of 25 feet, the balance being open hole. The two remaining shallow wells, H9 and H10, were located east of the pond near Waite Road.

The second group of monitoring wells (S1 to S11), was installed in March 1982 in the wetlands area west of the site (Figure 2). S series wells were installed to a completion depth of approximately 30 feet below grade, and were constructed of 30 feet of either 2.5 or 3-inch O.D. PVC screen that extended across overburden and bedrock. A 4-inch protective steel casing was placed over the PVC riser pipe and cemented in place.

Ground-Water Sampling

Three rounds of ground-water sampling were conducted by Dunn Geosciences' personnel. H series wells were sampled in February 1982, and again with the S

H series 2/82 ; 4/82 ; 9/82
S Series 4/82 ; 9/82

8 samples H1, 3, 5, 7 (i.e. shallow H) 12/82
S1, S2, S6 & S10
+ surface water & Soil Samples

series wells in April and September of 1982. Analytical parameters included volatile aromatics as well as total hydrocarbons. Selected samples collected during round two were analyzed for additional parameters. Each ground-water sample was collected with a disposable bailer to prevent cross-contamination between wells. Water was directly transferred to laboratory containers and preserved in ice coolers. The samples were delivered to the laboratory (C.T. Male Associates) for chemical analysis the day of sampling. Analytical results are summarized in the tables contained in Appendix A.

Dunn reported that several shallow wells contained "elevated" levels of volatile aromatics and petroleum hydrocarbons. Dunn also concluded that "the contaminant plume appears to be confined to the upper most zones..." of the site, west and southwest of the site. However, because the shallow wells were screened across overburden and shallow bedrock it is impossible to evaluate if overburden beneath the site acts as a confining layer or a recharge zone to the shallow bedrock water bearing zones, or if the wells themselves provide a pathway for the downward migration of contaminants from the surface or overburden to the shallow bedrock aquifer. As a result, samples collected from these wells may not be representative of actual ground water conditions, and may reflect surface water contaminants that have infiltrated the well.

2.3 NYSDEC INVESTIGATIONS

2.3.1 Sampling Activities

NYSDEC conducted additional sampling at the Waite Road Site between November 18 and 24, 1982, after the completion of Dunn Geosciences study. Eight ground-water samples were collected from selected monitoring wells. The wells sampled,were: H1, H3, H5, H7, S1, S2, S6 and S10. Surface water samples were collected at several locations along the southeastern edge of the pond, near monitoring well S9, and composited into a single sample. All water samples were analyzed by RECRA Environmental Laboratories for volatile organics (series 601),

metals, PCBs, phenols, total organic carbon (TOC) and polynuclear aromatic hydrocarbons (PAH).

Three soil samples were collected (November 1982) along the western side of the pond in an area described by NYSDEC as heavily oil stained. They were composited and analyzed for volatile organics (series 601), E.P. toxicity metals, PCBs and PAH. Another soil sample was obtained immediately north of the railroad tracks which form the northern limit of the site.

NYSDEC conducted a second, limited field investigation at the Waite Road Site on 20 September 1984. A total of 10 samples were collected: 5 soils, 2 sediments and 3 ground-water samples. Representatives of the NYS Department of Law, Niagara Mohawk and General Electric Companies observed the sampling operations which were conducted by NYSDEC personnel.

All samples were split between NYSDEC and Niagara Mohawk and General Electric companies. NYSDEC samples were analyzed for metals, volatile organics, pesticides/PCBs, chlorobenzenes, by VERSAR, Inc. of Springfield, Virginia. Soils and sediments were analyzed for metals, PCBs and volatile organics. The three ground-water samples were only tested for volatile organics.

Analytical results are summarized in Appendix A. The data for the ground water monitoring wells indicate that benzene (5.3 ppb) and toluene (34 ppb) were detected in MW-H7 on 22 November 1982. This contrasts with the 3 September 1982 analyses for MW-H7 in which benzene was not detected, and toluene was present in a concentration of 132 ppb. A similar pattern was present in MW-H3. The 22 November 1982 analysis indicated 57 ppb of toluene in comparison to 17,369 ppb in the 3 September 1982 analysis. In general, the 3 September 1982 analysis tends to indicate much higher concentrations of volatile organics than all analyses conducted before and after that date. The cause of elevated concentrations in September 1982 samples is not known. Possible causes include errors or artifacts caused by laboratory or sampling methods, or natural

gw stds
benzene
toluene

fluctuations resulting, for example, from variations in rainfall.

2.3.2 NYSDEC Remediation Activities

During the summer of 1987, NYSDEC removed the tanks from the site, and regraded part of the southeastern portion of the site. A report describing these activities, or the protocols used during the site remediation conducted by NYSDEC was not available to WCC.

SECTION 3
METHODOLOGY

3.1 SUMMARY OF WORK PLAN

A detailed description of the approach and procedures utilized during field investigation of the Waite Road site is contained in WCC's Project Work Plan (Appendix B). The Work Plan was approved by NYSDEC prior to the PRP's entering into the ICO.

Sample locations are shown on Plate 1. In summary, the Work Plan required that the following activities take place:

- o sampling and chemical analysis of existing on-site monitoring wells and three off-site wells installed during previous investigations of the site by NYSDOT and NYSDEC;

- o the installation and sampling of a new monitoring well cluster under observation of NYSDEC, which was located in the downgradient (southwest) corner of the site, as approved by NYSDEC based on a preliminary report submitted to NYSDEC;

- o sampling and chemical analysis of eight residential water supply wells located along Waite Road, with the knowledge and approval of NYSDOH;

- o analysis of surface water samples collected from the pond located on site, and from the swamp at an off-site location;

- o the installation of trenches to investigate the possibility that free product may be present in soils adjacent to monitoring wells S-9 and H-3 with the approval of NYSDEC's project manager;

- o establishing a sampling grid, and the collection and chemical analysis of surface soil samples on and off-site; and

- o the collection and analysis of soil samples from soil borings located on site.

3.2 IMPLEMENTATION OF THE WORK PLAN

In November, 1987 NYSDEC was informed by WCC of the intent to commence field work at the site in early December, 1987. A preliminary meeting was held in NYSDEC's Albany offices on 3 December, 1987 to discuss WCC's schedule for implementing the Work Plan, and to establish communication between WCC's and NYSDEC's project teams. In addition, protocols were established in the event that field conditions necessitated changes to the sampling plan. Minor changes could be made in the field with the approval of NYSDEC's on-site representative. Significant changes would require the approval of NYSDEC's project manager.

The attendees at the 3 December 1987 meeting included:

Mr. Richard Torrey	NYSDEC (Project Manager)
Mr. Gary Litwin	NYSDOH
Mr. Robert Knizeck	NYSDEC
Mr. Wally Magee	General Electric Co.
Mr. Henry Gold	WCC (Project Manager)
Ms. Mary Stevenson	WCC (Chemist)
Mr. Paul Kareth	WCC (Geologist)
Mr. Robert Fabian	WCC (Technician)

Ms. Stevenson and Messrs. Kareth and Fabian comprised the WCC field team. They were assisted at times by Mr. Jack Riley, a WCC technician and Mr.

Carl Varteresian, a WCC geologist. Mr. Kareth was on site during surface soil, ground water and surface water sampling. Mr. Kareth also inspected soil borings, trenching and monitoring well installation,

Mr. Edward Tabor was NYSDEC's on-site representative during field activities conducted in December 1987 and January 1988. Mr. Jerry McDonald of NYSDOH accompanied WCC during residential well sampling in December 1987, and January 1988. NYSDEC was represented during on-site activities conducted in August 1988 by Kevin Farran. Mr. Richard Torrey was replaced as NYSDEC's project manager by Mr. James Ludlum in April 1988.

3.3 MODIFICATIONS TO THE WORK PLAN

This investigation included all of the field activities and procedures described in the Work Plan. However, physical conditions at the site either required that some sample locations be moved or otherwise caused those samples to not be obtained. All changes to the basic Work Plan were discussed with and approved by NYSDEC's Project Manager or on-site representative. These changes which were discussed with Mr. Torrey and approved by him during telephone conversations on 8 and 11 December, 1987, and during a site visit on 16 December 1987 included:

- Not sampling monitoring wells S-3, S-8 and H-7 which could not be located and were presumed to be destroyed and replacing S-3 with S-5, an off-site well located in the general vicinity of S-3. The basic scope of the investigation was not modified by this change.

- Deleting surface soil sampling points at grid locations C-1, C-3, D-4, E-4, G-5, H-2, H-3, H-4 and H-5, because they are located in areas where surface soil was disturbed during the tank removal conducted at the site by NYSDEC in 1987,or in the driveway constructed by NYSDEC. These modifications did not impact the scope of the investigation.

- o Adding surface soil samples at locations B-2, D-1, D-3, F-1, G-2 and I-5, which are situated in locations where above ground tanks were removed by NYSDEC. These changes specifically addressed a potential area of concern and thus enhanced the investigation.

- o Moving samples H-1, E-2 and E-3 from the actual grid nodes to adjacent locations where tanks had been removed by NYSDEC. These changes addressed a specific potential area of concern and thus enhanced the investigation.

- o Moving pond sediment sampling locations to points north of grid node B-6, south of node F-6, and at the approximate mid-point between nodes E-7 and E-8. These changes did not have any significant effect on the investigation.

- o Elevations were surveyed relative to an arbitrary datum, rather than to mean sea level. This change does not affect the interpretation of ground water elevation data.

- o Moving the location of three of the eight proposed soil borings from the spill area west of the pond, to locations in the former above ground tank area. These changes addressed a specific potential area of concern and thus enhanced the scope of the Work Plan.

3.4 FIELD ACTIVITIES

3.4.1 Surface Soil Sampling

WCC's Work Plan describes two phases of shallow soil sampling and analysis. Phase 1 began in December 1987, and was completed in January 1988, and consisted of on- and off-site soil sampling. NYSDEC's project manager, Mr. Richard Torrey was informed of the planned commencement of field work. After

chemical analyses of Phase I soil samples were received and reviewed, 10 additional off-site sampling locations were recommended by WCC and approved by NYSDEC's project manager and NYSDEC's on-site representative. The 10 additional samples were collected in August 1988.

Shallow soil samples were collected at the locations shown on Plate 1. Soils were collected from the first 6 inches of soil using field decontaminated, dedicated stainless steel trowels. Before being used, each trowel was decontaminated in the field using the procedures described in Section 9 of the Appendix to WCC's Work Plan (Appendix B of this report). The decontamination procedure is consistent with current USEPA protocols that are used to minimize cross-contamination between sample locations. The soil was placed in a new disposable aluminum pan and thoroughly mixed before being transferred to laboratory supplied sample jars. A portion of each sample was retained by WCC for in-house analysis of total petroleum hydrocarbons (Horiba Instruments OCMA-220) and PCBs (McGraw-Edison test kit). Analytical protocols are described in Section 8 of the Appendix to WCC's Work Plan (Appendix B of this report).

A field blank was collected each day by pouring laboratory supplied distilled-deionized water over a field decontaminated stainless steel trowel and into the aluminum pan. The water was then poured into the appropriate laboratory jars and analyzed for the same parameters as the other samples collected on that day. The analysis of field blank water provides a mechanism for evaluating the efficacy of field decontamination procedures. The absence from field blanks of substances detected in samples collected on site indicates that field decontamination procedures were thorough, and that the possibility of cross-contamination between sample locations is minimal.

As per WCC's Work Plan (Section 2.2.2 and Appendix A-Section 5.0), all samples were packed in ice after collection and shipped to ENSECO Laboratories of Cambridge, MA for analysis (Appendix A-Section 6.0 of Work Plan). Proper

chain-of-custody was maintained throughout the sampling event as specified in Section 7.0 of Appendix A to the Work Plan. Sample jars were received from the laboratory in sealed coolers. Each day, a packed cooler was delivered to the local Federal Express office in Colonie, NY, for overnight delivery to ENSECO.

3.4.2 Sampling of Existing Monitoring Wells

The sampling plan required that ground water from existing on site wells ('H' and 'S' series), and three off site wells (Plate 1), be sampled. The monitoring wells were sampled in December 1987. The wells were inspected prior to sampling to evaluate installation methods and their current condition. Initial well identification was made by H. Gold of WCC and R. Torrey of NYSDEC.

Existing well casings are not labelled, and as a result accurate identification of off-site wells is difficult. The location and identification of off-site wells was also hindered by poor location control on existing maps that were used to prepare the Work Plan. Identification was based on visual comparison of the relative positions of the wells, as surveyed in the field during a level survey of the site (Plate 1) with the spatial representation shown on existing maps (Work Plan - Appendix B). The following well identifications were made: MW-S1 was located and sampled (Sample No. MW-A); MW-S2 was located in the field but not sampled; MW-S3 could not be found and is presumed destroyed; MW-S4 was located and sampled (Sample No. S-3); MW-S5 was located and sampled (Sample No. 51); MW-S6 was located in the field but not sampled. MW-S7 was located but not sampled; MW-S8 could not be found, presumed destroyed; and MW-S11 was located and sampled (Sample No. S-4). S-2, S-6 and S-7 were not sampled in accordance with Work Plan.

The 'S' series wells are poorly constructed and should not be considered true monitoring wells. They were installed by Soil and Material Testing, Inc., in March, 1982 as part of NYSDOT's site investigation. They appear to be simply 2 in. PVC screen installed in a soil boring with no sand pack or seal. The screen extends to

the surface, allowing direct infiltration of surface water into the well. If contaminants are present in surface material, these wells may provide a mechanism for downward migration of these substances into the aquifers underlying the site. This may be a particular issue in the swampy areas west of the site where standing surface water can readily enter the monitoring wells.

At the surface, 'S' series well screens are surrounded by 3 in. PVC protective casing that extends to approximately 2 feet below and above existing grade. Several of the S-series wells could not be located and are presumed destroyed. These include S-3 and S-8, which according to the Work Plan, were to be sampled. MW-S11, an off site well, was sampled instead of MW-S3 to provide a comparable sample distribution. Although the 'S' series wells were not constructed according to current standards, WCC utilized its best efforts to obtain representative samples from these wells. As a consequence of the well construction, and the drilling method used, analysis of samples obtained from these wells may represent false positive results due the potential infiltration of surface water. It is unlikely that these wells would produce false negative results.

Eight of the 'H' series wells were installed as paired overburden/bedrock wells. These are: H-1 (overburden) and H-2 (bedrock); H-3 (overburden) and H-4 (bedrock); H-5 (overburden) and H-6 (bedrock); and H-7 (overburden) and H-8 (bedrock). Some have protective steel collars but none have locking caps. Shallow 'H' series overburden wells are constructed of 3" PVC and appear to be of standard construction, with a sandpack and seal around the screens. The deeper bedrock monitoring wells are open hole rock wells with 6 in. steel casing and no locking caps. The 'H' series wells were installed by Hanson Well Drilling Company in January and February of 1982.

Monitoring wells H-2, H-4, H-6 and H-8, which were installed in bedrock, appear to be in good condition. The condition of the shallow wells varied as described below.

H-1 appeared to be intact.

H-3 casing was broken, and well integrity may be compromised because of surface water infiltration through the broken casing.

H-5, which is outside the property fence, was intact through August 1988, and destroyed sometime during September 1988.

H-7 could not be located, presumed destroyed.

H-9 appeared intact, has a steel protective casing but no lid.

H-10 appeared intact, has a steel protective casing but no lid.

The monitoring wells were purged before sampling using a centrifugal pump and dedicated plastic tubing to avoid cross-contamination. Samples were collected with dedicated stainless steel bailers, placed in sample jars and shipped to the laboratory. A field blank was collected each day by pouring laboratory supplied water through a laboratory cleaned bailer, and collecting that water in sample jars. The field blanks were submitted to the laboratory for analysis along with a trip blank.

3.4.3 Installation of New Monitoring Wells

A monitoring well cluster consisting of three wells was installed at the site between 10-12 August 1988. The wells were drilled by Northstar Drilling Company using a CME-55 truck mounted rig. Borings were advanced using both hollow stem auger and water rotary techniques. All drilling and well installation activities were supervised by Mr. Paul Kareth, a WCC geologist. Proposed well locations were identified in an interim report prepared by WCC in May of 1988. The report was transmitted to NYSDEC by the PRP's. Mr. James Ludlum of NYSDEC approved of the locations and depths of the wells.

The monitoring wells were installed in three stratigraphic zones: the soil/overburden zone (MW-1S), the shallow fractured and distinctly weathered bedrock zone (MW-1M), and competent bedrock (MW-1D). Because the wells were located within 10 ft of one another stratigraphic samples were collected only from the deepest monitoring Well (MW-1D), which was drilled first.

The boring in which MW-1D was installed, was advanced through overburden using $6\frac{1}{4}$ inch ID hollow stem augers. Two inch OD split spoon samples were collected continuously to the top of bedrock. Below the top of the fractured rock zone, rock cores were collected to the completion depth of 25 feet below grade.

The augers were able to partially penetrate the fractured bedrock zone. The augers were left in place and used as a working casing and an NX core barrel was used to collect rock cores until competent bedrock, based on degree of weathering observed in core was encountered. The boring was then reamed with $5\frac{1}{4}$ inch diameter bit to 13 feet below grade. A 4 inch ID black steel casing was installed by tremie grouting the annulus between the casing and the borehole wall with a cement bentonite mix that was allowed to harden overnight. The 4-inch ID casing was installed to prevent ground water in the overburden or shallow bedrock from entering deeper bedrock water bearing zones. After the grout set, drilling continued to a depth of 25 feet below grade with the NX core barrel. The borehole was then completed by reaming with a 3-7/8 inch bit.

MW-1D consists of ten feet of two inch O.D. PVC 0.020 inch slot screen attached to 17 ft of PVC riser. The screen was surrounded by a #2 sand filter pack placed to a depth of one foot above the top of the screen. A one foot bentonite pellet seal was installed above the sand pack, and the remaining annular space was grouted with a cement bentonite grout. A locking steel protective casing was installed at the surface to prevent unauthorized access to the well. WCC retained custody of the keys.

MW-1M was installed in a similar fashion. Augers were used to drill to the top of the fractured rock zone. Four inch black steel casing was then set one foot into the fractured rock zone and grouted in place with a cement bentonite grout which was allowed to set overnight. A 3-7/8 inch bit was then used to drill to the top of competent bedrock and a 2-inch O.D. PVC monitoring well installed in the borehole. Five feet of 0.020 inch slot screen was installed from 6-11 feet below

grade. MW-1S was drilled with 6-1/4 inch ID hollow stem augers to the top of the fractured rock zone. Three feet of 0.020 inch slot screen was installed from 3-6 feet below grade. Boring inspection logs and well installation logs are contained in Appendix C.

MW-1D and MW-1M were developed using a centrifugal pump as approved by NYSDEC's on site representative. The discharge was monitored for pH, temperature and conductivity to verify development. MW-1D was developed for 95 minutes at which time temperature, pH and conductivity stabilized and a sediment free discharge was achieved. MW-1M did not produce sufficient water to fully verify development. MW-1S was dry at the time of installation and could not be developed.

3.4.4 Soil Borings

Eight soil borings were installed at the site on 11 and 12 August 1988, using a tripod rig and two inch OD split spoons collected to the top of bedrock. Boring inspection logs describing soils encountered during drilling activities are in Appendix C. Soil samples were collected from each spoon and analyzed by WCC for petroleum hydrocarbons and PCBs using field test kit methods. Randomly selected samples were also submitted to ENSECO Labs of Cambridge, MA for verification of results.

3.4.5 Sampling of New Monitoring Wells

The three new monitoring wells, MW-1S, MW-1M and MW-1D, were purged and sampled on 18 August 1988. All three wells were purged using a centrifugal pump and dedicated black PVC tubing. Samples were collected using dedicated, laboratory cleaned, stainless steel bailers. A field blank was collected by pouring laboratory supplied water into a clean bailer, and then collecting the water in sample containers. This bailer was then used to sample MW-1M.

The new monitoring wells do not produce large quantities of water and are slow to recharge. MW-1S in particular experienced very slow recharge and the complete set of sample bottles could only be partly filled before the well went dry. Sufficient water was present for sample jars for volatile organic compounds be completely filled first. The well was allowed to recharge for several hours and then sampled again to obtain enough water to fill the balance of the sample bottles. Because of the turbidity observed in MW-1S, it is believed that the water found is a relic of the drilling operation (water discharge during coring) and does not represent actual ground water.

Samples were packed in ice prior to shipment to ENSECO Labs. Proper chain of custody was maintained throughout the sampling event.

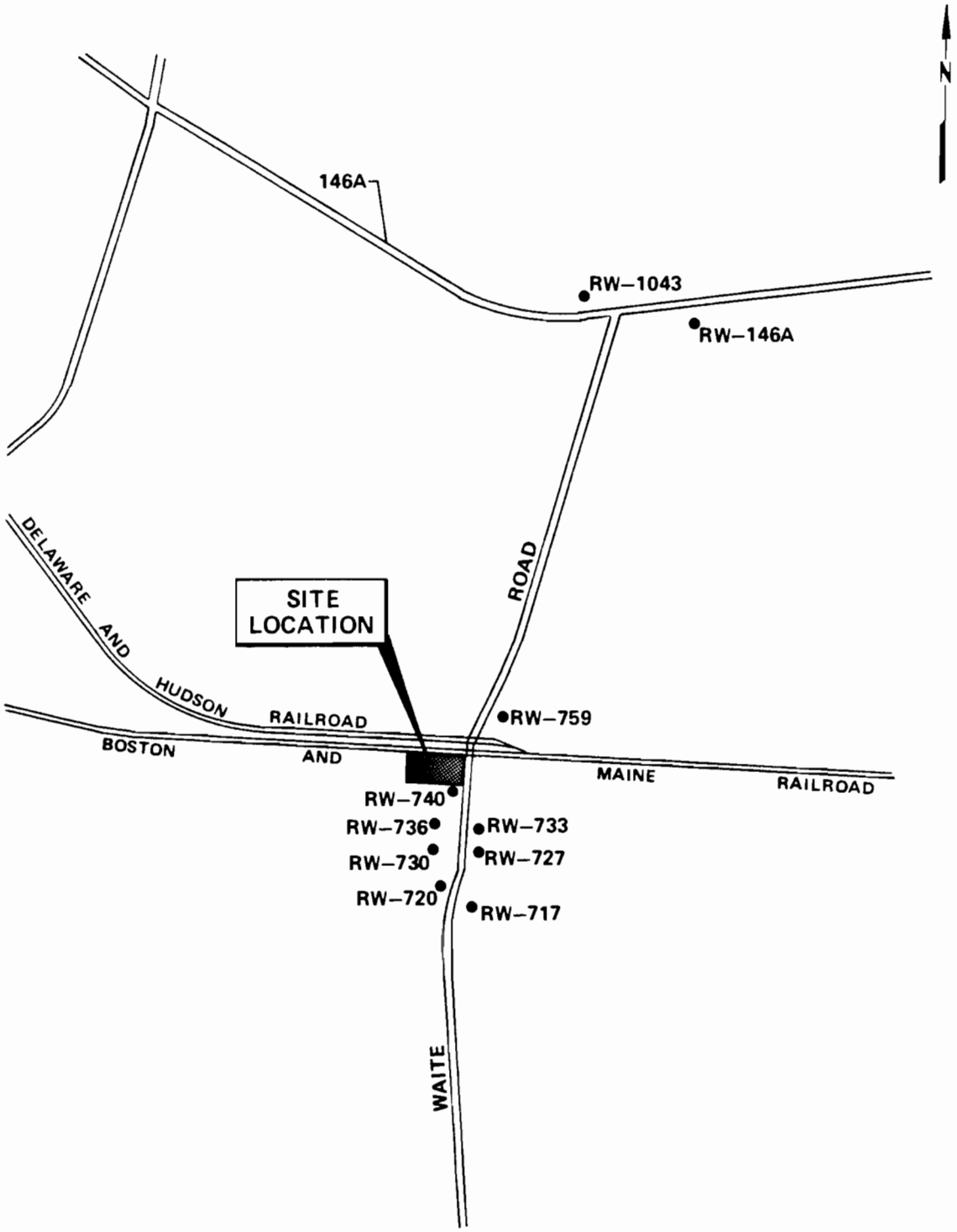
3.4.6 Trenches

Two trenches were excavated on 18 August using a John Deere 466C backhoe, to identify free product that may have accumulated at the top of rock. The trenches were excavated adjacent to monitoring wells H-3 and S-9 (Plate 1). The trenches were logged (see Appendix C) and backfilled with excavated soils.

3.4.7 Residential Wells

WCC conducted two rounds of residential well sampling in the vicinity of the Waite Road site. The first round was conducted in December 1987 and January 1988. The second round of samples was collected in October 1988.

The Work Plan required that eight residential water supply wells located along Waite Road be sampled (Figure 4). The wells were identified by Mr. Gary Litwin of NYSDOH. Seven of the wells are situated south of the site and one (RW-759) is located northeast of the site in the presumed upgradient direction. Five of the eight wells were sampled on 10 December 1987, and a sixth on 5 January 1988. One of the proposed sampling locations (RS-733) was under



RESIDENTIAL WELL SAMPLING LOCATIONS
SAMPLING ROUNDS 1 AND 2
WAITE ROAD SITE
CLIFTON PARK, NEW YORK

WOODWARD – CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY	KF	SCALE	AS SHOWN	PROJ NO	85C4337
CK'D BY	CV	DATE	9 NOV 1988	FIG NO.	4

SOURCE:
ROUND LAKE QUADRANGLE
LOCATION FOR SOME RESIDENCES
ARE APPROXIMATE.

construction and had no power. Several attempts were made to sample the eighth well (RW-736) in December 1987 and January 1988. However, that resident failed to keep all appointments that were made.

The second round of samples was collected from the residential wells on 11 and 12 October 1988. During this event, seven of the eight wells originally identified by NYSDOH were sampled along with two upgradient residential wells. Residential well RW-740 was not sampled in October 1988 because the house was vacant and power had been turned off. Two additional residential wells (RW-1043 and RW-146A) were sampled during this event to ensure that upgradient wells were sampled.

Table 1 contains a summary of the residential wells sampled during this investigation. Each of the eight wells identified by NYSDOH was sampled at least once between the two rounds.

During both rounds of sampling, residential well water was analyzed for volatile organic compounds (EPA methods 601 and 503.1) total petroleum hydrocarbons, PCBs and selected series 200 metals.

3.4.8 Surface Water Samples

One sample of pond water and three samples of swamp water were collected in December 1987, at the locations shown on Plate 1. The pond water sample was collected with a bailer, resulting in a composite sample of the water column. The swamp water samples were collected by immersing the mouths of the sample jars below the surface of the swamp. The surface layer of water was allowed to enter the jars, thereby capturing any floating hydrocarbons that may have been present.

3.5 ANALYTICAL METHODS

3.5.1 Laboratory Analyses

Laboratory analyses were performed by ENSECO, Incorporated of Cambridge, MA. Soil, sediment and ground water samples were analyzed for PCBs by USEPA Method 8080, and for petroleum hydrocarbons by USEPA Method 418.1. Ground water samples were analyzed for halogenated volatile organics (USEPA Method 601), aromatic volatile organics (USEPA Method 503.1), and selected 200 series metals (arsenic, cadmium, chromium, lead and mercury).

3.5.2 Field Analyses

The McGraw Edison PCB Test Kit was used to determine the total PCB concentration in oils, soils, sediments, or other extractable materials. In the test kit method, PCBs in oils, or in a solvent extract from solid matrices, are reacted with an agent which releases chloride ions from the PCB molecules. The chloride ion is then extracted into an aqueous phase, where a chloride specific electrode is used to measure the concentration. The test kit manual provides a calibration for conversion of electrode readings to ppm of PCBs in oil and soil.

A few positive interferences exist which can cause false high PCB readings. The solvent extraction of solid materials will extract other organic molecules in addition to PCBs. If these additional organics are chlorinated, they can contribute to false-positive results. Also, if any suspended solid material containing inorganic chlorides is inadvertently transferred with the organic extraction solvent to the reaction vials, positive interference may occur.

Field analyses for petroleum hydrocarbons were performed using the Horiba Instruments, Ltd. OCMA-220 Oil Content Analyzer, a portable apparatus designed to determine the concentration of petroleum hydrocarbons in water, soils, and other extractable materials. The hydrocarbons are extracted into an organic

solvent, and the absorption of infrared (IR) light at a specific wave length range (3.4-3.5 microns) is measured. The extraction solvent used is a chloro/fluorocarbon known by its trade name Flon-316. This solvent is used because of its low toxicity, low volatility, and its non-interference with the IR absorption. The actual petroleum hydrocarbon concentration of the sample extract is determined from its IR absorbance based upon comparison to a hydrocarbon standard, and displayed by the unit. The sample concentration is then back-calculated to account for any dilutions.

SECTION 4
GEOLOGIC AND HYDROLOGIC SETTING

4.1 PHYSIOGRAPHY

The Waite Road site is located in the southern part of Saratoga County, New York. This area is situated in the Hudson-Mohawk lowlands physiographic province (Fisher, 1977). This province lies west of the Taconic thrust sequences, which consist of metamorphosed rock that was intensely faulted and folded, and thrust over rocks of the lowlands (Potter, 1979). Rocks of the lowlands, however, are relatively undeformed. The primary rock types underlying the lowland are shales, limestones, and siltstones. These rocks were initially deposited as continental shelf sediments prior to lithification.

4.2 SURFICIAL GEOLOGY

Overburden in the vicinity of the Waite Road site consists primarily of Pleistocene age glacial till (USGS, 1949). The till consists of unconsolidated and unstratified deposits of rock fragments of various sizes, gravels, and locally-developed lenses of sand (USGS, 1949). At the site, overburden consists of brown clayey to silty fine sands, or silty clays which probably represent the lacustrine deposits of glacial Lake Albany (Cadwell and Dineen, 1987). The soils at the site and in the surrounding area are poorly drained, and consequently much of the site is swampy. Typically, clay rich soils do not readily allow the vertical movement of ground water.

The average thickness of overburden in the site vicinity is about 25 feet (USGS, 1963). Soil borings installed at the site during this investigation indicate that depth to bedrock ranges from 4 to 8 feet below grade. Detailed logs of soil borings installed at the site by WCC in August 1988 are included in Appendix C.

4.3 BEDROCK GEOLOGY

In the region, bedrock consists of the Canajoharie shale, a middle-to late-Paleozoic age unit considered to be equivalent to the Normanskill shale found further to the south (Fisher, 1970). The rock is generally a homogeneous shale, but thin units of sandstone may occur (USGS, 1963). The surface contact of the Canajoharie shale with the somewhat sandier Schenectady formation, occurs about 1/2 mile southwest of the site (Fisher, 1970).

Seventeen feet of core was obtained during the installation of MW-1D. The core indicated that the site is at least partly underlain by massive to finely laminated gray shale and silt stones. Shale was encountered from a depth of approximately 6 ft to 15 ft below grade. The shale was moderately hard, moderately strong, and fresh. Abundant horizontal and sub-horizontal fractures were encountered in this interval. However, fresh fracture surfaces and good crack fit suggest that these fractures were induced by mechanical action during coring. Siltstone was encountered from a depth of 15 to 21 ft below grade. The silt stone is less fractured than the shale, although a broken zone was encountered at approximately 18 ft below grade. Shale was present from 21 to 25 ft. A second broken zone was encountered in shale at a depth of 21.5 ft.

4.4 HYDROGEOLOGY

Ground water in the area surrounding the site occurs in both the overburden and in the shale, although the shale units generally make poor aquifers (USGS, 1963). The USGS report describes a number of domestic wells drilled within several miles of the site, only a few of which had yields of more than 5 gallons per minute (gpm). One well drilled through unconsolidated sediments had a reported yield of 30 gpm. Wells that penetrated bedrock generally had yields of less than 3 gpm (USGS, 1963). Monitoring wells installed on site did not produce significant quantities of water. Typical yields observed during well development were less than 5 gpm.

At the site, ground water is found in two zones, a shallow zone consisting of overburden and weathered bedrock, and a deeper zone in fresh bedrock. The hydraulic connection between the two zones at the site is not well understood. Logs describing the installation of monitoring wells at the site are included in Appendix C.

Ground water in bedrock beneath the site is derived from fractures, rather than from intergranular pore space. As described above, many of the fractures observed in core obtained from the shallow bedrock were mechanically induced. This observation is consistent with the low yield obtained from MW-1M, the shallow bedrock monitoring well installed by WCC at the site in August 1988. The two broken zones encountered respectively, at 18 ft and 21 ft below grade, probably yield most of the water obtained from MW-1D.

Static water level measurements taken in August 1988 are shown on Plate 2. The contours of ground water elevation are generalized and, based on the available data, suggest that in general, ground water in the shallow aquifer flows towards the southwest and that mounding may occur around the pond. Data available from bedrock wells also indicates flow towards the southwest. In both water bearing zones, flow gradients are very shallow, suggesting slow movement of ground water across the site.

SECTION 5
ANALYTICAL RESULTS AND DATA INTERPRETATION

5.1 SOIL SAMPLING

Soil sampling activities included surface soil sampling and soil sampling from borings. On-site surface soil samples were collected at selected grid locations and analyzed for total petroleum hydrocarbons and PCBs. In addition, off-site surface soil and stream sediment samples were collected at locations established with the concurrence of representatives of New York State Department of Health and NYSDEC. In total, surface soil was collected from over 100 locations on and off site. Analyses were conducted in the field using a McGraw-Edison PCB test kit and a Horiba Instruments OCMA 220 oil content analyzer. Thirty-seven samples were analyzed by Enseco for PCBs. Trenches were also excavated to investigate potential presence of free product.

Eight soil borings were installed on-site as part of Phase II field investigations. Three borings were installed in an area west of the pond where NYSDEC alleges that a spill occurred. The other five borings were installed in the former tank area. Logs describing the materials encountered while drilling on-site are included in Appendix C.

Selected samples were submitted to ENSECO, Inc. of Cambridge, MA, for laboratory analysis and confirmation of field test kit results. Sample locations and analytical results for PCBs and total petroleum hydrocarbon content are shown on Plates 3 and 4, respectively. Detailed laboratory reports are included in Appendix D.

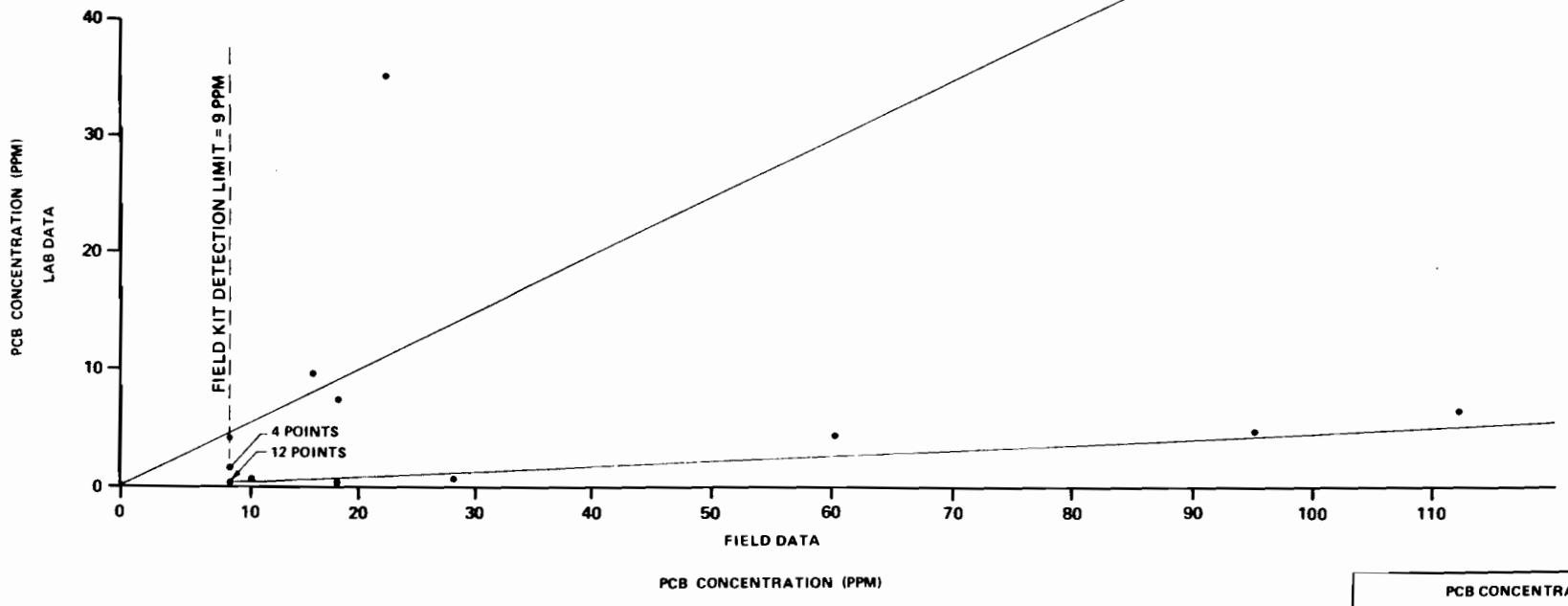
5.1.1 PCB Results

One hundred and thirty-four soil samples were collected at the site and analyzed for PCBs with the test kit. Thirty-seven soil samples (including duplicates) of the 134 soil samples collected at the site were analyzed by both the laboratory and the test kit. A correlation of paired sets of laboratory and field results for PCBs is shown on Figure 3. The figure shows two lines, one representing a best fit for most of the data, the other an upper limit for correlation between lab and test kit data. The plot provides a range of values for correlation and suggests the following:

and w/ poor comparison

- Except in one sample (G-1), when PCBs were not detected (less than 9 ppm) by the test kit, laboratory analyses were less than 1 ppm. Laboratory analysis of Sample G-1 indicated the presence of 1.4 ppm PCBs, whereas the test kit indicated no detection (less than 9 ppm). This ratio (1/37) indicates that analyses by the test kit did not indicate false negative results, i.e., if PCBs were present above 1 ppm, they were generally detected by the test kit; and
- Detection of PCBs by the test kit was usually confirmed by detection of PCBs in split samples analyzed by the laboratory. However, test kit results tend to over estimate PCB concentrations at this site. This is probably due in part to the presence of chlorinated compounds other than PCB in some samples, which may have resulted in false-positive results.

The data shown on Figure 3, and our experience with the PCB test kit at other sites, indicate that the test kit is unlikely to yield false negative results. The correlation plot provides a mechanism for interpreting test kit results for samples that were not sent to the laboratory for confirmation, by providing a probable range of values for those samples. Based upon the observed correlation, the test kit results can be expected to be about 2 to 10 times higher than laboratory results. For example, reported concentrations of 20 ppm, as



PCB CONCENTRATIONS IN PPM
LAB VS FIELD RESULTS

WOODWARD - CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR BY	BAS	SCALE	AS SHOWN	PROJ NO	86C4337
CK'D BY	HBG	DATE	20 MAY 1988	FIG NO	3

determined by the test kit, probably correspond to actual PCB concentrations of less than 10 ppm. One sample, SB-6, did not fit this pattern. Over 4000 ppm PCBs were detected with the test kit, whereas the laboratory analysis did not detect PCB in this sample. In order to reduce uncertainties in data interpretation for off-site samples, all off-site soil samples collected during Phase 2 field activities were submitted for laboratory analysis.

PCB test kit results and laboratory analyses for soils are plotted on Plate 3. The data plotted on Plate 3 indicate the following:

- The highest concentration of PCBs detected by the laboratory on site is 35 ppm (B-2), which is below the 50 ppm cutoff for disposal of solid materials as a PCB waste. Elsewhwere on site only twelve samples contained detectable concentrations of PCBs, with values ranging from 0.027 to 9.7 ppm. The balance of on site samples analyzed by the laboratory did not contain detectable concentrations of PCBs.

- Of the total 19 off site samples analyzed by the laboratory, 14 did not contain detectable concentrations of PCBs. Where detected in off site soils, PCB concentrations ranged from 0.022 ppm to 1.5 ppm. Only two of these samples contained greater than 1 ppm of PCBs.

The test kit and laboratory results indicate that low concentrations of PCBs were detected in several samples collected across the site. The alleged spill area west of the pond (samples C-8, E-9 and F-9) and the former tank area (E-3 and B-2) contain the highest concentrations of PCBs in surface soils. In no case was a PCB concentration above 50 ppm observed in laboratory analyses. The presence of PCBs in off-site surface soil samples suggests possible PCB migration resulting from particle transport during heavy rains and flooding.

Eight soil borings were installed at two locations, the alleged spill area and the former tank area, to evaluate the possibility that soil at depth contained

PCBs. PCBs were reported at depths greater than 2 feet in two samples analyzed by the laboratory (SB-5 and SB-8), and in one sample analyzed with the test kit (SB-2). Concentrations of PCBs in the samples from SB-5 and SB-8 were less than 1 ppm (laboratory results) and approximately 10 ppm (test kit results) in SB-2 (Plate 3). These results suggest that PCB presence is limited to near surface soils.

Petroleum Hydrocarbon Results

The results for analyses of total petroleum hydrocarbon content are shown on Plate 4. A comparison of laboratory and field analyses for petroleum hydrocarbons indicates that the field test kit tended to underestimate petroleum hydrocarbon concentrations, in this instance, generally by an order of magnitude. The difference between laboratory and field results can be attributed to variations in soil conditions (e.g. percent clay content) and limitations in the efficiency of extraction techniques used in the field. Nevertheless, the field data reflect a pattern that is similar to the laboratory results, and can be used as an indication of relative petroleum hydrocarbon concentration. To eliminate the uncertainties associated with the field test, all of the off-site samples collected were submitted for laboratory analysis.

The highest petroleum hydrocarbon concentrations in surface soil on site are found in the allegeded spill area (B-9, B-10, C-8, C-9, D-9, E-9 and F-9) and in the former tank area (B-2, D-3 and E-3). Perimeter samples and off-site samples south of the site contained detectable concentrations of petroleum hydrocarbons, but at concentrations significantly lower than the maxima observed on site. However, several perimeter samples (G-1, A-9, and F-11) and off-site samples located in the swamp west of the site (OS-25 and OS-27) contained anomalously high petroleum hydrocarbon concentrations in comparison to adjacent samples.

Petroleum hydrocarbons were detected in soil samples collected from the eight soil borings installed on-site. The analytical results (Plate 4) indicate that significant concentrations of hydrocarbons (greater than 1 per cent or 10,000 ppm) are generally limited to within 2 ft of grade.

Trenches

Two trenches were installed at the site adjacent to MW-H3 and MW-S9, respectively (Plate 1). Installation logs describing the excavation of the trenches are included in Appendix C. Overburden consisted of a silty sand unlerlain by a brown sandy clay mixed with rock fragments and cobbles.

Free product was not observed in either of the two trenches. However, a petroleum odor and discolored soil were detected during the excavation of the trenches adjacent to MW-H3. Bedrock was encountered within 3 feet of grade at this location, and no infiltration of ground water occurred while the trenches were open.

A french drain was encountered during the excavation of the trench near MW-S9. Several gallons of water released by the drain contained a slight oil sheen. Ground water was not observed in this trench.

Summary

PCBs - Analytical results of soil samples for PCBs obtained from the test kit and the laboratory indicate low concentrations of PCBs in several samples on site. Only one sample (B-2) collected on site contained greater than 10 ppm as reported by the laboratory. The highest concentrations as indicated by laboratory and test kit analyses are localized in the alleged spill area (C-8 and C-9 through F-8 and F-9 and the former tank area (B-3 and B-4 through E-3 and E-4). Analytical results from off-site samples collected east of the site and from samples collected along the southern edge of the site suggest that off site PCB migration was extremely limited in these directions. PCB concentrations were detected by laboratory analysis in five off-site samples. The maximum concentration detected by the laboratory in samples collected off-site was 1.5 ppm.

Petroleum Hydrocarbons - Analytical results for petroleum hydrocarbons, as indicated by laboratory analyses for off-site samples collected in August 1988, suggest that off-site migration of oil into the swampy area to the west of the site has occurred by surface transport mechanisms. Residual hydrocarbon concentrations up to 3,900 ppm were observed in this area. No evidence of off-site migration was detected in soil samples collected south of the site.

5.2 SURFACE AND GROUND WATER

Ground water samples were collected from each of the monitoring wells shown on Plate 5. These samples were analyzed in the laboratory for halogenated volatile organic compounds (EPA method 601) aromatic volatile compounds (EPA method 503.1), and selected Series 200 metals (arsenic, barium, cadmium, chromium, lead, mercury and silver) in accordance with the procedures described in WCC's work plan. In addition, ground water from MW-S10 and MW-H3 was analyzed for PCBs in accordance with the work plan. Analytical results for ground water samples are summarized on Plate 4 and on Tables 3 and 4.

Volatile Organics

The data summarized on Table 3 indicate that benzene, chloroethane and 1,1-dichloroethane (1,1-DCA) were the only volatile organic compounds (VOCs) detected in any of the samples. Benzene (3.9 and 7.4 ppb) and chloroethane (28 and 32 ppb) were detected only in replicate samples from MW-S10, whereas 1,1-DCA is more widely distributed (Plate 4), having been found in low concentrations in both on- and off-site wells. 1,1 DCA was not found in MW-H1, MW-H2, MW-H9 and MW-H10, which are located in the former tank area (Plate 4). Where present, concentrations of 1,1-DCA ranged from 2.2 to 8.6 ppb. Benzene, however, was detected in the field blank (2.5 ppb) prepared on the day that the ground water sample was obtained from MW-S10. This suggests that the benzene detected in MW-S10 may not be representative of site conditions.

MW-H4 is the only deep bedrock well installed by NYSDOT that contained 1,1-DCA (8.2 ppb). The concentration of 1,1-DCA in MW-H3, the companion overburden well to MW-H4, was 8.6 ppb, virtually identical to the concentration detected in MW-H4. The compound was not found in MW-H6, which is upgradient of contaminated areas, although its adjacent overburden well (MW-H5) contained 1,1-DCA in extremely low concetrations (2.2 ppb). MW-1M, one of the new wells, installed by WCC, contained 5.3 ppb of 1,1-DCA. Ground water from the deep bedrock well installed by WCC (MW-1D) did not contain volatile organic compounds, suggesting that the deeper water bearing zone may be hydraulically isolated from the shallow zone at that location.

Current NYS ambient water quality standards for VOCs detected in ground water and the site are:

Benzene - not detected
1,1-DCA - 50 ppb

No standard is published for chloroethane or petroleum hydrocarbons. Benzene was detected in one well completed in the shallow bedrock zone. The absence of benzene in ground water samples obtained from other wells on site suggests that its extent is limited both horizontally and vertically.

The water sample from the pond contained 1,1-DCA in a concentration comparable to that found in the ground water samples. Surface water samples collected from the swamp west of the site did not contain VOCs.

The distribution of VOCs in ground water (Plate 5) suggests that their source may be located in the north central or northwestern portions of the site. Except for benzene, concentrations detected in ground water were below NYS ground water quality standards. The presence of VOCs in MW-S1 and in MW-1M suggests that off site migration may have occurred in the direction of the generalized

ground water flow illustrated on Plate 2. VOC concentrations in MW-S1 and MW-1M were below NYS ground water standards indicating that ground water remediation would not be required. The absence of VOCs from the wells located in the east central and southeastern areas of the site (MW-H1, MW-H2, MW-H9 and MW-H10) suggests that the former tank area may not be a source of these compounds in ground water.

Petroleum Hydrocarbons

Petroleum hydrocarbons were found in ground water and surface water on and off site. Suspected source areas include the alleged spill area and the former tank area. In addition, surface runoff from Waite Road may contribute to the presence of petroleum hydrocarbons in the site vicinity. As shown in Plate 5 and Table 3, reported total petroleum hydrocarbon concentrations were less than 10 ppm. Free product was not observed in any well during sampling activities. MW-S11 and MW-S1, which are located offsite, contained petroleum hydrocarbons in concentrations that were slightly higher than those observed in ground water on site. The presence of petroleum hydrocarbons in MW-S11 may not be related to site activities. MW-S11 does not appear to be downgradient of the site, given its location west of the site, perpendicular to, rather than downgradient from generalized flow directions. In addition, MW-S5 which lies between the site and MW-S11 (Plate 5) did not contain detectable concentrations of petroleum hydrocarbons. Petroleum hydrocarbons were not detected in any of the wells installed by WCC (MW-1S, 1M and 1D).

Metals

Table 4 contains a summary of analytical results for metals in ground water. The data indicate a nearly ubiquitous presence of barium in surface and ground water in concentrations that range up to 3.2 ppm. Arsenic, chromium, lead and mercury were less broadly dispersed (Plate 5). The water samples were not filtered during sampling, and the reported concentrations may reflect metals adsorbed onto suspended particles rather than dissolved metals.

Current NYS water quality standards for these metals in ground water are:

Arsenic	0.025 ppm	
Barium	1 ppm	up to 3.2 ppm
Lead	0.025ppm	one hit 0.036 ppm
Mercury	0.002 ppm	

These standards were exceeded for barium in MW-1D, MW-H2, MW-H4, MW-H6, MW-S1 and MW-S9; and for lead at 0.036 ppm in MW-H3, and MW-S9.

These data indicate that barium is the only significant metal contaminant observed in ground water. Barium was detected in similar concentrations in both upgradient and downgradient wells on site and in the immediate vicinity of the site.

natural occuring?

5.3 RESIDENTIAL WELLS

Potable water wells, from residences located along Waite Road (Figure 4), were sampled and analyzed for aromatic and halogenated volatile organics (EPA methods 503.1 and 601, respectively), petroleum hydrocarbon content, PCBs and selected series 200 metals. Two rounds of samples were collected, the first in December 1987 and January 1988, the second in October, 1988.

Analytical results are presented on Table 5. During the first round of analyses, no VOCs were detected in any of the drinking water wells, although petroleum hydrocarbons in concentrations less than 1.7 ppm were detected in three wells. Barium was detected in concentrations comparable to those found in ground water samples collected on site and exceeded the drinking water standard (1 ppm) in one well (RW-740) where concentrations were 1.1 ppm (1.2 ppm in the duplicate). No other metals analyzed for were detected during first round analyses.

Analytical results for the second round of sampling are consistent with the first round samples. Petroleum hydrocarbons were not detected in any of the second round samples at a detection limit of 2 ppm. In the first round, petroleum hydrocarbons were detected in three wells, in each case at concentrations below 2 ppm. VOCs were detected in RW-759, which is northeast of the site and presumably an upgradient location. The compounds detected were chloroform (20 ppb) and p-xylene/m-xylene (1.3 ppb). The NYS Class GA standard for chloroform is 100 ppb, whereas the standard for xylene is 5 ppb. Chloroform and xylene were not detected in ground water samples collected on site by WCC.

Analytical results for barium identified one well that exceeded class GA standards during second round sampling. This was RW-731, which is a duplicate of RW-730. The duplicate contained 1.3 ppm of barium, in contrast to the original sample, which contained 0.93 ppm. RW-740, in which barium exceeded class GA standards during December 1987 sampling, could not be sampled during October 1988 because the house was uninhabited and power had been shut off. RW-736, which lies between RW-730 and the site, contained 0.19 ppm barium during the October 1988 sampling. The variation between analytical results may be due to differences in well completion depths.

SECTION 6
FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 SUMMARY OF FINDINGS

6.1.1 General Findings

WCC evaluated the lateral extent of PCB and total petroleum hydrocarbons in surface soil on- and off-site. The vertical extent of these substances was evaluated at two areas on-site, in the alleged spill area west of the pond, and in the former tank area. Chemical analysis of soils indicated that detectable concentrations of PCBs and elevated (greater than 1 percent) concentrations of petroleum hydrocarbons are present in soils in the alleged spill area and in the former tank area. Concentrations of petroleum hydrocarbons greater than 1 percent appear to be localized on-site and limited to near surface soils (within two feet of grade).

Ground water samples were collected from existing monitoring wells, new wells installed by WCC and eight residential wells located along Waite Road. The laboratory data indicate that NYS Class GA standards were exceeded on-site in one monitoring well for benzene. No other monitoring wells sampled by WCC contained organic substances in excess of NYS standards. The well in which benzene was detected is poorly constructed and it is not clear that the analytical results reflect actual ground water conditions.

Barium was detected in ground water collected from monitoring wells and two residential wells in concentrations that exceeded NYS standards. The highest concentration of barium detected in a residential well was 1.3 ppm in comparison to the NYS standard of 1 ppm. A relationship between site conditions and the distribution of barium on- and off-site cannot be confirmed or excluded with the available data.

WCC has proposed a limited site remediation on the basis of these findings. The remediation plan, which is discussed in greater detail below, contains the following elements:

- o Source removal by excavation of soil in areas where petroleum hydrocarbon concentration exceeds 1 percent; as a consequence, soils containing PCBs with concentrations of approximately 5 ppm will also be excavated;

- o Abandoning and sealing NYSDOT monitoring wells to eliminate potential pathways between surface water and ground water;

- o Installation of new monitoring wells to evaluate the effectiveness of source removal vis-a-vis potential off-site migration of substances detected in soils on-site;

- o Treatment of residential well water for removal of barium; and

- o Continued monitoring of residential wells.

Ground water remediation by a pump and treat system is not likely to be effective at this site. Yields from wells are low (less than 5 gpm), and development of a zone of influence as a result of pumping in a fracture flow aquifer is unpredictable. Our findings, and proposed remediation plan are discussed in greater detail below.

6.1.2 Ground Water Findings

Laboratory analysis of ground water samples collected from monitoring wells and residential wells indicate the following:

- In general, ground water flows towards the southwest across the site;

- 1,1-DCA was detected in several monitoring wells on-site, but in concentrations below NYS ground water standards;

- 1,1,-DCA was not detected in any of the residential wells sampled along Waite Road;

- Benzene was detected in one well on site, MW-S10. The sample collected from MW-S10 contained 7.4 ppb of benzene. A duplicate sample collected at the same time contained 3.9 ppb benzene. Benzene was not detected in other on-site wells. The NYS class GA Standard for benzene is non-detection.

- Benzene was not detected in any of the residential wells sampled along Waite Road;

- Free product was not observed in any of the monitoring wells during ground water sampling;

- Elevated levels of barium were observed in upgradient, on-site, downgradient, and two residential wells. Observed levels of barium may be related to site conditions. However, the available data can not be used to definitively associate elevated barium concentrations in residential wells with site conditions.

- Petroleum hydrocarbons were detected in three residential wells in concentrations that ranged from 0.8 to 1.7 ppm. NYS has not published a hydrocarbon standard for ground water.

- The sample collected from the deep bedrock well installed by WCC did not contain any of the organic substances detected in the shallow wells.

6.1.3 Petroleum Hydrocarbons in Soil

For soils, the data collected indicate low concentrations of petroleum hydrocarbons and PCBs in soils. Isolated areas of elevated hydrocarbon concentrations were also found, although no saturated soils or free product were observed.

- o Free product was not observed in the two test pits excavated on-site;
- o Petroleum hydrocarbons were detected in soils at depths as great as 6.5 feet, but in concentrations less than 1 percent (10,000 ppm);
- o On-site hydrocarbon contaminated soils are present in both the alleged spill area and former tank area; and
- o Off-site concentrations of petroleum hydrocarbons in soil were less than 1 percent. The maximum concentration detected off-site was 0.39 percent (3900 ppm).

6.1.4 PCBs in Soil

- o Laboratory analyses identified only one location on site where PCBs exceeded 10 ppm (35 ppm at B-2), and no locations where PCBs exceeded 50 ppm, the concentration at which PCB contaminated material must be disposed of as PCB waste;
- o On site, the presence of PCBs was detected in the alleged spill area and the former tank area;
- o Detectable PCB concentrations were generally limited to near surface soil samples; and

- o PCBs were detected in off-site soil samples, but in low concentrations (<1.5 ppm) as detected by laboratory analysis.

6.2 CONCLUSIONS

This investigation of the Waite Road site was designed to evaluate soil and ground water conditions in the vicinity of the site. Surface soil sampling, test borings and trench excavations were conducted to evaluate the presence of PCBs and petroleum hydrocarbons in soil. Ground water samples were collected from on-site and off-site monitoring wells, as well as from nearby residential wells, to evaluate the impact of past site activities on shallow and deep water bearing zones beneath the site.

The analytical results indicate that near surface soils (less than 2 feet deep) in the former tank area and west of the pond, were impacted by petroleum hydrocarbon spills and should be removed from the site and disposed of properly off-site. WCC recommends that excavation continue in these areas until concentrations of total petroleum hydrocarbons are less than 1 percent (10,000 ppm). Soils are generally considered saturated by hydrocarbons at concentrations ranging from 3 to 10 percent, concentrations at which free hydrocarbons may migrate through soil. Utilizing 1 percent as a "cleanup" level will provide a safe margin to prevent migration of free hydrocarbons.

remedy selection assigned. See 6.3 options

i.e. as oil

PCBs were detected in surface soils on site. Concentrations detected by the laboratory were less than 10 ppm in all but one sample, which contained less than 50 ppm, the concentration at which PCB wastes are considered hazardous. Removal of soils containing high petroleum hydrocarbon concentrations will result in the removal of soils containing the highest concentrations of PCBs.

no - test

Benzene was detected in one on-site well (S-10) during this investigation. The NYS class GA standard for benzene is non-detection. The low concentration

detected (7.4 ppb), the absence of benzene from the residential wells and from all other monitoring wells sampled during this investigation, and its presence in the field blank collected on the day S-10 was sampled suggests that benzene detected may not be representative of ground water conditions or may be limited to the immediate vicinity of S-10. Furthermore, the well construction of S-10 may allow surface water to infiltrate ground water. WCC recommends the abandonment of S-10, along with previously installed monitoring wells to remove vertical connections, and the installation of a new monitoring well network to more accurately monitor ground water conditions after site remediation. Abandoning S-10 may remove the infiltration of surface water which may be responsible for observations of benzene in the subsurface. The proposed monitoring will evaluate if this approach will remediate the presence of benzene in the vicinity of S-10.

Two of the residential wells contained barium in concentrations that exceeded the drinking water standards of 1 ppm. The maximum concentrations of barium detected in these wells were 1.2 and 1.3 ppm. Monitoring of these wells should be continued to evaluate the accuracy and reproducibility of the reported concentrations. In addition to monitoring, we recommend the installation of a water treatment system to remove barium from the water supply at the two residences at which the exceedences were observed.

Softener will add salts more harmful than Barium at this level

6.3 RECOMMENDATIONS

WCC considered four possible remedial alternatives: no action with long-term monitoring; encapsulation; pump and treat; and source removal coupled with end user treatment and monitoring.

The no action alternative was not considered feasible because of the long-term monitoring and stewardship of the site that no action would require.

Encapsulation was not considered appropriate because of the presence of wetlands on and adjacent to the site. The wetlands west and south of the site are

classified by NYSDEC as Class 3 wetlands. Class 1 wetlands are considered the most valuable and Class 4 the least valuable. The remediation proposed below would preserve the wetlands, whereas encapsulation would result in a loss of the wetlands. In addition, areas to be remediated probably lie within the buffer zone mandated by NYSDEC regulations adjacent to wetlands. Prior to implementing remedial action at the site, permitting requirements will have to be resolved with NYSDEC.

Barium was detected in concentrations that exceeded NYS Class standards in six monitoring wells. Pumping and treating ground water, however, is not a practical remedial alternative for this site as a result of geohydrologic conditions. Ground water in bedrock beneath the site is derived from fractures and not from intergranular pore space. On a local scale, fracture flow systems tend to be anisotropic, that is, hydraulic characteristics vary as a function of fracture density, orientation and aperature. It is common for most of the water to be derived from a few prolific fractures. In addition, the shallow bedrock aquifer beneath the site does not yield significant quantities of water (less than 5 gpm, and probably closer to 2-3 gpm). The combination of low flow in the aquifer and the unpredictable nature of fracture flow systems creates an environment in which the establishment of an effective hydraulic barrier through a pump and treat system would be difficult.

Source removal and control should be sufficient to remediate the site. No significant off-site migration of ground water contamination was detected. However, although not directly traceable to the site, barium was detected in two residential wells in concentrations slightly above NYS class GA Standards.

The goals of remediation for the Waite Road site are:

- o removing residual sources of contamination;
- o abandoning and grouting existing on site wells to minimize vertical migration of ground water and surface water;

- o controlling surface runoff and erosion to prevent migration of contaminated soil;
- o minimizing direct contact with contaminated soils;
- o minimizing impact on adjacent wetlands; and
- o reducing the concentration of barium in residential well water where exceedences of standards were detected.

In addition, we recommend semi-annual ground water monitoring for a period of five years to demonstrate that ground water is not being impacted. Monitoring would utilize the three existing on-site wells installed by WCC during this investigation, as well as one additional upgradient and two downgradient well pairs. Analytical parameters would include VOCs, total petroleum hydrocarbons, and barium, the parameters detected in ground water at the site. In addition, the residential wells along Waite Road would be monitored at the same frequency and for the same parameters as ground water collected from the monitoring wells.

The goals of site remediation can be achieved by implementing the following program:

- o Removing soils containing greater than 1 percent (10,000 ppm) hydrocarbons and backfill with clean material. This activity would be limited to the former tank area and the spill area to an average depth of 1 foot below grade. This depth was chosen as a result of the limited observed occurrence of petroleum hydrocarbons in concentrations greater than 1 percent at depths as great as 2 feet. As a consequence of the hydrocarbon cleanup, the soils containing the highest concentrations of PCBs on site would also be removed, although these soils would not be considered a PCB waste. Data collected to date indicate that approximately 650 cu yds of soil would have to be removed. Hydrocarbons may move in soil as free product in concentrations of 3 to 10 percent. Utilizing 1 percent as a cleanup standard provides a safety margin regarding potential hydrocarbon product migration.

- Regrading the site to control future off-site runoff and particulate transport by erosion.

- Placing a nominal 1 ft thick layer of clean soil over the site to isolate residual low-level contaminated soils. The site would then be re-vegetated with native species. This would prevent direct contact with soils.

- Abandoning existing wells by reaming out and grouting. This would eliminate the vertical migration pathway these wells currently represent.

- Installing new monitoring wells on site to provide accurate long-term monitoring.

- Installing a treatment system at the two residential wells where barium concentrations exceeded NYS class GA Standards. This would eliminate the current potential exposures to barium concentration slightly above standards. A cation exchange column would be installed at all drinking water sources in each residence. Cation exchange utilizes a resin that removes positively charged dissolved ions from water. This method is essentially the same as commercially available water softening methods. Required maintenance would be limited to periodic changing of the resin package. The installation of the treatment system would be coupled with monitoring of the eight residences that were part of this study.

- Developing a contingency plan to contend with problems that might arise during and after remediation activities.

TABLE 2
BENZENE CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	Benzene (in ppb)				ND	
Well No.	2/19/82	4/26/82	9/3/82	11/22/82	9/20/84 A	9/20/84 B
H1	ND	1.3	ND	ND	--	--
H2	ND	ND	ND	--	--	--
H3	ND	ND	ND	ND	ND	ND
H4	ND	ND	ND	--	--	--
H5	ND	ND	ND	ND	--	--
H6	ND	ND	ND	--	--	--
H7+	2.2	ND	ND	5.3	--	--
H7 (dup)	--	ND	71	--	--	--
H8	ND	ND	ND	--	--	--
H9	ND	ND	ND	--	--	--
H10	ND	1.4	ND	--	--	--
H10 (dup)	--	ND	ND	--	--	--
H11 (H10 split)	--	ND	--	--	--	--
H12 (H7 split)	--	ND	--	--	--	--
H13 (H10 split)	--	--	2	--	--	--
S1	--	ND	ND	ND	--	--
S2	--	ND	ND	ND	--	--
S3	--	ND	ND	--	--	--
S4	--	ND	ND	--	--	--
S5	--	ND	ND	--	--	--
S6	--	ND	ND	ND	--	--
S7	--	ND	ND	--	--	--
S8	--	ND	ND	--	--	--
S9	--	ND	ND	--	ND	ND
S10	--	ND	ND	ND	ND	ND
S10 (dup)	--	--	--	--	--	--
S11	--	ND	ND	--	--	--
S13 (S10 split)	--	--	2	--	--	--
Pond	--	ND	ND	ND	--	--

Notes:

A : VERSAR - Analytical Lab

B : ERCO - Analytical Lab

ND : None detected or below method of detection limit

\- : No data or not analyzed.

dup : Duplicate sample.

\+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 3
TOLUENE CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	Toluene (in ppb)					
Well No.	2/19/82	4/26/82	9/3/82	11/22/82	9/20/84 A	9/20/84 B
H1	ND	ND	1.1	ND	--	--
H2	ND	ND	ND	--	--	--
H3	74	411	17,369	57	ND	ND
H4	ND	ND	ND	--	--	--
H5	ND	ND	ND	ND	--	--
H6	ND	ND	ND	--	--	--
H7+	12	ND	132	34	--	--
H7 (dup)	--	ND	322	--	--	--
H8	ND	1.4	ND	--	--	--
H9	1.4	ND	ND	--	--	--
H10	ND	ND	ND	--	--	--
H10 (dup)	--	ND	ND	--	--	--
H11 (H10 split)	--	ND	--	--	--	--
H12 (H7 split)	--	8.3	--	--	--	--
H13 (H10 split)	--	--	ND	--	--	--
S1	--	3.9	ND	ND	--	--
S2	--	ND	ND	ND	--	--
S3	--	ND	ND	--	--	--
S4	--	ND	ND	--	--	--
S5	--	ND	ND	--	--	--
S6	--	ND	ND	ND	--	--
S7	--	ND	ND	--	--	--
S8	--	ND	ND	--	--	--
S9	--	ND	ND	--	ND	ND
S10	--	50	ND	ND	ND	ND
S10 (dup)	--	--	--	--	--	--
S11	--	ND	ND	--	--	--
S13 (S10 split)	--	--	ND	--	--	--
Pond	--	ND	ND	ND	--	--

Notes:

A : VERSAR - Analytical Lab

B : ERCO - Analytical Lab

ND : None detected or below method of detection limit

\- : No data or not analyzed.

dup : Duplicate sample.

\+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 4
XYLENE CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	Xylene (in ppb)					
Well No.	2/19/82	4/26/82	9/3/82	11/22/82	9/20/84 A	9/20/84 B
H1	ND	ND	ND	--	--	--
H2	ND	ND	ND	--	--	--
H3	8	148	18,497	--	--	--
H4	ND	ND	ND	--	--	--
H5	ND	ND	ND	--	--	--
H6	1.4	ND	ND	--	--	--
H7+	56	ND	ND	--	--	--
H7 (dup)	--	ND	23	--	--	--
H8	ND	ND	ND	--	--	--
H9	ND	ND	ND	--	--	--
H10	ND	ND	ND	--	--	--
H10 (dup)	--	ND	ND	--	--	--
H11 (H10 split)	--	ND	--	--	--	--
H12 (H7 split)	--	17.4	--	--	--	--
H13 (H10 split)	--	--	3.1	--	--	--
S1	--	ND	ND	--	--	--
S2	--	ND	ND	--	--	--
S3	--	ND	ND	--	--	--
S4	--	ND	ND	--	--	--
S5	--	ND	ND	--	--	--
S6	--	ND	ND	--	--	--
S7	--	ND	ND	--	--	--
S8	--	ND	ND	--	--	--
S9	--	ND	ND	--	--	--
S10	--	6.9	ND	--	--	--
S10 (dup)	--	--	--	--	--	--
S11	--	ND	ND	--	--	--
S13 (S10 split)	--	--	3.1	--	--	--
Pond	--	ND	ND	--	--	--

Notes:
A : VERSAR - Analytical Lab
B : ERCO - Analytical Lab
ND : None detected or below method of detection limit
- : No data or not analyzed.
dup : Duplicate sample.
+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 5
1,1 DICHLOROETHANE AND CHLOROETHANE CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	1,1, Dichloroethane (ppb)			Chloroethane (ppb)		
Well No.	11/82	9/84 A	9/84 B	11/82	9/84 A	9/84 B
H1	ND	--	--	ND	--	--
H2	--	--	--	--	--	--
H3	48	ND	ND	330	ND	ND
H4	--	--	--	--	--	--
H5	ND	--	--	ND	--	--
H6	--	--	--	--	--	--
H7+	260	--	--	910	--	--
H7 (dup)	--	--	--	--	--	--
H8	--	--	--	--	--	--
H9	--	--	--	--	--	--
H10	--	--	--	--	--	--
H10 (dup)	--	--	--	--	--	--
H11 (H10 split)	--	--	--	--	--	--
H12 (H7 split)	--	--	--	--	--	--
H13 (H10 split)	--	--	--	--	--	--
S1	14	--	--	ND	--	--
S2	ND	--	--	ND	--	--
S3	--	--	--	--	--	--
S4	--	--	--	--	--	--
S5	--	--	--	--	--	--
S6	ND	--	--	ND	--	--
S7	--	--	--	--	--	--
S8	--	--	--	--	--	--
S9	--	ND	ND	--	ND	ND
S10	8.1	ND	ND	77	ND	98
S10 (dup)	--	--	--	--	--	--
S11	--	--	--	--	--	--
S13 (S10 split)	--	--	--	--	--	--
Pond	ND	--	--	16	--	--

Notes:
A : VERSAR - Analytical Lab
B : ERCO - Analytical Lab
ND : None detected or below method of detection limit
- : No data or not analyzed.
dup : Duplicate sample.
+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 6
1,2 DICHLOROETHANE AND TRANS-1,2-DICHLOROETHYLENE CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	1,2-Dichloroethane (ppb)			Trans-1,2-Dichloroethylene (ppb)		
Well No.	11/82	9/84 A	9/84 B	11/82	9/84 A	9/84 B
H1	ND	--	--	ND	--	--
H2	--	--	--	--	--	--
H3	16	ND	ND	6	ND	ND
H4	--	--	--	--	--	--
H5	ND	--	--	ND	--	--
H6	--	--	--	--	--	--
H7+	51	--	--	20	--	--
H7 (dup)	--	--	--	--	--	--
H8	--	--	--	--	--	--
H9	--	--	--	--	--	--
H10	--	--	--	--	--	--
H10 (dup)	--	--	--	--	--	--
H11 (H10 split)	--	--	--	--	--	--
H12 (H7 split)	--	--	--	--	--	--
H13 (H10 split)	--	--	--	--	--	--
S1	ND	--	--	ND	--	--
S2	ND	--	--	ND	--	--
S3	--	--	--	--	--	--
S4	--	--	--	--	--	--
S5	--	--	--	--	--	--
S6	ND	--	--	ND	--	--
S7	--	--	--	--	--	--
S8	--	--	--	--	--	--
S9	--	ND	ND	--	ND	ND
S10	ND	ND	ND	ND	ND	ND
S10 (dup)	--	--	--	--	--	--
S11	--	--	--	--	--	--
S13 (S10 split)	--	--	--	--	--	--
Pond	ND	--	--	ND	--	--

Notes:

A : VERSAR - Analytical Lab

B : ERCO - Analytical Lab

ND : None detected or below method of detection limit

- : No data or not analyzed.

dup : Duplicate sample.

+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 7
1,1 DICHLOROETHYLENE AND ETHYLBENZENE CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	1,1-Dichloroethylene (ppb)			Ethylbenzene (ppb)		
Well No.	11/82	9/84 A	9/84 B	11/82 A	9/84 B	9/84
H1	ND	--	--	ND	--	--
H2	--	--	--	--	--	--
H3	ND	ND	ND	11	ND	ND
H4	--	--	--	--	--	--
H5	ND	--	--	ND	--	--
H6	--	--	--	--	--	--
H7+	3.2	--	--	ND	--	--
H7 (dup)	--	--	--	--	--	--
H8	--	--	--	--	--	--
H9	--	--	--	--	--	--
H10	--	--	--	--	--	--
H10 (dup)	--	--	--	--	--	--
H11 (H10 split)	--	--	--	--	--	--
H12 (H7 split)	--	--	--	--	--	--
H13 (H10 split)	--	--	--	--	--	--
S1	ND	--	--	ND	--	--
S2	ND	--	--	ND	--	--
S3	--	--	--	--	--	--
S4	--	--	--	--	--	--
S5	--	--	--	--	--	--
S6	ND	--	--	ND	--	--
S7	--	--	--	--	--	--
S8	--	--	--	--	--	--
S9	--	ND	ND	--	ND	ND
S10	ND	ND	ND	ND	ND	ND
S10 (dup)	--	--	--	--	--	--
S11	--	--	--	--	--	--
S13 (S10 split)	--	--	--	--	--	--
Pond	ND	--	--	ND	--	--

Notes:
A : VERSAR - Analytical Lab
B : ERCO - Analytical Lab
ND : None detected or below method of detection limit
- : No data or not analyzed.
dup : Duplicate sample.
+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 1
RESIDENTIAL WELL SAMPLING

Residence Sampled	Sample I.D. Number	Approximate[1] Depth of Well (feet below grade)	Sampling Date
Biancha, Barry 1043 Main St. (Rt. 146A)	RW-1043-2		12 Oct 1988
Deyoe, David 727 Waite Rd.	RW-727 RW-727-2	>100	10 Dec 1987 11 Oct 1988
Kopec, Anthony 720 Waite Rd.	RW-720 RW-720-2		10 Dec 1987 11 Oct 1988
Mooney, Anna Rt. 146A	RW-146A-2		12 Oct 1988
Perry, Bruce 736 Waite Rd.	RW-736-2		11 Oct 1988
Russom, Steve 733 Waite Rd.	RW-733-2		11 Oct 1988
Sanford, Harold 717 Waite Rd.	RW-717 RW-717-2	210	10 Dec 1987 11 Oct 1988
Shafrim, Steve 730 Waite Rd.	RW-730 RW-730-2 RW-731-2		22 Dec 1987 12 Oct 1988 12 Oct 1988
Truchi, Gino 759 Waite Rd.	RW-759 RW-759-2		10 Dec 1987 12 Oct 1988
Viedt, Harold 740 Waite Rd.	RW-740 RW-740 DUP	180	10 Dec 1987 10 Dec 1987

Note: (1) No official well logs are available. Depths are based on information provided by resident.

AM88-064Tz

TABLE 9
TRICHLOROETHYLENE AND VINYL CHLORIDE CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	Trichloroethylene (ppb)			Vinyl Chloride (ppb)		
Well No.	11/82	9/84 A	9/84 B	11/82	9/84 A	9/84 B
H1	ND	--	--	ND	--	--
H2	--	--	--	--	--	--
H3	ND	ND	ND	ND	ND	ND
H4	--	--	--	--	--	--
H5	ND	--	--	ND	--	--
H6	--	--	--	--	--	--
H7+	2.5	--	--	34	--	--
H7 (dup)	--	--	--	--	--	--
H8	--	--	--	--	--	--
H9	--	--	--	--	--	--
H10	--	--	--	--	--	--
H10 (dup)	--	--	--	--	--	--
H11 (H10 split)	--	--	--	--	--	--
H12 (H7 split)	--	--	--	--	--	--
H13 (H10 split)	--	--	--	--	--	--
S1	ND	--	--	ND	--	--
S2	ND	--	--	ND	--	--
S3	--	--	--	--	--	--
S4	--	--	--	--	--	--
S5	--	--	--	--	--	--
S6	ND	--	--	ND	--	--
S7	--	--	--	--	--	--
S8	--	--	--	--	--	--
S9	--	ND	ND	--	ND	ND
S10	ND	ND	ND	ND	ND	ND
S10 (dup)	--	--	--	--	--	--
S11	--	--	--	--	--	--
S13 (S10 split)	--	--	--	--	--	--
Pond	ND	--	--	ND	--	--

Notes:

A : VERSAR - Analytical Lab

B : ERCO - Analytical Lab

ND : None detected or below method of detection limit

\- : No data or not analyzed.

dup : Duplicate sample.

\+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 10
TOTAL HYDROCARBONS CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	Total Hydrocarbons (in ppb)					
Well No.	2/19/82	4/26/82	9/3/82	11/22/82	9/20/84 A	9/20/84 B
H1	29	8	10.2	--	--	--
H2	8	2.5	6.4	--	--	--
H3	980	485	37,080	--	--	--
H4	3	2.7	1.9	--	--	--
H5	111	6.3	18.5	--	--	--
H6	83	8.2	19.2	--	--	--
H7+	305	4.2	1,517	--	--	--
H7(dup)	--	2,400	27,000	--	--	--
H8	12	2.9	27	--	--	--
H9	785	10	3.3	--	--	--
H10	218	8.7	20.5	--	--	--
H10 (dup)	--	2.7	220	--	--	--
H11 (H10 split)	--	3.4	--	--	--	--
H12 (H7 split)	--	76	--	--	--	--
H13 (H10 split)	--	--	485	--	--	--
S1	--	79	333	--	--	--
S2	--	14	36	--	--	--
S3	--	19	48	--	--	--
S4	--	11	2.5	--	--	--
S5	--	21	1.9	--	--	--
S6	--	86	38.4	--	--	--
S7	--	31	18	--	--	--
S8	--	30	13	--	--	--
S9	--	29	18	--	--	--
S10	--	803	666	--	--	--
S10 (dup)	--	--	--	--	--	--
S11	--	39	52	--	--	--
S13 (S10 split)	--	--	485	--	--	--
Pond	--	6.6	6.7	--	--	--

Notes:
A : VERSAR - Analytical Lab
B : ERCO - Analytical Lab
ND : None detected or below method of detection limit
- : No data or not analyzed.
dup : Duplicate sample.
+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 11
PESTICIDES/PCB AND POLYNUCLEAR AROMATIC HYDROCARBONS
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples ppb)	Pesticides/PCB (ppb)			PAH		
Well No.	11/82	9/84 A	9/84 B	11/82	9/84 A	9/84 B
H1	ND	--	--	0.72	--	--
H2	--	--	--	--	--	--
H3	0.51*	8	ND	37.59	--	--
H4	--	--	--	--	--	--
H5	ND	--	--	0.16	--	--
H6	--	--	--	--	--	--
H7+	ND	--	--	3.40	--	--
H7 (dup)	--	--	--	--	--	--
H8	--	--	--	--	--	--
H9	--	--	--	--	--	--
H10	--	--	--	--	--	--
H10 (dup)	--	--	--	--	--	--
H11 (H10 split)	--	--	--	--	--	--
H12 (H7 split)	--	--	--	--	--	--
H13 (H10 split)	--	--	--	--	--	--
S1	ND	--	--	9.20	--	--
S2	ND	--	--	5.23	--	--
S3	--	--	--	--	--	--
S4	--	--	--	--	--	--
S5	--	--	--	--	--	--
S6	ND	--	--	0.32	--	--
S7	--	--	--	--	--	--
S8	--	--	--	--	--	--
S9	--	0.3	--	--	--	--
S10	0.06*	10.3	--	6.60	--	--
S10 (dup)	--	--	--	--	--	--
S11	--	--	--	--	--	--
S13 (S10 split)	--	--	--	--	--	--
Pond	0.1*	--	--	0.08	--	--

Notes:

A : VERSAR - Analytical Lab

B : ERCO - Analytical Lab

ND : None detected or below method of detection limit

- : No data or not analyzed.

dup : Duplicate sample.

+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

* : As total PCB.

TABLE 12
TOTAL ORGANIC CARBON AND PHENOLIC CONTENT
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Samples	TOC (ppm)			Phenolics (ppm)		
Well No.	11/82	9/84 A	9/84 B	11/82	9/84	9/84 A B
H1	150	--	--	0.87	--	--
H2	--	--	--	--	--	--
H3	270	--	--	0.27	--	--
H4	--	--	--	--	--	--
H5	19	--	--	ND	--	--
H6	--	--	--	--	--	--
H7+	190	--	--	0.16	--	--
H7 (dup)	--	--	--	--	--	--
H8	--	--	--	--	--	--
H9	--	--	--	--	--	--
H10	--	--	--	--	--	--
H10 (dup)	--	--	--	--	--	--
H11 (H10 split)	--	--	--	--	--	--
H12 (H7 split)	--	--	--	--	--	--
H13 (H10 split)	--	--	--	--	--	--
S1	93	--	--	ND	--	--
S2	12	--	--	ND	--	--
S3	--	--	--	--	--	--
S4	--	--	--	--	--	--
S5	--	--	--	--	--	--
S6	13	--	--	ND	--	--
S7	--	--	--	--	--	--
S8	--	--	--	--	--	--
S9	--	--	--	--	--	--
S10	180	--	--	0.026	--	--
S10 (dup)	--	--	--	--	--	--
S11	--	--	--	--	--	--
S13 (S10 split)	--	--	--	--	--	--
Pond	45	--	--	ND	--	--

Notes:

A : VERSAR - Analytical Lab

B : ERCO - Analytical Lab

ND : None detected or below method of detection limit

- : No data or not analyzed.

dup : Duplicate sample.

+ : Priority Pollutants analysis on sample collected on 4/26/82: (in ppb) 1,1DCA: 161; 1,2DCA: 18.2; methylene chloride: 50.8; 1,1,1TCA: 35.6; bis (2 Ethylhexyl) phthalate: 354; butyl benzyl phthalate: 93; no pesticides/PCB or acid extractable compounds detected.

TABLE 13
SUMMARY OF ANALYTICAL RESULTS FOR METALS
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Concentrations in ppm.

Samples	Arsenic		Barium		Cadmium		Chromium		Lead		Mercury		
Well No.	11/82	9/84	11/82	9/84	11/82	9/84	11/82	9/84	11/82	9/84	11/82	9/84	12/87
H1	0.031	--	--	--	ND	--	0.018	--	ND	--	ND	--	ND
H2	--	--	--	--	--	-	--	--	--	--	--	--	ND
H3	0.013	0.018	--	--	0.001	ND	0.136	ND	0.009	ND	ND	ND	ND
H4	--	--	--	--	--	--	--	--	--	--	--	--	0.0006
H5	ND	--	--	--	0.003	--	0.006	--	ND	--	ND	--	ND
H6	--	--	--	--	--	--	--	--	--	--	--	--	ND
H7	ND	--	--	--	ND	--	0.020	--	ND	--	ND	--	--
H8	--	--	--	--	--	--	--	--	--	--	--	--	ND
H9	--	--	--	--	--	--	--	--	--	--	--	--	ND
H10	--	--	--	--	--	--	--	--	--	--	--	--	ND
S1	ND	--	--	--	ND	--	0.020	--	ND	--	ND	--	ND
S2	ND	--	--	--	ND	--	0.074	--	0.022	--	0.0009	--	--
S4	--	--	--	--	--	--	--	--	--	--	--	--	ND
S5	--	--	--	--	--	--	--	--	--	--	--	--	ND
S5 (dup)	--	--	--	--	--	--	--	--	--	--	--	--	ND
S6	ND	--	--	--	ND	--	0.054	--	ND	--	ND	--	--
S9	--	ND	--	--	--	ND	--	ND	--	ND	--	ND	ND
S10	ND	ND	--	--	0.001	ND	0.012	ND	ND	ND	ND	ND	ND
S10 (dup)	--	--	--	--	--	--	--	--	--	--	--	--	ND
S11	--	--	--	--	--	--	--	--	--	--	--	--	ND
Pond 1	ND	--	--	--	ND	--	0.004	--	ND	--	ND	--	0.0003
Swamp 1	--	--	--	--	--	--	--	--	--	--	--	--	ND
Swamp 2	--	--	--	--	--	--	--	--	--	--	--	--	ND
Swamp 3	--	--	--	--	--	--	--	--	--	--	--	--	ND

AM88-064T6

TABLE 13 (continued)
SUMMARY OF ANALYTICAL RESULTS FOR METALS
SURFACE WATER AND GROUND WATER
WAITE ROAD SITE

Concentrations in ppm.

Samples	Antimony		Beryllium		Copper		Nickel		Zinc	
Well No.	11/82	9/84	11/82	9/84	11/82	9/84	11/82	9/84	11/82	9/84
H1	ND	--	--	--	--	--	--	--	--	--
H2	--	--	--	--	-	--	--	--	--	--
H3	.037	ND	--	ND	--	0.028	--	0.049	--	0.168	--
H4	--	--	--	--	--	--	--	--	--	--
H5	ND	--	--	--	--	--	--	--	--	--
H6	--	--	--	--	--	--	--	--	--	--
H7	ND	--	--	--	--	--	--	--	--	--
H8	--	--	--	--	--	--	--	--	--	--
H9	--	--	--	--	--	--	--	--	--	--
H10	--	--	--	--	--	--	--	--	--	--
S1	ND	--	--	--	--	--	--	--	--	--
S2	ND	--	--	--	--	--	--	--	--	--
S4	--	--	--	--	--	--	--	--	--	--
S5	--	--	--	--	--	--	--	--	--	--
S5 (dup)		--	--	--	--	--	--	--	--	--
S6	ND	--	--	--	--	--	--	--	--	--
S9	--	ND	--	ND	--	ND	--	ND	--	ND	--
S10	ND	ND	--	ND	--	ND	--	0.060	--	ND	--
S10 (dup)		--	--	--	--	--	--	--	--	--	--
S11	--	--	--	--	--	--	--	--	--	--	--
Pond 1	ND	--	--	--	--	--	--	--	--	--	--
Swamp 1	--	--	--	--	--	--	--	--	--	--	--
Swamp 2	--	--	--	--	--	--	--	--	--	--	--
Swamp 3	--	--	--	--	--	--	--	--	--	--	--

NOTES:

Metals analyzed but not detected include: selenium, silver, and thallium
ND: not detected
--: No data or not analyzed

AM88-064T6

GROUND WATER MONITORING PLAN

WAITE ROAD SITE
CLIFTON PARK, NEW YORK

Prepared for:

THE WAITE ROAD SITE PRP GROUP
c/o GENERAL ELECTRIC CORPORATION
SCHENECTADY, NEW YORK

Prepared by:

WOODWARD-CLYDE CONSULTANTS
201 WILLOWBROOK BOULEVARD
WAYNE, NEW JERSEY 07470

MAY 1989

85C4337

GROUND WATER MONITORING PLAN

WAITE ROAD SITE
CLIFTON PARK, NEW YORK

Prepared for:

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WAYNE, NEW JERSEY 07470

MAY 1989

85C4337

TABLE OF CONTENTS

LIST OF FIGURES

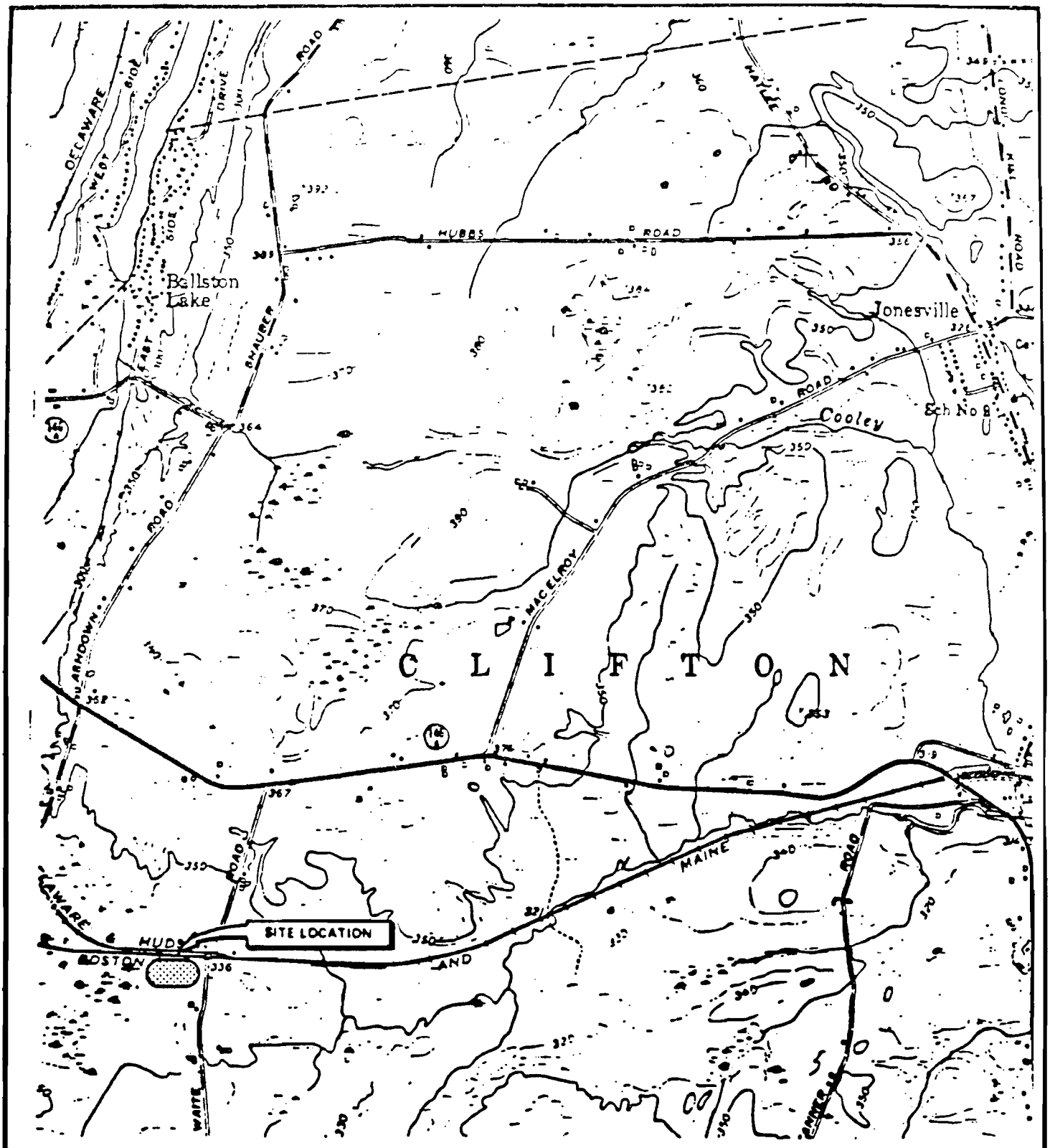
1.0 INTRODUCTION

A site characterization of the Waite Road facility in Clifton Park, New York (Figure 1) was performed by Woodward-Clyde Consultants (WCC) from December 1987 through December 1988. This investigation was conducted to evaluate the extent of soil and ground water contamination at the site and to recommend an approach to site remediation. All site activities were performed in accordance with procedures approved by NYSDEC and documented in the Waite Road Site Investigation Work Plan dated December 1986. The results of the investigation are presented in WCC's Waite Road Site Investigation Report dated December 1988.

The proposed site remediation program, as presented in WCC's 1988 report, incorporates abandoning and sealing existing wells, removal of hydrocarbon contaminated soils, regrading of the site, installation of clean cover, installation of new monitoring wells, and continued ground water monitoring. The proposed remediation addresses potential concerns associated with direct contact, surface water runoff, and potential ground water contamination.

A review of the Waite Road Site Investigation Report and the proposed remediation plan was conducted by the New York State Department of Environmental Conservation (NYSDEC) Program Review Panel. Comments generated by this review are presented in NYSDEC's letter of approval dated 30 March 1989 and relate to the following issues:

Comment 1	Proposed hydrocarbon cleanup level, and proposed ground water monitoring program.
Comment 2 & 3	Proposed ground water monitoring program.
Comment 4	Proposed residential well treatment system.



SOURCE: ROUND LAKE QUADRANGLE

LOCATION MAP WAITE ROAD SITE

CLIFTON PARK, N.Y.

WOODWARD—CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

WAYNE, NEW JERSEY

DR. BY: TJD	SCALE: AS SHOWN	PROJ. NO.: 86C4337
CK'D. BY: MN	DATE: 20 JUNE 1986	FIG. NO.: 1

Comment 5 Proposed ground water monitoring program, and contingency plan.

In response to NYSDEC's Comment 1, WCC has submitted a letter report, dated 9 May 1989, documenting the proposed cleanup standard for total petroleum hydrocarbons in soils. This letter report also addresses the issues raised by NYSDEC concerning the proposed residential well treatment system and contingency plan, in Comments 4 and 5, respectively.

The balance of the comments pertaining to the proposed scope of work for long-term ground water monitoring are addressed in this report.

2.0 BACKGROUND

The proposed scope of work for long term ground water monitoring at the Waite Road site is based on the results and findings presented in WCC's 1988 Site Investigation Report. Geology, hydrogeology, and occurrence and extent of contamination on-site are detailed in the 1988 report and summarized below. Site features are shown on Figure 2.

2.1 GEOLOGY

Soil borings installed at the Waite Road site during WCC's 1988 investigation indicate that depth to bedrock ranges from 4 to 8 ft below grade. Overburden sediments consist primarily of brown, fine grained, clayey to silty sands, or silty clays. These sediments are poorly drained, probably as a consequence of the high clay content, and therefore contribute to presence of swampland throughout much of the site.

Bedrock core samples obtained during monitoring well installation indicate that the site is at least partly underlain by massive to finely laminated gray shale and siltstone. A moderately fresh and well indurated shale is encountered in two

horizons, from 6 to 15 ft and from 21 to 25 ft below grade. Interbedded between the upper and lower shale horizons is a zone of gray siltstone, occurring at a depth of 15 to 21 ft below the ground surface.

2.2 HYDROGEOLOGY

Ground water is found in two zones in the vicinity of the Waite Road site: a shallow zone of overburden and weathered bedrock; and a deeper zone of fresh bedrock. The hydraulic connection between the two zones is not well understood.

Static water level measurements obtained in the summer of 1988 suggest that in general, ground water in the shallow aquifer flows towards the southwest and mounds in the vicinity of the on-site pond. Data collected from bedrock wells also indicates a southwesterly flow direction. In both water bearing zones, flow gradients are shallow, suggesting slow movement of ground water across the site. Typical yields observed during well development were less than 5 gpm.

2.3 SOIL AND GROUND WATER CONTAMINATION

The extent of possible PCB and total petroleum hydrocarbon contamination in the surface soil was evaluated as part of WCC's site characterization activities. The lateral extent of these substances was evaluated both on-site and off-site while an evaluation of the vertical extent was confined to two areas on-site on the alleged spill area west of the pond and the former tank area east of the pond. Chemical analyses of soil samples indicated that detectable concentrations of PCBs and elevated (greater than 1 percent) concentrations of petroleum hydrocarbons are present in soils from both the alleged spill area and former tank area. Concentrations of petroleum hydrocarbons greater than 1 percent appear to be localized on-site and limited to near surface soils (within 2 ft of grade).

Ground water samples were collected from monitoring wells installed by NYSDOT, wells installed by WCC and eight residential wells located along Waite

3.1 MONITORING WELL DESIGN, CONSTRUCTION AND INSTALLATION

As part of the proposed remediation plan presented in WCC's 1988 report, new monitoring wells will be installed for the purpose of long-term ground water monitoring. The proposed wells will be installed in clusters of two double cased bedrock wells installed in the shallow and deep bedrock water-bearing zones. WCC's 1988 investigation indicated low ground water yields from the monitoring well installed in the surficial sediments and uncertain potential hydraulic connection between the overburden and shallow bedrock zones. As a result, no overburden wells are proposed for the long-term monitoring plan.

New monitoring wells will be installed during the early stages of the remedial activities. Shallow and deep wells will be installed with PVC screens and risers to ensure borehole stability during the monitoring period. The shallow bedrock well will be installed in the upper, weathered portion of the bedrock. Shallow bedrock monitoring wells will be installed by drilling with 8 inch O.D. hollow stem augers. The augers will be used to drill through overburden and into the upper portion of the weathered bedrock zone. A 6 inch I.D. steel casing will then be installed in the borehole by tremie grouting the annulus between the casing and the borehole wall (Figure 3) as the augers are removed. The grout, a cement bentonite mix, will be allowed to harden overnight. A roller bit will then be used to advance the borehole to the proposed completion depth. A 2 inch diameter PVC well screen (10 slot) and riser pipe will be set within the 6 inch I.D. steel casing. The proposed intake zone, approximately 3 to 5 ft in length, will be positioned and sealed approximately 2 ft below the bedrock surface (Figure 3).

The intake zone of the deep bedrock well, approximately 10 ft in length, will be installed at least 5 ft below the bottom of the corresponding shallow well (Figure 3). The proposed deep well will be screened in the unweathered, relatively fresh bedrock zone. The final position of the intake zone may vary depending on bedrock conditions.

During drilling of the deep bedrock well, 12 inch O.D. augers will be used as a working casing to minimize migration of ground water from the overburden to the bedrock. The augers will be used to seal the overburden as the bedrock is penetrated using water rotary techniques. Once competent rock is encountered, a 6 inch I.D. steel casing will be installed as described for the shallow well.

3.2 SAMPLING LOCATIONS

Ground water samples will be collected from both on-site and off-site monitoring well locations as well as from nearby residential wells. The location of wells to be sampled is based on the hydrogeologic conditions which existed at the site at the time of WCC's 1988 investigation. It is presumed that hydrologic conditions at the site have not changed significantly since that time, nor will they change significantly within the next five years.

Four monitoring well clusters are proposed for use in the ground water monitoring program. The proposed location and status of each well cluster is shown in Figure 2 and includes:

Well Cluster	Location	Status
MW-1	downgradient; on-site	existing
MW-2	downgradient; off-site	proposed
MW-3	downgradient; off-site	proposed
MW-4	upgradient; off-site	proposed

One well cluster, MW-1, consists of three existing monitoring wells installed by WCC in 1988. Of the three existing wells only two, MW-1D (deep) and MW-1M (intermediate), will be used. The shallow overburden well MW-1S will be abandoned and sealed prior to implementation of the ground water monitoring program. The balance of the proposed well clusters will be installed during the early stages of the proposed remedial activities.

The ten residential wells sampled during WCC's 1988 site investigation will be incorporated into the ground water monitoring program. Seven of the ten wells are located downgradient of the site immediately adjacent to Waite Road. The remaining three wells are located upgradient, approximately 350 ft, 2900 ft, and 3100 ft from the Waite Road site. The location of residential wells to be used in the monitoring program are shown in Figure 4.

The locations of monitoring wells and residential wells to be incorporated in the long term monitoring program were selected in order to obtain samples representative of both background and site-related ground water conditions.

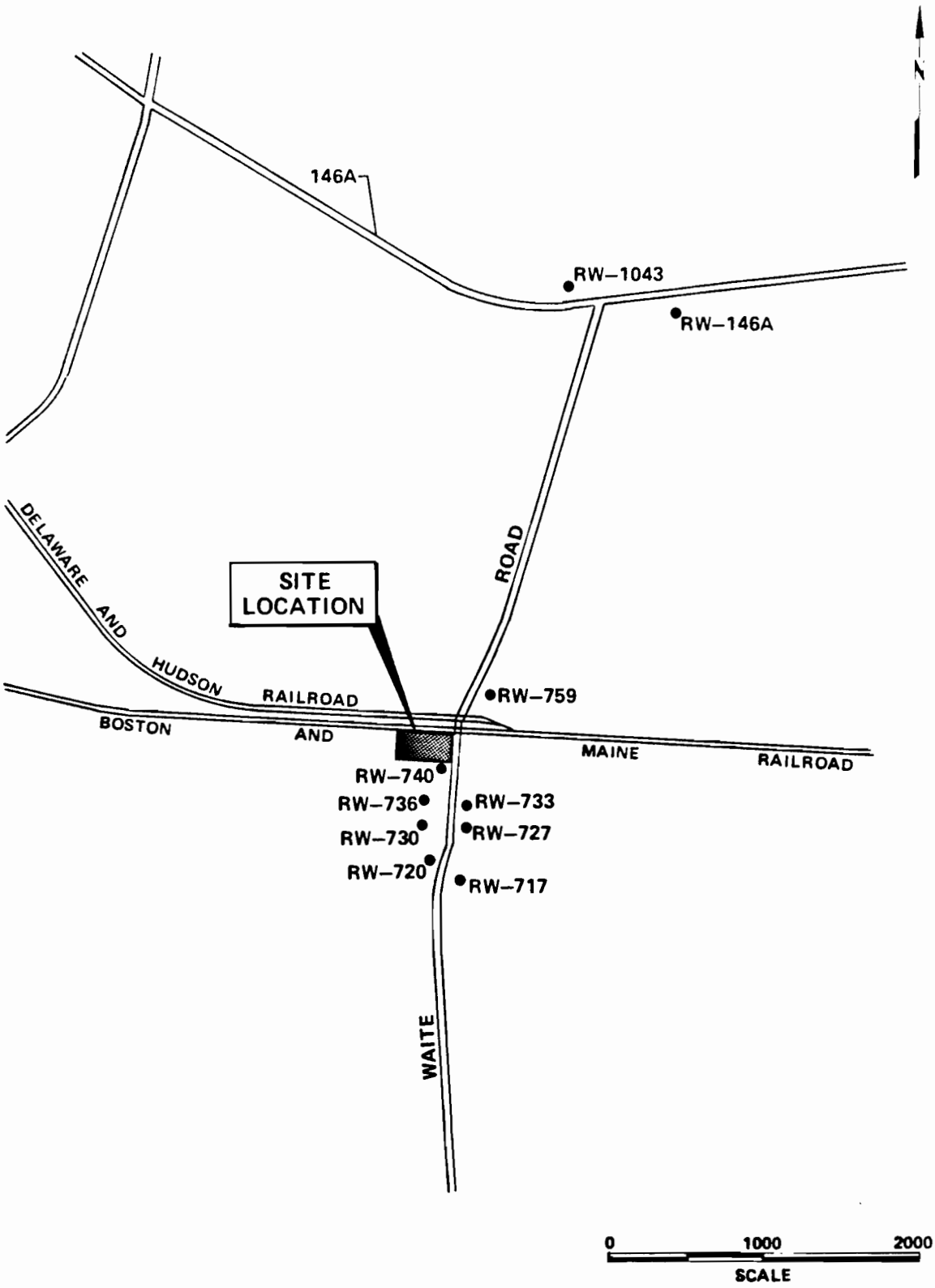
The location and elevation of each monitoring well will be determined by an NYS licensed surveyor. Synoptic water level measurements will be taken during each sampling event to evaluate long-term ground water elevation and flow directions.

3.3 SAMPLING FREQUENCY AND PROTOCOLS

All wells included in the ground water monitoring program will be sampled on a semi-annual basis for a period of five years. Semi-annual sampling will begin at the conclusion of site remediation, which is anticipated in the fall of 1989. Samples will be collected every six months thereafter. Sampling activities will be performed in accordance with procedures approved by NYSDEC and summarized in WCC's Waite Road Field Investigation Work Plan dated December 1986.

3.4 ANALYTICAL PARAMETERS AND PROTOCOLS

Ground water samples collected from monitoring wells and residential wells during the monitoring period will be analyzed for parameters detected at elevated concentrations during WCC's site investigation. Analytical results obtained from the 1988 sampling activities indicated that elevated concentrations of volatile



SOURCE:

ROUND LAKE QUADRANGLE
LOCATION FOR SOME RESIDENCES ARE APPROXIMATE.

LOCATION OF RESIDENTIAL WELLS TO BE INCLUDED IN GROUND WATER MONITORING PROGRAM
WAITE ROAD SITE
CLIFTON PARK, NEW YORK

WOODWARD - CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY	KF	SCALE	AS SHOWN	PROJ NO	85C4337
CK'D BY	LTM	DATE	15 MAY 1989	FIG. NO.	4

organic compounds, petroleum hydrocarbons, and metals were detected in samples collected from both on-site and off-site well locations. Laboratory analyses will therefore focus on these parameters as an aid in evaluating the impact and effectiveness of site remediation activities.

In their letter of 30 March 1989, NYSDEC requested that ground water be monitored for component compounds and breakdown products of petroleum hydrocarbons. Analysis of target compound list (TCL) volatile organic compounds, in conjunction with a library search for non-targeted compounds will be used to identify and quantify the potentially mobile individual substances petroleum hydrocarbon compounds (those containing nine carbons or fewer). In contrast to limiting the analyses to specific hydrocarbon compounds of concern (e.g., benzene, toluene, xylene, ethyl benzene), analysis for the TCL and corresponding library searches can identify a wider range of compounds, including a variety of hydrocarbons, breakdown products, and unsuspected contaminants.

Total petroleum hydrocarbons will be analyzed to provide an estimate of potential migration of petroleum hydrocarbon compounds which cannot be analyzed as specific compounds. This data will be used to compare post-remediation monitoring data to the pre-remediation data, as an additional check on effectiveness of the remediation.

Barium was the only metal detected in concentrations which exceed the NYS ground water standards and will therefore be incorporated as part of the laboratory analyses.

The analytical parameters to be monitored throughout the duration of this program include:

- o target compound list volatile organic compounds and library search - EPA Method 624
- o total petroleum hydrocarbons - EPA Method 418.1

- barium - EPA Method 208.1 or 208.2

3.5 QUALITY ASSURANCE/QUALITY CONTROL

Field activities will be performed in accordance with procedures approved by NYSDEC and summarized in WCC's Waite Road Work Plan dated December 1986. Laboratory analytical procedures will be performed in accordance with current EPA analytical methods. Data collected during each sampling event will be reviewed with respect to laboratory QA/QC protocols, such as adherence to holding times, and surrogate/spike recovery requirements.

3.6 REPORTING

Ground water monitoring reports will be prepared after each scheduled sampling event in the monitoring program. The reports will present a summary of all field activities, analytical results and data validation. A synoptic tabulation of all analytical results and ground water elevations will be included in each report.

Submittal of all reports will occur upon completion of laboratory analyses and data validation. A total of ten reports will be submitted on a semi-annual basis over the five year duration of the program.